SCHEDULE 3

DESIGN AND CONSTRUCTION SPECIFICATIONS

PENTICTON REGIONAL HOSPITAL

PATIENT CARE TOWER

TABLE OF CONTENTS

PART 1. INTERPRETATION 1

1.1 Definitions 1
1.2 Interpretation 4
1.3 Acronym List 4

PART 2. GENERAL 10

2.1 Standards 10
2.2 Use of Wood 21
2.3 Clinical Specifications 22
2.4 Rooms and Spaces 22
2.5 Processes and Submittals 23
2.6 Helipad 23
2.7 MRI Docking Station 23

PART 3. DESIGN PRINCIPLES AND OBJECTIVES 24

3.1 Evidence Based Design 24
3.2 Project Design Objectives 24
3.3 Universal Design Philosophies 26
3.4 Sustainability 26
3.5 Optimized Outcomes 29
3.6 Adaptability, Flexibility and Expansion 29

PART 4. SITE DEVELOPMENT REQUIREMENTS 30

4.1 Site Considerations 30
4.2 Site Preparation - Demolition 31
4.3 Urban Design and Site Development 33
4.4 Connections to Existing Hospital and Site Services 44
4.5 Site Infrastructure 47

PART 5. BUILDING DESIGN REQUIREMENTS 52

5.1 Adaptability and Flexibility 52
5.2 Expandability 53
5.3 Post-Disaster Requirements 54
5.4 Architecture 55
5.5 Interior Environment 76
5.6 Structural Design 87
5.7 Bariatric Design 96

PART 6. FACILITIES CONSTRUCTION SUBGROUP SPECIFICATIONS 98

6.1 Procurement and Contracting Requirements (Division 1) – NOT USED 98
6.2 Existing Conditions (Division 2) 98
6.3 Concrete (Division 3) 98

6.4 Masonry (Division 4) 99
6.5 Metals (Division 5) 100
6.6 Wood Plastics and Composites (including Millwork) (Division 6) 104
6.7 Thermal and Moisture Protection (Division 7) 108
6.8 Openings (Division 8) 115
6.9 Finishes (Division 9) 128
6.10 Specialties (Division 10) 140
6.11 Equipment (Division 11) 147
6.12 Furnishings (Division 12) 148
6.13 Special Construction (Division 13) 152
6.14 Conveying Equipment (Division 14) 153
6.15 Demountable Partitions 168

PART 7. FACILITIES SERVICES SUBGROUP SPECIFICATIONS 171

7.1 Mechanical Systems Design Principles 171
7.2 Fire Suppression (Division 21) 177
7.3 Plumbing (Division 22) 178
7.4 Heating, Ventilating and Air Conditioning (Division 23) 193
7.5 Major Equipment – Performance Specification 205
7.6 Energy Model 210
7.7 Reserved for Future Expansion (Division 24) – NOT USED 211
7.8 Integrated Automation (Division 25) 211
7.9 Electrical (Division 26) 214
7.10 Communications (Division 27) 272
7.11 Electronic Safety and Security (Division 28) 318

PART 8. SITE AND INFRASTRUCTURE SUBGROUP SPECIFICATIONS 337

8.1 General 337
8.2 Earthworks (Division 31) 337
8.3 Exterior Improvements (Division 32) 337
8.4 Utilities (Division 33) 340

APPENDIX 3A - CLINICAL SPECIFICATIONS AND FUNCTIONAL SPACE REQUIREMENTS

APPENDIX 3B – WOOD FIRST APPROPRIATE USE MATRIX

APPENDIX 3C - MEDICAL GAS REQUIREMENTS

APPENDIX 3D - ACOUSTIC AND NOISE CONTROL MEASURES

APPENDIX 3E – AUTHORITY IMIT INFRASTRUCTURE SPECIFICATIONS

APPENDIX 3F – NOT USED

APPENDIX 3G – NOT USED

APPENDIX 3H - SYSTEMS RESPONSIBILITY MATRIX

APPENDIX 3I - ROOM REQUIREMENTS

APPENDIX 3J - SITE SERVICES

APPENDIX 3K – STAFF SAFETY GUIDELINES FOR HEALTHCARE FACILITY DESIGN PROJECTS

APPENDIX 3L - NOT USED

APPENDIX 3M – UBC STANDARDS

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:

"**Authority's Engineer**" means an Engineer hired by the Authority;

"**Authority's Quantity Surveyor**" means a Quantity Surveyor hired by the Authority;

"Airborne Isolation Room (AIR)" -is a space designed, constructed and ventilated to limit the spread of microorganisms from an infected occupant; with negative pressure ventilation conforming to CSA Z8000 Canadian Health Care Facilities and CSA Z317.2 Special Requirements for Heating, Ventilation, and Air Conditioning (HVAC) Systems in Health Care Facilities;

"**BC Building Code**" means the most recent version of the British Columbia Building Code;

"**Borrowed Light"–**means that there must be a window in the direction of an exterior window and the centre of the space falls within the 8 meter light radius (10 meter light radius if the area is over 45 square meters).

"**Building**" means the New Facility;

"**Building Envelope Consultant**" refers to building technology professionals who specialize in the design and inspection of all elements of the building envelope, including roofs, walls, foundations, and their component parts;

"Building Gross Area or Building Gross Square Meters" (BGSM) – The sum of all Building floor areas measured to the outside face of exterior walls for all stories or areas having floor surfaces. Building gross area includes component gross area, general circulation, mechanical and electrical space and exterior walls;

"**Campus Master Wayfinding Plan**" means wayfinding and signage systems and formats currently under development by the Authority;

"**Central Sterile Reprocessing**" renamed Medical Device Reprocessing (MDR);

"Clinical Spaces" spaces used primarily in the direct care of patients and families excluding; storage rooms, housekeeping rooms, and corridors. It includes spaces such as, but not limited to; waiting rooms, medication rooms, nourishment stations, clean supply rooms, clean and soiled utility rooms and team care stations;

"**Clinical Specifications and Functional Space Requirements**" refers to Appendix 3A and includes a description of the purpose of the New Facility and how the programs will be delivered at the site;

"Component or Functional Component" A cohesive grouping of activities or spaces related by service or physical arrangement. A planning component may or may not be a department since the term "department" refers to an administrative organization rather than a functional organization of space and activities;

"Convenient Access" Physical access between rooms or components through the use of convenient horizontal and/or vertical general circulation;

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

"**dBA**" refers to the unit of sound pressure level when the "A weighting filter" is used;

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

"Direct Access" means components, which are contiguous and avoid movement through other circulation systems of the facility. An acceptable alternative to horizontal contiguity between departments may be vertical contiguity by means of a dedicated elevator or internal stairs; vertical contiguity by means of a dedicated elevator or internal stairs shall not be acceptable for the following key departmental adjacencies; existing Diagnostic Imaging and Satellite Diagnostic Imaging, Satellite Diagnostic Imaging and existing Emergency Department, existing Maternity and the Surgical Services Area, existing ICU and Post-Op Level 1 Recovery Area (PARR);

"Direct Natural Light" means that the space must have an exterior window and the centre of the space falls within the 8 meter light radius measured from the entire length of the window (10 meter light radius if the area is over 45 square meters); the window glass opening must be 1.7 square meters in area minimum;

"Emergency Operations Centre" has the meaning set out in Section 5.3.4 of this Schedule;

"**End-Use Equipment**" means Category 1 Equipment and Category 2 Equipment;

"EOC" means the PRH Campus-wide Emergency Operations Centre.;

"**Equipped"** means the rooms and/or spaces which are specified in the Functional Space Requirement as being completely finished, equipped and commissioned;

"Evidence-Based-Design" or "**EBD"** has the meaning defined in section 3.1.1;

"**Functional Space Requirements**" refers to the list of required spaces to be included in the design of the New Facility. The Functional Space Requirements document is located in the Appendix 3A Clinical Specifications and Functional Space Requirements;

"**Future Expansion**", means space that will not be built now but which Project Co must include in planning and design of the New Facility;

"General Circulation" The system of connecting links (corridors, elevators, stairs, etc.) providing access for people and materials to or between functional components;

“Hazardous Substance” has the meaning set out in Schedule 1;

“Helipad” has the meaning set out in Section 2.6 of this Schedule;

“**Indicative Design**” refers to the New Facility conceptual plan included as a reference document available in the Data Room. Note that all references to both the Indicative Design and the Data Room will be removed from Schedule 3 prior to financial close;

“Internal Circulation” the system of connecting links (corridors, elevators, stairs, etc.) within functional components, connecting rooms of a component or directly connecting contiguous components;

“**Life Safety Equipment**” refers to any equipment that either monitors or supports patient's vital signs and systems;

“Make Good” means preparing new surfaces which are identical to adjacent surfaces, and finished off in such a manner that there are no visible traces (at a distance of 600 mm), between existing work and the work of new patching. Making good therefore, extends to the complete re-finishing of entire surface areas as is necessary, to junction points or inside or outside corners of walls, partitions and ceiling.

“**Medical Device Reprocessing (MDR)**” refers to the department which processes and provides supplies of sterile instruments, linen packs, dressing and other sterile items used in patient care. Previously Central Sterile Reprocessing (CSR);

“Net Area or Net Square Meters (NSM)” The horizontal area of space assignable to a specific function. The net area of rooms is measured to the inside face of wall surfaces;

“**Opening Day Layout**” means the layout of the all rooms and areas which will be equipped and put into service as of the Service Commencement Date. Refer to the Equipment List for the quantity of rooms that will be equipped on the Service Commencement Date;

"Outbreak Control Zone" a collection of rooms and spaces that can be isolated in area and negatively pressurized from the surrounding areas to mitigate the spread of airborne infections;

“Patient area” an area used primarily for diagnosis, therapy or treatment;

“**PRH Campus**” has the meaning set out in Schedule 2 [Design and Construction Protocols];

“**Project Design Objectives**” means the project design objectives set out in Section 3.2 of this Schedule;

“**Provide**” means supply and install;

“**Room Requirements**” refers to the list of qualifying features and/or functions for specific rooms. The Room Requirements document is located in Appendix 3I;

“Recurrent Room” refers to spaces listed in the Appendix 3A Clinical Specifications and Functional Space Requirements which occur more than once and are to be standardized in their design and layout including but not limited to location of entry points, sinks, medical gases, millwork, services and designed with same-handed layout;

"Site" has the meaning set out in Schedule 2 (Design and Construction Protocols);

"**STC**" means Sound Transmission Class and is used in this Schedule 3 as a rating requirement for the degree to which a building partition attenuates airborne sound;

"Un-Equipped" means the rooms and/or spaces which are specified in the Functional Space Requirements as being completely finished and commissioned except for having Equipment Installed. The room/space must be designed and constructed at Service Commencement to accommodate and accept the Placeholder Equipment;

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

1.2 Interpretation

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

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

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

1.3 Acronym List

1.3.1 AFFL – Above Finished Floor Level AFUE - Annual Fuel Utilization Efficiency

1.3.2 AIR –Airborne Isolation Room

1.3.3 ANSI - American National Standards Institute

1.3.4 ARCAL – Aircraft Radio Control of Aerodrome Lighting

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

1.3.6 ASME - American Society of Mechanical Engineers

1.3.7 ASPE - American Society of Plumbing Engineers

1.3.8 ASTM - American Society for Testing and Materials

1.3.9 ATM – Automated Teller Machine

1.3.10 AV / IT – Audio Visual / Information Technology

1.3.11 AWMAC – Architectural Woodworker Manufacturers Association of Canada

1.3.12 BCERMS - British Columbia Emergency Response Management System

1.3.13 BCICA - British Columbia Insulation Contractors Association

1.3.14 BCLNA - British Columbia Landscape & Nursery Association

1.3.15 BCSLA - British Columbia Society of Landscape Architects

1.3.16 BICSI - Building Industry Consulting Service International

1.3.17 BMS - Building Management System

1.3.18 CATV – Community Access Television

1.3.19 CCD – Charge Couple Device

1.3.20 CCTV – Closed Circuit Television

1.3.21 CEC – Canadian Electrical Code

1.3.22 CFC – Chlorofluorocarbon

1.3.23 CFL – Compact Fluorescent Lamp

1.3.24 CGA - Compressed Gas Association

1.3.25 CGSM – Component Gross Square Metres

1.3.26 CIF – Common Intermediate Format

1.3.27 CISCA - Ceiling Interior Systems Construction Association

1.3.28 CLSI – Clinical Laboratory Standards Institute

1.3.29 CMU – Concrete Masonry Unit

1.3.30 CODEC – Coder/Decoder

1.3.31 CPTED - Crime Prevention Through Environmental Design

1.3.32 CPU – Central Processing Unit

1.3.33 CRTC – Canadian Radio-television and Telecommunications Commission

1.3.34 CSA - Canadian Standards Association

1.3.35 CT - Computer Tomography

1.3.36 CTAS – Canadian Triage Acuity Scale

1.3.37 Cx - Commissioning

1.3.38 DDC - Direct Digital Controls

1.3.39 DFO - Department of Fisheries and Oceans

1.3.40 DID – Direct Inward Dialling

1.3.41 DISS - Diameter Index Safety System

1.3.42 DSSS – Direct Sequence Spread Spectrum

1.3.43 EBD-Evidence Based Design

1.3.44 ECG – Electrocardiography

1.3.45 ED –Emergency Department

1.3.46 EEG - Electroencephalogram

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

1.3.48 EHR – Electronic Health Record

1.3.49 EMS - Emergency Medical Services

1.3.50 EMT – Electric Metallic Tubing

1.3.51 ENT – Ear Nose Throat

1.3.52 EOC-Emergency Operations Centre

1.3.53 FACP – Fire Alarm Control Panel

1.3.54 FATO – Final Approach and Take-off Area

1.3.55 FE - Future Expansion

1.3.56 FEMA – Federal Emergency Management Agency

1.3.57 FIPPA – Freedom of Information and Protection of Privacy Act

1.3.58 FM – Factory Mutual

1.3.59 FP – Family Practice/Practitioner

1.3.60 GPS – Global Positioning Satellite

1.3.61 HAZMAT - Hazardous Materials

1.3.62 HCF-Health Care Facility

1.3.63 HEPA - High Efficiency Particulate Air

1.3.64 HID - High Intensity Discharge

1.3.65 HIMSS – Healthcare Information and Management Systems Society

1.3.66 HIS – Health Information Services/Hospital Information System

1.3.67 HL7 – Health Level 7

1.3.68 HLD - High Level Disinfection

1.3.69 HOA – Hand/Off/Auto

1.3.70 HP – Horsepower

1.3.71 HRC – High Rupting Capacity (fuse type)

1.3.72 HSSBC – Health Shared Services BC

1.3.73 HVAC - Heating, Ventilating and Air-Conditioning

1.3.74 IAQ-Interior Air Quality

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

1.3.76 IEEE - Institute of Electrical and Electronic Engineers

1.3.77 IP – Internet Protocol

1.3.78 IT – Information Technology

1.3.79 IMIT – Information Management Information Technology

1.3.80 IPU - Inpatient Unit

1.3.81 IR – Interventional Radiology

1.3.82 ISO – International Organization for Standardization

1.3.83 IT/Tel – Information Technology / Telecommunication

1.3.84 IV – Intravenous

1.3.85 KW – Kilowatt

1.3.86 KWH – Kilowatt hours

1.3.87 KV – Kilovolt

1.3.88 KVA – Kilovolt Ampere

1.3.89 LAN – Local Area Network

1.3.90 LCD – Liquid Crystal Display

1.3.91 LED – Light Emitting Diode

1.3.92 LEED- LEED® Leadership in Energy and Environmental Design

1.3.93 LEED HC –LEED® HC Leadership in Energy and Environmental Design 2009 for Health Care – US Green Building council

1.3.94 Mb - Megabit

1.3.95 MCP – Motor Circuit Protector

1.3.96 MDR - Medical Device Reprocessing

1.3.97 MFP – Multi-Function Peripheral (or Multi-Function Printer)

1.3.98 MMCD – Master Municipal Contract Documents

1.3.99 MPI – Master Painters Institute

1.3.100 MRI - Magnetic Resonance Imaging

1.3.101 NEMA - National Electrical Standards Association

1.3.102 NFPA - National Fire Protection Association

1.3.103 NTSC – National Television Standards Committee

1.3.104 NM – Nuclear Medicine

1.3.105 NRC-National Research Council

1.3.106 NSM – Net Square Metres

1.3.107 OHSR – Occupation Health and Safety Regulations

1.3.108 OR - Operating Room

1.3.109 OFDM – Orthogonal Frequency Division Multiplexing

1.3.110 OS&Y - Open Stem and Yoke

1.3.111 OT - Occupational Therapy/Therapist

1.3.112 PACS - Picture Archiving and Communication System

1.3.113 PBX – Private Branch Exchange

1.3.114 PCC – Patient Care Coordinator

1.3.115 PC – Personal Computer

1.3.116 PDA – Personal Digital Assistant

1.3.117 PET - Positron Emission Tomography

1.3.118 PIPEDA – Personal Information Protection and Electronic Document Act

1.3.119 PoE – Power Over Ethernet

1.3.120 PPE - Personal Protective Equipment

1.3.121 PT - Physiotherapy/Physiotherapist

1.3.122 PTS - Pneumatic Tube System

1.3.123 PTZ – Pan Tilt Zoom

1.3.124 PVC – Polyvinyl Chloride

1.3.125 RCDD – Registered Communications Distribution Designer

1.3.126 RCABC – Roofing Contractors Association of British Columbia

1.3.127 RN – Registered Nurse

1.3.128 RO – Reverse Osmosis

1.3.129 RT – Respiratory Therapy/Therapist

1.3.130 RTLS – Real Time Location System

1.3.131 SAGA - System of Approach Azimuthal Guidance

1.3.132 SES – Safety Engineering Society

1.3.133 SIP – Session Initiated Protocol

1.3.134 SMACNA – Sheet Metal and Air Conditioning Contractors National Association

1.3.135 SMDR – Station Message Detail Recording

1.3.136 SNR – Signal to Noise Ratio

1.3.137 SPD- Surge Protective Device

1.3.138 SQL – Structured Query Language

1.3.139 STAT – Statim (“immediately”)

1.3.140 STC – Sound Transmission Coefficient

1.3.141 STI – Sound Transmission Index

1.3.142 TAB – Testing, adjusting and balancing

1.3.143 TCO – Total Cost of Ownership

1.3.144 TCP – Transmission Control Protocol

1.3.145 TDM – Time Division Multiplexing

1.3.146 THD - Total Harmonic Distortion

1.3.147 TIA – Telecommunications Industry Association

1.3.148 TTMAC – Terrazzo and Tile Manufacturers Association of Canada

1.3.149 TVOC – Total Volatile Organic Compounds

1.3.150 TVSS - Transient Voltage Surge Suppressor

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

1.3.152 ULC - Underwriters’ Laboratories of Canada

1.3.153 UPS – Uninterruptible Power Supply

1.3.154 US – Ultrasonography/Ultrasound

1.3.155 V - Volt

1.3.156 VAR – Volt Ampere Reactive power

1.3.157 VFD - Variable Frequency Drive

1.3.158 VLAN – Virtual Local Area Network

1.3.159 VOC – Volatile Organic Compounds

1.3.160 VoIP – Voice Over Internet Protocol

1.3.161 WAN – Wide Area Network

1.3.162 WAP2 – Wireless Application Protocol 2

1.3.163 WMM – Wi-Fi Multimedia

PART 2. GENERAL

2.1 Standards

2.1.1 Project Co will undertake the Design and Construction:

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

2.1.1.2 in accordance with the BC Building Code and all applicable Laws, and City of Penticton:

2.1.1.2(1) Building Bylaw 94-45

2.1.1.2(2) Zoning Bylaw 2011-23

2.1.1.2(3) Subdivision and Development Bylaw No. 2007-81

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

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

2.1.1.3(2) all Governmental Authorities;

2.1.1.3(3) the community;

2.1.1.3(4) City of Penticton.

2.1.1.4 in accordance with Good Industry Practice; and

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

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

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

2.1.4 Guidelines listed in section 2.1.6 will be interpreted as standards and Project Co will comply with them as such.

2.1.5 The most recent version of any standard and guideline listed in section 2.1.6 or elsewhere in this document, that is in effect when the Project Agreement is signed, will govern.

2.1.6 Without limiting Section 2.1.1 of this Schedule, Project Co will undertake the Design and Construction in compliance with all applicable codes, standards and guidelines, including, but not limited to:

2.1.6.1 AIA Guidelines for Design and Construction of Health Care Facilities, 2010;

2.1.6.2 AAMI TIR 34; Water for Reprocessing of Medical devices.

2.1.6.3 B.C. Building Code;

2.1.6.4 B.C. Fire Code;

2.1.6.5 B.C. Plumbing Code;

2.1.6.6 National Fire Code;

2.1.6.7 Atomic Energy

2.1.6.8 BC Ambulance Standard 2007

2.1.6.9 WorkSafe BC ergonomic regulations:

2.1.6.9(1) Occupational Health and Safety Regulation (http://www2.worksafebc.com/Topics/Ergonomics/RegulationAndGuidelines.asp)

2.1.6.9(2) Ergonomics (MSI) Requirements

2.1.6.10 The requirements of the Authority, document “Section 01550 - Infection Control Measures” during construction; available in the Data Room

2.1.6.11 BCICA Quality Standards Manual for Mechanical Insulation

2.1.6.12 Canadian Council on Health Services Accreditation Program, latest edition

2.1.6.13 Sustainability

2.1.6.13(1) US Green Building Council – LEED for Health Care;

2.1.6.13(2) The Green Guide for Health Care;

2.1.6.13(3) Green Globes – Environment Assessment for New Buildings;

2.1.6.13(4) BOMA (Building Owner and Managers Association) Go Green Program;

2.1.6.13(5) ASHRAE Green Healthcare Construction Guidance Statement, Jan 2002;

2.1.6.13(6) Sustainable Health Care Architecture –by Robin Guenther and Gail Vittori;

2.1.6.13(7) Canadian Building Green Hospitals Checklist - Canadian Coalition for Green Health Care;

2.1.6.13(8) Natural Resources Canada Energy Innovators Initiative;

2.1.6.13(9) Building Materials for the Environmentally Hypersensitive, CMHC;

2.1.6.13(10) ASHRAE Proposed Standard 189- Standard for the Dosing and High Performance Green Buildings;

2.1.6.13(11) ASTM E917.24401-1 Life Cycle Cost Assessment Methodology;

2.1.6.13(12) LEED® New Building (NC) Program;

2.1.6.13(13) BC Hydro High Performance Building Program.

2.1.6.14 All ANSI / ASHRAE standards and guidelines including, but not limited to:

2.1.6.14(1) 52.2-2007: Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size;

2.1.6.14(2) 55-2004: Thermal Environmental Conditions for Human Occupancy;

2.1.6.14(3) 62.1-2007: Ventilation for Acceptable Indoor Air Quality;

2.1.6.14(4) 90.1-2007: Energy Standard for Buildings Except Low Rise Residential Buildings;

2.1.6.14(5) 111-2008: Practices for Measurement, Testing, Adjusting & Balancing of Building HVAC Systems;

2.1.6.14(6) 129-1997: Measuring Air Change Effectiveness;

2.1.6.14(7) 135-2004: Data Communication Protocol for Building Automation & Control Networks;

2.1.6.14(8) 170-2008 Ventilation of Health Care Facilities.

2.1.6.15 All ASHRAE standards and guidelines including, but not limited to:

2.1.6.15(1) Handbooks: 2009 Fundamentals, 2006 Refrigeration, 2007 HVAC Applications, 2008 HVAC Systems and Equipment;

2.1.6.15(2) Design of Smoke Control Systems;

2.1.6.15(3) ASHRAE Guideline 12-2000 - Minimizing the Risk of Legionellosis Associated with Building Water Systems;

2.1.6.15(4) ASHRAE Guideline 1.1-2007 – HVAC & R Technical Requirements for the Commissioning process;

2.1.6.15(5) ASHRAE Guideline 0-2005 – The Commissioning Process;

2.1.6.15(6) ANSI/ASHREA/IESNA 90.1 Energy Standard for buildings except low-rise residential buildings;

2.1.6.15(7) ASHRAE System Design Manual for Hospitals and Clinics.

2.1.6.16 All ANSI / ASME standards and guidelines including, but not limited to:

2.1.6.16(1) B31.1 Power Piping;

2.1.6.16(2) B31.9 Building Services Piping;

2.1.6.16(3) Section VIII: Pressure Vessels;

2.1.6.16(4) Section IX: Welding Qualifications;

2.1.6.16(5) Unfired pressure vessels; and

2.1.6.16(6) AWS D1.3-98 - Structural Welding Code - Sheet Steel.

2.1.6.17 All ANSI / EIA standards and guidelines including, but not limited to:

2.1.6.17(1) 568-C.1 & 568-C.2 (CSA-0T529) Commercial Building Telecommunications Cabling Standard – Parts 1 & 2:

2.1.6.17(2) 568-C.3 (CSA-T529) Commercial Building Telecommunications Cabling Standard – Part 3;

2.1.6.17(3) 569-C (CSA-T530) Commercial Building Standard for Telecommunications Pathways and Spaces;

2.1.6.17(4) 606-B (CSA-T528) Administration Standard for Telecommunications Infrastructure of Commercial Buildings;

2.1.6.17(5) 607-B (CSA-527) Commercial Grounding and Bonding Requirements for Telecommunications; and

2.1.6.17(6) 758 Customer Owned Outside Plant Telecommunications Cabling Standard.

2.1.6.18 All ANSI / TIA standards and guidelines including, but not limited to:

2.1.6.18(1) 942 Telecommunications Infrastructure Standard for Data Centers; and

2.1.6.18(2) TSB-162 Telecommunications Cabling Guidelines for Wireless Access Points.

2.1.6.18(3) 1179 Healthcare Facility Telecommunications Infrastructure Standard.

2.1.6.19 ANSI / ESNA American National Standard Practice for Lighting.

2.1.6.20 ASPE Plumbing Engineering Design Handbook, Volumes 1-4.

2.1.6.21 All ASTM standards and guidelines including, but not limited to:

2.1.6.21(1) ASTM C568-03 - Standard Specification for Limestone Dimension Stone

2.1.6.21(2) ASTM C615-03 - Standard Specification for Granite Dimension Stone

2.1.6.21(3) ASTM C503-05 - Standard Specification for Marble Dimension Stone

2.1.6.21(4) ASTM C616-03 - Standard Specification for Quartz-Based Dimension Stone

2.1.6.21(5) BCSLA and BCLNA - BC Landscape Standard – Current Edition

2.1.6.21(6) ASTM C260 / C260M – 10a – Standard Specification for Air-Entraining Admixtures for Concrete

2.1.6.21(7) ASTM C494 / C494M – 13 – Standard Specification for Chemical Admixtures for Concrete

2.1.6.21(8) ASTM A36 A36M-12 – Standard Specification for Carbon Structural Steel

2.1.6.21(9) ASTM A193 / A193M-14 – Standard Specification for Alloy –Steel and Stainless Steel Bolting for High Temperature or High Pressure Service and Other Special Purpose Applications

2.1.6.21(10) ASTM A307-12 – Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60000 PSI Tensile Strength

2.1.6.21(11) ASTM S325-10e1 – Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength

2.1.6.21(12) ASTM A326M-13 – Standard Specification for Structural Bolts, Steel, Bolts, Steel, Heat Treated, 830 MPa Minimum Tensile Strength (Metric)

2.1.6.21(13) ASTM A490-12 – Standard Specification for Structural Bolts, Alloy Steel, Heat Treated, 150 ksi Minimum Steel Strength

2.1.6.21(14) ASTM A490M-12 - Standard Specification for High Strength Structural Steel Bolts, Classes 10.9 and 10.9.3, for Structural Steel joints (Metric)

2.1.6.21(15) ASTM A653 / A653M-13 – Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process

2.1.6.21(16) ASTM A792 / A792M-10 – Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process

2.1.6.21(17) ASTM A47 / A47M-99(2014) – Standard Specification for Ferritic Malleable Iron castings

2.1.6.22 All CAN ULC standards and guidelines including, but not limited to:

2.1.6.22(1) S524 Standards for the Installation of Fire Alarm Systems; and

2.1.6.22(2) S537 Standards for Verification of Fire Alarm Systems.

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

2.1.6.24 All CAN/CSA-B651 standards and guidelines including, but not limited to:

2.1.6.24(1) B52-05: Mechanical Refrigeration Code;

2.1.6.24(2) B51-2003: Boiler, Pressure vessel and Pressure Piping Code;

2.1.6.24(3) B64.10 Selection and Installation of Backflow Preventers;

2.1.6.24(4) B139 Installation Code for Oil Burning Equipment;

2.1.6.24(5) B149.1-05: Natural Gas and Propane Installation Code;

2.1.6.24(6) B651-95: Barrier Free Design;

2.1.6.24(7) C22.1 & C22.2 Canadian Electrical Code as adopted in British Columbia;

2.1.6.24(8) C282 Emergency Electrical Power Supply for Buildings;

2.1.6.24(9) Z32-09 Electrical Safety and Essential Electrical System in Health Care Facilities;

2.1.6.24(10) Z317.5 Illumination Systems in Health Care Facilities;

2.1.6.24(11) Z318.5 Commissioning of Electrical Equipment and Systems in Health Care Facilities;

2.1.6.24(12) Z7396.1-12 “Medical Gas Pipeline Systems – Part 1: Pipelines for Medical Gases and Vacuum;

2.1.6.24(13) Z316.5 Fume hoods and associated Exhaust Systems;

2.1.6.24(14) Z317.1 Special Requirements for Plumbing Installations in Health Care Facilities;

2.1.6.24(15) Z317.2-10: Special Requirements for Heating, Ventilation, and Air Conditioning (HVAC) Systems in Health Care Facilities;

2.1.6.24(16) Z318.0-93: Commissioning of Health Care Facilities;

2.1.6.24(17) Z318.1-95: Commissioning of HVAC Systems in Health Care Facilities;

2.1.6.24(18) Z317.3 Infection control During Construction or Renovation of Health Care Facilities;

2.1.6.24(19) A23.4-09 - Precast Concrete - Materials and Construction;

2.1.6.24(20) W186-M1990 (R2012) - Welding of Reinforcing Bars in Reinforced Concrete Construction;

2.1.6.24(21) A370-14 - Connectors for Masonry;

2.1.6.24(22) A23.1-14/A23.2-14 - Concrete Materials and Methods of Concrete Construction / Test Methods and Standard Practices for Concrete

2.1.6.24(23) A23.3-14 – Design of concrete structures

2.1.6.24(24) G40.20-13/G40.21-13 – General Requirements for rolled or welded structural quality steel / Structural quality steel

2.1.6.24(25) G30.18-09 – Carbon steel bars for concrete reinforcement

2.1.6.24(26) S269.3-M92 (R2013) – Concrete Formwork

2.1.6.24(27) S832-06 – Seismic Risk Reduction of Operational and Functional Components (OFCS of buildings).

2.1.6.24(28) S478-95 (R2007) – Guideline on Durability of Buildings.

2.1.6.24(29) S413-14 Parking Structures.

2.1.6.24(30) S16-14 Design of Steel Structures.

2.1.6.24(31) S136-12 North American Specification for Design of Cold Formed Steel Structural Members.

2.1.6.24(32) S304-14 Design of Masonry Structures.

2.1.6.24(33) S832-06 Guidelines for Seismic Risk Reduction of Operational and Functional Components of Buildings.

2.1.6.24(34) W47.1-09 Certification of Companies for fusion welding of steel

2.1.6.24(35) W48-14 Filler metals and allied materials for metal arc welding

2.1.6.24(36) W55.3-08 (R2013) Certification of companies for resistance welding of steel and aluminum

2.1.6.24(37) W59-13 Welded steel construction (metal arc welding)

2.1.6.24(38) W59.2M1991 (R2013) Welded Aluminum Construction

2.1.6.24(39) W186-M1990 (R2012) Welding of Reinforcing Bars in Reinforced Concrete Construction

2.1.6.24(40) Z317.1-09 Special requirements for plumbing installations in Health Care facilities.

2.1.6.24(41) Z314.7-03 Steam sterilizers for Health Care Facilities.

2.1.6.24(42) Z317.11-02 Area requirements for Health Care Facilities.

2.1.6.24(43) Z317-10.09 Handling of waste materials in Health Care Facilities and Veterinary Health Care Facilities.

2.1.6.24(44) Z317.13-07 “Infection Control During Construction, Renovation, and Maintenance of Health Care Facilities.

2.1.6.24(45) Z8000–11, September 2011 Canadian Health Care Facilities.

2.1.6.24(46) A660-10 Certification of manufacturers of steel building systems

2.1.6.24(47) CSA Z32 “Electrical Safety and Mandatory Electrical systems in Health Care Facilities”, 2009 edition or later

2.1.6.24(48) CSA Standard Z317.5 “Illumination Systems in Health Care Facilities”

2.1.6.24(49) CSA C282 Emergency electrical power supply for buildings, 2010 edition or later

2.1.6.24(50) CSA-C22.3 No. 1, Overhead Systems

2.1.6.24(51) CSA C22.2 No.65, Wire Connectors

2.1.6.24(52) CSA C22.2 No.41, Grounding and Bonding Equipment

2.1.6.24(53) CSA C22.2 No.0.4, Bonding of Electrical Equipment

2.1.6.24(54) CSA C22.2 No.40, Cut-out, Junction and Pull Boxes

2.1.6.24(55) CSA C22.2 No. 45, Rigid Metal Conduit

2.1.6.24(56) CSA C22.2 No. 56, Flexible Metal Conduit and Liquid-Tight Flexible Metal Conduit

2.1.6.24(57) CSA C22.2 No. 83, Electrical Metallic Tubing

2.1.6.24(58) CSA C22.2 No. 211.2, Rigid PVC (Unplasticized) Conduit

2.1.6.24(59) CSA C22.2 No. 100 0, Motors and Generators

2.1.6.24(60) CSA C22.2 No. 145 Motors and Generators for use in Hazardous Locations

2.1.6.24(61) CSA C22.2 No.184.1, Solid State Dimming Controls (Bi national standard with UL 1472)

2.1.6.24(62) CSA C22.2 No.58, High Voltage Isolating Switches

2.1.6.24(63) CSA G40.20/G40.21, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel

2.1.6.24(64) CSA C9, Dry Type Transformers

2.1.6.24(65) CSA C22.2 No. 58, High Voltage Isolating Switches

2.1.6.24(66) CSA C22.2 No.29, Panelboards and enclosed Panelboards

2.1.6.24(67) CSA C22.2 No.144.1, Ground Fault Circuit Interrupters

2.1.6.24(68) CSA Z314.0-13 Medical Device Reprocessing – General requirements

2.1.6.24(69) CSA Z314.8-14 Decontamination of Reusable Medical Devices

2.1.6.24(70) CSA Z314.3-14 Effective Sterilization in Health Care Settings by the Steam Process

2.1.6.24(71) CSA Z314.23-12 Chemical Sterilization of Reusable Medical Devices

2.1.6.24(72) CSA Z386-14 – Safe Use of Lasers in Health Care.

2.1.6.25 All NFPA standards and guidelines including, but not limited to:

2.1.6.25(1) 10-2002: Standard for Portable Fire Extinguishers;

2.1.6.25(2) 13: Standard for the Installation of Sprinkler Systems;

2.1.6.25(3) 14: Standard for the Installation of Standpipe System;

2.1.6.25(4) 30: Flammable and Combustible Liquids Code;

2.1.6.25(5) 55: Storage, Use, and Handling of Compressed and Liquefied Gases in Portable Containers;

2.1.6.25(6) 56F: Non-flammable Medical Gas System;

2.1.6.25(7) 90A - Current Edition: Standard for Installation of Air Conditioning and Ventilation Systems;

2.1.6.25(8) 92A - Current Edition: Standard for Smoke-Control Systems Utilizing Barriers and Pressure Differences; and

2.1.6.25(9) 101 - Current Edition: Life Safety Code.

2.1.6.26 All IEEE standards and guidelines including, but not limited to:

2.1.6.26(1) 802.1 series for Interworking, Security, Audio/Video Bridging and Data Centre Bridging;

2.1.6.26(2) 802.3 series of Ethernet Standards; and

2.1.6.26(3) 802.11 series of Wireless Standards.

2.1.6.27 All NETA standards and guidelines including, but not limited to:

2.1.6.27(1) ATS International Electrical Testing Association (Acceptance Testing Specifications); and

2.1.6.27(2) MTS Standards for Maintenance Testing.

2.1.6.28 BICSI Telecommunications Distribution Methods Manual (TDMM)

2.1.6.29 Interior Health IMIT Infrastructure Specifications V2.1 release date: March 2015.

2.1.6.30 Code Plus, Physical Design Components for an Elder Friendly Hospital, January 2006.

2.1.6.31 BC Supplement to TAC Geometric Design Guide.

2.1.6.32 City of Penticton Earthworks Control Bylaw No. 2006-65.

2.1.6.33 City of Penticton Traffic Bylaw No. 94-39

2.1.6.34 Master Municipal Construction Documents (MMCD) – 2009 Platinum Edition Volume II.

2.1.6.35 Master Municipal Construction Documents (MMCD) – Platinum Edition Supplementary Updates.

2.1.6.36 Fire Underwriter Survey – Water Supply for Public Fire Protection, 1999.

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

2.1.6.38 Industrials Ventilation Manual;

2.1.6.39 Hydronic Institute Manuals;

2.1.6.40 American Society of Plumbing Engineer Manuals;

2.1.6.41 Associated Air Balance Council (AABC);

2.1.6.42 BC Guidelines for Decontamination of Patients in Health Facilities;

2.1.6.43 Best Practices for Hand Hygiene in All Heath Care Settings and Programs, British Columbia Ministry of Health;

2.1.6.44 "Design Guide for Improving Hospital Safety in Earthquakes, Floods, and High Winds: Providing Protection to People and Buildings" Date published: 06/2007 FEMA Publication Number 577;

2.1.6.45 RD–52 Design Guide for Nuclear Substance Laboratories and Nuclear Medicine Rooms.

2.1.6.46 Applicable Municipality Bylaws

2.1.6.47 Ministry of Environment (MOE)

2.1.6.48 CAN/CSA-B72 Installation Code for Lightning Protection Systems

2.1.6.49 Illuminating Engineering Society of North America Lighting Handbook - Reference & Application

2.1.6.50 Commercial Building Telecommunications Cabling Standard TIA/EIA 568-C.1-2010 Including all Addendum's and Latest Drafts for requirements of Category 6

2.1.6.51 Commercial Building Standard For Telecommunications Pathways And Spaces TIA 569-C-2012 including addendum

2.1.6.52 TIA/EIA-606-B-2012 including addendum - Administration Standard For The Telecommunications Infrastructure Of Commercial Buildings (CSA T528)

2.1.6.53 Commercial Building Grounding And Bonding Requirements For Telecommunications TIA-607-B-2011

2.1.6.54 Provincial Lightning Rods Act

2.1.6.55 FGI Guidelines for Design and Construction of Health Care Facilities (Electrical, Security, Lighting, Communication reference section)

2.1.6.56 CSA/CAN3-C235, Preferred Voltage Levels for AC Systems, 0 to 50,000 V

2.1.6.57 CAN/CSA C22.2 No. 131, Type TECK 90 Cable

2.1.6.58 NEMA WC7 ICEA S 66 524, Cross Linked Polyethylene Wire and Cable for Transmission and Distribution

2.1.6.59 CAN/CSA C22.2No.18, Outlet Boxes, Conduit Boxes, Fittings and Associated Hardware

2.1.6.60 CAN/CSA C22.2 No. 18, Outlet Boxes, Conduit Boxes, Fittings and Associated Hardware, A National Standard of Canada

2.1.6.61 CAN/CSA C22.1 No.126.1, Metal Cable Tray Systems

2.1.6.62 NEMA VE 1, Metal Cable Tray Systems

2.1.6.63 ANSI C37.121, Unit Substations Requirements

2.1.6.64 For by pass/isolating switches refer to CSA C22.2 No.178.1, Automatic Transfer Switches

2.1.6.65 CAN/CSA-C2, Single-Phase and Three-Phase Distribution Transformers, Types ONAN and LNAN

2.1.6.66 IEEE C57.19.91, IEEE Standard test code for dry-type distribution and power transformers

2.1.6.67 CAN/CSA C22.2 No.31, Switchgear Assemblies

2.1.6.68 NEMA PB2.2, Application Guide for Ground Fault Protection Devices for Equipment

2.1.6.69 NFPA 20, Stationary Fire Pumps for Fire Protection

2.2 Use of Wood

2.2.1 Use wood as a featured material in both the interior and exterior of the New Facility.

2.2.2 As contemplated by the *Wood First Act* (British Columbia), Project Co will incorporate wood products into the design of the New Facility to the extent that the use of wood products is consistent with the requirements of this Schedule and the BC Building Code.

2.2.3 Wood will be used where indicated as “Appropriate” in Wood First – Appropriate Use Table, Appendix 3B. Wood will not be used where indicated as “Inappropriate”.

2.2.4 The term “Alternative Solution” used in this section specifically refers to this term as described in the 2012 BC Building Code.

2.3 Clinical Specifications

2.3.1 Project Co will design and construct the Building:

2.3.1.1 So that it accommodates all of the spaces, activities, functions, design features and adjacencies described in the Appendix 3A Clinical Specifications and Functional Space Requirements;

2.3.1.2 In accordance with the requirements of the Clinical Specifications, including the Functional Space Requirements and the Room Requirements, Appendix 3I, subject to any adjustments or refinements made in accordance with the User Consultation Process and the Design Review Procedure; and

2.3.1.3 The net square metre area for all rooms must not be more than 2% smaller than the required area listed in the Functional Space Requirements. Project Co must provide a rationale for each variation and demonstrate to the Authority’s satisfaction that affected rooms retain their functionality. If, in the Authority’s opinion, the room does not meet the required functionality, the full net square metres must be provided as stated in the Functional Space Requirements.

2.4 Rooms and Spaces

2.4.1 Notwithstanding anything in the Clinical Specifications and Functional Space Requirements, Project Co will design and construct the Building to include all rooms and spaces as required to comply with the terms of this Agreement, including sufficient rooms and spaces as necessary for the operation and maintenance of the Building and for Project Co to perform the Services in accordance with this Agreement. Spaces provided for operations, maintenance and other FM requirements will not impact clinical function or public and staff access to the building.

2.4.2 The Authority’s architectural consultant undertook an indicative design of the Building (the “**Indicative Design**”). The Indicative Design is based on the Clinical Specifications but also reflects consultations with potential New Facility Users. Drawings are available in the Data Room.

2.4.3 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.

2.4.4 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.

2.5 Processes and Submittals

2.5.1 For all requirements for User Group Consultations and Review Procedures including, but not limited to; shop drawings, commissioning requirements, demonstrations, training, mock-ups and medical equipment, refer to Schedule 2 and its associated appendices.

2.6 Helipad

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

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

2.6.1.2 ICAO / Annex 14, Volume II;

2.6.1.3 NFPA 70 National Electrical Code;

2.6.1.4 NFPA 70B Recommended Practice for Electrical Equipment Maintenance;

2.6.1.5 IEEE C2 National Electrical Safety Code; and

2.6.1.6 Canadian Aviation Regulations Standard 325 – Heliports.

2.7 MRI Docking Station

2.7.1 Project Co will provide the structural concrete pads with roll over curb for the portable MRI system at the new MRI Docking Station on the PRH Campus. Refer to the Data Room for the MRI Docking Station drawings and specifications. See also section 4.2.3.

PART 3. DESIGN PRINCIPLES AND OBJECTIVES

3.1 Evidence Based Design

3.1.1 In undertaking the design of the Building, Project Co will apply Evidence Based Design methodologies to achieve the Project Design Objectives. “Evidence Based Design” or “EBD” means that decisions about the design of the Building will be based on credible research, information derived from comparable North American projects, and information about Authority operations, in order to achieve the best possible outcomes. The goal of EBD is to deliver measurable improvements, for example in the Authority’s patient and workflow outcomes, productivity, economic performance, and client satisfaction. Project Co will provide EBD documentation through the User Consultation Process and Design Review Procedure for the Authority's use to consider, implement, teach, etc.

3.2 Project Design Objectives

3.2.1 Project Vision

3.2.1.1 The vision for the Penticton Regional Hospital Patient Care Tower Project is:

3.2.1.1(1) Provide essential capital renewal as an achievable and affordable solution that supports the hospital’s regional role now and into the future;

3.2.1.1(2) Align services with identified specialized and acute care needs for patients living in the South Okanagan; and

3.2.1.1(3) Develop the next generation of health providers in conjunction with UBC Faculty of Medicine and other academic agencies.

3.2.2 Guiding Principles and Critical Success Factors

3.2.2.1 The overarching principles guiding the Project are:

3.2.2.1(1) Develop spaces to maximize the long-term flexibility and adaptability of interior spaces and to maintain a high level of utilization;

3.2.2.1(2) Leverage and review the 7 Lean flows of health services (Information, Patient, Providers, Medications, Supplies, Process Engineering, Equipment) through key design and operational commissioning stages of the Project;

3.2.2.1(3) Incorporate patient-friendly and elder-friendly design concepts to improve the patient experience;

3.2.2.1(4) Incorporate standardization of spaces and incorporate lessons learned from other major capital healthcare projects wherever possible;

3.2.2.1(5) Engage users and patients in planning and design;

3.2.2.1(6) Focus on environmental sustainability stewardship through building design and operation; and

3.2.2.1(7) Support clinical education activities to help rectify the critical shortage of health care providers.

3.2.3 Project Objectives

3.2.3.1 In support of the Project Vision and Project Guiding Principles, the Project Objectives are:

3.2.3.1(1) Deliver the approved project scope and enable specific program/departmental targets to be achieved;

3.2.3.1(2) Improve model of care and patient outcomes/safety through application of evidence-based design principles, and health care facility design and construction standards, that all have a patient centred design philosophy;

3.2.3.1(3) Implement design features that enhance well-being of patients, families, visitors, staff, and communities;

3.2.3.1(4) Create a healthy and safe work environment that improves engagement, recruitment and retention, and minimizes workplace injuries;

3.2.3.1(5) Support the IMIT strategic plan by providing a robust, flexible technical infrastructure;

3.2.3.1(6) Optimize utilization and efficiency to improve health system sustainability;

3.2.3.1(7) Maintain full 24/7 hospital operations throughout the construction and operations phase; and

3.2.3.1(8) Minimize overall capital and operating costs of the project.

3.2.4 Departmental Objectives

3.2.4.1 Inpatient Care:

3.2.4.1(1) Improve inpatient room configurations with construction of 84 single occupancy rooms (with standardized layouts), and reconfigure existing bed stock into single and double occupancy rooms; and

3.2.4.1(2) Increase inpatient bed capacity by 15 net-new beds in 2019/2020.

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

3.3 Universal Design Philosophies

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

3.3.1.1 Equitable use – the design will make the building easy to use by people with diverse abilities;

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

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

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

3.3.1.5 Tolerance for error – the building will be designed so as to minimize hazards and the adverse consequences of accidental or unintended actions;

3.3.1.6 Low physical effort – the building is capable of being used efficiently and comfortably and with a minimum of fatigue or injury potential; and

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

3.4 Sustainability

3.4.1 The Design Life requirement is a 50 year building starting at the date of Service Commencement. Table 3.6.2 indicates The Design Life, in years, of major building components and systems. The indicated timeframes are to be used as a guideline for quality and will in no way relieve Project Co of its responsibility to assess and adjust lifecycle responsibilities as needed through the Term.

3.4.2 Table 3.6.2, Design Life:

SITE	
Hardscaping	20+
Landscaping	15+
Site lighting	20+
Exterior CCTV/security	15+
Exterior signage	10+
Site furnishings	7+
Water service	70+
Sanitary sewer service	70+
Storm sewer and drainage system	70+
STRUCTURE	
Building structure	50+
Parking garage structure	50+
EXTERIOR BUILDING	
Building façade finish	50+
Canopies/sun shades/balconies	15+
Glazing systems	25+
Roof finish	25+
Eaves, soffits, fascia	25+
Exterior door and hardware	15+
Chimney and flues	20+
VERTICAL MOVEMENT	
Elevator cable	25+
Elevator	25+
Elevator finishes	15+
INTERIOR FINISHES	
Floor finishes	10+
Ceiling finishes	15+
Wall finishes	7+
Wall protection	10+
Interior door and hardware	20+
Furnishings	5+
Signage (interior)	10+
Casework/counters	15+
Casework/counters - stainless steel	20+
EQUIPMENT	
MDR equipment	10+
OR equipment	10+
Pneumatic tube	18+
Equipment (other)	5+

SITE	
ELECTRICAL	
Low voltage distribution system	50+
High voltage distribution system	50+
Alarm system	15+
IMIT/Data systems	10+
Communication systems	15+
Light fixture	15+
Interior CCTV/security	15+
Major equipment	25+
MECHANICAL	
Heating Systems	25+
Cooling Systems	25+
Plumbing	25+
Plumbing fixture	15+
Air handling units and associated equipment	20+
Medical gas systems	25+
Major equipment	25+
CATEGORY – Major Components/Systems	**Design Life Years**

3.4.3 In addition to the requirement to achieve LEED® Gold Certification in accordance with the terms of this Agreement, Project Co will:

3.4.3.1 Design and construct the Building using design methods, building materials, operational practices, energy and life cycle considerations that promote environmental quality, social benefits and economic vitality throughout the Construction and Operating Periods, including by minimizing the Authority's operating costs (for example in relation to utilities and carbon taxes).

3.4.3.2 Give priority to efficient use of resources, protection of health and indoor environmental quality.

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

3.4.3.4 Will not permit materials on the interior of the Buildings that are detrimental to human health.

3.4.3.5 Give priority to efficiencies and innovations that may be possible through integration of systems within the PRH Campus to minimize operational costs for the Authority.

3.5 Optimized Outcomes

3.5.1 Project Co will:

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

3.5.1.2 Recognize the value to the Authority of LEAN health care in supporting the delivery of Authority activities, and accordingly will use the findings to affect design decisions.

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

3.5.1.4 Design workplaces to support innovative and collaborative methods of working (such as team approach to care, family centred rounds, huddles and daily management systems) help incorporate the Authority's new and emerging technologies, incorporation of clinical research into daily methods of working, respond to diverse work styles (such as hoteling and job-sharing), and optimize flexibility and space utilization. A key element to the development of an integrated workplace is the provision of physical environments that support varied workplace strategies. Accordingly, Project Co will design workplaces to:

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

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

3.5.1.4(3) consider co-location options, space saving strategies, and lay-outs and furniture that facilitate change; reduction in Schedule 3 requirements are to be agreed to by the Authority.

3.6 Adaptability, Flexibility and Expansion

3.6.1 Project Co will design and construct the Facility:

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

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

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

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

3.6.1.5 Provide the following spaces listed in Appendix 3A Clinical Specifications and Functional Space Requirements to be Un-Equipped. Un-Equipped has the meaning as defined in Schedule 3.

3.6.1.5(1) 1 Endoscopy Procedure Room

3.6.1.5(2) 3 Endoscopy Recovery beds

3.6.1.5(3) 4 PARR Recovery Bays

PART 4. SITE DEVELOPMENT REQUIREMENTS

4.1 Site Considerations

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

4.1.2 Project Co will design the Building:

4.1.2.1 To ensure that the New Facility is an integrated part of the PRH Campus, and accordingly:

4.1.2.1(1) facilitates the delivery of clinical and non-clinical support services across the PRH Campus, for example, through the provision of efficient physical links to existing PRH buildings; and

4.1.2.1(2) effectively integrates with existing PRH Campus communication and life safety infrastructure.

4.1.2.2 To facilitate the need to:

4.1.2.2(1) present an urban presence and a distinctive architectural character, reflecting the Authority's values and role as a regional acute care

centre and tertiary medical teaching centre for health in the region and community; and

4.1.2.2(2) To support community access and include a highly visible main entry and lobby facing Government Street (designed with appropriate high profile architectural scale and features).The main entry and lobby will have a connection to the parking garage and serve as the main entry point to the facility for patients, visitors and staff to access the outpatient clinics, inpatient floors and surgical procedures suite. The existing main entrance at PRH (north entrance, near ED) will be maintained and serve primarily Emergency, Maternity (labor inpatients) and direct admit patients.

4.1.3 Project Co will consider all design decisions within the context of enhancing the PRH Campus.

4.2 Site Preparation - Demolition

4.2.1 Project Co will be responsible for demolition of the Interns' Residence Building and all associated infrastructure;

4.2.2 Project Co will be responsible for relocation of the Social Work Trailer to a new location on the PRH Campus as determined by the Authority. Project Co will be responsible for demolition of all remaining infrastructure associated with the Social Work Trailer and providing all required services for its continued function at the new location.

4.2.3 Project Co will be responsible for demolition of the existing MRI Docking Station and construction of a new MRI Docking Station on the PRH Campus as determined by the Authority. Project Co will be responsible for demolition of all existing infrastructure associated with the MRI Docking Station and providing all required services, foundation and sub-structure for its continued function at the new location.

4.2.4 Project Co will be responsible for completing a hazardous material study, at its cost, to determine the extent of existing Hazardous Substances, including but not limited to, asbestos, lead paint, PCB's and mercury. Project Co is responsible for all abatement, containment and disposal of Hazardous Substances, demolition of the existing Intern's Residence Building, and removal of all Hazardous Substances as part of their scope of work to provide connections between the existing Campus and the New Facility. Project Co is responsible for, as "Project Co Hazardous Substances", all asbestos disclosed in or reasonably inferred from the Asbestos Report on, in or under the PRH Campus and affected by or impacted by the Design and Construction. Project Co acknowledges receipt of the Asbestos Report. However, Project Co is responsible for assessing and confirming the presence of any Hazardous Substances on, in or under the PRH Campus prior to proceeding with any Design and Construction that may be affected by the Hazardous Substances and any failure to do so is at Project Co's risk.

4.2.5 A hazardous materials assessment of the Penticton Regional Hospital has been prepared for the Authority and a copy is available in the Data Room. However, Project Co is responsible

for assessing and confirming the presence of any hazardous materials within the PRH campus affected by the New Facility.

4.2.6 Demolition includes demolition of any foundations, any slab on grade, removal of all materials from the PRH campus, disconnecting, capping and/or removal of utilities, all sub-surface structure, such as foundations, slabs, pits, sumps, pipes, cables and ducts and removal of any underground tanks and piping prior to any activity.

4.2.6.1 Project Co's design will determine where the New Facility and existing campus Buildings are joined as interior space. The New Facility is required to connect to the existing hospital at two locations on each of the following levels; Level 0, Level 1 and Level 2. Connections are to align with the network of existing hospital corridors. Connections will permit safe and efficient flow of patients, staff, services and public.

4.2.6.2 Project Co will be responsible for any required modifications to existing exterior walls including infill of existing exterior windows which shall meet all the requirements of Schedule 3.

4.2.6.3 Refer to Section 4.5.1 for demolition of existing trailer and docking station pads.

4.2.7 The walls separating the New Facility construction site from remaining structures will be designed so that the demolition and construction activities of the New Facility will not interfere with the normal operation of the PRH campus including buildings, roads and services.

4.2.8 Project Co will:

4.2.8.1 obtain City of Penticton and other authority approvals required to undertake any demolition;

4.2.8.2 make provisions to ensure that affected areas of the remaining building are weather-proof during and after demolition and for the duration of construction of the New Facility;

4.2.8.3 terminate existing surfaces at structures to be demolished along straight lines at natural divisions determined through consultation with and approval by the Authority. Cut existing surfaces so that a smooth transition with the New Facility will result; conform to applicable codes for demolition of structures and provide for the safety of adjacent structures, the erection and maintenance of temporary barriers and security devices, dust control, runoff control and disposal of materials;

4.2.8.4 be responsible for ensuring that fire safety will be in force at all times during demolition.

4.2.8.5 provide dust control at all times:

4.2.8.5(1) spray demolition area with water once demolition of structure begins;

4.2.8.5(2) manage water runoff through the PRH campus;

4.2.8.5(3) protect City storm drains;

4.2.8.6 Avoid use of jack hammers; instead, concrete chipping hammers are preferred and can be employed; refer to Schedule 2 Control of Noise

4.2.8.7 Carry out demolition activities so as not to interfere with access to exiting PRH Campus buildings. Requirements for traffic control must be coordinated with the Authority;

4.2.8.8 provide overhead protection from falling debris;

4.2.8.9 provide perimeter screen and safety walls to ensure safety and protection of people and objects outside of the demolition area;

4.2.8.10 schedule, hours of operation and traffic required for demolition determined in consultation with the Authority as per Schedule 2 Design and Construction Protocols;

4.2.8.11 never leave demolition and demolition equipment in precarious, unsafe or hazardous condition at the end the work day;

4.2.8.12 secure demolition site 24/7; obtain Authority's approval of Project Co's security plan prior to commencing work;

4.2.8.13 coordinate the demolition schedule with existing Authority construction on the PRH campus;

4.2.8.14 conform to applicable regulatory procedures, including WorkSafe BC requirements, during all phases of the demolition and when discovering hazardous or contaminated materials;

4.2.8.15 if any buried tanks are discovered, surrounding soils must be tested for contamination;

4.2.8.16 provide required LEED® documentation for recycled content; and

4.2.8.17 accurately record actual locations of capped utilities, subsurface obstructions and/or conditions.

4.3 Urban Design and Site Development

4.3.1 General

4.3.1.1 Minimize the impact of site development and Building placement on adjacent neighbours and land uses. Preserve visual privacy and sunlight for adjacent properties and buildings, and include features that will give the Building an identity consistent with its overall urban context.

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

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

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

4.3.1.5 Consider the increased vehicular and pedestrian permeation of the PRH campus with pedestrian-oriented walkway connections to the main entry from Government Street and parking facilities. Reinforce the physical relation of the Building with Government Street and create a legible PRH campus layout and pattern to foster a strong sense of place and identity.

4.3.1.6 Provide site furniture and pedestrian scale lighting to complement the existing Campus furniture and lighting. Create vehicular connection to parking garage along Government Street.

4.3.1.7 Design for the functional separation of traffic for: 1) emergency vehicles, 2) visitor/ staff, and 3) service vehicles.

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

4.3.1.8(1) design for maximum access to the Building. Provide separate and distinct passenger-side drop-off areas. All drop-off areas, will be covered with canopies that extend a minimum 300mm over curbs to allow shelter from inclement weather along the entire length of the entrance;

4.3.1.8(2) include waiting space and benches for seated, in-wheelchair and standing users;

4.3.1.8(3) provide secure bicycle storage area. Quantity of bicycles as per City and LEED® requirements.

4.3.1.9 Keep existing supply flows to the existing Loading areas intact during and after construction.

4.3.1.10 Maintain existing access to ED department in the existing PRH campus at all times.

4.3.1.11 Design refuse, recycling, and utility areas so they cannot be viewed from the surrounding buildings or neighbourhood areas.

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

4.3.1.13 Incorporate sustainable measures such as integrated landscaping, drainage swales, and permeable paving to decrease storm water run-off.

4.3.1.14 Provide connection to the outdoors, natural light and the exterior environment in:

4.3.1.14(1) All inpatient rooms;

4.3.1.14(2) Patient areas to the greatest extent possible;

4.3.1.14(3) End of long corridors to the greatest extent possible;

4.3.1.14(4) Staff and student lounges and workspaces wherever possible; and

4.3.1.14(5) Waiting areas.

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

4.3.2 Public Realm and Open Space

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

4.3.2.2 Provide a hierarchy of open spaces as follows:

4.3.2.2(1) public open spaces;

4.3.2.2(2) semi–private open spaces (hospital staff, family / visitors); and

4.3.2.2(3) private open spaces (patient, dedicated staff areas).

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

4.3.2.4 Provide a design that responds to CPTED principles having particular regard for theft, mischief and vandalism.

4.3.3 PRH Campus Way Finding and Exterior Signage

4.3.3.1 Arrange pedestrian pathways created by the New Facility to ease way finding and create an amenable environment for pedestrians through the use of coordinated methods of way finding which inform people of routes through the PRH campus to specific buildings and entries or to the major street and transit nodes. Encourage pedestrians to avoid unsafe vehicle roads by providing well-signed alternative pedestrian routes. Utilize paving patterns which can easily be differentiated from vehicular paving by pedestrians where they cross vehicular traffic to access the Moog & Friends Hospice House and the New Facility public entrances on Carmi Avenue, Government Street and Industrial Avenue East.

4.3.3.2 Provide continuity of treed walkways for consistent sun/shade protection along Government Street and where possible along other walkways.

4.3.3.3 Provide visually connected pathways and integrated plazas with required signage.

4.3.3.4 Provide external directional signage that:

4.3.3.4(1) clearly identifies the Building and its components including the main entry, drop-off areas and parking;

4.3.3.4(2) is easily understandable by patients and families using it to access the PRH campus for first time;

4.3.3.4(3) clearly indicates the entry point(s) to the PRH campus, access points for public parking, lay-by drop off locations, entry points to the Campus buildings and where there are multiple entrances, signs clearly identify which entrances are for which purpose, any restrictions for both entry and/or parking for various vehicle types and any ‘after-hours’ access limitations;

4.3.3.4(4) is well-illuminated, backlit, reflective or high contrast and easily visible at night;

4.3.3.4(5) minimizes light spillage;

4.3.3.4(6) uses universal symbols and standard colours for parking signage;

4.3.3.4(7) uses the Interior Health Graphic Standard for all ‘Interior Health and logo’ placement; and

4.3.3.4(8) resists wind loads as required by the BC Building Code, latest edition.

4.3.3.5 Without limiting the requirements of Section 4.3.3.4, provide all necessary exterior illuminated signage along Government Street, Carmi Avenue and Industrial Avenue East identifying the New Facility and the access points. Signage must be legible for drivers at an adequate distance that they can safely slow down and enter the PRH campus appropriately for drop-off and parking areas. Fully coordinate way-finding and signage with the Authority and the PRH campus.

4.3.3.6 Provide all temporary site signage required prior to and during construction to notify public and staff regarding the following, but not limited to:

4.3.3.6(1) Vehicles – public, service and staff vehicle route changes.

4.3.3.6(2) Walkways, sidewalks – public and staff closure, alternate routes locations, access

4.3.3.6(3) Site and Building access/egress – temporary closure of access or egress from any of the building on the PRH campus

4.3.3.6(4) Hours of closure – temporary hour changes

4.3.3.6(5) Relocated parking, drop-offs/pick-ups – temporary relocation of parking, drop-off pick-up stalls for public, taxi, ambulance, etc.

4.3.4 Site Access for Disabled, Elderly and Paediatric Populations

4.3.4.1 The primary pedestrian systems, public open spaces, primary private walkways and principal entrances to the Building will be accessible to the physically challenged. The design must exceed disability access guidelines in terms of wheelchair use as these are written for independent wheelchair users and not those requiring physical assistance with wheeled mobility.

4.3.4.2 Provide adequate space at drop off and pick up points for additional assistive equipment.

4.3.4.3 Access, egress routes, entrances and the exterior courtyard will be accessible for persons requiring assistive mobility equipment (including strollers).

4.3.4.4 Use signage, markers, or other levels of way finding along access routes to indicate to the physically challenged the route terminus points or any required route changes to ensure universal access throughout the PRH campus.

4.3.5 Site Lighting

4.3.5.1 Provide lighting to enable 24 hour per day public and staff accessibility.

4.3.5.2 Provide lighting for public outdoor spaces to create an unobtrusive, human scale lighting concept, with a hierarchy of fixture types designed according to functional

and security needs (including CPTED), and reflecting the hierarchy of pedestrian corridors.

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

4.3.5.4 Lighting on pedestrian paths will illuminate not just the path but also spill over to illuminate several metres adjacent to the path, particularly en route to transit connections.

4.3.5.5 Provide lighting for roadways, walkways and parking areas within the Site to ensure safe vehicle and pedestrian traffic with respect to collisions, personal safety, and building access and egress. Lighting design considerations should address existing PRH buildings and neighbours privacy from all storeys.

4.3.5.5(1) Prevent light trespass into patient rooms and neighbouring yards and windows.

4.3.5.5(2) Prevent lighting glare, shadow or high contrast with surrounding areas

4.3.5.5(3) Screen views into patient rooms and neighbouring yard from upper floor windows.

4.3.5.6 Site lighting will conform to LEED® light spillage requirements and shall comply with CSA and City of Penticton Standards complete with sharp cut-off (dark sky compliant) to meet LEED Certification. Match existing lamp sources on the street.

4.3.6 Landscaping

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

4.3.6.2 Provide an open space for respite and repose dedicated to patient and family use directly accessed from the New Facility.

4.3.6.3 Provide landscaping complementary to any permanent landscaping at PRH to create a contiguous and unified landscape buffer along the entire PRH campus interface with Government Street, Carmi Avenue and Industrial Avenue. Street trees will be a consistent species and be suitable to urban conditions.

4.3.6.4 Landscaping will comply with all applicable City of Penticton bylaws.

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

4.3.6.6 Limit the number of tree species to help unify the urban character, create recognizable spaces, contribute to PRH campus orientation and create a strong sense of place.

4.3.6.7 Use indigenous flora to minimize maintenance and express an attitude about the South Okanagan context. All plant selection to be suitable for the Penticton site climate.

4.3.6.8 Landscape open spaces and setbacks, including protecting all existing heritage trees, as required by the City of Penticton. Provide suitable protection in the form of fencing around existing street trees to be retained. Protected zone should extend to the drip line of the tree canopy.

4.3.6.9 Provide all landscaping for the exterior courtyards. Include all site furnishings and art work to complete the space. Consider elements such as water features, sculpture, raised garden plots and a variety of seating spaces. Plant selection shall consist of non-poisonous species. All elements should be designed to be universally accessible.

4.3.6.10 Provide pedestrian surfaces that are suitable for use by wheelchairs, double wide strollers, and small wheeled medical devices. Asphalt or crushed rock surfaces will not be permitted for outdoor spaces surfaces.

4.3.6.11 Use flowering and non-edible fruiting trees to promote natural avian habitat.

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

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

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

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

4.3.6.16 If required, design leveling strips at the point of access to the Building to ensure ongoing barrier free access. The leveling strips should be designed to be barrier free and paved and allow for simple adjustment if required by Building settlement.

4.3.6.17 Design landscape features and provide furniture that does not encourage the use of skateboards.

4.3.6.18 Where possible use landscape features for the enjoyment of patients, visitors and staff; consider the use of Healing Gardens and quiet spaces verses play features.

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

4.3.6.20 All external foliage will be reviewed by site security /violence intervention program to ensure it does not interfere with exterior camera views and any required external site lines.

4.3.7 Parking and Site Access

4.3.7.1 Off-Site Works - Design and construct the following (reference Appendix 3J) in consultation with and approval from the City of Penticton:

4.3.7.1(1) vehicle entrance from Government Street which provides access to the parking garage, exterior parking and New Facility main entrance.

4.3.7.2 On-Site Works - Design and construct permanent parking for the Facility, including:

4.3.7.2(1) provide parking stall sizes, locations and drive aisle sizes as per City of Penticton Parking By-Law;

4.3.7.2(2) within Work Area Boundaries as per Appendix 2H Site Plan, provide a minimum 780 total parking stalls (disability parking spaces will count as one stall only);

4.3.7.2(3) a maximum of 300 parking stalls will be surface parking stalls, the remainder will be located in the parking garage; refer to the table below.

Parking Summary Table

Total Required on Site	826
Existing Stalls outside Work Areas to remain (Lots F & J)	46
Minimum stalls in the parking garage	480
Balance to be provided on site by Project Co	300

4.3.7.2(4) The minimum number of disability parking spaces and small car spaces will be as per the City of Penticton bylaw.

4.3.7.2(5) set parking layouts in an orderly and logical design to minimize confusion and excessive internal circulation;

4.3.7.2(6) apply CPTED principles, including the following:

4.3.7.2(6)(a) reduce opportunities for graffiti through the use anti graffiti coatings; at a minimum provide anti graffiti coating on the exterior, and

4.3.7.2(6)(b) reduce opportunities for hiding spaces.

4.3.7.2(7) provide a method for users to readily summon help if in distress or danger in both exterior parking areas and in the parking garage, refer to 7.11.3.3.(2)(b);

4.3.7.2(8) provide one parking payment machine for every one hundred, or fraction of one hundred, parking stalls at exterior parking areas and in the parking garage; at a minimum provide one payment machine per floor of the parking garage, machines to be supplied by the Authority and installed by Project Co. Location of the machines to be reviewed by the Authority and placed to facilitate efficient payment by users without requiring back-tracking and return trips;

4.3.7.2(9) locate parking payment machines in the parking garage close to entrances to elevators;

4.3.7.2(10) locate parking payment machines in the exterior parking areas spread throughout the parking area to provide easy access, and

4.3.7.2(11) Relocate existing parking payment machines within the Site as required by the Authority. Coordinate the new location with the Authority;

4.3.7.2(12) Parking payment machines which are not required to be relocated shall be delivered to the Authority in the same condition as before their removal;

4.3.7.2(13) design traffic flow which minimizes car speed on the PRH Campus and provide traffic calming measures to slow cars down where required to encourage safe traffic speed. Traffic calming measures include landscape features, road textures and speed bumps.

4.3.7.3 Design and construct parking in accordance with the following:

4.3.7.3(1) Permanent roadway, sidewalk and parking adjacent to Moog & Friends Hospice House. Provide a minimum 2 pick-up drop-off stalls at the hospice entrance and 10 parking stalls directly adjacent to the hospice for dedicated use by the hospice design and construct parking access so as not to obstruct free flow of traffic in and out of the PRH campus or onto adjacent streets. Perpendicular pick-up and drop-off stalls are acceptable at the Moog & Friends Hospice House provided the minimum width of each is equal to an accessible parking stall;

4.3.7.3(2) design and construct a parking garage that is capable of being secured and locked when not in use; parking garage shall not be

used as a roadway or thoroughfare for vehicle traffic to circulate around the site;

4.3.7.3(3) provide adequate provision for ingress and egress to all parking spaces to ensure ease of mobility, ample manoeuvring clearances, and safety of vehicles and pedestrians;

4.3.7.3(4) Allow public and staff vehicles entering the PRH Campus from Government Street, Carmi Avenue and Industrial Avenue to remain on the PRH campus and access the New Facility drop-off/pick-up area and Parking Garage with two-way traffic circulation without having to leave the PRH campus

4.3.7.3(5) provides fire vehicle access to the New Facility main entrance;

4.3.7.3(6) provide glazing between parking areas and exit stairs;

4.3.7.3(7) provide glazing and visibility between parking areas, and elevator lobby and building entrance points;

4.3.7.3(8) ensure the parking garage interior is well lit ; clearly number and mark with paint or signage, all parking spaces on the wall centered above the stall for maximum visibility for the driver and to be visible when a car is parked;

4.3.7.3(9) paint all stall lines and stall numbers;

4.3.7.3(10) paint all parking garage walls and soffits white;

4.3.7.3(11) parking garage shall have a system of indicating that garage is full. Provide a parking count system that identifies full or available parking status for both public and staff parking stalls, taking into account accessible stalls, for review and approval by the Authority. System shall include LED signage located at strategic points including, but not limited to, both vehicle entrances to alert drivers to the parking availability status. System shall be programmable and flexible should the Authority make future changes to the ratio of staff and public parking stalls by floor in the parking garage;

4.3.7.3(12) use way finding strategies, including signage, to allow each floor to be identifiable and to assist in orientation and ease of finding/identifying parking stalls;

4.3.7.3(13) use vehicle ramps that do not exceed recommended slope as per City of Penticton Parking By-Law;

4.3.7.3(14) lay out parking such that it does not require a vehicle to back up for more than 10m;

4.3.7.3(15) maximum allowable slope or cross-fall is 5% applicable to both the parking stalls and access aisles;

4.3.7.3(16) parking garage will need to accommodate both public and staff vehicles and be organized to clearly separate the two users by floor;

4.3.7.3(17) lower level of the parking garage to accommodate Medi-Van and Ambulance overhead clearances along the entire route the vehicles will use from entrance to pick-up and drop-off location. Project Co shall consult with BC Ambulance in the design of the facility;

4.3.7.3(18) provide a security gate (arm) at the entrance and exit points to the parking garage;

4.3.7.3(19) provide employee card swipe access and egress;

4.3.7.3(20) provide an appropriate number of motorcycle parking spaces;

4.3.7.3(21) all floors of the parking garage shall be contiguous. Vehicles shall be able to access all floors of the parking garage without having to leave the parking garage and re-enter.

4.3.7.4 On-Site Works - Design and construct lay-by and parking stalls for the Building, including:

4.3.7.4(1) Lay-by stalls for patient drop-off and pick-up only located adjacent to the New Facility entrance to accommodate a minimum of 5 cars and 1 taxi cab;

4.3.7.4(2) Two stalls in the lower level of the parking garage, accessed via a second vehicle entrance separate from the main parking garage entry, for discrete drop-off and pick-up of patients arriving by Medi-van or Ambulance and large vans for MDR equipment/materials and mortuary/coroner service.

4.3.7.4(2)(a) The terms “drop-off” and “pick-up” refer to quick turnover parking spaces for which the Authority intends to limit the length of time they are continuously occupied by the same vehicle. The layout of these spaces must meet all applicable City of Penticton parking space by-laws, including size.

4.3.7.4(2)(b) Drop-off and pick-up spaces will be lay-by, parallel type spaces located adjacent to main entrance which provide sufficient room for elderly and physically impaired visitors to maneuver safely.

Passengers being dropped off or picked up must not have to cross a road or drive aisle.

4.3.7.5 On-Site Works - Principles

4.3.7.5(1) do not obstruct the free flow of traffic in and out of the PRH campus or onto adjacent streets; and

4.3.7.5(2) provide adequate provision for ingress and egress to all spaces to ensure ease of mobility, ample manoeuvring clearances, and safety of vehicles and pedestrians;

4.4 Connections to Existing Hospital and Site Services

4.4.1 General

4.4.1.1 The Building will not function autonomously but instead will contribute to an overall integrated PRH Campus. Accordingly, Project Co will design the Building to maximize opportunities for connections to the existing PRH buildings and enhance the ability for the other site facilities and the New Facility to function in a cohesive manner. In order to achieve this, Project Co must design and construct all links identified in this Schedule and the Project Agreement.

4.4.2 Connections for People and Materials

4.4.2.1 Design the New Facility to maintain and expand on the continuity of existing circulation systems. The indicative tie-in locations to existing buildings may be found in the Indicative Design Report drawing package located in the Data Room. The connections to the New Facility are to align with the existing corridors. Connections will be designed to provide for ease of patient and material transfers between New Facility and PRH.

4.4.2.2 Provide a minimum of two interior connections between the New Facility and the PRH on each of the following Levels; 0, 1 and 2. The connections shall be distinct and physically separated to provide independent continuity of public, patient and staff, equipment and material flows. The connections will minimize the use of ramps and where ramps are required to connect existing floor elevations to the New Facility, they will be designed to minimize slopes which will not exceed 2%. Increased slopes at Level 1 may be considered by the Authority if it can be demonstrated the connection will meet the functional needs of the project.

Provide connections between the PRH and the New Facility to optimize functionality in meeting the requirements of the Project Agreement and Appendix 3A Clinical Specifications and Functional Space Requirements.

Level 0 connection points shall consider the flow of materials, supplies, linen, food and providers and their access to the loading dock, PRH and the New Facility.

Connections will accommodate trains and other required flows between the buildings.

Project Co shall be responsible for all work within the existing hospital as required to complete all connections and seamlessly integrate the New Facility with the existing hospital. Any work required to connect to the existing Hospital must minimize disruptions, reduce impacts to existing operations and be completed in accordance with an approved, phased Work Plan consistent with the requirements of this Agreement.

4.4.2.3 Wherever possible, design and construct the connections so as to maintain existing fire exits and fire ingress/egress routes. As necessary, modify or replace any fire exits and fire ingress/egress routes affected by the New Facility construction and its connections to the existing Campus with equivalent exits and ingress/egress routes as approved by the Authority. Any work required in the existing Hospital must be completed in accordance with a Work Plan in accordance with the requirements of this Agreement.

4.4.2.4 Separation of flows in the circulation system between public, patient and materials distribution is a desired outcome.

4.4.3 Existing Hospital Work

4.4.3.1 Perform all upgrades and modifications to PRH campus as required for code compliance as a result of design and construction of the New Facility including, but not limited to:

4.4.3.1(1) requirements to accommodate alternate solutions;

4.4.3.1(2) modifications to existing building systems and existing building structures;

4.4.3.1(3) upgrading existing fire protection systems;

4.4.3.1(4) relocating existing fire department response points; and

4.4.3.1(5) relocating existing fire alarm annunciator panels.

4.4.3.2 Repair the integrity of existing PRH building envelopes that are impacted by the design and construction of the New Facility. Where existing windows are blocked by the New Facility, provide Virtual Luminous Windows for appearance of natural light.

4.4.3.3 Perform adjustments or commissioning of existing building systems that are impacted by the design and construction of the Facility.

4.4.3.4 Limit work in the existing hospital as much as possible, give preference to Facility design that limits construction work in existing buildings.

4.4.3.5 Provide sprinkler water curtains where required.

4.4.3.6 Perform work in existing buildings to comply with the requirements of section 4.2 Site Preparation – Demolition.

4.4.3.7 Any work required in the Hospital or to connect to the Hospital, must be completed in accordance with a Work Plan agreed to by the Authority in accordance with the requirements of Schedule 2.

4.4.3.8 Project Co will repair any damage to existing buildings in accordance with Schedule 2, 6.16 Protection of Property. All repair work will meet the requirements of Schedule 3.

4.4.3.9 Project Co will be responsible for patching, repairing and —making good all exterior and interior surfaces affected by the construction of the Facility in all existing buildings in which work is taking place, to match the quality of the adjacent surfaces.

4.4.3.10 Project Co will perform any remediation work or protective measures required in existing buildings as a result of construction of the Facility, including waterproofing measures; all work will meet the requirements of Schedule 3.

4.4.3.11 At interfaces between the New Facility and existing buildings:

4.4.3.11(1) Erect and maintain temporary partitions as per infection control guidelines to prevent spread of dust, odours, and noise to permit continued occupancy and function by the Authority as per the Authority's infection control during construction standards.

4.4.3.11(2) Prevent movement of existing structures; provide bracing and shoring.

4.4.3.11(3) Remove demolished materials from the PRH campus except where specifically noted otherwise. Do not burn or bury materials on the PRH campus.

4.4.3.11(4) Patch or replace portions of existing surfaces which are damaged, lifted, discoloured, or showing other imperfections. Where new Work abuts or aligns with existing, provide a smooth and even transition. Patch Work to match existing adjacent Work in texture and appearance.

4.4.3.11(5) Extend new finishes from the New Facility side of the temporary wall seamlessly into the existing corridors.

4.4.3.11(6) Renovations in the existing campus must be completed to meet the same standards and performance specifications as described in Schedule 3.

4.4.4 Service Connections

4.4.4.1 The New Facility design will provide optimized utilization of the building site, including provision for future flexibility. Engage the Authority in identifying optimal solutions to achieve these results, as well as opportunities for innovation.

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

4.4.4.3 Any shut down of existing PRH services, or any work required to connect to the existing Hospital, must be completed in accordance with an approved Work Plan consistent with the requirements of this Agreement. Provide any services that cross a building or corridor with seismic mitigation and building separation devices.

4.5 Site Infrastructure

4.5.1 General

4.5.1.1 Provide, as necessary, adequate and reliable infrastructure to provide all necessary municipal services to the Building.

4.5.1.2 Prepare an on-site servicing Quality Assurance Plan for construction of on-site services and improvements. The servicing Quality Assurance Plan shall include the following results:

4.5.1.2(1) Pipe bedding and surrounding material gradation tests;

4.5.1.2(2) Trench backfill compaction tests;

4.5.1.2(3) Structural fill gradation and compaction tests;

4.5.1.2(4) Sub-base aggregate gradation and compactions tests;

4.5.1.2(5) Base aggregate gradation and compaction tests;

4.5.1.2(6) Asphalt design mix;

4.5.1.2(7) Asphalt Marshall Analysis;

4.5.1.2(8) Asphalt core tests;

4.5.1.2(9) Concrete tests;

4.5.1.2(10) Watermain pressure tests;

4.5.1.2(11) Watermain disinfection and flushing tests;

4.5.1.2(12) Sanitary sewer air leakage tests;

4.5.1.2(13) Sanitary and storm sewer CCTV inspections;

4.5.1.2(14) Testing frequency shall at a minimum meet standards specified in the 2006 Standard Specifications for Highway Construction by British Columbia Ministry of Transportation and Highways or other local standards approved by the Authority's Engineer. The completed Quality Assurance Plan is to be signed by a Professional Engineer registered in British Columbia and shall be submitted to the Authority's Engineer.

4.5.1.3 Connect on-site servicing to the off-site servicing.

4.5.1.4 Use the survey benchmarks and coordinate system provided in the Disclosed Data.

4.5.1.5 Carry out, construct, and maintain environmental protection and dust mitigation.

4.5.1.6 Trenching to meet WorkSafe BC guidelines.

4.5.1.7 Construct and install manufactured components in accordance to the respective manufacturer's recommendations.

4.5.1.8 Repair damaged pavement structure, signage, pavement markings, lighting, conduits, services, curbing, sidewalks, landscape, irrigation, etc. to existing condition or better.

4.5.1.9 Prior to commencing any construction or stockpiling of materials, complete a photographic/video record of the surface features within the Project Site, including existing curbs, sidewalk, landscape, asphalt, etc. One copy is to be provided to the Authority within three (3) days of the documentation date.

4.5.1.10 Locate a legal site for disposal of all soil, rock, asphalt, concrete, or other unsuitable or excess material that results from construction at the Project Site.

4.5.1.11 Locate and protect all existing utilities.

4.5.1.12 Manage and control traffic during construction within the Project Site with signage, equipment, flag persons, barriers, lighting, and other devices necessary for traffic management.

4.5.1.13 Design and construct a concrete pad foundation and service connections for the existing Social Worker Trailer at a suitable location on-site approved by the Authority. Provide a concrete sidewalk from the entry to an on-site pedestrian route. Relocate the Social Worker Trailer and other re-usable

features and connect the services. Refer to Appendix 3J Site Services for a possible location. Potable water and sanitary sewer service connections are not required.

4.5.1.14 Design and construct an on-site MRI Docking Station consisting of a concrete pad foundation and service connections for the portable MRI Trailer at a suitable location on-site approved by the Authority. Provide a concrete sidewalk from the entry to an on-site pedestrian route. Relocate the canopy and other re-usable features. The new docking station is to be provided prior to demolition of the existing docking station. Refer to revised Appendix 3J Site Services Plan dated 2015-05-11 for a possible location. Refer to the Data Room for design drawings of the existing pad. Potable water and sanitary sewer service connections are not required.

4.5.1.15 Refer to Section 5.3 and Section 7.3.7 for required fuel tanks. Refer to Appendix 3J Site Services for possible fuel tank locations.

4.5.2 Municipal Off-Site Services Infrastructure

4.5.2.1 Design and construct all municipal off-site services to provide the infrastructure necessary to support the Building in accordance with the requirements of the City of Penticton and other Governmental Authorities, including with respect to sanitary sewers, storm sewers and drainage, water and road works. Refer to Appendix 3J Site Services.

4.5.2.2 Notify and obtain authorization from City of Penticton staff for all utility service tie-ins prior to connection.

4.5.3 On-Site Services Infrastructure

4.5.3.1 Design and construct all on-site services to meet or exceed the City of Penticton's Subdivision and Development Bylaw standards and other Governmental Authorities requirements for the corresponding municipal off-site services, and to meet the needs of the Building.

4.5.3.2 Sanitary Sewers

4.5.3.2(1) Provide a sanitary sewer of a diameter, grade and depth to safely convey all effluent from the Building. Refer to Appendix 3J Site Services. The sanitary sewer system will include the pipes, manholes and all other required appurtenances to comply with applicable municipal and Provincial standards.

4.5.3.3 Storm Sewers and Drainage

4.5.3.3(1) Consider opportunities to use this water for on-site irrigation purposes and for the LEED program.

4.5.3.3(2) Provide storm sewers and drainage network of a size, grade and depth to safely convey all storm water.

4.5.3.3(3) For any new or relocated storm sewer, provide adequately sized water quality/sediment control inlet chambers as a component of the drainage system before discharging to the offsite drainage system.

4.5.3.3(4) Provide redundancy to the storm sewer system for low point areas that pose a flooding risk to adjacent buildings if the primary drainage system clogs at the low point.

4.5.3.3(5) If required by the City of Penticton or other Governmental Authorities, provide adequately sized storm water detention basin and storm water oil grit separator.

4.5.3.3(6) Provide stormwater management on the temporary parking lot to meet the City of Penticton's bylaws.

4.5.3.4 Watermain and Appurtenances

4.5.3.4(1) Provide two new watermain services in separate trenches complete with appurtenances, capable of providing all required domestic and firefighting capacity and redundancy for the Building. Each service is to be sized to provide domestic and fire flow demands for the Buildings. New services shall not connect to existing onsite watermains unless approved by the Authority.

4.5.3.4(2) The watermain system and the secondary water service will include proper backflow preventers necessary to protect the municipal system and on-site facilities from contaminants based on the hazard level of the Building.

4.5.3.4(3) Abandon and/or remove existing watermains where needed.

4.5.3.4(4) Coordinate with the City of Penticton's Engineering Department for off-site watermain connections and installation of three off-site fire hydrants.

4.5.3.4(5) Project Co will relocate existing water services beyond the Building footprint as shown on the site services drawing in Appendix 3J Site Services.

4.5.3.5 Road Works

4.5.3.5(1) Design and construct on-site roadway, including the pavement, curbs and gutters, sidewalks, walkways, signage, pavement markings, and traffic calming devices that are handicapped accessible and wheelchair friendly, to provide safe passage between parking areas, loading areas, vehicle areas and drop-off areas.

4.5.3.6 Electrical, Telecommunications, Gas Services

4.5.3.6(1) Provide electrical, telecommunication and natural gas services to the Building. Coordination will be required with PRH Facility Services, Fortis Gas BC, Telus, Shaw, BC Safety Authority and the City of Penticton.

4.5.3.6(2) Project Co will relocate the existing gas service and meter beyond the Building footprint as shown on the site services drawing in Appendix 3J Site Services.

4.5.3.6(3) Remove abandoned services where needed.

4.5.3.7 Irrigation

4.5.3.7(1) Abandon and/or remove existing irrigation lines and provide new irrigation lines complete with appurtenances to replace the existing irrigations lines where needed.

4.5.3.8 Existing Boiler and Emergency Generator Fuel Tanks

4.5.3.8(1) Relocate existing boiler and emergency power generation systems and remove all redundant equipment, piping, controls and tanks.

4.5.4 Temporary Off-site Parking Lot

4.5.4.1 Design and construct a temporary public parking lot on parcels Lot 1 and Lot 2, Plan KAP72995 (1748 and 1802 Camrose Street) to meet the City of Penticton's Zoning Bylaw. Reduced standards will be allowed per the Temporary Use Permit to be applied for by the Authority.

4.5.4.2 Obtain a Building Permit for the parking lot from the City of Penticton.

4.5.4.3 Design and construct a safe pedestrian crossing across Industrial Avenue to meet the current Pedestrian Crossing Control Manual for British Columbia standards and guidelines.

4.5.4.4 The surface is to be constructed from asphalt millings, preferable from asphalt removed on-site and secondly from the City of Penticton Public Works Department's stockpile. Surface to be treated with magnesium chloride at a rate of 3.0 L/sq.m.

4.5.4.5 Design to allow for the integration of the Pay Parking system.

4.5.4.6 Provide all required signage and markings.

PART 5. BUILDING DESIGN REQUIREMENTS

5.1 Adaptability and Flexibility

5.1.1 Project Co will:

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

5.1.1.2 Utilize building systems and components that facilitate changes in the Building configuration and changes in servicing;

5.1.1.3 Accommodate program, service, work and equipment changes with minimized utility infrastructure and Building impact, including downtime, e.g., during fit-out of shelled space or equipment installation

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

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

5.1.1.6 Columns must not impact the functionality and intended use of a room and or area;

5.1.1.7 Interior shear walls shall not be used; locate shear walls to cores to minimize impact on clinical spaces.

5.1.1.8 Provide adaptability and flexibility in highly technical areas (such as recovery areas), which contain many small rooms with stringent functional and ergonomic requirements affecting the placement of furniture and equipment;

5.1.1.9 Standardize the design and layout of recurrent room types, including but not limited to, ORs, Minor Procedure Rooms, Endoscopy Procedure Rooms, Medical Surgical inpatient rooms, PARR recovery bays, Pre- and Post-Op recovery bays, Infusion Bays, diagnostic imaging procedure rooms, ambulatory care exam rooms, consultation rooms, interview rooms, on-call suites, patient and staff washrooms, medication rooms and areas, team care stations, offices and clean and soiled utility rooms;

5.1.1.10 Consider the ongoing adaptation and reuse of the Building as it relates to sustainable building design;

5.1.1.11 Provide excess capacity in vertical (and horizontal) distribution shafts and plenums to accommodate service system improvements, new equipment, digitization, Picture Archiving and Communication System (PACS), and current and future technologies;

5.1.1.12 Accommodate the vertical and horizontal distribution of electrical and mechanical services to allow maintenance and changes to occur with no interruptions to hospital operations, particularly where the need for service flexibility is highest;

5.1.1.13 Provide building service systems and operations designed to minimize service disruptions to areas adjacent to building maintenance and renovation areas; and

5.1.1.14 Provide a system of raceways for cable and fibre optic connections below and above each OR for future equipment. Identify/provide areas for coring and/or rough-in conduits through slabs as requested by the Authority

5.2 Expandability

5.2.1 To support future expansion of components, and capacity as a whole, Project Co will provide a loose fit design to optimize functionality within a given floor area, and multi-use adaptable space. Provide floor zoning that allows for expansion of programs or services by, for example, locating administrative and other non-clinical 'soft' functions adjacent to clinical areas that are likely to need to expand.

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

5.2.3 Provide a structural system capable of supporting equipment for future spaces as described in Appendix 3A Clinical Specifications and Functional Space Requirements and the Indicative Design Report.

5.2.4 Provide mechanical ventilation, including shaft requirements, to accommodate future use and equipment;

5.2.5 Provide sufficient mechanical, electrical and communications services to accommodate future uses and equipment.

5.2.6 Project Co will:

5.2.6.1 Design the Building to anticipate the future expansion of the Procedural Services Centre Operating Rooms into the area referred to in Appendix 3A Clinical Specifications and Functional Space Requirements as Sterile Supply Holding.

5.2.6.1(1) Design all mechanical and electrical systems to allow for this future expansion in the number of OR's with minimal disruption to the Building,

5.2.6.2 Design the New Facility as not to impede the possible future expansion of the Emergency Department to the north.

5.2.6.3 The Appendix 3A Clinical Specifications and Functional Space Requirements account for future space requirements in the New Facility. On Service

Commencement not all of the spaces will be equipped as these spaces are planned for the future. To ensure these un-equipped spaces are not used, temporary partitions will be required to close off these areas to staff and patients.

5.2.6.3(1) The design must accommodate the 'opening day' layout and indicate how any 'unequipped areas' will function as they become equipped;

5.2.6.3(2) Provide all partitions, demountable walls and finishes to complete the floor plan; and

5.2.6.4 Ensure all access/egress routes are maintained. Provide any doors, hardware, CCTV and security measures necessary to complete the floor plan. Utilize open planning to create soft zones responsive to rapid change and growth by use of modular fit out; and

5.2.6.5 Provide excess capacity and capability for expansion in all building systems as required by this Schedule.

5.3 Post-Disaster Requirements

5.3.1 Post- disaster architectural and structural design is required for the New Facility excluding the parking garage.

Design the New Facility excluding the parking garage so that:

5.3.1.1 The need to protect the life safety of all Building occupants and the need for continuing services following an earthquake or other disaster are considered and provided;

5.3.1.2 The Building's structure, structural components, non-structural components, anchorages, and equipment are designed and constructed to post-disaster standards in accordance with the BC Building Code;

5.3.1.3 Essential services including the electrical system, HVAC, steam, domestic water, fuel supply, sanitary drainage, storm systems, and medical gases are designed and constructed to post-disaster standards as defined in the BC Building Code. Locate these services in utilities enclosures that meet post-disaster standards as defined in the BC Building Code. In addition, provide connections exterior to the Building to allow delivery of potable water, generator fuel, boiler fuel, removal of sewage waste and delivery of oxygen by tanker truck. These locations must allow the Oxygen, potable water, and sewage holding service connections to be accessed at the same time; and

5.3.1.4 For additional information refer to Section 7.

5.3.2 A normal level of design importance is required for the parking garage.

5.3.2.1 As this facility does not house any emergency medical services there is not the same requirement for continuing services following an earthquake or other disaster.

5.3.3 Project Co will design and construct the New Facility so that it includes space that is capable of being used as an Emergency Operations Centre ("EOC") during an emergency. Room A4.3 Large Conference Room as indicated in Appendix 3A Clinical Specifications and Functional Space Requirements will be designed and constructed as the EOC .

5.3.4 The Emergency Operations Centre will be treated as a Type I space per CSA Z317.2 and according to CSA Z8000.

5.4 Architecture

5.4.1 Building Form and Character

5.4.1.1 The Building will embody the following design principles:

5.4.1.1(1) The Building will be highly articulated to break down its scale, utilizing such components as glazing, canopy and shading systems, varying cladding patterns/design, as well as exposed structural elements.

5.4.1.1(2) Maximize glazing at exit stairs without creating a new source of light pollution for residential neighbours.

5.4.1.1(3) Roof top mechanical/electrical equipment will be screened and incorporated in architectural elements. The use of a penthouse for such equipment is encouraged.

5.4.1.1(4) Where retaining walls are necessary, they shall be consistent in materials and quality to that of the Facility.

5.4.1.1(5) Use wood as a featured material in both the interior and exterior of the Building as outlined in the Wood First Appropriate Use Matrix.

5.4.1.2 Exterior Building Materials and Colour

5.4.1.2(1) The design will incorporate materials to create a distinct character appropriate to the function of the Building. Accordingly the material palette will:

5.4.1.2(1)(a) Avoid a clinical and repetitive aesthetic;

5.4.1.2(1)(b) Promote variation and articulation of the exterior through varied use of materials;

5.4.1.2(1)(c) Avoid extensive unbroken exterior wall areas and the excessive use of concrete;

5.4.1.2(1)(d) Animate the exterior with playful elements using materials and colours to add visual interest to the patients, visitors and staff;

5.4.1.2(1)(e) Reinforce the recognition of primary entries, encourage material changes at major height transitions in the massing and clearly express the functional distinction between the inpatient units on the upper floors and the hospital support services on the lower “podium” floors;

5.4.1.2(1)(f) Create changes and transitions to express the Building hierarchy, prime circulation connections and to articulate stairs and elevators;

5.4.1.2(1)(g) Variation of glazing type, pattern and frequency to reduce Building scale and massing, and to clearly distinguish the inpatient units from the ambulatory care and procedural areas;

5.4.1.2(1)(h) Emphasize the glazed and visually transparent major entrances with surrounding solid elements.

5.4.1.2(2) Materials will be durable and appropriate to the character of the area. Materials including wood, stone, brick masonry, and architectural concrete are anticipated and acceptable. In addition, incorporating limited amounts of smooth or corrugated metal panels, or proven high quality cementitious cladding panels, is an acceptable design approach. There is a preference for exterior wall cladding materials that are sourced locally to the extent possible, and be of high quality, durable and with permanent finish.

5.4.1.2(3) Unacceptable materials include stucco, vinyl siding, large expanses of concrete, mirrored glass, and neon lighting.

5.4.1.2(4) Facade transparency and views into non-clinical building activities should be provided, especially at grade levels and large public waiting areas; accordingly, use of mirrored or highly reflective glass is discouraged.

5.4.1.3 Access to Daylight and Views

5.4.1.3(1) Patient and staff must be provided with access to daylight and views to the outside, to support the demonstrated improvement in well-being and care outcomes.

5.4.1.3(1)(a) Patient and staff on the all Medical/Surgical Inpatient Units shall be provided with direct access to the outside through exterior roof decks from the following rooms:

(a).1 C2.15 Break Room, Staff

(a).2 C2.1 Lounge, Patient/Family/Visitor

5.4.1.3(2) Building design should address access to daylight and views by:

5.4.1.3(2)(a) the arrangement of circulation routes and occupied spaces to maximize opportunities for windows;

5.4.1.3(2)(b) the careful selection of window size and placement consistent with the space use;

5.4.1.3(2)(c) the inclusion of windows, of the largest possible size consistent with project sustainability and space use objectives;

5.4.1.3(2)(d) the provision of skylights, with appropriate glare protection, where windows are not possible or suitable;

5.4.1.3(2)(e) the provision of door sidelights and glazing in doors to increase daylight within spaces;

5.4.1.3(2)(f) the provision of tubular daylighting devices to increase daylight within spaces.

5.4.1.3(2)(g) Luminous Virtual Windows and Skylights:

(g).1 If the Medical Device Reprocessing department is located on Level 0 and does not receive natural light, provide high level Luminous Virtual Windows along a minimum of 50% all perimeter walls and Luminous Virtual Skylights for minimum 50% of the ceiling in all receiving, sorting, assembling, packaging and holding areas. The exact locations to be confirmed through User Group Consultation Process.

(g).2 Replace existing windows with Luminous Virtual Windows where blocked by the Facility construction.

5.4.1.3(3) Provide the following minimum requirements for access to daylight and views:

5.4.1.3(3)(a) all principal horizontal public circulation routes, including corridors accessing patient care areas, will include natural lighting strategies and access to views in the form of windows or skylights;

5.4.1.3(3)(b) glazed doors at entrances to exterior accessible roof areas;

5.4.1.3(3)(c) windows in corridors located on the perimeter of the Building;

5.4.1.3(3)(d) windows in all inpatient rooms as follows:

(d).1 to provide Direct Natural Light;

(d).2 to provide an unobstructed view which is not filled with impediments, hindered or stopped within a 9 meter horizontal view line, 90 degrees to the glazing;

(d).3 the maximum sill height to be 900mm;

(d).4 window head to extend to the underside of the ceiling;

(d).5 width of the windows to be minimum 3000mm;

(d).6 width of window for corner rooms to be equal or greater than the immediately adjacent inpatient room; and

(d).7 have roller shades systems recessed into the ceiling.

5.4.1.3(3)(e) Team Care Stations in PARR, Infusion and Endoscopy will have Borrowed Light or Direct Natural Light and views to the exterior are encouraged;

5.4.1.3(3)(f) OR's which are daylit (by Borrowed Light or Direct Natural Light), will have daylight originating from clerestory windows;

5.4.1.3(3)(g) The following rooms will have Direct Natural Light:

(g).1 Lobbies and Waiting Areas

(g).2 Inpatient Bedrooms
(g).3 Staff Lounges and Break Rooms
(g).4 UBC Student Lounge,
(g).5 Rehab Medicine Room,
(g).6 Lounge, Patient/Family/Visitor on Inpatient Floors,
(g).7 Conference/Education Room and,
(g).8 Conference Teach/Meeting Room

5.4.1.3(3)(h) The following rooms will have Borrowed Light and/or Direct Natural Light:
(h).1 4 OR's and 1 Interventional Urology OR, to the greatest extent possible,
(h).2 14 PARR Recovery Bays,
(h).3 6 Infusion Bays,
(h).4 10 Level II Recovery Bays for Minor Procedures and Endoscopy.

5.4.1.3(4) Provide glare control and minimize heat gain with the provision of sun shades and other solar control measures at windows as required;

5.4.1.3(5) Provide full height interior glazing at component waiting or pause areas.

5.4.1.4 Roofs

5.4.1.4(1) Landscaping and other "green" treatments of roof areas not intended for future expansion are encouraged, including provision of useable outdoor open spaces for patients and staff. All roof top gardens are to be designed so that direct views into neighbouring yards and windows are not permitted.

5.4.1.4(2) Where not landscaped, roof areas will be designed to be attractive when viewed from above and should avoid use of large areas of undifferentiated gravel.

5.4.1.4(3) All roofs are to be accessible by maintenance staff. Ensure design incorporates all safety requirements required by the BC Building Code and Work Safe BC

5.4.2 Building Configuration and Internal Circulation

5.4.2.1 Building Entrances

5.4.2.1(1) All direct entries from other buildings and access into the Facility from the exterior, including patient, visitor and drop-off areas, will

be protected from snow and rain by canopies or building overhangs.

5.4.2.1(2) All patients, visitor and ambulance areas will be covered and be protected from the elements.

5.4.2.1(3) Provide visible, protected places to sit near both the interior and exterior of entrances.

5.4.2.1(4) Entrance designs will create positive and calming first impressions for patients and families.

5.4.2.1(5) Entrance vestibules will provide complete transparency from the exterior, from the interior immediately in front of the vestibule, and from habited spaces adjacent to at least one long side of the vestibule.

5.4.2.1(6) Entrance vestibules will be configured and sized such that only one set of doors will open at one time in order to preserve the airlock effect for climate control. Ensure adequate distance between the sets of doors to allow stretchers and wheelchairs and attendants to fit lengthwise into the vestibule. No rotating doors are permitted.

5.4.2.1(7) Provide automatic doors at all public entrances and exits to the Building and to departments. Doors will be configured for push-pull manual operation in addition to automatic operation.

5.4.2.1(8) Pedestrian interest and comfort at entries will be provided through specifically designed seating, signage, lighting and features that signal the Building's use.

5.4.2.1(8)(a) Provide entrances to the Facility, at a minimum at the following locations;

- (a).1 from Government Street to the Central Reception/Patient Intake Area;
- (a).2 from the parking garage to the Central Reception/Patient Intake Area;
- (a).3 from the parking garage to the Procedural Services Centre;
- (a).4 from the parking garage lower level to the patient/service elevators for patients arriving by Medi-van.

5.4.2.1(8)(b) The highest volume of patients/visitors to the New Facility will occur at the connection from the parking garage to the Central Reception/Patient Intake Area where all visitors will be received.

Access at this level shall be accessible and avoid the use of ramps. All entrances from the parking garage to the Patient Care Tower shall be fully enclosed to provide protection from the elements.

5.4.2.2 Exit Stairs

5.4.2.2(1) Locate exit stairs strategically for the convenience of staff, patients and visitors to promote the use of stairs over elevators.

5.4.2.2(2) Locate exit stairs conveniently accessible from circulation routes and as per section 5.1.1.4.

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

5.4.2.2(4) Provide day lighting and views from stairwells for orientation and amenity, and provide adequate lighting into stairwells for security at night but do not permit direct views into neighbours' back windows and yards.

5.4.2.2(5) Provide stairwell design that facilitates the use of evacuation sleds excluding the parking garage.

5.4.2.2(6) Provide fully glazed exterior end walls maximizing views to and from the exit stairwells.

5.4.2.3 Convenience Stairs

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

5.4.2.3(2) Convenience stairs will have finishes similar to the floor levels they serve and in all cases will have a finished floor and steel handrails and guardrails.

5.4.2.3(3) Provide a convenience stair in the following locations:

5.4.2.3(4) Provide an open convenience stair between Ambulatory Care services and Procedural Services Centre floor areas located adjacent to the public elevators for use by staff, visitors and patients;

5.4.2.3(5) Between Inpatient Floors and Procedural Services Centre floor areas (is permitted to have secure and direct access within an exit stair in lieu of convenience stair);

5.4.2.3(6) Between Medical Device Reprocessing and the Surgical Suites.

5.4.2.4 Safety of Stairs

5.4.2.4(1) Stairwells shall minimize the gap between flights of stairs. If large gaps do exist, provide full height walls which divide the stair flights.

5.4.2.4(2) Guardrails extending to a minimum height of 1600mm may be required in lobbies or public areas to prevent public, patients or staff from using the stairwells for self harm.

5.4.2.4(3) Provide stairwells that do not allow for individuals to hide in the landing areas.

5.4.2.5 Corridors

5.4.2.5(1) Corridor widths will be as follows:

5.4.2.5(1)(a) Corridors within the Ambulatory Care Centre, with the exception of Satellite Diagnostic Imaging, shall be minimum 1600mm wide.

5.4.2.5(1)(b) Corridors within the Satellite Diagnostic Imaging shall be minimum Width as noted below:

(b).1 2400mm for: Procedure Room Digital Radiography, Procedure Room MRI, Procedure Room Nuclear Medicine, Procedure Room Ultrasound, Bone Density Diagnostic Room, and;

(b).2 1800mm for: Procedure Room Mammography.

5.4.2.5(1)(c) Global circulation corridors and corridors accessing patient care areas requiring stretcher/bed/pallet movement within the Building will be a minimum clear dimension of 2400 mm clear;

5.4.2.5(1)(d) Corridors accessing the service areas will be minimum 2000 mm clear, except the corridors on Level 0 which link the existing hospital to the New Facility patient/service elevator core and the New Facility patient/service elevator core to MDR will be minimum 3600 mm wide to accommodate supply truck trains;

5.4.2.5(1)(e) Corridors at patient and service elevators will have a minimum clear area of 3100mm deep by

3400mm long in front of each elevator to accommodate movement of beds, stretchers, staff, carts and supply truck trains; with the exception of the service elevators at Level 0 which shall be 4300mm deep, and

5.4.2.5(1)(f) Corridors in all other areas will be minimum 1500 mm wide.

5.4.2.5(2) Design corridor ceiling space to accommodate all mechanical and electrical services.

5.4.2.5(3) Design corridors to be level wherever possible. Transitions between the existing hospital and the Facility will minimize the use of ramps. Where ramps are required, minimize the slope to the greatest extent possible. .

5.4.2.5(4) Design corridors to have soft corners to allow ease of movement for stretchers, beds and accompanying medical staff and equipment.

5.4.2.5(5) Corridors in patient care areas will have alcoves for storage of equipment. The alcoves will be dispersed between patient rooms and recovery bays allowing corridors to be kept clear of equipment and supplies. Provide the alcoves with power outlets for charging electronics and data ports, each at 1050 above finished floor (height to be confirmed during User Group Consultation). Corridors will have recessed rest areas for patients to promote mobility and activity. Alcoves must not reduce required corridor widths.

5.4.2.5(6) Corridors outside ORs will have storage areas located across the corridor from each OR, where possible. Stretcher storage and storage for scrub bay items are required for each OR. There shall be alcoves adjacent in the Sterile Core for storage of case carts.

5.4.3 Acoustics and Noise Control

5.4.3.1 Design and construct the Facility in consultation with a Consultant in Acoustics and Noise Control.

5.4.3.2 Design and construct the Facility to comply, at a minimum, with the requirements described in Appendix 3D Acoustics and Noise Control.

5.4.3.3 Provide acoustic and noise measures necessary to create a healing environment for patients, a safe and comfortable environment for staff and confidentiality where it is required.

5.4.3.4 Appropriate acoustic and noise control measures shall be considered to meet the functional requirements of the space by:

5.4.3.4(1) attenuation of sound within public, patient and staff environments;

5.4.3.4(2) sound isolation between the exterior and interior spaces;

5.4.3.4(3) sound isolation between interior spaces within the Building at both horizontal and vertical separations ;

5.4.3.4(4) sound and vibration isolation of building service noises and sound isolation of Building service rooms;

5.4.3.4(5) sound isolation as required for specialty rooms such as video-conferencing;

5.4.3.4(6) sound attenuation of noise from equipment within rooms; and

5.4.3.4(7) sound masking system referred to in Appendix 3D Acoustic and Noise Control Measures.

5.4.3.5 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.

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

5.4.3.7 Minimize constructions such as ducts, rigid conduits, or corridors that act as tubes to transmit sound from one area to another. At common supply and return ducts, provide sound attenuation liners at the diffuser and/or grill to maintain the acoustical requirements described in Appendix 30 Acoustics and Noise control. Seal around conduits.

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

5.4.3.9 Use acoustic screens , vibration isolators, and carefully selected exterior equipment to prevent exterior noise that neighbours may find offensive.

5.4.4 Building Envelope

5.4.4.1 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 Building is situated in.

5.4.4.2 Design exterior walls in accordance with the 'rain-screen principles' as described by the CMHC document "The Rain Screen Wall System" available on-line at: http://www.cmhc.ca/en/inpr/bude/himu/coedar/loader.cfm?url=/commonspot/security/getfile.cfm&PageID=70139 Include a continuous air space of minimum 25 mm clear width..

5.4.4.2(1) with a predicted service life that exceeds 50 years as defined in CSA S478-95:

5.4.4.2(1)(a) for components and assemblies whose categories of failure are 6,7,or 8 in Table 3 in CSA S478-95, use a design service life equal to the design service for the Building;

5.4.4.2(1)(b) for components and assemblies whose categories of failure are 4 or 5 in Table 3 in CSA S478-95, use a design service life equal to at least half of the design service life of the Building; and

5.4.4.2(1)(c) where component and assembly design service lives are shorter than the design service life of the Building, design and construct so they can be readily replaced.

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

5.4.4.4 To accommodate the high humidity service conditions expected inside the Building,

5.4.4.5 Below grade assembly will resist the ingress of water;

5.4.4.6 Design building envelope details to avoid thermal bridging.

5.4.4.7 Include design features which control unwanted solar gain and glare.

5.4.4.8 Maintain integrity of adjacent building envelope at roof, walls and foundation.

5.4.4.8(1) Utilize a building envelope consultant through design and construction process and provide for review during construction;

5.4.4.8(2) Back-up walls for outer cladding will consist of concrete masonry units, precast concrete, poured in place reinforced concrete or structural stud backup system. Design for deflection of interior finishes must conform to code in all conditions; and

5.4.4.8(3) Submit building envelope test results to the Authority verifying that the building envelope is meeting all requirements.

5.4.5 Interior Walls and Partitions

5.4.5.1 Use interior walls and partition systems that:

5.4.5.1(1) Provide acoustic separations as required for the specific functions to be carried out in the spaces affected, and in accordance with the requirements of Appendix 3D Sound Transmission Ratings; and

5.4.5.1(2) Provide separations required for fire safety and protection.

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

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

5.4.5.3(1) cleaning, maintenance and infection prevention and control as relevant for the particular or specific function;

5.4.5.3(2) wall finishes shall be washable using hospital grade disinfectant. In the vicinity of plumbing fixtures, wall finishes shall be smooth and water resistant;

5.4.5.3(1) in OR's, isolation rooms and the MDR wall finishes shall be free of fissures, open joints, or crevices that can retain or permit passage of dirt particles;

5.4.5.3(1) in the MDR reprocessing areas ceiling, walls, and work surfaces in this area will be impervious to moisture.

5.4.5.3(1) resist damage due to normal wear and resist damage due to collision in high traffic areas; permanence and durability including impact resistance

5.4.5.3(1) non-toxic/ non-allergenic;

5.4.5.3(2) low VOC emissions so as to minimize adverse impact on indoor air quality and indoor environmental quality;

5.4.5.3(3) flexibility to permit adaptability of the internal spaces, if required, to suit future process revisions;

5.4.5.3(4) Recesses and gaps created by wall, partition, furring must allow for ease and proper cleaning, those that do not must not exist;

5.4.5.3(5) Void Space must be incorporated into the usable room/area if the Void Space is not of a size which can be outfitted in the future for a

usable sole purpose. Void space along corridors must be made available as completed alcoves; and

5.4.5.3(6) The completion of Void Spaces will not be deemed a cost to the Authority

5.4.5.4 Line of sight provides the ability to see what is important from where a person is located; the implications to the design include the general layout, use of low walls and furniture, low equipment, glazed walls and corridors and doorways that line up.

5.4.5.4(1) provide full height glazing for a minimum of 1.5m where line of site is required and a partition is required;

5.4.5.4(2) provide half height glazing for a minimum of 1.5m where line of site is required and a partition as well as furniture, millwork or equipment is required;

5.4.5.4(3) provide low height furniture, millwork and equipment where line of sight is required.

5.4.5.5 Provide line of sight

5.4.5.5(1) as required for functionality and as indicated in Appendix 3A Clinical Specifications and Functional Space Requirements.

5.4.5.5(2) from Team Care Stations to department entry points on inpatient floors, if entry is not visible from the Team Care Station provide CCTV camera to view the entry with monitor and remote door release from the Team Care Station;

5.4.5.5(3) from Team Care Stations to all recovery bays (Level 1 PARR/Level II and Endoscopy)

5.4.5.5(4) from PARR medication area to stretcher recovery bays,

5.4.5.5(5) Support space must be arranged to provide line of sight to all recovery bays and private bedrooms in Procedural Services Centre.

5.4.5.5(6) Use of glass in support areas such as; medication rooms and clean supply areas to maintain views of patient care areas is encouraged,

5.4.5.5(7) Store supplies in alcoves to the greatest extent possible,

5.4.5.6 Location and design of interior walls and columns shall minimize disruption of exterior views and line of sight. .

5.4.5.7 Provide fittings, attachments and internal bracing/backing as required to accommodate and support wall-mounted clinical and non-clinical fixtures, storage

systems and equipment, including equipment at videoconferencing and other applicable rooms.

5.4.5.8 At a minimum, Project Co shall provide wall backing;

5.4.5.8(1) Full width of the wall to a minimum height of 1500mm in alcoves around hand hygiene sinks and scrub sinks.

5.4.5.8(2) Full width and height of the wall at the patient's head where there is a bed or stretcher

5.4.5.8(3) Full width and height of the walls in all Medication Rooms except where Equipment is located such as Automated Medication Management System or refrigerator,

5.4.5.8(4) Full width and height of the walls in all Clean Utility rooms and,

5.4.5.8(5) Full width and height of walls as required to support wall mounted dumbbells and weights in Rehabilitation Room.

5.4.5.9 Partition design to allow for built in pass through where required,

5.4.5.10 Provide protection against water damage in spaces that contain equipment or services by considering appropriate partition base design, such as concrete curbs.

5.4.6 Surfaces

5.4.6.1 Surfaces shall have the following characteristics, consistent with their functional purpose:

5.4.6.1(1) Resistant to microbial spread and growth;

5.4.6.1(2) non porous or smooth;

5.4.6.1(3) durable;

5.4.6.1(4) seamless;

5.4.6.1(5) resilient and impact resistant;

5.4.6.1(6) non toxic/ non allergenic;

5.4.6.1(7) presenting minimal glare;

5.4.6.1(8) constructed in a way that will not soak up or harbour moisture; and

5.4.6.1(9) water impermeable in areas where water or dampness can occur

5.4.7 Ceilings

5.4.7.1 Design ceilings to accommodate ceiling-mounted equipment as per the Schedule 2, Appendix 2, Equipment List and as required per Appendix 3A Clinical Specifications and Functional Space Requirements.

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

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

5.4.7.4 Ceiling penetrations must be properly sealed to prevent the entrance of air, insects and rodents.

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

5.4.7.5(1) ceiling heights in corridors which have ramps, 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 meters);

5.4.7.5(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 2.6 meters above the finished floor, including door frame clearances;

5.4.7.5(3) Ceiling heights in OR's and all Procedure Rooms to be of a height to accommodate booms and be a minimum 3.3 meters; and.

5.4.7.5(4) Patient bedrooms shall have a minimum ceiling height of 2.8 m.

5.4.7.6 For consistency with existing products and materials on the campus, all components including tiles and suspension systems will be of a metric dimension standard.

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

5.4.7.7(1) cleaning, maintenance and infection prevention and control;

5.4.7.7(2) flexibility and access to the spaces above;

5.4.7.7(3) compatibility with mechanical, plumbing, electrical, communications services and fixtures;

5.4.7.7(4) low VOC emissions so as to minimize adverse impact on indoor air quality and indoor environmental quality; and

5.4.7.7(5) aesthetic and design qualities to provide a healing environment for the patients, staff and public.

5.4.7.8 Ceiling finishes in semi restricted rooms will be compliant with CSA Z8000. Semi restricted rooms include, but are not limited to:

5.4.7.8(1) AIR rooms and anterooms

5.4.7.8(2) Clean or Restricted Access corridors

5.4.7.8(3) Clean rooms

5.4.7.8(4) Specialized radiographic rooms

5.4.7.8(5) Minor surgical procedure rooms

5.4.7.9 Ceilings in restricted rooms, OR's, and Rehabilitation Rooms shall be monolithic and shall be constructed with drywall or removable ceiling panels complying with the requirements 6.9.2.4.

5.4.7.10 Ceilings in the Medical Device Reprocessing Department shall be resistant to humidity in spaces where steam and moisture are encountered. Shall be constructed of non-porous, non-shedding materials with recessed, enclosed pipes and fixtures so as to create a flush surface, facilitating frequent cleaning. Appropriate access shall be provided for maintenance of pipes and fixtures. Ceilings shall be constructed without fissures, open joints, or crevices that can retain or permit passage of dirt particles.

5.4.7.11 All piping, duct work, and structure will be covered by a finished ceiling in location where dust fallout would present a potential problem. All overhead piping and ductwork in dining or food handling areas shall be concealed behind a solid finished ceiling.

5.4.7.12 Ceilings will be designed for seismic restraint according to the BC Building Code.

5.4.7.13 Provide fittings, attachments and internal bracing/backing as required to accommodate and support ceiling-mounted clinical and non-clinical fixtures and equipment, including equipment at videoconferencing and other applicable rooms.

5.4.8 Entry Facilities

5.4.8.1 Provide entry facilities that have the following features (not including washrooms, or storage areas):

5.4.8.1(1) Enhanced flooring

5.4.8.1(2) if sheet flooring is provided create a pattern design using different flooring colours;

5.4.8.1(3) Wood design features;

5.4.8.1(4) 75% of exterior wall as full height glazing;

5.4.8.1(5) Curvilinear design elements;

5.4.8.1(6) Feature walls, donor walls, space for artwork to be displayed; and

5.4.8.1(7) Three dimensional ceiling design.

5.4.8.1(8) First Point of Contact Volunteer Desk

5.4.9 Floor Finishes

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

5.4.9.2 Project Co will select floor finishes to suit types and concentration of pedestrian and/or vehicular/wheel traffic to be anticipated; use heavy-duty materials for flooring on which wheeled or service vehicle traffic is anticipated and to which wear and damage may result.

5.4.9.3 Project Co will design and select floor finishes complying with the following criteria and cross referencing with 6.9.2.5:

5.4.9.3(1) ergonomic comfort, cleaning, maintenance and infection prevention and control including the frequency and quality of joints and also including ease of replacement if and when required;

5.4.9.3(2) imperviousness to concentrations of moisture anticipated to be existing on the floors and duration of that moisture;

5.4.9.3(3) permanence and durability and resistance to concentrated service traffic both pedestrian and vehicular;

5.4.9.3(4) aesthetic and design qualities to provide a healing environment for the benefit of patients, staff and public;

5.4.9.3(5) low VOC emissions so as to minimize adverse impact on indoor air quality and indoor environmental quality;

Sound absorbing in areas requiring acoustic control such as inpatient floors;

5.4.9.3(6) compatibility of patterns and textures with the requirements for pedestrian safety and elder-friendly design in order to provide a smooth path of travel for wheelchair users on both interior and exterior surfaces; and

5.4.9.3(7) incorporation of colours and graphics for way finding.

5.4.9.4 Non-skid flooring will be used in food service areas, housekeeping rooms, Medical Device Reprocessing (MDR), wash and change rooms, shower areas, and at scrub sinks.

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

5.4.9.6 Use anti-static flooring material for medical imaging rooms and telecommunication and data rooms.

5.4.9.7 Flooring material for operating rooms shall be heavy-duty, durable, monolithic, seamless and integral surface suitable for high traffic/high abuse environments.

5.4.9.8 Use resilient vinyl or rubber sheet flooring in service corridors and service areas.

5.4.9.9 Floors in patient care areas, wet areas, MDR, procedure rooms and operating rooms must be flashed cove, washable and able to withstand routine hospital cleaning and detergents; and

5.4.9.10 Use water-resistant and slip-resistant flooring in public, staff, and patient washrooms.

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

5.4.9.12 Floor cleaning and/or buffing will be as per manufacturer's specifications for occupancy and meet the approval of the Authorities Housekeeping Manager.

5.4.9.13 Use of carpet shall be as described in section 6.9.2.5(12)

5.4.10 Door Function

5.4.10.1 Provide doors, door hardware and controls to suit the intended purpose and satisfy the Authority's functionality requirements. Project Co shall, at a minimum, provide the following to meet the Authority's intended operation for these common door types within the New Facility. Doors, door hardware and controls for these, as well as all other doors, will be determined and approved by the Authority through the User Consultation Process as described in Appendix 2B.

5.4.10.2 Medication Room Doors

5.4.10.2(1) Size; 1065mm (3'- 6") Swing door or sliding/barn door with upper glazing panel minimum 800mm x670mm, typical except inpatient units

5.4.10.2(2) Size; 1220mm (4'- 0") Swing door with upper glazing panel minimum 800mm x670mm for all inpatient units

5.4.10.2(3) Automatic door opener operation with card reader activation typical

5.4.10.3 Soiled Utility Rooms

5.4.10.3(1) Size; 1220 mm (4'-0") Swing door with upper glazing panel minimum 800mm x670mm

5.4.10.3(2) Lock; Manual key lock to secure the room when not in use

5.4.10.3(3) Hold open device

5.4.10.3(4) Hands free push/pull door operation

5.4.10.4 Clean Supply Rooms

5.4.10.4(1) Size; 1220 mm (4'-0") Swing door with upper glazing panel minimum 800mm x670mm

5.4.10.4(2) Lock; Manual key lock to secure the room when not in use

5.4.10.4(3) Hold open device

5.4.10.4(4) Hands free push/pull door operation

5.4.10.5 Public Entry Door/Corridor Doors on Inpatient Units

5.4.10.5(1) Size; (2) 1065mm (3'- 6") Swing doors with upper glazing panel minimum 800mm x670mm

5.4.10.5(2) Automatic door opener both sides

5.4.10.5(3) Card Reader with activation coordinated with Wander Guard System, equipped with Wander Guard System to lock doors remotely

5.4.10.5(4) Public entry door require remote door lock and release function from Central Team Care station. Provide intercom at entry to communicate with the Central Team Care Station if doors are locked

5.4.10.6 Outbreak Control Zone Corridor Doors on Inpatient Units

5.4.10.6(1) Size; (2) 1065mm (3'- 6") Swing doors with upper glazing panel minimum 800mm x670mm

5.4.10.6(2) if used for anteroom function during outbreak control zone situation; provide door controls such that one set of doors must close completely before the other set opens.

5.4.10.6(2)(a) First door into the outbreak control zone from the service corridor; card reader releases the lock and door automatically opens. Both sets of doors shall have automatic openers

5.4.10.6(2)(b) Doors are normally in the open position unless an outbreak control operation is required then the doors shall remain closed. Staff requires card reader activation for access and automatic door operation on the first set of doors from the service elevator to the outbreak control zone

5.4.10.6(2)(c) The second set of doors shall have push button automatic operation. Push button automatic door opening shall be provided on both doors for staff exiting through the doors from the outbreak control zone. Provide 3000mm minimum distance between sets of doors

5.4.10.6(3) Hold open device when not in Outbreak Control Zone mode.

5.4.10.7 Patient Bedroom Door on Inpatient Units

5.4.10.7(1) Size; 1065mm (3'- 6") Swing door and 460mm Swing Door (18") for total 1530mm (60") clear opening, Upper glazing panel minimum 800mm x670mm with integral blinds control from corridor side

5.4.10.7(2) Locks; no locking function required

5.4.10.7(3) Hold open devices on both doors

5.4.10.8 Procedure Rooms

5.4.10.8(1) Minor Procedure Rooms- Size; 1065mm (3'- 6") Swing door and 460mm Swing Door (18") for total 1530mm (60") width

5.4.10.8(2) Endoscopy and Cystoscopy/Colposcopy Rooms – Size; 1220 mm (4'- 0") Swing door and 610 mm Swing Door (24") for total 1830 mm (72") width

5.4.10.8(3) Minor Procedure Rooms shall be laser ready including; no gaps and all metal burnished

5.4.10.8(4) Locks; Lock from inside of the room only, coordinated with In Use Light above the door.

5.4.10.8(5) Hold open devices required (both doors)

5.4.10.8(6) Hands free Push/Pull door operation

5.4.10.8(7) To comply with CSA Z386-14 – Safe Use of Lasers in Health Care.

5.4.10.9 Operating Rooms

5.4.10.9(1) Size; 1220 mm (4'- 0") Swing door and 610 mm Swing Door (24") for total 1830 mm (72") clear opening , Upper glazing panel minimum 800mm x670mm on larger door

5.4.10.9(2) Laser ready integral blinds operable from inside the room

5.4.10.9(3) Locks; deadbolt lock operable from inside of the room

5.4.10.9(4) Hold open devices on both doors

5.4.10.9(5) Hands free Push/Pull door operation

5.4.10.9(6) to comply with CSA Z386-14 - Safe Use of Lasers in Health Care

5.4.10.10 Operating Room to Sterile Corridor

5.4.10.10(1) Size; 1220mm (4'- 0") Swing door with Upper glazing panel minimum 800mm x670mm,

5.4.10.10(2) Laser ready integral blinds operable from inside the room

5.4.10.10(3) Locks; manual key lock operated from inside of the room to secure the room.

5.4.10.10(4) Hold open device

5.4.10.10(5) Push/Pull manual operation with no handles

5.4.10.10(6) to comply with CSA Z386-14 - Safe Use of Lasers in Health Care

5.4.10.11 Decontamination Room

5.4.10.11(1) Size; 1220mm (4'- 0") Swing door with Upper glazing panel minimum 800mm x670mm

5.4.10.11(2) Hold open device

5.4.10.11(3) Automatic Opener both sides

5.4.10.12 Cardiology Stress Testing Lab Area

5.4.10.12(1) Size; 1220 mm (4'- 0") Swing door and 610 mm Swing Door (24") for total 1830 mm (72") width

5.4.10.12(2) Locks; Manual key lock to secure the room when not in use

5.4.10.12(3) Push/Pull manual operation with 'D' handles

5.4.10.13 Departmental Entry Doors – Public/Patient Entry (front-of-house)

5.4.10.13(1) Size; 1220 mm (4'- 0") Swing door where leading into a corridor 1800mm wide or less and (2) 1065mm (3'- 6") Swing doors where leading into a corridor greater than 1800mm wide

5.4.10.13(2) Upper and lower glazing panels minimum 800mm x670mm typical

5.4.10.13(3) Lock; manual key lock to secure the department after hours

5.4.10.13(4) Hold open device

5.4.10.13(5) Automatic Opener both sides

5.4.10.14 Departmental Entry Doors – Staff/Registered Patient Entry (back-of-house)

5.4.10.14(1) Size; 1220 mm (4'- 0") Swing door or (2) 1065mm (3'- 6") Swing doors, to be confirmed through the User Consultation Process

5.4.10.14(2) Upper glazing panel minimum 800mm x670mm

5.4.10.14(3) Card readers; automatic door opener operation with card reader activation where automatic openers are required

5.4.10.14(4) Hold open device

5.4.10.14(5) Automatic Openers are required for Surgical Services Area, Post-Op Level 1 Recovery Area (PARR) and Pre-Op Prep/Post-Op Level II Recovery/Surgical Daycare Area.

5.4.10.15 MDR Department

5.4.10.15(1) Size; all perimeter doors entering into MDR space shall be minimum 1220 mm (4'- 0") wide swing doors

5.4.10.15(2) Automatic Openers are required for MDR Scope Decontamination, Disinfection and Clean Scope Holding Rooms doors.

5.5 Interior Environment

5.5.1 Infection Control

5.5.1.1 General

5.5.1.1(1) Design the Building to mitigate and prevent, where possible, the spread of infection including via contaminated surfaces and airborne pathogens, consistent with all infection control standards.

5.5.1.1(2) Select appropriate materials and use simple detailing with quality workmanship and ease of accessibility for routine cleaning, maintenance and to minimize the physical spread of bacteria.

5.5.1.1(3) Design the Facility to support infection prevention and control in future alterations, modifications and additions; demonstrate measures taken to achieve this goal.

5.5.1.1(4) Design the Facility to segregate sterile, clean, and soiled items, including traffic patterns of clean and soiled transport within the Facility.

5.5.1.1(5) Design the Building to mitigate the spread of airborne infections during an outbreak by creating Outbreak control zones as follows:

5.5.1.1(5)(a) Outbreak control zones will be provided in the following areas

5.5.1.1(5)(b) One 14 bed inpatient unit and all support spaces on each inpatient floor will be an airborne outbreak control zone: Outbreak control zones will be bounded by construction that allows the mechanical ventilation systems to create negative pressure within a zone relative to adjacent floor areas;

5.5.1.1(5)(c) Outbreak Control Zones will contain space that can be converted into an anteroom adjacent to the entrance to the pod with a hand hygiene sink;

5.5.1.1(5)(d) Coordinate outbreak control zones with the mechanical requirements of this Schedule.

5.5.1.2 Sinks and Hand Hygiene Stations

5.5.1.2(1) Design the Building in compliance with all applicable infection control standards.

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

5.5.1.2(3) Strainers and anti-splash fittings at outlets shall not be used.

5.5.1.2(4) All hand hygiene sinks shall be located in alcoves and not project into the minimum corridor width, refer to 5.4.2.5(1).

5.5.1.2(5) One hand hygiene sink per every three opened bays (privacy curtains on three sides of the bay)

5.5.1.2(6) One hand hygiene sink per bay if bay has physical walls on three sides of the bay

5.5.1.2(7) One hand hygiene sink per patient room

5.5.1.2(8) One hand hygiene sink at the entry to each 28 bed unit collocated or adjacent to the Respiratory Station.

5.5.1.2(9) Install hand hygiene stations (Respiratory Station):

5.5.1.2(9)(a) at all entrances to the Building with current IHA standard STOP signage so that visitors stop, take notice, and access them (stations shall have hand rub dispensers and mask tissues mounted for convenient access for visitors); and

5.5.1.2(9)(b) at other locations determined in consultation with the Authority as per Schedule 2 Design and Construction Protocols.

5.5.1.3 Scrub Sinks

5.5.1.3(1) At minimum, provide specialized, stainless steel scrub sinks in the following locations:

5.5.1.3(2) As indicated in CSA Z8000 7.5.12.

5.5.1.3(3) As indicated in Appendix 3A Clinical Specifications and Functional Space Requirements.

5.5.1.3(4) All scrub sinks will have hands-free operation

5.5.1.4 Surfaces

5.5.1.4(1) Materials and finishes will be moisture impervious and compatible with disinfectants and cleaning products to be used in the Facility. Surfaces in OR's, procedure rooms, inpatient areas, and MDR shall be smooth and durable enough to withstand the additional cleaning and disinfection that is required in these areas

5.5.1.5 Equipment & Storage

5.5.1.5(1) Provide storage shelves that are:

5.5.1.5(1)(a) cleanable with Authority-approved detergents and disinfectants;

5.5.1.5(1)(b) not be located under sinks;

5.5.1.5(1)(c) 250 mm above the floor to permit routine cleaning; and

5.5.1.5(1)(d) at least 500 mm from ceiling to ensure adequate functioning of fire sprinklers but not above an acceptable ergonomic height of 1800 mm AFF;

5.5.1.5(2) If open shelving is provided for storage, the bottom shelf of such shelving will be a solid surface to prevent contamination from the floor.

5.5.1.6 Retail Gift Shop

5.5.1.6(1) Specific requirements will be dependent on the configuration, but at a minimum Project Co will provide;

5.5.1.6(1)(a) Retail display areas consisting of slat board on designated wall,

5.5.1.6(1)(b) adjustable shelving with storage cupboard below and lighting above,

5.5.1.6(1)(c) customer service counter with under counter storage, outlets for phone, interact and cash register, additional power outlets as may be required on the walls and specialty lighting,

5.5.1.6(1)(d) Storage Area with shelving for stock, small millwork work area with additional power and data outlets and lighting,

5.5.1.6(1)(e) Non-slip, low maintenance flooring

5.5.1.6(1)(f) Sliding glass security doors wide enough for wheelchairs and strollers

5.5.2 Ergonomic Design

5.5.2.1 Project Co will provide:

5.5.2.1 detailed design features which expressly facilitate the physical activities of the staff and patients to increase their safety, efficiency and general well-being, and assist in eliminating ergonomic risk factors by designing, for example, appropriate millwork, lighting, lift devices, and patient assist or equipment manoeuvring space;

5.5.2.1(1) for all patient care and treatment spaces to accommodate lifting and transfer devices; and

5.5.2.1(2) ergonomic design to accommodate 95% of North American Working Population defined in “Engineering Anthropometry” within the *Occupational Ergonomic Handbook* (most recent edition) and Appendix 3K Staff Safety Guidelines for Interior Health / Northern Health Facility Design Projects, for all work spaces including millwork, furniture, lighting and finishes to eliminate strain and injury to health care workers including consideration of, but not limited to:

5.5.2.1(2)(a) Separation and efficiency of clinical, patient and support service workflow corridors;

5.5.2.1(2)(b) Convenience of equipment and supply storage for both clinical and non-clinical staff; specific attention to storage access from each OR; and

5.5.2.1(2)(c) Awkward posture and repetitive motion ergonomic measures (lighting, work heights, adjustability) at all task-intensive work stations; specific attention must be paid to work surface heights for office/ computer inputting versus task intensive bench work.

5.5.3 Elder-Friendly

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

5.5.3.2 Project Co will provide easy access to wheelchairs/stretchers close to the entrance of the Building; and ensure that all patient-occupied spaces are designed to meet elder friendly and disability design principles and provide for disabled access and assistance by nursing staff, e.g., barrier-free, including flush entrances and minimal use of stairs in patient circulation routes.

5.5.4 Interior design

5.5.4.1 Project Co to provide interior design as follows:

5.5.4.1(1) reflects the values of the Facility;

5.5.4.1(2) overall interior design throughout the Building is integrated;

5.5.4.1(3) provides a distinct character for the Facility which relates to its purpose and the patients using the Facility;

5.5.4.1(4) individual design concepts for each component area;

5.5.4.1(5) sensitive to the user groups in different areas;

5.5.4.1(6) less stark and clinical character than existing campus facilities;

5.5.4.1(7) complementary environmental wall graphics and other thematic décor with a range of themes and colours; and

5.5.4.1(8) coordinates with wayfinding concepts

5.5.5 Colour

5.5.5.1 Project Co will:

5.5.5.1(1) Provide departmental colour palettes appropriate for the emotional and psychological needs of patients and staff;

5.5.5.1(2) Provide natural colour palettes that contribute to the creation of a healing environment;

5.5.5.1(3) Provide distribution of ambient full-spectral colour within typical staff and patient environments;

5.5.5.1(4) avoid glare-creating finishes; and

5.5.5.1(5) avoid yellow/green tones in patient recovery and treatment areas.

5.5.6 Art Works

5.5.6.1 As part of the Authority's art program, the Authority intends to procure various art works for display within the Building.

5.5.6.2 Project Co will:

5.5.6.2(1) Design the Building to support the Authority's art program by providing and identifying for the Authority effective and appropriate locations for major and minor art works throughout the Building;

5.5.6.2(2) Provide lighting to enhance the display of all art works;

5.5.6.2(3) Provide all necessary structural support, seismic restraint, vandal-proof mounting and other protective measures required for particular art works; and

5.5.6.2(4) consider the development of major public pathways as galleries with hanging and display systems that can accommodate complete size and spacing flexibility in mounting.

5.5.6.2(5) Art can improve the quality of the environment by reinforcing the impression of a caring environment and by creating a sense of space through strong ties to the local community. Art can be a positive distraction for patients and promote social interaction and social support as well as patient's and staff's sense of ownership. Artwork can be used in the wayfinding strategy and plan.

5.5.6.2(6) Project Co shall work in concert with the Interior Health Authority to coordinate and manage artwork that is owned by IHA. Artwork shall form an integral part of the design development of the New Facility and shall form part of design development proposals without additional cost to the Authority.

5.5.7 First Nations Considerations for Penticton Regional Hospital – Patient Care Tower

5.5.7.1 Culture and Beliefs

5.5.7.1(1) First Nations culture and beliefs is passed down orally through storytelling, songs, dancing and hand drumming. Each carving, mask, painting, pictograph, and pottery piece describes the history as it is passed down, coming to life through dance and ceremony. The design of items such as clothing, baskets, masks, hand-drums, and pictograph paintings are interrelated with religious and social ceremonies, family histories and names, and geographical differences. Art and artifacts can signify rank and clan, and can commemorate events such as births, celebrations, ceremonies and deaths. The baskets, dugout canoes, and weapons were the lifeblood for food supplies and survival.

5.5.7.2 Okanagan History and Culture

5.5.7.2(1) The Okanagan Nation occupies a large area, from within Washington State to north of modern day Revelstoke and bordered on the east by the Kootenay Lakes and the west by the Nicola Valley. Baskets from birch bark and pine needles for sage, bitter root and shia stored within pit houses; canoes for crossing the lakes and for catching and drying salmon, characterize the region. Much of the art symbolizes the coyote, bear and salmon.

5.5.7.3 Design Considerations

5.5.7.3(1) New Facility shall have a design component representing the First Nations people and their art, and artefacts of the area.

5.5.7.3(2) This component should represent the art of the area and should allow space for local artists to show their work. Outdoor settings should have vegetation such as sage, bitterroot, pine, poplar and cottonwood trees, and Saskatoon berries. The inclusion of these icons is important to represent the culture and traditional lands of the area.

5.5.7.3(3) The design of the facilities shall include adequate structural support and seismic restraint to accommodate the shape weight and size of artwork components.

5.5.7.3(4) Gallery quality lighting shall be included to enhance the display of artwork, and security and/or protective enclosures shall be provided if and where required.

5.5.7.3(5) The development of the facility design shall where practical include major public pathways and galleries with hanging and display systems that are appropriate for the selected artwork.

5.5.8 Interior Way Finding

5.5.8.1 Project Co will:

5.5.8.1(1) Provide a simple configuration of the Building circulation systems and functions so that way finding is inherently easy for patients and families who are not familiar with the facility and so that the signs create a welcoming tone for them;

5.5.8.1(2) locate major destinations, such as department entrances, directly off of entry spaces and/or along primary circulation paths, make waiting areas as open as possible to circulation routes without forming part of the circulation corridors;

5.5.8.1(3) Provide significant recognizable, easily named and identified elements in key locations that can become ‘meeting points’ for patients and visitors;

5.5.8.1(4) design public elevator and stair lobbies and public circulation routes to be distinct from service routes and other non-public routes; and

5.5.8.1(5) orient all building plan directories to reflect the direction from which they are viewed.

5.5.9 Signage

5.5.9.1 Project Co will provide all signage required for the Building in accordance with the following:

5.5.9.1(1) use the Interior Health Graphic Standard for all ‘Interior Health’ logo placement.

5.5.9.1(2) signage will be highly visible (day and night), clear, concise, and well-differentiated from surrounding information, notices, advertising, etc. Use high colour contrast combinations on signs;

5.5.9.1(3) avoid the following colour combinations:

5.5.9.1(3)(a) Yellow on Black;

5.5.9.1(3)(b) Yellow on Green;

5.5.9.1(3)(c) Green on Blue;

5.5.9.1(3)(d) Red on Green.

5.5.9.1(4) font should be at least 16mm high on small signs and 40mm high on larger signs. Where used, tactile letters should be raised 1mm. Use the combination of capital and lower case lettering;

5.5.9.1(5) signage will be resistant to graffiti and physical damage and be of a material which will stand up to routine cleaning;

5.5.9.1(6) use international symbols where applicable so that signs are understandable to patients and families who do not or cannot read English;

5.5.9.1(7) Provide signage that directs visitors to all patient destinations and all other departments. Prioritize patient destinations over non-patient destinations;

5.5.9.1(8) place maps, including ‘You Are Here’ maps, at reception and entry areas;

5.5.9.1(9) exact sign installation height will be determined on-site with the Authority Design and Construction Representative;

5.5.9.1(10) orient all important signs, including all patient destination signs, to be perpendicular to the line of patient travel on approach;

5.5.9.1(11) avoid multi-layered naming hierarchies and complex numbering systems. The numbering system must dovetail with existing numbering system conventions already adopted on the PRH campus,

5.5.9.1(12) signage design must incorporate elder-friendly principles so that signage is easily understandable by patients and families using it for first time.

5.5.9.1(13) Project Co will provide spaces for donor recognition;

5.5.9.1(13)(a) one located in proximity to the main entrance;

5.5.9.1(13)(b) one in each of the public waiting rooms and other specific rooms where the Authority may construct a feature to recognize donors, and other supporters of the Building. Each space is to be outfitted with power and data, location to be determined through the user consultation process.

5.5.9.2 Design the internal directional signs to include:

5.5.9.2(1) A main directory, installed at or near each of the main public entrances/lobbies that indicates the location of the Building in relation to the overall PRH Campus, the location of every area and department within the Building that is accessible to the public, and the location of major departments identified by the Authority located in other parts of the PRH Campus, including parking lots, street names and north arrow;;

5.5.9.2(2) a continuous 'trail' of signage from the entrances to each of the departments located in the New Facility and listed on the directories;

5.5.9.2(3) installation of signage at each point at which a directional decision is required;

5.5.9.2(4) provide a graphic panel at each department entry, reception area, waiting rooms and within the department at main nurse stations. Coordinate the graphic panel with the departmental signage.

5.5.9.2(5) use consistent terminology and location of signage;

5.5.9.2(6) door signage to identify every space (e.g. rooms, alcoves, corridors and stairwells) in the Building. Door signage will:

5.5.9.2(6)(a) be located in a consistent location for every space in the Building;

5.5.9.2(6)(b) indicate restrictions on entry and warn of hazards, including "Laser in use" and "Radiology in use" signage;

5.5.9.2(6)(c) not be obscured by the emergency systems and Code Blue system call; and

5.5.9.2(6)(d) be consistent with the following room numbering protocol:

(d).1 each room has a unique identifier number;
(d).2 rooms are numbered in a manner that reflects normal movement through the Building and through its departments;
(d).3 labelling anticipates a person attempting to follow numbering along corridors in sequence;
(d).4 blocks of numbers are periodically skipped to allow for future expansion of the numbering system if rooms are added through renovations;
(d).5 each patient room will have a unique number which will follow a logical sequence for patients and visitors, such as Bay 1, Bay 2, Bay3, and so on, as well as a unique identifier number (see d)1), above;
(d).6 each room and space requires a unique number. It is important that room numbers be determined early in design and maintained following occupancy;
(d).7 Follow the same numbering system on design and construction documentation for all disciplines (architectural, mechanical, electrical, etc.).

5.5.9.2(7) Directional signage for staff at each service elevator;

5.5.9.2(8) Restricted access and card access signage for all service elevators;

5.5.9.2(9) Signage required at each stairwell level

5.5.9.2(10) Signage required at all staff only doors (interior and exterior)

5.5.9.2(11) Signage required at all public doors noting: facility name, hours of operation, if alternate entry location, smoke free environment, scent free environment.

5.5.9.2(12) Final signage wording will be determined through the User Consultation process.

5.6 Structural Design

5.6.1 Structural Design Principles

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

5.6.1.2 The structural design, including minimum design loads, general provisions and material specifications, will satisfy the more stringent requirements of the 2012 or most recent BC Building Code, local by-laws, other applicable or referenced design standards, loading criteria required by equipment suppliers or construction technique and the loading and performance requirements detailed in this Section.

5.6.1.3 Prior to starting construction of the Building, Project Co's structural engineer of record will have a qualified second Professional Engineer licensed in the Province of British Columbia perform a concept review satisfying the requirements of the Association of Professional Engineers and Geo-scientists of British Columbia Quality Management By-law.

5.6.1.4 Project Co's structural engineer-of-record will perform field review of the Construction at sufficient frequency and review of the reports of the applicable inspection and testing agencies to verify that the building structures of the New Facility have been built in substantial conformance to the approved issued for construction structural drawings and any authorized amendments thereto.

5.6.1.5 Project Co will carry out the Construction, including any site works, excavation, backfill, shoring and engineered backfill, so that Construction-caused settlement of existing buildings and structures over the term of the agreement will be minimized.

5.6.1.6 The structural design of the New Facility will be to 'post disaster' standards and the parking garage to normal standards. Related Importance Factors will be applied to seismic, wind and snow loads.

5.6.1.7 Upgrade the roof structures of adjacent buildings that may be impacted by snow drift due to the height of the structures to be added. Project Co shall submit a site specific snow study for review and acceptance by the Authority.

5.6.2 Structural Analysis Methods

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

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

5.6.3 Site Preparation and Sub Structures

5.6.3.1 Building foundation systems will provide adequate support to the superstructure while limiting overall and differential settlement to acceptable amounts for the building structure and serviceability over the term of the contract. Maximum settlement limits will be as specified in 5.6.3.5.

5.6.3.2 A geotechnical consultant will be part of Project Co's team. A supplementary geotechnical investigation may be required.

5.6.3.3 Building foundation systems and site preparation design will be in accordance with recommendations from a qualified geotechnical engineer registered in the Province of British Columbia. Building foundations to be designed by the building engineer-of-record.

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

5.6.3.5 During site preparation and construction, a qualified geotechnical engineer, registered in the Province of British Columbia, will provide site reviews and on-going testing to confirm the general intent of the foundation and site preparation specification and design recommendations, including densification, are carried out.

5.6.3.6 During site preparation, vibration will not exceed the limits specified in Schedule 2.

5.6.4 Structural Systems

5.6.4.1 For the New Facility the preferred structural system for the suspended floors and main roof consists of cast-in-place concrete flat slab construction. For the parking garage the preferred structural system is precast concrete double tees with either precast or cast in place concrete beams. Any other proposed system must provide similar performance for flexibility or change, vibration resistance, fire rating, acoustic separation, ceiling space available for services, and overall building height.

5.6.4.2 Building lateral seismic and wind loads will be resisted by strategically placed reinforced concrete shear walls that encompass both stair wells and elevator shafts. Where possible, shear walls should be avoided within interior spaces in order to leave flexibility for future changes.

5.6.4.3 Post tensioned or precast concrete structural systems may be used only for the parking garage structure.

5.6.4.4 The raised Helipad platform is preferred to be of a minimum 130 mm thick concrete topping above the top of the 76mm steel deck on structural steel beams.

5.6.4.5 Roofs may be structural steel or concrete slab construction. Structural steel roofs can be part of the building design and massing strategy to reduce settlements of adjacent buildings. Structural steel open web joists may be used at roof areas directly above mechanical rooms only. They are not permitted in spaces containing clinical, functional or storage of materials related to hospital functions as required by CSA Z8000.

5.6.4.6 The preferred system for the mechanical roof is 76mm steel roof deck on structural steel beams to accommodate the hanging of mechanical piping, etc.

5.6.4.7 The building foundations are to be founded a minimum of 600mm below finish grade to provide for frost protection.

5.6.5 Design Loads

5.6.5.1 Performance criteria for the New Facility excluding the parking garage

5.6.5.1(1) unless higher loads are required by the specific use and occupancy, and equipment loads, the following minimum floor design live loads will apply

5.6.5.1(1)(a) Level 0, level 1 and level 2 floors: 4.8 kPa (100 psf);

5.6.5.1(1)(b) level 3 mechanical floor: 6.0 kPa (125 psf)

5.6.5.1(1)(c) level 4 and 5 floors: 3.6 kPa (75 psf)

5.6.5.1(1)(d) mechanical penthouse: 6.0 kPa (125 psf) or as required for equipment

5.6.5.1(1)(e) helipad: designed for a helicopter static load of 75.6 kN (17,000 lbs.) times a factor of 1.5 for landing impact. This is to accommodate the three helicopters referred to in the Heliport report by Ground Effect Aerodrome Consulting Ltd. dated March 22, 2012.

5.6.5.1(2) floors will be designed to accommodate concentrated loads from equipment, fixtures, and machinery, whether floor, wall, or ceiling-mounted;

5.6.5.1(3) floors will be designed for a minimum superimposed dead load allowance of 1.5 kPa to allow for partitions, ceilings and suspended mechanical equipment;

5.6.5.1(4) roofs will be designed for a minimum net uplift wind load of 1.5 kPa and for the minimum snow and rain loads required by the BC Building Code and the local building 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;

5.6.5.1(5) roofs will be designed for the superimposed dead load of roofing materials, green roofs, ceilings, mechanical equipment, but not be less than 1.5 kPa (30 psf) to allow for future re-roofing alternatives;

5.6.5.1(6) floors and roofs above mechanical and electrical service rooms and penthouses will be designed for a minimum superimposed suspended equipment dead load of 2.0 kPa (40 psf) in addition to the minimum dead load allowances specified above; and

5.6.5.1(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.

5.6.5.2 Performance Criteria for the parking garage

5.6.5.2(1) floors will be designed for a live load of 2.4 kPa plus a superimposed dead load of 0.25kPa

5.6.5.2(2) roofs will be designed for a minimum net uplift wind load of 1.5 kPa and for the minimum snow and rain loads required by the BC Building Code and the local building 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

5.6.5.2(3)

5.6.6 Flexibility for Future Change

5.6.6.1 Design the New Facility floor structure excluding the parking garage, with a minimum of one 150mm diameter knock-out opening on two sides of each column for future use. The knock-out openings will be in addition to any openings required for current services; additionally the floor structure will be capable of having a minimum of six additional core holes (100 mm diameter) per bay without additional reinforcing. The additional core holes can be located outside slab column strip zones.

5.6.6.2 Select a structural system that will readily accommodate future changes for similar design load parameters without the addition of structural members, welding, noise, dust, or demolition should be a primary structural design criteria.

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

5.6.6.4 Avoid in-slab conduits and heating/cooling tubes.

5.6.7 Deflection limitations

5.6.7.1 Design the structure to meet the deflection limits of the BC Building Code, and in accordance with the applicable materials design standards listed in Section 2.1 of this Schedule as a minimum and as appropriate for the non-structural components of the Facility. Notwithstanding the above, the deflection limit will not exceed the levels specified in this Section.

5.6.7.2 Performance criteria

5.6.7.2(1) for concrete floor or roof construction, the maximum deflection occurring after the installation of non-structural elements due to all sustained loads, including long-term creep deflection due to sustained loads, plus immediate deflection due to live load, will not exceed span/480 for the PCT and span/360 for the parking garage;

5.6.7.2(2) for steel roof construction, the maximum live load deflection will not exceed span/360 and the total load deflection will not exceed span/240;

5.6.7.2(3) for steel floor construction, the maximum live load deflection will not exceed span/480 and the total load deflection will not exceed span/360. The total load deflection will include effects of shrinkage of concrete topping slabs; and

5.6.7.2(4) the floor and roof perimeter edge will be designed to limit combined short and long term deflection occurring after the installation of exterior wall components, including effects of creep, to a maximum of 25mm.

5.6.8 Vibration limitations

5.6.8.1 Design the structural system to minimize the effects of floor vibration due to use, occupancy, and equipment. Vibration is to be limited to acceptable levels for the use and occupancy of the floors and the performance requirements of this section. An acoustic and vibration consultant will be retained by Project Co. The consultant will be a Professional Engineer registered in the Province of B.C. with demonstrated experience in providing recommendations and analysis for acoustic and vibration performance of buildings.

5.6.8.2 Floor system vibration characteristics are to be in accordance with Commentary D of the NBC 2010 Edition.

5.6.8.3 Performance criteria

5.6.8.3(1) Select and design floor structural systems to have a vibration acceleration maximum limit of 0.5%g with a damping ratio of 0.02 when an excitation force of 0.29 kN is applied.

5.6.8.3(2) Machinery that could be a source of vibration will be mounted using vibration isolation techniques; this includes the potential dynamic loads associated with the use of the Helipad.

5.6.8.3(3) In areas supporting sensitive medical equipment and occupancies, design the structure for the vibration limitations specified by the manufacturer of the specified equipment or required by the planned use and occupancy of the floor space in accordance with the vibration limits in the following table. In-situ measurement verification of floor vibration characteristics is to be carried out where specified by the equipment manufacturer.

5.6.8.3(4) Acceptable vibration levels for various typical medical and non-medical Functional spaces are shown in Table 5.6.8.3(4),Vibration Limitation.

Table 5.6.8.3(4) - Vibration Limitation

Occupancy or Equipment Requirements	Vibration Velocity(1)		Floor Stiffness KF_n(2)
	µin/s	µm/s	Kips/in-sec
Mechanical rooms on an unoccupied floor above or below an occupied floor	40,000	1,000	Not Applicable
Office areas, waiting rooms and corridors	16,000	400	250-1500
Mechanical Rooms on the same floor as an occupied area	12,000	300	Not Applicable
Computer areas; patient care areas (daytime) – threshold of human perception	8000	200	500-3000
Operating rooms and critical work areas; bench microscopes up to 100 x magnification	4000	100	1000-6000
Bench microscopes up to 400 x magnification; optical and other precision balances; optical comparators	2000	50	2000-12000
Microsurgery, eye surgery; Bench microscopes at magnification greater than 400x; optical equipment on isolation tables	1000	25	4000-25000
Magnetic resonance imagers	500	12	8000-50000
Mass spectrometers	250	6	16000-100000

Occupancy or Equipment Requirements	Vibration Velocity[(1)]		Floor Stiffness KF_n[(2)]
	µin/s	µm/s	Kips/in-sec
(1) Value of constant velocity regions measured in one-third octave bands of frequency range 8 to 100 Hz. Based on ASHRAE, AISC and ISO Criteria. Vibration velocity at 4 Hz is to be limited to 2 times the allowable vibration at 8 Hz. (2) KFn depends on walker weight and gait. Ranges indicated reflect average to conservative designs. Average walker (150 lbs, 75 steps/min). Conservative walker (185lbs, 100 steps/min)			

5.6.8.3(5) Design specific functional floor area structure for the current planned occupancy vibration criteria as per Table 5.6.8.3(4)-Vibration Limitation with the provision that for any floor containing any clinical and inpatient occupancy, the vibration velocity for the entire floor, excluding mechanical and electrical rooms, shall not exceed 200 micro metres per second.

5.6.9 Durability

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

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

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

5.6.9.3(1) adequate concrete crack control joints and expansion/contraction joints. Caulk exposed joints;

5.6.9.3(2) high strength concrete mixes proportioned to CSA A23-1/A23-2 durability requirements for exposure class;

5.6.9.3(3) reinforce concrete for crack control and repair exposed cracks;

5.6.9.3(4) hot-dip galvanize or use a quality two part epoxy paint system on exterior exposed steel;

5.6.9.3(5) chamfer exposed concrete edges; and

5.6.9.3(6) add corrosion inhibitors to exterior reinforced concrete pavements subject to vehicle traffic.

5.6.10 Medical equipment supports

5.6.10.1 Design and Provide for support/anchorage of all Authority and Project Co supplied equipment including vendor required seismic bracing. Medical equipment will be

supported, anchored, and braced to resist gravity, operational, and seismic loads in a manner appropriate for the functional and service requirements for the specific equipment.

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

5.6.10.3 Performance criteria

5.6.10.3(1) Design floor and roof assemblies to support the gravity and seismic loads for floor, wall, or ceiling-mounted medical equipment included on the Equipment List. Ensure that steel content of structural members is compatible with equipment which is sensitive to steel content of the surrounding structure.

5.6.10.3(2) Design the structure for the vibration limitations specified by the manufacturer of the specified equipment or required by the planned use and occupancy of the floor space and carry out in-situ vibration testing when specified by the equipment manufacturer or as required in Schedule 2, Where practical, the design of and supports for ceiling-mounted equipment, such as radiology gantries, is to be universal for re-use with future equipment installations; and

5.6.10.3(3) Drilled insert-type anchors for medical equipment supports and anchorage are to be rated by the insert manufacturer for seismic and cyclic loading applications and drop-in sleeve anchors will not be permitted.

5.6.11 Member Design Criteria

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

5.6.11.2 Design all floor and roof structural framing members to have sufficient stiffness so as to remain serviceable under the specified gravity loads. The deflection criteria are presented in Section 5.6.7.

5.6.11.3 Lateral Load Resisting System Design Criteria

5.6.11.3(1) Design all structural framing members to have sufficient strength and stability so that the factored member resistance is equal to or greater than the effects of the factored lateral wind pressures or seismic loads, whichever produces the more unfavourable effect.

5.6.11.3(2) Design all structural framing members to have sufficient stiffness so as to remain serviceable under the specified wind pressures. The maximum inter-storey drift under the 1 in 50 year service wind pressure and gravity loads will not exceed 1/500 of the storey height.

5.6.11.4 Cladding Support Design Criteria

5.6.11.4(1) Where the cladding system is to be supported by the structural members, design the members to have sufficient strength and stability so that the factored member resistance is equal to or greater than the effects of the factored gravity, wind pressures and seismic forces, including applicable importance factors.

5.6.11.4(2) Where the cladding system is to be supported by the structural members, design the members to have sufficient stiffness so as to remain serviceable under the 1 in 50 year service wind pressure and gravity loads and prevent undue stress to the cladding elements. The deflection serviceability limits are shown in Table 5.6.11.4(2) Deflection/Span Ratios.

Table 5.6.11.4(2) - Deflection/Span Ratios

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 max

5.6.11.5 Structural Integrity

5.6.11.5(1) Various levels of structural integrity, ranging from the minimum level of structural integrity as stipulated the BC Building Code to enhanced integrity as determined by a rigorous progressive collapse design approach will be considered. Design any structure and its structural members to have sufficient structural capacity and structural integrity to safely and effectively resist all loads and effects of loads and influences that may reasonably be expected over the service life of the structure including settlement.

5.6.11.6 Thermal Expansion

5.6.11.6(1) Design the primary and secondary structural elements to accommodate the effects of thermal movements of the Facility structure.

5.6.11.7 Seismic Isolation

5.6.11.7(1) Design the structure to be completely independent from any existing adjacent new structures and any adjacent structures by a properly designed seismic isolation joint which takes into account the lateral drifts of both the new and adjacent existing structures in accordance with the provisions of the BC Building Code.

5.7 Bariatric Design

5.7.1 Definition of obesity:

5.7.1.1 For the purposes of this document, bariatric individuals are considered to be those within the range of 225 kg to 453 kg.

5.7.2 Bariatric Inpatient Room Requirements

5.7.2.1 Bariatric inpatient bedrooms will comply with CSA Z8000- 7.8.8.2.3 (Accommodation of Bariatric Persons);

5.7.2.2 The minimum dimension (in any direction) of the Bariatric bedroom will be 4500mm;

5.7.2.3 Clear space of at least 1500mm will be provided on three sides of three sides of the bed;

5.7.2.4 Sufficient clear space will be provided to accommodate large mobility aids and other portable equipment as well as family space;

5.7.2.5 Service connections (e.g.: medical gas, electrical) will be spaced farther apart to accommodate a wider bed;

5.7.2.6 The room will have a ceiling mounted patient lift and track system that can lift and transport at least 454 kg. The track should extend to both sides of the bed;

5.7.2.7 The room will be equipped with handrails that can support at least 454kg; and

5.7.2.8 Patient controlled room lights, temperature, and TV from bed.

5.7.3 Washrooms for inpatient bedrooms for bariatric patients should be designed with the following features:

5.7.3.1 door conforming to 6.8.1.2.(7)(c);

5.7.3.2 sink that can support at least a 363 kg downward force;

5.7.3.3 wall hung toilets which will accommodate mobile commodes;

5.7.3.4 toilet position compatible with the use of a bariatric commode;

5.7.3.5 distance from the toilet centre line to wall of 533mm to 610mm;

5.7.3.6 clear space of at least 1118mm on one side of the toilet for transfer use;

5.7.3.7 toilet paper dispenser mounted in a location where it can be easily reached by a bariatric patient;

5.7.3.8 equipped with grab bars that are appropriately sized and positioned for use by a bariatric person and can support 363 kg downward force. Grab bars all extend behind and beside the toilet.

5.7.3.9 Shower area that:

5.7.3.9(1) is open to the toilet area, with no floor lip, and with floor sloped to a drain;

5.7.3.9(2) has a minimum dimensions of 1220mm x 1520mm; and

5.7.3.9(3) is equipped with a moveable/portable shower seat and grab bars.

5.7.3.10 A privacy curtain will be provided at the door.

PART 6. FACILITIES CONSTRUCTION SUBGROUP SPECIFICATIONS

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

6.2 Existing Conditions (Division 2)

6.2.1 Refer to Section 6.8 of Schedule 2 regarding the Geotechnical Report.

6.2.2 Project Co will visit the Project Site, and at its option and prior to the execution of the Project Agreement, may perform further sub-surface investigation, drilling and sampling, material testing, exploratory excavations, and pre-construction monitoring, at its own expense and after receiving written permission from the Authority.

6.3 Concrete (Division 3)

6.3.1 Basic Requirements

6.3.1.1 Refer to Section 2.1.6 Technical References. The list of technical references is not intended to be a complete list of applicable standards. Design and construction will comply with applicable standards and practices whether listed in this section or not. See Section 2.1.6 for Technical References.

6.3.2 Overriding Principles

6.3.2.1 Design and construct cast in place or precast concrete of appropriate properties for the intended use in accordance with the requirements of all applicable codes and specifications for the applicable concrete exposure class and to maximize the fly ash content of the mix. All cast in place concrete must be vibrated or densified in an approved manner by a competent Place and Finish Contractor.

6.3.2.2 Honeycombing and bug holes will be repaired immediately under the direction of the Structural Engineer.

6.3.2.3 Use wood formwork or sonotube type form for all cast in place concrete.

6.3.3 Quality Requirements

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

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

6.3.4 Performance Criteria

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

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

6.3.4.3 Water proof foundation walls surrounding occupied spaces to prevent groundwater ingress. Construction joints will have purpose-made water stops. A perimeter footing drainage system will be installed around the exterior of the below grade spaces. Exposed architectural concrete will comply with CAN/CSA A23.1 to minimize honey combing or patching.

6.3.4.4 Exposed architectural concrete will comply with CAN/CSA A23.1 to minimize honey combing or patching and achieve a smooth and flat surface of uniform colour. Sandblast all concrete exposed to view in public areas on the interior and exterior. Repairs to be under the direction of the structural Engineer of Record.

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 section, may be considered for building elements and systems.

6.4.1.2 Masonry design and construction will comply with all applicable codes and standards including, but not limited to, CSA S304, CSA A371, the BC Building Code, and the standards listed in Section 2.1.6 for Technical References.

6.4.1.3 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 Building.

6.4.1.4 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.

6.4.1.5 Face work must be laid plumb and true with all joints consistent in both width and colour.

6.4.1.6 Provide masonry sealers to all exterior masonry.

6.4.2 Concrete Masonry Units

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

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

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

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

6.4.2.5 Masonry design and construction will comply with Canadian Masonry Contractors Association (CMCA) Masonry Practices Manual, CSA-S304, and all applicable standards including CSA-A371.

6.4.3 Brick Masonry

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

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

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

6.4.4 Stone Masonry

6.4.4.1 Stone masonry may be considered as a finish veneer to concrete walls or concrete masonry walls. Exterior wall systems in such applications will be a rain screen or cavity wall system.

6.4.4.2 Stone will be sound, hard and durable, well-seasoned and of uniform strength, colour and texture, and free of quarry sap, flaws, seams, sand holes, iron pyrites or other mineral or organic defects.

6.4.4.2(1) Manufactured stone products are excluded.

6.5 Metals (Division 5)

6.5.1 Basic Requirements

6.5.1.1 Structural steel, steel deck, miscellaneous metal fabrications, and cold-formed steel stud design and construction that meets or exceeds current Canadian standards and practices, including BC Building Code, as set out in this section, may be considered for building elements and systems. See Section2.1.6 for Technical References.

6.5.2 Performance Criteria

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

6.5.2.2 Erection tolerances for steel construction will be in accordance with CSA S16 Clause 29.3 except the maximum out-of-plumbness of exterior columns will be +/- 20mm over the full height of the building.

6.5.2.3 For steel floor and roof construction, the deflection of steel beams, joists, and girders due to the wet weight of concrete topping slabs is to be considered. Topping slab thickness may have to vary to maintain floor levelness tolerances. The additional concrete ponding weight is to be considered in the design of the structure.

6.5.2.4 Concrete topping slabs will be finished with a smooth, dense, steel trowel finish with a Class A Flatness Classification in accordance with CSA A23.1. Thin overlay toppings to level floors will not be used to level floors.

6.5.2.5 Pay special attention to crack control of concrete topping slabs on steel deck to avoid random surface shrinkage cracking and radial cracking around re-entrant corners and special attention to curing is required for concrete topping slabs on metal deck. 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) Provide extra topping slab reinforcement around openings, columns, and at corners.

6.5.2.6 Cracks in concrete topping slabs will be repaired to suit the floor finish and long-term serviceability requirements of the floor.

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

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

6.5.2.9 Fire proof structural steel floor/roof framing and supporting members to meet the fire rating requirement. Spray on fire proofing applications, which will be tamped

while wet to densify product, will be used for floor and roof beams and girders, complete with an applied sealer creating a dense non-friable surface, for ease of future attachment of services and equipment.

6.5.3 Structural Steel

6.5.3.1 Quality Requirements

6.5.3.1(1) Cause quality assurance testing and monitoring of workmanship to be carried out by an approved testing laboratory using testing procedures as specified in the CAN/CSA standards listed in Section 2.1 of this Schedule, including CSA S16, to verify soundness of representative shop and field welds. Test all full-strength welds.

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

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

6.5.3.1(4) Exterior exposed structural steel will be hot dipped galvanized to 600 g/m2 or painted with a quality two part epoxy paint system.

6.5.4 Cold-Formed Metal Framing

6.5.4.1 Overriding Principles

6.5.4.1(1) Load bearing and non-load bearing steel studs may be considered as a component of the exterior wall systems to support exterior wall finishes and form an integral part of the perimeter envelope.

6.5.4.1(2) Rain screen walls utilizing cold-formed metal framing will be non-load bearing.

6.5.4.1(3) Load bearing steel studs will be independent of the principle structural system.

6.5.4.1(4) Utilize cold-formed metal framing systems as part of rain screen systems, including tested air barrier assemblies.

6.5.4.2 Quality Requirements

6.5.4.2(1) Design, detail and construct load bearing steel stud design and construction to comply with all applicable CAN/CSA standards. See Section 2.1.6 for Technical References.

6.5.4.2(2) Cold –formed metal framing design will be carried out by a Professional Engineer registered in the Province of British Columbia; construction will comply with CSA-S136. Field reviews of the cold-formed metal framing installation will be carried out by the cold formed metal framing design engineer.

6.5.4.2(3) The steel stud manufacturer will be certified in accordance with CSSBI Standard 30M-06 and all applicable CAN/CSA standards including CSA-A660.

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 (including masonry veneers), unless a smaller maximum deflection is specifically required due to wall finishes.

6.5.4.3(2) Design components to accommodate erection tolerances of the structure.

6.5.4.3(3) Design wind bearing stud end connections to accommodate floor/roof deflections and to ensure that studs are not loaded axially.

6.5.4.3(4) Design steel studs to take into account the anchorage of other materials being supported including but not limited to: sub-girts supporting metal cladding and composite panels, soffit finishes and the provision of lateral support at window heads.

6.5.5 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.

6.5.5.1(2) Exterior elements will be hot dipped galvanized with 600 g/m2 to CAN/CSA – G164 or painted with a quality two part epoxy paint system.

6.5.5.2 Performance Requirements:

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

6.5.6 Modular Ceiling System

6.5.6.1 Provide a special, modular structural ceiling system (such as Unistrut), attached to the main structure, and designed to support all ceiling mounted equipment indicated in Schedule 2, Appendix 2E Equipment and Furniture, in the following areas:

6.5.6.1(1) All clinical spaces in Satellite Diagnostic Imaging.

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

6.6.1 Basic Requirements

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

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

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

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

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

6.6.1.3 Provide solid polymer fabricated surfacing for:

6.6.1.3(1) all counters that incorporate sinks, with the exception of where counters are also stainless steel such as Medical Device Reprocessing, Endoscopy scope reprocessing areas and Surgical Services Support areas;

6.6.1.3(2) all reception desks, Team Communication Stations, Team Care Station, and Diagnostic Imaging Control Desks; and

6.6.1.3(3) other areas as required to create surfaces that provide antiseptic or clean characteristics, special or regular maintenance, and resistance to caustic action of chemicals or agents used by the Authority.

6.6.1.4 Provide acrylic plastic, stainless steel or epoxy products as required for wall cladding, wall protection, corner protection, casework finishing, trims, ornamental

elements, and other applications to achieve a quality of interior finish suitable for use by patients and staff.

6.6.1.5 Use pressure treated wood for exterior exposed wood.

6.6.2 Performance Criteria

6.6.2.1 Finish Carpentry, Millwork and Architectural Woodwork

6.6.2.1(1) Conform to Architectural Woodwork Standards, First Edition, as issued by Architectural Woodwork Manufacturer's Association of Canada (AWMAC). Typically comply with Quality Standards Manual for minimum "Custom Grade," and Door and Hardware Institute (DHI) standards for the design, fabrication, materials, installation, and workmanship of finish carpentry and architectural woodwork;

6.6.2.1(2) All bottoms of sink cabinet boxes and areas that may come into contact with water must have a marine-grade plywood substrate. Do not use fibreboard or particleboard;

6.6.2.1(3) Use marine-grade plywood substrate for countertops. Do not use fibreboard or particleboard;

6.6.2.1(4) For millwork and cabinets, seal all wood surfaces and edges. All door, drawer and other exposed millwork edges will have applied an appropriately sized PVC edge strip, heat applied. There will be no P-Lam to P-Lam edges;

6.6.2.1(5) 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(6) Adhesives will be non-toxic, non-solvent glue to comply with AWMAC Quality Standards Manual, Canadian 'Eco-Logo' program, and CaGBC (Canada Green Building Council);

6.6.2.1(7) All exposed wood products on the interior of the Facility to be finished to meet infection control standards.

6.6.3 Architectural Millwork

6.6.3.1 Provide architectural millwork including all counters, cabinet units, shelving, hardware, finishing and installing as follows:

6.6.3.1(1) All composite wood products and laminating adhesives used in the millwork will not contain added urea-formaldehyde resins;

6.6.3.1(2) Adhesives will be non-toxic, low VOC, non-solvent glue to comply with AWMAC Quality Standards Manual, Canadian ‗Eco-Logo' program, and LEED credit 4;

6.6.3.1(3) Seal all wood surfaces and edges for infection control;

6.6.3.1(4) All cabinets will be flush overlay construction;

6.6.3.1(5) Design millwork so that no sharp edges are exposed, provide minimum 25 mm radiused corner to countertops;

6.6.3.1(6) All cabinets to be provided with locks except for nourishment areas;

6.6.3.1(7) Incorporate all required mechanical, electrical and communication services into the millwork so that wires and pipes are hidden from view, provide access panels to all services to allow for future adjustment;

6.6.3.1(8) Coordinate millwork with equipment indicated in Schedule 2, Appendix 2E Equipment and Furniture;

6.6.3.1(9) Provide built in valance lighting underneath all upper cupboards for task oriented and staff areas; and

6.6.3.1(10) All architectural woodwork hardware to be stainless steel of durable quality to meet the standards of AINSI/BHMA grade 1 Cabinet Hardware.

6.6.3.2 Provide stainless steel counters and shelves as follows:

6.6.3.2(1) Fabricate from Type 316, No. 4 finish stainless steel;

6.6.3.2(2) Corners will be welded, ground, polished and crevice-free. Joints and welds will be polished to a uniform No. 4 satin finish. No filler or solders will be used. Straight lengths will be one-piece with all seams, including field joints, welded;

6.6.3.2(3) Sound-deaden tops and reinforce with waterproof plywood core, bonded to tops with waterproof contact cement. Seal underside of top (plywood core) with a waterproof finish. The front edges of the tops will be marine edge. Form splashback as an integral part of the tops, radiused where the splashback occurs in the top. Bond all splashbacks to plywood core, bonded the same as specified for the tops. Fabricate countertops, splashbacks, and front aprons out of one piece of stainless steel. Weld counter and sink assemblies into single units without seams or joints. Drill splashbacks, tops and sinks to receive plumbing and electrical fittings; and

6.6.3.2(4) Form integral sinks with all-welded rounded corners, seamless construction with all traces of welding removed. Weld stainless steel sinks integrally into tops without seams or joints. Slope tops for sinks and adjacent drain boards to sinks. Provide sinks with drain outlets with removable stainless steel strainer. Stainless steel bench and or counter tops are required where staining or similar procedures are performed.

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

6.6.3.3(1) All counters will be a minimum 1500 mm in length, except in locations where the room area is too small to accommodate the full length;

6.6.3.3(2) All storage closets will be a minimum along 50% of the available wall perimeter in a room or space;

6.6.3.3(3) All storage closets will be a minimum 2100 mm high with a top surface designed to be easily cleaned;

6.6.3.3(4) Workroom, Biomedical Engineering in Surgical Services Support area requires stainless steel work counter minimum 3000mm length and 812mm wide with 2 banks of lower drawers.

6.6.3.3(5) All nourishment/ kitchenette areas will be provided with millwork as follows:

6.6.3.3(5)(a) counter, upper cupboards and under counter cupboards as follows:

(a).1 Food Service Galley/nourishment/ kitchenette areas (except those located in lounges): along 100% of the wall space available;

(a).2 Nourishment/ kitchenette areas in lounges: dimensions of millwork to suit function but have a minimum 2100 mm of uninterrupted counter space, upper cupboards, under the counter cupboards and drawers,

(a).3 Accommodate all the requirements of the equipment listed in Schedule 2, Appendix 2E Equipment and Furniture, for microwaves, integrated sinks etc. ;

(a).4 A minimum of three drawers in lower cupboards.

6.6.3.3(6) All medication rooms and medication areas:

6.6.3.3(6)(a) Counter to extend across the full width of the room with lower drawers.

6.6.3.3(7) Pneumatic tube station millwork as follows:

6.6.3.3(7)(a) fully coordinate with the pneumatic tube manufacturer‘s requirements to integrate PTS sending and receiving unit;

6.6.3.3(7)(b) provide a wall recess for the tube station;

6.6.3.3(7)(c) have directly adjacent a dedicated, standing height, minimum length 915 mm, millwork counter top with two deep drawers below for storage.

6.6.3.3(8) Provide alcove workstations as follows:

6.6.3.3(8)(a) To extend across the width of the alcove; and

6.6.3.3(8)(b) Depth to serve the intended clinical functions and equipment listed in Schedule 2, Appendix 2E Equipment and Furniture.

6.6.3.3(9) Provide digital display millwork as follows:

6.6.3.3(9)(a) freestanding millwork structures or wall mounted millwork installations; and

6.6.3.3(9)(b) designed to accommodate digital displays so visitors and the digital interface is easily accessed.

6.6.3.3(10) Provide Patient wardrobe cabinet as follows:

6.6.3.3(10)(a) a minimum 600 mm in length and comes with hanging space, shelving and a keyless lockable cupboard for valuables. Rods or hooks shall be anti-ligature, breakaway type.

6.6.3.3(11) In General Clinics Reception Area A2.1.2 Large Waiting Area and Diagnostic Clinic Reception Area A3.1.1 Diagnostic Testing Waiting area provide standing height, solid polymer fabricated surface counter along the wall with stools for a portion of the overall seating capacity. Provide power and data along the length of the counter at a minimum of 5 locations.

6.7 Thermal and Moisture Protection (Division 7)

6.7.1 Basic Requirements

6.7.1.1 Design construction assemblies according to building envelope principles.

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

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

6.7.1.4 Provide protection (such as insulation) as required by code.

6.7.1.5 Provide fire-resistance rated exterior and interior walls as required by code and locate these separations to minimize impact on clinical adjacencies and flows.

6.7.2 Performance Criteria

6.7.2.1 Dampproofing

6.7.2.1(1) Provide foundation wall surfaces with dampproofing coverage that is sufficient to repel and prevent moisture ingress in accordance with BCBC 5.8.2 where no hydrostatic pressure is present.

6.7.2.2 Waterproofing

6.7.2.2(1) Provide waterproofing to prevent moisture ingress to occupied spaces below grade.

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

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

6.7.2.3 Vapour Barriers

6.7.2.3(1) Prevent water vapour transmission and condensation in wall assemblies, roofing assemblies, and under concrete slabs-on-grade within the Building perimeter by means of a continuous vapour barrier membrane.

6.7.2.3(2) At underslab conditions, Provide continuous vapour barrier not less than 0.15 mm thick plastic sheet complying with ASTM E1745, Class A.

6.7.2.3(3) Conduct dew-point analysis to determine correct placement of vapour barrier within wall and roof assemblies.

Coordinate locations of thermal insulation, waterproof membranes, and air and vapour barriers to prevent creation of dew point, resulting in condensation within assemblies.

6.7.2.4 Air Barriers

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

6.7.2.4(2) Provide air barrier assemblies that:

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

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

6.7.2.5 Thermal Protection

6.7.2.5(1) Provide thermal insulation as part of the building envelope to prevent the transfer of heat both from the interior to the exterior and vice versa, depending on seasonal conditions, and to resist the absorption of water.

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

6.7.2.5(3) Use foamed plastic insulation that is CFC and HCFC free and in compliance with the Province of British Columbia Ozone Depleting Substances Regulations.

6.7.2.6 Roofing

6.7.2.6(1) Comply with the Roofing Contractors Association of British Columbia Guarantee Corp (RGC) latest standards and requirements for a ten (10) year Guarantee as published in the RGC Roofing Practices Manual. Perform roofing quality inspections as required by the RCABC to obtain the RCABC warranty.

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

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

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

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

6.7.2.6(4) Roof assembly design including deck, vapour barrier, insulation, board stock, and membranes will comply with British Columbia Building Code for fire classifications and with RGC requirements for wind uplift requirements, as well as requirements of Paragraph 3.10.1.1 for live loads, dead loads, snow loads, and wind uplift. Comply with ULC Class 60 wind uplift classification.

6.7.2.6(5) Use foamed plastic insulation that is CFC- and HCFC-free and in compliance with the Province of British Columbia Ozone Depleting Substances Regulations.

6.7.2.6(6) Provide a complete horizontal barrier to weather and climate using one of the aforementioned roofing systems.

6.7.2.6(7) If a green roof is used, design the assembly so that the system dead load, measured according to ASTM D2397, when added to the weight of the roofing membrane system, do not exceed the maximum allowable dead load for the roof.

6.7.2.6(8) Roofing systems will include:

6.7.2.6(8)(a) flashings and sheet metal;

6.7.2.6(8)(b) thermal insulation;

6.7.2.6(8)(c) assembly components for green roofs if used, otherwise provide roof with SRI complying with LEED requirements;

6.7.2.6(8)(d) roofing specialties and accessories required for completion;

6.7.2.6(8)(e) interior access systems to roof areas;

6.7.2.6(8)(f) protection from pedestrian traffic and solar radiation; and

6.7.2.6(8)(g) roof drainage, including overflow scuppers.

6.7.2.6(9) Provide sheet metal flashings that divert water away from membrane flashing termination and protect the membrane from deterioration due to the exterior elements and mechanical damage. Provide roofing membrane continuously under the metal flashings. Ensure that sheet metal components comply with wind uplift requirements established for roofing system

6.7.2.6(10) Metal roofing systems, if used, will provide clear internal paths of drainage to allow any trapped moisture to drain to the exterior and avoid the staining of architectural finishes, forming of puddles, forming of icicles, and dripping on pedestrians. In designing the Building, including any roof systems, ensure that entrance ways are protected from sliding snow and ice and that there are no accumulations of snow and ice in roof valleys.

6.7.2.6(11) Ponding of water on roofs will not be accepted.

6.7.2.7 Fire and Smoke Protection

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

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

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

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

6.7.2.7(5) Use firestopping that:

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

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

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

6.7.2.7(6) When more than one product is required for an assembly, use products that are compatible with one another and from the same manufacturer. Products will comply with requirements established by ULC tested assemblies.

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

6.7.2.8 Sealants

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

6.7.2.8(2) Apply sealant materials to achieve:

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

6.7.2.8(2)(b) seals around and over cavities in or behind surface elements to allow effective infection prevention and control;

6.7.2.8(2)(c) sealant around door frames must include joints at bottom of door frames (between floor finish and frames);

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

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

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

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

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

6.7.2.8(5)(a) Seal all door frames to floor,

6.7.2.8(5)(b) Seal all top edge of equipment rails and wood hand, bumper and crash rails to wall.

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

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

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

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

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

6.7.2.9 Traffic Coatings

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

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

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

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

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

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

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

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

6.8 Openings (Division 8)

6.8.1 Basic Requirements

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

6.8.1.2 Doors

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

6.8.1.2(2) All patient washroom doors must either swing out or be dual swing. Hardware for these doors must allow the staff access in case of an emergency without having to use a tool.

6.8.1.2(3) For all doors: floor mounted rails, slides and/or locking pins are not permitted (top mount only).

6.8.1.2(4) Isolation Room doors must be of a quality which allows for a good seal to maintain HVAC as well as acoustical privacy.

6.8.1.2(5) Glazing in doors (interior and exterior) will be required to allow for proper security, sight lines and natural lighting as per Appendix 3A Clinical Specifications and Functional Space Requirements and Schedule 2, Design and Construction Protocols.

6.8.1.2(6) Exterior doors will meet the requirements of ASHRAE 90.1.

6.8.1.2(7) Size Requirements for Doors

6.8.1.2(7)(a) Provide door openings of adequate width to suit the intended purpose of rooms on either side of the doors and also allow the movement of people and equipment associated with those rooms;

6.8.1.2(7)(b) Provide door openings to accommodate bariatric requirements where required;

6.8.1.2(7)(c) Entry door for bariatric inpatient rooms will be at least 1500 mm provided with an uneven pair of doors; doors to Lounge areas that could be used by bariatric patients should be a minimum 1220 mm wide;

6.8.1.2(7)(d) Main Entrance doors will be a minimum 2440 mm (8'-0")

6.8.1.2(7)(e) Minimum door width for non-clinical spaces will be 914 mm (3'-0");

6.8.1.2(7)(f) Minimum door openings for clinical rooms will be 1065 mm (3'-6") where no pallet, stretcher or bed will be required;

6.8.1.2(7)(g) Minimum door width for clinical rooms where pallet, stretcher or bed access is required shall be 1065 mm and shall include a side leaf to allow a total width of 1525 mm.

6.8.1.2(7)(h) Door width shall be a minimum 1800 mm for private level one and level two recovery rooms. . The minimum door width for inpatient bedrooms shall be 1065 mm and shall include a side leaf to allow a total width of 1530 mm.

6.8.1.2(7)(i) Minimum door width for Operating Rooms shall be 1220 mm wide for access to central core and 1220 mm wide with 610 mm side leaf for patient access door openings.

6.8.1.2(7)(j) Minimum door width for minor procedure shall be 1065 mm with 460 mm side leaf. Endoscopy and Cystoscopy/Colposcopy Rooms shall be 1220 mm with610 mm side leaf.

6.8.1.2(7)(k) Provide double 914 mm (3'-0") doors into rooms where large pieces of equipment will be moved in or out during the lifetime of the Building. This will include all mechanical and electrical rooms; provide a minimum of 2134 mm (7'-0") high door or door leaf, unless specifically required for access

to services or other purposes where height is restricted or greater height is required.

6.8.1.2(8) At all doors, including secured and fire separation doors, where patient wheelchair/stretcher/bed movement is required, including doors into or between major departments, restricted zones or activity areas, provide automatic doors activated by handicapped accessible push-button controls located on the inside and outside of the doors. Doors will be configured for push-pull manual operation in addition to automatic operation.

6.8.1.2(9) One public washroom per department and public areas must accommodate a bariatric wheelchair. These doors must be on automatic openers.

6.8.1.2(10) Acoustic Requirements for Doors: refer to Appendix 3D Sound Transmission Ratings.

6.8.1.2(11) Provide patient rooms with hardware that allows the doors to stay in an open position and facilitates casual observance of patients by the nursing staff.

6.8.1.2(12) Apply door sizes and designs consistently to rooms of similar use, location, and configuration.

6.8.1.2(13) Avoid doors swinging into corridors in a manner that may obstruct traffic flow or reduce the corridor width, except doors to spaces that are used infrequently and are not subject to occupancy such as small closets.

6.8.1.2(14) Provide all doors with appropriate hinges, edge protection, and face protection to minimize damage and resultant disruptive maintenance.

6.8.1.2(15) Be consistent with the extent of glazing in a door, or the size and quantity of sidelights, and balance these between the extent of observation required and the privacy requirements of the occupants of the room. Where appropriate, provide glazing in an adjacent sidelight rather than within the door itself. The amount of glazing in doors or side lights in clinical areas will require input and review by the Authority in the context of the specific design of rooms and departments.

6.8.1.2(16) Provide glazing in doors and sidelights in such a way that they allow patient observation and operational safety of the spaces they serve. Provide sealed double glazing in aluminum frame sliding

doors, sliding doors to be without floor tracks, and be provided with emergency swing breakout.

6.8.1.2(17) Provide doors and door frames with the capability to withstand the varying and high levels of humidity and impact that occur typically within a hospital and in specific rooms within a hospital, and maintain their inherent aesthetic and functional capacities.

6.8.1.2(18) In areas where security is considered paramount, achieve security with the appropriate location, configuration, materials, construction, and detailing of doors and hardware.

6.8.1.2(19) Wood doors are appropriate for public, patient and staff care areas, including department entrances.

6.8.1.2(20) Metal doors are appropriate for service areas where high impact to doors are frequent

6.8.1.3 Windows

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

6.8.1.3(2) Provide ‘borrowed light’ deep into the building, either through interior windows to occupied rooms that do not have exterior windows or through other means. The intent is to borrow light to create a more comfortable and less closed-in atmosphere which will benefit staff and patients alike.

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

6.8.1.3(4) Coordinate glazing heights with adjacent wall protection, handrails, and other accessories to achieve functional and aesthetic cohesiveness.

6.8.2 Performance Criteria

6.8.2.1 Hollow Metal Doors and Frames

6.8.2.1(1) Materials and manufacture of metal doors will comply with the requirements of the Canadian Steel Door and Frame Manufacturer’s Association (CSDFMA).

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

6.8.2.1(3) Doors with an inactive leaf will not be floor bolted. Bolt into frame instead.

6.8.2.1(4) Provide exterior metal doors with:

6.8.2.1(4)(a) flush face construction, continuously welded, seamless edge construction using steel sheet;

6.8.2.1(4)(b) edge seams to correspond with door function and minimize maintenance needed;

6.8.2.1(4)(c) prepared surfaces to receive finishes that resist corrosion from exposure to weather. Provide with ZF180 coating.

6.8.2.1(4)(d) all exterior doors that open out must be capped to avoid water collecting in welding channels.

6.8.2.1(5) Provide pressed metal frames with:

6.8.2.1(5)(a) fully welded construction. Provide same gauge at frames as at doors to improve performance of assembly, including hardware;

6.8.2.1(5)(b) thermally-broken door frames for exterior, non-fire-rated openings; and

6.8.2.1(5)(c) anchors to each jamb to suit wall type and receive the frame.

6.8.2.1(6) Door Glazing - Coordinate with 6.8.1

6.8.2.1(6)(a) For exterior hollow metal door glazing, use sealed units with warm edge, argon filled space in thermally-broken frames to prevent heat loss.

6.8.2.1(6)(b) For interior hollow metal door glazing use tempered glass. Provide with safety label where required.

6.8.2.2 Wood Doors

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

6.8.2.2(2) Wood doors will have hardware and finishes that suit the intended function and aesthetics of the Building. Typically use Grade A faces

for transparent finish. Factory finish is required for doors with transparent finish; use UV-cured polyurethane finish system. All wood door edges must be sealed.

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

6.8.2.2(4) Provide wood doors in flush design, Custom Grade quality (as defined in the AWMAC standards referred to above), 5-ply bonded particleboard core.

6.8.2.2(5) Doors with an inactive leaf will not be floor bolted. Bolt into frame instead.

6.8.2.2(6) Provide fire-resistance rated doors with a homogeneous incombustible mineral core and AWMAC Quality Standards Option 5 blocking.

6.8.2.2(7) Install finish hardware securely. Fasten to solid wood backing, except where hardware is designed to be through-bolted.

6.8.2.2(8) Glue stiles, rails and faces to the core with Type II water-resistant adhesive to minimize de-lamination or disassembly as a result of moisture ingress.

6.8.2.2(9) Use B-Grade hardwood veneer with AWMAC No. 3 edge, finish to suit the intended use.

6.8.2.2(10) Do not use wood veneer-faced doors in critical care areas for reasons of cleanliness and infection prevention and control,

6.8.2.2(11) In locations requiring radiation protection, line doors with lead and label such doors with lead thickness.

6.8.2.3 Aluminum Entrances and Storefronts

6.8.2.3(1) Aluminum entrances and storefront framing and doors may form part of the exterior envelope of the Building.

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

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

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

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

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

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

6.8.2.4 Specialty Doors

6.8.2.4(1) Overhead Rolling Service Doors

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

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

6.8.2.4(1)(c) For manually operated doors, Provide inside lift handle and locking bar or chain hoist. Motor operation must 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) Provide motor operation for any overhead doors to be operated by clinical staff.

6.8.2.4(1)(e) For fire doors, Provide automatic closing device operated by fire door release device connected to fire alarm system.

6.8.2.4(2) Overhead Rolling Grilles

6.8.2.4(2)(a) Provide grilles that allow visual access to secure areas.

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

6.8.2.4(2)(c) For manually operated closures, Provide inside lift handle and locking bar or chain hoist. Motor operation must be provided on grilles requiring constant usage. Chain operation will be by means of reduction gears and heavy chrome plated hand chain.

6.8.2.4(2)(d) Provide motor operation for any overhead doors to be operated by clinical staff.

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

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

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

6.8.2.4(3)(c) Provide motor operation for any overhead doors to be operated by clinical staff

6.8.2.4(4) Interior Aluminum Sliding Doors and Sidelights

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

6.8.2.4(5) Automatic Sliding Doors

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

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

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

6.8.2.4(6) Automatic Swing Doors

6.8.2.4(6)(a) Use automatic swing doors for interior and exterior locations where appropriate, including cross-corridor double-egress doors, entrances to departments, inpatient unit medication rooms and areas where stretchers and equipment are frequently wheeled, and doors to exterior spaces that are required to be handicapped accessible. Door controls must be determined through the User Consultation process to ensure placement is accessible to staff pushing wheeled equipment including patient stretchers.

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

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

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

6.8.2.5 Door hardware to be the following:

6.8.2.5(1) The Authority's goal is to limit the use of keys through door hardware technology. Location of card readers and other technologies such as keypads are described in Schedule 3 and Appendix 3I [Room Requirements].

6.8.2.5(2) Office locksets: Offices.

6.8.2.5(3) Storeroom lockset: Mechanical/Electrical rooms.

6.8.2.5(4) All doors within patient corridors, departmental entrances, high level disinfection (HLD) zone and exits, which are closed due to code and/or controlled access requirements must be on automatic operators, both leafs are to open allowing for maximum corridor width. Automatic opening hardware will be push button type in all public areas and hands-free sensor type in all staff areas. The hands-free sensor type in all staff areas should be a touchless switch, wave-to-open type sensor, designed for healthcare applications.

6.8.2.5(5) Areas requiring card reader access (controlled access):

6.8.2.5(5)(a) All entrances into the OR's, sterile core, clean and soiled housekeeping rooms, all entrances into MDR, all doors which access off the 24 hr. public corridor;

6.8.2.5(5)(b) MDR decontamination area, clean/assembly area, supply storage/case cart assembly area, staff facilities, administration areas;

6.8.2.5(5)(c) Inpatient Unit Medication Rooms;

6.8.2.5(5)(d) Minor Procedures Scope Decontamination Room and Scope Disinfection Room;

6.8.2.5(5)(e) Satellite Diagnostic Imaging Technologist Viewing Rooms, MRI Procedure Room and Control Room, and;

6.8.2.5(5)(f) Cardiology Diagnostics Clinic Records Storage Room.

6.8.2.5(6) Keypads: Meeting or Conference Rooms, including Video Conference and Team Conference Rooms, staff lounges, staff break rooms, staff change rooms, staff locker rooms and staff washrooms;

6.8.2.5(7) Dual function Keypad/Card reader: Nuclear Medicine Procedure Room;

6.8.2.5(8) All exterior doors require card access;

6.8.2.5(9) All doors throughout the New Facility require door hardware. Evacuation Room Verification System including hinges and evacuation indicators which are highly visible in low light and smoke filled environments to signal if the room is vacant or in-use. The Evacuation Room Verification System shall indicate the status of the room during emergency conditions. The system shall be activated when occupants have vacated the room and indicate if someone has re-entered the room. The system shall enable the Fire Department to quickly assess the status of a room; if the device is in closed position then the room has been accessed and must be verified. If the door to a room is opened by more than one inch, the spring hinge shall revert the system automatically to the closed position. The unit shall not be reset from inside the room.

6.8.2.6 Aluminum Curtain Walls

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

6.8.2.6(2) Incorporate in the curtain wall framing a drained and vented system complete with air and vapour seal, allowing any water entering the framing/system and the glazing detail cavities to drain to the exterior and also allow air into the pressuring chamber.

6.8.2.6(3) Provide curtain wall framing that incorporates a thermal-break.

6.8.2.6(4) For exposed aluminum surfaces, provide a finish that is permanent and resistant to corrosion resulting from weather exposure and climate.

6.8.2.6(5) Provide assemblies that resist local seismic conditions and 1-in-100 year climatic events (with a safety factor).

6.8.2.7 Aluminum Windows

6.8.2.7(1) Aluminum windows will comply with all applicable standards, including the Aluminum Association Standards (AAS) and the American Architectural Manufacturers Association (AAMA) field testing specifications. Provide Architectural Grade windows unless otherwise noted.

6.8.2.7(2) Incorporate in windows a drained and vented system complete with air and vapour seal, allowing any water entering the framing/system and the glazing detail cavities to drain to the exterior and also allow air into the pressuring chamber.

6.8.2.7(3) Provide windows that incorporate a thermal-break.

6.8.2.7(4) For exposed aluminum surfaces, Provide a finish that is permanent and resistant to corrosion resulting from weather exposure and climate.

6.8.2.7(5) Provide assemblies that resist local seismic conditions and 1-in-100 year climatic events (with a safety factor).

6.8.2.8 Skylights

6.8.2.8(1) Skylights will comply with all applicable standards, including the Aluminum Association Standards (AAS), and the American Architectural Manufacturers Association (AAMA) field testing specifications.

6.8.2.8(2) Roof or skylight glazing may be provided where natural light is required in interior spaces to augment or complement interior ambient lighting.

6.8.2.8(3) For exposed aluminum surfaces, provide a finish that is permanent and resistant to corrosion resulting from weather exposure and climate.

6.8.2.9 Tubular Daylighting Devices (light tubes)

6.8.2.9(1) Tubular daylighting devices may be provided in interior spaces to augment or complement interior ambient lighting.

6.8.2.9(2) Provide tubular daylighting devices as follows:

6.8.2.9(2)(a) transparent roof mounted skylight dome and self flashing curb, reflective tube and ceiling level diffuser assembly;

6.8.2.9(2)(b) complying with the International Code Council ICC AC-16;

6.8.2.9(2)(c) minimum tube diameter to be 530 mm.

6.8.2.10 Glass and Glazing

6.8.2.10(1) Glass and glazing will comply with all applicable standards, including the Insulating Glass Manufacturers Association of Canada (IGMAC) Guidelines and the Glazing Contractors Association of B.C. (GCA) Glazing Systems Specifications Manual.

6.8.2.10(2) Exterior and/or interior glass and glazing may be provided as integral components of the exterior envelope, interior partitions and screens, exterior and interior doors, handrail balustrades, skylights and decorative and ornamental glazing.

6.8.2.10(3) Provide assemblies that resist local seismic conditions as a post-disaster building as defined in the BC Building Code.

6.8.2.10(4) Provide assemblies that resist 1-in-100 year climatic events (with a safety factor).

6.8.2.10(5) Use laminated safety glass in entry doors and sidelights, or as the inboard light of a double-glazed skylight.

6.8.2.10(6) Mirrors

6.8.2.10(6)(a) For full wall unframed mirrors, use 6 mm thick minimum float glass backed with electrolytically-

applied copper plating. Grind smooth and polish all edges.

6.8.2.10(6)(b) For wall mounted posture mirrors, use framed type; one piece, stainless steel channel frame with a No. 1 quality, 6 mm thick float glass mirror backed with electrolytically applied copper plating. Back with galvanized steel.

6.8.2.10(6)(c) Identify whether safety glazing will be required. If so, apply laminate to back of mirror. Do not use tempered glass as this results in distortion

6.8.2.10(6)(d) . Consider the need for mirrors in corridors which have a 90 degree corner.

6.8.2.11 Finish Hardware

6.8.2.11(1) Finish hardware will comply with all applicable standards, including the quality standards of the Door and Hardware Institute (DHI).

6.8.2.11(2) Provide all finish hardware from one supplier that is a member in good standing of the Door and Hardware Institute (DHI) and has in its employ one or more AHC (Architectural Hardware Consultant).

6.8.2.11(3) Hardware will be integrated with the security requirements and coordinated with electrical wiring and power requirements.

6.8.2.11(4) Select finishes providing maximum longevity and preservation of the finish. Use minimum 65% copper content material without varnish finish on frequently touched hardware to reduce the spread of infection.

6.8.2.11(5) Provide, where applicable, ULC-listed hardware for the required fire rating.

6.8.2.11(6) Use heavy-duty Grade 1 commercial quality hardware; locksets and latch sets fully mortised type and lever handles of solid material.

6.8.2.11(7) Hardware will not penetrate the floor.

6.8.2.11(8) For special areas provide hardware to suit the purposes unique to those areas, as identified in the user consultation process as described in Appendix 2B User Consultation Process.

6.8.2.11(9) Keying

6.8.2.11(9)(a) Provide ASSA key cylinders, 6 pin (factory pinned) with matching keyway to the existing Hospital.

6.8.2.11(9)(b) Implement a 4-level system.

6.8.2.11(9)(c) Keying groups will be assigned by the Authority.

6.8.2.11(9)(d) New key fittings will be given to and controlled by the Authority.

6.8.2.11(9)(e) Turn over keys from factory to the Authority.

6.8.2.11(9)(f) Provide four (4) keys for each lock cylinder.

6.8.2.11(9)(g) Provide Key Schedule to the Authority.

6.9 Finishes (Division 9)

6.9.1 Basic Requirements

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

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

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

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

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

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

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

6.9.2 Performance Criteria

6.9.2.1 Interior Wall Framing in Patient Care Areas

6.9.2.1(1) Interior wall framing in patient care areas will comply with all applicable standards, including the Canadian Sheet Steel Building Institute Standards (CSSB1) and the Association of Wall and Ceiling Contractors of B.C. (AWCC) Wall & Ceiling Specification Standards Manual for materials and workmanship for interior walls, including steel studs and furring and gypsum board ceiling suspension systems.

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

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

6.9.2.1(4) Consider in design, the differences in air pressure that may result on opposite sides of the wall or partition due to factors such as wind and other lateral pressures, stack effects, or mechanically-induced air pressurization.

6.9.2.1(5) Design assembly to accommodate construction tolerances, deflection of building structural members, and clearances of intended opening.

6.9.2.1(6) Where gypsum board systems are required to provide fire resistance ratings, design wall assemblies tested by fire testing laboratories acceptable to Authorities Having Jurisdiction.

6.9.2.2 Gypsum Board

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

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

6.9.2.2(3) Use cementitious backer board (tile backer board) behind ceramic wall tile in showers or other wet areas where tile is used. Use glass mat water-resistant gypsum backing panels behind sinks and other wet areas including Medical Device Reprocessing department.

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

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

6.9.2.2(6) Use fire rated gypsum board at fire rated wall assemblies.

6.9.2.2(7) Provide airborne sound insulation for gypsum board/steel stud assembly to close off air leaks and flanking paths by which noise can go around the assembly. Make assemblies airtight. Where it is necessary to install back to back devices in a single stud space, provide additional drywall separation between devices within the stud space to reduce sound transfer between rooms in order to meet requirements outlined in Appendix 3D Sound Transmission Ratings. In addition, carefully cut any opening for fixtures to the proper size and appropriately seal piping penetration. Seal conduit/duct/piping penetrations with tape and fill at the plenum barrier. Make the entire perimeter of a sound insulating assembly airtight to prevent sound flanking. Use an acoustic caulking compound or acoustical sealant to seal between the assembly and all dissimilar surfaces (including at window mullions) in accordance with the recommendations of an acoustic consultant.

6.9.2.3 Ceramic Tilework

6.9.2.3(1) Ceramic tilework will comply with all applicable standards, including the Terrazzo Tile and Marble Association of Canada (TTMAC) Specification Guide 09 30 13 Tile Installation Manual.

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

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

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

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

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

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

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

6.9.2.3(6) Provide crack isolation membranes to resist crack transmission from the substrate due to lateral movement; design for use in thin-set applications of tile over a cracked substrate. Use elastomeric sheets or trowel-applied materials suitable for subsequent bonding of ceramic tile.

6.9.2.3(7) Set ceramic tile with latex modified mortar and all grout must be epoxy based.

6.9.2.3(8) Do not use tile floors in showers.

6.9.2.4 Ceilings

6.9.2.4(1) Ceiling finish for Infection Control purposes must meet the 'semi-restricted' and 'restricted' definitions as set out in the Health Care Design Guidelines.

6.9.2.4(2) Acoustic Tile Ceilings/Wood Batten

6.9.2.4(2)(a) Ceiling tiles/wood batten may be used in the following locations:

(a).1 Hallways;
(a).2 Offices, meeting rooms;
(a).3 Common lobby, admitting areas;
(a).4 Waiting areas;
(a).5 Staff sleep rooms;
(a).6 Medication rooms;
(a).7 Patient and staff lounges; and
(a).8 Other areas requiring a non-institutional finish.

6.9.2.4(2)(b) Acoustic Panel: Non-directional, fissured pattern, white ceiling panel, trim edge detail (square) to fit a standard 15/16" T-bar grid panel size.

6.9.2.4(2)(c) Install acoustic ceiling tiles in the suspension system to provide the levels of sound attenuation required to suit the intended function of the room.

6.9.2.4(2)(d) Provide accessibility to the ceiling spaces where access is required to mechanical, electrical or other service systems.

6.9.2.4(2)(e) Special surface-treated ceiling tiles, such as wood, Mylar or metal-faced tiles may be used where

maintenance and ease of cleaning are priorities as well as the accessibility and acoustic requirements.

6.9.2.4(2)(f) Provide acoustical panels that are appropriate for the normal occupancy condition range of 15°C - 29°C and maximum 70% relative humidity. When the service use temperature and relative humidity are expected to exceed these ranges, consider use of acoustical units specifically designed for such applications.

6.9.2.4(2)(g) Use tiles with scratch-resistant surfaces in any area where lay-in ceiling panels frequently need to be removed for plenum access.

6.9.2.4(2)(h) For ceilings installed in Nourishment Stations areas, use acoustic panels capable of being cleaned without undue wear on the panel.

6.9.2.4(2)(i) Where required in restricted or semi restricted areas use acoustic panels ceiling system that is monolithic, gasketed and clipped down. Perforated or highly textured tiles will not be used in these areas

6.9.2.4(3) Hard Ceilings

6.9.2.4(3)(a) Construct hard ceilings of 16 mm gypsum board where fire rating is not required. In fire rated rooms the gypsum board must be fire rated and the thickness of the gypsum board is to be determined by the rating required by the BC Building Code. Finish hard ceilings as per the paint specifications outlined in Section 6.9.2.7. Provide hard ceilings for the following rooms:

(a).1 Housekeeping, clean and soiled utility rooms;
(a).2 washrooms and shower rooms;
(a).3 operating rooms, procedure rooms and any other rooms where invasive procedures may be performed;
(a).4 sterile supply rooms
(a).5 other areas where infection prevention and control may be an issue such as AIR isolation rooms.

6.9.2.5 Flooring

6.9.2.5(1) All Rooms except Wet Rooms

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

6.9.2.5(2) Resilient Flooring

6.9.2.5(2)(a) Choose products with exposed surface having anti-bacterial properties to prevent entry of gram-positive and gram-negative micro-organisms. Weld all seams. Provide integral cove bases.

6.9.2.5(2)(b) If used, provide slip-resistant sheet vinyl with a static coefficient of friction of 0.6 on level surfaces and 0.8 on ramps.

6.9.2.5(2)(c) If used, provide linoleum sheet flooring with a homogenous core of primarily natural materials, consisting of linseed oil, wood flour, and resin binders mixed and calendared onto a natural jute backing. Weld all seams. Provide integral cove bases.

6.9.2.5(2)(d) If used, provide rubber flooring solid cushioned sheet or tile formulated with 100% virgin elastomers, reinforcing agents, soil-resisting agents, and migrating waxes compounded to create durability, excellent cleaning characteristics, and exceptional slip resistance. Stud designs to have chamfered edges with a sharply-defined edge at the top for higher slip resistance, easier cleaning, superior maintenance and low vibration design to minimize vibration and noise.

6.9.2.5(2)(e) Hot weld all seam joints.

6.9.2.5(2)(f) Form flash coved bases 150 mm high, straight cut, finished with metal J-cap and apply silicone caulking to any gaps to address infection control requirements.

6.9.2.5(2)(g) Use solvent based low odour flooring adhesive where appropriate.

6.9.2.5(2)(h) Use water soluble, low odour flooring adhesive where appropriate.

6.9.2.5(2)(i) Use adhesive for resilient flooring that meets or exceeds the United States Environmental Protection Agency (EPA) Standards for acceptable VOC concentration and emission rates.

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

6.9.2.5(2)(k) Finish flooring with high speed buffing as per manufacturer's operational specifications and to the Authority's approval.

6.9.2.5(2)(l) Where there is no existing product to butt against, finish edging finish with vinyl finishing strip as per manufacturers' specifications.

6.9.2.5(2)(m) Finish flooring with high speed buffing as per manufacturers' specification. Do not apply sealer or wax.

6.9.2.5(3) Wet Rooms

6.9.2.5(3)(a) Use slip-resistant solid sheet flooring (or an equivalent product approved in advance by the Authority) or epoxy finish for all wet areas.

6.9.2.5(3)(b) Hot weld all joint seams.

6.9.2.5(3)(c) Form flash coved bases 150 mm high, straight cut, finished with metal J-caps and silicone caulking.

6.9.2.5(3)(d) Use solvent based, low odour flooring adhesive.

6.9.2.5(3)(e) Finish flooring as per manufacturer's specification. Do not apply sealer or wax.

6.9.2.5(4) Stair Covering

6.9.2.5(4)(a) Use one piece treads and sheet risers with carborundum strip of a colour which will hide dirt (or an equivalent product approved in advance by the Authority).

6.9.2.5(4)(b) Use water soluble, low odour adhesive.

6.9.2.5(4)(c) Provide tactile warning strips and stair nosings to assist the visually impaired.

6.9.2.5(5) Comply with all applicable standards, including the National Floor Covering Association (NFCA) Specification Standards Manual. US Federal Specification RR-T-650d.

6.9.2.5(6) Where epoxy flooring is used in wet areas, use water and slip-resistant grade and prevent water or moisture transmission to the substrate. Terminate flooring at the walls in the form of 150mm high flash coved bases. Above 150mm high flash cove, taper flooring material to allow smooth transition of the wall protection over the flooring.

6.9.2.5(7) Use permanent, heavy-duty integral materials such as seamless quartz epoxy flooring in areas subject to moisture and heat over extended periods of time.

6.9.2.5(7)(a) Where epoxy flooring is used in wet areas, use water and slip-resistant grade and prevent water or moisture transmission to the substrate. Terminate flooring at the walls in the form of 150mm high flash coves. Above 150mm high flash cove, taper flooring material to allow smooth transition of the wall protection over the flooring.

6.9.2.5(7)(b) The transition between epoxy flooring and sheet wall protection must be smooth. The wall protection must overlap the flooring.

6.9.2.5(8) Use suitable flooring in patient and staff areas where cart or stretcher traffic is expected or where cleaning on a regular or emergency basis is necessary.

6.9.2.5(9) Use water resistant and slip-resistant flooring in public, staff, and patient washrooms.

6.9.2.5(10) Consider resilient tile products for flooring in service corridors and service areas.

6.9.2.5(11) Use anti-static flooring materials for telecommunication rooms.

6.9.2.5(12) Carpets and Carpet Tiles

6.9.2.5(12)(a) Carpet finishes will be used in the patient and staff areas where relaxation and comfort are primary considerations, including patient/public lounges, staff lounges, staff offices, conference/meeting rooms and areas of similar function. Provide 150mm high rubber bases.

6.9.2.5(12)(b) Use carpeting that is certified under Canadian Carpet Institute / Canadian Rug Institute (CCI/CRI) Indoor Air Quality Program and having CRI/IAQ Label and number certifying that VOC emission rate of less than 0.6 mg/m2/h4 has been passed.

6.9.2.5(12)(c) Choose carpet that has a maintained static generation at less than 3.5 KV at 21ºC and 20% relative humidity throughout its produce life.

6.9.2.5(12)(d) Use non-solvent, non-toxic, odourless adhesive that, when installed, meets or exceeds EPA standards for acceptable VOC concentration and emission rate.

6.9.2.5(12)(e) Choose a carpet designed to accept wheelchair traffic.

6.9.2.6 Acoustic Treatment

6.9.2.6(1) Design and construct the Building 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/or patients where confidentiality is required.

6.9.2.6(3) Sound control will include:

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

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

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

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

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

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

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

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

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

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

6.9.2.6(9) Use acoustic screens, vibration isolators, and exterior equipment to prevent exterior noise. All Building systems must be designed so that they do not produce more than 50 dBA at night and 60 dBA during the day when measured at the property line of the project.

6.9.2.7 Painting and Protective Coatings

6.9.2.7(1) All paint materials to be rated under the Environmental Notation System (NTS) with acceptable VOC ranges as listed in the MPI Approved Products List under E ranges

6.9.2.7(2) Use only materials having a minimum MPI 'Environmental Friendly' E2 rating based on VOC (EPA Method 24) content levels.

6.9.2.7(3) If seamless epoxy wall coatings are used, provide a two component, high solids, zero or low VOC, solvent free, epoxy glaze wall coating which will be seamless, abrasion and chemical

resistant, and UV resistant, Coatings will have been tested in accordance with ASTM D1308-Standard Test Method for Effect of Household Chemicals on Clear and Pigmented Organic Finishes.

6.9.2.7(4) Walls and shelving

6.9.2.7(4)(a) Use eggshell or semi-gloss for all walls; in Patient care areas use semi-gloss.

6.9.2.7(5) Door frames and metal doors

6.9.2.7(5)(a) Use semi-gloss for all door frames and metal doors.

6.9.2.7(6) Wood finish doors

6.9.2.7(6)(a) Use clear coat interior rub varnish for all wood finish doors.

6.9.2.7(7) Paint Grade Doors

6.9.2.7(7)(a) Use semi-gloss for all paint grade doors.

6.9.2.7(8) Ceilings

6.9.2.7(8)(a) Use eggshell paint for all ceilings.

6.9.2.7(9) Floors, concrete

6.9.2.7(9)(a) Use a 2-component (base component A, curing agent B).

6.9.2.7(9)(b) Use a primer if part of coating system.

6.9.2.7(10) Exposed Conduit & Services in the parking garage, and any electrical panel boards in New Facility corridors.

6.9.2.7(10)(a) Paint to match the adjoining surface for finished appearance.

6.9.2.7(11) Conform to all applicable standards, including the material and workmanship requirements of Master Painters Institute (MPI) Architectural Painting Specification Manual.

6.9.2.7(12) Use exterior paints of a quality designed to protect substrate materials from weather and climate conditions.

6.9.2.7(13) Achieve a visually harmonious and aesthetically coordinated appearance across all areas of the Building.

6.9.2.7(14) Use exterior and interior finish materials with surface finishes either as integral to the finish material or field-applied separately to the surface of the finish material.

6.9.2.7(15) Treat exterior masonry materials such as brick and concrete block with water-repellent coatings to prevent water ingress into or through the material.

6.9.2.7(16) Provide a special protective coating on exterior and interior materials that are subject to corrosion from exposure to moisture or other corrosive agents, and where painting is deemed to be insufficient protection. Materials requiring a special protective coating include exterior and interior structural, galvanized, and miscellaneous steel.

6.9.2.7(17) Use paints with a minimal VOC level in patient, staff, and public interior areas.

6.9.2.7(18) Use interior paint materials of a quality to withstand regular or repeated cleaning as the function of the area dictates.

6.9.2.7(19) Paint handrails, doors, and frames with a contrasting colour from walls in consideration of the visually impaired.

6.9.2.7(20) Do not use materials containing lead and mercury.

6.9.2.8 Vinyl Acrylic Wall Covering

6.9.2.8(1) If vinyl/acrylic wall covering is used, provide vinyl/acrylic high impact rigid sheet, minimum 0.60” thickness with colour-matched vinyl/acrylic trim for joint/transitions.

6.9.2.8(2) Furnish complete packaged system containing all primers and adhesive. Use water-based and non-hazardous primer and adhesive materials.

6.9.2.9 Dry Erase Wall Covering

6.9.2.9(1) Provide pigmented gloss vinyl wall covering presentation surfaces for dry erase markers, including .61 kg/sq.m, non-woven backing, in meeting rooms and team rooms throughout the Building.

6.9.2.9(2) Provide trim and other accessories including but not limited to wall covering trim of anodized aluminum, low profile trim.

6.9.2.9(3) For the rooms listed in Appendix 2E Equipment and Furniture as having whiteboards; Project Co shall provide either a whiteboard or

dry erase wall covering to be determined through the User Consultation process as per Schedule 2.

6.10 Specialties (Division 10)

6.10.1 Provide specialty products manufactured for the specific purposes intended, and installed in strict accordance with the manufacturer's directions.

6.10.2 Bulletin Boards and Whiteboards

6.10.2.1 Provide and install, as appropriate throughout the Building:

6.10.2.1(1) Bulletin Board surfaces that have reasonable resistance to deterioration; and

6.10.2.1(2) whiteboard surfaces that allow use of felt-type writing instruments and allow erasing and cleaning with minimal effort. Use porcelain ceramic on steel surface, magnetic, scratch and abrasion-resistant and have maximum contrast, glare control, and reflectivity.

6.10.2.2 Provide bulletin boards and whiteboards with extruded aluminum frames, accessory trays, maprails and maphooks.

6.10.2.3 Use non-toxic, water based lamination adhesive for bulletin board and whiteboards.

6.10.3 Compartments and Cubicles

6.10.3.1 Provide compartments and cubicles including toilet partitions, change cubicles, shower partitions, and other compartments and cubicles requiring privacy and security.

6.10.3.2 Provide exposed surfaces that are permanent, water-resistant, corrosion-proof, and readily cleaned and maintained.

6.10.3.3 Secure partitions and standards to the floor or ceiling structure, and in a manner to resist lateral loading and impact.

6.10.3.4 For compartment/cubicle doors, use material matching the partitions and include permanent, purpose-made hardware. Design doors and hardware to provide barrier-free access.

6.10.3.5 Where appropriate and approved by the Authority, curtain tracks and curtains may be used in lieu of doors.

6.10.3.6 Provide a mirror in all change compartments.

6.10.3.7 Provide a small mirror at each scrub bay.

6.10.3.8 Provide coat hooks in each change compartment (Pre-Op/Post-Op), offices, , Sleep Rooms and exam rooms.

6.10.3.9 Provide duty shoe shelves in all staff locker rooms; provide adequate shoe shelf storage for the required staff levels anticipated.

6.10.3.10 Provide open coat rod and shelf in all staff locker rooms.

6.10.3.11 Provide all required benches and seating (chairs) in all patient and staff change rooms/cubicles.

6.10.3.12 Provide all required benches and/or seating need in shower/change stalls

6.10.3.13 Toilet Partitions

6.10.3.13(1) Galvannealed sheet metal will conform to ASTM A653 with minimum ZF001 (A01) zinc coating. Finish in polyester, baked enamel or powder coating.

6.10.3.13(2) For stainless steel, use Type 304 conforming to ASTM A240 with No. 4 finish.

6.10.3.13(3) For plastic laminate, use Grade 10/HGS GP50 scuff-resistant, high pressure laminate, conforming to NEMA LD-3.

6.10.3.13(4) For particleboard core used for partitions, conform to CAN3-0188.1 Industrial Grade “R”. Refer to Wood First Matrix for appropriate use.

6.10.3.13(5) For fibre-reinforced plastic (fibreglass), use a moisture resistant grade.

6.10.3.14 Change Cubicle Partitions

6.10.3.14(1) Where not adjacent to showers, change cubicle partitions will comply with the above requirements for toilet partitions.

6.10.3.15 Shower Partitions

6.10.3.15(1) Use solid phenolic laminated thick stock, factory-laminated with decorative finish both faces of core and conforming to CAN3-A172 or NEMA LD3.

6.10.4 Wall Guards and Corner Guards, Handrails, Wall Protection, Door Edge and Door Frame Protection

6.10.4.1 Wall and corner guards

6.10.4.1(1) Provide protection of walls and exposed wall corners at patient care areas, service areas, and other areas as required, to prevent damage due to impact from traffic such as wheelchairs, stretchers, equipment and service vehicles including carts. Full height wall and stainless steel corner guards are required throughout the surgical services area and support area including operating rooms, supply alcoves, corridors, equipment and supply areas, biomedical workrooms and storage rooms, sterile core and the medical device reprocessing (MDR) areas. All other wall and corner guard protection height to be determined through the User Consultation process as per Schedule 2.

6.10.4.1(2) Design and install the height of wall and corner guards to be aesthetically pleasing throughout the room/area. Wall protection must continue above the handrail/wall bumper to fully protect the wall from damage as required.

6.10.4.1(3) Minimum sheet protection height is 1220 mm above the floor bases except for storage rooms, clean and soiled utility rooms, soiled and clean housekeeping rooms, Rehab Medicine Room, equipment rooms and alcoves, where the minimum sheet protection height in to be 1600 mm above finish floor.

6.10.4.1(4) Select materials appropriate to the amount and degree of impact anticipated. Stainless steel corner guards are required throughout the surgical services area and support area including operating rooms, supply alcoves, corridors, equipment and supply areas, biomedical workrooms and storage rooms, sterile core, MDR areas and all other high impact areas.

6.10.4.2 Handrails

6.10.4.2(1) Must meet the needs of the visually impaired and comply with Elder Friendly principles.

6.10.4.2(2) Provide handrails in all corridors and patient care areas of an appropriate type for patient support. .

6.10.4.2(3) Select materials and shapes appropriate for the use, provide continuous uninterrupted supports.

6.10.4.3 Wall protection

6.10.4.3(1) Apply sheet wall protection and bumper guards as needed in locations where the there is a potential for impact damage. Minimum height of wall protection is nominally 1350mm (150mm floor base + 1200mm wall protection) above the finished floor

except where an increased height is required to meet the requirements of the Authority or otherwise noted in Schedule 3.

6.10.4.3(2) Provide wood wall bumper guards in high traffic pedestrian areas.

6.10.4.3(3) Provide wall splash back protection behind and surrounding hand hygiene sinks, scrub sinks and housekeeping sinks.

6.10.4.3(4) Apply sheet wall protection to faces of doors where impact damage is anticipated. Use sheet wall protection that complements the installation of door edge and frame protection.

6.10.4.3(5) Secure wall and corner guards to reinforcing and backing in the walls, such backing sufficient to withstand expected impact loads.

6.10.4.3(6) Use wall protection handrails, bumper and corner guard products that are high impact resistant, stain-resistant to pen marks, paint, and graffiti, and able to withstand commercial cleaners without fading or staining. Use products containing anti-microbial additives to retard mildew and bacterial growth.

6.10.4.3(7) Wood chair rails must be provided in all areas where walls can be damaged due to chairs including but not limited to: waiting rooms, quiet rooms and meeting rooms. Width to be 260 mm; height to be 980mm from floor to top of rail.

6.10.4.4 Door Edge and Door Frame Protection

6.10.4.4(1) Protect door edges and door frames in patient care areas from damage such as impact caused by the regular movement of stretchers and other wheeled vehicles.

6.10.4.4(2) Protect door edges and door frames in clinical and service areas from damage such as impact caused by regular and non-regular service vehicles and stretcher/beds.

6.10.4.4(3) Provide full height door edge protection in high use areas. Height of all door, edge and frame protection will be of an adequate height to fully protect the door, edge and frame from damage**.**

6.10.4.4(4) Use stainless steel door protection for doors which are in high impact locations such as surgical services area and support area including; operating rooms, corridors, equipment and supply rooms, biomedical workrooms and storage rooms, sterile core and MDR areas.

6.10.4.4(5) Protect elevator frames from damage due to bed and cart movement.

6.10.4.5 Horizontal Surfaces

6.10.4.5(1) Protect all horizontal drywall surfaces (pony wall, window sills, etc.) with plastic laminate c/w PVC or wood edging, solid surface or solid wood caps. Sub-surface material must be plywood; no particle board permitted.

6.10.5 Metal Lockers

6.10.5.1 Provide individual and shared storage facilities in designated staff areas in the Building based on expected staffing requirements as described in the Clinical Specifications and as appropriate for operation of the Building. Such storage facilities may be metal lockers and metal locker systems of sizes, numbers, and groupings as determined through the User Consultation process. Locker count must accommodate expected staff levels on any given shift at full capacity and the storage requirements of those staff members. The OR lockers are 'owned' by the staff. Male and female surgical change rooms must supply enough lockers for all full-time and part-time staff with a 1% redundancy.

6.10.5.2 For sheet metal, use galvannealed steel conforming to ASTM A653 with ZF001 (A01) zinc coating.

6.10.5.3 Finish steel surfaces with polyester baked enamel or powder coating.

6.10.5.4 For single, double, or multiple-tier metal lockers for staff use, include a provision for locking with padlock, and complete with number plates, and hanging hooks.

6.10.5.5 All staff change room lockers to be half height, pork chop type lockers.

6.10.5.6 Provide purse lockers within or close to each care station to accommodate expected staff levels on any given shift at full capacity.

6.10.6 Storage Shelving Systems

6.10.6.1 All rooms and/or areas where the Equipment List identifies 'Bin System' or 'Bin System Tilt' final quantities and locations will be determined through the User Consultation process. Provide all required backing.

6.10.6.2 Provide storage systems for materials in designated storage areas.

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

6.10.6.4 For mobile storage systems, provide a high-density system designed to make maximum use of available space by eliminating need for access aisle for each run of shelving. Install and brace systems to resist seismic loads. The mobile storage

system to be either power assisted or to be easily operable without undue required strength by any person.

6.10.7 Washroom Accessories

6.10.7.1 Install all washroom accessories (as noted in 6.10.7.4 and 6.10.7.5 below) in all public, patient, and staff washrooms.

6.10.7.2 Provide washroom accessories in all public, patient, and staff washrooms as required in accordance with the applicable high quality hospital standards or any existing consumable contract held by the Authority. Determine the type, size, and number of accessories with regard for the numbers and categories of users.

6.10.7.3 Washroom accessories and installation will be in conformance to the BC Building Code requirements for persons with disabilities.

6.10.7.4 Staff and public washroom accessories will include, but are not limited to, the following (for category types refer to Equipment List; if category is not listed, the item will be Provided by Project Co):

6.10.7.4(1) soap dispensers, Category 1;

6.10.7.4(2) toilet paper dispensers, Category 1;

6.10.7.4(3) paper towel dispensers, Category 1;

6.10.7.4(4) paper towel / garbage disposals, Category 1;

6.10.7.4(5) mirrors;

6.10.7.4(6) barrier-free grab bars (with integral tactile grip finish);

6.10.7.4(7) coat hooks;

6.10.7.4(8) baby change tables (in public washrooms only).

6.10.7.5 Patient washroom accessories will include, but are not limited to, the following:

6.10.7.5(1) soap dispensers, Category 1;

6.10.7.5(2) toilet paper dispensers, Category 1;

6.10.7.5(3) paper towel dispensers, Category 1;

6.10.7.5(4) paper towel / garbage disposals, Category 1;

6.10.7.5(5) mirrors;

6.10.7.5(6) handicap grab bars (with integral tactile grip finish); and

6.10.7.5(7) coat hooks.

6.10.7.6 Shower rooms or showers in washrooms will include, but are not limited to, the following accessories:

6.10.7.6(1) Provide shower curtain and breakaway track or breakaway rod as appropriate;

6.10.7.6(2) Provide handicap grab bars; and

6.10.7.6(3) use commercial grade accessories free from imperfections in manufacture and finish.

6.10.7.7 Install washroom accessories to allow cleaning and maintenance of the accessory and surrounding wall and floor area.

6.10.7.8 Use fittings with concealed fastening for security and discouragement of tampering.

6.10.8 Privacy Curtain, Track and IV Tracks

6.10.8.1 Provide privacy curtains and tracks:

6.10.8.1(1) Around the door at each inpatient bedroom

6.10.8.1(2) around the door at exam rooms; and

6.10.8.1(3) In all rooms and areas where visual patient privacy is required from public or staff areas/views;

6.10.8.2 Project Co will Provide and install privacy curtains and tracks as well as 25% additional privacy curtains, i.e., 125% of minimum number required, in order to meet operational needs,

6.10.8.3 Curtains will comply with CAN/CBSB-4.162-M, “Hospital Textiles - Flammability Performance Requirements”.

6.10.8.4 For cubicle tracks, use extruded, anodized aluminum, entirely enclosed except for the track guide.

6.10.8.5 Use cubicle carriers composed of a non-binding, abrasion-resistant, nylon block supported from self-lubricating bearings by two nylon wheels with a free-moving plated swivel-hook assembly. Fit one end of each track with a removable end stop to permit simple carrier replacement. Use anodized aluminum splicing clamps. Factory-curve tracks.

6.10.8.6 For IV tracks, use extruded aluminum, anodized finish and entirely enclosed except for slot in bottom. Provide IV carriers consisting of plated steel block supported from four nonconductive nylon ball-bearing wheels and equipped with 180-degree twist lock with nylon washer.

6.10.8.7 Curtain and IV tracks will be structurally supported.

6.10.8.8 at a height of 1950mm above the finished floor to the hooks so that housekeeping staff are not required to climb a ladder to remove and replace curtains.

6.10.8.9 Of a style that does not require curtains to be released individually from hooks. Hooks shall be integral with the curtain to allow the curtains to be gathered and removed from the track in one move.

6.10.9 Miscellaneous

6.10.9.1 Provide 2 laser goggles/eye protection hooks outside each OR. Exact location to be determined in OR Mock-up.

6.10.10 Provide mop/broom bracket with a minimum of 5 mops holder in each housekeeping room. Final location and height will be determined through the User Consultation process.

6.11 Equipment (Division 11)

6.11.1 Refer to Section 7 of Schedule 2 [Design and Construction Protocols] and Appendix 2E Equipment and Furniture.

6.11.2 Patient Lifts

6.11.2.1 Provide all above-ceiling structural supports, anchors, backing and power in all patient rooms and bays to support the installation of patient lifts as identified in Appendix 2E Equipment and Furniture**.** Ceiling lifts to have a load bearing capacity of 450 lb, load-tested to 563 lb., in patient rooms and treatment areas, excluding ORs. Allow for 20% to have bariatric load bearing capacity of 800 lb., load-tested to 1000 lb. Provide full length coverage of the patient bed plus 1000 mm beyond the edges into the lateral transfer zone.

6.11.2.2 Ceiling-mounted equipment including booms, lights and lifts will be coordinated in the structural design.

6.11.2.3 Coordinate the parking/charging location of the lift with all clinical and housekeeping activities in the patient room/bay. Charging station is to be located away from the patient bed

6.11.2.4 Inpatient room tracks will not obstruct (partially or completely) over-bed, ceiling mounted light fixtures

6.11.2.5 X-Y gantry track with traversing boom configuration

6.11.3 Headwalls

6.11.3.1 All headwalls are the responsibility of Project Co. Headwalls shall be prefabricated units and not built up. Headwalls shall be provided by the following manufactures or Authority approved equivalent; Class 1, Amico, Beacon Meades, and Hillrom.

6.11.3.2 On or adjacent to the medical service unit, provide a rail system or comparable alternative for the storage of a small quantity of medical surgical supplies for ease of access for direct patient care.

6.11.4 Fall Protection and Window Washing

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

6.12 Furnishings (Division 12)

6.12.1 Furniture, Millwork and Casework

6.12.1.1 Refer to Appendix 2E Equipment and Furniture and Appendix 3I Room Requirements located in the Data Room;.

6.12.1.2 In addition to Project Co's obligation to provide Equipment as per Appendix 2E Equipment and Furniture, provide all furniture, millwork and casework including stainless steel required to support the programs and functions in this schedules and as described in the Clinical Specifications to support the operation of the Building, including:

6.12.1.2(1) Millwork, casework (including stainless steel casework), tables, work stations, furniture, grommets, mounting brackets, storage, storage carts, work surfaces, charting/care stations to meet the needs of each department, locks and keyboard trays and all items described.

6.12.1.3 New Facility Casework Quantities:

6.12.1.3(1) Design of casework will comply with Schedule 3 and Appendix 3A Clinical Specifications and Functional Space Requirements. Any fixtures, including plumbing are to be provided – and coordination of casework is part of Project Co responsibility. Specific design parameters such as heights, depths, open vs. closed and locking vs. not will be developed through the User Consultation Process as described Schedule 2

6.12.1.3(2) Where casework has been identified in the Room Matrix, Project Co must allow for all casework that is required to allow proper function and operation in that room/area. The Authority's requirement to provide proper function in a room or area for the quantity and configuration of casework will be final and not open to challenge.

6.12.1.4 The Authority will consider modular furniture in lieu of fixed casework where it is appropriate and the modular systems being proposed by Project Co meet all the

requirements for durability, Infection Control, Housekeeping and the staff who must stock, store, access and work with the modular furniture.

6.12.1.5 All furniture and millwork supplied by Project Co will:

6.12.1.5(1) be ergonomically designed and functional for multi work heights; sitting, stool and standing;

6.12.1.5(2) if used in any patient care or treatment areas, have sealed surfaces and be covered in upholstery material that is inert and will not support microbial growth and is cleanable with hospital grade disinfectant;

6.12.1.5(3) and as necessary, incorporate communications outlets and cabling that complies with Appendix 3E Authority IMIT Infrastructure Specifications;

6.12.1.5(4) Provide the necessary millwork locks to secure all cabinets whether in a locked room or not;

6.12.1.5(5) Provide built in valance lighting as required for task orientated and staff areas such as: medication rooms, ante rooms, nourishment areas, lounge, dictation, nurse station and patient rooms. All upper cabinets above a workstation, work surface, sink or countertop will be provided with valance lighting underneath.

6.12.1.6 In undertaking the design and construction of work stations, incorporate the recommendations outlined in section 5.5.2 of Schedule 3, the Clinical Specifications, Appendix 3A Clinical Specifications and Functional Space Requirements and Appendix 3K for ergonomically sensitive work stations.

6.12.2 Stainless Steel Casework

6.12.2.1 Stainless steel casework must be provided in all Operating Rooms, Sterile Core, MDR and Soiled Utility Rooms as a minimum. There may be additional areas which require stainless steel and those areas will be developed with the Authority.

6.12.2.2 Fabricate from Type 316, No. 4 finish stainless steel.

6.12.2.3 Corners will be welded, ground, polished and crevice-free. Joints and welds will be polished to a uniform No. 4 satin finish. No filler or solders will be used. Straight lengths will be one-piece with all seams, including field joints, welded.

6.12.2.4 Sound-deaden tops and reinforce with waterproof plywood core, bonded to tops with waterproof contact cement. Seal underside of top (plywood core) with a waterproof finish. The front edges of the tops will be marine edge. Form splashback as an integral part of the tops, radiused where the splashback occurs in the top. Bond all splashbacks to plywood core, bonded the same as specified for

the tops. Fabricate countertops, splashbacks, and front aprons out of one piece of stainless steel. Weld counter and sink assemblies into single units without seams or joints. Drill splashbacks, tops and sinks to receive plumbing and electrical fittings. All countertops will have marine edge.

6.12.2.5 Form integral sinks with all-welded rounded corners, seamless construction with all traces of welding removed. Weld stainless steel sinks integrally into tops without seams or joints. Slope tops for sinks and adjacent drain boards to sinks. Provide sinks with drain outlets. Stainless steel bench and or counter tops are required where staining or similar procedures are performed. All countertops with sinks will have a marine edge.

6.12.2.6 Strainers and anti-splash fittings at outlets shall not be used,

6.12.2.7 Provide the necessary casework locks to secure cabinets and drawers from public access, restricted staff access and shared rooms where specific storage requirement are needed;

6.12.2.8 Provide medication locking cabinets which are alarmed locally as well as monitored on the BMS.

6.12.3 Window Coverings

6.12.3.1 Provide window coverings for:

6.12.3.1(1) all exterior windows - roller shades are preferred but other products may be used if they provide equivalent privacy, sun and heat control, are easy to clean and do not support or provide a surface that encourages spread of infectious disease (i.e. do not become electrostatically charged); provide integral blinds on all exterior windows in Isolation Rooms and the MDR decontamination area including; Soiled Receiving/ Unloading/Sorting Area and Soiled Holding Area, Washing Area, Automatic Washing/Sanitizing Area;

6.12.3.1(2) all interior windows where privacy may be a concern refer to clause 6.12.6.1 for those which require integral blinds, and;

6.12.3.1(3) window coverings shall be a smooth surface, easy to clean, wipe-able and non-pleated.

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

6.12.3.3 Provide black-out window coverings for on-call sleep rooms, video conference rooms, Clinical Skills Rooms and Enhanced Clinical Skills Rooms - refer to UBC FoM Distributed Medical Education Program. Where window coverings are required for black-out functions, provide materials, tracks, seals, and operation suited to that purpose.

6.12.3.4 Use window coverings manufactured from materials and mechanisms that minimize cleaning and maintenance operations and maximize infection prevention and control.

6.12.3.5 Where window blind controls are difficult to reach, motorized blinds will be provided.

6.12.4 Window Shade Systems

6.12.4.1 Use shading fabric of PVC or vinyl-coated polyester or fibreglass yarn and that:

6.12.4.1(1) is waterproof, washable, rot-proof, flame-resistant, fungal and bacteria-resistant, colourfast to light, glare-reducing, and able to control heat gain and provide external visibility;

6.12.4.1(2) conforms to CAN/CBSB-4.162-M, “Hospital Textiles - Flammability Performance Requirements”; and

6.12.4.1(3) is tested in accordance with ASHRAE Standard 74073 for shading coefficient, fungal resistance in accordance with ASTM G21, and bacterial resistance.

6.12.5 Roller Shades

6.12.5.1 Roller shades systems will operate with a spring wrap mechanism, adjustment-free continuous qualified #10 nickel-plated brass ball chain ((50-lb. test)) and pulley clutch operating system. System will be chain operated with spring assist when required to reduce pull force to lift heavy or large shadesFabric will be inherently anti-static, flame retardant, fade and stain resistant, light filtering, room darkening, & blackout fabrics providing 0% - 3% openness factors. Fabric weight 320g/m_2 (9.4 oz/sy) containing fiberglass, PVC, polyester, acrylic or vinyl laminates.

6.12.5.2 Roller shades systems in inpatient bedrooms shall be recessed into the ceiling to protect the roller blind when not in use, keep it clear when windows are cleaned, and protect the shade from dust collection.

6.12.6 Venetian-Type Blinds between Glass (Integral Blinds)

6.12.6.1 Provide integral blinds in interior windows and door window glazing for all inpatient rooms including Isolation Rooms, and ORs, and MDR decontamination area. Integral blinds will have widest blades available.

6.12.6.2 Integral blind controls must not be chain or rod type. Controls must be user friendly. Pull down cords shall not be used for window treatment.

6.12.6.3 Blinds will consist of tempered aluminum alloy slats uniformly spaced and 100% interlaced between cross-ladders on at least one tape. Use tapes with no special

end rails required to attach the suspension members from the window opening to the blind.

6.12.6.4 Blinds in OR theatre glazed openings will be laser ready.

6.12.6.5 Use a hardware/window design that does not allow air movement from a room to adjacent rooms. Openings in the glazing plane are not allowed.

6.12.6.6 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.

6.12.6.7 Isolation Rooms will have controls on both sides of glazing. OR controls will be located within the theatre.

6.13 Special Construction (Division 13)

6.13.1 Radiation Protection

6.13.1.1 Comply with all applicable requirements of the National Council on Radiation Protection and Measurement (NCRP).

6.13.1.2 All radiation protection must be designed and installed under the supervision of an independent physicist hired by Project Co.

6.13.1.3 Maintain a full record of lead installation on site including written reports and complete photo documentation of entire installation.

6.13.1.4 Provide radiation protection in walls, doors, floors, ceilings and windows as required and appropriate to protect staff and patients from x-ray, imaging digitizing, radiology, and other rooms in the radiation protection shield.

6.13.1.5 Provide radiation protection by incorporating lead sheet of appropriate weight and thickness into wall and door assemblies and leaded glass manufactured for radiation shielding purposes into window assemblies.

6.13.1.6 For sheet lead, comply with ASTM B749 Standard Specification for Lead and Lead Alloy Strip, Sheet and Plate and meet or exceed Federal Specification QQL-201F Grade C.

6.13.1.7 For lead-lined gypsum board, comply with ASTM C36 or CAN/CSA-A82.27, Type X.

6.13.1.8 For lead glass, meet or exceed Federal Specification DD-G-451.

6.13.1.9 For cassette transfer cabinets, meet or exceed MIL-C-3673 (DM) Radiation shielded.

6.13.1.10 For radiation shielded doors, meet or exceed American National Standards Institute/ National Woodworkers Manufacturers Association (ANSI/NWMA) Industry Standard for wood doors and NCRP Report #49.

6.13.1.11 Fabricate radiation-shielded doors using a single layer of sheet lead with wood core laminated on each side of the lead. Bond cores using poured lead dowels at edges.

6.13.1.12 Fabricate radiation-shielded door frames with lead-lining.

6.13.1.13 Lead glass or lead louvers occurring in radiation shielded doors will be equivalent rated to sheet lead in doors.

6.13.1.14 For lead-laminated gypsum wallboard, use a single unpierced sheet of lead.

6.13.1.15 For sheet lead applied directly to partition steel studs, provide a continuous and complete protective shield.

6.13.1.16 Provide radiation shielding barriers, mobile or fixed, modular and transparent barriers to protect medical personnel by providing a full body shield. Provide units with distortion-free, lead-plastic windows.

6.14 Conveying Equipment (Division 14)

6.14.1 Elevators – General

6.14.1.1 Provide comprehensive vertical transportation study and analysis of the hospital plan and operational program to determine the number, size and speed of the elevators for proposed plan. The requirements set out in a prescriptive manner herein are based on the indicative design and shall be considered minimums.

6.14.1.1(1) Submit analysis conforming to performance requirements to demonstrate suitable design for contemporary hospital facility of this nature. Submit analysis report to authorities for review.

6.14.1.1(2) Elevator service in a hospital is evaluated based on demands placed on the system during a typical, fifteen-minute, heavy, two-way traffic period, (i.e., considerable traffic is being handled in both the UP and DOWN directions), with passenger and vehicles entering and exiting the cars at various floors throughout the elevator round trip.

6.14.1.1(3) Elevator analysis, to provide service excellence in health care facilities, is predicated on the projected number of patient, staff counts in the Facility and the projected vehicle traffic.

6.14.1.1(4) Handling Capacity: Passenger elevators will have a handling capacity of at least 12% of the total population for a peak 5 minute

period. (Handling capacity refers to the number of passengers that are transported by the elevator for a certain period of time).

6.14.1.1(5) Waiting Times: For adequate elevator service the following maximum average waiting times are required during peak two way traffic periods:

6.14.1.1(5)(a) Public / Passenger Elevators 25 seconds

6.14.1.1(5)(b) Patient / Service Elevators, 35 seconds

6.14.1.1(5)(c) MDR Elevators 35 seconds

6.14.1.1(5)(d) The waiting time is defined as the average time a passenger waits for an elevator arrival after they arrive in the elevator lobby area.

6.14.1.1(6) Load Factor: Passenger elevators will provide adequate service with a load factor below 40%. Load factor refers to the number of passengers transported by each elevator during one trip expressed as a percentage of the maximum number of passengers permitted by the Safety Code for Elevators and Escalators (CSA B44).

6.14.1.1(7) Separation of Traffic: Provide distinct separation of traffic types, with passenger elevators for public, patient and trauma elevators for inpatient traffic and service elevators for materials and logistic traffic.

6.14.1.1(8) Elevator Grouping: Grouping elevators rather than providing single units or small groupings at various locations gains the best elevator service. In consolidating elevator service, traffic congestion, infant security and walking distance must be considered.

6.14.1.1(9) Elevator Locations: Elevators will be located to provide separation of traffic types as well as minimize walking distances.

6.14.1.1(10) Migration: When more than one elevator group is available, a person or vehicle's origin does not necessarily dictate which vertical transport element will be used. A certain percentage of the population will migrate to other areas of a Building and may not use the same elevator throughout the day. Elevator design should accommodate a minimum migratory imbalance of 10%.

6.14.1.1(11) Patient Elevator Cabs: Non-public elevators used to transport patients will be able to accommodate a bariatric bed, up to four staff, four IV pumps, extra corporeal life support equipment, portable ventilator, oxygen tanks and monitors; and have enough

space to allow for staff to carry out emergency procedures within the elevator.

6.14.1.2 Scope of Work

6.14.1.2(1) Provide passenger and service elevators as required to satisfy the equipment and performance specifications as herein described.

6.14.1.2(2) Provide groups of elevators for:

6.14.1.2(2)(a) Public / Staff Passenger

6.14.1.2(2)(b) Patient / Staff and Material Service

6.14.1.2(2)(c) Clean MDR Service

6.14.1.2(2)(d) Soiled MDR Service

6.14.1.2(2)(e) Parking garage passenger elevators

6.14.1.2(3) Provide equipment and perform elevator work in accordance with the requirements of the most recent applicable edition of the following standards and any other Codes or Regulations that may be in effect, at the time of installation.

6.14.1.2(3)(a) CSA/B44 Safety Code for Elevators and Escalators

6.14.1.2(3)(b) CSA/B44 Safety Code for Elevators and Escalators (Appendix E)

6.14.1.2(3)(c) Canadian Electrical Code C22.1 – 06 Part 1

6.14.1.2(3)(d) British Columbia Building Code, 2006

6.14.1.2(4) Include all work required for registration, testing and licensing of elevators by jurisdictional authorities.

6.14.1.2(5) Unless otherwise indicated, all stainless steel finishes will be manufacturer's standard ASTM type 304, brushed #4 finish.

6.14.1.3 Quality Assurance

6.14.1.3(1) All systems and components will have demonstrated record of reliable performance, in similar applications, for a minimum of five years.

6.14.1.3(2) Provide equipment capable of maintaining normal operations with power fluctuations up to 10% of normal supply voltage and

machine / controller / hoistway temperatures of 5 – 35 degree Celsius.

6.14.1.4 Trademarks

6.14.1.4(1) Manufacture / Elevator Contractor Trademarks or Logos will not be visible to the public.

6.14.1.5 Maintainability

6.14.1.5(1) Provide elevator equipment that will not restrict the ability to engage a competent elevator maintenance contractor, other than the original manufacturer / installer, for the provision of maintenance services. Where microprocessor based control systems are supplied, provide “on board” diagnostic tools and associated manuals containing all set-up parameters, code references and troubleshooting instructions required for routine maintenance and adjusting procedures.

6.14.1.5(2) Elevator equipment will not include any software, counters, timers, or other devices that will automatically shut down, alter, or otherwise effect normal equipment operation.

6.14.2 Elevators – Products

6.14.2.1 Passenger Elevators

6.14.2.1(1) Provide a group of three (3) machine-room-less traction type passenger elevators serving levels 0, 1, 2, 3, 4, 5 and 6.

6.14.2.1(2) Elevators will have rated capacity of 1820 kg (4000 lb), minimum rated speed of 1.78 mps (350 fpm).

6.14.2.1(3) Provide entrances at each floor served, with 1220 mm (48”) wide x 2135 (7’-0”) high clear horizontal sliding, centre -opening doors and finished in stainless steel.

6.14.2.1(4) Provide cab configuration to accommodate front openings only. Configurations using both front and rear openings can be confusing to the public and should be avoided. Car enclosure will have nominal clear inside dimensions of 2340 mm (7’-8”) wide, 1650 mm (5’-5”) deep and a minimum overall height of 2745 mm (9’-0”), with 2565 mm (8’-5”) to underside of suspended ceiling.

6.14.2.1(5) Provide car enclosure with stainless steel fronts, two (2) car operating panels and durable finishes appropriate to the building.

6.14.2.1(6) Locate controller room adjacent to or in close proximity to the elevator core at mechanical level 3 or 6 where service can be conducted with a minimum of disruption to occupants of the building.

6.14.2.1(7) Provide electrical brake release to permit controlled motion of the elevator from controller room.

6.14.2.2 Patient / Trauma & Material Service Elevators

6.14.2.2(1) Provide a group of three (3) Patient / Trauma & Material Service elevators.

6.14.2.2(2) Elevators will have rated capacity of 3300 kg (7250 lb.), rated speed of 1.78 mps (350 fpm).

6.14.2.2(3) Provide entrances at each floor served with 1830 mm (72") wide x 2135 mm (7'-0") high horizontal sliding, two speed, centre-opening doors and finished in stainless steel.

6.14.2.2(4) All three elevators will serve all floors and the rooftop Helipad level. The Authority will review and approve front and rear openings based on the proponent's design through the design process. At least one elevator shall serve mechanical levels and if all elevators in the group do not serve the mechanical levels then there must be a method of calling the specific elevator(s) that serve the additional floors from all other floors in the building.

6.14.2.2(5) Provide car enclosure with minimum nominal clear inside (finished panel to panel) dimensions of 2134 mm (7'-0") wide, 3050 mm (10'-0") deep, minimum overall height of 2745 mm (9'-0"), with 2565 mm (8'-5") to underside of suspended ceiling or lighting coves. Refer to Schedule 2 for service elevator mock-up requirements. Final approved mock-up will confirm exact dimensions required.

6.14.2.2(6) Configure elevators as conventional overhead traction machine type. Locate the machine room directly above the elevator hoistway. Machine room-less type elevators are not acceptable for the Patient / Trauma Service elevators.

6.14.2.3 Parking garage shuttle elevators

6.14.2.3(1) Provide a group of two (2) machine-room-less traction type passenger elevators serving all levels of the parking garage.

6.14.2.3(2) Elevators will have minimum rated capacity of1135 kg (2500 lb.), rated speed of 1.78 mps (350 fpm)

6.14.2.3(3) Provide entrances at each floor served with 1070 mm (42”) wide x 2135 (7’-0”) high horizontal sliding, single speed, side opening doors and finished in stainless steel.

6.14.2.3(4) Elevators will serve all floor Levels in the parking garage and shall have front openings only. Configurations using both front and rear openings can be confusing to the public and should be avoided.

6.14.2.3(5) Provide car enclosure with minimum nominal clear inside (finished panel to panel) dimensions of 2032 mm (6’-8”) wide, 1295 mm (4’-3”) deep,, minimum overall height of 2440 mm (8’-0”), with 2390 mm (7’-6”) to underside of suspended ceiling or lighting coves. .

6.14.2.3(6) Locate controller room adjacent to or in close proximity to the elevator core at the top parking level where service can be conducted with a minimum of disruption to users of the elevators.

6.14.2.3(7) Provide electrical brake release to permit controlled motion of the elevator from controller room.

6.14.2.4 Clean / Soiled Service Elevators

6.14.2.4(1) Provide separate, dedicated Clean and Soiled MDR service elevators (total of two (2) elevators), each located in its own shaft. Equipment will be Machine-Room-Less (MRL) traction type.

6.14.2.4(2) Clean and soiled service elevators will be dedicated and serve only the Surgical Services / Support Area and the MDR department (Levels 0 and 2 only if MDR is located on Level 0 and Surgical Services is located on Level 2). Provide cab configuration to accommodate front and rear openings. Front and rear openings will be determined through the design process based on the proponent’s design.

6.14.2.4(3) Elevators will have rated capacity of 2268 kg (5000 lb.), minimum rated speed of 0.75 mps (150 fpm).

6.14.2.4(4) Provide entrances at each floor served with 1220mm (48”) wide x 2135 (7’-0”) high horizontally sliding, two speed side opening doors and finished in stainless steel.

6.14.2.4(5) Car enclosure will have minimum nominal clear inside dimensions of 1730 mm (5’-8”) wide, 2578 mm (8’-5.5”) deep and a minimum overall height of 2440 mm (8’-0”), with 2260 mm (7’-5”) to underside of suspended ceiling.

6.14.2.4(6) Provide each car enclosure with stainless steel fronts and reveals, one (1) car operating panel and applied, raised panels with

stainless steel cladding on all non-access walls. Provide 100 mm (4”) wide stainless steel hand rail and 155 (6”) wide stainless steel foot / bumper rail, bar type, with turned back ends.

6.14.2.5 Traction Elevator Equipment (including MRL elevators)

6.14.2.5(1) Provide sound and vibration isolation pads such that there is no direct contact between the machine and the building structure.

6.14.2.5(2) Provide an emergency brake to stop the elevator if it overspeeds or if unintended motion is detected in accordance with the B44 code.

6.14.2.5(3) Provide a fully regenerative solid state AC motor drive complete with isolation transformers and filters to meet IEEE Standard 519-1992 for Special Applications.

6.14.2.5(4) Provide digital encoders to provide closed loop feedback to the controller on car speed and position.

6.14.2.5(5) 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.

6.14.2.6 Machine-Room-Less (MRL) Equipment

6.14.2.6(1) Elevators of the Machine-Room-Less (MRL) type shall include the following:

6.14.2.6(1)(a) Provide gearless traction hoisting machine located within the hoistway.

6.14.2.6(1)(b) 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.

6.14.2.6(1)(c) 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. Provide a means to remotely activate the governor for testing purposes from the elevator controller room.

6.14.2.6(1)(d) Provide an electrically released brake system, to permit momentary nudging of elevator within the hoistway under test or emergency conditions.

6.14.2.6(1)(e) Locate controller room near proximity to the elevator core, or remotely at the Mechanical level.

6.14.2.7 Hoistway Equipment

6.14.2.7(1) Provide entrances consisting of doors, frames, sills, sight guards, door hangers, tracks, interlocks, door closers, gibs, and all other equipment required for a complete installation. Provide entrance doors and frames finished in brushed stainless steel.

6.14.2.7(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.

6.14.2.7(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.

6.14.2.7(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.

6.14.2.7(5) Provide for the car (and counterweight) spring mounted roller guides located at the top and the bottom of the car (and counterweight frame).

6.14.2.7(6) Provide fascias from each hall sill to the entrance header below. Include express zones. Extend the fascias into the pit and the overhead. Alternatively provide a labelled car door interlock if fascias are not provided.

6.14.2.7(7) Provide sound isolated car platform

6.14.2.7(8) 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.

6.14.2.8 Cab Equipment

6.14.2.8(1) Provide a heavy duty closed loop door operator to open and close the car and hoistway doors simultaneously

6.14.2.8(2) Provide an infra-red multiple beam door protective device that protects the full width and up to 1830 mm (6') from the floor of the door opening.

6.14.2.8(3) Provide durable cab finishes which are consistent with other campus components, or as specified elsewhere. Finishes will be subject to approval by the Authority.

6.14.2.8(4) For each elevator with centre – opening doors, or elevators with front and rear entrance arrangements, provide two (2) car operating panels. Otherwise, provide one car operating panel, per elevator.

6.14.2.8(5) Include, as part of the car equipment, the following:

6.14.2.8(5)(a) Stainless steel car fronts, including doors, return panels, transom panels

6.14.2.8(5)(b) For Passenger elevators, provide suspended ceiling, with recessed pot lighting. Include raised panels with wood veneer behind glass or other high quality finishes to achieve a high level aesthetic on all non-access walls. Provide cylindrical type, stainless steel handrails (38 – 50 mm in diameter) that are easily grasped.

6.14.2.8(5)(c) For all Patient/Trauma and Material Service Elevators, provide indirect cove lighting. Include raised panels with 5WL textured stainless steel cladding on all non-access walls. Provide bar type, stainless steel hand (100 mm) and bumper (155 mm) rails with turned back ends.

6.14.2.8(5)(d) For parking garage elevators provide suspended ceiling, with recessed pot lighting. Include raised panels with phenolic finish on all non-access walls. Provide cylindrical type, stainless steel handrails (38 – 50 mm in diameter) that are easily grasped.

6.14.2.8(5)(e) Car operating panel(s), including LED illuminating floor buttons with audible call registration tone.

6.14.2.8(5)(f) Digital (dot matrix or segmented) car position indicator(s) with a minimum 50 mm (2") high display.

6.14.2.8(5)(g) Voice synthesizer with automatic verbal announcement of each floor

6.14.2.8(5)(h) Hands-free two-way voice intercommunication / telephone system with a lobby rescue station and remote handset. Provide communication from each car enclosure to designated CACF in the New Facility and the Facilities Management Office in the New Facility.

6.14.2.8(5)(i) Emergency battery powered lighting

6.14.2.8(5)(j) Two speed ventilation fan

6.14.2.8(5)(k) Firefighters' Emergency Operation panel

6.14.2.8(5)(l) Service cabinet and switches

6.14.2.8(5)(m) Other features required for normal operation.

6.14.2.8(6) Do not install any certificates or licences in the cab. Arrange and pay for a variance from the Authority (if required).

6.14.2.8(7) Provide one set of cab protective pads for each group of elevators that cover all walls and the cab front return panel along with pad hooks. Provide pad hooks in each elevator.

6.14.2.9 Hall Signals and Equipment

6.14.2.9(1) Provide hoistway access switches located in the entrance frame or in the hall door sight guard at the top and bottom landing for each elevator regardless of the car speed or floor to floor height for safe access to the car top and pit areas..

6.14.2.9(2) Provide hoistway doors on all levels with standard landing door unlocking devices.

6.14.2.9(3) For three (3) or four (4) car elevator groups, provide two hall stations on each level, centrally located between the elevator entrances.

6.14.2.9(4) For single car or two (2) car elevator groups, provide one riser of hall stations located between adjacent elevators.

6.14.2.9(5) Provide in each hall station illuminating up and down push buttons (at terminal floors, provide only one button located with their centreline 1070 mm ± 25 mm (42" ± 1") above the floor

6.14.2.9(6) Hall call buttons to be selected from manufacturer Top of line or 3rd party series as approved by the Authority. All car and hall call button illuminations to be LED type.

6.14.2.9(7) For the Passenger elevator group, provide a digital (dot matrix or segmented) hall position indicator located above the main floor entrances with a minimum 50 mm (2") high display. Provide hall lanterns with dual stroke electronic tones and adjustable volume control above each main floor entrance and above each entrance at all other levels served. Hall lanterns will be designed to allow 180 degree viewing of direction indicators.

6.14.2.9(8) For the Patient/Trauma and Material Service elevator groups, provide combined digital (dot matrix or segmented) hall position indicator, with a minimum 50 mm (2") high display, and hall lanterns with dual stroke electronic tones and adjustable volume control at all levels served. Hall lanterns will be designed to allow 180 degree viewing of direction indicators.

6.14.2.9(9) For each of the Clean and Soiled MDR service elevators, provide in-car direction indicators with electronic tones, located in the strike side entrance column.

6.14.2.9(10) For the parking garage passenger elevator group, provide a digital (dot matrix or segmented) hall position indicator located above the main floor entrances with a minimum 50 mm (2") high display. Provide hall lanterns with dual stroke electronic tones and adjustable volume control above each main floor entrance and above each entrance at all other levels served. Hall lanterns will be designed to allow 180 degree viewing of direction indicators.

6.14.2.9(11) For each group of elevators, provide a properly labelled Fire Recall keyswitch and keybox in one hall station at the main floor level. Activation of the keyswitch will initiate Phase One of Firefighters Operation.

6.14.2.9(12) For each group of elevators, provide an emergency power selection switch and LED indicator, labelled “Elevator Emergency Power”, in a separate emergency feature hall fixture at the main

floor. Indicator will illuminate when elevators are operating on emergency power.

6.14.2.9(13) For the Patient/Trauma Service elevator group, provide a Call Button, labelled “Medical Emergency” in the hall station at each level served. Activation of the Call Button will initiate Phase One of “Medical Emergency” operation.

6.14.2.9(14) Provide elevator control panels within the New Facility CACF and provide a lobby panel for the elevators including car position indicators, elevator lobby telephone handset and remote firefighter’s emergency operation keyswitch and indicators, and any other elements required by the specification or governing codes and regulations.

6.14.2.9(15) Designated CACF is located in the New Facility.

6.14.2.10 Electric Wiring

6.14.2.10(1) Provide copper wiring to connect the equipment.

6.14.2.10(2) Run all wire in metal conduit, duct or electrical metallic tubing.

6.14.2.10(3) Run travelling cable between car stations and the controller in the machine room, without use of mid-way junction boxes.

6.14.2.10(4) In addition to the wiring required for elevator operations, provide special wiring to support installation of Two Way Voice Communication, Wireless Access Points, Security Card Readers, Security CCTV camera, Video display screen within each car enclosure. If not used at the time of initial installation, label the unused special wires and provide a neat coil of at least five (5) feet of cable within an interface box mounted on side of each controller. The elevator contractor shall ensure that wireless access points mounted in the elevator cabs will not interfere with the operation of the elevator.

6.14.2.10(5) Provide at least ten percent spare of each wire type in each travelling cable.

6.14.2.10(6) Provide on each controller a separate junction box for non-elevator devices such as telephones, cameras, and security systems.

6.14.2.11 Accessory Systems

6.14.2.11(1) Provide a Two Way Voice Communication System and integrate with existing campus elevator communication systems a hands-free, two-way voice communication system in each elevator, with a

central CACF lobby rescue station and remote hand- set located in Facilities management Office. Provide system that will permit two-way communication between any station location and each car enclosure, remote CACF Facilities Management Office and control/machine room(s).

6.14.2.12 Operational Features

6.14.2.12(1) For all elevators provide:

6.14.2.12(1)(a) Group Supervisory, Full Selective Collective Operation. Provide simplex full selective operation for MDR elevators.

6.14.2.12(1)(b) AC VVVF Motion Control

6.14.2.12(1)(c) Independent Service Operation

6.14.2.12(1)(d) Firefighters Emergency Operation Phase 1 and 2

6.14.2.12(1)(e) Emergency Power Operation with automatic sequencing

6.14.2.12(1)(f) Inspection Operation

6.14.2.12(1)(g) Hoistway Access Operation

6.14.2.12(2) For Passenger parking garage and Patient/Trauma and Material Service elevators, provide travelling cable wiring, interface and circuits, installation assistance for Card Reader Security Operation (Card readers and Security Systems provided by others).

6.14.2.12(3) For the Patient/Trauma Service elevator group, provide “Medical Emergency” Operation. Provide Phase One Call Button and indicator in hall stations at each floor level and Phase Two keyswitch and indicator in each elevator Car Operating Panel.

6.14.2.12(4) For all elevators, including MDR, provide a personnel card reader inside each elevator cab. For Service and MDR elevators, the personnel card must be swiped to activate the elevator to go to that floor. For Public elevators, no personnel card swipe will be required during normal hours of operation other than to restrict access to mechanical or other non-public levels. After hour access to any of the floors will require personnel card swipe to activate the elevator.

6.14.2.12(5) Provide restricted access to Mechanical Level.

6.14.2.12(6) Where applicable, all keyswitches will be keyed identical to those provided in other PRH buildings.

6.14.2.12(7) For Passenger and Service elevators providing access to patient care areas provide Wandering Patient System Operation (lock down elevator when activated)

6.14.2.12(8) Minimal threshold gap at door to prevent wheeled equipment from getting stuck in threshold space.

6.14.3 Execution

6.14.3.1 Performance

6.14.3.1(1) Levelling - Arrange that the car stops within 3 mm (1/8") of the floor level.

6.14.3.1(2) 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.

6.14.3.1(2)(a) Arrange the control room and machine room equipment so that the noise level with the elevator running is less than 80 decibels. Measure the noise levels using a sound level meter set to the "A" scale for a fast response.

6.14.4 Pneumatic Tube Systems

6.14.4.1 The pneumatic tube system will be designed to accommodate the requirements / needs of the New Facility and existing Hospital in a manner which contributes to the overall efficiency and effectiveness of hospital operations.

6.14.4.2 The placement of each of the pneumatic tube stations must allow easy access for staff, have adequate counter space and storage for preparing and receiving material, proper lighting for all times of the day and be in view of the main unit clerk, nurse station. The tube station must be conveniently located close to staff. Tube stations are not permitted to have public access.

6.14.4.3 Project Co will provide a computerized pneumatic tube system (PTS) that interconnects and serves the departments with automated secure on-demand transport of light materials and health care products.

6.14.4.4 The PTS will be a six-inch tube system

6.14.4.5 The pneumatic tube system is considered a Select Campus-wide System. Project Co shall ensure seamless integration of the system across the New Facility and the

Other Site Facilities. Project Co will be responsible for providing pneumatic tube stations in the New Facility and existing Hospital at the following locations:

6.14.4.5(1) All locations noted in Appendix 3A Clinical Specifications and Functional Space Requirements,

6.14.4.5(2) In these departments in the existing Hospital, exact location to be confirmed through User Group Consultation Process.

6.14.4.5(2)(a) All inpatient units including Maternity, excluded those inpatient units noted as vacated in the Indicative Design Report;

6.14.4.5(2)(b) Main Laboratory;

6.14.4.5(2)(c) Oncology Department;

6.14.4.5(2)(d) Emergency Department; at two locations;

6.14.4.5(2)(e) ICU;

6.14.4.5(2)(f) Pharmacy and;

6.14.4.5(2)(g) Medical Records

6.14.4.6 The PTS will:

6.14.4.6(1) be a computer-controlled pneumatic tube materials distribution system, consisting of tubing, stations, transfer units, blower packages, carriers, and a control system with a 150 mm diameter tube and will match existing PTS in the latest addition to the Hospital;

6.14.4.6(2) include all necessary transfer units, user stations and carriers through a strategically designed network tubing in a configuration that is optimized for overall PTS performance. “Transactions Times” will be at a minimum as supported through a pre-installation “Virtual System Simulation” conducted by Project Co.;

6.14.4.6(3) allow the dispatching, routing and storage of carriers to be directed by a system control centre to provide automatic unattended transmission of carriers between two stations;

6.14.4.6(4) all stations will be of the recessed type; no virtual stations will be allowed. Locate stations in such a way to minimize staff travel distance.

6.14.4.6(5) include no more than ten stations per zone;

6.14.4.6(6) provide each zone with its own blower and to allow it to function independently.

6.14.4.6(7) include twelve carriers for each station and storage capacity to match;

6.14.4.6(8) include at least one spare port at each transfer unit,

6.14.4.6(9) have a modular design of system components that will permit changes in the number of stations and/or zones as Authority requirements change; and

6.14.4.6(10) have directly adjacent a dedicated, standing height, minimum length 915 mm, millwork countertop with two deep drawers below for storage.

6.15 Demountable Partitions

6.15.1.1(1) All demountable partitions will:

6.15.1.1(1)(a) be Moveable Solid and Glass Walls, demountable partitions or a product of equivalent quality;

6.15.1.1(1)(b) include sliding, butt hinge, pivot, aluminum with glass lite, wood with optional glass lite, frameless glass doors and glazing, and double sliding barn doors, all sourced from a single manufacturer;

6.15.1.1(1)(c) have an STC rating of 37 minimum (determined using ASTM E90).

6.15.2 Electrical, Communications, and Security System Requirements

6.15.2.1 Integrate voice, data and security system components into demountable partitions.

6.15.2.2 Provide conduit, boxes and electrical duplexes and integrate into electrical and communication components.

6.15.2.3 Provide for installation of electrical, communications, and security system items arranged so that wiring can be readily removed and replaced.

6.15.2.4 Boxes: Provide outlet and pre-wired device boxes in cavity of demountable partitions for all outlets and devices. Provide metal junction and pull boxes where required. Must offer plug and play electrical solution.

6.15.2.5 Conduit: Provide option for metal conduit in cavity of demountable partitions, from outlet and device boxes to top or bottom of demountable partitions to permit wiring installation and connections.

6.15.2.6 Components: Provide all cut-outs and reinforcements required for demountable partitions to accept electrical, communications, and security system components.

6.15.3 Demountable Unitized Panel Partitions

6.15.3.1 Solid Panels

6.15.3.1(1) Aluminum Framing: Aluminum extrusions will be 6063-T54 or 6061-T6 aluminum alloy;

6.15.3.1(2) Face Mounted Tile Attachment: Provide unitized frame assembly to accept face mounted tiles;

6.15.3.1(3) Frame Accessibility: Provide up to 75 mm (3 inches) clear wall cavity for distribution of utilities accessible from either side of wall by removable face panels. The wall cavity must also accommodate plumbing.

6.15.3.1(4) Face Panels: The following face tiles and finishes may be used:

6.15.3.1(4)(a) Paint Finish: Factory applied paint finish;

6.15.3.1(4)(b) Wood Veneer Finish: Factory applied wood veneer finish;

6.15.3.1(4)(c) Upholstered Fabric Finish: Factory applied Fabric finish;

6.15.3.1(4)(d) Frameless Back Painted Glass: Factory applied paint finish on frameless glass;

6.15.3.1(4)(e) Solid Write Away Tile (for dry eraser): Factory applied finish on tiles;

6.15.3.1(4)(f) Magnetic Whiteboard;

6.15.3.1(4)(g) Custom material.

6.15.4 Glass Panels

6.15.4.1(1) Glass included in partitions will have aluminum glazing framing with aluminum extrusions, 6063-T54 or 6061-T6 aluminum alloy. Frame Finishes will be one of the following.

6.15.4.1(1)(a) Clear Anodized aluminum; AAMA 611, AA-M12C22A31, Class II;

6.15.4.1(1)(b) Powder coat Color: Factory applied powder coat to match paint finish;

6.15.4.1(1)(c) Wood Veneer Wrapped Finish: Factory applied wood veneer finish.

6.15.4.1(2) Frame Bases:

6.15.4.1(2)(a) Provide frame bases with provisions for height adjustment to accommodate floor slab variances;

6.15.4.1(2)(b) Provide a leveling mechanism for making fine adjustment in height over adjustment range of the product.

6.15.4.1(3) Connections and Supports: Provide manufacturer's standard connections and supports that connect and release from floor and ceiling without damage using carpet grippers and ceiling track clips, with exception of the following conditions: bulkhead (drywall ceiling), seismic conditions, electrical or service feeds, physical connections to base building (where required).

6.15.4.1(4) Panel Joint Closure: Will be manufacturer's standard, capable of closing up to a 25 mm (1 inch) gap between demountable partitions and base building elements.

6.15.4.1(5) Trim: Will be continuous and modular, factory finished, snap-on type; adjustable for variations in floor and ceiling levels.

6.15.4.1(5)(a) Base Trim Profiles: Recessed; removable to access leveling mechanisms.

6.15.4.1(5)(b) Ceiling Trim Profile: Recessed; adjustable to accommodate up to a 12 mm (1/2 inch) gap between demountable partitions and base building elements.

6.15.4.1(5)(c) Wall Trim Profile: Recessed; adjustable to accommodate up to a 12 mm (1/2 inch) up to 25 mm (1 inch) gap between demountable partitions and base building elements.

PART 7. FACILITIES SERVICES SUBGROUP SPECIFICATIONS

7.1 Mechanical Systems Design Principles

7.1.1 This section is accompanied and should be read in conjunction with the Appendix 2E Equipment List and Appendix 3I Room Requirements.

7.1.2 The HVAC, plumbing, fire protection, speciality systems and medical gas systems will be designed to provide a healing, comfortable and productive environment for the Building Users and provide the environmental and infrastructure needs of all equipment.

7.1.3 The mechanical, plumbing, fire protection, speciality systems and medical gas systems will be designed to minimize impact on the natural and physical environment, through energy efficiency, optimization of resource use, and simplification of the systems. The systems will be designed to have no adverse affects on the existing PRH Campus.

7.1.4 The mechanical, plumbing, fire protection, speciality systems, and medical gas systems will be designed and located to be hidden or blend into the overall building. The design and location of equipment will mitigate noise transmission to areas of respite for patients, staff and visitors, and the residential properties adjacent to the site.

7.1.5 It is essential that all mechanical systems, equipment, material and installation conform to the latest version of all the applicable codes, standards, regulations and guidelines.

7.1.6 For Class I areas and patient rooms as defined by CSA and the Room Matrix, mechanical and plumbing equipment will be configured and located in such a way that maintenance and repair can be performed without entering these areas. VAV boxes serving individual in patient rooms located on the patient care floors in the tower may be located in the ceiling of the patient room served, either in the entrance or above the washroom.

The mechanical, plumbing, fire protection, speciality systems and medical gas systems component selection, system design, and installation will incorporate the flexibility and adaptability for future repurposing without major disruption or alteration to the facilities infrastructure.

7.1.7 Mechanical, plumbing, fire protection, specialty systems and medical gas systems will be planned for future repurposing. Expansion space will be shown on the developed drawings for the boiler and chiller room for future installation of one hot water boiler, one chiller and associated pumps and equipment, valved connection points will be provided to connect future equipment to the associated systems. Adequate space will be provided and shown on drawings to install a future cooling tower adjacent to the other cooling towers inside the screened area. Chilled water, heating water and condenser water systems, in the mechanical room, will be sized for 20% spare capacity above that required at date of occupancy for future capacity. Valved connections will be provided for connection of future capacity noted above. Easy access will be provided and shown on drawings for moving the new equipment in and out of the mechanical rooms and energy plant without disruption and major rework.

7.1.8 The mechanical (HVAC), plumbing, fire protection, speciality systems and medical gas systems will be developed to provide reliability of uninterrupted continual operation. Redundancy will be included in Building system design to ensure uninterrupted service and maintain all spaces in accordance with CSA Z317.2 Table 1 in the case of a source equipment or component failure while under normal operating conditions. Redundancy will be demonstrated in real time after building is commissioned and balanced.

7.1.9 Provide water, sanitary, storm and gas utilities as required and sized to suit the consumption and discharge needs of the building occupancy based on Schedule 3 requirements plus an additional 20% spare capacity to allow for future flexibility. Existing water and gas mains currently located where the new Facility will be built shall be relocated by Project Co and reconnected to the existing systems located in the existing Boiler Room. The current PRH campus water loop main arrangement shall be maintained. Water and gas service disruption shall be limited, coordinated with IHA and not last longer than 4 hours. Refer to Appendix 3J Site Services for more information.

7.1.10 All mechanical piping systems, i.e. heating, cooling, domestic water, sewer, storm, plumbing venting, medical gas, natural gas, propane, etc. will have 20% additional capacity above building requirements on date of occupancy built into all main piping distribution sizing. Provide duct shaft areas with 20% additional space for future services installation. Shaft space for future shall be accessible at each floor.

7.1.11 Mechanical services in electrical, communication, and telecommunications rooms shall maintain a clear height of 2200 mm above finished floor. Hydronic and domestic piping shall not be routed through these room types and any sanitary piping shall be avoided where possible. Where sanitary piping is unavoidable provide pans under all piping and drain the pans to a visible location outside of the room. Slab penetrations above these rooms shall be equipped with sleeves which terminate 75mm above the slab to prevent water from entering the sleeves. Equipment with fluid connections shall not been installed in these room types.

7.1.12 Water, glycol and other fluids used within mechanical systems will be treated to prevent corrosion, algae growth, buildup of deposits, disease, bacteria and will prolong the equipment life.

7.1.13 All mechanical, HVAC, plumbing, fire protection, speciality systems, and medical gas systems will be vibration isolated to minimize noise and vibration through the structure or other components of the New Facility .

7.1.14 All mechanical, HVAC, plumbing, fire protection, speciality systems and medical gas systems will comply with standard acoustic requirements as per CSA or current ASHRAE application handbooks, whichever is more stringent. All pipes, ducts and fittings will be insulated to conserve energy, prevent condensation, attenuate noise and prevent accidental burns. All building services and ductwork will be run inside the building envelope.

7.1.15 Speciality systems may include acid waste and vent, radioactive waste and vent, reverse osmosis water, laboratory air, laboratory vacuum, oncology pharmaceutical preparations, natural gas, laser cooling water and dialysate solutions as required by the building.

7.1.16 Provide required mechanical services for the Medical Device Reprocessing water quality, compressed air, and wet vacuum requirements. Refer to room matrix for compressed air and wet vacuum outlet locations. Provide multiple water qualities as required by AAMI Technical Information Report on Water for Reprocessing of Medical Devices, equipment supplier's requirements and end users need. Confirm water, wet vacuum and compressed gas requirements with the Authority.

7.1.17 It is essential that the links to the PRH Campus will be pressurized by this New Facility upon a fire alarm from the PRH Campus and integration to the PRH Campus smoke venting control systems operation should be implemented. If fire is located in the link the link containing the fire shall be exhausted and surrounding areas pressurised to prevent smoke from entering the buildings. Design concept to be supported by code consultant's report.

7.1.18 Public and Staff entrances shall be protected by vestibules and air curtain heaters. Service entrances shall be protected by air curtains.

7.1.19 No "drop in anchors" shall be used to support, hang, or brace piping, ductwork, or other equipment.

7.1.20 The following listed manufacturers, in the Authorities opinion are capable of meeting the general design intent, quality and performance characteristics specified. It remains the responsibility of the Project Co to ensure the products supplied (whether from the list below or others) meet the performance specifications in this Agreement.

7.1.21 Project Co. selected equipment and products must be submitted to the Authority for review as per Schedule 2, Appendix 2C.

• Access Doors	Maxam, Acudor, Milcor, Can.Aqua, Mifab
• Air Flow Measuring Air Monitor, Air Stations	Cambridge, Sentinel, Ebtron
• Air Handling Units	Racan, Pace, Haakon, Scott Springfield
• Air Separators, Relief Valves	Armstrong, Bell & Gossett, Taco
• Air Terminals - Grilles Registers, Diffusers	E.H. Price, Titus, Halton
• Air Valves - Mixing, Constant Volume and VAV	E.H. Price, Titus, Trane
• Air Vents	Hoffman, Maid-O-Mist, Taco
• Backdraft Dampers	Airolite, Vent-Aire, Penn, T.A. Morrison
• Backflow Preventers	Febco, Watts, Hersey, Singer, Ames
• Balancing Dampers	Maxam, Ruskin
• Boilers - Condensing	Viessmann, Cleaver Brooks
• Bypass Filter (HW)	Sumco, GESL, Pace Chemicals

• Chillers - Centrifugal	McQuay, Multistack
• Chimney and Breeching	Metalbestos P/S, Van Packer P/S, Metal Fab PIL
• CO and Combustible Gas Detector	MSA, ACME, Armstrong, Critical Environment Technology
• Coils - Heating and Cooling	Trane, Aerofin, Colmac
• Condensing Units and Fan Coil Units	Trane, Dunham Bush, York
• Condensors - Air Cooled Refrigerant	Trane, Carrier, Engineered Air, Keeprite
• Controls Contractors	Siemens, Delta, Johnson Controls
• Convectors - HW	Engineered Air, Trane, Rosemex, McQuay, Dunham Bush
• Cooling Tower Water Filter	Baltimore Air Coil, PEP
• Cooling Towers - Blow Through and Fluid Coolers	Baltimore Air Coil, Evapco, Marley/ Recold
• Cooling Towers - Induced Draft	Baltimore Air Coil, Marley
• Dampers - Control, Backdraft	Ruskin, Tamco
• Dampers - Smoke-Fire Combination	Ruskin, Controlled Air, Prefco
• Domestic Water Heaters - Electric	Jetglas, Aerco, AO Smith, Ruud-Rheem, State
• Domestic Water Heaters - Gas	Jetglas, Aerco, AO Smith, Ruud-Rheem, State
• Domestic Water Heaters - Steam	Aerco
• Drains - Floor, Roof, Cleanouts, Water Hammer Arrestors	Zurn, Ancon, PPP, J.R. Smith
• Expansion Compensators	Flexonics, Tube Turn, Hyspan, Hydroflex, Metraflex, United Flexible, Mason
• Expansion Joints	Flexonics, Hyspan, Hydroflex, Metraflex, United Flexible, Mason
• Eye Wash Fountains	Western, Haws
• Fan Coil Units	Trane, Engineered Air, Williams
• Fans - Axial	Northern, Chicago, Woods, Joy, CB&F
• Fans - Centrifugal	Buffalo, Twin City, Trane, Chicago, Barry Blower, Northern
• Fans - Roof and Wall Mounted	Greenheck, Ammerman, Powerline, ACME, Loren Cook, Penn, Jenn Fan, ILG, Carnes, Twin City
• Filters	Cambridge, AAF, Pacific, FARR
• Fire Dampers	Controlled Air, Ruskin, Canadian Advanced Air, Maxam, Nailor

• Fire Hose Cabinets, Valves and Extinguishers	NFE, Grigor, Wilson & Cousins, Flag
• Flexible Connectors - Ducting	Thermaflex, G.I. Industries Type IHP
• Flexible Connectors - Piping	Flexonics, Tube Turn, Atlantic, Hyspan, Hydroflex, Metraflex, United Flexible, Mason
• Flexible Duct	Thermaflex, Wiremold, GI Industries Type H.P.
• Gauges - Air	Dwyer, Magnehelic
• Gauges - OWG Pressure	Trerice, Marsh, Ashcroft, Weiss
• Heat Exchangers - Plate	Alpha Laval, Tranter, Armstrong, APV
• Heat Exchangers - Shell and Tube	Armstrong, Taco, Leitch, Bell & Gossett
• Humidifiers - Steam	Armstrong, Sarco, Dri-Steam
• Immersion Heaters	Armstrong, Taco, B&G
• Insulation - Piping and Duct	Fibreglass Canada, Manson, Knauf Fibreglass, Plasti-Fab, Manville
• Louvres	Airolite, Penn, Airstream, West Vent, Nailor, Ruskin
• Piping Hangers and Saddles	Grinnell, Myatt, Anvil
• Plumbing Brass	Crane, American Standard, Cambridge Brass, Waltec, Kohler, Symmons, Toyo Chicago Faucets
• Plumbing Fixtures	Crane, American Standard, Kohler, Toyo
• Pump - Condensate Packages	Paco, Leitch
• Pumps - Deaerators and Boiler Feed	York Shipley, Cleaver Brooks, Duro
• Pumps - Fire Booster	Aurora, Peerless, Leitch, Armstrong
• Pumps - In-Line Circulators	Armstrong, B & G, Taco, Grundfos
• Pumps - Manual	Crane
• Pumps - Positive Displacement	Viking, Fairbanks, Morse, Ebara, Albany
• Pumps - Submersible Bilge or Sewage	Monarch, Barnes, Hydromatic or Sewage, Myers, Zoeller
• Pumps - Sump	Monarch, Barnes, Hydromatic, Myers, Zoeller
• Pumps - Turbine	Aurora
• Pumps - Vertical In-Line and Base Mounted	Armstrong, B & G, Taco, Leitch, Grundfos

• Radiant Ceiling Panels	Airtex, Frenger
• Radiation - Wall Fin	Engineered Air, Trane, Slant/Fin, Rosemex, Dunham Bush
• Silencers - Fan and Duct	Vibro Acoustics, Vibron, Korfund, I.A.C, Koopers
• Sinks - Stainless Steel	KIL, American Standard, Elkay, Franesse
• Steam Traps	Spirax/Sarco, Armstrong, Erwal
• Tank - Diaphragm Type Expansion	Amtrol, Hamlet and Garneau Inc.
• Tanks - Boiler Feed and Blowdown	York Shipley, Cleaver Brooks
• Tanks - Domestic Hot Water Storage	Clemmer, PVI, Everdur, Westeel-Rosco, Ruud/Rheem, State
• Tanks - Expansion	Bell & Gossett, AS Leitch, Sanford, Westeel-Rosco Steelweld, Clemmer, Wheatley
• Tanks - Fibreglass Fuel Oil Storage	CAE, ZCL Manufacturing, Owens, Corning
• Tanks - Steel Fuel Oil Storage	Clemmer, Westeel-Rosco, Tidy, Regal
• Unit Heaters - HW	Engineered Air, Trane, Rosemex, McQuay, Dunham Bush
• Vibration Isolation	Mason, Vibro Acoustic

7.2 Fire Suppression (Division 21)

7.2.1 Fire Protection

7.2.1.1 Basic Requirements:

7.2.1.1(1) Provide all required fire protection for the New Facility including the Helipad and Helipad foam system. Helipad systems shall be designed to NFPA 418 and referenced codes.

7.2.1.1(2) The sprinkler system and equipment will be designed to the occupancy classification that it protects. Provide additional capacity of 20% above facility requirements within each system including main and branch line sizing.

7.2.1.1(3) Provide on the sprinkler system take-off from water supply an approved detector type double check valve assembly with approved listed OS&Y gate valves on both sides complete with tamper switches.

7.2.1.1(4) 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.

7.2.1.1(5) Sprinklers subject to freezing temperatures such as the parking garage and exterior overhangs will be supplied by a dry system.

7.2.1.1(6) Pendant concealed quick response sprinklers will be provided in all areas with dropped ceilings with temperature ratings to suit the specific hazard area.

7.2.1.1(7) Provide a double interlocked, cross zoned pre-action supplied sprinkler system to the following rooms: MCR, all TR's, generator room, MRI and MRI Control rooms, and Nuclear Med and Nuclear Med Control rooms.

7.2.1.1(8) Each fire extinguisher will be located per relevant codes and to the satisfaction of the City of Penticton inspection department and approved for the hazard and classification of the space it serves.

7.2.1.1(9) All fire extinguishers in finished spaces shall be fully recessed.

7.2.1.1(10) There will be no wet sprinkler system in main Electrical Room [as per B.C. Building Code]. Provide either a double interlocked, cross zoned pre-action supplied sprinkler for the main Electrical Room or

provide 3 hour rating around main Electrical Room and do not install sprinklers in the room.

7.2.1.2 Performance Criteria:

7.2.1.2(1) All fire protection systems will be hydraulically sized to NFPA standards.

7.2.1.2(2) All equipment and installation will be in accordance with manufacturers' requirements.

7.2.1.2(3) All equipment will be ULC approved.

7.2.1.2(4) Qualified contractor licensed and regularly engaged in such installations will install all fire protection systems and equipment.

7.2.1.2(5) Provide backflow protection on all fire protection systems in accordance with CSA requirements.

7.2.1.2(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 will be monitored.

7.2.1.2(7) Fire Department Connection will be installed at a location approved by the local Governmental Authorities.

7.2.1.2(8) Install fire extinguishers in a semi (unfinished areas) or fully recessed (finished areas) cabinet to the satisfaction of the City of Penticton Inspection Department.

7.3 Plumbing (Division 22)

7.3.1.1 Provide individual water, fire protection, natural gas, sanitary, medical gas, and storm services as required and sized to suit the usage needs of the New Facility and provide an additional future capacity of (20%) above facility requirements on day of occupancy based on Schedule 3 requirements. Sewer, storm and water service penetrations will be designed for flexibility and movement. No service will be buried in concrete.

7.3.1.2 Provide two domestic water service connections each sized to provide 100% of New Facility load. Each supply into the Site will have a reduced pressure backflow preventer and 25 micron filtration. Each supply will have independent shut-off valves. Provide a common water meter for the domestic service. Submit the projected domestic water supply load. Each connection point will be from mains located on different streets adjacent to the site. Connection points will be a minimum 50 m apart.

7.3.1.3 Basic Requirements

7.3.1.3(1) Domestic water systems will meet the requirements outlined in American Water Works Association (AWWA) standards. Provide water treatment, as required to meet CSA/AWWA standards – and IH Public Health water quality standard or the Canadian Drinking Water standard. Provide an exterior domestic water connection to enable domestic water connection to an exterior source if water main service is not available from the City main. Provide Legionella testing and certification prior to building Occupancy.

7.3.1.3(2) Minimum water quality to the MDR will meet the requirements outlined by AAMI. This report will be used as a standard for this building. Project Co. to provide documentation showing how this requirement has been met at the time of commissioning.

7.3.1.3(3) Refer to Section 5.3 regarding post disaster requirements for services.

7.3.1.3(4) Provide utilities-grade meters for domestic water and natural gas. The meters will be used to accurately measure water flow and natural gas consumption in all flow conditions. Refer to Appendix 8C Energy.

7.3.1.3(5) Provide the plumbing, fire protection, and medical gas systems in such a manner as to avoid disruption to the operation of the New Facility during maintenance or repairs. Design the systems so that, as much as possible, the rooms do not need to be entered when performing these functions. All isolation, maintenance, balancing, and other service valves will be located in the corridor ceiling spaces and will be accessible.

7.3.1.3(6) Distribute plumbing by means of risers to each floor to a maximum of 50% of the floor area. Provide isolation valves to each area. Each floor area shall be jointly served by two [2] risers. Divide the total floor area into six equal zones and provide valves to allow any one zone to be shut off for service while maintaining service to the other five zones. Smaller floor plates such as the In Patient Tower may be served by 3 zones.

7.3.1.3(7) Incorporate flexibility in the system designs to accommodate future alterations. Label all systems clearly, including painting and labelling of all pipes, ceiling identification dots, valve tagging, and emergency valve identification signage.

7.3.1.3(8) Provide and install all fixtures and equipment to manufacturer’s specifications, standards, and instructions.

7.3.1.3(9) Provide the water systems to ensure that water is supplied at the required pressures to all water outlets. Minimum water pressure will be maintained at 35 PSI to the most remote fixture.

7.3.1.3(10) Provide water inlet connections exterior to the New Facility for supply water through tanker truck connections. Design to include the ability to maintain the minimum pressure required by code in the building while drawing water from the tanker truck by using a booster pump provided in the building. The system may use the domestic pumps utilized in daily operations to achieve the required pressure. The system will be designed in such a way that it may be used as a backup should the municipal services fail during a disaster such as an earthquake and shall tie in downstream of the building back flow protection. The operation of this system shall be demonstrated to IHA prior to building occupancy.

7.3.1.3(11) Provide durable materials to allow for 24 hour a day operation with minimal downtime. Domestic and non-potable water piping in the building shall be copper or ductile iron, stainless steel is permitted if permitted by the City of Penticton. Pex piping is only permitted for use in trap primer lines run in the slab. Sanitary and storm piping above ground in the building shall be cast iron or copper.

7.3.1.3(12) Domestic and non-potable water piping shall be connected by soldering, brazing, threading, flange or roll grooved systems. Connections utilizing compression shall not be used except for connection of trap primer lines run in the slab.

7.3.1.3(13) Provide services with easy access and serviceability and to avoid interference with other services during operation and maintenance activities. All equipment valves and serviceable items will be accessible and removable without adapting wall/ceiling finishes or structure.

7.3.1.3(14) Provide floor drains in all mechanical rooms, rooms noted in Room Matrix, and for all devices requiring these drains including but not limited to emergency showers, reverse osmosis systems and backflow prevention devices. Ensure all equipment drain piping is terminated at floor drains and floors slope to the drains.

7.3.1.3(15) Connect the sanitary systems from the MDR-Specimen Fixation, and Biomedical rooms by means of a single point connection per system to the main sanitary building drain. Provide space and venting allowances for future solids interceptors at these connections.

7.3.1.3(16) Provide dedicated storm piping from the Helipad to the aviation fuel separator, no other piping shall tie in above interceptor. Aviation fuel interceptor shall be sized to handle anticipated helicopter's fuel load in the case of a spill.

7.3.1.3(17) Provide, as required by code, interceptors to intercept oil, grease, dirt, solids, aviation fuel from helipad, and bio-waste from the facility. Interceptors shall be located in such a manner that they can be emptied without running hoses through the building.

7.3.1.3(18) Provide domestic water strainers at 25 microns on the incoming services into the Facility. Design shall allow for filter maintenance to occur without affecting water flow to the facility.

7.3.1.3(19) Provide the domestic water booster pumping system per the requirements of CSA Z317.1-09. The number and arrangement of pumps shall be such that peak demand can be met in the event of failure of one pump. Provide a connection to emergency power if required to provide minimum pressure requirements on the top floor. The system will provide uninterrupted water service and constant pressure under all conditions. It may also be able to work in conjunction with section 5.3.1.3 requirements for post-disaster conditions.

7.3.1.3(20) Provide all systems to meet the infection control requirements of this Schedule and CSA Z317.13.

7.3.1.3(21) All piping will be accessible. No in-slab piping is allowed except piping serving the trap primers.

7.3.1.3(22) All Interventional Urology Operating Rooms, Cystoscopy Procedure rooms, and Urodynamics Procedure rooms, will be fitted with flushing rim style floor drains. Flushing device will be concealed push button type. Backflow prevention will be located in Janitor and/or Mechanical Rooms.

7.3.1.3(23) Provide flushable type floor drain in Biomedical and Anaesthetic work rooms for draining of medical equipment must be located so that the machine being drained can be accessed from all sides.

7.3.1.3(24) Coordinate final location of all drains in MDR through User Group Consultation Process.

7.3.1.3(25) All vents shall terminate outdoors; the use of Air Admittance Valves in not permitted.

7.3.1.4 Performance Criteria

7.3.1.4(1) Connect all sanitary drainage utilizing gravity drainage whenever possible. Provide underground overflow tank based on Section 5.3 Storage Provisions to hold sewage in the case of municipal system failure. Provide a minimum storage capacity of 6 hours at peak load. Storage may consist of a single tank or multiple interconnected tanks piped in a manner that allows for the complete emptying of the tank or tanks from one emergency pump out location. Sewage shall bypass tank in normal operation but be directed into the holding tank if required via valves.

7.3.1.4(2) If pile foundations are used to support the structure, all underslab piping will be supported (hung) from the concrete slab above. Hangers and rods will be of sufficient strength and be installed at intervals to carry the pipe and load and maintain the required slope. Hangers and rods will be corrosion resistant. Install light-weight fill above all piping that is supported (hung) from the concrete slab above. Support system will be demonstrated to work and witnessed by the Authority and compliance team

7.3.1.4(3) Pumping systems for subsurface, storm, or sanitary drainage will include 100% redundancy (one redundant unit for each active unit) and related equipment will be supplied with emergency power. The storm / subsurface sump will have twin compartments for settling and pumping and will be sized to prevent short cycling of the pump. Provide local alarm and outputs to the BMS for high water levels, status, and pump failure.

7.3.1.4(4) Insulate storm drainage, domestic water piping, cooling water and exposed p-traps throughout per BCICA quality standards. Where piping and/or piping components are subject to freezing, provide insulation and heat tracing. Provide canvass or vinyl service jacket on all exposed insulation inside, provide aluminum jacketing outside. Ensure life-safety systems are not installed in locations subject to freezing.

7.3.1.4(5) Provide drainage as required to alleviate water pressure exerted onto the bottom of foundations and/or floor slabs.

7.3.1.4(6) All plumbing drainage for acidic fluids will be of ‘acid’ resistant material to a point where dilution, as a result of additional discharge from other sources or neutralizer, reduces the acidity of the discharge to a neutral pH.

7.3.1.4(7) Provide flushing and disinfection of domestic water systems to AWWA and CSA infection control standards. Provide independent testing of piping systems once flushing and cleaning has been completed

7.3.1.4(8) Provide trap primers in drains that are subject to losing the trap seal.

7.3.1.4(9) Provide electronic trap primers with solenoid valves controlled by DDC. Trap primers which rely on fixture use or pressure drop will not be used.

7.3.1.4(10) The Retail areas noted as G1.1 Food Service Area Allocation and Retail Pharmacy Allocation will be fitted out as a tenant improvement. Provide the Pharmacy Allocation with a 75 mm sanitary connection with grade allowance to serve entire space, 50 mm vent connection, 25mm domestic cold, 20mm domestic hot and 12mm domestic hot water recirculation connections complete with valves in the base building contract. The Food Service allocation will require sanitary, domestic cold, hot and recirculation, vent connection, and a grease interceptor. Refer to the Data Room for list of sinks and equipment to be installed by Tenant and provide correctly sized services to the space. Provide space allocation for future installation of grease interceptor. Grease interceptor shall be able to be serviced and contents removed without pulling hoses through the facility.

7.3.1.4(11) Conceal all sanitary, waste, and water piping in walls. Only trap arms and water supply piping shall be exposed. Fixture outlet piping for adjustable height fixtures shall be installed so that no water can collect in the piping at any fixture height.

7.3.2 Plumbing Fixtures

7.3.2.1 Basic Requirements

7.3.2.1(1) All plumbing fixtures will be suitable for a hospital facility. Fixtures selected must have proven acceptable hospital performance from previous installations. All wall hung fixtures will be supported by floor mounted carriers.

7.3.2.1(2) Consult with the Authority on the selection of fixtures, and give particular attention to performance relative to infection prevention and control. The dimensions will at a minimum meet CSA Standards for all hand hygiene sinks, including public washrooms. Small ‘bar’ type sinks are not acceptable. Public lavatories provided for handicap accessibility and lavatories in patient washrooms shall meet ADA guidelines.

7.3.2.1(3) Provide security fixtures where needed.

7.3.2.1(4) Patient bariatric toilets shall be wall hung toilets as per 7.3.2.1(9) which will accommodate mobile commodes. Provide mock up to

confirm compatibility with the Authority supplied equipment, i.e., commodes.

7.3.2.1(5) Provide anti-splash, anti-aerosolizing, faucet fittings (i.e. laminar flow) that do not retain air. Provide gooseneck faucet fittings. Avoid low profile gooseneck faucet fittings. Faucet discharge will not discharge directly in drain grid.

7.3.2.1(6) Fixtures will not have an overflow.

7.3.2.1(7) Public toilets, with the exception of handicap accessible toilets, will consist of wall hung elongated bowls with an open front seat and wired electronic flush valves. Handicap accessible toilets shall be floor mounted rear outlet bowls with an open front seat and wired electronic flush valves. Wall hung toilets will be a minimum height of 18” from floor to rim, floor mounted toilets shall be a minimum of 17” from floor to rim. All toilets must meet Elder Friendly guidelines.

7.3.2.1(8) Staff toilets will consist of wall hung elongated bowls with an open front seat and wired electronic flush valves. All toilets will be a minimum height of 18” from floor to rim. All toilets must meet Elder Friendly guidelines.

7.3.2.1(9) Patient toilets will consist of wall hung elongated bowls, an open front seat and manual high/low dual flow flush valves. All toilets will be a minimum height of 18” from floor to rim. All toilets must meet Elder Friendly guidelines. Toilets will be of a type that can be used with portable bariatric commode chairs as required.

7.3.2.1(10) Clinical service sink (hopper) shall be wall mounted with flush valve, rim guard, cover, and vacuum breaker protected faucet with hose thread spout. Rim height to be confirmed with User Groups. Locate away from work station or provide barrier.

7.3.2.1(11) Showers and bath tubs will be provided with pressure balanced and high temperature limit shower valves, metal shower heads will be utilized. Shower bases will ensure that the water is contained within the shower area and drain fully without puddling. Install shower heads at 6’-6” AFF minimum. Shower bases shall not be fibreglass.

7.3.2.1(12) Showers for staff use shall not be less than 1200 x1200 mm.

7.3.2.1(13) Urinals will be wall-hung and low-consumption with electronic hands-free flush valve operation.

7.3.2.1(14) Public and patient 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. Lavatories shall be wall hung and shall be wheelchair accessible.

7.3.2.1(15) Utility sinks shall be commercial grade stainless steel sinks integral to the counter top. Faucets shall be goose neck laminar flow with blade handle unless noted otherwise. Provide thermostatic mixing valve to limit hot water discharge temperature to 43 degrees Celsius.

7.3.2.1(16) Inpatient room washroom lavatory fixtures will be made of an impervious, durable material and will have manually operated faucets with blade handles. Provide thermostatic tempering valve to limit hot water discharge temperature to 45 degrees C. Lavatories shall be wall hung and shall be wheel chair accessible.

7.3.2.1(17) Hand Hygiene sinks (Clinical hand wash) for nursing stations, patient care areas, examination rooms, and other similar function rooms will be wall hung, made of impervious durable material (vitreous china, porcelain) 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 and will have an integral temperature control which is user adjustable. Hand hygiene sink to be reviewed and approved by the Authority.

7.3.2.1(18) Nourishment station sinks shall be 2 compartment stainless steel sinks with a blade handle goose neck faucet and an Instant hot water dispenser. Provide water supply and drain connection for ice maker.

7.3.2.1(19) Operating room scrub sinks will be hands-free type faucet. Faucet must have sufficient clearance and height to allow proper surgical scrubbing to occur. Single temperature supply that can be adjusted and set to the desired temperature will be an integral temperature control user adjustable. Number of compartments per scrub sink will depend on location/distribution and will be confirmed with Users during the User group meetings.

7.3.2.1(20) MDR and scope cleaning faucets within the soiled decontamination side of the departments to be selected through the user consultation process. There will be multiple faucets required at each workstation to allow proper filling of sinks and cleaning of instruments and equipment.

7.3.2.1(21) Equipment cleaning sinks will be made of stainless steel integral to counters with blade handle faucets and gooseneck spouts. Sinks

will be large and deep to accommodate proper washing of equipment.

7.3.2.1(22) Bottle fillers shall be fully recessed, stainless steel, hardwired, with no touch sensor activation. Fixtures shall be ADA compliant.

7.3.2.1(23) Provide electronic trap primers with automatic solenoid valves to maintain the prime of p–traps for showers, lavatories, and hand hygiene sinks in negatively pressurized rooms.

7.3.2.1(24) Provide suitable quantities of janitors' sinks, hose bibbs, eye wash and emergency shower stations to provide sufficient service to the New Facility.

7.3.2.1(25) Provide all appropriate services and connections to all equipment for patient care, laboratory and all other areas. Provide all accessories as needed.

7.3.2.1(26) Sinks will be stand-alone wall hung type or have bowls integrally formed into countertops. Drop-in or under-mount style countertop sinks will not be used.

7.3.2.1(27) Provide floor mop sink in each housekeeping room of an adequate size, depth and access to support the floor burnishers and other required housekeeping equipment. Faucet shall have blade handles, integral stops, vacuum breaker, and be equipped with a hose connection on the spout.

7.3.2.1(28) Provide a RPBD protected hose thread connection to all housekeeping detergent dispensing systems, minimum one per Janitor's room.

7.3.2.1(29) Provide eyewash and emergency shower fixtures to comply with ANSI 2358.1- 2009 or latest standards and the Work Place Health and Safety Guidelines.

7.3.2.1(30) Hose bibs shall be provided around the building and on every level of the parkade. Parkade system shall be isolated from the building by a Reduced Pressure Backflow Device. The design will incorporate the ability to drain down the parkade system during the winter so piping does not require heat tracing.

7.3.2.2 Performance Criteria

7.3.2.2(1) Provide isolation valves for all plumbing services and clearly identify the location of all valves.

7.3.2.2(2) Provide accessible clean-outs for all sinks and lavatories above the flood-level rim of the sink. Also include provisions for clean outs for future sinks and lavatories.

7.3.2.2(3) Provide Low/High flush toilets to reduce water consumption.

7.3.2.2(4) Fixtures requiring backflow preventers will have backflow preventers concealed in wall or located in Mechanical Room or Janitor's room.

7.3.2.2(5) Select toilets that will reduce the spread of infection. Size flush valves for the water consumption of the bowl. Toilet bowls will not splash or spray water onto the toilet rim or anywhere outside of the toilet bowl and will be designed to minimize the aerosolization of the toilet contents.

7.3.2.2(6) All electronic sensor-activated fixtures will be hardwired and on delayed vital emergency power.

7.3.2.2(7) If system pressure exceeds the acceptable delivery pressure, then provide pressure reducing valves with 100% redundancy. Place the valves in accessible locations in Mechanical Rooms or chases.

7.3.3 Domestic Hot Water Systems

7.3.3.1 Basic Requirements

7.3.3.1(1) Provide a domestic hot water system with sufficient capacity and recovery rate for the hot water requirements of the New Facility. Allow for 20% expansion capacity within each system for future flexibility. Calculate domestic hot water demand in accordance with ASPE Plumbing Engineering Design Handbook.

7.3.3.1(2) Domestic hot water supply will be of adequate temperature to serve the needs of the New Facility and stored and circulated at temperatures noted in CSA Z317.1 Table 1. Provide central mixing valve to reduce from stored tank temperature to distribution temperature. Provide thermostatic mixing valves where temperatures are required to be less than 60ºC at point of use as required by CSA Standards. Provide fail safe bypass for over temperature water after central mixing valve. Provide alarm to BMS for over temperature conditions.

7.3.3.1(3) Ensure timely delivery of hot water to all fixtures [0-10 seconds acceptable].

7.3.3.1(4) Design the domestic hot water system to prevent growth and spread of Legionella bacteria within the piping, fixtures, or any

other component. Design methods will include eliminating dead-leg piping and minimizing uncirculated piping by connecting the circulation system as close as possible to fixtures. Hand hygiene sinks shall have the circulation connection within 50mm of the hot water supply to the fixture.

7.3.3.2 Performance Criteria

7.3.3.2(1) Provide the hot water generating equipment with 100% redundancy. Include the fuel requirements for domestic hot water generation in the 72 hour fuel allowance. If separate system is provided for MDR this system shall also be included in the fuel storage capacity.

7.3.3.2(2) Generate domestic hot water at 70ºC to minimize conditions for Legionella bacteria.

7.3.3.2(3) Recirculate domestic hot water from the distribution system(s) back to the generating equipment.

7.3.3.2(4) Monitor hot water supply temperatures via the BMS and provide alarm outputs when the temperature exceeds the design set point.

7.3.3.2(5) The domestic hot water generating equipment will meet the energy efficiency requirements of ASHRAE 90.1.

7.3.3.2(6) Tanks used to store domestic hot water will have active heating elements (gas, steam or hot water) capable of attaining a water temperature in the tank of 80 degrees C for the purpose of sanitizing.

7.3.4 Medical Gas Systems

7.3.4.1 Basic Requirements

7.3.4.1(1) Project Co will provide medical gases for the Building as required by Appendix 3C Medical Gas Requirements.

7.3.4.1(2) Project Co will provide oxygen to the New Facility by connecting to the oxygen distribution piping at the Bulk Oxygen Tank farm, refer to site plan for location. Project Co shall be responsible to run all piping to the tank farm from the new building and shall coordinate the connection point and tie in with the Authority and Linde.

7.3.4.1(3) Project Co will:

7.3.4.1(3)(a) provide centralized duplex bottle manifold supply systems for the following medical gases: medical

air [4 hour reserve], oxygen (4 hour reserve), nitrogen, nitrous oxide, and carbon dioxide based on anticipated usage from the Functional program and User Group meetings. Provide 20% spare capacity in manifold sizing;

7.3.4.1(3)(b) design the centralized duplex bottle manifold supply systems so that they will, when required, automatically switch to the spare bank of bottles (and that switching to the spare bank is alarmed at the master alarm); and

7.3.4.1(3)(c) include in the Building an enclosed room with adequate space for the storage of medical gas bottles, including bottles of gases supplied by the centralized supply systems described above and bottles of the following additional medical gases: argon, helium, oxygen mix and rare gas/oxygen mix. Bottle quantity shall be confirmed with Users.

7.3.4.1(4) Provide new central medical air and medical vacuum systems with redundancy so that if 2 of the compressors or pumps in either system were to fail or be shut down, there will be no degradation of the system's ability to meet the capacity requirements of the Building. (i.e.- 100% redundancy.)

7.3.4.1(5) Connect new central medical air and medical vacuum systems to vital or delayed vital emergency power.

7.3.4.1(6) Provide a wet independent vacuum system with 50% redundancy for the laboratories and MDR that is connected to delayed vital emergency power. System shall have a central canister located in a Mechanical space emptied to drain by an automatically activated control valve. Provide high liquid alarm. No canisters allowed at outlets. Outlets suction shall be User adjustable.

7.3.4.1(7) Provide instrument air with N+1 redundancy in compressors to laboratories and MDR that is connected to delayed vital emergency power. Outlet pressure shall be User adjustable.

7.3.4.1(8) Provide active Anesthetic Gas Scavenging System with redundancy so that with 2 vacuum producers out of service the system can meet design loads. System shall operate at 12"Hg.

7.3.4.1(9) Project Co will install an emergency oxygen outlet suitable for a tanker truck to draw alongside and dispense oxygen into the building system.

7.3.4.1(10) With the exception of outlets such as those located in booms and single outlets that may be found in areas such as the Medical Device Reprocessing, locate all medical gas outlets in a head wall system that incorporates medical gases, electrical and data outlets as per Schedule 2 Design and Consultation Process.

7.3.4.1(11) All pipe and pipe fittings will be in accordance to ASTM 88, de-greased copper Type 'L'.

7.3.4.1(12) Service Outlets

7.3.4.1(12)(a) Provide recessed service outlet boxes designed for concealed piping and fabricated for straight insertion of secondary equipment.

7.3.4.1(12)(b) Each recessed wall outlet will have a permanently marked, colour-coded non-interchangeable index system to prevent connection to the wrong gases. Provide a secondary check valve to maintain the line pressure if the primary valve is removed for maintenance.

7.3.4.1(12)(c) Provide 2-part DISS type outlet connections for each medical gas. Refer to Room Matrix for locations and quantities.

7.3.4.1(13) Ball type shut off valves will be U.L. labelled showing the appropriate gas service & pressure rating. Valves will swing out during installation and have a quarter turn from full open to close. All valves to be dual port. In the case of valves over 2" for vacuum system stainless butterfly valves may be used provided purge points are provided in piping immediately before and after valve.

7.3.4.1(14) Area zone shut off valves will be housed in a single box comprised of multiple shut off valves with tube extensions, lexan glass door with hinges and pull out opening ring. Provide pressure / vacuum gauges for each service. Provide label stating rooms served by valves.

7.3.4.2 Performance Criteria

7.3.4.2(1) Provide the medical gas system so that there is a minimum of one zone shut off valve per program area and a local alarm panel for each zone. Monitor all local alarms on BMS system.

7.3.4.2(2) Provide valved medical gas piping to the hallway outside the Sterile Supply Holding room sized for oxygen (10 outlets) vacuum (20

outlets) medical air (10) nitrous oxide (2) nitrogen (6) carbon dioxide (4) and scavenging (4).

7.3.4.2(3) All medical gas piping in normally inaccessible areas (e.g. behind walls and boarded ceilings) will be clearly identified.

7.3.4.2(4) Provide the medical gas system such that each program area will have its own valve box and alarm panels. Alarm panels will be connected to delayed vital emergency power.

7.3.4.2(5) Provide an alarm interface signal to the BMS for critical alarms such as low or high pressure from each local alarm station.

7.3.4.2(6) All piping, valves and filters will be factory cleaned and capped or sealed to prevent contamination.

7.3.4.2(7) All departments will be provided with local valve boxes and alarm panels.

7.3.4.2(8) Provide a master medical gas alarm panel to monitor all medical gas functions. Master alarm panel will be located in location with 24 hour continuous responsible surveillance. Remote alarm annunciation will be provided at a location with 24 hour continuous monitoring by FM provider/personnel and not be located in Clinical Areas. Provide an inter-connected status and alarm point and signal to the BMS. The FM provider will be the first responder.

7.3.4.2(9) Individually connect all alarms from master alarm panels to the BMS.

7.3.4.2(10) All medical gas systems will be certified in accordance with CSA standards by an independent and qualified testing agency who will be employed by the Authority.

7.3.4.2(11) All systems components requiring electrical power will be on delayed vital emergency power.

7.3.4.2(12) The medical gas supply system will be for patient consumption only. If equipment and/or procedure(s) require medical grade gas supply, then provide separate dedicated source equipment, piping, valving and monitoring to accommodate that application.

7.3.5 Specialty Systems

7.3.5.1 Provide all specialty systems required for the operation of the Building, including:

7.3.5.1(1) acid waste piping and venting; and neutralization

7.3.5.1(2) oil, grease, dirt, aviation fuel, and solids interceptors

7.3.5.1(3) reverse osmosis water systems

7.3.5.1(4) medical gas systems

7.3.5.1(5) biowaste systems

7.3.5.2 Interceptors will be provided and installed in accordance with manufacturer's specifications and applicable codes.

7.3.6 Acid waste, vent piping, and fittings will be suitable for the pH levels of the waste system.

7.3.7 Oil storage and distribution systems – Provide a complete and fully operational fuel oil system to serve the existing boilers and new emergency power generation systems. In lieu of a fuel oil system the existing boilers may be supplied with propane that is vaporized and mixed to match the caloric value of natural gas. If Propane is used in lieu of a fuel oil system provide 72 hours of stored propane on site and complete the propane system install prior to removing existing boiler fuel oil system. Provide a total of 72 hours of fuel storage in the underground and day tank per system. Dedicated belly tanks on generators not connected to a central storage tank shall each be sized to provide 72 hours of fuel to generator served. Project Co to maintain fuel supply to existing generators until new generators are operational and connected to the existing power distribution. Fuel oil systems to include but not be limited to:

7.3.7.1 Underground double wall tank with mechanical anti-overfill device, inventory floats for fuel and water levels, interstitial and turbine leak detection, personnel-access for tank maintenance and spill containment on fill.

7.3.7.2 Provide underground double wall piping system including monitored transition sumps. Piping shall rise above grade before entering building. Provide shut off valves before and after the piping enters the building above grade.

7.3.7.3 Provide an inventory system to provide fuel levels to transfer pumps, monitor inventory and water levels in all tanks, and all interstitial / turbine / and transition sump leak detectors. Inventory system will communicate with BMS to provide alarms / status and graphics.

7.3.7.4 Duplex transfer pump factory piped skid mounted complete with drip tray, control panel, relief valves, strainers, check valves, gauges, flow switches, hand priming ability. Control panel will communicate and receive signals from BMS and inventory systems. Transfer pumps shall shut down on low level alarm from underground storage tanks.

7.3.7.5 Provide fuel filtering and polishing to meet generator supplier fuel quality and capacity. Provide redundancy and bypasses required to allow filter maintenance without interrupting fuel flow to generators.

7.3.7.6 Provide cathodic corrosion protection on any direct buried steel pipe associated with oil distribution and storage system.

7.3.7.7 Remove all redundant equipment, piping, controls, tanks, etc. from the existing boiler and emergency power generation systems being relocated.

7.4 Heating, Ventilating and Air Conditioning (Division 23)

7.4.1 Building Heat Source

7.4.1.1 Project Co will provide heating for the Building by providing a stand-alone heat source for the Building.

7.4.1.1(1) Project Co to provide a stand-alone heat source to the following:

7.4.1.1(1)(a) Project Co will provide multiple dual-fuel hot water heating boilers [natural gas and propane] to provide all necessary heating (including redundancy and additional 20% allowance for future flexibility above facility requirement) and domestic hot water generation, if applicable, for the Building to meet the standards as follows:

(a).1 the boilers will provide heat for the entire facility to meet their full functional requirements for a period of at least 72 hours following any disruption of the supply of natural gas utility service.

7.4.1.1(2) The Authority will co-operate with Project Co to identify a suitable area of the PRH Campus for locating back-up fuel storage equipment. Project Co. to provide required storage tank, seismic pad, tank enclosure, equipment and connect equipment to building. A location has been shown on the site plan for the backup fuel storage, Project Co to size fuel storage based on their design and verify the clearances meet all codes and Standards.

7.4.1.1(3) Project Co will provide clean steam for humidification and sterilizers. Steam will be generated at point of use by electricity or gas. “Clean steam” for humidification shall not contain chemicals or contaminates harmful to health or which slow the healing process. “Clean steam” for sterilizers shall meet the purity and saturation requirements of the equipment it is supplying; filtration at point of connection may be required. Piping used for “clean steam” shall not contaminate the steam it carries. Steam generation for MDR with an electrical energy source shall be on Vital or Delayed Vital power. R.O. water to be used for creating steam feed water and

humidification steam. Provide 72 hours of backup fuel for gas fired steam generators for sterilizers.

7.4.1.1(4) Project Co will not use the PRH central plant to provide back-up heating or humidification for the Building.

7.4.1.1(4)(a) Redundancy for boilers will be as per CSA Standards. Steam generation for MDR shall contain redundancy such that a single steam generator can be removed from service for maintenance or due to equipment failure without out affecting the operation of any MDR equipment.

7.4.2 Heating

7.4.2.1 Basic Requirements

7.4.2.1(1) Sources and related accessories of ventilation and/or heating systems that serve the Building will be connected to the delayed vital emergency power supply unless specified otherwise in Section 7.9.5.1(15).

7.4.2.1(2) It is essential that perimeter heating with radiant ceiling panels be utilized for the entire building, excluding mechanical, electrical and communication rooms. Radiant floor heating may be substituted in Inpatient Units located in the patient care tower. The radiant floor system may be zoned by primary exposure provided the rooms grouped maintain individual temperature control.

7.4.2.1(3) Boilers will capable of operating at a minimum AFUE efficiency of 93% at all firing rates. Consideration will be given to designing and providing a heating system with condensing boilers. Steam boilers shall operate at a minimum efficiency of 80%.

7.4.2.1(4) Boilers will be dual fuel fired with natural gas as the primary fuel and propane as the secondary fuel. Adequate storage of secondary fuel will be provided on-site to operate the boilers for a minimum of 72 hours, under maximum demand conditions. Complete boiler plant will be sized such that low load and shoulder season loads can be achieved at high efficiency and that the total capacity will accommodate an additional 20% allowance for future above facility requirements.

7.4.2.1(5) Provide a dedicated glycol loop to serve the Helipad slab and exterior access walkway path in-slab heating system. Provide 100% redundancy in the heat exchangers and pumping components.

7.4.2.1(6) Provide adequate expansion compensation for heating piping. Location of anchors and guides, design of expansion compensation loops and selection of expansion compensation devices will be based on a thorough review of piping layout, and piping stress analysis. Anchor systems to be pour-in-place type (inbed or pre-set).

7.4.2.1(7) All high points in piping will be equipped with automatic air removal devices including air collection chambers and air vents. Relief will be piped to nearest drain, glycol systems pipe to receiver or back to feed tank. Discharge termination will be visible.

7.4.2.1(8) Provide the HVAC systems to avoid disruption to the operation of the Building during maintenance or repairs. Design the systems so that, as much as possible, the rooms do not need to be entered when performing these functions. All isolation, maintenance, balancing, and other service valves will be located in the corridor ceiling spaces and will be accessible.

7.4.2.1(9) Equipment and piping will be installed with adequate service space, access panels and the ability to remove equipment for servicing or replacement without adapting wall/ceiling finishes or structure.

7.4.2.1(10) Isolation valves, unions and bypass piping will be provided to allow for equipment isolation and removal without unduly affecting the system operation or major drain down.

7.4.2.1(11) Balancing valves, flow-measuring devices, temperature and pressure sensors will be provided throughout the system to facilitate system balancing.

7.4.2.1(12) Design pumps to operate at the system fluid temperature without vapour binding and cavitation. Pumps, will be non- overloading in parallel or individual operation, and will operate within 25% of the midpoint of published maximum efficiency curve. Where there is more than 40% variation in flow, variable frequency drives will be provided. Provide grounding rings on all motors equipped with VFD’s.

7.4.2.1(13) Pump construction and installation will permit complete pump servicing without disrupting piping or motor connections.

7.4.2.1(14) Locate services that require access for regular maintenance above non-critical spaces such as corridors to minimize or eliminate disruptions to the delivery of health care services.

7.4.2.1(15) Insulate all heating water piping, equipment and accessories in accordance with the most stringent of all applicable standards, including applicable BCICA and ASHRAE standards. Provide canvass or PVC service jacket on all exposed piping inside, exterior piping shall have aluminum jacketing. Piping above 3meters off finished floor in Mechanical rooms does not require service jacketing.

7.4.2.1(16) Utilize screw fittings for steel piping 50mm and smaller and welded fittings for steel piping 65mm and larger. Copper piping for run outs, coil connections, and radiant panel circuiting shall be soldered with lead free or 95/5 solder. PEX piping used for in slab radiant heat shall be connected with fittings approved by the PEX pipe manufacture for installation type.

7.4.2.1(17) Design seismic mitigation and building separation devices for all piping that crosses buildings and/or utility corridors.

7.4.2.1(18) All piping will be accessible. With the exception of in floor active radiant heating elements and trap primer piping no in-slab piping is allowed. All piping installed in the slab shall be identified for its full length on the slab surface with permanent markings. These marks shall remain visible after floor removal. Marking system and product shall be approved by flooring manufacture for use with their product.

7.4.3 Air Conditioning

7.4.3.1 Basic Requirements

7.4.3.1(1) Provide all necessary space, ventilation and process cooling for the Building including an additional 20% allowance for future above facility requirement. Design shall accommodate the removal of heat generated by equipment; refer to equipment list for list of equipment. Connect all cooling systems to delayed vital.

7.4.3.1(2) The design and installation will comply with all applicable standards, including CSA B52, Mechanical Refrigeration Code.

7.4.3.1(3) Equipment will be CSA approved, and will meet all applicable standards, including applicable sections of the ASME Code.

7.4.3.1(4) Welding materials, fabrication standards, and labour qualifications will comply with all applicable standards, including applicable ANSI and ASTM Codes.

7.4.3.1(5) Cooling towers performance will be certified in accordance with CTI (Cooling Tower Institute) Standard STD-201. No open type cooling

towers are allowed; condensing water from the chillers shall be in a closed loop. Evaporative cooling of the chilled water closed loop bundle is acceptable. Cooling towers shall be visibly screened for full height of equipment sympathetic to Architectural Design. They shall not be visible from windows in New Facility.

7.4.3.1(6) Chillers and cooling towers will be designed and located so as not to have an adverse effect on PRH's mechanical systems or the Helipad's landing pattern. Installation will be fully screened.

7.4.3.1(7) Provide chillers and cooling towers for ease of operation, accessibility for maintenance, safety and appearance.

7.4.3.1(8) Installation will comply with ASHRAE Guideline 12-2000 for Minimizing the Risk of Legionellosis Associated with Building Water Systems.

7.4.3.1(9) Redundancy will be as per CSA Standards.

7.4.3.2 Performance Criteria

7.4.3.2(1) Provide dedicated and continuously available chilled water systems for all New Facility areas containing specialized medical equipment, walk in coolers, elevator rooms, server rooms, communication and IMIT rooms, and electrical rooms where heat rejection to outdoors is not possible for managing continuous internal heat gains. This system may be supplied from the New Facility chiller plant provided that 100% redundancy is provided to meet Class 1 area requirements, Diagnostic Imaging requirements, and dedicated system requirements combined and the New Facility chiller plant is designed to run year round. Cooling distribution systems shall be designed such that non critical loads can be isolated and cooling directed toward critical areas if the system capacity is limited due to equipment failure. All cooling systems will be on delayed vital. Specialized equipment requiring cooling will be confirmed during User Group meetings.

7.4.3.2(2) Provide water cooled refrigeration systems where required for the medical needs connected to the dedicated condensing water system.

7.4.3.2(3) Provide sufficient space cooling capacity to meet the required indoor design temperatures outlined in applicable CSA Standards while using the July 2.5% outside design wet and dry bulb temperatures outlined in the BC Building Code or 1% Design Cooling Temperature as per ASHRAE, whichever is greater.

7.4.3.2(4) The building shall be able to provide 100% outdoor air for free cooling as a means of space cooling except to the extent that peak cooling loads require the use of chillers.

7.4.3.2(5) Ensure that no air within the air conditioning system, outside of the central air handling equipment, drops below its dew point temperature.

7.4.3.2(6) CFC and HCFC based refrigerants will not be used in the refrigeration equipment.

7.4.3.2(7) Design piping to be installed in an orderly manner (aligned with structural elements and at right angles). Slope piping to permit complete drainage of the system.

7.4.3.2(8) All high points in the closed loop piping will be equipped with automatic air removal devices, such as air collection chambers and air vents. Relief will be piped to drain. Glycol systems will be piped back to make up tank.

7.4.3.2(9) Provide equipment and piping with adequate service space, access panels and ability to remove equipment from the Facility for servicing or replacement without affecting facility operations. Provide chilled water risers and piping with 20% spare capacity to accommodate future flexibility.

7.4.3.2(10) Provide isolation valves, unions and bypass piping to allow for equipment isolation and removal without unduly affecting the system operation or major drain down.

7.4.3.2(11) Select pumps that operate without vapour binding or cavitation, be non-overloading in parallel or individual operation, and operate within 25% of the mid-point of published maximum efficiency curve.

7.4.3.2(12) Pump construction and installation will permit complete pump servicing without breaking piping or motor connections.

7.4.3.2(13) Locate services that require access for regular maintenance above non-critical spaces so that there is minimal to no disruption to the delivery of health care services.

7.4.3.2(14) Insulate all chilled water piping, equipment and accessories in accordance with the most stringent of applicable standards, including BCICA and ASHRAE standards. Provide canvass or PVC service jacket on all exposed piping inside, exterior piping shall have aluminum jacketing. Piping above 3meters off finished floor in Mechanical rooms does not require service jacketing.

7.4.3.2(15) Provide 100% redundancy for fan coil units serving electrical and communication rooms to ensure continuous cooling in the case of a unit failure or required maintenance shut down.

7.4.3.2(16) Utilize screw fittings, welded fittings or roll grooved mechanical couplings for all piping.

7.4.3.2(17) Provide seismic mitigation and building separation devices for all piping that cross buildings and/or utility corridors.

7.4.4 Ventilation

7.4.4.1 Basic Requirements

7.4.4.1(1) Provide all necessary ventilation for the Building as per applicable CSA Guidelines with 100% uninterrupted service redundancy. System design shall include 20% spare capacity above capacity required on day of occupancy for future flexibility in all areas with the exception of the OR suite, this area shall have 60% spare capacity.

7.4.4.1(2) Ductwork velocity not to exceed 1500 feet per minute when designed. For future flexibility allowance will be made up to 1800 fpm to accommodate future air handling growth. Air handling units will also have static requirements built in to accommodate increase. Balancing Contractor to confirm this requirement has been met in the final report. Duct work serving the Sterile supply holding room shall be sized to provide 20 air changes to the room, volume of air based on a 3.3 meter ceiling. Provide 2 supply VAV's and 2 return VAV's to serve this space.

7.4.4.1(3) Design the ventilation systems to mitigate the spread of infections during an outbreak by creating negative pressure Out Break Control zones as follows:

7.4.4.1(3)(a) configure the ventilation systems serving control zones to allow the building operator to easily move each zone into a negative pressure condition with respect to adjacent floor areas by proportionately changing the supply and return air ratio for all rooms within the zone;

7.4.4.1(3)(b) Program the settings required into the BMS system so that the Out Break Control zone settings for each zone can be implemented with a single command; and

7.4.4.1(3)(c) configure the ventilation systems to ensure that no airborne infection can be re-circulated into any ventilation system from the Out Break Control zones. HVAC system shall be able to maintain CSA Z317.2 Table 1 requirements while in Out Break Control mode. Each 28 bed unit shall be able to be separated into two 14 bed units with one operating as an Out Break Control zone.

7.4.4.1(3)(d) The Out Break Control zones shall be commissioned, balanced, and demonstrated to the Authority as part of the verification process.

7.4.4.1(4) Provide an HVAC system that maintains appropriate pressure relationships between various areas of the Facility and provides necessary outdoor air quantity, air filtration, cleansing and exhaust to control the transmission of infection. Refer to applicable infection control standards and CSA Z317.2-10 (Special Requirements for Heating, Ventilation, and Air Conditioning (HVAC) Systems in Health Care Facilities) for the relative pressurization and other minimum indoor air quality requirements for the Facility. Where relative pressurization is required (either negative or positive) the minimum pressure differential shall be 2.5 Pa.

7.4.4.1(5) Provide an HVAC system to maintain the Decontamination Area (E.1) of MDR negative to all surrounding areas, the HLD zone positive to Decontamination Area but negative to other surrounding spaces, the Clean assembly and Sterilization Areas (E.2 and E.3) positive to Decontamination and to the other surrounding spaces but negative to E.4, and Supply Storage and Case Assembly Area (E.4) positive to all surrounding spaces.

7.4.4.1(6) Provide an HVAC system to maintain the Scope Decontamination Room negative to the Scope disinfection room.

7.4.4.1(7) Provide HVAC systems with 100% equipment and system redundancy to ensure continuous Facility operations at all times. All HVAC systems serving the facility will be on delayed vital emergency power unless specified otherwise in Section 7.9.5.1(15)..

7.4.4.1(8) Provide air handling units with sectional heating and cooling coils and manual isolation valves that will enable isolation removal, or repairs to the damaged sections of coils without stoppage of the system. Provide space for coil removal and replacement without removing piping or accessories serving other equipment.

7.4.4.1(9) All air handling units will provide redundant capacity so that, in the event of a failure or scheduled shutdown of one unit for servicing, the remaining units will continue to run and provide 100% capacity to the affected area.

7.4.4.1(10) Provide air filtration in accordance with all applicable standards, including CSA Z317.2-10. Operating Rooms shall be supplied with HEPA filtered air. Supply air handling units shall be able to accommodate carbon filters should they be required in future to remove smoke from forest fires or fumes from equipment. Air handling units shall be designed with this additional static pressure requirement.

7.4.4.1(11) Provide dedicated supply air with HEPA filters for spaces as required by applicable CSA standards.

7.4.4.1(12) Provide the ventilation system and all components in accordance with all applicable standards, including ASHRAE and CSA standards.

7.4.4.1(13) Provide fans with Variable Frequency Drives (VFDs) for energy savings under part-load conditions. Motor loads of 100 hp. or greater will be provided with reduced voltage motor starter acceptable to BC Hydro. Provide grounding rings on all motors with VFD's.

7.4.4.1(14) Provide an indirect and/or direct heat recovery system on the general exhaust air systems where energy savings are possible.

7.4.4.1(15) Provide an exhaust air system suitable for the laboratory requirements and any other special venting requirements as per CSA standards. These systems will be interlocked with the supply air systems.

7.4.4.1(16) Provide supply and return air to the Retail Area spaces. Spaces will be completed under a tenant improvement. Base building design shall provide the ventilation requirements for the spaces including the VAV and reheat coils, final diffuser/grille locations to be done by tenant. Refer to Data room for more information on room function and anticipated equipment.

7.4.4.2 Performance Criteria

7.4.4.2(1) Incorporate a strategy to allow the installation and removal of major building equipment such as fans or boilers without disrupting Hospital operations. Show access routes on submittal drawings as per Schedule 2, Appendix 2C. Locate fans, common filters (e.g.

HEPA), and other equipment in the central mechanical rooms. Allow for adequate clearance for service access.

7.4.4.2(2) Airborne isolation rooms and their associated anterooms shall be served by separate exhaust VAV boxes controlled by the pressure monitors maintaining the pressure relationships noted in CSA Z317.2 Figure 1 (1 VAV box for Ante room, 1 VAV box for Isolation room). One supply VAV can serve both rooms. System shall be able to self-compensate for small changes in room seal without alarming or requiring rebalancing.

7.4.4.2(3) Exhaust grilles in Negative pressure air borne isolation rooms shall be located close to the patients head at low level. Noise criteria for these grilles shall not exceed NC20.

7.4.4.2(4) Provide exhaust systems with bag in – bag out filters and 100% redundancy for isolation room exhaust systems.

7.4.4.2(5) All equipment for supply air, return air and general exhaust systems will be located inside the Building envelope. (Mechanical Penthouse).

7.4.4.2(6) Make allowances in duct sizing and equipment selections to provide flexibility for future changes in spaces. Allow for a future increase in capacity of 20% on branch lines and 20% on the capability of the air handling units.

7.4.4.2(7) Provide fresh air intakes, cooling coil drain pans, air handling units, duct mounted humidifiers, ductwork, and all other interconnected components to prevent moisture or contaminants from collecting within the system. Provide sufficient access panels to allow for inspection and cleaning.

7.4.4.2(8) Fresh air intakes will be located to not entrain contaminants from outdoor sources including existing Hospital exhaust points. All intakes will be located in areas that are not accessible by the public and will not be located near exhaust air outlets. Take into account the location of the Helipad and emergency generator exhaust and ensure that fumes from the Helipad and generator exhaust are not introduced into the Building or adjacent buildings' fresh air intakes. Perform computer modelling to support the placement of intakes. Computer modeling shall take into account existing Campus exhaust locations, local wind conditions, helipad, and New Facility exhausts.

7.4.4.2(9) All supply, return, transfer, and exhaust air will be fully ducted to the space being served. Ceiling area will not be used as return air

plenums. Door grilles are only permitted for non-medical storage and service rooms, door undercuts are not permitted.

7.4.4.2(10) Locate services that require access for regular maintenance above non-critical spaces so that there is minimal disruption to the delivery of health care services. VAV boxes serving individual in patient rooms located on the patient care floors in the tower may be located in the ceiling of the patient room served, either in the entrance or above the washroom.

7.4.4.2(11) Insulate all ductwork in accordance with the most stringent of applicable standards, including BCICA, ASHRAE and CSA standards. Provide canvass service jacket on all exposed insulation inside and up to 3 meters above finished floor in Mechanical rooms.

7.4.4.2(12) Provide seismic mitigation and building separation devices for all ductwork including that which cross buildings and/or utility corridors.

7.4.5 Exhaust Systems

7.4.5.1 Design Principles

7.4.5.1(1) All exhausted air will be discharged to ensure that there is no cross contamination with outdoor air intakes for the Building and for existing PRH campus buildings.

7.4.5.1(2) Provide exhaust fans and locate them as close as possible to the end of the exhaust ductwork systems. Ensure that the fans will be readily serviceable and are separated from spaces that house other mechanical equipment. Provide welded pressure ductwork after Isolation and other contaminated exhaust fans to the building exterior.

7.4.5.1(3) Provide exhaust systems for enclosed parking areas controlled by CO_2-monitors tied to BMS.

7.4.5.1(4) All exhaust systems will be on delayed vital emergency power. All diesel gen set exhaust to exit through roof.

7.4.5.1(5) Provide exhaust to Retail Area Food Serve Space Allocation (G1.1) complete with VAV box. Base building design to allow for the anticipate fit out of the space, refer to the Data Room for information on equipment and space function. Space shall be negative in relation to surrounding spaces.

7.4.5.1(6) Provide exhaust above all floor model printers or multipurpose business machines to remove fumes.

7.4.5.2 Performance Criteria

7.4.5.2(1) Negative pressure or “Airborne” Isolation Rooms and their associated washrooms will be provided with dedicated exhaust systems with 100% redundancy. HEPA filters will be provided in the exhaust ductwork in readily accessible locations for servicing.

7.4.5.2(2) Biosafety cabinets and grossing tables/specimen mounting tables will be provided with dedicated exhaust systems that are appropriate for their class and type. Where multiple cabinets are tied into a common system, a 100% redundant central exhaust system will be provided. Specimen mounting tables and grossing tables shall be equipped with counter top level exhaust.

7.4.5.2(3) Fume hoods and other smoke/fume generating process booths/space will be provided with dedicated exhaust systems that are corrosion/ chemical resistant to the exhaust media.

7.4.5.2(4) Dedicated exhaust systems will be provided as required for the medical equipment.

7.4.6 Metering Requirements for Energy Measurement and Verification

7.4.6.1 Provide all required system meters, and trend logging equipment sensors to comply with and fulfill the energy measurement and verification requirements set out in Appendix 8C Energy. Provide meters on all systems serving MDR which consume energy including domestic hot water generation in such a manner that the MDR energy use can be monitored separately.

7.4.6.2 Metering intervals will be one hour or less.

7.4.7 Sound Attenuation and Vibration Isolation

7.4.7.1 Basic Requirements

7.4.7.1(1) Provide all mechanical systems to prevent sound and vibration transmission between spaces, and transmission from mechanical equipment to the spaces. Provide sound attenuation to limit sound levels in accordance with Appendix 3D Sound Transmission Ratings and CSA Z317.2-10. Design and install mechanical systems located at or near any exterior wall to minimize sound transmission to the neighbouring residential community.

7.4.7.1(2) Provide vibration isolation devices on all equipment with rotating components.

7.4.7.1(3) All hung equipment will utilize spring isolators designed for the weight and vibration characteristics of the equipment.

7.4.7.1(4) Provide flexible connections where needed to isolate mechanical equipment sound and vibration from ducting, piping and electrical wiring systems.

7.4.7.2 Performance Criteria

7.4.7.2(1) Ensure duct silencers meet or exceed the requirements of the ductwork for cleanliness and inspection.

7.4.7.2(2) Utilize fibre free internal insulation with stainless perforated liner.

7.4.7.2(3) Testing, Adjusting, Balancing and Commissioning Without limiting Project Co's commissioning obligations under Section 4 and Section 12 (Commissioning) of Schedule 2 [Design and Construction Protocols], demonstrate to the Authority that the mechanical and electrical systems are substantially operational by testing, adjusting and balancing the systems in accordance with Good Industry Practice. Demonstration shall include redundancy in the case of equipment failure and spare capacity.

7.5 Major Equipment – Performance Specification

7.5.1 Custom Air Handling Units.

7.5.1.1 The systems and units noted on the following Performance Specifications are, in the Authorities opinion, capable of meeting the general design intent, quality and performance characteristics specified. It remains the responsibility of the Project Co to ensure the products supplied (whether from the Specifications below or others) meet the performance specifications in this Agreement.

7.5.1.2 Air handling units will be designed and manufactured to the specific requirements of this project. This specification applies to the custom air handling units for supply, return, and heat recovery systems.

7.5.1.3 Units will be produced by a recognized manufacturer who maintains a local service agency and parts stock.

7.5.1.4 Air handling units and major components will be products of manufacturing firms regularly engaged in production of such equipment whose products have been in satisfactory use in similar service for not less than 10 years.

7.5.1.5 Units with factory wiring will be factory approved and labelled.

7.5.1.6 Environmental Requirements:

7.5.1.6(1) Units will not be operated for any purpose, temporary or permanent, until ductwork is clean and space served is clean, filters are in place, bearings lubricated, isolators adjusted, belt tension checked, sheaves aligned and the fan has been test run under observation.

7.5.1.6(2) The manufacturer will provide the factory assembled air handling unit. The unit will include all specified components installed at the factory. Field fabrication of units and their components will not be accepted. Air handling units shall sit directly on housekeeping pads; all vibration isolation shall be internal to the air handling unit.

7.5.1.6(3) The internal liner will be 304 stainless steel and will be suitable for washing with a pressure washer or steam cleaner without risk of wetting the insulation. The liner will be installed over top of the panel flanges and each liner seam will be sealed with a lap joint. The wall liner will be installed over top of the base water dam such that any water run-off from the liner will drip into the water tight base rather than into the wall panel. The roof liner will be installed over top of the roof support so that water cannot enter the roof insulation. All exposed wall material inside the unit shall be stainless steel.

7.5.1.7 Acoustical Performance:

7.5.1.7(1) The housing will have been tested for acoustical performance by an accredited independent laboratory.

7.5.1.7(2) Test methods and facilities used to establish sound transmission loss values will conform explicitly with the ASTM designation E90-85 and E413-73.

7.5.1.7(3) The manufacturer will submit the lab report for approval

7.5.1.7(4) Sound Transmission Loss DB ASTM E-90 & E413-73.

	1	2	3	4	5	6	7	8	
(2”) Walls	18	19	27	33	43	52	52	52	STC=37
(4”) Walls	20	20	28	41	51	56	55	57	STC=40

7.5.1.7(5) Test methods and facilities used to establish sound absorption values will conform explicitly with the requirements of the ASTM Standard Test Method for Sound Absorption Coefficients by the Reverberation Method: ASTM C423-84A and E795-83.

7.5.1.7(6) Sound Absorption ASTM C423-84A & E795-83

	1	2	3	4	5	6	7	8	
50 mm (2”) Walls	.10	.23	.75	1.08	1.05	.99	.97	.95	STC=37

7.5.1.8 Base Construction:

7.5.1.8(1) Units will be constructed from structural steel C-channel around the perimeter of the unit with intermediate channel and angle iron supports. Unit will have a minimum 6 in channel.

7.5.1.8(2) A 12 gauge aluminum checker plate floor will be installed on the base. All seams on aluminum floor will be continuously welded. The floor will be flat, reinforced below with all seams continuously welded. Drive screw attachment and caulking are not acceptable. The base will be provided with lifting lugs, a minimum of four [4] per unit section. The base will be insulated with 50mm (2”) fibreglass insulation and sheeted with a 22 gauge galvanized steel liner. Floors that “oil can” are not acceptable and will be site-remedied at this contractor’s expense.

7.5.1.8(3) The manufacturer will provide a 40mm (1.5”) perimeter collar around the entire unit and around each floor opening to ensure the unit is internally watertight. The entire base will act as an auxiliary drain pan and hold up to 40mm (1.5”) of water.

7.5.1.8(4) The manufacturer will provide auxiliary drains in fan sections downstream of cooling coils and in mixing sections.

7.5.1.8(5) All drain connections on floor mounted air handling units will terminate at the side of the unit.

7.5.1.8(6) Maximum base deflection will be 6mm (0.25”) on 600cm (240”) in unsupported span.

7.5.1.9 Airflow Measuring Probes:

7.5.1.9(1) Provide on each fan air flow measuring probes capable of continuously monitoring the air handling capacity of the respective fan.

7.5.1.9(2) Each airflow probe will contain multiple, averaged velocity pressure taps located symmetrically around the throat of the fan inlet and a single static pressure tap located on the fan housing. The entire airflow monitoring probe must be located outside the inlet throat as to not obstruct airflow.

7.5.1.9(3) The probes will be capable of producing steady, non-pulsating signal of the velocity pressure, independent of the upstream static pressure without adversely affecting the performance of the fan. The sensing probes will be accurate ±3% of actual fan airflow.

7.5.1.10 Airflow Display:

7.5.1.10(1) Provide on indicated fans a method of displaying digitally, in real time, the fans current air flow.

7.5.1.10(2) The display will be capable of showing the airflow of two (2) independent fans simultaneously.

7.5.1.10(3) For interaction with a controller, the display will output one (1) 0-10VDC signal for each fan being monitored.

7.5.1.10(4) The output signal will be accurate to ±0.5% of Natural Span, including non-linearity, hysteresis and non-repeatability.

7.5.1.11 Filters:

7.5.1.11(1) Merv 8 pre-filters will be utilized in exhaust air streams for protection of heat extraction units. Dynamic 1" pre-filters will be used with sterile sweep UV lights in units with return air. Supply air handling units shall be able to accommodate carbon filters should they be required in future to remove smoke from forest fires or fumes from equipment. Racks for these filters shall be provided. Air handling units shall be designed with this additional static pressure requirement.

7.5.1.11(2) Final filters will be Dynamic Air Cleaner V8 with UV Sterile Sweep (Sterile sweep is only required on units with mixing of return air with OA – not on 100% OA units). Units with Sterile Sweep will have a 1" Dynamic pre-filter upstream of the V8 bank. Units that have 100% outside air will not require sterile sweep lights.

7.5.1.11(3) The air cleaner will have been tested and meet CSA Standard C22.2 No. 187-M19986 and UL Standard 867 for electrostatic air cleaners.

7.5.1.11(4) The air cleaner will remove 97% of contaminants at 0.3 microns and above in a re-circulating system. The pressure drop of the V8 air cleaner bank will not exceed 100 Pa (0.30" wpd) when the filter media is new. The pressure drop will not exceed 160 Pa (0.65") when panels are fully loaded. Filter media will be changed when the pressure drop reaches 0.65" wpd.

7.5.1.11(5) The air cleaner will have an active electrostatic field that polarizes a dielectric media. The unit will not ionize airborne particles and will not produce ozone. Units that utilize “ion cloud” ozone (carcinogen) producing technology will not be acceptable.

7.5.1.11(6) The high voltage Powerheads will require 24 volts AC input. The Powerheads must be fully potted and connected in parallel. Powerheads will be factory wired and will include factory supplied and mounted transformer.

7.5.1.11(7) The 24VAC power supply must be a UL or CSA certified transformer, class “2” type, which will permit one side of the secondary output (24V) to be attached to electrical ground.

7.5.1.12 Filter Gauges:

7.5.1.12(1) The manufacturer will provide magnehelic gauges or equivalent.

7.5.1.12(2) Magnehelic gauges will be accurate to +/- 2% of full range.

7.5.1.12(3) One gauge will be provided for each filter bank.

7.5.1.12(4) Gauges will be recessed into the exterior cabinet casing to provide a “flush” finish.

7.5.1.13 Lights:

7.5.1.13(1) Provide 1219mm (48”) vapour proof fluorescent lights with T8 ballasts in each section (where shown on drawings). Duplex receptacles will be installed in each fan section on the wall across from the access doors. A switch with an indicator light will be installed on the unit outer wall at each access door location. Electrical power will be 120V/1/60. All lights will be wired back to a single point on the unit for connection of power by Div 16. This circuit will also be factory wired to the Dynamic Air cleaner system for single point 120 Volt power.

7.5.1.14 Finish:

7.5.1.14(1) The unit will be finish painted with two components, etch bond primer and alkyd enamel. All uncoated steel will be painted with grey enamel. All metal surfaces will be prepainted with vinyl wash primer to ensure paint bonds to metal. Unit colour will be standard grey or white.

7.5.1.15 Unit Mounted Silencers:

7.5.1.15(1) Each silencer pod will consist of radiused noses and tails and perforated metal panels stiffened for flatness. Silencers will be rated in accordance with ASTM E477.

7.5.1.15(2) Acoustic media will be compressed and supported to minimize dusting and erosion. Mineral wool is not acceptable. Insulation will be encapsulated with Tedlar.

7.5.1.15(3) Minimum 915 mm (36") silencer with 50% free area will be provided for each of supply fan and return fan.

7.5.1.15(4) Silencer pods will be full height and full width of the plenum.

7.5.1.15(5) Stacked duct type silencers are not acceptable.

7.5.1.15(6) Sound Power Levels: The following octave band data will be met or exceeded. Sound data will be submitted as part of the submittal process to confirm these numbers will be met.

Octave Band Sound Power Levels								
Band	63	125	250	500	1000	2000	4000	8000
AHU typical SA discharge	85	90	88	77	65	59	62	59
AHU typical RA inlet	84	87	77	62	56	55	55	55

7.6 Energy Model

7.6.1 Basic Requirements:

7.6.1.1 The Project will be designed to achieve minimum six (6) points for Credit EAc1: Optimize Energy Performance.

7.6.1.2 Compliance will be demonstrated through whole building energy simulation using one of the eligible energy modelling software.

7.6.1.3 The building energy performance will be compared to either of the following building standards: ASHRAE 90.1-2007 or MNECB.

7.6.2 Performance Criteria:

7.6.2.1 A single energy modelling software will be used at all stages of design and certification process.

7.6.2.2 Additional supplementary software tools such as Retscreen can be used in conjunction with the eligible software.

7.6.2.3 Proponents are required to use one of the following modeling software for the purposes of their Proposal and for determining the Design and Construction Regulated Energy Target: eQUEST, IES-ve, OpenStudio and EE4.

7.6.2.4 It is the Authority's intent that Proponents provide a summary of their building's performance using the LEED NC 2009 letter template for energy and atmosphere credit 1. This template provides a breakdown of the building's energy performance by end use and also identifies the non-regulated loads. The energy model is to include a non-regulated plug load as per the default assumptions detailed in Table 4.3.2B, pages 4-8 of the National Research Council – Performance Compliance for Buildings.

7.6.2.5 As per LEED Canada NC Reference guide (page 209) other non-regulated plug loads should be included in the simulation model on an hourly basis to better predict the building internal gains and their interactions with the building systems. The energy use for non-regulated process loads should be removed from the proposed and reference buildings for the purposes of calculating percentage energy savings and percentage cost of energy savings. The magnitude of the annual energy use associated with non-regulated loads is to be the same for the proposed and reference buildings and include on the LEED NC 2009 letter template as a separate non-regulated load.

7.6.2.6 The energy management plan will be developed using the results of the energy model. Non-regulated loads are to be identified and included in the building energy target. The magnitude of the non-regulated process loads will be determined through the building energy monitoring system and the measured results will be used to calibrate the energy model. Discrepancies between the calibrated energy model and the measured building performance will be explained or resolved as part of the continuing energy management plan for the building.

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

7.8 Integrated Automation (Division 25)

7.8.1 Controls

7.8.1.1 Basic Requirements

7.8.1.1(1) Provide a stand-alone, web based BMS or Building Management System (also referred to as a BAS or Building Automation System). for the New Facility that performs the following functions:

7.8.1.1(1)(a) automatically operates, monitors and manages the Facility's mechanical systems to provide a high level of occupant comfort and maintain a healthy and productive environment without disruption to

the delivery of clinical and patient treatment services;

7.8.1.1(2) provides an internet based means of external monitoring for the Authority, including all associated hardware and software;

7.8.1.1(3) interfaces with the building mechanical, electrical and communication systems and controls;

7.8.1.1(4) meters, trends and archives all data related to the flow of services into and out of the New Facility, including domestic water, medical oxygen, and electricity and takes into account seasonal variations in flow rate;

7.8.1.1(5) annunciates building and equipment alarms, including fire alarm, security alarms, freezer alarms, specimen fridge alarms, lab alarms, medical equipment alarms, lighting, UPS, emergency power systems and switchgear alarms;

7.8.1.1(6) monitors the status, temperature, humidity and alarms for equipment identified by the Equipment list and the Authority, including freezers, coolers, labs and medical equipment; and

7.8.1.1(7) acquires and collates all data associated with energy measurement and verification as required this Schedule and Appendix 8C Energy.

7.8.1.2 Design the controls systems to allow monitoring and operation of the New Facility from a BMS location in the Facility. Display building related alarms at the Systems monitoring space.

7.8.1.3 The BMS will be a completely integrated (front-end and back-end) Native BacNET DDC system.

7.8.1.4 The BMS will be non-proprietary and designed with open protocol.

7.8.1.5 The BMS will optimize the system performance under all operating conditions to minimize Building energy usage.

7.8.1.6 The BMS will accommodate future technological changes and the architecture of the BMS will permit expansion of the system for future renovations. System will have additional 20% capacity floor by floor for traffic increases and future expansion. If panels are not mounted on every floor provide spare conduits to floors served to accommodate the 20% additional capacity utilisation without coring.

7.8.1.7 The BMS will be an independent system separate from the fire alarm and other control systems. The BMS will be provided as a complete package from one manufacturer, not a composite system from several manufacturers.

7.8.1.8 Provide airflow sensors, pressure sensors, and infectious control isolation dampers in ductwork to ensure isolation can be achieved for each of the Out Break Control zones. Provide local audio and visual alarms at the associated care stations in addition to the BMS alarms. Provide all programming required for implementation of Out Break Control zones with single command.

7.8.1.9 Provide a separate physical network and any required network equipment for the BMS.

7.8.2 Performance Criteria

7.8.2.1 Zoning for HVAC systems will be based on occupancy, room location within the Facility, room orientation, and room heating and cooling loads. Provide independent zone for each patient care room. For non-patient care areas, a maximum of 3 rooms will be on one zone. Configure zoning to minimize reheat/recool.

7.8.2.2 Zone floor areas to provide control of smoke in a fire situation as required by B.C. Building Code. Zone floor areas to accommodate the Outbreak Control Zones and ensure zones served by VAV boxes do not cross zones.

7.8.2.3 Provide adjustable type thermostats with temperature read out in all private patient rooms, operating rooms, lounges, sleep rooms, and as noted on Room Matrix. The temperature range will be controlled by the BMS and shall match CSA Table 1 range. Provide local relative humidity displays in MDR and Scope Processing areas as required by Users to confirm humidity during procedures and as shown on the Room Requirements.

7.8.2.4 Provide local pressure controllers for each isolation room and anteroom. Provide a local annunciator panel located in the corridor outside each of these rooms. Standard of Acceptance: Triatek or equivalent. Provide door sensors on doors between isolation room and corridor and alarm delay to permit doors to be opened for short time periods without triggering pressure alarms. Door contacts shall also provide alarm if door left open for more than 5 minutes. Provide a remote alarm at the associated nursing station.

7.8.2.5 Provide pressure monitors with BMS alarms for all pressure critical spaces including OR's, Sterile core, Procedure rooms, invasive imaging, between zones MDR, Scope Processing, and as required by CSA.

7.8.2.6 Monitor pass through doors in MDR, provide local alarm (visual and audible) if the pass through doors are open longer than 15 seconds.

7.8.2.7 Failsafe components will be hard-wired to provide reliable operation in all circumstances.

7.8.2.8 Refer to Schedules regarding energy management system, which may be connected to the BMS.

7.8.2.9 The BMS will monitor, control, indicate alarms, and provide trending where applicable for all connected sensors and control points.

7.8.2.10 The BMS will be connected to emergency power.

7.8.2.11 The BMS will monitor critical alarms for essential building and life safety systems. Provide ability to direct alarms to an e-mail address and an alpha numeric pager. Critical alarms include:

7.8.2.11(1) fire alarm system for alarm, supervisory and trouble;

7.8.2.11(2) all temperature alarms resulting from set point deviations;

7.8.2.11(3) failure of any major HVAC or plumbing equipment;

7.8.2.11(4) medical gas system high and low pressure alarms; and

7.8.2.11(5) all alarms relating to the fire protection system.

7.8.2.11(6) UPS, emergency power systems. Upon activation of a critical alarm, Project Co will notify the Authority.

7.8.2.11(7) Alarm locally and monitor all medication, blood and bone fridges via the BMS.

7.8.2.12 The BMS documentation will include a detailed narrative description of the sequence of operation of each system.

7.8.2.13 User interface will be graphical in nature with animated graphics to indicate equipment operation. Graphics will be grouped in systems and in departments. Generate a pop-up window on the browser display panel with audible alarm, informing operator that an alarm has been received.

7.9 Electrical (Division 26)

7.9.1 General

7.9.1.1 Basic Requirements

7.9.1.1(1) All electrical systems, materials and equipment will be new and of a type and quality intended for use in a health care facility. Configure electrical systems to meet requirements of the identified program and patient care needs in an efficient manner, with optimal utilization of space, staff and equipment resources.

7.9.1.1(2) Provide electrical systems that provide redundancy, protection, continuity of service and a comfortable and safe working environment for patients, visitors, and staff.

7.9.1.1(3) Integrate systems where integration provides efficiency, operational and cost advantage.

7.9.1.1(4) Incorporate into the design and construction the principle that change will be a constant and inevitable fact within the Building. Completed electrical systems will permit change while minimizing the cost of change and the amount of interruption to the regular Building activities.

7.9.1.1(5) Include systems and equipment coordinated to provide synergy and reliable electrical performance for the various Building functions.

7.9.1.1(6) Provide provisions to minimize the noise and vibrations of electrical equipment/ components (transformers, luminaries, cables etc.) to below an acceptable level as required in a health care facility.

7.9.1.1(7) Locate electrical rooms and power distribution equipment in order to minimize the distances for feeder runs, to provide easy access for equipment move and to avoid interference with other services and equipment.

7.9.1.1(8) Provide clear aisle ways and routes to permit removal of major electrical equipment from the building as well as to bring in new equipment into the electrical rooms without impacting hospital operations and site access. Indicate on the floor plans the removal aisle ways and routes for major electrical equipment such as diesel generators, transformers sized 300kVA and greater, and switchgear sections.

7.9.1.1(9) Install equipment, conduits, piping, ductwork etc., in electrical rooms such that a minimum clear height of 2000 mm (6’-6”) AFF is available.

7.9.1.1(10) All outlets to be installed at a height which allows for good ergonomics and not less than 1100 mm above finished floor except in corridors, unless noted otherwise or as developed and agreed upon through the User Consultation Process as per Schedule 2. Note that outlets in corridor alcoves will be installed not less than 1100 mm above finished floor.

7.9.1.1(11) Outlets for equipment must be coordinated with the Equipment List. Outlets and connections for equipment detailed in the Authority’s Equipment List Schedule 2, Appendix 2E, have not been included for in the Room Requirements detailed in Appendix 3I.

7.9.1.1(12) Electrical and communication rooms will not have drain pipes, plumbing pipes or water-cooled fan-coil units located in the ceiling space.

7.9.1.1(13) Incorporate energy management systems to minimize demand pressures on the building systems and minimize the anticipated increase to energy costs.

7.9.1.1(14) Refer to Appendix 8C Energy regarding energy incentive programs. Integrate any requirements of those programs into the electrical systems.

7.9.1.1(15) Electrical systems to be “State of the Art” technology and that the most recent and up to date and proven systems that are available be provided.

7.9.1.1(16) Electromagnetic interference (EMI) to be considered in installation of electrical equipment. EMI reduction to be achieved by electromagnetic shielding for transformers and switchgear, use of ferrous raceways such as EMT as required by electrical Code, close spacing of conductors in feeders, running all the spaces of a feeder together to cancel net magnetic fields, locating all distribution transformers in electrical rooms and running feeders in service spaces and ceiling spaces away from occupied areas. Bus Duct is acceptable when used only in electrical rooms or in vertical risers from electrical room to electrical room and must be fully enclosed. Should there be an electromagnetic field that results in interference to equipment Project Co. shall mitigate the electromagnetic field with appropriate techniques.

7.9.1.1(17) Reference all Clinical, Non Clinical, and FM sections of the Output Specifications for requirements affecting Division 26 and include requirements noted. All sections included in Division 27 and 28.

7.9.1.2 Performance Criteria

7.9.1.2(1) Install electrical systems and equipment in a fixed and permanent manner, seismically restrained to meet post-disaster building standards. Plan installation of equipment to allocate space for future additions and to facilitate easy access to other systems and equipment which may require inspection or maintenance.

7.9.1.2(2) Incorporate redundancy into the electrical system design such that failure of any electrical equipment or feeder will not impair Building operation or leave any patient treatment room or area of the Building without at least one active light and one active receptacle unless stated otherwise.

7.9.1.2(3) Design and construct all systems with protection, grounding, isolation and control to address the functional requirements where they are located.

7.9.1.2(4) Power throughout the building will comprise of a combination of 347/600V and 120/208V for all power, lighting and equipment loads except where 277/480V is required for Authority's Equipment

7.9.1.2(5) In addition to allowing for known future requirements, operating factors and safety factors, design and construct the Building electrical systems with a minimum 40% spare capacity. This spare capacity to be provided throughout the distribution network elements.

7.9.1.2(6) Redundancy shall be incorporated into systems and equipment such that the failure of a single piece of major equipment or major conductor shall not impair the operation of the Facility nor the clinical or administrative activities.

7.9.1.2(7) All electrical equipment shall be located interior to the building with the exception of the high voltage outdoor double-ended substation.

7.9.1.2(8) Every electrical system shall be installed in a fixed and permanent manner, adequately seismically restrained to meet the Facility needs including the areas identified as post-disaster. The installation shall economically occupy available space, leaving space for future additions, and shall 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.

7.9.1.2(9) Mandatory that demolition within existing areas meet the following criteria: Remove all electrical materials inclusive of conduit, equipment, pull boxes, junction boxes, wiring back to electrical and communication rooms and made safe, Review all salvaged devices and equipment with the Authority for items which the Authority wishes to retain (all items which the Authority does not want shall be disposed of by Project Co.),Prior to demolition confirm Record Drawings for area, confirm systems operation and ensure that areas beyond demolition/renovation area are not affected.

7.9.1.2(10) Existing areas which are being renovated as part of this project will be upgraded to the requirements of the Output Specifications.

7.9.1.2(11) Access Doors

7.9.1.2(11)(a) Supply flush-mounted access doors, for installation by Building Trades in non-accessible type ceilings and walls where necessary for access to service and/or to inspect electrical equipment and accessories and life safety devices and where specifically indicated.

7.9.1.2(11)(b) Unless otherwise noted, access doors shall be minimum 450 mm x 450 mm (18” x 18”) for body entry; 300 mm x 300 mm (12” x 12”) for hand entry; 200 mm x 200 mm (8” x 8” for cleanout access.

7.9.1.2(11)(c) Locate access doors so that all concealed items are readily accessible for adjustment, Operation, maintenance and inspection. Locate in service and storage areas wherever possible. Do not locate in paneled, feature or special finish walls or ceilings, without prior approval of the Consultant.

7.9.1.2(12) Codes, Standards and Guidelines

7.9.1.2(12)(a) All electrical systems shall be designed and installed to meet or exceed the current health care and hospital industry standards at the time of the Building Permit Submission.

7.9.1.2(12)(b) Mandatory that the design, equipment, material and installation conform to the most stringent requirements of the latest adopted version of all the applicable codes, standards and regulations. The codes, standards and regulations shall include, but not limited to the following:

7.9.1.2(12)(c) Refer to 2.1 Standards section of Schedule 3.

7.9.2 Electrical Utilities

7.9.2.1 Basic Requirements

7.9.2.1(1) New redundant high-voltage services obtained from the City of Penticton Utility via separate circuits will be connected to a new double-ended outdoor unit substation. Redundant feeders from the Unit substation and shall feed into the New Facility main electrical room at 12.5kV. Two new 600V redundant sub-feeders from the New Facility to the existing PRH will be installed and a new

12.5kV/8.3kV HV transformer will be located outdoors by the Unit Substation to feed the Extended Care Unit (ECU).

7.9.2.1(2) Assessment of existing main service infrastructure:

7.9.2.1(2)(a) Existing incoming electrical high-voltage service from the City of Penticton Utility into the PRH is connected via a 12.5kV feeder. There are two feeds to the PRH that are transformed down to 8.3kV and down to 600V within the building. The 12.5kV outdoor unit substation, the outdoor 12.5/8.3kV transformers, all 8.3kV equipment in the PRH, the outdoor unit sub and all associated feeders shall be removed.

7.9.2.1(2)(b) The ECU building service is connected via the existing unit substation at 8.3kV. The existing unit substation shall be removed and the ECU building will be serviced with a new high voltage 12.5kV/8.3kV outdoor transformer from the new outdoor 12.5kV unit substation.

7.9.2.1(3) Within 3 months after the award, notify the Authority of the anticipated power requirements for the Facility.

7.9.2.1(4) The New Facility design to comply with Fortis BC High Performance Building Program. Project Co. to design building to meet program requirements and submit application for program incentives. Incentives paid by Fortis BC will apply 50% to Project Co and 50% to the Authority.

7.9.2.2 Performance Criteria

7.9.2.2(1) Identify the location of existing underground and overhead service lines in the area to avoid interference with proposed routing of new services and future services for known expansions. Use latest techniques (ground penetration radar test) to verify and confirm all existing underground services in the direction of service lines to the Building. Remove or relocate existing site lighting, branch circuit power and communications to accommodate the New Facility. Reconnect all power and controls to electrical and communication circuits affected by the site preparation work.

7.9.2.2(2) Provide temporary site lighting, Panic Duress, parking payment and CCTV system as required by the Authority for temporary site parking as required in section 4.3.7. Include for removal of all equipment, conduit and wire after project is complete.

7.9.2.2(3) Project Co will be responsible for relocation of the Social Work Trailer and MRI Trailer to new locations on the PRH Campus as determined by the Authority. Project Co will be responsible for demolition of all remaining infrastructure associated with the Social Work Trailer and MRI Trailer and providing all required electrical services for its function including; power, telephone, data and code white (on the CHUBB system) to the new locations.

7.9.2.2(4) Obtain prior written authorization from the Authority for all service connections. Service connections must be installed to the Authority's reasonable satisfaction. Refer to Section 6.10 (Connections and Integration to Existing Hospital) of Schedule 2 [Design and Construction Protocols] regarding Work Plan and other requirements regarding work in existing PRH.

7.9.2.2(5) Prepare and submit to the Authority a detailed Protective Device Coordination, Short Circuit and Arc Flash Hazard Study signed and sealed by a professional engineer registered in British Columbia and provide equipment labelling indicating available energy levels and level of PPE required when servicing the equipment. The study is to include the existing electrical distribution located in the PRH.

7.9.2.2(6) The detailed Protective Device Coordination, Short Circuit and Arc Flash Hazard study to:

7.9.2.2(6)(a) indicate all new and relevant existing service equipment from the point of utility supply and standby generators; and

7.9.2.2(6)(b) include all transformers, distribution equipment, Generators, UPS and panelboards.

7.9.2.3 Make all Changes and Recommendations from the Protective Device Coordination, short circuit and arc flash hazard study at the end of the project for PCT; the PRH recommendations will be completed by the Authority at a later date.

7.9.3 High Voltage Distribution (Over 600 Volts)

7.9.3.1 Basic Requirements

7.9.3.1(1) Utilize transmission and distribution equipment that are robust, reliable, easily operated and maintained and designed for Healthcare facilities. Design with additional capacity to accommodate load growth and equipment additions.

7.9.3.1(2) Provide two, independent 12.47kV high-voltage concrete encased incoming electrical feeders to the New Facility from a new double ended outdoor unit sub.

7.9.3.1(3) Remove the existing high-voltage switchboard and transformers in the PRH and provide two new 600V feeders to the existing 600V distribution in the PRH from the New Facility.

7.9.3.1(4) Provide redundancy in incoming high-voltage services to the New Facility such that it will be possible to support the entire PRH (including the New Facility) building load on either incoming feeder when one incoming feeder is unavailable. Provide a diverse main utility service. Two separate circuits feed from different utility circuits. Coordinate with utility provider and pay all associated fees.

7.9.3.1(5) New 600V feeders from the New Facility to the PRH to be installed in underground concrete-encased duct banks for the portion of run between buildings. Enter the existing electrical PRH vault by utilizing the existing 2 sets of 4 4" PVC sleeves located in the top North East corner. Provide new sleeves if required.

7.9.3.1(6) Provide high voltage switchgear, cast-coil or FR3 oil filled high voltage transformers and tie breakers for the two normal power incoming 12.47kV feeders in the New Facility.

7.9.3.1(7) The 600V low-voltage normal power distribution to be derived from two 12.47kV – 600V step-down cast-coil or FR3 oil filled power transformers of equal kVA capacity. Transformers to be sized to carry the maximum anticipated demand load, including identified future expansions, plus 25% spare capacity. Additionally, size the power transformers such that, in the natural cooled configuration, each transformer is capable of providing 100% of the ultimate PRH campus's normal power demand.

7.9.3.1(8) Provide clear physical space equal to one vertical switchboard section on both ends of all Distribution Panels (in addition to required clearance) to permit capability for expansion in the future.

7.9.3.2 Performance Criteria

7.9.3.2(1) Existing 15kV main switchgear in PRH including the 15kV-8.3kV transformers and 8.3kV switchgear to be removed. Connect the new 600V feeders from the New Facility into the main normal 600V buses in the main electrical vault in the PRH.

7.9.3.2(2) The new 15kV switchgear being added to each main bus (each side) to include two 15kV, 600A, draw-out vacuum circuit breakers, solid-state protective relaying and revenue grade CT's, PT's and digital metering. In each new switchgear section, one circuit breaker will feed one of the feeders to the New Facility, the other circuit breaker to be spare for future.

7.9.3.2(3) The two 600V feeders from the New Facility to the PRH to be installed in a separate underground reinforced concrete-encased duct bank for the portion of run between the buildings. The duct bank to be designed to also have two new 103mm diameter spare ducts for future use.

7.9.3.2(4) Each incoming 12.47kV feeder to the New Facility to be sized for the entire campus load, including identified future expansions, plus 25% spare for future.

7.9.3.2(5) Each incoming 12.47kV feeder to terminate on a load-break switch in the New Facility. These load-break switches, in turn, to feed a 15kV rated double-ended switchboard comprised of:

- 7.9.3.2(5)(a) two main breakers, a tie breaker, and two feeder breakers, and configured with one breaker per vertical section
- 7.9.3.2(5)(b) draw-out vacuum circuit breakers at mains, tie, and outgoing feeder breaker positions.
- 7.9.3.2(5)(c) revenue-grade digital metering at each of the mains.
- 7.9.3.2(5)(d) An automatic transfer scheme in place between the two main breakers and the tie-breaker such that in the event of loss of any one incoming feeder the entire switchboard is energized from the surviving incoming feeder.
- 7.9.3.2(5)(e) 3-phase, solid-state multi-function type protective relay at each vacuum circuit breaker with ANSI functions 50/51, 50N/51N, 86 and additional functions as required. Protective relay to have integral digital metering capable of displaying V, A, KVA, KW and harmonic parameters.
- 7.9.3.2(5)(f) Communication port integrated with the facilities Building Management System to indicate status of each breaker.

7.9.3.2(5)(g) 125V DC battery-backed power supply with charger for protective relays and controls.

7.9.3.2(6) Power transformers:

7.9.3.2(6)(a) to be dry-type cast-coil or FR3 oil filled, with copper or aluminum windings. The kVA capacity indicated to be based on Class 220 degree C insulation, 115 degree C rise.

7.9.3.2(6)(b) to have delta connected primary windings and star-connected secondary windings. The secondary star point to be solidly grounded.

7.9.3.2(6)(c) if dry-type, to have ANN/ANF (air natural cooled / air force cooled) ratings and have cooling fans that will provide an additional 33% capacity over the base (air natural cooled) rating.

7.9.3.2(6)(d) to have four 2½% full capacity primary taps, two above and two below nominal voltage.

7.9.3.2(6)(e) to have a digital thermometer, indicating average coil temperature, with two stage alarm contacts connected to the building management system. The first stage to alarm when the fans start up and the second stage to alarm at a higher temperature. Alarms to indicate on the BMS.

7.9.3.2(6)(f) to have integral intermediate class lightning arrestors connected to the primary terminals.

7.9.3.2(6)(g) to be suitable for interior installation with CSA type 2 ventilated housing with overhanging drip proof louvers.

7.9.4 Low Voltage Distribution (600 Volts and below)

7.9.4.1 Basic Requirements

7.9.4.1(1) Provide electrical power transmission and distribution from the main, secondary and other sources of supply (power transformers and diesel generators) to meet all requirements of the New Facility and the Clinical Specifications.

7.9.4.1(2) Design the distribution system to provide security of supply and the flexibility to allow concurrent safe maintenance without impacting hospital operations. Provide tie breakers with key interlocking

devices on all main and secondary distribution. Provide double by-pass automatic switches.

7.9.4.2 Performance Criteria

7.9.4.2(1) Design and construct the Facility with a minimum of 40% spare capacity and include 25% physical space for future devices when sizing all distribution equipment.

7.9.4.2(2) Main normal power 600V Distribution Equipment will be fed from the power transformers. This Equipment will be configured as double-ended with two main breakers, a tie-breaker, and feeder breakers as required. Key interlocks will be in place between the two main breakers and tie breaker. Two spare circuit breakers and two equipped spaces will be provided on each half (side) of the Distribution Equipment.

7.9.4.2(3) The main normal power 600V Distribution Equipment will directly feed:

- 7.9.4.2(3)(a) Distinct Automatic Transfer Switches (ATS) for: the vital branch, and delayed-vital branch
- 7.9.4.2(3)(b) Motor Control Centres (MCC)
- 7.9.4.2(3)(c) Central Distribution Panels (CDP)
- 7.9.4.2(3)(d) Surge Protection Device (SPD)
- 7.9.4.2(3)(e) Large individual loads. Example: chillers
- 7.9.4.2(3)(f) Fire Pump Transfer Switch
- 7.9.4.2(3)(g) Automatic power factor correction systems, one on each side of the switchboard.

7.9.4.2(4) The main Automatic Transfer Switches (ATS) serving vital and delayed-vital branches to be closed-transition transfer type with integral dual-source bypass and isolation features. These transfer switches to be similar and have identical voltage and short-circuit withstand ratings ; the ampacity (current) rating of the ATS serving the delayed-vital branch is required to be identical, and the ampacity (current) rating of the ATS serving the vital branch is required to be identical. The preferred source input of each of these transfer switches to be directly connected to a separate air-circuit breaker on the main normal power 600V distribution equipment. The alternate source input of each of these transfer switches to be

directly connected to a separate air-circuit breaker on the generator synchronizing switchboard.

7.9.4.2(5) Configure the distribution downstream of the main Automatic Transfer Switches such that each one of the main ATS's feed a double-ended 600V distribution panel for emergency power. Provide two such 600V Distribution Panels for emergency power. One of these Distribution Panels to be arranged with one main breaker and one tie-breaker and to feed the vital branch plus load breakers. The second emergency 600V distribution panel will be arranged with one main breaker and two tie breakers and to serve the delayed-vital branch loads plus load breakers; the tie breakers to provide redundancy to the vital bus and the conditional bus.

7.9.4.2(6) 600V Distribution Panels:

7.9.4.2(6)(a) to be designed, factory-assembled and tested in accordance with CSA C22.2 No.31-10 "Switchgear Assemblies";

7.9.4.2(6)(b) to be provided with motorized draw-out type power circuit breakers complying with ANSI/IEEE C37.13 at mains, ties, and outgoing feeder breaker positions and labeled to work continuously at 100% rated current. Fuses will not be used;

7.9.4.2(6)(c) to have circuit breakers with solid-state trip units with adjustable time and current elements for Long time, Short time, Instantaneous, and Ground fault pickup settings. The trip units to have integral digital metering capable of displaying V, A, KVA and KW parameters and retaining the maximum recorded value of each parameter. The metering function of the circuit breaker trip units to be connected to the overall metering system and the building management system; breakers 200A and larger shall be LSI electronic trip fully adjustable selective breakers. Breakers 400A and larger shall be LSGI electronic trip fully adjustable selective breakers;

7.9.4.2(6)(d) to have circuit breaker auxiliary contacts connected to the building management system to indicate operational status of each breaker;

7.9.4.2(6)(e) to have a coloured lamicoid mimic bus single line diagram riveted on the front;

7.9.4.2(6)(f) to have coloured engraved lamicoid nameplates for cubicle and circuit identification on front and rear sections;

7.9.4.2(6)(g) will be colored red for Vital, blue for Delayed Vital and yellow for Conditional.

7.9.4.2(7) Each double-ended emergency 600V Distribution Panel to directly feed:

7.9.4.2(7)(a) 600V Centralized Distribution Panels (CDPs). Provide a minimum of one CDP for each of the normal, vital, delayed-vital, conditional, and normal branches.

7.9.4.2(7)(b) Motor Control Centres

7.9.4.2(7)(c) Surge Protection Device

7.9.4.2(7)(d) Large individual loads. Example: chillers

7.9.4.2(8) Provide individual dry-type step-down 600V – 120/208V transformers in the main electrical room on Level 0, level 3 Mechanical room and in the Mechanical room in the penthouse for each of the following distribution branches: normal, vital, delayed-vital, and conditional. Additional 600V 120/208V transformers to be located as required by the design.

7.9.4.2(9) The individual step-down transformers shall be fed from a 600V Centralized Distribution Panel and located in an electrical room.

7.9.4.2(10) Centralized Distribution Panels located on the same floor shall have tie breakers to at least one other system CDP.

7.9.4.2(11) All Centralized Distribution Panels (CDP) to utilize moulded case circuit breakers; CDPs for Vital, Delayed Vital and UPS to use MCCB draw-out breakers.

7.9.4.2(12) 600V Centralized Distribution Panels for Vital, Conditional and Normal power to feed 120/208V Centralized Distribution Panels in electrical rooms. These 120/208V CDPs to feed panel boards on each floor. The 600V Delayed Vital CDP shall feed 120/208V CDPs or panelboards in the same location. Additional 120/208V panelboards shall be installed throughout the building as required by the design.

7.9.4.2(13) Provide a minimum of one electrical riser room on each floor level to house electrical equipment serving that floor. Vertically stack the

electrical rooms on all floors throughout the height of the building. If a second electrical room is required on any floor, spatially separate the two rooms on plan and position these in different architectural fire-compartments and such that each room can serve one half of the floor plate. Vertically stack the electrical rooms on all floors throughout the height of the building.

7.9.4.2(14) Install 600:120/208V dry type transformers for small equipment loads in electrical rooms on concrete pads or suspend from structure. Install transformers so that removal can be facilitated without removal of any other equipment or conduit serving the room. Utilize sound and vibration mitigation installation methods for all transformers.

7.9.4.2(15) Install 600:277/480V dry type transformers in electrical rooms connected to 480V equipment supplied by the Authority. These transformers shall be fed from the 600V Centralized Distribution Panels or the 600V Distribution Panels depending on the size.

7.9.4.2(16) Locate the main electrical room above the flood plain and separate from plumbing and mechanical equipment. Design the electrical room to be readily accessible, well ventilated and free of corrosive or explosive fumes, gases or any flammable material. Provide a pre-action sprinkler system for the room. Provide a minimum of two entrances/exits from the electrical room and doors sized to allow removal of large electrical equipment.

7.9.4.2(17) Locate major electrical equipment to minimize run length of feeders and branch circuits, and locate within the New Facility so as to provide a clean, dry, safe, accessible installation protected from unauthorized access.

7.9.4.2(18) Provide dedicated automatic-transfer switches for each elevator bank to allow all elevators to run in the event of an emergency power test.

7.9.4.2(19) Locate and design electrical equipment for ease of maintenance and with due regard for future expansion and renovation.

7.9.4.2(20) Rate all distribution devices to handle available fault duty at line terminals. Perform a computer generated fault study to ensure that all devices are properly rated.

7.9.4.2(21) Design and install protection equipment so that the initial electrical installation, future additions and modifications will be fully coordinated to isolate only the faulty portion of the system.

7.9.4.2(22) Select, configure, locate and install all components of transmission and distribution systems to minimize the transmission of noise, vibration or unwanted heat into other parts of the Facility.

7.9.4.2(23) Provide a networked digital metering system to monitor electrical loads and quality of power in the New Facility. System to be part of the central electrical metering & monitoring system or Building Management System (BMS).

7.9.4.2(24) Provide automatic power factor correction equipment within the Building to ensure the New Facility power factor does not fall below the 95% lag threshold. Coordinate capacitors with adjustable frequency drives and other harmonic generating equipment to avoid resonance conditions.

7.9.4.2(25) Provide transformation equipment for diagnostic imaging equipment as required by the imaging equipment vendors.

7.9.4.2(26) Provide circuit breaker type panel boards fully rated to handle calculated fault current level. Series rating of breakers and panel boards is not acceptable.

7.9.4.2(27) Oversize neutral(s) for panel boards, feeders and branch circuiting where significant non-linear load(s) are anticipated, such as in open office and other areas with a high density of personal computers. Provide extra neutral terminal bus in such panels to accommodate dedicated neutrals in branch circuit wiring.

7.9.4.2(28) Construct flush mounted panel boards with three spare 25mm conduits stubbed into ceiling space above.

7.9.4.2(29) Provide panel boards with integral surge protective devices to serve electronic equipment susceptible to electrical transients. Panel boards serving the Main Cross-connect Room and the on-floor communication riser rooms to have integral surge protective devices in addition to panels intended to provide power to electronic equipment.

7.9.4.2(30) Install Centralized Distribution Panels and Panelboards on the same floor as the loads they serve. Where Panelboards are located outside of electrical rooms, installation of these Panelboards shall be in interdepartmental, non-public corridors, provided they are painted to match the adjoining surface for finished appearance. Staff only cross-corridors in inpatient units will also be considered.

7.9.4.2(31) All Panelboards to have minimum of 40% spare capacity after all connected loads have been installed.

7.9.4.2(32) Provide one 200A 60 circuit 120/208V 4W 3Ph Vital power panel, one 200A 60 circuit 120/208V 4W 3Ph Normal power panel and one 100A 30 circuit 120/208V 4W 3Ph UPS power panel outside of the Sterile Supply Holding Room in Operating Room area. Both vital and normal panels to have integral SPD.

7.9.4.2(33) Provide a 400A 84 circuit 120/208V 4W 3Ph normal power panel for the Food Services space, a 200A 60 circuit 120/208V 4W 3Ph normal power panel for the Pharmacy space and a 200A 42 circuit 120/208V 4W 3Ph normal power panel for the Gift Shop space. Each panel to be metered with revenue quality meters.

7.9.4.2(34) Components of the transmission and distribution systems in any public, clinical, administrative or staff area will have long life expectancy without perceptible deterioration and a good appearance. Design and install so as to permit easy and complete cleaning. Such equipment shall be lockable.

7.9.4.2(35) Provide individual enclosed motor starters for individual motors. Utilize motor control centers for groups of four or more motors that require individual motor starters.

7.9.4.2(36) Motor starters to be combination magnetic MCP (Motor Circuit Protector) type with integral control power transformers, Hand-Off-Auto (HOA) or start/stop control and at least two auxiliary contacts in addition to seal-in contacts.

7.9.4.2(37) Provide combination starters for all motors 1/2 HP and larger that are not already controlled by adjustable frequency drive or include an integral control package. All motors of ½ HP or more to be 600 volt 3 phase.

7.9.4.2(38) Provide surge protection for the main 600V and 120/208V Centralized Distribution Panels and all other panel boards serving sensitive electrical loads including diagnostic equipment, lab equipment and adjustable frequency drives.

7.9.4.2(39) Locations of receptacles to comply with all applicable codes and standards and the requirements for each program area as described in the Clinical Specifications.

7.9.5 Emergency Power

7.9.5.1 Performance Criteria

7.9.5.1(1) Provide an emergency power system to supply code-required loads and additional loads indicated in the event of a power failure. Remove existing generators and remove existing delayed

operation draw-out breaker located in existing vital switchgear; existing tie breaker to remain. Existing vital and delayed vital switchboards in the PRH to be connected to either the new vital and delayed vital switchboards or to the new generator synchronization board. Should the synchronization board be utilized Project Co shall use the existing automatic transfer switch for the vial switchboard and install a new automatic transfer switch for the existing delayed vital switchboard; otherwise the existing automatic transfer switch shall be removed. **Removed electrical equipment to become the property of Project Co.**

7.9.5.1(2) The emergency power system to include a minimum of two (2) synchronized diesel generator units of equal capacity capable of supplying power to the existing PRH essential loads, 100% of the vital and delayed vital branches, UPS branch loads, the fire pump and 25% spare capacity for future growth. This capacity shall be in addition to any spare capacity included for in the mechanical equipment. The diesel generators in the emergency power system shall be able to supply power to 100% of the Vital and Delayed Vital systems in both the PRH and PCT, UPS loads and the fire pump when one diesel generator unit is unavailable. Provide automatic load shedding of the conditional system in the event of a generator failure.

7.9.5.1(2)(a) The existing PRH essential loads shall be determined by Project Co based on the following information: current Peak kW/kVA demand on the generator plant is 737kW/780kVA and occupancy changes as noted in the table below:

Existing Occupancy	Area	Future Occupancy
LEVEL 0		
MDR Storage	43m2	Laundry Storage
MDR Storage	214m2	Laundry Stores
MDR	307m2	Laundry

LEVEL 1		
Arthritis Clinic	16m2	Clinical
Neurology	14m2	Clinical
Mammography	78m2	Clinical
X-Ray	40m2	Clinical
Bone Density	37m2	Clinical
Blood Draw Lab	50m2	Clinical
Emergency	464m2	Emergency
- Foundation	39m2	Emergency

Existing Occupancy	Area	Future Occupancy
- Gift Shop	37m2	Emergency
- Overflow	73m2	Emergency
- Cast Room	38m2	Emergency
- Endo/Pacemaker/Cardio	436m2	Emergency
- Pre-Surgery screening	69m2	Emergency
- New Addition for Emerg	614m2	Emergency

LEVEL 2		
Cysto Pain Clinic	58m2	Clinical
PARR	206m2	Clinical
Surgery	624m2	Clinical
Urology	29m2	Clinical
Bed Scheduling	52m2	Inpatient
Maternity Clinic	127m2	Inpatient
Med/Surgery SP2	1266m2	Inpatient

LEVEL 3		
Respiratory Diagnostics	236m2	Administration
Day Surgery	298m2	Administration
Medical South	426m2	Administration
Medical Core	589m2	Administration

7.9.5.1(3) Provide diesel generators and support systems that are capable of running continuously for at least 72 hours at 100% rated load of all the units combined.

7.9.5.1(4) Provide new power and controls for new emergency boiler tank that will feed to the existing PRH emergency boilers. Coordinate location of new tank and pumps with the Authority. Remove all redundant power and controls to existing PRH emergency generator and boiler tanks. Provide power and control for new inventory system, transfer pumps, duplex pumps, turbine pumps and associated devices.

7.9.5.1(5) Generators shall be located so as to permit convenient servicing and monitoring, to prevent unauthorized access, ease of removal and to avoid interruption due to floods and seismic event.

7.9.5.1(6) Generators shall be diesel to ensure a continuous source of fuel supply. The fuel supply shall be independent to other building equipment and shall be stored on site in permanent storage for the New Facility. Fuel level to be electronically monitored by the BMS system to alarm when fuel supply drops below 24 hours. Fuel

system to comprise dedicated belly tanks or underground fuel tanks, day tank for each generator, duplex redundant electric fuel pumps with backup manual fuel pumps as required to allow maintenance staff to manually transfer fuel from main tank to the day tank.

7.9.5.1(7) Locate each diesel generator in a dedicated 2-hr fire rated room or in a dedicated exterior rated self-attenuated enclosure.

7.9.5.1(8) Diesel generator exhaust emissions at full load on 100% diesel fuel shall not exceed the U.S. Environmental Protection Agency Non-Road 'Tier 2 Interim' limits. The diesel generator exhaust shall vent vertically above roof level of building or enclosure and shall be located to prevent re-entrainment of emissions into air-intakes on the New Facility, PRH and the adjacent parking garage building. Provide after-treatment of engine exhaust if necessary to maintain NOx concentration within 500 $\mu g/m^3$ at all air-intakes of the above mentioned buildings.

7.9.5.1(9) Generators shall be located, vibration isolated, and muffled so that neither sound nor vibration are perceptible outside of the rooms or generator enclosure containing the generators. Provide acoustic panels and silencers at air intake and exhaust to limit the generated noise in compliance with local regulations and sound bylaws.

7.9.5.1(10) Locate the main emergency distribution equipment such as ATS's and 600V Centralized Distribution Panels in the main electrical room. Provide a fire separation between the main distribution equipment for emergency power and normal power such that a catastrophic failure in one system does not affect the other system.

7.9.5.1(11) Design the system with redundant power paths to maintain full and continuous service to clinical operations at all times, including during system maintenance.

7.9.5.1(12) The generator synchronization board shall provide breakers for the vital and delayed vital systems as well as the fire pump transfer switch, one spare space and a load bank test connection. The load bank shall be configured such that the load bank can be connected safely without connection to lugs on a breaker or buss and shall cut off power to the load bank in the event of a loss of power to the normal supply.

7.9.5.1(13) Breakers in the synchronization board and generators shall be of the same manufacturer as the 600V electrical distribution equipment.

7.9.5.1(14) Provide annunciation of alarms for each generator to the BMS. Include ‘run’ and ‘fail to run’ alarms to the BMS.

7.9.5.1(15) Provide emergency power to serve essential loads as defined by CEC, CSA Z32-09 and as required to meet the Clinical Specifications, including, but not limited to:

7.9.5.1(15)(a) vital branch loads:

- (a).1 Path of egress lighting.
- (a).2 Exit signs.
- (a).3 Stair and ramp lighting.
- (a).4 Receptacles and lights at service rooms for emergency distribution.
- (a).5 Medical gas alarm panels.
- (a).6 Elevator cab and machine room lighting.
- (a).7 Fire alarm system and Sprinkler system.
- (a).8 Smoke venting fans and smoke control fans.
- (a).9 Telecommunications systems and Network equipment in all IT Communication Rooms.
- (a).10 100% of lighting, receptacles, and permanently connected equipment in Operating Rooms.
- (a).11 50% of receptacles and lights in all patient care rooms.
- (a).12 50% of lights and outlets in care team station.
- (a).13 Nurse call system power supplies.
- (a).14 Medical vacuum pumping systems.
- (a).15 50% of receptacles and lights in laboratories.
- (a).16 Pharmacy dispensing areas.
- (a).17 Equipment indicated on Equipment List as requested by Interior Health Authority during user meetings.
- (a).18 Lab analyzers.
- (a).19 Emergency generator related equipment such as ventilation, battery charger or air compressor for starting engine and derangement signals.
- (a).20 Hands-free sinks with electronic operators.

7.9.5.1(15)(b) Delayed vital branch loads including but not limited to:

- (b).1 Centralized UPS system

(b).2 Ventilation systems serving patient care areas.
(b).3 Sump pumps and sewage ejector pumps.
(b).4 Medical air pumping systems.
(b).5 Fume hoods.
(b).6 Selective operation of one elevator in each elevator bank containing more than one elevator.
(b).7 All individual elevators.
(b).8 Essential heating, ventilation and plumbing systems.
(b).9 Radiology and Ultrasound equipment as per Equipment List and Clinical Specifications.
(b).10 Alarmed freezers and refrigerators.
(b).11 Pneumatic Tube system
(b).12 All equipment in Medical Device Reprocessing (Central Sterilization) area.
(b).13 Ventilation and air conditioning/cooling equipment serving the Main Cross-connect Room, and on-floor communication riser rooms, and 24x7 cooling loads as defined by the CSA-Z317.5
(b).14 Ventilation and air-conditioning/cooling equipment serving the main electrical room, electrical riser rooms on each floor and the central UPS room.

7.9.5.1(15)(c) Fire Pump and jockey pump via dedicated transfer switch.

7.9.5.1(16) The BMS to monitor and record emergency loads.

7.9.5.1(17) Provide a UPS branch panel board and a vital branch panel board in the Main Cross-connect Room (main telecommunications equipment room) and in each on-floor communication room. Each panel board to be capable of independently supporting all the telecommunication equipment in the respective room. All active equipment (example: servers, IT switches) to be dual-corded with dual power supplies and simultaneously connected to the UPS branch panel and the vital branch panel such that an interruption in either power branch will not affect the telecommunication equipment.

7.9.6 Uninterruptible Power Supply (UPS) Systems

7.9.6.1 Basic Requirements

7.9.6.1(1) Provide a centralized Uninterruptible Power Supply (UPS) system arranged in a redundant N+1 configuration to serve all areas, equipment and systems that require a continuous and uninterrupted source of power as per the requirements of this Schedule 3 Design and Construction Specifications, Appendix 3I Room Requirements, Appendix 3E Authority IMIT Infrastructure Specifications and for the following additional outlets, equipment and systems:

7.9.6.1(1)(a) 25% of lighting, room receptacles, and permanently connected equipment, and 100% of receptacles in Booms in Operating Rooms.

7.9.6.1(1)(b) 100% of the Operating Room surgical task lights.

7.9.6.1(1)(c) 50% of all Procedure Room Lighting.

7.9.6.1(1)(d) Provide UPS capacity allowance to add up to 25% of the initial quantity of lights, receptacles and equipment as requested by the Authority during Design Consultation phase.

7.9.6.1(1)(e) the Building Management System;

7.9.6.1(1)(f) panic duress system;

7.9.6.1(1)(g) electronic access control systems;

7.9.6.1(1)(h) intrusion detection system;

7.9.6.1(1)(i) CCTV system;

7.9.6.1(1)(j) medical equipment which is deemed life-safety; and in accordance with IHA user groups requirements. Coordinate with IHA representative to confirm exact requirements.

7.9.6.1(1)(k) all equipment and systems located in Main Cross-connect Room, each telecommunication room and including, but not limited to:

(k).1 network equipment for the wired and wireless networks;
(k).2 wireless access points;
(k).3 PBX and other telephone equipment;
(k).4 wireless communications system;
(k).5 nurse call system;

(k).6 paging system;
(k).7 intercom;
(k).8 Patient wandering system;
(k).9 Vocera system; and
(k).10 RTLS system.

7.9.6.2 Performance Criteria

7.9.6.2(1) The centralized UPS system to be fed from the Delayed Vital power system backed by diesel generators And have an alternate source of power from an alternate fully redundant connection path; these two connections shall have a manual means of selection which shall not impede the availability of the UPS during maintenance of any of the parts.

7.9.6.2(2) Where vital functions are connected to a UPS circuit, include an audible warning in the vital function area 5 minutes before the UPS battery supply is exhausted. Provide additional monitoring by the BMS.

7.9.6.2(3) Centralized UPS system:

7.9.6.2(3)(a) To have modular architecture with no system-level single-point-of-failure.

7.9.6.2(3)(b) To have two (2) or more UPS modules connected in parallel providing N+1 redundancy, to ensure UPS power to support 100% of the initial load and 40% spare capacity when one UPS module is unavailable. The spare capacity shall be calculated by adding the connected loads minus the IMIT loads located in the MCR and all TRs multiplied by 1.4 plus the IMIT loads located in the MCR and all TRs with the future capacity required by clause 7.10.3.3(5).

7.9.6.2(3)(c) To have a dedicated battery string for each UPS module rated to provide 15 minutes of back up time when the UPS module is carrying 100% rated load.

7.9.6.2(3)(d) To be online, double-isolation type having output power factor of minimum 0.9

7.9.6.2(3)(e) To have input filter at each UPS module to limit the total harmonic current distortion to 5% when the UPS module is carrying 100% rated load.

7.9.6.2(3)(f) To have static bypass to automatically bypass the UPS in the event of UPS failure.

7.9.6.2(3)(g) To have external maintenance bypass switching cabinet for servicing the UPS system.

7.9.6.2(3)(h) Each UPS module and the static bypass to have a dedicated input feeder connected to the delayed-vital branch.

7.9.6.2(3)(i) Shall have a network connection for monitoring and shall indicated any alarms to the BMS.

7.9.6.2(4) The main distribution panel that is fed from the UPS system output to have an alternate input that can be energized directly from the main delayed vital distribution equipment in the event of a UPS system-failure. Provide interlock controls such that only one feeder can be energized at any one time.

7.9.6.2(5) Size breakers, electrical equipment and conductors feeding the UPS unit and the conductors and immediate electrical equipment connected on the load side of the UPS to the maximum capacity of the modular UPS such that the addition of future modules in the UPS will not require an upgrade to the electrical equipment infrastructure.

7.9.7 Metering

7.9.7.1 Basic Requirements

7.9.7.1(1) Provide networked, digital microprocessor metering to provide detailed information about power quality and power consumption at key points throughout the Building. Key points include:

7.9.7.1(1)(a) High voltage feeders from the Utility;

7.9.7.1(1)(b) 600V feeders to the PRH;

7.9.7.1(1)(c) Secondary feeder of all 12.47kV-600V step-down transformers;

7.9.7.1(1)(d) 600V Centralized Distribution Panels, mains and each feeder breaker;

7.9.7.1(1)(e) UPS;

7.9.7.1(1)(f) Power and Lighting Panelboards at 600V and 120/208V;

7.9.7.1(1)(g) Motor control centres;

7.9.7.1(1)(h) Panelboards feeding mechanical equipment and elevators; and

7.9.7.1(1)(i) All other requirements of ASHRAE 90.1 and LEED.

7.9.7.1(2) Provide revenue metering for the panelboards feeding the gift shop, food services and pharmacy spaces as noted in 7.9.4.2(34).

7.9.7.1(3) Ensure that metering is provided to record total energy consumed by lighting fixtures and equipment. Integrate information from all meters on a common software platform residing on a dedicated electrical metering server.

7.9.7.1(4) Metering will be provided on all normal, vital, delayed vital, conditional and UPS power branches.

7.9.7.1(5) Ensure that sufficient metering is provided to record the energy consumed by all major mechanical equipment including chillers, steam consumption, fan and pump motors, medical air and vacuum. Refer to the electrical section 7.9.15 Energy Management.

7.9.7.1(6) Implement a networked metering system with terminals for maintenance and plant administration, and data transfer to the Building's BMS. Provide network software, hardware, licensing to provide remote monitoring and third party assistance, re-programming and troubling shooting.

7.9.7.1(7) Connect electrical demand and consumption meters to the BMS.

7.9.7.1(8) Include trend logging equipment sensors to comply with and fulfill energy measurement and verification requirements. Logged information will not be overwritten and will be archived.

7.9.7.1(9) Provide additional meters required to measure energy performance in order to determine performance in accordance with Appendix 8C.

7.9.7.2 Performance Criteria

7.9.7.2(1) The metering system will provide easily read locally displayed information for all distribution at primary voltage and for each secondary distribution switchboard.

7.9.7.2(2) Metering intervals will be one hour or less.

7.9.7.2(3) Design the metering system network to store historical data and to have the capability to generate user configurable electronic and printed reports on demand.

7.9.7.2(4) Support the metering system by a backup power source(s), which ensures operation when the metered circuit is de-energized. The metering system will not be dependent on power from the metered circuit for its operation.

7.9.7.2(5) The metering system will, at a minimum, provide the following information about each metered circuit: Phase-to-Phase Voltage (all phases), Line-to-Neutral Voltage (all phases), Phase Demand and Peak Current (all phases and neutral), KW (peak and average), KVA (peak and average), Power Factor, KWH, VAR hours, frequency, current and voltage harmonics.

7.9.7.2(6) Utilize power quality type meters for monitoring harmonics and surges / sags. Provide power quality meters capable of monitoring harmonics on the normal, vital, delayed vital and conditional Distribution Panels.

7.9.7.2(7) Draw-out circuit breakers on the 600V main normal and emergency Distribution Panels will be provided with trip units with integral 3 phase true RMS digital meter with local LCD display to indicate the phase current for each phase, kW and kVA.

7.9.8 Grounding and Bonding

7.9.8.1 Basic Requirements

7.9.8.1(1) Provide grounding and bonding for all electrical equipment and systems in the New Facility for the safety of people and for protection against damage to equipment or property in the case of a fault occurring in any of the equipment or systems. Install grounding and bonding as required by all applicable codes and standards, including CEC, IEEE, CSA and ANSI/TIA standards for communications and security equipment and systems.

7.9.8.2 Performance Criteria

7.9.8.2(1) Utilize non-alloyed copper for all conductors and all conducting components of electrical equipment which form part of the grounding and bonding systems in the New Facility.

7.9.8.2(2) Provide solid or low resistance system grounding including conductors and bussing.

7.9.8.2(3) Provide equipotential grounding systems and equipment for all patient care areas, including a common ground bus for each patient bed location as required by CSA Z-32.

7.9.8.2(4) Bond all exposed non-current carrying components of communication, radio or television equipment in patient care areas to ground using a properly sized equipment bonding conductor.

7.9.8.2(5) Provide a ground bus in each electrical and communication room connected to the central grounding system.

7.9.8.2(6) Provide a copper ground conductor within all raceways for feeders and branch circuit wiring.

7.9.8.2(7) Provide a minimum #6 AWG copper ground conductor to be run to the Telecommunications Main Bus Bar (and bond communications systems in accordance with ANIS/TIA 607 requirements).

7.9.8.2(8) Performance Criteria states: “Complete a lightning protection study for the PCT, such study to be done by a specialist in lightning protection work and to be signed and sealed by a professional engineer registered in British Columbia. Implement a lightning protection study on any risk value of 4 or higher, as defined by CAN/CSA B72. Provide lightning protection if required by study.”

7.9.8.2(9) Label all grounding and bonding conductors and bus bars consisting of the ‘bonding backbone’ with printed labels.

7.9.9 Seismic Requirements for Electrical Systems

7.9.9.1 Basic Requirements

7.9.9.1(1) Provide seismic restraint for all electrical equipment and components of electrical systems which are part of the building electrical systems designed to meet the standards of a post disaster building as defined in the BC Building Code. The Seismic restraints systems to facilitate the maintenance and reconfiguration, as well as the installation is to coordinate with the buildings architectural finishes.

7.9.9.2 Performance Criteria

7.9.9.2(1) Provide seismic support for all electrical equipment and components of electrical systems that have the potential to cause injury or damage during or following a seismic event.

7.9.9.2(2) Use seismic restraint systems that are designed by a professional engineer, registered in British Columbia, or, where an identified

pre-designed standard restraint device or system exists for a particular item, that equipment may be used provided that written confirmation of its acceptability for the installation is provided by a professional engineer registered in British Columbia. Provide signed and sealed drawings as well as typewritten field reports from a professional seismic engineer, registered in British Columbia. Obtain certification of the main electrical distribution equipment for "seismic withstand capability" and, to maintain the certification, anchor such equipment according to the manufacturer's instructions.

7.9.10 Power Quality

7.9.10.1 Basic Requirements

7.9.10.1(1) Establish and maintain an overall power quality which assures suitable conditions for operation of all electrical and electronic equipment throughout the New Facility.

7.9.10.1(2) Provide equipment and systems which assure that electrical equipment and systems will not be harmed or impaired either by external events or conditions, such as lightning and disturbances on the utility service, or by internal events or conditions generated within the New Facility.

7.9.10.1(3) Meet or exceed the IEEE established standards for power quality including, but not limited to, Harmonic Mitigating Transformers, Harmonic Filters, Surge Protective Devices (SPD's), etc., where deemed necessary by the Authority and IEEE.

7.9.10.1(4) Provide harmonic mitigation equipment, as necessary, to ensure that power quality meets or exceeds recommendations in IEEE, including standard 519. For the purposes of measuring the harmonic distortion, the "Point of Common Coupling" will be the two main 12.5kV-600V step-down transformers.

7.9.10.2 Performance Criteria

7.9.10.2(1) Provide equipment, such as filters, zigzag transformers, surge protective devices (SPD's), etc, specifically designed to control and remove all adverse power quality conditions that could damage or impair function of sensitive electronic equipment used in the New Facility. Adverse power quality conditions include single phasing, voltage sags, voltage dips, voltage surges, voltage spikes, transients, harmonics, power factor and radio frequency interference.

7.9.10.2(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.

7.9.10.2(3) The voltage phase imbalance will not exceed 3 percent between phases A, B, C anywhere within the power distribution system.

7.9.10.2(4) Provide station class lighting arrestors on the primary side of the 12.47kV-600V main step down transformers. Provide integral surge protective devices (SPD's) on all 600V Centralized Distribution Panels, all120/ 208V Centralized Distribution Panels. 120/208V Panel boards supplying power to sensitive electronic equipment shall also have integral SPDs and dedicated neutrals for electronic equipment.

7.9.10.2(5) Provide phase detection/protection at all Centralized Distribution Panels feeding mechanical equipment, elevator equipment and medical equipment.

7.9.10.2(6) Provide a third party specializing in power quality systems to fully test and commission all power quality systems. Submit the reports with the commissioning documents.

7.9.10.2(7) Provide individual harmonic filters ahead of and coordinated with variable speed drive for every motor greater than 7.5 HP.

7.9.10.2(8) Provide harmonic mitigation transformers for all loads fed by vital, delayed vital, and UPS power sources and any specific critical equipment.

7.9.11 Wiring Methods, Materials and Devices

7.9.11.1 Basic Requirements

7.9.11.1(1) Use wiring methods, materials and devices that result in a safe, reliable and flexible electrical power, lighting control, communication, data, and life safety system.

7.9.11.1(2) Install all wiring in a neat and secure manner so that it is protected from damage, is not in conflict with mechanical or architectural components and allows for future changes and additions.

7.9.11.1(3) Receptacle colours will be red for Vital, white for Normal and Conditional, blue for UPS, and grey for dedicated neutral. Colour of receptacles will be finalized and implemented through the User Group Consultation process.

7.9.11.1(4) All receptacles will be identified with source panel and circuit number with a colour coded printed label in accordance with site and IHA standards as specified in IMIT Infrastructure Specifications.

7.9.11.1(5) Project Co. shall provide room reference bonding in accordance with the Canadian Electrical Code (CEC) Section 24 for all Patient Care Areas as defined within and as defined in CSA Z32-09 Section 4.2.6 Patient Care Area classification. Project Co. shall provide a dedicated room reference ground bus located in acceptable location, typically behind the door to the room. Room reference ground bus shall consist of a CSA listed enclosure complete with terminal strips, mechanical divider to isolated different sources. All branch circuits shall enter the room reference ground bus. Project Co. to provide minimum #10 AWG bond conductors for all patient care areas bonding.

7.9.11.2 Performance Criteria

7.9.11.2(1) Project Co. shall provide the minimum number of receptacles required in all basic care areas, intermediate care and critical care areas as defined by the CSA Z32-09 Table 6. These minimum requirements shall be increased to the requirements noted in the schedule, Appendix 3I Room Requirements, and for equipment indicated in Appendix 2E, the Equipment Schedule, industry reference documents, reference standards and good industry practice where noted.

7.9.11.2(2) Project Co. shall provide receptacles and connections as directed by the user group to all owner supplied equipment, including but not limited to, computers, monitors, IV poles, stands, video systems, scanners, monitoring units, ECC, EEG, EMG, defibrillators, treadmills and echo chairs as indicated in the Appendix 2E Equipment Schedule.

7.9.11.2(3) Provide power, data and make all connections in accordance with manufacturers installation recommendations for the following but not limited to all light arms, articulation arms, equipment booms, anesthesia booms, MRI, radiography, mammography, urodynamics, colonoscopy, MDR stress testing and observation equipment.

7.9.11.2(4) Contractor shall make allowances for the installation of all owner supplied equipment, surgical and procedure equipment, devices noted in this schedule, Appendix 3I Room Requirements, and for equipment indicated in Appendix 2E, the equipment schedule, as well as based on experience, industry standards and good practice.

7.9.11.2(5) Utilize non-alloyed copper for all conductors and all conducting components of electrical equipment, which form part of the New Facility's wiring systems. Minimum conductor size will be #12AWG. Aluminum conductor installed in conduits may be used for feeders to equipment, not electrical panels, greater than 100 Amp current rating except for vibrating equipment, which shall have copper feeds. Provide dedicated neutrals for clinical and clinical support areas and electronic equipment, including but not limited to computers, operating rooms, procedure room, surgical suites, exam and treatment rooms, observation and testing areas.

7.9.11.2(6) Feeders 100 Amp and larger to be installed in EMT conduit. Do not install armoured flexible cable (example: TECK or ACWU cable) for feeders.

7.9.11.2(7) Provide panel boards, feeders and branch circuiting with double neutral(s) capacity where significant non-linear load(s) are anticipated. This includes, but not limited to, all offices, open office and other areas with a medium to high density of personal computers.

7.9.11.2(8) Provide two 15A 120V duplex receptacles to each computer/ workstation. One of these receptacles shall have a dedicated neutral. Where receptacles are required to be switched by ASHRAE 90.1 the dedicated neutral receptacle shall not be switched. The two receptacles shall be of differing power sources.

7.9.11.2(9) Conceal all wiring and wiring support systems from public view.

7.9.11.2(10) Separate all wiring for systems of different voltages and from different sources and do not run in common raceways. Maintain adequate shielding and separation between wiring for power and communication systems to prevent interference.

7.9.11.2(11) Identify system voltage, phase, neutral and grounding of all pull boxes, junction boxes, conduits and wiring. Provide additional colour coding for wiring and "P Touch" self-adhesive labelling for receptacles and switches.

7.9.11.2(12) Provide hospital grade receptacles in patient areas, surgical procedure, testing, observation and medical / treatment areas and similar usage areas. Receptacles in all other areas will be specification grade.

7.9.11.2(13) Provide tamper resistant receptacles in public areas and child care designated areas.

7.9.11.2(14) Label receptacles in offices switched as required by ASHRAE 90.1 as 'Controlled'.

7.9.11.2(15) Utilize stainless steel cover plates for receptacles and switches. Grouped receptacles and switches will have a single cover plate for the whole group.

7.9.11.2(16) Provide, at a minimum, a quantity of receptacles to meet CSA Z32-09 in particular Table 6 and to meet the requirements indicated elsewhere in this Schedule, Appendix 3I Room Requirements, and for equipment indicated in Appendix 2E, the Equipment Schedule. In addition, allow for 150 duplex 15A 120V receptacles on 50 dedicated circuits to be placed as required by the Authority during User Consultation meetings and connected to any of the power branches as requested by the Authority and directed by Electrical Consultant.

7.9.11.2(17) Allow a maximum connection of four general use receptacles to one 15 or 20 amp circuit maximum. Number of receptacles per 15AMP circuit to be adjusted in accordance with equipment manufacturer's requirements, CSA Z32-09 and good industry practice.

7.9.11.2(18) Provide the required power connections to each fixed and moveable equipment in Appendix 2E Equipment Schedule. Coordinate details with equipment vendors as required.

7.9.11.2(19) Final location of all receptacles and connections will be determined in User Group Meetings.

7.9.11.2(20) Provide, at a minimum, one (1) duplex convenience receptacle rated at 15/20A, 120V in all rooms, alcoves, and vestibules, and connect these to the conditional power branch unless indicated otherwise in Appendix 3I Room Requirements. Provide additional receptacles identified in this Schedule, in Appendix 3I Room Requirements, and as required by code or applicable standard.

7.9.11.2(21) Utilize NEMA 5-20R 15/20Amp style receptacles for copiers. Provide separate dedicated circuits for each fax machine, printer and copier.

7.9.11.2(22) Utilize NEMA 5-20R 15/20Amp style receptacles for housekeeping staggered on alternate sides of the hallways spaced a maximum of 10 meters apart and as required for complete coverage of the Building and at each stairwell landing.

7.9.11.2(23) Provide one 15/20A 120V duplex receptacle for every 10 square meters, or portion thereof, of service and storage space. One GFCI duplex receptacle will be provided, at a minimum, on each wall in housekeeping rooms.

7.9.11.2(24) Medical Device Reprocessing (MDR) departmental areas will be provided with minimum 1 general use 115/20A 120V duplex receptacle on the walls at 10 meter centres. 50% of these receptacles to be connected to the vital power branch and the other 50% of receptacles to be fed from the normal power branch.

7.9.11.2(25) Provide one 15/20A 120V duplex receptacle on alternate sides of corridors and hallways, and in lobbies, and waiting/seating areas, with carpets and one duplex receptacle and one 208V receptacle in non-carpeted areas spaced at 10 meter centres maximum. Each wall will have minimum one receptacle. Connect these receptacles to the conditional power branch.

7.9.11.2(26) In staff washrooms, provide one (1) GFCI 15A 120V duplex receptacle above the counter connected to Conditional power. In patient washrooms, provide one GFCI receptacle above counter.

7.9.11.2(27) In operating rooms, surgical rooms, procedures rooms and similar usage rooms and as directed by department representative, provide each articulated arm and boom, with a minimum of 12-15/20A duplex receptacles on 7 dedicated circuits for equipment booms, and 5 dedicated circuits for anaesthesia booms. Additionally provide receptacles and power connections such as 30A, 208V (L5-30R) receptacle on a dedicated circuit or 20A, 208V twist lock duplex receptacle on a dedicated circuit as required by the manufacturer and User Groups. Connect receptacles on the boom on the vital branch.

7.9.11.2(28) In operating rooms, surgical rooms, procedure rooms and similar usage rooms, provide receptacle for laser on boom or on wall as required by the Authority. Connect laser receptacle to the Vital branch.

7.9.11.2(29) In operating rooms, surgical rooms, procedure rooms and similar usage rooms, provide 1-15/20A 120V duplex receptacle at 2 meter centres, connected to Vital and UPS branches as determined by the Authority through the User Consultation Process.

7.9.11.2(30) In each operating room, surgical rooms, procedure rooms and similar usage rooms and as directed by department representative provide 1-15/20A 120V duplex receptacle for housekeeping outlet in two locations.

7.9.11.2(31) In each operating room, surgical room, procedures room and similar usage rooms as directed by department representative provide 1-20A, 208V receptacle in two locations.

7.9.11.2(32) Provide a 'Laser-in-Use' light above each door of operating rooms, procedure rooms and similar usage rooms.

7.9.11.2(33) Provide an 'X-Ray in Use' light above each door of MRI and similar usage rooms.

7.9.11.2(34) In all patient rooms, connect 50% of the receptacles on the normal branch and the remaining 50% on Vital branch.

7.9.11.2(35) In all patient bays, connect 50% of the receptacles on the normal branch and the remaining 50% on Vital branch.

7.9.11.2(36) Provide special receptacles for fixed and moveable equipment as defined in the Equipment List. Provide all necessary electrical equipment devices as required to provide an electrical installation in accordance with manufacturers installation recommendations and make all connections for owner supplied equipment. Provide source of power as directed by department representative.

7.9.11.2(37) Provide 15A, 120V conditional circuits for all hands-free devices. Provide connections to low voltage transformers.

7.9.11.2(38) Provide a digital count up and count down timer in each surgical operating and procedure rooms and as directed by department representative.

7.9.11.2(39) Provide 15/20A, 120V vital circuit for all ceiling lifts and overhead lifting equipment.

7.9.11.2(40) Provide 15/20A, 120V duplex receptacles in two locations located on the ceiling of all surgical rooms, procedures rooms and similar usage rooms.

7.9.11.2(41) Provide 15A, 120V circuit for all hands-free automatic door operators. Typically all surgical rooms, procedures rooms and similar usage rooms will be provided with automatic door operators. Provide as directed by department representative.

7.9.11.2(42) Install approved fire stopping to maintain all fire separations and as required by local Governmental Authorities.

7.9.11.2(43) Provide raceways for all wiring and cabling to support, protect and organize all wiring and cabling systems.

7.9.11.2(44) Design raceways to provide ease of access and install with capacity for expansion and change, consistent with the requirements of the equipment and systems that they serve.

7.9.11.2(45) Install all raceways in a neat and secure manner in such a way that it is protected from damage, is not in conflict with mechanical or architectural components and allows for future changes and additions.

7.9.11.2(46) Except in 7.9.11.2(54), install power wiring in EMT with steel couplings and connectors.

7.9.11.2(47) Install low tension wiring (unless otherwise required by applicable Laws) in EMT with steel couplings and connectors and cable trays. Install EMT (or flex) conduits with low tension conductors between individual backboxes of devices (on walls or ceilings) and cable tray. Provide conduits and cable trays for low tension system wiring such that the maximum length of exposed wire between tray and conduit is less than 200mm.

7.9.11.2(48) EMT is to be surface mounted in service rooms and concealed in ceiling spaces and partition walls. Use rain tight connectors for surface mounted conduits. Do not encase EMT in concrete, unless such installation is:

7.9.11.2(48)(a) For fire alarm wiring; install in rigid green guard steel conduit if in slab on grade, For power wiring to lighting fixtures and receptacles, use rigid PVC conduit where conduit is installed in slab on grade; or

7.9.11.2(48)(b) Provide a concealed installation in finished spaces such as exposed concrete stairwells.

7.9.11.2(48)(c) Electrical conduits, whether metal or otherwise shall not be embedded in toppings.

7.9.11.2(48)(d) Metal electric al conduits, junctions and fixture boxes and other services that can erode shall not be embedded within the concrete slab or topping of parking structure.

7.9.11.2(49) If EMT conduit is encased in concrete, such conduit runs will:

7.9.11.2(49)(a) be as short as possible; and

7.9.11.2(49)(b) emerge from the concrete in the closest adjacent space above suspended ceilings.

7.9.11.2(50) Minimum EMT conduit size is 21mm (3/4”), except that minimum EMT conduit size for all communications are 27mm (1”) in accordance with the Schedule 3 and Appendix 3E Authority IMIT Infrastructure Specifications.

7.9.11.2(51) Use flexible conduit for all final connections:

7.9.11.2(51)(a) to devices located on suspended ceilings; and

7.9.11.2(51)(b) to vibrating equipment, such as transformers and motors.

7.9.11.2(52) Minimum flexible conduit size is 21mm (3/4”) and maximum length of any flexible conduit run is 1.5 metres.

7.9.11.2(53) Armoured cable (BX) may be used only for final connections from concealed junction boxes to lighting fixtures on suspended ceilings. The maximum length of any individual piece of BX cable is 3.0 metres.

7.9.11.2(54) Use rigid PVC conduits for the underground portion of services to lighting and power outlets located outside of the Building.

7.9.11.2(55) Install individual ground conductor in each conduit and/or raceway.

7.9.11.2(56) Provide cable trays for installation of all low tension wiring for data, telephone, public address and other such communication and IMIT systems. Install cable trays from communication rooms and above all corridors. If cable trays pass through walls with fire resistance ratings, provide removable twist and adjustable (Hilti) mechanism fire stopping to allow easy installation of cables in the future. Cable fill through each Adjustable Hilti Mechanism Fire Stop sleeve will not exceed 40% of the available internal cross-sectional area. Provide additional Hilti firestop sleeves at each location for future use, capable of accepting 40% of the number of cables initially installed at each location.

7.9.11.2(57) Cable tray to be aluminum or steel wire mesh, ladder type with manufactured fittings. Provide continuous #6AWG minimum green insulated copper bond wire in the tray. Provide #6AWG green insulated copper bonding jumper between the cable tray and every associated conduit to ensure continuous bond between tray and low tension raceways.

7.9.11.2(58) Identify all conduits, raceways, pull boxes, and junction boxes using colour bands. Colouring scheme will be determined by the Authority at a later date. Provide power, lighting, fire alarm, nurse call, paging, BMS, 600 volt systems etc. with unique colours in

accordance with the colouring scheme. Major colour to be 100 mm wide and minor colour to be 50 mm wide. Identify raceways with coloured bands using coloured duct tape at intervals of 6 m, plus at the point where the raceway enters a wall or floor (i.e. raceway is identified on both sides of a penetration to facilitate tracing of raceway). Colour-code all junction boxes using coloured duct tape on the cover. Neatly identify the relevant system and circuit ID using permanent marker pen. Identify parallel conduit runs at common locations. Indicate the location of conductors encased or embedded in concrete or masonry by acceptable permanent markers set in the walls, floors, or ceilings.

7.9.11.3 Performance Criteria

7.9.11.3(1) Construct separate raceways or raceways with barriers to isolate systems of different voltages and prevent magnetic interference.

7.9.11.3(2) Design and install raceways without sharp edges or sharp bends so that cables can be pulled in or laid in and removed without damage to the cables. Any bends in raceways not to exceed the soft 90 degree bend as per ANSI/TIA cabling standards.

7.9.11.3(3) Provide all cable trays with minimum 40% spare (physical space) capacity for the installation of future cables. If multiple raceways are required in a group, such as a duct bank or tray system interconnecting two or more major areas, provide matching empty raceway equal to a minimum of 50% of the capacity of the total installed group.

7.9.11.3(4) Provide a minimum of two spare 103 mm conduits from the main electrical room to each sub-distribution room. Provide pull cords for future, and label accordingly.

7.9.11.3(5) Install all conduits in finished areas within finished walls and above finished ceilings.

7.9.11.3(6) Provide bonding conductor within the metallic raceways and bond raceways continuously.

7.9.11.3(7) Provide a minimum of 3 spare 27mm EMT conduits from all panelboards to terminate in a 154mmx154mm ceiling mounted junction box. Install smoke seal and pull string for future.

7.9.11.3(8) Provide pull string and smoke seal all spare conduits. Label accordingly.

7.9.12 Lighting

7.9.12.1 Basic Requirements

7.9.12.1(1) Utilize hosital grade luminaires in all clinical and general hospital areas and specification grade quality luminaires in utility and storage closets. All luminaires to be selected with emphasis on energy efficiency, aesthetics, glare reduction and high colour rendering. Project Co. shall provide healthcare luminaires in all clinic service areas. Healthcare luminaires shall be appropriate to the unique requirements of each application, including:

7.9.12.1(1)(a) Examination lighting to provide high powered lighting for patient exams.

7.9.12.1(1)(b) Task lighting to support a variety of tasks requiring enhanced illumination.

7.9.12.1(1)(c) Healing lights to soothe the patient during anxiety providing procedures.

7.9.12.1(1)(d) Ambient lighting to promote overall patient wellness.

7.9.12.1(1)(e) Chart lights to support caregiver notations on patient progress.

7.9.12.1(1)(f) Way finding – night lights in patient rooms and areas to promote overall patient wellness.

7.9.12.1(1)(g) Provide maximum uniformity.

7.9.12.1(2) All operating rooms, procedure rooms, MDR luminaries shall be NSF2 listed IP65 rated UL certified IP65 per IEC 60598 and K230 rated. Provide non-electronic interfering MIL-STD 461F rated luminaires in operating, surgical, MRI, operating and nuclear med, procedure rooms and similar areas.

7.9.12.1(3) Provide aesthetically pleasing, exceptional visual comfort luminaires with dimming and scene setting as detailed in this section.

7.9.12.1(4) Ballasts will be high efficiency extra-long life type. Luminaries shall have the following characteristics:

7.9.12.1(4)(a) Fluorescent – 3500oK to 4100oK with minimum CRI 80;

7.9.12.1(4)(b) LED 3500oK to 4100oK with minimum CRI 80;

7.9.12.1(4)(c) Areas with a Color Appearance (and Color Contrast) of Very Important as listed in Table 3B of the IESNA RP 29-06 shall be 4100oK and have a CRI of 85 to 90.

7.9.12.1(5) Patient room lighting must accommodate the needs of both patient and caregiver. Lighting requirements within the patient rooms differ based on the task being performed, including testing, patient examination, charting, reading and wayfinding. Additionally the patient room shall optimize patient comfort with a residential inspired design. Provide multi-function lighting, night lighting and head wall illumination.

7.9.12.1(6) Patient room lighting shall consist of a multi-function headwall luminaire to provide ambient and exam lighting. Provide examination and general area lighting above bed or stretcher with 10% - 100% dimming. Provide a dimmable reading lamp in the headwall design. In addition, provide general overhead room lighting to be determined with user groups. Provide LED night lights for wayfinding switched from patient pillow control and at entrance to room. Provide dimmable down lights for patient visitors area separately switched for convenience. The Project Co. shall also provide a separately switched wall mounted vanity luminaire above all patient washroom sinks and a heatlamp on a timer in patient washrooms with a shower.

7.9.12.1(7) Corridors/nurses stations and similar area lighting to meet performance requirements as follows:

7.9.12.1(7)(a) Sealed for infection control.

7.9.12.1(7)(b) Appropriately placed lighting for tasks.

7.9.12.1(7)(c) Way finding capabilities.

7.9.12.1(7)(d) Dependable and effective signage, exit and emergency lighting.

7.9.12.1(8) Corridor lighting primary requirement is the ability to ease transitions to adjacent areas. Provide wall sconces and down lights to deliver soothing corridor illumination. Provide under cabinet task lighting to support a variety of caregivers duties.

7.9.12.1(9) Project Co. shall provide MRI/imaging/ECG/EEG/EMG/CT lighting to performing requirements as follows:

7.9.12.1(9)(a) Non ferrous

7.9.12.1(9)(b) Mitigation of electromagnetic interference (EMI)

7.9.12.1(9)(c) Sealed and gasketed for infection control.

7.9.12.1(9)(d) Dimmable LED technology for enhancing operational safety and patient control.

7.9.12.1(9)(e) Designed for ease of maintenance.

7.9.12.1(9)(f) Healing lights to optimize patient comfort.

7.9.12.1(9)(g) Provide aesthetically pleasing, exceptional visual comfort, dimming and scene setting.

7.9.12.1(10) Project Co. shall provide patient room, patient holding and stretcher bay and similar area lighting to performance requirements as follows:

7.9.12.1(10)(a) Sealed and gasketed or infection control.

7.9.12.1(10)(b) Multi-function capability

7.9.12.1(10)(c) Wall finding capabilities

7.9.12.1(10)(d) Aesthetic appeal

7.9.12.1(10)(e) Ease of maintenance and cleanability.

7.9.12.1(11) Provide luminaires and light sources that enhance safety and allow personnel to circulate throughout spaces and perform required tasks.

7.9.12.1(12) Design lighting with the objective of creating a comfortable working environment and an environment conducive to healing and recovery.

7.9.12.1(13) Lighting will comply with all characteristics recommended by the CSA Standard Z317.5-98 Illumination Systems in Health Care Facilities and ANSI/IESNA RP-29-06.

7.9.12.1(14) Lighting power density levels will be lower than the ASHRAE Standard 90.1 by 10% and the lighting installation shall meet the requirements of the Clinical Specifications and ASHREA standard 90.1.

7.9.12.1(15) Provide a low voltage fully programmable lighting controller complete with power management system. Provide low voltage occupancy, vacancy, daylight sensor, dimmers and switches where

lighting control is to be low voltage; otherwise provide line voltage sensors.

7.9.12.1(16) An electrically powered LED "Laser In Use" sign will be located outside any room in which a laser is anticipated to be used, such as all operating and procedure rooms. The sign will be connected to an internally illuminated switch inside the room label "Laser". The switch will be interlocked with the laser equipment such that the equipment will not operate with the switch in the “off” position. Internal illumination of the switch will be on only when the “Laser in Use” sign is illuminated.

7.9.12.1(17) An electrically powered LED "X-ray In Use" sign will be located outside any room in which fixed x-ray equipment is anticipated to be used, such as the OR. The sign will be connected to an internally illuminated switch inside the room label "X-ray". The switch will be interlocked with the x-ray equipment such that the equipment will not operate with the switch in the “off” position. Internal illumination of the switch will be on only when the “X-ray in Use” sign is illuminated.

7.9.12.2 Performance Criteria

7.9.12.2(1) Provide luminaires that require minimal cleaning and permit practical and easy access and disassembly. All luminaries shall be ULC listed, provided with anti-microbial finish, and rated for intended usage. Provide infection control rated luminaires throughout all patient care areas and clinical spaces. All lighting components to be specification or hospital grade.

7.9.12.2(2) Utilize LED lighting predominantly. Use wall sconces or down lighting for decorative purposes. Use high efficiency electronic fluorescent ballasts and linear T5 25W lamps when LEDs are not used. Do not use incandescent, compact fluorescent or HID lighting unless otherwise indicated in this Schedule.

7.9.12.2(3) Light emitting diodes (LEDs) will have a CRI no less than 80 and will be minimum 1.2 to 3W per LED. For colour temperature consistency, LEDs to be from the same bin number. To ensure a full lamp life, control the maximum temperature at the base of the “LED cap” mounted to the substrate. LEDs shall be measured to LM79 standards and tested to LM80 and L70 using TM-21 standards.

7.9.12.2(4) Utilize programmed start electronic ballasts for fluorescent lamps with a THD less than 10% and no more than 8% for third harmonic.

Ballasts will not exceed Class A ambient noise levels. Power factor will be .90 or greater.

7.9.12.2(5) Minimize use of battery-operated unit emergency lighting. Battery-operated emergency lighting may be an acceptable alternative as a second level of emergency lighting in areas including operating rooms, procedure rooms, laboratories, inpatient areas, electrical rooms, mechanical areas and other areas determined and directed by any other specification section or reference document, code or standard. Remote heads shall utilize LED technology.

7.9.12.2(6) Connect, at a minimum, 20% of the lighting in patient care areas and rooms and areas used by the public to the UPS system.

7.9.12.2(7) No area will have luminaires circuited from one power source only. Circuit the luminaires in all interior and exterior areas from both normal and emergency power so that if one power source is not available emergency light levels are met.

7.9.12.2(8) Utilize recessed volumetric or indirect fluorescent luminaries in offices, reception areas, care team stations and other areas where computer terminals and similar screens are present. Provide lighting control in accordance with ASHREA 90.1. Provide dual technology occupancy sensors with manual on/auto off in offices. Utilize 10% - 100% dimming control or multi-level switching and daylight dimming where appropriate.

7.9.12.2(9) Design lighting in conference rooms, meeting rooms and video conferencing facilities to maximize viewing of monitors and screens and provide suitable vertical and horizontal illumination of people being viewed. Provide fully dimmable lighting with switching to allow for general and ambient lighting selection. In accordance with Appendix 3E Authority IMIT Infrastructure Specifications.

7.9.12.2(10) Provide special task lighting designed for the types of procedures conducted for rooms and areas where treatment is provided, e.g. medication rooms, nurse stations and rooms and areas where specialized analytical or diagnostic work is carried out, e.g., MDR, sterile core, lab, biomed, nuclear medicine, surgical, operating and procedure rooms and similar.

7.9.12.2(11) As architectural features, design lighting in main lobbies, waiting areas, staff lounges and the main entrance will be provided with high quality products aesthetically pleasing to the public and staff. Staff areas and rooms must have multiple switching and dimming controls. Wall sconces will be ADA compliant and will be an LED 10%-100% dimming fixture.

7.9.12.2(12) Where patients are being transferred and/or lying on a stretcher provide volumetric or indirect lighting to limit glare to patients.

7.9.12.2(13) Provide under counter lights on a dedicated switch for all above counter cabinets.

7.9.12.2(14) Where multi-level lighting is required, each luminaire shall have multiple levels of lighting. Switching of different luminaires on and off shall not constitute multi-level lighting control.

7.9.12.2(15) Utilize daylight dimming for lighting at exterior glazing.

7.9.12.2(16) Controls to be to ASHRAE 90.1 requirements. Occupancy and Vacancy sensors to be dual technology and designed for the application in which they are used.

7.9.12.2(17) Exterior luminaires to be LED vandal resistant and have full cut off.

7.9.12.2(18) Utilize LED type edge lit green pictogram exit signs in finished areas, and steel in unfinished areas. All exit signs shall be LED type powered by the vital system. Provide exit signs wherever required to provide wayfinding to exit doors from corridor intersections.

7.9.12.2(19) Operating/Surgical and Procedure Rooms

7.9.12.2(19)(a) Provide maximum uniformity between zones in all surgical and operating rooms. Provide illumination as recommended by CSA standard Z317.5-98 Illumination Systems in Healthcare Facilities. Provide minimal luminance contrast between zones to allow surgical teams to work effectively and in maximum comfort for extended time periods. Provide optical systems design to achieve maximum luminance uniformity between all three zones.

7.9.12.2(19)(b) Provide IP65 rated UL certified IP65 per IEC 60598 and K230 rated luminaires suitable for a "Clean Room" environment.

7.9.12.2(19)(c) Luminaires will meet the MIL Standard 461E/462/463 for EMI and RF. Filter to eliminate RFI from power supply and line feedback. Minimum attenuation 30 to 60dB common and transverse mode.

7.9.12.2(19)(d) Connect Surgical Procedure Lights to the UPS branch.

7.9.12.2(19)(e) Provide infrastructure services (power, raceway, grounding, wiring, etc.) for all special Operating Room lighting provided by vendors. Project Co to supply/install, set-up, test and commission all owner supplied equipment. Provide all necessary devices/equipment and provide all connections and installation in accordance with manufacturers requirements.

7.9.12.2(19)(f) Provide dimmable down lights or 1’ x 4’ recessed luminaires around the perimeter of the room.

7.9.12.2(19)(g) Provide separately switched 10%-100% dimmable down lights above the Nurses desk, Anaesthetist’s Work Area and Storage areas.

7.9.12.2(19)(h) Provide dimmable linear T5 fluorescents or LED surgical luminaires above the surgical field. Connect these luminaires to the Vital and UPS branch.

7.9.12.2(19)(i) Provide, at a minimum, a 6 zone lighting controller to provide preset lighting zones to control all general lighting. Locate, at a minimum, 1 master and 2 slave controllers located at nurses desk and entrances to rooms.

7.9.12.2(20) Control Rooms

7.9.12.2(20)(a) Provide volumetric or indirect recessed fixtures.

7.9.12.2(20)(b) Provide for under counter lighting at workstations on a separate switch.

7.9.12.2(20)(c) Provide dimming for room lighting.

7.9.12.2(21) Medical Devices Reprocessing areas and Sterile Core

7.9.12.2(21)(a) Provide IP65 rated UL certified luminaires suitable for a "Clean Room" environment.

7.9.12.2(21)(b) Provide separately switched task lighting at each of the workstations in addition to room/area lighting.

7.9.12.2(21)(c) In computer workstation/monitor locations, provide volumetric lighting and position ceiling luminaires to avoid direct and reflected glare.

7.9.12.2(22) Offices and Workrooms

7.9.12.2(22)(a) Provide uniformly luminous, recessed mounted volumetric or indirect luminaires.

7.9.12.2(22)(b) Position ceiling luminaires to avoid direct and reflected glare.

7.9.12.2(22)(c) Provide multi-level or dimming lighting controls, dual technology occupancy sensors with manual on/auto off and daylight sensing where appropriate. Provide dimming in specific rooms as noted in Appendix 3I Room Requirements.

7.9.12.2(22)(d) Provide under counter luminaire above sinks and under upper cabinetry. Provide separate switching for these lights.

7.9.12.2(23) Meeting Rooms (including Multipurpose, Videoconference, Conference/Education Rooms)

7.9.12.2(23)(a) Provide uniformly luminous, recessed mounted volumetric or indirect luminaires or linear luminaries mixed with down lights. Provide appropriate luminaires where videoconferencing will take place to illumine faces while minimizing glare.

7.9.12.2(23)(b) Position ceiling luminaires to avoid direct and reflected glare.

7.9.12.2(23)(c) Provide dimming lighting controls, dual technology occupancy sensors with manual on/auto off and daylight sensing where appropriate.

7.9.12.2(23)(d) For UBC rooms, refer to UBC specifications (Appendix 3M) for additional information.

7.9.12.2(23)(e) Provide under counter luminaire above sinks and under upper cabinetry. Provide separate switching for these lights.

7.9.12.2(24) Public Areas, such as Reception, Waiting, Lobby and Seating

7.9.12.2(24)(a) Provide decorative lighting for visual interest, and lighting that illuminates feature wall and specialty signage, design features, and special features of the area.

7.9.12.2(24)(b) Wall sconces must comply with ADA requirements.

7.9.12.2(24)(c) Provide low voltage controls and dimmers at reception, nurses' station and other areas not available to the public for lighting controls for these areas.

7.9.12.2(25) Care Team Stations, Decentralized Care Team Stations

7.9.12.2(25)(a) Provide volumetric or indirect recessed lighting and down lighting.

7.9.12.2(25)(b) All lighting to be dimmable.

7.9.12.2(25)(c) Provide decorative lighting.

7.9.12.2(25)(d) Provide dual technology occupancy sensors with manual on/auto off and daylight sensors where appropriate.

7.9.12.2(25)(e) Provide dimming controls for the corridor and Care Team Station lighting at the Care Team Stations.

7.9.12.2(25)(f) Provide an override on/off switch for all patient bay lighting at the Care Team Stations.

7.9.12.2(26) Staff and Public Washrooms

7.9.12.2(26)(a) Provide down lighting for general illumination and aesthetically pleasing vanity light above sink.

7.9.12.2(26)(b) Provide ceiling mounted dual technology occupancy sensor.

7.9.12.2(27) Public and Non-Public Corridors

7.9.12.2(27)(a) In publicly accessible corridors, provide volumetric or indirect recessed lighting and in corridors not accessible by the public provide lensed recessed lighting.

7.9.12.2(27)(b) Provide daylight dimming sensors for corridors with exterior glazing. Provide dimming controls of

corridors. Lighting in corridors to be reduced to 50% at each fixture during night time except where directed otherwise by the Authority.

7.9.12.2(27)(c) Corridor lighting to be 45% normal power, 45% vital power and 10% UPS power. UPS powered luminaires to be located at corridor intersections and corners.

7.9.12.2(28) Patient Holding, Patient Stretcher Bay, IV and Patient Cast areas (including Isolation and Bariatric rooms)

7.9.12.2(28)(a) Provide two asymmetrical1'x4' (flanking the patient bed) or one 2'x4' ceiling mounted patient exam lights with antimicrobial finish. Patient exam room lights shall function as exam light and ambient light with no glare and be architecturally pleasing.

7.9.12.2(28)(b) Provide an amber LED nightlight that is switched inside the room at the entrance from the corridor and through the patient-controlled nurse call pillow speaker.

7.9.12.2(28)(c) Provide separate controls for the patient exam fixtures at each of the following locations:

(c).1 inside the room at the entrance from the corridor; and

(c).2 the headwall.

7.9.12.2(28)(d) Provide a multi-function bedhead luminaire with different illumination levels for tasks, including ambient room, patient exam, patient charting, patient reading and night light. Provide controls at the headwall and entrance locations.

7.9.12.2(28)(e) Provide a vanity luminaire above all hand hygiene sinks in patient rooms separately switched.

7.9.12.2(28)(f) Lighting in Stage one and Stage two recovery bays to be dimmable.

7.9.12.2(29) Patient Rooms (including Isolation and Bariatric)

7.9.12.2(29)(a) Provide two dimmable, asymmetrical, 1'x4' (flanking the patient bed) or one dimmable 2'x4' ceiling mounted patient exam lights with antimicrobial finish. Patient exam room lights shall

function as exam light and ambient light with no glare and be architecturally pleasing.

7.9.12.2(29)(b) Provide two amber LED night lights that are switched and dimmed inside the room at the entrance from the corridor, in the ante-room and through the patient-controlled nurse call pillow speaker or headwall system.

7.9.12.2(29)(c) Provide a multi-function headwall luminaire to provide ambient and exam lighting. Include for a dimmable reading lamp in the headwall system.

7.9.12.2(29)(d) Provide dimmable down lighting at visitor areas.

7.9.12.2(29)(e) Provide vanity light above hand hygiene sink switched at sink.

7.9.12.2(29)(f) Provide separate dimming controls for all fixtures separately at the following locations:

(f).1 inside the room at the entrance from the corridor;
(f).2 the headwall.
(f).3 the patient-controlled nurse call pillow speaker; and
(f).4 the ante-room if required.

7.9.12.2(29)(g) Provide task lighting in the respective ante-room and general area recessed lighting.

7.9.12.2(30) Patient Washrooms (including Bariatric and Isolation)

7.9.12.2(30)(a) Provide an amber LED night light in each Patient Washroom that is not switched. Provide a separately switched aesthetically pleasing vanity light over the sink. Provide general area lighting utilizing down lights. Provide a heat lamp on a timer where washroom has a shower. Night lights to illuminate on photocell only.

7.9.12.2(31) Exam Rooms (including Consulting, Interview and Multipurpose Rooms)

7.9.12.2(31)(a) Provide dimmable, asymmetrical, volumetric or indirect 1’x4’ or 2’x4’ ceiling mounted recessed lights with antimicrobial finish. The fixtures will dim 10-100%.

7.9.12.2(31)(b) Provide connection and controls for Patient Exam Light.

7.9.12.2(31)(c) Provide dual technology occupancy sensor.

7.9.12.2(32) Laboratory Stress Test Rooms

7.9.12.2(32)(a) Provide two dimmable, asymmetrical volumetric or indirect 1'x4' or 2'x4' ceiling mounted recessed lights with antimicrobial finish. The fixtures will dim 10-100% and shall be independently controlled.

7.9.12.2(32)(b) Provide dimmers to turn on and control light level of fixtures; provide dual technology vacancy sensor to automatic turn lights off.

7.9.12.2(33) Provide LED recessed visual graphic/scenic displays (Luminous Virtual Windows or Skylights) for 50% of wall spaces at high level (clerestory), and 50% of ceiling spaces in the Medical Device Reprocessing if the MDR is located on Level 0 or does not receive natural daylight; area to include receiving, sorting, assembling, packaging and holding areas. Multiple screens, when installed together, shall display one large image. Such displays shall be dimmable and controlled by the BMS. Provide dimmers in non-public areas.

7.9.12.2(34) Parking Garage Lighting

7.9.12.2(34)(a) Provide LED fixtures suitable for parking garage use with low glare.

7.9.12.2(34)(b) Control parking garage lighting to ASHRAE 90.1 requirements. Do not provide each fixture with occupancy sensor controls. Provide occupancy sensors zoned such that lights are turned on ahead of traffic and people. Lighting in parking garage to only be reduced at each fixture; do not shut lighting off.

7.9.12.2(34)(c) Connect parking garage lighting to the BMS system. All parking garage lights to turn on upon activation of any panic alarm station within the parking garage or 2nd stage fire alarm.

7.9.12.2(35) Exterior Lighting

7.9.12.2(35)(a) Provide LED fixtures suitable for exterior use with full cut off and vandal resistant. Provide low level

lighting, bollards, wall mounted and post top lighting where needed to provide safe, well lit walkways, parking areas and roads.

7.9.12.2(35)(b) Exterior lighting to be connected to the Vital and Normal power sources. Mix lighting sources so no area is dark with loss of one source of power.

7.9.12.2(35)(c) Control exterior lighting to ASHRAE 90.1 requirements.

7.9.12.2(35)(d) Comply with LEED requirements for light trespass and light pollution.

7.9.12.2(35)(e) Connect Exterior lighting to the BMS system. Exterior lights to be controlled via astronomical time clock and photocell.

7.9.12.3 Helipad Lighting, Illuminated Signage and Lighting Control

7.9.12.3(1) Basic Requirements.

7.9.12.3(1)(a) Provide navigational aids for the Helipad in accordance with applicable standards based on the specified category, including inset lights for both Final Approach and Take-off Area (FATO) and Touchdown and Lift-off Area (TLOF) perimeters.

7.9.12.3(1)(b) Utilize white or amber Omni directional lighting, pending operator preference.

7.9.12.3(1)(c) Inset lights and ARCAL lighting control (Aircraft Radio Control of Aerodrome Lighting), obstruction lights, SAGA (System of Approach Azimuthal Guidance) lights and beacons will comply with CAR (Canadian Aviation Regulations) 325 and other Transport Canada Standards.

7.9.12.3(2) Performance Criteria

7.9.12.3(2)(a) Connect all helipad lighting, signage and lighting control to emergency power sources.

7.9.12.3(2)(b) Install inset lights for FATO comprising of seven lights on each side including two end lights. FATO lighting will be spaced 4M apart.

7.9.12.3(2)(c) Install inset lights for TLOF comprising of nine lights on each side including two end lights. TLOF lighting will be spaced 2M apart.

7.9.12.3(2)(d) Provide flood lighting of the Helipad and general lighting for the connection paths for patient transfer from the Helipad to the dedicated elevators on the roof.

7.9.12.3(2)(e) Utilize manual lighting control switches in the Emergency Department for the Helipad lighting control.

7.9.12.3(2)(f) Provide Aircraft Radio Control of Aerodrome Lighting (ARCAL) system for Helipad lighting control.

7.9.12.3(2)(g) Provide System of Approach Azimuthal Guidance (SAGA) lights for the Helipad, for threshold identification and azimuthal guidance.

7.9.12.3(2)(h) Provide illuminated wind sock, obstruction lights and beacon lights as required for the Helipad.

7.9.13 Control

7.9.13.1 Basic Requirements

7.9.13.1(1) Lighting controls to comprise a significant part both of the energy management of the facilities and of the flexibility required to adjust lighting to suit functions and activities.

7.9.13.1(2) Lighting control to permit simple and integrated control of lighting; controls will be easily operated and located for each area and function in consultation with the Authority.

7.9.13.1(3) Lighting controls are to meet or exceed ASHRAE 90.1 requirements.

7.9.13.1(4) Lighting controls to be of the extra-low voltage type except where not permitted by the Canadian Electrical Code CSA standards for healthcare facilities, and in the following areas: utility rooms, bathrooms, workrooms, offices, interview rooms, medication rooms, housekeeping rooms, break rooms, quiet rooms and storage rooms. The extra-low voltage lighting control system shall be fully programmable and have 40% spare capacity in the panels and scanners.

7.9.13.1(5) All of the lighting in a space to be capable of being switched at all entrances to the space.

7.9.13.1(6) Integrate the lighting control system with the Building Management System for remote control of the lighting and energy management.

7.9.13.1(7) Staff and patients to have the ability to control the lighting in their environment. All patient areas to have staff and patient lighting control. All other rooms to have staff lighting control.

7.9.13.1(8) Patient to have the ability to control the lighting levels in their room or bay directly and easily from their beds

7.9.13.1(9) Dual Technology Occupancy Sensors, Vacancy Sensors and daylight dimming control systems to be utilized to maintain light levels at levels based upon the occupancy of the room and the quantity of daylight. On/Off daylight controls are not permitted.

7.9.13.1(10) Performance Criteria

7.9.13.1(11) Where lighting controls are required to be located in areas accessible to the public, they will be protected from unauthorized operation. Corridor lighting controls to be located at the Nurse Stations and reception desks, where applicable. Controls to be multilevel (to provide a lower light level at night) and capable of overriding the BMS night setback control. There will be no night setback in critical care areas.

7.9.13.1(12) Lighting control system to be interfaced to the Building Management System to permit override ‘100% on’ and night set back control. Lighting program to be established by the Authority and Project Co to address different conditions such as power outage and fire alarm.

7.9.13.1(13) All manually operated lighting controls to be of a type, which can be completely cleaned and disinfected without requiring any disassembly. Manually operated controls will not be deteriorated or otherwise adversely affected by frequent cleaning and disinfections.

7.9.13.1(14) Lighting controls in locations where they may be subjected to excessive moisture or to chemicals that might cause deterioration are to be rated specifically for the application.

7.9.13.1(15) Locate all lighting control panels and relay devices within electrical rooms and non-public corridor walls, and not within ceiling spaces. Provide dedicated lighting panels for all lighting. Do not mix lighting loads with power loads.

7.9.13.1(16) Provide lighting control schedules that respond to individual departmental requirements and occupancy/use. Design a schedule of lighting control and include in the design specifications. Review controls with the Authority as per Schedule 3 Design and Construction Protocols.

7.9.13.1(17) Lighting in open areas and common areas to be zoned and subdivided to permit energy management control and variation of light levels.

7.9.13.1(18) Provide zone control of lighting for all corridor, circulation and atrium areas. Zoning control will include floor by floor and department by department, as a minimum. Provide master switches to control groups of lighting zones with the capability of direct on/off control or on/flick-then-off control ('flick-then-off' function is that the lights will flick prior to turning completely off). Any master switch which could cause an occupant to be left in the dark shall have the 'flick-then-off' warning function.

7.9.13.1(19) Dual Technology Occupancy Sensors in ceilings will be automatic on/off type and will control both room lighting and HVAC systems (via sensor contact interface to BMS).

7.9.13.1(20) Dual technology occupancy sensors on the wall to be manual on/automatic off type and will control both lighting and HVAC systems (via sensor contact interface to BMS).

7.9.13.1(21) Vacancy sensors, a subset of occupancy sensors, manual on/off/dimming, automatic off type.

7.9.13.1(22) Daylighting controls to be provided for all lighting in areas adjacent to exterior glazing and to provide dimming to 0% of lamp output. Provide combination daylight harvesting and occupancy control to the rooms exposed to daylight and requiring occupancy sensors.

7.9.13.1(23) Daylighting to meet the following performance criteria:

7.9.13.1(23)(a) The average luminance across a representative portion of the task surface to be at least 30% of the target design level for that space type within 5 meters of the daylight source;

7.9.13.1(23)(b) Overhead lights within the space to be dimmed as low as possible (or turned off) while satisfying above criteria (a).

7.9.13.1(24) Occupancy sensors and daylighting controls to be extra-low or line voltage type; and where low voltage shall be integrated into the

lighting control system and located on ceilings to avoid interference with furniture. Occupancy sensors will typically be dual technology with other types to suit application.

7.9.13.1(25) Exterior lighting to be controlled via BMS and photocell.

7.9.14 Energy Management

7.9.14.1 Basic Requirements

7.9.14.1(1) Provide an integrated energy management system to monitor, record, analyse, report on and control energy consumption from all sources that supply energy to the New Facility. This system to be connected to the BMS. Refer to Section 7.9.7 Metering of this Schedule.

7.9.14.1(2) Design the system to provide sufficient information to enable the Authority to make New Facility-wide “demand-side management” decisions relating to overall energy demand, with the intent of reducing overall energy consumption and demand throughout the New Facility. Incorporate data from the digital meters required by Section 7.9.7 Metering of this Schedule. Provide and coordinate with the owner’s representative to provide an IP address for energy management monitoring capabilities.

7.9.14.1(3) Provide a system and equipment that is flexible, controllable, and will form an integral part of the Building.

7.9.14.2 Performance Criteria

7.9.14.2(1) Design the energy management system to be accessible from any networked computer using appropriate software.

7.9.14.2(2) Provide a minimum of five site software licenses if licensing is required.

7.9.15 Mechanical Equipment Connections

7.9.15.1 Basic Requirements

7.9.15.1(1) Provide electrical power control and monitoring connections to all mechanical equipment as required for proper operation, protection and maintenance of the equipment. Materials and installation methods will result in safe, reliable and serviceable mechanical equipment and systems in the Building.

7.9.15.2 Performance Criteria

7.9.15.2(1) Utilize institutional or industrial quality cables, connectors, conduit systems, fittings and hardware used to make connection to mechanical equipment so as to provide for high levels of reliability, durability and ease of maintenance of the equipment.

7.9.15.2(2) Design connections made to motors and/or motor driven equipment or equipment with noticeable levels of vibration to accommodate the vibration.

7.9.15.2(3) Design connections to mechanical equipment to easily permit removal and replacement of the equipment.

7.9.15.2(4) Size motor control centres, main feeders to motor control centres, and mechanical distribution centres to accommodate the current mechanical equipment with an additional 40% spare capacity.

7.9.15.2(5) Utilize motor control centres when three 3-phase motors that require a starter are located within 50m of each other.

7.9.15.2(6) Provide labelling on MCC's to match motors.

7.9.15.2(7) Provide wring diagrams of each starter type.

7.9.15.2(8) Provide full size starters.

7.9.15.2(9) For motors 20 hp. and above, provide reduced current starters. Provide integral harmonic cancellation devices to limit harmonics to 5% current harmonics (iTHD) of the full load fundamental current if solid-state starters are employed.

7.9.15.2(10) Starters and MCC's to be indoor sprinkler-proof, type 2 enclosures. Arc Flash reducing type shall be utilized for 600V MCCs.

7.9.15.2(11) Provide individual control transformers for each starter.

7.9.15.2(12) Starters or MCC's connected to emergency and normal power to be coloured to match the corresponding system colour. All interiors to be white.

7.9.15.2(13) Electrical connections and power-paths to mechanical equipment should reflect the redundancy considerations of the corresponding mechanical system or portion of the mechanical system serving an area.

7.9.16 Major Medical Equipment/Medical Device Reprocessing Equipment

7.9.16.1 Basic Requirements

7.9.16.1(1) Provide all electrical requirements for connection, operation and monitoring and control of any supplied major medical or medical device reprocessing equipment.

7.9.16.2 Performance Criteria

7.9.16.2(1) Each item of equipment to be installed and electrically connected for proper and full operation.

7.9.16.2(2) Electrical characteristics of this equipment, including but not limited to voltage, wattage, phase, demand, inrush, frequency, connection method and control and monitoring requirements to be confirmed by the designer and provided for.

7.9.16.2(3) Space, access and ventilation requirements and other operation critical characteristics of this equipment to be provided for and outlets and connection points to be located correctly for installation and so as to permit proper and safe isolation for servicing and disconnection for removal or replacement.

7.9.16.2(4) Any motorized equipment is to be equipped with a local lockable disconnect switch.

7.9.16.2(5) Feed all major medical equipment (imaging, procedure, OR) from a dedicated transformer.

7.9.17 Medical Service Headwall Units Systems

7.9.17.1 Basic Requirements

7.9.17.1(1) Incorporate headwall power, communications, equipment mounting, medical gases, lighting control into the medical service units specified under another division.

7.9.17.2 Performance Criteria

7.9.17.2(1) Provide horizontal or vertical type medical service headwall units as directed by department representative and identified in Appendix 3A Clinical Specifications and Functional Space Requirements, and Appendix 3I Room Requirements and User Group consultation.

7.9.17.2(2) Coordinate and install the required electrical services, including but not limited to, nurse call, normal, emergency and UPS power, communications outlets and reading light and switches, in the medical service units.

7.9.17.2(3) Conceal within walls all of the mechanical and electrical services feeding the medical services unit.

7.9.17.2(4) Outlet location to be developed through the User Consultation Process as per Schedule 2 Design and Construction Protocols.

7.9.17.2(5) Each medical service unit to have 25% space capacity for additional power and communications outlets.

7.9.17.2(6) Avoid back to back installations between bedrooms that could compromise acoustic rating of such assembly. Where back to back installations are unavoidable, acoustic isolation will be provided.

7.9.17.2(7) Exact medical service unit dimensions and configurations to depend on the room layout and the available space. Generally, the medical service unit length will suit the quantity and location of outlets and all outlets will be clear from the width of the bed.

7.9.18 Specialty Systems

7.9.18.1 Basic Requirements

7.9.18.1(1) Special electrical and communications systems are required in the New Facility (as described in this Schedule) and form essential parts of the Building. Provide power supply, specially conditioned power and communication conduits and other electrical operational support equipment to meet all requirements of these special electrical and electronic systems.

7.9.18.2 Performance Criteria

7.9.18.2(1) Utilize institutional or industrial quality cables, connectors, conduit systems, fittings and hardware to make connection to special equipment and to provide for high levels of reliability, durability and ease of maintenance of the equipment.

7.9.18.2(2) Provide connections to special equipment that easily permit removal and replacement of the equipment.

7.9.19 Clock System

7.9.19.1 Basic Requirements

7.9.19.1(1) Provide a synchronized wireless clock system to assure accurate, consistent time is available in the New Facility. The system will provide automatic correction for daylight savings time and self-correct if power fails.

7.9.19.1(2) Provide master time controllers and all clocks by a recognized industry leader with all components by the same manufacturer.

7.9.19.1(3) Wireless clocks within the New Facility to be compatible with the existing PRH GPS wireless clock system and to work with the signal received from the existing central controller.

7.9.19.1(4) All synchronized clocks to incorporate the Authority's logo on the face to identify the clock as a synchronized clock.

7.9.19.1(5) The finish and appearance of the clocks are to complement the architectural finishes and be flush mount type within rooms.

7.9.19.1(6) The clock system is considered a Select Campus-wide System. Project Co shall ensure seamless integration of the system across the New Facility and Other Site Facilities. Project Co may choose to either replace the current system and related equipment in the Other Site Facilities or choose to integrate to this system. If Project Co chooses to integrate to the Other Site Facilities system, Project Co shall be responsible for all required upgrades to the Other Site Facilities system. If Project Co elects to replace the system in the Other Site Facilities, the system will comply with the requirements in the Design and Construction Specifications.

7.9.19.2 Performance Criteria

7.9.19.2(1) Install battery-operated analog type synchronized clocks that will receive correction signals from the master clock. Use batteries rated to last a minimum of 5 years.

7.9.19.2(2) Provide synchronized clocks minimum 300 mm in diameter with sweeping second hand and 24 hour numbering. Numbering to include hours 1-12 in large numbers on outer ring and hours 13-24 in smaller numbers on inner ring.

7.9.19.2(3) Locate synchronized clocks so that the faces are clearly visible to users in areas indicated in Schedule 3I Room Requirements and in other areas as required to ensure that staff are able at all times to view a clock when caring for patients, whether in a room or down a corridor.

7.9.19.2(4) The elapsed time clocks will include control pushbuttons to allow for interval timing and reset.

7.9.19.2(5) In the event of a power loss, the control system will continuously maintain proper internal time.

7.9.19.2(6) Provide local satellite transmitters to provide signals to all clocks in the New Facility where required.

7.9.19.2(7) The clock system to have an independent wiring system and raceway system to any other building system.

7.10 Communications (Division 27)

7.10.1 General

7.10.1.1 Principles and Guidelines

7.10.1.1(1) Information management directional plans consisting of 3 core deliverables: provision and management of the technology, management and delivery of information and management and support for the core business. Project Co will support this plan using technology that seamlessly integrates with the Authority.

7.10.1.1(2) The Authority's patient health record is predominantly electronic in nature and a substantial amount of information related to patients is digital or has the ability to be converted to digital and reside on the network.

7.10.1.1(3) The full electronic health record (EHR) is the ultimate goal of the Authority when it comes to gathering, storing and transmitting patient information. The intent of the EHR is to allow health care providers the ability to make more accurate, faster decisions on courses of action for patients, provide efficiencies for staff and patients to reduce costs, and provide better privacy and security of the patient record by controlling where it is stored.

7.10.1.1(4) The Authority's primary Health Care Information System (HCIS) software application package is Meditech Connex. Meditech Connex is a telnet based application and has to run on a secure, low latency network. All applications used in PRH for clinical purposes will be provided by the Authority. Most applications will be hosted on servers located at off-site data centres. The management of all the Authority's employees and patient information is the responsibility of the Authority.

7.10.1.1(5) The types of communication between the various zones and departments shall be one or a combination of hands free, PC based, intercom, or phone as determined through the User Group Consultation Process described in schedule 2.

7.10.1.2 Basic Requirements

7.10.1.2(1) The communications systems in the New Facility to be a standalone system with an extension to the PRH communications systems. Ensure all new technology systems and equipment are compatible with the existing systems and equipment used at the PRH.

7.10.1.2(2) The communications systems to be proven technology for use in facilities similar to the New Facility.

7.10.1.2(3) All communications systems infrastructure and equipment provided by Project Co to be the latest proven version of the equipment at the time of procurement.

7.10.1.2(4) The communications systems to be easy to operate, easy to maintain and adaptable to change, and expandable to accommodate growth.

7.10.1.2(5) Project Co to be responsible for all physical network design and installation in consultation with the Authority as per Schedule 2, Design and Construction Protocols.

7.10.1.2(6) Physical network design and installation to:

- 7.10.1.2(6)(a) Accommodate multiple separate networks and VLANs administered by multiple System Administrators;
- 7.10.1.2(6)(b) Support Unicast and Multicast communication;
- 7.10.1.2(6)(c) Have high availability and security that meets or exceeds the Canadian Standards for use in and support acute care hospital applications; and
- 7.10.1.2(6)(d) Network equipment manufacturers shall be of current Authority standard. Refer to Authority IMIT Infrastructure Specifications in Appendix 3E of this document.

7.10.1.2(7) The Authority anticipates that the following networks will be required in the New Facility:

- 7.10.1.2(7)(a) An administrative network for core health users, including the Authority's local area network, which will include the following applications:
  - (a).1 patient information systems;
  - (a).2 Meditech Connex;
  - (a).3 financial information systems;
  - (a).4 human resource information systems; and

(a).5 electronic communications systems including e-mail, video conferencing and VoIP phones and end-user resources including home drives and shared enterprise resources.
(a).6 Patient Entertainment System
(a).7 imaging equipment,
(a).8 PACs
(a).9 Nurse Call (refer to Section 7.10.10 of this Schedule)
(a).10 Biomedical and other clinical units with patient monitoring;
(a).11 Alarm management systems.
(a).12 The PRH administrative servers will be supplied by the Authority and are located off-Site. New Facility administrative servers for Nurse Call, Patient Monitoring, Alarm Management, and others as shown in the System Responsibility Matrix located in Appendix 3H of this document to be Provided by Project Co and to reside in the New Facility Main Cross-connect Room. Exact placement of these servers to be in accordance with section 7.10.3.4 (1). The network equipment to connect to the existing off-site data centre via wide area network connections, provided by the Authority in the PRH Main Cross-connect Room, and the PRH server farms to secure access to all levels of required information.

7.10.1.2(7)(b) A Security network for the New Facility to include the following systems:
(b).1 CCTV (Refer to Section 7.11.3.5 of this document)
(b).2 Security system

7.10.1.2(7)(c) Physically separated and independent Building Management System (BMS) network, to include:
(c).1 the Building Management System (refer to Section 7.8.1 of this Schedule);

7.10.1.2(7)(d) The physically separated Building Management System to have a separate and secure connection to the internet for remote system monitoring and

access. If the use of the administrative network is required, consult with the Authority as per Schedule 2, Design and Construction Protocols;

7.10.1.2(7)(e) as required by the relevant equipment manufacturer or vendor, patient monitoring equipment (refer to the Equipment List).

7.10.1.2(7)(f) The above list is for reference only and does not limit Project Co's obligation to provide all physical networks required for the New Facility.

7.10.1.2(8) Provide systems which promote operational efficiency and integrate systems where this integration provides efficiency and operational and cost advantages.

7.10.1.2(9) Provide a common pathway for all communications systems wiring referenced herein, including the BMS, and coordinate the requirements of the individual communications systems as established by the vendors of such systems e.g. clinical patient monitoring systems.

7.10.1.2(10) The communications systems to accommodate all media types, including data, voice, video and overhead paging.

7.10.1.2(11) Train the Authority's IT specialist(s) on configuration/setup and testing of the communication systems equipment in the New Facility.

7.10.1.2(12) Training to include classroom training, web training, hands on, on-site training or any combination as appropriate for the system being trained on, along with user reference guides and take away handouts for Authority staff.

7.10.1.2(13) Design and install equipment and infrastructure to remain operational during and after disasters.

7.10.1.2(14) The Authority will have a main data centre located in an off-site facility (current data centre is located on Dayton Street in Kelowna), where the core applications, communications services and storage facilities exist. This data centre will house the majority of the administrative servers and storage infrastructure. The New Facility will not have a significant server installation and will house the servers and data storage devices used specifically for the New Facility. Accessibility to the off-site and PRH Main Cross-connect Room as well as storage requirements need to be co-ordinated in

consultation with the Authority as per Schedule 2, Design and Construction Protocols.

7.10.1.2(15) Project Co will coordinate with existing Authority vendors to ensure successful integration with any required existing system.

7.10.1.2(16) The New Facility shall connect to the existing Main Cross-connect Room in the PRH using fully redundant and separate paths.

7.10.1.2(17) Project Co. shall provide an Entrance Facility c/w incoming underground ducts to support various telecommunication service providers LEC (Local Exchange Carrier) and/or CLEC (Competitive Local Exchange Carrier). Incoming services shall extend to the MCR, PBX and Telecommunication Rooms as required. The Entrance Facility shall be secure and include Access Controls. Services to include but not limited to Data/Voice and TV.

7.10.1.2(18) Project Co. shall provide an Authority/Customer owned incoming telecommunications service boulevard type precast concrete service box located outside adjacent to the new building and within the PRH property. The service box shall be engineered and sized to accommodate at minimum four (4) 103mm underground ducts. Provide four (4) 103mm incoming underground ducts from telecommunications service provider, via the service box, extend and stub out all four (4) 103mm ducts to the Entrance Facility.

7.10.1.2(19) All incoming services to have fully redundant, separate paths and shall be designed to include for 25% growth in incoming services. . Redundant incoming services shall be provided from a separate service pole located on the street. The redundant service shall enter the new facility and demarc in the new Entrance Facility.

7.10.1.2(20) Provide an Entrance Facility for all incoming services designed using Industry Standards and Best Practices. Refer to Authority IMIT Infrastructure Specifications in Appendix 3E of this document.

7.10.1.3 Performance Criteria

7.10.1.3(1) The systems that are critical for patient life safety to have built-in redundancy. Provide redundancy at each wall jack location and connect physically adjacent ports to different switches within the same telecommunications room. Refer to Appendix 3E Authority IMIT Infrastructure Specifications of this document for colour coding guidelines for jacks to identify system usage.

7.10.1.3(2) IP Protocol is used for data network based equipment. Telecom equipment to be a mix of VoIP, and analog equipment.

7.10.1.3(3) All network protocols to be IPV4 compatible.

7.10.1.3(4) Project Co to maintain the manufacturer's warranties on all communications systems equipment and ensure that the warranties are assignable to the Authority.

7.10.1.3(5) All communications systems equipment provided by Project Co to support all applications run generally by the Authority, which include but not limited to; Meditech Connex, PACS and Microsoft Office.

7.10.1.3(6) All applications, software modules and any related software installed, operated or used by Project Co will not interfere with the operation or performance of, or reduce the security or privacy of, any Authority applications or equipment.

7.10.1.4 Quality Requirements

7.10.1.4(1) Project Co to comply with all applicable standards and to:

7.10.1.4(1)(a) Use and Provide the latest technology for transferring, securing, and storing information available at the date of procurement of the communications system for the New Facility;

7.10.1.4(1)(b) Comply with all applicable IEEE, CSA, ANSI, TIA/EIA, and BICSI standards, including CSA C22.2 and CSA Z32-09, and ANSI/TIA 1179 Healthcare Facility Telecommunication Infrastructure Standards;

7.10.1.4(1)(c) Provide equipment and materials that are certified and clearly sealed by CSA or ULC or other testing agency approved and accepted by the Safety Engineering Services (SES);

7.10.1.4(1)(d) Comply with Authority IMIT Infrastructure Specifications in Appendix 3E of this document;

7.10.1.4(1)(e) Obtain and Provide any required network and communications systems equipment (including software and hardware) that will be utilized by or directly interface with the Authority's network environment from the list of approved/existing vendors and products set out in the Authority IMIT Infrastructure Specifications in Appendix 3E of this document, or from another vendor approved by the Authority acting reasonably.

7.10.1.5 Definitions

7.10.1.5(1) Active Data Port or Data Jack: A CAT6A cable that has been installed tested and certified with proper terminations at both the field and head ends that can be patched into an HP Network switch port in a communication room without the need for additional infrastructure.

7.10.1.5(2) In-active Data Port or Data Jack: A CAT6A cable that has been installed, tested and certified with proper terminations at both the field and head ends that has the ability to become active if required post construction.

7.10.1.5(3) Telecommunication Outlet: Refer to definition provided in Appendix 3E Authority IMIT Infrastructure Specifications

7.10.1.5(4) Switch Port: A port on the network switch in the Telecommunications Room that can be connected into using a CAT6A patch cable to make a data port/jack active.

7.10.2 Integration with the Authority Networks

7.10.2.1 Basic Requirements

7.10.2.1(1) Minimum requirements for inter-building and intra-building cable infrastructure are set out in the Authority IMIT Infrastructure Specifications in Appendix 3E of this document.

7.10.2.1(2) Provide 2N redundant outside plant cable infrastructure to connect the New Facility Main Cross-connect Room (PRH B0A) to the existing Main Cross-connect Room located in the PRH Campus (PRH C1A MCR) via physically diverse and redundant pathways. Terminate pathways in the PRH Service Connection Rooms. Outside plant cable infrastructure will be continuous and terminate in the existing Main Cross-connect Room in the PRH. Outside plant cable infrastructure will consist of multimode and single mode fibre optic cable and multi-conductor copper tie cable. All external cables to be outdoor water resistant type cables. Project Co will perform all work (including providing all necessary parts and components) required to provide the new redundant and diverse pathways between the PRH service connection spaces identified above. The Authority to provide actual network connectivity. Refer to Section 6.11 [Connections and Integration to Hospital] of Schedule 2 [Design and Construction Protocols] regarding Work Plan and other requirements regarding work in existing PRH.

7.10.2.1(3) Provide sufficient fibre pairs of outside plant multimode and single mode fibre optic cable and multi-conductor copper tie cable to support the networks, systems and equipment installed and used in the New Facility. Provide additional cabling required, in consultation with the Authority as per Schedule 2, Design and Construction Protocols, for the inter-building backbone connection between the New Facility MCR and the exiting PRH MCR. The following are minimum backbone cables quantities to support the Authority's Network: (telephone/data network and security only) all other systems shall require backbone cable in addition to below:

- 7.10.2.1(3)(a) 6 strand main and 6 strand redundant Single Mode (SM) from Street to PRHB0A;
- 7.10.2.1(3)(b) 6 strand main and 6 strand redundant SM from PRHB0A to PRHTEL (PRH PBX Room);
- 7.10.2.1(3)(c) 6 strand main and 6 strand redundant SM from PRHB0A to PRHC1A;
- 7.10.2.1(3)(d) 12 strand main and 12 strand redundant Multi Mode OM4 from PRHB0A to PRHTEL;
- 7.10.2.1(3)(e) 12 strand main and 12 strand redundant MM OM4 from PRHB0A to PRHC1A;
- 7.10.2.1(3)(f) 200 pair main and 200 pair redundant copper backbone from PBX in PRHB0A to PBX in PRHTEL;
- 7.10.2.1(3)(g) 12 strand main and 12 strand redundant MM OM4 from PRHB0A to each TR in the New Facility (excluding the parking garage);
- 7.10.2.1(3)(h) 25 pair main and 25 pair redundant copper backbone from PRHB0A to each TR in the New Facility (excluding the parking garage);
- 7.10.2.1(3)(i) 6 strand main and 6 strand redundant MM OM4 fibre backbone cables from PRHB0A to each TR in parking garage.

7.10.2.1(4) Project Co to collaborate with the Authority to ensure that communications systems in the New Facility are capable of being integrated with existing communication systems at PRH, other Authority facilities and with Province-wide communication systems between health authorities.

7.10.2.1(5) The communication systems to permit and facilitate the secure transmission, storage, and retrieval of electronic health records within the New Facility and to and from all other Authority facilities.

7.10.2.1(6) The communications systems to be integrated or interoperate with Authority systems and to be compatible with the systems of the Authority's service providers as of the date of installation of the systems and be designed to integrate with the service providers' equipment and, as appropriate, to utilize the Authority's existing service agreements by extending them to the New Facility.

7.10.2.1(7) 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 this Facility.

7.10.2.1(8) The systems to be integrated include but are not necessarily limited to video conferencing, telephones, all networks, patient entertainment, patient education, access control, CCTV, intrusion detection, nurse call and specialized clinical equipment such as picture archiving and communication systems (PACS), cancer treatment systems, electronic registration, and dictation systems.

7.10.3 Interface with Authority Systems

7.10.3.1 Basic Requirements

7.10.3.1(1) The New Facility's technology and communications systems that are in a digital format may operate on the Buildings networks and integrate with the Authority's applications, subject to requirements of this Agreement and approval from the Authority.

7.10.3.1(2) Project Co will not, without the Authority's prior approval, install or use any software that resides on, accesses or otherwise interacts with the Authority's network. Project Co to complete, and submit to the Authority, the Authority's software assessment form for each such software installation (available in the Data Room).

7.10.3.1(3) The Authority intends that:

7.10.3.1(3)(a) electronic patient information should be available at the bedside to assist clinical staff in performing their duties, on portable devices, run over the wired or wireless network;

7.10.3.1(3)(b) the portable device display information such as code blue, video conferencing, patient / staff education, and patient monitoring, if creates

efficiencies for clinical staff are to integrate with the IT applications and run over the common network platform; and

7.10.3.1(3)(c) electronic patient information should be available on the patient education and patient entertainment displays in all patient rooms where such a display will be installed.

7.10.3.1(4) Project Co. to provide an Integration Manager who will be responsible for ensuring all systems are integrated and function as per this document.

7.10.3.2 Quality Requirements

7.10.3.2(1) The technology and communications system to be IP compatible and run over a standard Ethernet network.

7.10.3.2(2) Databases for these systems to be HL7 compatible with an SQL open system architecture to allow key fields to be read from and written to the Authority's information technology software applications.

7.10.3.3 Operating Requirements

7.10.3.3(1) Servers for the technology and communication systems to be Microsoft compliant (version acceptable to the Authority) and to be from a common manufacturer where possible.

7.10.3.3(2) Servers used shall have built in redundancies including but not limited to:

7.10.3.3(2)(a) Dual Power supplies

7.10.3.3(2)(b) Dual home run network connections

7.10.3.3(3) The servers to be the latest technology, as of the date of installation (Intel processor latest model or similar acceptable to the Authority) and to interface with the Ethernet network via a 1/10 Gb network interface card. All servers shall be of rack mountable form factor, to be installed into a 4 post, fully enclosed rack.

7.10.3.3(4) The Main Cross-connect Room (MCR) and the Telecommunication Rooms (TR) shall have properly sized Computer Room Air Conditioning (CRAC), in accordance with the Authority IMIT Infrastructure Specifications in Appendix 3E of this document; to cool equipment plus 100% future capacity. The system shall

function 24 hours-per-day and 365 days-per-year and be designed to have redundancy in case of failure or maintenance work.

7.10.3.3(5) The Main Cross-connect Room (MCR) and the Telecommunication Rooms (TRs) shall connect to a central UPS which will be designed to power all equipment in the MCR and TRs plus 100% future capacity.

7.10.3.4 Performance Criteria

7.10.3.4(1) Project Co shall provide design of the New Facility Main Cross-connect Room (MCR) in accordance with the Authority IMIT Infrastructure Specifications in Appendix 3E of this document.

7.10.3.4(1)(a) Final placement of all equipment in the MCR to be determined in consultation with the Authority as per Schedule 2 Design and Construction Protocols. Project Co must submit an MCR design and layout for final approval by the Authority.

7.10.3.4(1)(b) All equipment in the Main Cross-connect Room (MCR) shall be mounted in 4 post, fully enclosed racks with vertical PDU. The vertical PDUs are to include a webcard and shall not have an on/off switch. Refer to the Authority IMIT Infrastructure Specifications in Appendix 3E of this document for a typical rack layout.

7.10.4 Structured Cabling

7.10.4.1 Basic Requirements

7.10.4.1(1) Provide a complete structured cabling solution for the New Facility in accordance with Authority IMIT Infrastructure Specifications in Appendix 3E of this document.

7.10.4.1(2) Project Co to assign each room and space in the Building a communications cable density in accordance with Appendix 3I Room Requirements of this document. Refer to Appendix 3I for the specific quantity of telecommunications outlets and data ports for each room and space, and also include for active data ports required for equipment, other than computers, multi-function devices and printers, detailed in the Equipment List in Appendix 2E.All Bays (Stretcher, Infusion, Private, Open), and all Patient Rooms and Stretcher Rooms, do not require additional active data ports for equipment detailed in the Equipment List in Appendix 2E over what has been indicated in Appendix 3I Room Requirements.

Any discrepancy shall be resolved in consultation with the Authority IMIT representative as per Schedule 2, Design and Construction Protocols.

7.10.4.1(3) At a minimum, provide two (2) Telecommunications Outlets (as defined in the Authority IMIT Infrastructure Specifications in Appendix 3E of this document) on opposite walls for each room that is not listed in Appendix 3I Room Requirements.

7.10.4.1(4) In addition to the communications cables required by Section 7.10.4.1(3), Project Co to provide:

7.10.4.1(4)(a) a dedicated phone located at the main entry which is directly connected to Surgical Day Care to facilitate the process of pick-up for day surgery patient discharge.

7.10.4.1(4)(b) any additional cables necessary to support all of the networks, systems and equipment (including the Equipment listed in the Equipment list) to be installed or used in the New Facility; and

7.10.4.1(4)(c) all cables required by other provisions of this Agreement.

7.10.4.1(5) Project Co to co-locate at each Telecommunications Outlet location, the appropriate number of power outlets in accordance with Appendix 3I Room Requirements and Equipment list requirements.

7.10.4.1(6) The end to end cabling infrastructure to be white sheathed TE CONNECTIVITY Category 6A UTP cable, 4 pair, 23 AWG CMR / CMP rated based on jurisdictional / municipal codes, and to conform to this standard, including all patch cables, jumper wires and equipment cords.

7.10.4.1(7) Provide separate physical networks, in accordance with Good Industry Practice or equipment vendor specifications and as required for the communications systems and equipment installed or used in the New Facility. At a minimum, provide a separate physical network for each of the networks identified in Section 7.10.1.2(7) of this Schedule.

7.10.4.1(8) The cabling infrastructure to be universal and to support the networks and systems required in the New Facility, including voice, data, video, CCTV and security systems. Allow all forms of end-use equipment, including computers, telephones, video conferencing

equipment and other digital end-use equipment access to the various IT, telecommunication, and digital video networks.

7.10.4.1(9) The voice/data/video cabling infrastructure will not differentiate on the type of End-Use device that connects to it. All data outlets (regardless of application) are to be BLACK in colour with the following exceptions:

7.10.4.1(9)(a) Patient Monitoring – Red

7.10.4.1(9)(b) Wireless Access Points – Green

7.10.4.1(9)(c) IT CCTV and Security Cameras – Violet

7.10.4.1(9)(d) Nurse Call – Yellow

7.10.4.2 Colour coding must exist at the faceplate (end device) end and the patch panel (Telecommunication Room) end.

7.10.4.2(1) Project Co will cause:

7.10.4.2(1)(a) the cabling infrastructure to be designed by an RCDD;

7.10.4.2(1)(b) the RCDD to complete the physical network design; and

7.10.4.2(1)(c) without limiting this Section 7.10.4, the RCDD to provide, as necessary, preliminary conceptual drawings of proposed communications outlet locations in advance of the first detailed room review meetings with the Authority.

7.10.4.2(2) The structured cabling system to be a complete end-to-end TE CONNECTIVITY system, and to be installed and tested by a TE CONNECTIVITY certified contractor.

7.10.4.2(3) Provide a manufacturer's extended product, performance, application, and labour warranty that warrant all passive components used in the technology infrastructure. Additionally, this warranty to cover components not manufactured by the technology infrastructure Manufacturer, but approved by the technology infrastructure manufacturer for use in the technology infrastructure.

7.10.4.2(4) The structured cabling to be neatly organised and clearly labelled for ease of use by the Authority and Building Users in accordance with the Authority IMIT Infrastructure Specifications in Appendix 3E of this document.

7.10.4.2(5) Create an operational plan for the cable infrastructure, including a management strategy and resource requirements for maintenance.

7.10.4.2(6) Provide for future Self-Registration Systems, Electronic Directional Systems, and Patient Entertainment Kiosk. Provide flush floor mounted power and data outlets for kiosks not mounted adjacent to walls. Allow for six (6) locations throughout the New Facility with unused locations being added back to the spare drop counts and/or credited back to the Authority.

7.10.4.2(7) Provide all cabinets and racks as a complete solution including but not limited to; power distribution units, horizontal managers, vertical managers and proper ventilation.

7.10.4.3 Performance Criteria

7.10.4.3(1) Utilize a star wired cabling approach to wire all communications outlet locations back to the floor communication rooms and all communication rooms back to the Main Cross-connect Room.

7.10.4.3(2) Project Co to cross-connect and test all cable infrastructure.

7.10.4.3(3) Terminate all cables in Telecommunication Rooms in accordance with Section 7.10 of this Schedule and in accordance with the Authority IMIT Infrastructure Specifications in Appendix 3E in this document.

7.10.4.3(4) Minimum size requirements for Telecommunication Rooms are in accordance with the Authority IMIT Infrastructure Specifications in Appendix 3E in this document. Provide and size a Main Cross-connect room and Telecommunication Rooms to accommodate the telecommunications requirements of the New Facility, including all cabling systems and all active and passive network equipment.

7.10.4.3(5) As part of the design process described in Section 5.3 of Schedule 2, Design and Construction Protocols, provide rack, equipment and wall layouts for Telecommunication Rooms in accordance with TIA/EIA-569-C. Refer to the Authority IMIT Infrastructure Specifications in Appendix 3E of this document for typical rack layout.

7.10.4.3(6) Provide physically diverse and redundant pathways between the New Facility Main Cross-connect Room and the other Telecommunication Rooms in the New Facility.

7.10.4.3(7) Utilize TE CONNECTIVITY Fibre optic cabling to connect local Telecommunication Rooms to the Main Cross-connect Room in accordance with the Authority IMIT Infrastructure Specifications in Appendix 3E in this document. Both multimode

(Telecommunication Room to Main Cross-connect Room) and single mode fibre to be provided. Provide at minimum 100% spare fibre strand terminations in each Telecommunication Rooms. Fibre optic cabling will also be provided for rooms requiring video streaming, and areas where bandwidth requirements necessitate it be used.

7.10.4.3(8) Run TE CONNECTIVITY 24 AWG, 25-pair UTP telephone style riser cables from the Main Cross-connect Room to each Telecommunication Rooms to connect the New Facility PBX to the telephone handsets through the horizontal cables in accordance with the Authority IMIT Infrastructure Specifications in Appendix 3E in this document. Provide a New Facility PBX, to be located in the Main Cross-connect Room at the New Facility. Project Co to provide cabling/conduit to the existing telephone system in the PRH (PRHTEL) for future use by the Authority. Provide 100% spare capacity in each Telecommunication Rooms.

7.10.4.3(9) Telecommunication Rooms:

- 7.10.4.3(9)(a) to serve the floor they are on and maximize the area they serve; and
- 7.10.4.3(9)(b) to minimize the distances for cable runs, to provide easy access for equipment modifications and to avoid interference with other services and systems.
- 7.10.4.3(9)(c) Refer to the Authority IMIT Infrastructure Specifications in Appendix 3E in this document.
- 7.10.4.3(9)(d) To minimize the flow and impact on clinical operations.

7.10.4.3(10) Cable types to be unshielded twisted pair and fibre optic multimode and single mode. The bandwidth requirements and distance limitations will determine the type of cable installed.

7.10.4.3(11) All rooms that have or are anticipated to have data, phone, video, or other end-use equipment to have data ports or Telecommunications Outlets run back to the Telecommunication Rooms. It is anticipated that washrooms and some storage, clean/dirty supply rooms, and corridors will not have data ports or Telecommunications Outlets.

7.10.4.3(12) All conduit pathways to have spare capacity at least as per TIA/EIA standards, and all Telecommunication Rooms to have physical

floor and wall space to accommodate such expansion. For each BIX wall, provide adequate space to accommodate 50% expansion on the same and adjacent wall. Provide adequate floor space to facilitate at least 2 expansion racks to be located adjacent to required racks.

7.10.4.3(13) All cabling to be run in conduit and cable tray except for the limited use of J-Hooks in the new PCT only in areas with no more than 6 horizontal runs per J-Hook as long as the runs do not run through, along, above or terminate in patient care areas, procedure/operating rooms, clinical spaces or exposed or fully concealed ceilings. Anticipated areas where J-Hooks could be utilized would be administration areas, offices and back of house areas.

7.10.4.3(14) All ceiling spaces to have cable outlets for wireless network access points, information display systems, and other ceiling mounted digital devices.

7.10.4.3(15) Terminate all cables at both ends. Provide the proper flame spread rating for the cabling system.

7.10.4.3(16) Supply equipment data cables for all end-use equipment in sufficient quantity to make each device operational plus include for 150 additional active data ports to be used at the Authority's discretion. Cross-connect cables, harness cables and equipment cords to allow complete connection from end to end. Channel Link testing performance and procedures to ANSI/TIA-568-C.2 standard to be used to certify the cabling system (from harness cable to patch cord). Length and colour of patch cables to be determined in consultation with the Authority. End to End (Device to Switch) length of horizontal cross-connect not to exceed a combined total of 100m.

7.10.4.3(17) Develop the labelling approach in accordance with the Authority IMIT Infrastructure Specifications in Appendix 3E in this document prior to labelling.

7.10.4.3(18) Specialized systems requiring multiple cables to have sufficient cables at each location to ensure system operation.

7.10.4.3(19) Provide at minimum 1 Telecommunication Outlet mounted at 1500 AFF with a single active data port as per 7.10.5.2(6) per lobby area per department in the New Facility as directed by the Authority.

7.10.4.3(20) Personal computers may not be wired through an IP telephone nor have any wired connectivity to the Authority's network. All personal

and non-Authority approved systems will only be able to access the network via wireless connectivity.

7.10.4.3(21) The Structured Cabling system and all of its components to have capacity to allow for a 40% increase.

7.10.4.3(22) If Finished but not Furnished spaces are provided the following to apply:

7.10.4.3(22)(a) Telecommunication raceways and cabling infrastructure shall be provided to all spaces.

7.10.4.3(23) All telecommunication cables to be routed on aluminum or steel wire mesh type cable trays that are located in the ceiling space of main corridors and from there run to the outlet in conduit. Refer to the Authority IMIT Infrastructure Specifications in Appendix 3E of this document for pathway requirements.

7.10.4.3(24) Provide physically diverse and redundant pathways between the existing PRH Entrance Facility and the New Facility Main Cross-connect Room.

7.10.4.3(25) Provide a New Facility PBX space collocated within the New Facility Main Cross-connect Room. The Entrance Facility may be located within the Main Cross-connect Room provided all physical partition requirements are met. Refer to the Authority IMIT Infrastructure Specifications in Appendix 3E of this document.

7.10.4.3(26) The New Facility Main Cross-connect Room shall not be used for horizontal cabling serving the work areas. Provide a separate Telecommunication Room to service the work area.

7.10.4.3(27) Provide a physically diverse and redundant pathway for incoming services including services coming from the street and the PRH.

7.10.5 Network Equipment

7.10.5.1 Basic Requirements

7.10.5.1(1) For the Authority's network described in Section 7.10.1.2(7)(a) of this Schedule, Project Co. to:

7.10.5.1(1)(a) provide all required network equipment, including HP network switches;

7.10.5.1(1)(b) Complete all logical network design, network equipment programming and configuration; and

7.10.5.1(1)(c) be responsible for all network management licensing.

7.10.5.1(2) For all other networks required in the Building, including those described in Sections 7.10.1.2(7)(b) and 7.10.1.2(7)(c) of this Schedule, Project Co to:

7.10.5.1(2)(a) provide all required network equipment, including network switches;

7.10.5.1(2)(b) complete all logical network design, program and configure all network equipment;

7.10.5.1(2)(c) be responsible for all network management licensing;

7.10.5.1(2)(d) If network design and cable lengths permit, Building network equipment may be located in the same Telecommunication Room as the Authority network equipment. If network equipment is collocated then locate such equipment in the telecommunications rooms in the New Facility in cabinets/racks separate from the Authority's equipment cabinet/racks; and

7.10.5.1(2)(e) All BMS network equipment must be located in a lockable cabinet or have a mechanism in place in front of the active network equipment clearly indicating that is BMS network equipment and not Authority network equipment. This additional level of security is required to ensure that proper patching procedures are followed.

7.10.5.1(3) For all of the networks described in Sections 7.10.5.1(1) and 7.10.5.1(2) above, Project Co to mount and connect all network switches and pigtails and cross connect and test all network equipment and cable infrastructure in accordance with the Authority IMIT Infrastructure Specifications in Appendix 3E of this document;

7.10.5.1(4) Install all network equipment in accordance with all applicable IEEE and EIA/TIA standards, including the 802.1 and 802.3 standards;

7.10.5.1(5) The Authority will provide and manage all firewalls, security and IDS/IPS systems for connections to the Authority's networks. Project Co is responsible for securing all networks in the New Facility other than the Authority's network such as but not limited to the BMS network;

7.10.5.1(6) All network equipment to be open architecture;

7.10.5.1(7) Retain a certified network engineer trained on the network equipment;

7.10.5.1(8) Network equipment to support converged communications, a combination of the three media types of voice, video and data and all equipment to support the prioritization of traffic. The systems to include the main telephone system, video conferencing, CCTV, dictation, fax, transcriptions and all information systems;

7.10.5.1(9) Network equipment to function as part of the existing global network management system and to conform to standards and methods used by the Authority across its various sites;

7.10.5.1(10) Redundancy and security to be taken into account in all network designs;

7.10.5.1(11) Project Co. will provide an additional 24 active switch ports in each Telecommunications Room in the New Facility, not including the Parkade, for additional capacity over and above the number of active data ports that will be required based on the quantities determined in 7.10.4.1, and 7.10.9.2(7);

7.10.5.1(12) Project Co to coordinate with existing Authority network vendor to ensure successful network integration;

7.10.5.1(13) Project Co to be responsible for any hardware, software or license upgrades required to connect the New Facility network to the existing Authority network;

7.10.5.1(14) New Facility network equipment to connect to the Core networks in the PRH;

7.10.5.1(15) New Facility network equipment to connect to new incoming services coming from the street;

7.10.5.1(16) All network equipment shall be dual corded with redundant power supplies. Power shall be supplied from both UPS and Emergency power;

7.10.5.1(17) New Facility network equipment chassis will be designed and provided by Project Co., to accommodate the addition of network modules by the Authority that would be required to make all inactive data ports active.

7.10.5.2 Performance Criteria

7.10.5.2(1) End-use equipment to be connected to the edge communications closet layer 2 switch and a 10/100/1000 base T Ethernet 802.3 protocols run on Category 6A (or greater based on standard in place at the time of procurement) twisted pair, to connect to the redundant layer 2/3 switches in the same communications room

7.10.5.2(2) The edge communication rooms will also support 802.11a/b/g/n/(ac) system with Cisco model 2702i and 1500 series (or latest) wireless access points, Cisco 5508 Controllers (or latest) and wireless telephones, both of which require PoE functionality and standards based QoS (Quality of Service) traffic prioritization.

7.10.5.2(3) All racks/cabinets requiring electrical power and cooling to be provided with a minimum of:

- 7.10.5.2(3)(a) 5 KW redundant power per rack for telecommunication racks;
- 7.10.5.2(3)(b) 10 KW redundant power per rack for 4 post fully enclosed racks;
- 7.10.5.2(3)(c) Refer to Section 7.9.6.1(1) of this Schedule 3 for the UPS power requirements for Telecommunication Rooms and systems.

7.10.5.2(4) As per Schedule 2 Design and Construction Protocols, prepare a network plan, and submit for Authority approval, showing:

- 7.10.5.2(4)(a) the edge communication devices;
- 7.10.5.2(4)(b) the core communication devices;
- 7.10.5.2(4)(c) the applications; and
- 7.10.5.2(4)(d) all connecting end-use equipment.

7.10.5.2(5) Each Telecommunications Outlets shall be supplied with two active data ports and one inactive data port. Where a Telecommunications Outlet has less than three ports as specified in the Appendix 3I Room Requirements, all data ports shall be active.

7.10.5.2(6) Any Telecommunication Outlet that is mounted at 1500 AFF with a single active data port will use a stainless steel faceplate. Project Co. will provide and install any hardware required for the wall-mounting of the phones onto these faceplates.

7.10.5.2(7) All switch infrastructures to support multiple VLAN functionality and multiple subnets per VLAN.

7.10.5.2(8) Network design to include but be limited to:

7.10.5.2(8)(a) A Core layer (connections to the TRs and routing)

7.10.5.2(8)(b) An Aggregate layer (connections to servers located in the New Facility MCR).

7.10.6 Telephone Equipment

7.10.6.1 Basic Requirements

7.10.6.1(1) Project Co shall provide a new Cisco PBX telephone system cluster for the New Facility. The new PBX system shall be modular in design and shall be scalable to allow future migration of existing system for the entire PRH.

7.10.6.1(2) Have a public telephone company provide and install pay phones in the main Public Lobby and other locations determined through the user consultation process.

7.10.6.1(3) Project Co may not use the PRH PBX system for its telecommunications needs.

7.10.6.1(4) Ensure that cellular and paging services function effectively in all areas of the New Facility, other than the parkade. Coverage to include all major cellular service providers in the area and to include public safety bands.

7.10.6.1(5) Project Co to include a PBX space collocated within the New Facility Main Cross-connect Room for the telephone system and where the external service provider will demark external service to the New Facility, including services from the PRH.

7.10.6.1(6) Project Co to be responsible for any hardware, software and license upgrades required to connect the New Facility PBX system with the existing Authority PRH PBX system.

7.10.6.1(7) New Facility PBX equipment to connect to incoming services from the street.

7.10.6.1(8) New Facility PBX equipment also to connect back to the PBX equipment in the PRH.

7.10.6.1(9) Project Co to replace existing phones in the PRH as noted below.

7.10.6.2 Performance Criteria

7.10.6.2(1) Design and construct the Building to support the Authority's IP and Analog phone technology, both wired and wireless. At minimum a

Cisco PBX shall be used as the New Facility's PBX System. The New Facility PBX shall be connected to the main PBX in the PRH and shall have a dedicated PSTN service provided by Project Co.

7.10.6.2(2) Coordinate with existing Authority vendor to ensure successful integration with existing system.

7.10.6.2(3) The New Facility Telephone system shall have a network switch dedicated to the PBX system with dual connections back to the cores.

7.10.6.2(4) SIP to SIP services shall be included with the PBX system to integrate with the Staff Communication System.

7.10.6.2(5) Voice equipment to comply with all BICSI/IEEE and EIA/TIA standards.

7.10.6.2(6) Voice equipment to be fully integrated, and to operate seamlessly, with the Authority's existing voice network.

7.10.6.2(7) Staff Communication System is to be included when designing the telephone system.

7.10.7 Authority's End-Use Equipment

7.10.7.1 Basic Requirements

7.10.7.1(1) As defined by the Equipment List Project Co will:

7.10.7.1(1)(a) include the installation of the Authority Supplied End-Use Equipment as part of the Move-in Schedule;

7.10.7.1(1)(b) assist the Authority to define locations for the Authority Supplied End-Use Equipment;

7.10.7.1(1)(c) provide adequate power and wired network outlets for the Authority Supplied End-Use Equipment; and

7.10.7.1(1)(d) provide jack number information (on the Authority's cable information Excel spreadsheet) to the Authority to facilitate placement of the Authority Supplied End-Use Equipment.

7.10.7.1(2) Project Co is to procure, install and commission the following phones:

7.10.7.1(2)(a) 500 Cisco 7841 (or equivalent) phones that will be deployed in the existing PRH to replace existing phones.

7.10.7.1(2)(b) 350 Cisco 7841 (or equivalent) phones that will be deployed in the New Facility.

7.10.7.1(2)(c) 75 analog ports (3x25 port analog gateways) on the Voice gateway, Cisco VG350 or future equivalent, located in PRHB0A, for the PRH analog requirements.

7.10.7.1(2)(d) 50 analog ports (2x25 port analog gateways) on the Voice gateway, Cisco VG350 or future equivalent, located in PRHB0A, for the New Facility analog requirements.

7.10.7.1(2)(e) 20 Cisco 8831 (or equivalent) conference phones that will be deployed in the PRH to replace existing conference phones.

7.10.7.1(2)(f) 10 Cisco 8831 (or equivalent) conference phones that will be deployed in the New Facility.

7.10.7.1(2)(g) Licensing for all of the above plus an additional 10% for future growth.

7.10.7.1(2)(h) Final placement of all phone sets will be done in accordance with Schedule 2 Design and Construction Protocols and the User Consultation Process.

7.10.7.1(3) Project Co is to procure, install and commission the following phone system:

7.10.7.1(3)(a) Cisco Unified Communications Manager (CUCM) Cluster – latest version at time of procurement. Provide a CUCM Publisher Server to be located in the Authority Data Center (off-site) on an Authority supplied virtual server and a CUCM Subscriber Server to be a virtual server on a physical sever host located in the New Facility. Cluster to be integrated with existing Authority-wide Cisco Unified Communications architecture.

7.10.7.1(3)(b) Cisco 3945E Integrated Services Router or future equivalent. Must include Survivable Remote Site Telephone (SRST) for all registered devices on

site (including the rest of the PRH). Must include redundant power supplies, each connected to different power sources.

7.10.7.1(3)(c) Cisco VG350 Analog Voice Gateway or future equivalent. Must include redundant power supplies, each connected to different power sources.

7.10.7.1(3)(d) Cisco Unity Voicemail Cluster – latest version at time of procurement. Provide a Unity Publisher Server to be located in the Authority Data Center (off-site) on an Authority supplied virtual server and a Unity Subscriber Sever to be a virtual sever on a physical server host located in the MCR of the New Facility. Cluster must be integrated with existing Authority-wide Cisco Unified Communications architecture. The Unity Subscriber VM server may co-exist on the same physical server host as the CUCM Subscriber virtual server.

7.10.7.1(3)(e) Provide redundant power supplies for the on-site server host that will be running the CUCM Subscriber server and the Unity Subscriber server. Each power supply must be connected to a different power source.

7.10.7.1(3)(f) Provide Cisco Unified Workspace Licensing – Professional. Ensure sufficient licensing to support all end user devices in the New Facility and the rest of the PRH.

7.10.7.1(3)(g) The complete telephone infrastructure will reside in a separate 4-post full enclosed rack on the secure side of the New Facility MCR.

7.10.7.1(4) Project Co will also be responsible for any additional horizontal cabling from the end user device end to the Telecommunication Room head end for any IP phones that will be deployed in the PRH where existing data ports do not exist or are not adequate to use as a horizontal connection to be used by an IP Phone set.

7.10.7.1(5) All provided Cisco phones will be connected directly to a dedicated data outlet for the IP phone. All Authority computers will also be connected directly to a dedicated data jack. Under no

circumstances in the PRH or the New Facility are computers to be daisy chained to a data jack via an IP Phone.

7.10.8 Project Co's Own Equipment

7.10.8.1 Basic Requirements

7.10.8.1(1) Provide end-use equipment and communications equipment to provide a fully operational New Facility and that Project Co may require for its own use for the performance of its obligations under this Agreement ("Project Co's End-Use Equipment").

7.10.8.1(2) Do not connect any of Project Co's End-Use Equipment to the Authority's network, both wired and wireless, without prior approval from the Authority. Project Co is responsible for paying any additional cost incurred by the Authority for Project Co's use of Project Co's End-Use Equipment on the Authority's network.

7.10.8.1(3) Servers and related equipment for Project Co's End-Use Equipment are to be located in a separate Project Co equipment room. They are not to be located in telecommunication rooms.

7.10.8.1(4) Any wireless infrastructure or devices used by Project Co will not interfere with the Authority's wireless infrastructure or devices.

7.10.8.1(5) The Authority wishes to have a single communications infrastructure but where required this infrastructure may be physically separated with approval of the Authority.

7.10.8.1(6) Project Co equipment cannot reside on the Authority's network.

7.10.8.1(7) Further to Section 7.10.4.3(16) Project Co is to provide the Authority with the following:

7.10.8.1(7)(a) 850 Black TE Connectivity XG CAT 6A F/UTP slim line patch cable, length 1.83m for all field end connections for the Cisco IP Phones. TE Connectivity Part# 1933880-6 or equivalent.

7.10.8.1(7)(b) 425 Black TE Connectivity XG CAT 6A F/UTP slim line patch cable, length 1.83m for 50% of the head end connections for the Cisco IP Phones. TE Connectivity Part# 1933880-6 or equivalent.

7.10.8.1(7)(c) 425 Black TE Connectivity XG CAT 6A F/UTP slim line patch cable, length 0.91m for 50% of the head end connections for the Cisco IP Phones. TE Connectivity Part# 1933880-3 or equivalent.

7.10.9 Wireless Infrastructure

7.10.9.1 Basic Requirements

7.10.9.1(1)(a) Subject to Section 7.10.9.1(2) of this Schedule, design and install a complete wireless network solution for the New Facility in accordance with Authority IMIT Infrastructure Specifications in Appendix 3E of this document to support the extension of the wireless network located at PRH.

7.10.9.1(2) Project Co. will:

7.10.9.1(2)(a) procure, program and configure all required network equipment for the wireless solution, including network switches, wireless controllers and access points; and

7.10.9.1(2)(b) be responsible for all logical network design and network equipment configuration.

7.10.9.1(2)(c) install all network switches and pigtails and cross connect and test all network equipment and cable infrastructure for the wireless network. Install all network equipment in accordance with all applicable standards, including the following IEEE and EIA/TIA standards: 802.1, 802.11 and 802.3.

7.10.9.1(2)(d) Provide a complete structured cabling infrastructure that will allow the installation of the complete wireless network, including PoE wireless access points. Project Co will locate data outlets and access points as developed through the Schedule 2 Design and Construction Protocols and the User Consultation process.

7.10.9.1(2)(e) Setup and test of all aspects of the wireless network and provide heat maps for the Building indicating the channel coverage, signal level, data rate and noise floor for 802.11b, 802.11g, 802.11a and 5GHz 802.11n, 802.11ac wireless networks.

7.10.9.1(2)(f) Ensure wireless management tools include access point locations mapped to a floor plan with RF characteristics defined for structural layers including glass, concrete, wood, drywall and metal permanently mounted RF obstacles.

7.10.9.1(2)(g) Provide the wireless network management tool configuration file to the Authority at the completion of the wireless network testing.

7.10.9.1(2)(h) Provide support for integration with existing wireless management systems and wireless IDS/IPS systems. Ensure that IDS features are part of site planning and configuration for the wireless network.

7.10.9.1(2)(i) Provide wireless coverage for areas outside the building to ensure seamless integration and transfer to the wireless system in PRH. Coverage areas to include but not limited to the rooftop Helipad, waiting areas, links and courtyards. Wireless infrastructure shall cover all of the New Facility.

7.10.9.1(3) The wireless infrastructure shall be Cisco Based system and will service 802.11b (2.4Ghz DSSS), 802.11g (2.4Ghz OFDM), 802.11a (5Ghz OFDM) , 802.11n(5Ghz and 2.4Ghz MIMO), and 802.11ac (5Ghz QAM) wireless communications and data transfer requirements for access by wireless devices to data and voice services within the New Facility and across the Authority via the Authority WAN.

7.10.9.2 Design Requirements

7.10.9.2(1) Work with the Authority in creating an operational plan for the wireless network complete with management strategy alerts notification and resource requirements for maintenance.

7.10.9.2(2) Retain a certified network engineer with expertise and experience in working with the Authority approved equipment to design the wireless network.

7.10.9.2(3) All wireless network components will be a Cisco based 802.11a/b/g/n/(ac) system with Cisco model 2702i and 1500 series (or latest) wireless access points for internal and external coverage respectively, and Cisco 5508 Wireless LAN Controllers (or latest) as are currently managed by the Authority. Provide all required modular components in each switch to support all protocols and functionality as designed.

7.10.9.2(4) The Cisco Access Points to be part of a wireless switch infrastructure and to be serviced by 10/100/1000 base T Ethernet ports. The Telecommunication Rooms switch backbone to the Main

Cross-connect Room (MCR) to provide enough bandwidth to allow wireless services to function as designed. The wireless LAN Controllers to reside in the MCR and be serviced by Gigabit Ethernet services as required by the wireless switches. The wireless switches to be deployed in a redundant fashion, with redundant power supplies, Ethernet feeds and switches. Telecommunication Room wireless switches to be dual 10GB to the core switches in MCR. All uplinks to terminate in a redundant core switch fabric. Ports on layer 2/3 edge switches to be capable of 10/100/1000 Mb, regardless of what is connected to them.

7.10.9.2(5) The access points to support redundant PoE connections and be connected to two physically separate PoE switches.

7.10.9.2(6) Deploy each wireless controller with local load balancing and stateful failover appropriate for the wireless access point density and application. Each controller shall have license to support the full complement of the deployed access points. Deploy the wireless controllers such that there is at a minimum 5% spare access point licenses per controller and an overall minimum of 10% spare access point licenses.

7.10.9.2(7) Include the switch ports required by the wireless network access points in the total port count for the New Facility. The list of layer 2/3 switch ports will be provided indicating the ports connected to a given access point, and the power load on the switch with the remaining available PoE power on the switch. The wireless network documentation to include a list of access points with the switch identification and port number indicated in a spreadsheet.

7.10.9.2(8) Project Co to coordinate all vendors that require Wireless Network access to ensure proper coverage and performance is maintained by all systems.

7.10.9.2(9) Project Co to coordinate with existing Authority vendor to ensure a successful integration with existing Wireless System.

7.10.9.2(10) Project Co to be responsible for any hardware, software or licence upgrades required to connect the New Facility Wireless Network to the existing Authority Wireless Network.

7.10.9.2(11) The New Facility wireless system shall fully integrate and be part of the existing wireless system at the PRH.

7.10.9.3 Performance Criteria

7.10.9.3(1) The wireless network to support the following main services which will be active in the Building:

7.10.9.3(1)(a) the Authority's administrative data services. These services do not require prioritization and will be on the default VLAN;

7.10.9.3(1)(b) the Authority's voice services which consist of 802.11a push to talk devices with multicast requirement. Voice traffic will be prioritized on the wireless and wired LAN. WMM and SVP protocols will be supported by the wireless infrastructure. Voice traffic will be on a separate VLAN(s);

7.10.9.3(1)(c) clinical wireless devices which consist of all handheld or mobile (cart based) wireless medical devices and include barcode scanners, bed side lab test equipment, mobile imaging systems and vital statistics gathering systems. Clinical devices will be on a separate VLAN;

7.10.9.3(1)(d) full coverage Real Time Location System (RTLS) which uses a triangulation method to locate devices that beacon a signal at regular intervals. Ensure that the network design is reviewed and approved by the equipment location vendor and the Authority.

7.10.9.3(2) Wireless network equipment will function as part of the existing network management tools and methods within the Authority.

7.10.9.3(3) Provide data rates consistent with the strictest specifications provided by the wireless end-use equipment.

7.10.9.3(4) Provide channel dB separation consistent with the strictest specifications provided by the wireless end-use equipment.

7.10.9.3(5) Provide an RF environment consistent with the noise floor and signal strength requirements (SNR) and consistent with the strictest specifications provided by the wireless end-use equipment.

7.10.9.3(6) Provide at a minimum, signal strength of -70dBm at the boundaries of the site.

7.10.10 Nurse Call Systems

7.10.10.1 Basic Requirements

7.10.10.1(1) Project Co will purchase and provide the Rauland-Borg Responder 5 nurse call system, or latest version for the New Facility, complete with all hardware and software necessary to meet or exceed the requirements in this Section 7.10.10. An equal alternate system would be considered by the Authority; utilizing an alternate system will require Project Co to upgrade the PRH Nurse Call System for compatibility reasons. A fully operational Ascom Teligence System in the new facility, with the replacement of all Rauland devices in the existing facility is an acceptable alternate system. The Ascom Teligence system shall include corridor mounted zone lights which shall be used for 'Code Wayfinding' similar to the Rauland system but also have multi zone overlays providing additional functionality. This Nurse Call upgrade will be included in the alternate system submission. The Nurse Call Provider will:

7.10.10.1(1)(a) prior to designing and installing the nurse call system and as required by the Authority, review the technical capabilities of the nurse call system, hardware integration issues and system layout and functionality with the Authority and the Authority's clinical staff;

7.10.10.1(1)(b) design the nurse call system in consultation with the Authority's clinical staff, including hardware and software functionality;

7.10.10.1(1)(c) implement the nurse call system, including to install, program, test and commission the system; and

7.10.10.1(1)(d) train Authority end-user staff on the nurse call system.

7.10.10.1(2) Configure and program the nurse call system in consultation with the Authority as per Schedule 2, Design and Construction Protocols.

7.10.10.1(3) Provide a full feature audio and visual nurse call system with full duplex communications in all inpatient rooms, and patient exam and treatment rooms in clinical areas. For full list of rooms refer to Appendix 3I Room Requirements.

7.10.10.1(4) The nurse call system to:

7.10.10.1(4)(a) be the primary emergency communication device for patients to contact staff in each patient care or treatment room;

7.10.10.1(4)(b) the primary communication device for Authority staff to alert other staff that they need assistance in a patient room; and

7.10.10.1(4)(c) promote efficient operation for Authority staff.

7.10.10.1(5) Design the nurse call system to integrate stand-alone alarm systems to annunciate alarms that clinical staff need, including code red (fire) signals with the nurse call system. In addition, the system will also annunciate code red (fire alarm), code white (panic duress), code blue (cardiac arrest), patient wandering, patient monitoring system alarms and monitoring equipment with the nurse call system. The nurse call system to annunciate alarms from these systems in a seamless manner on the nursing station consoles and wireless handheld devices based on Authority requirements. All code whites shall be alarmed at the Security system, and forwarded to the security office(s). All codes including code White to be annunciated at main switchboard , at the nurse call master stations, on dome lights dedicated to rooms (if applicable), zone lights, and have capacity to annunciate to the Staff Communication system (Vocera System) device(s) carried by staff members assigned to the area or call origin.

7.10.10.1(6) Zone lights are to be located throughout the New Facility and any connections between the New Facility and the PRH to assist staff in emergency response (type of way finding). Final location and quantity to be determined as per Schedule 2 Design and Construction Protocols and the User Consultation process.

7.10.10.1(7) Regardless of monitoring system type, the nurse call system shall be provided with Open System and HL7 standard interfaces.

7.10.10.1(8) The nurse call system to integrate with an annunciator on wireless staff communication devices (PDA's or phones) for near instant alarm response. The nurse call system to operate seamlessly with the wireless staff communication devices and allow two-way voice communication into all patient locations.

7.10.10.1(9) Provide a separate physical network, as per the Rauland-Borg system requirements, and all network equipment for the nurse call system and integrate this network, in consultation with the Authority, with other Building networks. The nurse call network shall connect to the hospital network and integrate into the hospital information system to provide access to patient information as well as additional integration for annunciation of alarms and events as required by the specifications and clinical meetings. Extracted patient information shall be determined and approved by the

Authority through the User Consultation Process as described in Appendix 2B.

7.10.10.1(10) Utilize standard TE CONNECTIVITY cabling and connectors, as required to maintain the ULC rating of the system, for nurse call cabling routed in cable tray in main corridors and conduit from the cable tray to the device location.

7.10.10.1(11) All nurse call network horizontal runs to Telecommunication Rooms will be terminated in accordance with the Authority IMIT Infrastructure Specifications in Appendix 3E of this document.

7.10.10.1(12) Install nurse call terminal cabinets in Telecommunication Rooms as near as possible to the department they serve. Each floor shall be served by a dedicated nurse call field panel(s) located in Telecommunication Rooms and shall be networked together with redundant network loops routed independently.

7.10.10.2 Quality Requirements

7.10.10.2(1) Reliability factor will be 99% or better.

7.10.10.2(2) All system equipment shall be from a single manufacturer and shall be the same model # from that manufacturer.

7.10.10.2(3) Nurse Call System shall be supplied by power from the UPS system with backup from the emergency power system.

7.10.10.3 Operating Requirements

7.10.10.3(1) Provide full duplex voice communication between master control stations and patient and staff locations.

7.10.10.3(2) At a minimum, provide a full feature master control master station (NCM) (Rauland-Borg 5 Model # 351200 or newer) in each clinical nursing station. Provide a full feature master control station at OR Control Desk, every care team station and rapid access locations. Provide cabling for VoIP feature at every master control station.

7.10.10.3(3) Nurse call stations to be individually programmable to allow multiple call classification and priority levels. Nurse call alarms to include: normal patient call, staff emergency call, priority patient call, bathroom call, shower call, anaesthetic call, clean room call, porter call and to be located in the appropriate room types.

7.10.10.3(4) Allow for cascading of call to higher priorities if they are not answered, will have time out call cascading if the calls are not cancelled and will be able to be displayed on nurse call master

stations, the Wireless Staff Communications System as per Section 7.10.11, and any other type of call display.

7.10.10.3(5) Provide nurse call cords for all patient beds. Call cords to be pillow speaker type (Rauland-Borg Model #350202) with TV control (sound and channels), low voltage lighting (reading, ambient) and customized buttons for functions as determined by the Authority.

7.10.10.3(6) Provide 2 Button (2B) (Rauland-Borg Model #354015) as indicated in Appendix 3I Room Requirements.

7.10.10.3(7) Provide 4 Button (4B) (Rauland-Borg Model #354017) as indicated in Appendix 3I Room Requirements.

7.10.10.3(8) Provide multi-call classification dome light (Rauland-Borg Model #352000) to annunciate calls in all rooms with nurse call devices. Locate dome lights in a manner that allow Authority staff the best possible view from the outside of the room where the nurse call device is located. Provide zone lights at corridor intersections and duty stations at staff work locations. Final placement and quantity of dome and zone lights to be determined as per Schedule 2 Design and Construction Protocols and the User Consultation process.

7.10.10.3(9) Provide Enhanced patient station (Rauland-Borg 5 Model # 353001 or newer) with buttons located at all patient bed locations and as noted in Appendix 3I Room Requirements. When possible, incorporate button into bedside station.

7.10.10.3(10) Provide emergency pull cord stations (PC/Audio) (Rauland-Borg 5 Model # 354000) at all patient toilets, shower rooms and dressing locations complete with audio and staff emergency alarms and as noted in Appendix 3I Room Requirements.

7.10.10.3(11) Provide emergency pull cord stations (PCSA)(Rauland-Borg Model #354002) in all public washrooms and as noted in Appendix 3I Room Requirements.

7.10.10.3(12) Provide the ability to program 3 levels of priority for each patient station from the nursing station console.

7.10.10.3(13) Provide code blue (cardiac arrest) system. Provide a code blue button at locations determined in consultation with the Authority including those locations identified by Appendix 3I Room Requirements. Provide remote indication of specific alarm origin at a central control panel located at the main reception desk of the Building or other location, as directed by Authority. Code Blue

button may be part of the Rauland-Borg 5 Model # 353001 or newer enhanced patient station. Provide Dome Lights with indicator arrows for Code Blue at intersections as directed in Schedule 2 Design and Construction Protocols and the User Consultation process.

7.10.10.3(14) Provide a VoIP staff terminal (ST) (Rauland-Borg 5 Model #351300) into every workflow station at locations, including but not limited to each staff locations, Pre-Op and Post-Op bays and as noted in Appendix 3I Room Requirements. VoIP staff terminals will serve as patient or procedure room communications tool while providing staff with “soft” touch-points to initiate an instantaneous notification of an in-room need. Additionally, the terminal may be used as a functional nurse call console. This programmable touch screen functionality will enable the Authority to program workflow applications.

7.10.10.3(15) Locate staff terminals separately from bedside stations. In all treatment rooms and exam rooms, locate staff terminals in close proximity to the room entrance, not at the patient bedside or at the side of the patient exam table. In Ante rooms locate the VoIP staff terminal on the wall adjacent to the patient room so that staff can look at the patient while they are using the VoIP staff terminal to communicate. Exact location of staff terminals will be as directed by the Authority and determined through the user consultation process which will include clinical staff and nurse call installer.

7.10.10.3(16) All patient care rooms and patient bed or stretcher locations to have a separate jack input with the ability to interface with relay/dry contact medical equipment alarms for medical equipment monitoring and patient monitoring (such as bed exit).

7.10.10.3(17) Provide workload and workflow management functionality to all areas.

7.10.10.3(18) Provide adequate duty stations (Rauland-Borg Model #353100) in rooms and ceiling mounted speakers (Rauland-Borg Model #353200) in corridors for each nurse call system to ensure that tones are heard throughout each department, including at locations as noted in Appendix 3I Room Requirements.

7.10.10.3(19) The nurse call system to provide an open system and HL7 standard interfaces that can accommodate integration to Meditech (Connex) system.

7.10.10.3(20) Interface the nurse call system with the Authorities existing “Connexall” system for additional monitoring and vectoring of calls.

7.10.10.3(21) Integrate the nurse call system with the fire alarm system to provide the Code Red functionality.

7.10.10.3(22) Integrate the nurse call system with the New Facility PBX and provide sufficient audio channels for the requirements of the Building and the nurse call server to track calls via Rauland-Borg management software. The call management software to record all calls from all departments, response time and allow trending and report generation.

7.10.10.3(23) The nurse call system is considered a Select Campus-wide System. Project Co shall ensure seamless integration of the system across the New Facility and Other Site Facilities. Project Co may choose to either replace the current system and related equipment in the Other Site Facilities or choose to integrate to this system. If Project Co chooses to integrate to the Other Site Facilities system, Project Co shall be responsible for all required upgrades to the Other Site Facilities system. If Project Co elects to replace the system in the Other Site Facilities, the system will comply with the requirements in the Design and Construction Specifications.

7.10.10.3(24) Provide programming servers and staff communication device allocation server locally on the network to allow nursing station computer access to monitor status of the system and with the appropriate password implement programming changes.

7.10.11 Wireless Staff Communications Systems

7.10.11.1 Basic Requirements

7.10.11.1(1) Provide network infrastructure for a complete wireless staff to staff communication system that will allow staff to place calls from wireless handheld devices and initiate a two-way voice conversation. It is expected that this system will function over the wireless network described in Section 7.10.9 of this Schedule.

7.10.11.1(2) New Facility wireless staff communication system to connect to the Authority's existing wireless staff communication system.

7.10.11.1(3) Project Co to coordinate with existing Authority Wireless Staff Communication vendor to ensure a successful integration with existing Wireless Staff Communication System

7.10.11.1(4) Project Co to be responsible for any hardware, software or license upgrades required to connect to existing Authority Wireless Staff Communication system.

7.10.11.1(5) Project Co must use a different system for its own communication such as portable radios. Any such devices or system must not interfere with the Authority's wireless communication devices or systems or other devices or systems.

7.10.11.1(6) The wireless system to function throughout the New Facility, including all links and integrate with that of the PRH.

7.10.11.1(7) The wireless system to include additional antennas in sensitive areas as may be required to comply with this Section 7.10.9.

7.10.11.1(8) Each wireless device to offer the full functionality of a standard hardwired telephone handset. Ensure that the wireless network in the New Facility will support all such functionality.

7.10.11.1(9) The wireless system shall have access to and integrate with the nurse call system, the New Facility PBX system, voice mail, dictation system, other data network systems, and portable clinical software applications.

7.10.11.1(10) The Authority's current wireless Staff Communication system is the Vocera System.

7.10.11.1(11) Provide the following as part of the overall Vocera (or existing wireless communication) system;

7.10.11.1(11)(a) (200) Two hundred Wireless Staff Communication badges. At time of procurement, the Authority, in conjunction with the vendor, will determine the Vocera badge model which is most equivalent to the Vocera Badges (Model B3000) procured for the PRH and which provides optimal functionality for the Authority's end users;

7.10.11.1(11)(b) (200) Two hundred licenses;

7.10.11.1(11)(c) (25) Twenty-five X (8) eight port charger stations;

7.10.11.1(11)(d) (400) Four hundred extended life batteries; (1) one battery for the badge + (1) one battery in charging station for a quick swap;

7.10.11.1(11)(e) (400) Four hundred lanyards; and

7.10.11.1(11)(f) Additional equipment required (but not mentioned) to facilitate a fully functional system.

7.10.11.2 Quality Requirements

7.10.11.2(1) Comply with all applicable standards, including all applicable handheld communications standards but not limited to;

7.10.11.2(1)(a) Vocera implementation standards for 802.11 networks.

7.10.11.2(2) Wireless staff communication system shall meet IEEE 802.11x standards and allow sufficient bandwidth to display clinical data.

7.10.11.2(3) The wireless staff communication system shall be the latest proven technology from a recognized leader in the industry providing all necessary functionality.

7.10.11.2(4) The wireless staff communication system shall provide standard telephone features as well as IP addressing and VoIP.

7.10.11.2(5) The wireless staff communication system shall employ data security encryption techniques.

7.10.11.3 Operating Requirements

7.10.11.3(1) Ensure that wireless devices may connect directly to the New Facility PBX to allow each wireless handheld communication device to have the same functionality as a wired phone.

7.10.11.3(2) Wireless handheld devices shall automatically log onto system. No manual intervention is required.

7.10.11.3(3) Provide adequate space and power outlets for wireless device charging stations inside each department.

7.10.11.3(4) New Facility Wireless Staff Communications Systems will connect to the existing Authority Wireless Staff Communications Systems located at the Authority offsite data centre (DC1).

7.10.11.4 Performance Requirements

7.10.11.4(1) The system to consist of antenna based stations, line cards, software and wireless handheld devices. Antenna based devices to be located in concealed areas throughout the Building to provide full coverage with no Dead Spots including the link from the New Facility to the PRH and link to parking garage.

7.10.11.4(2) System shall connect directly to the New Facility PBX system to allow each wireless handheld communications device the same functionality as a wired phone. Project Co. to supply additional line cards for the New Facility PBX, if required, to provide this functionality.

7.10.11.4(3) All wireless staff communication devices shall be able to make an external call.

7.10.11.4(4) The system shall include licensing for full programming as well as licensing to integrate with the nurse call system and other alarm systems to annunciate all necessary local alarms on the wireless handsets.

7.10.11.4(5) As per Schedule 2, Project Co will meet with clinical and IT staff to determine the programming requirements of the wireless staff communication system.

7.10.11.4(6) New Facility PBX system servers to be located in the Main Cross-connect Room in the New Facility.

7.10.11.4(7) All components of the wireless staff communication system shall be fed by UPS power.

7.10.11.4(8) Cabling will be a part of the structured cabling system

7.10.12 Patient Monitoring and Telemetry System

7.10.12.1 Basic Requirements

7.10.12.1(1) Provide patient monitoring systems including but not limited to cardiac monitoring, pulmonary monitoring, vital signs monitoring, and others identified in the Equipment List.

7.10.12.1(2) All inpatient floors to be wired to allow a patient monitoring device to be connected to a centralized patient monitoring system.

7.10.12.1(3) Any specialized wiring needed to connect centralized monitors to be provided by Project Co to form a complete system.

7.10.12.1(4) Wireless telemetry monitoring to be provided in all inpatient floors as defined by the Authority's Patient Monitoring Vendor. Project Co to ensure the New Facility Wireless Infrastructure does not interfere in any way with the Wireless Telemetry system and shall integrate with the Staff Wireless Communication System to annunciate alarms.

7.10.12.1(5) Coordinate with the Authority's Patient Monitoring vendors the installation and requirements of the Patient Monitoring and Wireless Telemetry Systems.

7.10.12.1(6) The Authority's existing Patient Monitoring vendor is Space Labs

7.10.12.2 Performance Criteria

7.10.12.2(1) All Patient Monitoring systems to be monitored at the nursing desk for each medical department. All alarms to be annunciated on the wireless Staff Communication devices issued to the nursing staff. Provide wiring and integration to accommodate this.

7.10.12.2(2) The wiring shall form part of the structured cabling system.

7.10.13 Public Address System

7.10.13.1 Basic Requirements

7.10.13.1(1) Provide cable infrastructure and equipment for a paging system in the Building. This paging system is intended to be used for emergency pages only. Other communications systems will be used for routine communications between staff and patients.

7.10.13.1(2) Integration with the fire alarm system will be acceptable if all requirements of the performance criteria are met. Provide interconnects between the systems as required by all applicable regulatory standards or codes.

7.10.13.1(3) Provide seamless functioning with the telephone system.

7.10.13.1(4) Provide for paging at the switchboard by authorized Authority staff only. Paging will be done via a telephone interface to the phone system. In addition, provide a hard-wired backup microphone in emergency registration in the event the PBX fails. This backup microphone must be able to page the entire New Facility.

7.10.13.1(5) Zone paging to be required. The Project Co to implement the zone paging number and configuration as determined per Schedule 2 Design and Construction Protocols and the User Consultation process.

7.10.13.1(6) Provide complete speaker coverage of the building (excluding all OR's and as indicated as not required in Appendix 3I Room Requirements), so that emergency pages can be heard with high Intelligibility and low loss of articulation and consonants.

7.10.13.1(7) The public address system is considered a Select Campus-wide System. As such, Project Co must ensure seamless integration of the system across the New Facility and Other Site Facilities. Project Co may choose to either replace the current system and related equipment in the Other Site Facilities or choose to integrate to this system. If Project Co chooses to integrate to the Other Site Facilities system, Project Co shall be responsible for all required upgrades to the Other Site Facilities system. If Project Co elects to replace the system in the Other Site Facilities, the system will

comply with the requirements in the Design and Construction Specifications.

7.10.13.2 Operational Requirements

7.10.13.2(1) Provide complete speaker coverage of the Building so that emergency pages can be heard everywhere in the Building with high intelligibility and low loss of articulation of consonants (%ALCONS).

7.10.13.2(2) Provide sound levels as follows throughout the New Facility:

7.10.13.2(2)(a) Normal paging: 60 dB minimum.

7.10.13.2(2)(b) Fire alarm messages: 75 dB minimum.

7.10.13.2(2)(c) Paging sound levels to be at least 10 dB above ambient noise levels in mechanical rooms and similar locations.

7.10.13.2(3) Provide all equipment necessary for a fully operational public address system, including:

7.10.13.2(3)(a) Paging amplifiers.

7.10.13.2(3)(b) Flush ceiling speakers in finished areas.

7.10.13.2(3)(c) Trumpet type speakers in mechanical and other high ambient locations.

7.10.13.2(3)(d) Microphone(s).

7.10.13.2(3)(e) Mixers.

7.10.13.2(4) Size amplifiers to handle total load plus 20% spare capacity.

7.10.13.2(5) Provide telephone access for paging with a maximum delay of 1 second between accessing system and ability to transmit page.

7.10.14 Clinical Camera System

7.10.14.1 Basic Requirements

7.10.14.1(1) Provide point-to-point cameras and viewing monitors for clinical purposes (these are not security cameras) at MRI, and EEG in Neurology patient holding areas. Cameras to be viewed on monitors located in the Neurology room and MRI control room. Number of cameras and locations to be determined through the User Consultation process as per Schedule 2.

7.10.14.1(2) Recording is not required unless otherwise stated in the Clinical Specifications.

7.10.14.1(3) Clinical security cameras are not to be viewable by site security staff or recorded on the building security system.

7.10.14.1(4) Coordinate viewing monitors with the millwork design to ensure ergonomic viewing and usage in conjunction with other systems.

7.10.14.1(5) In order to ensure patient safety, cameras required for specialized environments (e.g. MRI rooms) must be approved by the manufacturer for that specific use.

7.10.14.2 Performance Criteria

7.10.14.2(1) Provide color high-resolution, high sensitivity cameras with auto-iris lens operation. Mounting will be appropriate for the environment, unobtrusive, matching colour with hidden cabling. Cameras to be CCD image capture technology and will have at least 540 lines of resolution.

7.10.14.2(2) Infrared illuminated cameras are required for patient observation in low or no light (sleeping) environments.

7.10.14.2(3) Viewing monitors to be *professional grade* LCD type with LED backlit (with a minimum of 24” diagonal viewing surface).

7.10.14.2(4) System to be IP based or NTSC base band. IP based systems will utilize the cabling infrastructure. Consult with the Authority for any required network access.

7.10.14.2(5) System to be real time viewing with extremely low to no latency or delay.

7.10.14.2(6) System shall include audio monitoring and controls.

7.10.15 Video Conferencing

7.10.15.1 Basic Requirements

7.10.15.1(1) Design and construct (including all necessary building infrastructure and, as applicable, video conferencing infrastructure) and install any required Equipment, in accordance with the A/V Meeting and Conference Room standard provided in the Authority IMIT Infrastructure Specifications in Appendix 3E of this document.

7.10.15.1(2) Retain audio visual professionals with expertise and experience in the application, use and integration of audio/video conferencing

systems for the design, configuration and integration of the required videoconference rooms and systems.

7.10.15.2 Quality Requirements

7.10.15.2(1) Comply with all applicable standards and codes, including the latest IP based video conferencing standards or the latest high speed common standard.

7.10.15.2(2) Audio quality to be comparable to voice quality found in typical PSTN voice networks. Video quality to be high definition (720p) and synchronized with the audio content. Video conference systems will allow for adjustments of compression and audio and video quality to accommodate for bandwidth management.

7.10.15.3 Performance Criteria

7.10.15.3(1) Design and construct videoconference rooms and locate microphones, video cameras, video monitors, lighting systems and sound attenuation structures/materials to optimize the performance of the video conferencing systems.

7.10.15.3(2) Coordinate with the Authority for network access. Video conferencing systems to be configured and adhere to the Authority security and quality of service requirements so not to negatively impact the Authority's network performance in any way.

7.10.15.3(3) All supplied video conferencing equipment shall be suitable to operate with Authority's video conferencing network.

7.10.16 Patient Entertainment System

7.10.16.1 Basic Requirements

7.10.16.1(1) The patient entertainment system to operate over the Authority's network described in Section 7.10.1.2(7)(a) of this Schedule. If required to meet the patient entertainment system vendor's or manufacturer's specifications or necessary to provide system performance acceptable to the Authority acting reasonably, Project Co will provide a separate physical network for the patient entertainment system. All cabling to be via the structured cabling system (CAT 6A + Coaxial Cable and power at each TV location). The Authority prefers an IP based solution.

7.10.16.1(2) Arrange for the installation of local cable or satellite service (basic cable package) throughout the Building and patient care areas. Project Co. to be responsible for the costs of cable installation. The

Authority in conjunction with the Authority's current cable provider to be responsible for the ongoing costs of cablevision services.

7.10.16.1(3) In public spaces:

7.10.16.1(3)(a) provide public television programming (basic cable) and patient entertainment programming throughout the Building;

7.10.16.1(3)(b) Authority staff will control the channels/programming via remote control and will be able to change program channels or television inputs for access to patient entertainment programming;

7.10.16.1(3)(c) provide two television outlets (1 coax and 1 data for each outlet) and associated power, as a minimum, in all waiting areas, family respite, family lounges and staff lounges; and

7.10.16.1(3)(d) provide adequate backing at each television location to accommodate the wall mounting of televisions.

7.10.16.1(4) In Patient Rooms:

7.10.16.1(4)(a) Provide access to the patient entertainment programming in all patient rooms in the New Facility;

7.10.16.1(4)(b) Patients will control the channels/programming, on/off and volume control via the Rauland-Borg Responder V pillow speaker;

7.10.16.1(4)(c) Authority staff will control the channels/programming via remote control and will be able to change the channels/programming or television inputs for access to patient entertainment and patient education;

7.10.16.1(4)(d) Provide one specialized 4 port faceplate television outlet (1 coax, 1 data, 1 blank and 1 3.4mm stereo screw terminal (TE Connectivity Part #1-1933582-3 Almond/White) and associated power, as a minimum, on the foot wall by all patient beds at a height to be determined through the Schedule Design and Construction Protocols and User Consultation process;

7.10.16.1(4)(e) Provide adequate backing at each television location to accommodate the wall mount of televisions.

7.10.16.1(4)(f) Provide 27mm conduit from Patient Head wall 3 gang Enhanced Patient Station to Patient TV outlet for Nurse Call control of TV as noted in 7.10.16.1(4)(b).

7.10.16.1(5) The patient entertainment system will be provided to the Authority by Hospitality Networks, or current cable vendor at time of installation.

7.10.16.1(6) Local cable services shall be provided for the New Facility directly from the street and to be separate for the existing services.

7.10.16.1(7) Provide a 1 GHz broadband distribution system that will support bi-directional communication. Coordinate cabling types with the local Cable TV service providers.

7.10.16.2 Quality Requirements

7.10.16.2(1) The patient entertainment system to be manufactured by an industry leader and all components to be of that manufacturer.

7.10.16.2(2) The patient entertainment system to meet the CRTC standards and operate in the 8dBmv to 16dBmv range.

7.10.16.2(3) Allow for future deployment of integrated bedside devices which may be greater than or equal to the standard Authority computer display device at the time of procurement and to have enough processing power for 30 fps of video.

7.10.16.2(4) Patient Entertainment system to be compatible to the existing system used in the PRH. Refer to Authority IMIT Infrastructure Specifications in Appendix 3E of this document.

7.10.17 Patient Education System

7.10.17.1 Basic Requirements

7.10.17.1(1) The Authority intends to provide the application services, programs and electronic educational material that will be displayed via the network on televisions, video conferencing equipment, personal computers or integrated bedside terminals.

7.10.17.1(2) The patient education system to function over the TCP / IP Ethernet network and to be selectable via simple menu structure on

all patient entertainment devices. All cabling to be via the structured cabling system (CAT 6A + Coaxial Cable and power at each TV location).

7.10.17.2 Performance Criteria

7.10.17.2(1) The Authority will provide the head end components for this system on the Authority's servers.

7.10.18 Central Dictation

7.10.18.1 Basic Requirements

7.10.18.1(1) The Authority intends to provide a central dictation system for the New Facility, which will form part of the overall centralized system of the Authority. The file server and storage server is located off Site in the server farm.

7.10.18.2 Performance Criteria

7.10.18.2(1) All telephones to allow staff the ability to dictate onto the central Authority's dictation systems. An access code will be needed to access the dictation system. All dictation stations to be provided with a full featured phone and connect to the PBX via the structured cabling system.

7.10.19 Intercommunication System

7.10.19.1 Basic Requirements

7.10.19.1(1) Local video intercom systems are required at locked entrance doors that delivery personnel or the public will need access through.

7.10.19.2 Quality Requirements

7.10.19.2(1) The local video intercom systems to be manufactured by recognized industry leaders in the intercom business.

7.10.19.2(2) All wiring for the intercom system to be part of the structured cabling system.

7.10.19.3 Performance Criteria

7.10.19.3(1) Provide local video intercom systems at all locations requiring public or delivery access that may be locked. These systems to connect to the telephone system to allow the intercom to dial up the telephone at the nearest manned reception area. The telephone system will be able to remotely unlock the door.

7.10.19.3(2) Provide a vandal resistant, colour video intercom system at all entrance locations needing more security as determined based on the Facility Threat and Risk Assessment and through the User Consultation process.

7.10.19.3(3) Provide programmable all-master intercom system with the following capabilities:

7.10.19.3(3)(a) Loud-speaking full-duplex, hands-free operation.

7.10.19.3(3)(b) Two or three-digit number series.

7.10.19.3(3)(c) Line lockout: A fault on line blocks only extension line concerned.

7.10.19.3(3)(d) Camp-on busy: Automatic recall when busy extension becomes free.

7.10.19.3(3)(e) Priority feature: Incoming calls prevented from being connected “direct-in” and are announced by repeated call tone and flashing pilot lamp until manually accepted.

7.10.19.3(3)(f) All-call: All extensions can initiate or receive all-call.

7.10.19.3(3)(g) Three-way conference call capability.

7.10.19.3(3)(h) Ability to create multiple groups on the same system with blocked access as required by users.

7.10.19.3(3)(i) Minimum of 8 channels or more to ensure no busy signals based on number of stations in system. Provide additional channels after the New Facility is occupied if staff experience busy signals.

7.10.19.3(4) Provide desk loud-speaking colour video master station with handset at locations as determined through the User Consultation process, including:

7.10.19.3(4)(a) Each OR control room

7.10.19.3(5) Provide flush wall loud-speaking master station without handset at locations including but not limited to:

7.10.19.3(5)(a) IV mixture area (in Medication Rooms)

7.10.19.3(6) Video Intercoms to be mounted in such a way that the area behind and beside the person requesting access is visible so the nurse can determine if other individuals are present.

7.10.20 Real Time Location Systems ("**RTLS**")

7.10.20.1 Basic Requirements

7.10.20.1(1) The Authority is in process of implementing RTLS based applications for a variety of purposes in the PRH. These systems will be used for various applications, including:

7.10.20.1(1)(a) equipment location;

7.10.20.1(1)(b) staff location;

7.10.20.1(1)(c) staff/patient interactions; and

7.10.20.1(1)(d) room utilization.

7.10.20.1(2) Project Co to coordinate with all Wireless System Vendors to ensure provision of wireless infrastructure to support a Building-wide RTLS system.

7.10.20.1(3) The RTLS system to use software that is integrated with the Ekahau RTLS system. Refer to Authority IMIT Infrastructure Specifications in Appendix 3E of this document. Integrated means equipment/items can be tracked across the Campus.

7.10.20.1(4) Project Co to provide wireless infrastructure to support future implementation of RTLS in the New Facility and PRH by the Authority.

7.10.20.2 Quality Requirements

7.10.20.2(1) All wiring for the RTLS to be part of the structured cabling system.

7.11 Electronic Safety and Security (Division 28)

7.11.1 General

7.11.1.1 Ensure a safe environment for staff, patients and visitors by proper utilization of electronic access control, video monitoring and intrusion detection systems.

7.11.2 Fire Alarm System

7.11.2.1 Basic Requirements

7.11.2.1(1) Provide a new fire alarm system for the New Facility and ensure that that system meets or exceeds the requirements in this Section.

7.11.2.1(2) Provide a complete two stage (general and evacuation), supervised, 24 VDC fire detection and alarm system that includes addressable, intelligent, automatic and manual initiation devices and audio/visual alarm devices with voice evacuation capabilities. Alarm activation will be initiated by manual pull stations, smoke / heat detection, and fire sprinkler water flow devices. Alarm indication to consist of visual and combination visual/audible devices.

7.11.2.1(3) The fire alarm system to comply with all applicable standards, including:

7.11.2.1(3)(a) Can/UL S524 Standard for Installation of Fire Alarm Systems;

7.11.2.1(3)(b) Can/UL S537 Standard for Verification of Fire Alarm Systems;

7.11.2.1(3)(c) applicable NFPA Codes; and

7.11.2.1(3)(d) Elevator Code CSA-B44.

7.11.2.2 Performance Criteria

7.11.2.2(1) Install all fire alarm wiring in conduit. Provide two hour rated cable where required to meet survivability requirements of NFPA 72.

7.11.2.2(2) Provide addressable smoke detectors as required, self-correcting analog type to maintain consistent sensitivity. The following areas to be provided with smoke detector coverage, in addition to sprinklers, for early detection:

7.11.2.2(2)(a) Electrical rooms

7.11.2.2(2)(b) Communication rooms

7.11.2.2(2)(c) Operating and Procedure rooms

7.11.2.2(2)(d) Corridors

7.11.2.2(2)(e) Patient bays

7.11.2.2(2)(f) Patient bedrooms

7.11.2.2(3) Provide addressable two stage manual pull stations at all exit doors and entrances to exit stairs as required.

7.11.2.2(4) Connect the sprinkler system to the fire alarm system and provide full annunciation of all alarms and trouble conditions (wet, dry and pre-action).

7.11.2.2(5) Connect the fire alarm to the generator system to annunciate 'Generator Run' and 'Generator Fail-to-Run' troubles.

7.11.2.2(6) Provide fire alarm speakers throughout the New Facility as required. Speaker system will be available to announce alarm conditions and for use as public address announcements. Provide a microphone at the main reception desk, with telephone interface, for use of the speaker system. Pre-programmed messages will be transmitted over overhead paging system to annunciate origin of alarm. Any program sources on paging system to be muted while alarm messages are transmitted. Audible alert levels to be 10dBA above ambient with a minimum of 75dBA, and be audible in every room of the Building.

7.11.2.2(7) Alternate fire alarm speakers to be wired to the same circuit with a minimum of two (2) circuits per floor (riser wiring in two separate locations).

7.11.2.2(8) Use combination audible alarm and visual notification devices where applicable, including but not limited to boiler and mechanical rooms.

7.11.2.2(9) Include control devices and connection to close fire and smoke doors on activation of alarm condition.

7.11.2.2(10) Incorporate smoke control systems with control fans and dampers.

7.11.2.2(11) Provide a minimum of 2 isolation modules per floor for alarm circuits to isolate wire to wire shorts.

7.11.2.2(12) Provide a graphic annunciator complete with LCD display at the main reception area for the New Facility, as required and approved by the local fire department. Upgrade all graphic annunciator panels and screens located at PRH to reflect the addition of the New Facility. Provide remote annunciators at all Care Stations (Nurse Stations), and as noted and required by relevant code or standard.

7.11.2.2(13) The fire alarm system to control the smoke evacuation system. New Facility controls to interface with the fire alarm system to provide an integrated system.

7.11.2.2(14) Cross-corridor doors to be equipped with electromagnetic hold-open devices and electric locks, magnetic locks and to be released on first stage fire alarm.

7.11.2.2(15) Provide elevator homing and sequencing on first stage alarm.

7.11.2.2(16) The fire alarm system to have the capability for remote notification.

7.11.2.2(17) Full automatic smoke detection coverage for major egress corridors will be provided, in addition to the patient sleeping room and inpatient corridors.

7.11.2.2(18) The fire alarm system to monitor fire pumps, heat tracing for sprinkler system and generator equipment.

7.11.2.2(19) The smoke detector in the patient sleeping room will also annunciate at the nurse call dome light located outside of the patient room, and at the nurse call zone light in the corridor and at the nurse call master station and be annunciated on the fire alarm system annunciator located at all nurses stations.

7.11.2.2(20) Sprinkler zoning and fire speaker zoning to be compatible with the fire alarm zoning.

7.11.2.2(21) Provide a computer work station in the maintenance department and main security office within the New Facility.

7.11.2.2(22) The fire alarm control panel (FACP), remote annunciators and printers will indicate general alarm and trouble conditions.

7.11.2.2(23) Provide gel electrolyte type batteries with overcharge protection for FACP and all transponders. Provide solid state battery charger(s) with capacity to recharge entire battery system in 4 hours. Batteries will have enough capacity (with 25 percent spare time) to operate entire system (except magnetic door holders) in accordance with the BC Building Code.

7.11.2.2(24) The fire alarm system is considered a Select Campus-wide System. As such, Project Co must ensure seamless integration of the system across the New Facility and Other Site Facilities. Project Co may choose to either replace the current system and related equipment in the Other Site Facilities or choose to integrate to this system. If Project Co chooses to integrate to the Other Site Facilities system, Project Co shall be responsible for all required upgrades to the Other Site Facilities system. If Project Co elects to replace the system in the Other Site Facilities, the system will comply with the requirements in the Design and Construction Specifications.

7.11.2.2(25) 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

7.11.3 Electronic Security Systems

7.11.3.1 General

7.11.3.1(1) Design, provide and install a security system to meet the Authority's security programs within a healthcare facility campus environment.

7.11.3.1(2) Provide fully networked integrated security systems to protect staff, patients, visitors and property. As part of this security management program, at a minimum, provide a closed circuit television system to view and record events, an access control system to restrict access to secure areas to authorized personnel only, intrusion alarm detection systems to detect and report unauthorized entry into protected spaces, and a Building wide panic duress system (wired and wireless) to protect staff.

7.11.3.1(3) Develop the New Facility design based on the Facility Threat and Risk Assessment (refer to Sections 4.9 and 5.3 of Schedule 2 [Design and Construction Protocols]).

7.11.3.1(4) All security systems to reside on a completely separate network in the New Facility. The Security network to be designed to meet or exceed the specifications of the Administrative Network as specified in the document. The Security Network Infrastructure shall comply with Appendix 3E Authority IMIT Infrastructure Specifications.

7.11.3.1(5) Security system to be scalable to allow for future additions and interconnections of many devices and subsystems from different manufacturers.

7.11.3.1(6) The security system to incorporate commercial off-the–shelf equipment and proven designs from manufacturers regularly engaged in the production of models and types of equipment used in the security industry. Products will be quality control tested and verified for the intended operation prior to installation at site.

7.11.3.1(7) All materials, including hardware and software provided to be new and most current version or production model.

7.11.3.1(8) Electronic security systems to maintain dependability and reliability under all operational environmental conditions, capable of 24 hours per day, seven days per week continuous operation.

7.11.3.1(9) Interconnect security systems to the fire alarm system as required by applicable Laws or standards.

7.11.3.1(10) Arrange meetings with the Authority to coordinate system interconnections and programming requirements to integrate with the Authority's Lenel equipment infrastructure.

7.11.3.1(11) Train Authority staff on the use and operation of security systems and location of all security devices. Coordinate and schedule training with the Authority.

7.11.3.1(12) 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 this New Facility.

7.11.3.1(13) The systems to be integrated include but are not necessarily limited to video conferencing, telephones, all networks, patient wandering, patient entertainment, client education, access control, CCTV, intrusion detection, nurse call and specialized clinical equipment such as picture archiving and communication systems (PACS), cancer treatment systems, electronic registration, and dictation systems. Upgrade existing PRH systems and fully integrate into the new system platforms.

7.11.3.2 Access Control

7.11.3.2(1) Basic Requirements

7.11.3.2(1)(a) The Authority intends to maintain and manage a central "off-site" Lenel access control head-end server and database for administration and programming of card access at various healthcare facilities under the Authority's jurisdiction throughout the region.

7.11.3.2(1)(b) The access control system is considered a Select Campus-wide System. As such, Project Co must ensure seamless integration of the system across the New Facility and Other Site Facilities. Project Co may choose to either replace the current system and related equipment in the Other Site Facilities or choose to integrate to this system. If Project Co chooses to integrate to the Other Site Facilities system, Project Co shall be responsible for all required upgrades to the Other Site Facilities system. If Project Co elects to replace the system

in the Other Site Facilities, the system will comply with the requirements in the Design and Construction Specifications.

7.11.3.2(1)(c) The access control system will integrate with the patient wandering system to prevent unauthorized egress.

7.11.3.2(1)(d) Inpatient Unit entrance doors to be secured after hours, equipped with an Intercom to the Nurses Care Station and have a remote release on the doors located at the Nurses Care Station.

7.11.3.2(1)(e) The new Access Control system shall be the newest version of a Lenel system.

7.11.3.2(2) Performance Criteria

7.11.3.2(2)(a) Card access system to utilize fully redundant file servers c/w automatic fail-over and allow multiple workstations to access this file server for control and management purposes. All alarms will be annunciated at the PRH Security Office, on the security 2 way radios and pagers.

7.11.3.2(2)(b) The access control system to be complete with mapping capability, which will be implemented.

7.11.3.2(2)(c) Each access controlled door to have a local sounder to enunciate door held open and door forced open alarms.

7.11.3.2(2)(d) The access control system to function at the field controller level without connection to the PC Host or gateway. All field controllers to be connected by TCP/IP using the structured cabling plant.

7.11.3.2(2)(e) The access control system to have the capability to lock down departments or other areas identified by the Authority (such as the acute zones) in the event of an emergency or per an established schedule on a door by door basis or global command.

7.11.3.2(2)(f) The access control system to use proximity type readers and be capable of reusing all existing cards presently distributed across the Authority. The access control system to be compatible with

the Authority's existing systems at the PRH to allow existing Authority cards to work on the system and allow new cards for the New Facility to work on systems in the rest of the Authority's regions. Coordinate base programming requirements for access cards in the Building's system with the Authority.

7.11.3.2(2)(g) PRH is currently using the G-Prox II card reader system and cards. Refer to Appendix 3E Authority IMIT Infrastructure Specifications in this document for a current list of Vendors.

7.11.3.2(2)(h) Provide interconnectivity, licensing and interface access equipment panels and controllers to Lenel system and head-end equipment for seamless operation.

7.11.3.2(2)(i) Provide two hundred (200) blank G-Prox II proximity cards for Authority staff. Consult with the Authority on card numbering sequence and format before ordering cards to ensure compatibility with existing cards and equipment in the New Facility. Project Co to program the security. If Project Co chooses to replace the system in the Other Site Facilities, Project Co must supply sufficient replacement access control cards and other end use devices.

7.11.3.2(2)(j) Determine, through the User Consultation process, the location of access control doors and door alarms within the Building. Provide card readers, locking hardware, request-to-exit devices, door position/alarm contacts with all associated mechanical and electric hardware and field devices, including power supplies for a fully operational system. Areas requiring access control doors and door alarms include:

(j).1 Main entrances and all exterior doors;
(j).2 All links to PRH;
(j).3 parking garage;
(j).4 UBC area entrances and meeting rooms as per Appendix 3M;
(j).5 drug storage & medication rooms;
(j).6 medical device reprocessing;
(j).7 departmental main entrances;

(j).8 entrances to staff locker change rooms;
(j).9 staff lounges;
(j).10 Inpatient Unit Medication rooms;
(j).11 telecommunication rooms & equipment rooms;
(j).12 electrical rooms;
(j).13 elevators (public & service);
(j).14 Helipad;
(j).15 all doors to work areas and stairwells with access from public corridors; and
(j).16 as required by Appendix 3I Room Requirements.

7.11.3.2(2)(k) Provide proximity card readers at all access/egress locations to/from all strictly controlled areas identified by the Authority, otherwise all readers are to be non-pin pad models. Provide combination pin code/proximity card reader at Nuclear Medicine procedure room.

7.11.3.2(2)(l) Provide pan/tilt colour video intercom communications between the secure side of main entry doors and reception/care stations in departments and areas that are strictly controlled. Provide momentary remote pushbutton operation to release main entry doors when activated by staff or security personnel.

7.11.3.2(2)(m) Provide delayed egress operation and alarms at emergency exit doors; alarms to annunciate both locally and via the integrated access system.

7.11.3.2(2)(n) Interconnect and interface all electronically controlled doors for remote “lock & unlock” capability through the Lenel access control system on a door-by-door or global command basis.

7.11.3.2(2)(o) Provide clear signage indicating entry procedures. Consult with the Authority for appropriate and acceptable wording.

7.11.3.2(2)(p) All security alarms to be logged for a minimum period of 1 year. Logging system will be capable of external archiving/backup on compact disc or DVD in order to extend the event info storage duration.

7.11.3.2(2)(q) Security recording to provide, as a minimum, the following information for each alarm:
- (q).1 date;
- (q).2 time;
- (q).3 device identification;
- (q).4 descriptive code;
- (q).5 user/cardholder ID (when applicable); and
- (q).6 acknowledgement and action taken (when applicable).

7.11.3.2(2)(r) Provide interconnection access to the applicable control and reporting capabilities included with the Continuum platform to security workstations located in:
- (r).1 The Central Security Office,
- (r).2 The Security Post in the main entrance lobby of the PRH.

7.11.3.2(2)(s) Provide a maintenance/administration workstation (MAW) PC complete with operating & application software, monitor, keyboard, mouse and interconnection to the security system network. Locate main MAW in a secure space, accessible to authorized personnel and Authority staff.

7.11.3.3 Panic Duress System

7.11.3.3(1) Basic Requirements

7.11.3.3(1)(a) Provide wired and wireless panic duress systems to operate in tandem in appropriate areas throughout the New Facility in accordance with the level of security risk in each location.

7.11.3.3(1)(b) The panic duress system is considered a Select Campus-wide System. Project Co shall ensure seamless integration of the system across the New Facility and Other Site Facilities. Project Co may choose to either replace the current system and related equipment in the Other Site Facilities or choose to integrate to this system. If Project Co chooses to integrate to the Other Site Facilities system, Project Co shall be responsible for all required upgrades to the Other Site Facilities system. If Project Co elects to replace the system in the Other Site Facilities, the system will comply with

the requirements in the Design and Construction Specifications.

7.11.3.3(2) Performance Criteria

7.11.3.3(2)(a) Provide wired panic duress system for staff with buttons to initiate emergency assistance calls in areas of the New Facility as determined through the Facility Risk and Threat Assessment. Areas may include:

(a).1 main lobby reception;
(a).2 each department nurse station and substation;
(a).3 care/sub-care station reception desks;
(a).4 main reception area;
(a).5 medication rooms;
(a).6 isolated work stations (night use);
(a).7 staff locker rooms and showers;
(a).8 areas designated as high risk by the Authority.

7.11.3.3(2)(b) Provide permanent parking lot, parking garage, and temporary parking lot, public wired panic duress stations. Parking lot and parking garage duress stations shall be placed in well lit areas spaced such that no spot may be more than a maximum of 15m from a duress station, maximum of 10m from the parking area edge, and at all parking area entrances.

7.11.3.3(2)(c) Panic duress stations shall be equipped with video monitoring, strobe light, horns and pre-recorded digital message system that will provide announcement after the alarm activation. Emergency call buttons shall be mushroom type complete with conventional red light and manual key for system reset. The Duress stations shall utilize self-diagnostic, self-monitoring and reporting technology. Provide telephone management application software as required to allow for monitoring and reporting of Duress stations.

7.11.3.3(2)(d) Duress buttons to be strategically located, suitably sized and identified/clearly labelled for “security emergency”.

7.11.3.3(2)(e) Provide wireless systems, including all antennae/receivers to supplement the installation of fixed wired panic duress systems for reliable and dependable operation under all operational environmental conditions. Wireless systems will not be affected by or interfere with any equipment in use in the New Facility or the rest of the PRH. Provide six wireless transmitter pendants per Authority department.

7.11.3.3(2)(f) The panic duress system to report the alarm through the Lenel system and to the Security 2-way radios, pagers and the alarm system ("map pods") in the security office. Alarms must be addressable in order to pin-point the location of the alarm.

7.11.3.4 Intrusion Detection

7.11.3.4(1) Basic Requirements

7.11.3.4(1)(a) Intrusion detection systems to be installed in all areas where protection of physical assets is critical.

7.11.3.4(1)(b) The new Intrusion Detection system shall be the newest version of a Lenel system.

7.11.3.4(2) Performance Criteria

7.11.3.4(2)(a) The intrusion detection system(s) to utilize industry proven devices for intrusion alarm detection and reporting capable of 24 hours per day, seven days per week continuous operation, with battery backup operation in the event of power outages.

7.11.3.4(2)(b) Provide intrusion detection system(s) including alarm controllers, local keypads, motion sensors, shock sensors, glass break sensors, door contacts, strobes, sirens and other alarm initiating devices as needed for a reliable and fully operational system(s).

7.11.3.4(2)(c) Control each system with keypad(s) located inside the department or area being protected.

7.11.3.4(2)(d) Local alarm controllers to be integrated with the access control system. Each panel to report via its

own phone line through the Lenel system and to the Security 2-way radios, pagers, and the alarm system (“map pods”) in the security office.

7.11.3.4(2)(e) Install intrusion detection systems in all areas where protection of physical assets is critical as determined through the Facility Risk and Threat Assessment and the User Consultation process. Some areas may include:

(e).1 MDR;

(e).2 Exterior Doors; and

(e).3 Areas designated as high risk by the Authority.

7.11.3.4(2)(f) Duress alarm points to inter-connect to intrusion alarm system and separately report duress/panic alarms through the Lenel system and to the Security 2-way radios, pagers and alarm system (“map pods”) in the security office to allow security monitoring staff to individually identify the location point and origin of the alarm.

7.11.3.4(2)(g) Intrusion alarm system and all associated alarm panels must be compatible and remotely programmable from existing Authority system equipment.

7.11.3.5 CCTV

7.11.3.5(1) Basic Requirements

7.11.3.5(1)(a) Provide CCTV throughout the Building, including exterior areas, such as exterior courtyard, parking structure, and rooftop helipad for the purpose of viewing and recording video to enhance the level of security and assist Authority staff in providing a safe environment for patients, staff, visitors and the general public while protecting the physical assets.

7.11.3.5(1)(b) The CCTV system is considered a Select Campus-wide System. Project Co shall ensure seamless integration of the system across the New Facility and Other Site Facilities. Project Co may choose to either replace the current system and related equipment in the Other Site Facilities or choose to integrate to this system. If Project Co chooses to

integrate to the Other Site Facilities system, Project Co shall be responsible for all required upgrades to the Other Site Facilities system. If Project Co elects to replace the system in the Other Site Facilities, the system will comply with the requirements in the Design and Construction Specifications.

7.11.3.5(1)(c) The CCTV system may not reside on the Authority's network. Project Co will provide a separate physical network for the CCTV System. Project Co will provide dedicated active network equipment and switches for the CCTV system network, and will connect CCTV core network switch to the Authority's core network switches in the MCR.

7.11.3.5(1)(d) Areas which have CCTV cameras installed to have signage posted at the main entrances to the Building. The signage will notify the public that this area is under video surveillance. CCTV processes will be governed by the Public Surveillance System Privacy Guidelines for the Province of BC as well as the Freedom of Information and Protection of Privacy Act (British Columbia).

7.11.3.5(1)(e) The system must be able to record clear images of individuals, which would allow distinction of gender, ethnicity and age category. System to provide recorded images of sufficient quality to be used as court evidence in Canada.

7.11.3.5(1)(f) CCTV systems are divided into four different applications which depend on the desire image size required for the particular application.

7.11.3.5(1)(g) Detection:

(g).1 A CCTV system which provides for detection to be set up to "detect any change in the defined field of view".

(g).2 A human target (image) in a detection CCTV system to represent a minimum of 9% of the vertical height of the picture as displayed on the monitor.

7.11.3.5(1)(h) Classification:

(h).1 A CCTV system which provides for classification will be set up to allow the

viewer to differentiate between “a human target and an object or an animal”.

(h).2 A human target (image) in a classification CCTV system to represent a minimum of 17% of the vertical height of the picture as displayed on the monitor.

7.11.3.5(1)(i) Assessment:

(i).1 A CCTV system which provides for assessment to be set up to allow the viewer to be able to distinguish the type of target (image) including characteristics which may distinguish the target (image) from similar targets (images).

(i).2 A human target (image) or an object, in an assessment CCTV system will represent a minimum of 26% of the vertical height of the picture as displayed on the monitor.

7.11.3.5(1)(j) Recognition:

(j).1 A CCTV system which provides for recognition to be set up to allow the viewer to be able to recognize the human target head (image) including characteristics which will lead to the identity of the human target head (image).

(j).2 The human target head (image) in a recognition CCTV system will represent a minimum of 22% of the vertical height of the picture as displayed on the monitor.

7.11.3.5(1)(k) The new CCTV system shall be the newest version of a Lenel system.

7.11.3.5(2) Performance Criteria

7.11.3.5(2)(a) Provide CCTV cameras at locations determined in consultation with the Facility Risk and Threat Assessment. All CCTV cameras are to be implemented for “Recognition” applications as defined in 7.11.3.5(1)(f) through (j) unless otherwise indicated. Some areas may include:

(a).1 main entrances & exits to the Building (Recognition);

(a).2 all parking, drop-off and pick-up zones (Recognition);

(a).3 entrance and exit corridors to all departments (cameras that monitor Inpatient Unit entrances are also required to be monitored at the Team Care Station) (Recognition);
(a).4 public lobbies and waiting and gathering areas (Recognition);
(a).5 elevator lobbies (public & service) (Recognition);
(a).6 perimeter walkways and walkways connecting to other buildings on campus (Assessment);
(a).7 public thoroughfares and walkways (Assessment):
(a).8 Helipad (Detection);
(a).9 cash offices or areas were cash is exchanged (Recognition);
(a).10 rooftop Helipad (Detection);
(a).11 Exterior courtyard (Assessment).

7.11.3.5(2)(b) All entry and exit points to the facility and units require recorded video surveillance integrated to the CCTV security system.

7.11.3.5(2)(c) Provide CCTV equipment to monitor and record the specific identity of all persons entering and exiting the Building's main entrance, corridor/links and utilizing elevators.

7.11.3.5(2)(d) System(s) to be a software-based virtual matrix using the structured cable plant for transmission and recording of images.

7.11.3.5(2)(e) Provide the appropriate encoding/decoding capability to support 2 way (video and control) communications with any and all CCTV camera, individually and/or in predetermined clusters via the security Ethernet infrastructure.

7.11.3.5(2)(f) Provide digital CCTV system consisting of digital colour CCTV cameras that provide High Definition images, 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 through event driven recording 24-hours per day, 7 days a week in real time. All cameras will be IP addressable or use protocol converters as required.

7.11.3.5(2)(g) Provide video storage capacity for minimum of 30 days at (30) thirty frames per second, minimum full D1 resolution. Provide file servers, workstations, and optical storage devices and connect to network. System to have the ability to choose recording rates and quality for each camera, have activity detection and incorporate smart search capabilities.

7.11.3.5(2)(h) CCTV system to integrate with access control, panic stations, intercoms and intrusion detection to allow for higher recording rates during alarm conditions.

7.11.3.5(2)(i) CCTV display and review system to be network-based client application allowing for authorized users to remotely view, control and manage all aspects of the CCTV system across the network. System will have network and web access for remote monitoring, using predefined user authentication.

7.11.3.5(2)(j) Display and review for all the cameras to be accessible through dual screen workstations located in the PRH security office and the secondary post in the main entrance lobby. Provide CCTV workstations with all required operating and application software, monitors, keyboard, mouse with interconnection to security system network.

7.11.3.5(2)(k) Provide color high-resolution, high sensitivity (day/night) fixed smoke dome type with an auto iris fixed dome cameras with auto-iris lens operation. Mounting to be appropriate for the environment, unobtrusive, matching colour with hidden cabling. Fixed cameras to be vandal

resistant wall mounted and / or mounted at protective locations and heights.

7.11.3.5(2)(l) PTZ color dome cameras to be high resolution, high-speed with low light day/night operation capability with 360 degrees rotation in less than 3 seconds. Domes to mount on poles, parapets and walls located to provide optimum unobstructed viewing of the area under surveillance. PTZ cameras to have the ability to mask portions of view through software and remote programming.

7.11.3.5(2)(m) Outdoor cameras to be complete with weatherproof housing and internal heater/ defroster/blower/wiper as required for suitable operation under varying environmental conditions.

7.11.3.5(2)(n) Cameras will not be set up in private areas such as patient rooms, treatment rooms or clinical areas (unless specifically identified for use by clinical department staff), locker rooms or washrooms. Cameras will not be placed or reviewed for the purpose of observing work performance of employees.

7.11.3.6 Patient Wandering

7.11.3.6(1) Basic Requirements

7.11.3.6(1)(a) Provide a Patient Wandering system interfaced with door security control on the perimeter doors of all Inpatient units to control patient access. System must integrate with the nurse call system. The patient wandering system is considered a Select Campus-wide System. Project Co shall ensure seamless service of the two systems; new and existing across the Campus. Project Co may choose to replace the current system and related equipment in the Other Site Facilities to provide this seamless service. If Project Co chooses to integrate with the Other Site Facilities system to provide this seamless service, Project Co shall be responsible for all required upgrades to the Other Site Facilities system. If Project Co elects to replace the system in the Other Site Facilities, the system will comply with the requirements in the Design and Construction Specifications.

7.11.3.6(1)(b) Patients may be provided with RFID, ID bands, badges, or bracelets. The tracking system will be capable of continuous monitoring throughout all locations of the New Facility.

7.11.3.6(1)(c) A PC based web application will provide a presentation of all patient locations by superimposing positional data on a Facility floor plan and providing patient based information.

7.11.3.6(2) Performance Criteria

7.11.3.6(2)(a) Wiring for this system will meet TIA / EIA standards.

7.11.3.6(2)(b) System will locate patient location to within 10m anywhere in the Building. The system will utilize an independent antenna system separate from the wireless, cellular, and telemetry antenna systems.

7.11.3.6(2)(c) The system can annunciate or alarm at or in the central security station and the security room in the lobby if a patient leaves the Building;

7.11.3.6(2)(d) The system will incorporate latest encryption techniques to secure patient ID and location.

7.11.3.6(2)(e) Provide (30) personal patient monitoring devices; exact type to be confirmed in consultation with the Authority as per Schedule 2, Design and Construction Protocols.

PART 8. SITE AND INFRASTRUCTURE SUBGROUP SPECIFICATIONS

8.1 General

8.2 Earthworks (Division 31)

8.2.1 Site Grading

8.2.1.1 Basic Requirements

8.2.1.1(1) Grade site, including waste removal, stripping, clearing, grubbing, common excavation, rock removal, trenching, backfilling, embankment, controlled density fill, dewatering, and compaction,

8.2.1.2 Performance Criteria

8.2.1.2(1) Site grading shall meet the recommendations provided by Project Co's geotechnical engineer.

8.2.1.2(2) Work of this section will be carried out in accordance to guidelines and specifications listed in Part 2, unless otherwise noted.

8.2.2 Retaining Walls

8.2.2.1 Basic Requirements

8.2.2.1(1) Design and construct retaining walls consistent in materials and quality to that of the Facility where required for site grading. Geogrid tie-backs are to be located on the Authority's property.

8.2.2.1(2) If required, construct decorative safety railing or fence along the top of the retaining wall.

8.2.2.2 Performance Criteria

8.2.2.2(1) Work of this section will be carried out in accordance to guidelines and specifications listed in Part 2, unless otherwise noted.

8.2.2.2(2) Concrete unit blocks to be decorative, coloured, and graffiti resistant to meet the landscape design principles.

8.2.2.2(3) Railing to meet BC Ministry of Transportation Standard Specifications Section 741.

8.3 Exterior Improvements (Division 32)

8.3.1 Pavement Structure

8.3.1.1 Basic Requirements

8.3.1.1(1) Design and construct pavement structure for parking area and driveways. Driveway access locations to perimeter roadways to match existing driveway access locations.

8.3.1.1(2) Pavement structures shall meet the recommendations provided by Project Co's geotechnical engineer.

8.3.1.1(3) Utilize asphalt paving in areas where vehicle traffic and snow clearing equipment require a smooth surface for travel.

8.3.1.1(4) Asphalt surface to be provided with a minimum of 1.0% grade slope to drains.

8.3.1.1(5) Maximum grade for drive aisle where there is no parking stalls not to exceed 10.0%.

8.3.1.1(6) Maximum grade for parking stalls not to exceed 5.0% in any direction and not to exceed 3.5% in a cross slope direction (measured from side to side).

8.3.1.1(7) Handicap accessible parking stalls not to exceed 2.0% in any direction.

8.3.1.1(8) Mill lap joint where asphalt tie-in thickness is 80mm or thicker, otherwise sawcut smooth edge.

8.3.1.2 Performance Criteria

8.3.1.2(1) Exceed limits defined by regional average freeze thaw cycles averaged over a twenty year period. Work of this section will be carried out in accordance to guidelines and specifications listed in Part 2, unless otherwise noted.

8.3.2 Concrete Paving

8.3.2.1 Basic Requirements

8.3.2.1(1) Utilize concrete paving in areas that require firm, long lasting hard surfaces for activities such as pedestrian pathways, loading docks and Building entrances, as well as curbs and gutters.

8.3.2.1(2) Utilize decorative paving in areas where a high level of finish is desired.

8.3.2.1(3) Concrete gutter grades to be a minimum of 0.5%.

8.3.2.1(4) Concrete pavement structures intended for vehicular shall meet the recommendations provided by Project Co's structural engineer.

8.3.2.2 Performance Criteria

8.3.2.2(1) Work of this section to be carried out in accordance to guidelines and specifications listed in Part 2, unless otherwise noted.

8.3.3 Pavement Markings and Signage

8.3.3.1 Basic Requirements

8.3.3.1(1) Design and construct pavement markings and signage.

8.3.3.2 Performance Criteria

8.3.3.2(1) Work of this section will be carried out in accordance to guidelines and specifications listed in Part 2, unless otherwise noted.

8.3.4 Exterior Site Furnishings

8.3.4.1 Basic Requirements

8.3.4.1(1) Provide the following exterior furnishings: wood benches, garbage containers, bicycle racks and wood landscape curbs.

8.3.4.2 Performance Criteria

8.3.4.2(1) Select products for their suitability and durability in the climatic conditions found at the Site.

8.3.5 Growing Medium

8.3.5.1 Basic Requirements

8.3.5.1(1) Provide a growing medium with a mixture of mineral particulates, micro-organisms and organic matter which will provide a suitable medium for supporting plant growth.

8.3.5.2 Performance Criteria

8.3.5.2(1) Seed mix will have demonstrated suitability to the climatic and soil conditions found at the Site.

8.3.5.2(2) Amend soil as recommended by a qualified Soil Scientist.

8.3.6 Sodding

8.3.6.1 Basic Requirements

8.3.6.1(1) Provide sod in areas near Building entrances, and outdoor patio spaces to provide a usable surface.

8.3.6.2 Performance Criteria

8.3.6.2(1) Use number one turf grass nursery sod that has been sown and cultivated in nursery fields as turf grass crop in climatic zone comparable to the Site.

8.3.7 Trees, Shrubs and Ground Cover Planting

8.3.7.1 Basic Requirements

8.3.7.1(1) Provide planting to create scale, natural ambience, visual screening, acoustic screening and space definition;

8.3.7.1(2) Conform landscaping to Crime Prevention Through Environmental Design (CPTED) principles and to Facility Risk & Threat Assessment (per schedule 2, section 4.9)

8.3.7.1(3) Provide plantings to support the landscape design by reinforcing spatial relationships and way-finding. The plant selection and placement will address micro-climates surrounding the Facility and mitigation of heating and cooling loads.

8.3.7.2 Performance Criteria

8.3.7.2(1) Select and place trees, shrubs and ground covers to mitigate temperature fluctuations and winds.

8.3.7.2(2) Retain any healthy existing trees that do not conflict with the development and site grading.

8.3.7.2(3) Engage an arborist to evaluate existing trees.

8.3.7.2(4) Select trees, shrubs and ground covers from species that are indigenous or adapted to the region.

8.3.7.2(5) Plants will comply with the current edition of the BC Landscape Standard, published by the BC Society of Landscape Architects and the BC Landscape and Nursery Association. Plant material will be grown in Zone 5 in accordance with Plant Hardiness Zones in Canada.

8.4 Utilities (Division 33)

Design and construct utilities to service the Building with a reliable infrastructure that is maintainable without disrupting the effective operation of the existing PRH buildings. Restore pavement structure and landscape to existing condition or better.

8.4.1 Manholes and Catch Basins

8.4.1.1 Basic requirements

8.4.1.1(1) Section Includes

8.4.1.1(1)(a) Monolithic concrete manholes with transition to lid frame, covers, anchorage, and accessories.

8.4.1.1(1)(b) Modular precast concrete manhole sections with tongue and groove joints with masonry transition to lid frame, covers, anchorage, and accessories.

8.4.1.2 Performance criteria

8.4.1.2(1) Work of this section will be carried out in accordance to guidelines and specifications listed in Part 2, unless otherwise noted.

8.4.2 Water Utility Distribution Piping

8.4.2.1 Basic requirements

8.4.2.1(1) Section Includes

8.4.2.1(1)(a) Pipe, fittings, accessories, and bedding for water line including domestic water line and fire water line.

8.4.2.1(1)(b) Valves, fire hydrants and domestic water hydrants.

8.4.2.1(1)(c) Connection to municipal system or existing onsite infrastructure.

8.4.2.2 Performance criteria

8.4.2.2(1) Work of this section will be carried out in accordance to guidelines and specifications listed in Part 2, unless otherwise noted.

8.4.3 Site Sanitary Sewerage Piping

8.4.3.1 Basic requirements

8.4.3.1(1) Section includes

8.4.3.1(1)(a) Sanitary sewerage drainage piping, fittings, accessories, and bedding.

8.4.3.1(1)(b) Connection of building sanitary drainage system to municipal sewers or existing onsite infrastructure.

8.4.3.1(1)(c) Clean out access.

8.4.3.2 Performance criteria

8.4.3.2(1) Work of this section to be carried out in accordance to guidelines and specifications listed in Part 2, unless otherwise noted.

8.4.4 Storm Sewer Water Drains

8.4.4.1 Basic requirements

8.4.4.1(1) Section includes

8.4.4.1(1)(a) Site storm sewerage drainage piping, fittings and accessories, and bedding.

8.4.4.1(1)(b) Connection of drainage system to municipal storm sewers or existing onsite infrastructure.

8.4.4.1(1)(c) Catch basins, plant area drains, paved area drainage, and Project Site surface drainage.

8.4.4.2 Performance Criteria

8.4.4.2(1) Work of this section to be carried out in accordance to guidelines and specifications listed in Part 2, unless otherwise noted.

8.4.5 Foundation Drainage

8.4.5.1 Basic requirements

8.4.5.1(1) Section includes

8.4.5.1(1)(a) Building perimeter, retaining wall and under slab on fill weep drainage system.

8.4.5.1(1)(b) Filter aggregate, fabric and bedding.

8.4.5.1(2) Pipe materials will be

8.4.5.1(2)(a) Polyvinyl Chloride pipe: to ASTM D2729, with required fittings or;

8.4.5.1(2)(b) Concrete pipe: to ASTM C412, with required fittings.

8.4.5.1(3) Accessories will be

8.4.5.1(3)(a) Pipe coupling: solid.

8.4.5.1(3)(b) Joint cover: No. 15 or 30 asphalt saturated roofing felt or polyethylene.

8.4.5.1(3)(c) Filter Fabric: Water pervious type, black polyolefin or polyester.

8.4.5.2 Performance criteria

8.4.5.2(1) Foundation drainage to carry all sub-surface ground water away from footings and foundation walls and into the onsite storm drainage system.

8.4.5.2(2) Installation to meet the requirements of the B.C. Building Code, and all applicable municipal codes and bylaws.

8.4.6 Natural Gas Site Piping

8.4.6.1 Basic requirements

8.4.6.1(1) Section includes

8.4.6.1(1)(a) Pipe and fittings for Site utility natural and propane gas distribution.

8.4.6.1(1)(b) Propane storage tanks.

8.4.6.1(2) Quality Requirements

8.4.6.1(2)(a) ANSI B31.2 Fuel Gas Piping

8.4.6.1(2)(b) NFPA 54 National Fuel Gas Code

8.4.6.1(2)(c) NFPA 58 Liquefied Petroleum Gas Code

8.4.6.2 Performance Criteria

8.4.6.2(1) Perform work in accordance with the requirements of the gas transmission utility, and all local governing codes and bylaws.

8.4.6.2(2) Welding Materials and procedures: Conform to ASME Boiler and Pressure Vessel Code and applicable provincial regulations.

8.4.6.2(3) Welders Certification: In accordance with ASME SEC IX.

APPENDIX 3A - CLINICAL SPECIFICATIONS AND FUNCTIONAL SPACE REQUIREMENTS

See separate Document package.

APPENDIX 3B – WOOD FIRST APPROPRIATE USE MATRIX

Area of Usage	Appropriateness	Justification
Substructure		
Forming/ Shutter (temporary)	Appropriate	The use of wood in this process is a traditional method of construction.
Structure		
Slab on grade	Inappropriate	The loads applied to the slab are in excess of wood's capabilities and wood is subject to rot, mould and insects such as termites, impacts that are exacerbated by proximity to the ground.
Beams	Inappropriate	Not permitted by the BC Building Code.
Columns	Inappropriate	Not permitted by the BC Building Code.
Upper Flooring	Inappropriate	Not permitted by the BC Building Code.
Roof (Penthouse)	Inappropriate	Not permitted by the BC Building Code.
Heavy Timber Structure or Non-Structural Elements	Potentially Appropriate as an 'Alternative Solution' Approach	Although the base building structure is required to be of non-combustible construction, proponents are strongly urged to consider a heavy timber design that could be integrated as a 'secondary' structure or decorative installation for specific feature areas.
Exterior Cladding		
Roof Finish (Flat Roof)	Inappropriate	There is no known wood product for this application.
Walls above ground level	Appropriate or Potentially Appropriate as an "Alternative Solution" Approach	Exterior cladding, details, trims, etc., are permitted provided the interior surface of the wall assemblies are protected by a thermal barrier and the wall assembly satisfies the referenced test criteria for fire spread on exterior wall assemblies. Beyond that permitted by the BC Building Code, exterior components such as wood cladding and soffit/trims could be supported with an 'alternative solution' approach' incorporating fire-retardant treated wood (FRTW) or exterior sprinkler protection strategies (where warranted). Wood materials on soffits could extend to exterior wood on main building elevations. Alternative solution strategies should consider the use of FRT wood products and/or automatic sprinkler protection.
Exterior Windows	Inappropriate	Ability to clean and water/chemical resistance are paramount in this location.
Curtain Wall	Inappropriate	There is no known wood product for this application.
Exterior Doors and Screens	Appropriate	Wood doors and screens can be used in low traffic areas.
Roof	Appropriate	Wood permitted

Area of Usage	Appropriateness	Justification
Accessories (parapet, cant strips, plywood backing)		
Interior Partitions and Doors		
Partition Studding	Inappropriate	Not permitted by the BC Building Code.
Interior Doors	Appropriate for offices Inappropriate for ORs and MDR	Framing, core and facing of door can be wood for locations not requiring greater than a 90 minute fire resistance rating. Wood doors in high metal cart and material transport traffic areas and high humidity areas like the clinical and MDR areas would be inappropriate.
Vertical Movement		
Stairs (Structural)	Inappropriate	Not permitted by the BC Building Code.
Stairs (treads, risers)	Inappropriate	Not permitted by the BC Building Code.
Guardrails	Appropriate for non-exit stairs	Wood can be used in these locations where there is a low to medium risk of impact.
Handrails	Appropriate	Wood permitted.
Fittings and Equipment		
Hardwood Floor	Appropriate	Wood could be used in certain, non-clinical locations as a floor finish; this would be limited to high end finished areas which are not subject to low acoustic or high usage requirements. Building code requirements would have to be met.
Ceiling Tiles	Appropriate	Wood could be used in ceiling tiles for aesthetic requirements in certain, non-clinical areas within the building provided that they are not more than 25mm thick with a flame spread rating not more than 25, and except for not more than 10% of ceiling area in a fire compartment is permitted to have an FSR of up to 150. This would be limited to high end finished areas which are not subject to low acoustic or high usage requirements.
Wall Finish	Appropriate	Wood could be used as a wall finish for aesthetic and acoustic requirements in certain, non-clinical areas within the building provided that they are not more than 25mm thick with a flame spread rating not more than 150. This would be limited to high end finished areas which are not impaired by acoustic and high usage requirements. Beyond that permitted by the BC Building Code, interior finishes could be supported with an 'alternative solution' approach incorporating other considerations/features such as specific geometry/location of wood, potential fire exposure potential and enhanced fire suppression systems for the area.
Toilet Partitions	Appropriate	The core material for the partitions can be made from wood particles.
Signs	Appropriate	The base material on which the sign is mounted can be of wood.

Area of Usage	Appropriateness	Justification
Loose Equipment (Desks, chairs, etc)	Appropriate	The core material for the desks, chairs, etc., can be made from particle and complete wood substrate except where CSA standards require non-porous materials such as in MDR, the Sterile Core and the ORs.
Fixed Equipment (Millwork)	Appropriate	Frames, core material, doors and substrate for millwork can be constructed with wood. This includes show windows, aprons/backing, shelves, cabinets and counters.
Modular Benches	Inappropriate	To be stainless steel in MDR.
Specialized Equipment	Inappropriate	Clinical equipment and associated environment cannot utilise wood as these environments need to be inert.
Blocking within walls	Appropriate	For attachment of handrails, accessories and similar interior finish items mounted on the surface of walls.
Nailing Elements	Appropriate	Wood nailing elements attached directly to or set into a non-combustible backing for the attachment of interior finishes are permitted provided there is no air space of more than 50mm thick.
Mechanical		
None Known		
Electrical		
None Known		
Site Development		
Landscaping (Architectural, decorative, site furnishings, etc)	Appropriate	Wood could be used in Landscaped areas for the Arts, Architectural features/site furnishings; seats, pagodas, etc.
Contractor		
Site establishment	Appropriate	Where appropriate, Project Co is to endeavour to utilise materials of wood and wood derivative for their site establishment.

APPENDIX 3C - MEDICAL GAS REQUIREMENTS

PART 1: GENERAL

A. **SCOPE**

1. Oxygen System
2. Nitrous Oxide System
3. Nitrogen System
4. Medical Compressed Air System
5. Medical Vacuum System
6. Carbon Dioxide System
7. Anaesthetic Gas Scavenging Disposal System
8. Laser Smoke Evacuation Systems

B. **RELATED WORK**

1. Section 5.3 Post Disaster Requirements
2. Section 7 Facilities Services Sub-Group Specification

C. **GENERAL REQUIREMENTS**

1. Include supply, installation and testing of complete medical gas piping system.
2. Components to include but not be limited to:
    a. Pipe, fittings, valves, valve boxes, alarms and sensing devices, and medical gas outlets.
    b. Vacuum pumps, motors, control panels and accessories.
    c. Air compressors, motors, control panels, dryers, filters and accessories.
    d. Manifold and accessories.
    e. Gas control panels (for Nitrogen and Air service).
    f. Installation of service piping and connection to owner supplied bulk medical gas system.
    g. Evacuation/Scavenging Systems.

1. Medical gas purity and cross-contamination testing to be completed by a certified testing agency hired directly by the Authority. Include for all costs associated with co-ordination and assistance required during purity testing of the medical gas systems.

2. Provide maintenance data for incorporation into maintenance manual. This data will include:

    a. Equipment list identifying all components used in each system.

    b. Equipment manufacturer's names and addresses.

    c. Wiring diagrams of all alarms and electrical components.

    d. Detailed drawings of all equipment and components.

    e. Manufacturers service manuals for all equipment.

    f. Valve schedule listing all valves in the system with location.

    g. Completed test result report form.

D. **QUALITY ASSURANCE**

1. All piping equipment, installation and testing to conform to the latest editions (including changes and revisions) of the following Codes and Standards:

    a. NFPA 99 Health Care Facility (1999).

    b. NFPA 70 National Electrical Code.

    c. NFPA 50 Bulk 02 Systems at Consumer Sites.

    d. CSA Z305.1-1992 Non-flammable Medical Gas Piping Systems.

    e. CSA Z7396-1) Medical Gas Guidelines.

    f. BNQ5710-500 Medical Gas Guidelines.

    g. ASTM B819 Standard Specification for Seamless Copper Tube for Medical Gas Systems.

    h. AWS A5.8 Brazing Filler Metal.

    i. CGA G-4.1 Cleaning Equipment for Oxygen Service.

    j. CGA V-1 Compressed Gas Cylinder Valve Outlet and Inlet Connections

    k. CGA V-5 Diameter Indexing Safety System

l. NIOSH Evaluation of a Smoke Evacuator Used for Laser Surgery, Lasers

m. CAN/CSA-Z7396-2-02 Anaesthetic gas scavenging disposal systems

2. Comply with Federal, Provincial and Local Codes applicable to this installation.

E. **MANUFACTURER**

1. One manufacturer to provide the medical gas systems equipment, including the sources of supply. This manufacturer to have a product specialist available to periodically check with the contractor during initial installation of the pipeline systems equipment. The equipment manufacturer's representative will train the hospital personnel in the use of the piping system and related equipment, which is operated from those systems.

APPENDIX 3C, MEDICAL GAS REQUIREMENTS - PRODUCTS

A. **PIPE, FITTINGS AND JOINTS**

1. Piping: All distribution system piping except for the “passive” waste anaesthetic gas evacuation system will be Type "L" washed and degreased, seamless copper tubing, provided with protective caps at both ends. Where concealed it will be soft temper and where exposed it will be hard temper.

2. Fittings: All fittings except for the “passive” gas evacuation system to be of wrought copper, brass or bronze, designed expressly for brazed silver solder connections. Fittings will be cleaned to CSA standards.

3. Brazing Alloy: Fittings to be assembled using a silver brazing alloy conforming to AWS classification BCuP-5. This requirement does not apply to any part of the medical gas system that is located outdoors, including storage vessels.

B. **SHUT-OFF VALVES**

1. Valves to be a 4-bolt design, bronze body, double seal, full port, union ball-type with teflon (TFE) seats and Viton seals, "O" ring packing, bronze ball which seals in both directions, blow-out proof stem, having a pressure rating of 4137 kPa (600 psig).

2. Valves to be operated by a lever handle requiring only a quarter turn from a fully open position to a fully closed position. All valves will be equipped with type "K" washed and degreased copper pipe stub extensions at both the inlet and outlet sides of the valve port to facilitate installation.

3. Valves to be designed so that it can be "swung-out" during installation to prevent damage due to heat transfer during the brazing operation. A label showing the appropriate gas services and pressure rating will be attached to each valve.

4. Each valve assembly to be provided washed and degreased for oxygen service and pipe stub extensions to be capped at both ends. The valve to be supplied in a sealed plastic bag to prevent contamination prior to installation.

5. Valves will be dual port design.

C. **ZONE VALVE BOXES**

1. Each recessed zone valve box to consist of the following components: A steel valve box which can house single or multiple shut-off ball valves with tube extensions, an aluminium frame, and a pull-out removable window.

2. The valve box to be constructed of 18 gauge steel complete with a baked enamel finish. Affixed to the opposing sides of the box to be two adjustable steel brackets for the purpose of mounting to structural support. The steel brackets will accommodate various finished wall thicknesses of between 6 mm (1/4") and 13 mm (1/2") and will be field adjustable.

3. The doorframe assembly to be constructed of anodised aluminium and to be mounted to the back box assembly by screws as provided. The removable front to consist of a clear window with a pullout ring pre-mounted to the centre of the window.

4. Access to the zone shut-off valves to be by merely pulling the ring assembly to remove the window from the doorframe. The window can be reinstalled without the use of tools only after the valve handles have been returned to the open position.

5. The window to be marked with the following silk-screen:

"CAUTION: MEDICAL GAS CONTROL VALVE

CLOSE ONLY IN EMERGENCY"

6. Valves to be a 4-bolt design, bronze body, dual port design, double seal, union ball-type, with Teflon (TFE) seats and Viton seals, "O" ring packing, and ball which seals in both directions, blow-out proof stem, with a pressure rating of 2760 kPa (400 psig). Valves to be operated by a lever-type handle requiring only a quarter turn from a fully open position to a fully closed position. All valves to be equipped with type "K" washed and degreased copper pipe stub extensions of sufficient length to protrude beyond the sides of the box.

7. The entire valve body and pipe stubs to be plated to a minimum of 25 mm (1") beyond the sides of the back box, but in no instance will the plating be extended to the ends of the pipe stubs. All pipe stub extensions to be supplied with suitable plugs or caps to prevent contamination of the assembly prior to installation.

8. Each valve to be supplied with an identification bracket bolted directly onto the valve body for the purpose of applying an approved medical gas identification label. A package of labels to be supplied with each valve box assembly for application by the installer.

9. Valves to be available with or without line pressure gauges, as required. Gauges, when supplied, to be 51 mm (2”) diameter, with metal case and ring, and a 3 mm (1/8") MNPT brass stud at the back of the gauge for the purpose of mounting onto pipe stub extension. The pipe stub extension to be complete with a soldered gauge holder. Gauge holders to be sealed with a brass plug to prevent contamination prior to mounting gauges.

10. Pressure gauges to read 0-700 kPa (0-100 psig) for all gases except nitrogen, which will read 0-2000 kPa (0-300 psig), and vacuum, which will read -100-0 kPa (0-30" Hg).

D. **MEDICAL GAS OUTLETS DISS**

1. Medical gas outlets to be Diameter Index Safety System (DISS) recessed wall outlets designed for concealed piping.

2. Each DISS outlet to have a large colour coded front plate for ease of gas identification and aesthetic appeal. The front plate assembly to contain indexing pins for safety keying the gas specific cover plate to the appropriate steel rough-in mounting plate.

3. A one piece chromed fascia plate to cover the outlet. With the backbox rough-in mounted, the outlet to adjust from 10 mm (3/8") to 32 mm (1-1/4") variation in wall thickness.

4. The outlets to be of modular design and include a gas specific 1.6 mm (16 ga.) steel mounting plate designed to permit on-site ganging of multiple outlets, in any order, on 127 mm (5") spacing.

5. Each rough-in box to consist of a type "K", 6.4 mm (1/4") inside diameter copper inlet pipe stub, which is silver brazed to the outlet body. Body will be 32 mm (1-1/4") diameter one piece, brass construction. For positive pressure gas services, the outlet to be equipped with a primary and secondary check valve. The secondary check valve to be rated at a minimum 1379 KPa (200 psi) in the event the primary check valve is removed for maintenance.

6. The latch/valve assembly to be DISS type and only accept corresponding DISS type gas specific adapters.

7. All outlets to be UL listed, CSA approved, factory assembled, tested, cleaned for oxygen service, and supplied with temporary protective covers and packages to protect outlet during handling and installation at the job site.

8. Each Medical Vacuum gas outlet to be supplied with a wall mounted vacuum bottle slide. Installed at location confirmed by end user.

E. **AREA ALARM PANEL (DIGITAL)**

1. Each area alarm to be microprocessor based with individual microprocessors on each display and sensor board. The sensors to be capable of local (within alarm box) or remote mounting on pipeline utilising twisted pair wiring - up to 1,524 m (5,000 ft.). Each sensor and display unit to be gas specific; i.e. gas specific sensor with DISS nut & nipple, and display module with an error message display for an incorrect sensor/display connection.

2. Each area alarm to consist of: an 18 gauge (1.3 mm) steel back box with mounting brackets adjustable up to 13 mm (½") wall thickness and 6.4 mm (¼") I.D. type "K" copper tubing for connection to the gas service line. The area alarms to be of modular construction and to be field expandable with the addition of extra modules. Up to six services can be accommodated per standard box. All modules to be mounted on a hinged frame for easy accessibility.

3. Each specific service to be continuously monitored by a microprocessor based sensor. The pressure or vacuum to be displayed by a red digital LED. For pressure services the readout to be 0-1724 kPa (0-250 psig). For vacuum the readout to be -100-0 kPa (0-30" Hg). The digital readout to provide a constant indication of each service being measured. A bar graph trend indicator to be provided for each service displaying a green "NORMAL", yellow "CAUTION" and a red "HIGH" or "LOW" alarm condition. Under normal operations the bar graph display will move up and down in the "GREEN" range depending on service usage. If a deviation of ±20% from the factory pre-set normal condition occurs, a "RED" alarm light will flash and an audible buzzer in excess of 90 decibels will sound. Pushing the "ALARM SILENCE" button will cancel the audible buzzer, but the unit will remain in alarm condition until the problem is rectified.

4. The alarm to have field adjustable parameters; High/Low set points, Imperial/Metric units and Repeat alarm Enable (1 to 60 minutes)/Disable function. These parameters can be accessed within the calibration mode function of the alarm. Set-points will be adjustable by two on board push buttons. Alarm to be self-diagnostic with error message display for ease of maintenance.

5. Each gas service to be labelled with ISO or USA colour coded label, and alarm signals to be visible from a distance of 12 m (40 ft.) and to be visible if other lights in the room are off.

6. Each gas service display module to have dry contacts for remote monitoring of the High and Low alarms. The area alarm to interface with the BMS System.

7. Area alarms to be closed circuit and to be CSA certified and UL listed. A green "power on" light to indicate that the alarm is energised. Alarms to be complete with a "push to test" and "alarm silence" buttons. Area alarms will have no moving parts and will require no maintenance after initial installation.

F. **MASTER ALARM PANEL**

1. Each master alarm to be microprocessor based with individual microprocessors on each master module. Each master alarm module is capable of handling up to 10 operating functions.

2. Each master alarm to consist of: an 18 gauge (1.3 mm) steel back box with mounting brackets adjustable up to 13 mm (½") wall thickness. The master alarms to be of modular construction and to be field expandable with the addition of extra modules. Up to six, ten signal, master alarm modules can be accommodated per standard box for a total of 60 signals. All modules to be mounted on a hinged frame for easy accessibility.

3. The master alarm to be a closed circuit self-monitoring type. A green "POWER" light to provide indication that the alarm is energised. In addition "PUSH TO TEST" and “ALARM SILENCE" buttons to be easily accessible to operate and test the unit. If an alarm condition occurs, a "RED" alarm LED will illuminate and an audible buzzer in excess of 90 decibels will sound. Pushing the "ALARM SILENCE" button will cancel the audible buzzer, but a repeat alarm function will, when enabled, be capable of turning on the buzzer again, after a pre-set time, if the fault condition has not been rectified.

4. The master alarm to have field adjustable functions. For the master module: A maintenance mode will, when enabled, latch the source (master) alarm conditions, requiring a reset after the alarm condition has been rectified. This is to assist in tracking down wiring problems or faulty source equipment devices. A repeat alarm function will, when enabled, be capable of turning on the buzzer again, after a pre-set time, if the fault condition has not been rectified.

5. Each master alarm to be CSA certified and UL listed.

6. Every master module to be field upgradable to allow for interfacing to a building management system with the addition of add-on, piggyback circuit board. The master alarm to also interface with the BMS System.

7. The following source (remote) conditions to be monitored by the master display modules (10 signals/module):

    a. Oxygen Liquid Supply

        i. Oxygen Primary Liquid Level Low

        ii. Oxygen Secondary Liquid Supply In Use

        iii. Oxygen Secondary Liquid Low Head Pressure

iv. Oxygen Secondary Liquid Level Low

v. Oxygen Emergency Reserve Cylinders In Use

vi. Oxygen Emergency Reserve Cylinders Low

vii. Oxygen Line Pressure Low

viii. Oxygen Line Pressure High

b. Oxygen Cylinder Supply

i. 1. Oxygen Reserve Cylinders In Use

ii. 2. Oxygen Line Pressure Low

iii. 3. Oxygen Line Pressure High

c. Nitrogen Cylinder Supply

i. Nitrogen Reserve Cylinders In Use

ii. Nitrogen Line Pressure Low

iii. Nitrogen Line Pressure High

iv. Nitrous Oxide Cylinder Supply

v. Nitrous Oxide Reserve Cylinders In Use

vi. Nitrous Oxide Line Pressure Low

vii. Nitrous Oxide Line Pressure High

d. Carbon Dioxide Cylinder Supply

i. Carbon Dioxide Reserve Cylinders In Use

ii. Carbon Dioxide Line Pressure Low

iii. Carbon Dioxide Line Pressure High

e. Medical Air Compressor (Oil-less)

i. Medical Air Lag Compressor in Use

ii. Medical Air Compressor High Temperature Shutdown

iii. Medical Air Compressors Maintenance Required

iv. Medical Air Reserve Cylinders In Use

v. Medical Air Reserve Cylinders Low

vi. Medical Air High Dew Point

vii. Medical Air Line Pressure Low

viii. Medical Air Line Pressure High

f. Medical Air Dryer (Desiccant)

i. Desiccant Dryer Switching Failure

ii. Desiccant Dryer Low Outlet Pressure

g. Medical Vacuum System (Rotary Lobe)

i. Vacuum Pumps Low Oil Shutdown

ii. Vacuum Pumps High Temperature Shutdown

iii. Vacuum Pumps Maintenance Required

iv. Vacuum Lag Pump In Use

v. Vacuum Low

8. Master alarms will have no moving parts and will require no maintenance after initial installation.

G. **MASTER/AREA ALARM COMBINATION PANEL**

1. Each master/area alarm to be microprocessor based with individual microprocessors on each area display module/sensor board and each master module. The area sensors to be capable of local (within alarm box) or remote mounting on pipeline utilising twisted pair wiring - up to 1,524m (5,000 ft.). Each area display module/sensor unit to be gas specific; i.e. gas specific sensor with DISS nut & nipple, and display module with an error message display for an incorrect sensor/display connection. Each master alarm module is capable of handling up to 10 operating functions.

2. Each combination master/area alarm to consist of: an 18 gauge (1.3 mm) steel back box with mounting brackets adjustable up to 13 mm (½") wall thickness and 6.4 mm (¼") I.D. type "K" copper tubing for connection to the gas service line (required for the area sensor). The combination master/area alarms will be of modular construction and will be field expandable with the addition of extra modules. Up to six services (combination of area and/or master modules) can be accommodated per standard box. All modules will be mounted on a hinged frame for easy accessibility.

3. Each area alarm specific gas service to be continuously monitored by a microprocessor based sensor. The pressure or vacuum will be displayed by a red digital LED. For pressure services the readout to be 0-1724 kPa (0-250 psig). For vacuum the readout to be -100-0 kPa (0-30" Hg). The digital readout to provide a constant indication of each service being measured. A bar graph trend indicator to be provided for each service displaying a green "NORMAL", yellow "CAUTION" and a red "HIGH" or "LOW" alarm condition. Under normal operations the bar graph display will move up and down in the "GREEN" range depending on service usage. If a deviation of ±20% from the factory pre-set normal condition occurs, a "RED" alarm LED light will flash and an audible buzzer in excess of 90 decibels will sound. Pushing the "ALARM SILENCE" button will cancel the audible buzzer, but the unit will remain in alarm condition until the problem is rectified.

4. The combination master/area alarm to have field adjustable parameters. For the area modules: High/Low set-points, Imperial/Metric units and Repeat alarm Enable (1 to 60 minutes)/Disable function. These parameters can be accessed within the calibration mode function of the alarm. Set-points to be adjustable by two on board push buttons. Alarm will be self-diagnostic with error message display for ease of maintenance. For the master module: a maintenance mode will, when enabled, latch the source (master) alarm conditions, requiring a reset after the alarm condition has been rectified. This is to assist in tracking down wiring problems or faulty source equipment devices. A repeat alarm function will, when enabled, be capable of turning on the buzzer again, after a pre-set time, if the fault condition has not been rectified.

5. Each area gas service to be labelled with an ISO/USA colour coded label, and alarm signals to be visible from a distance of 12 m (40 ft.) and to be visible if other lights in the room are off.

6. Each area gas service display module to have dry contacts for remote monitoring of the High and Low alarms. Every master module to be field upgradable to allow for interfacing to a building management system with the addition of add-on, piggyback circuit board. The master/area alarm will interface with the BMS.

7. Master/Area alarms to be closed circuit and to be CSA certified and UL listed. A green "power on" light will indicate that the alarm is energised. Alarms will be complete with a "push to test" and "alarm silence" buttons. Area alarms will have no moving parts and will require no maintenance after initial installation.

8. Combination master/area alarms will have no moving parts and will require no maintenance after initial installation.

H. GAS CONTROL PANEL FOR NITROGEN AND AIR SERVICE

1. Each Gas Control Panel to be supplied with an integral 2069 kPa (300 psig) shut-off valve. Valve to require a quarter turn from fully open position to fully closed position. A 0-2000 kPa (0-300 psig) inlet pressure gauge to be mounted prior to the shut-off valve to monitor the degree of line pressure being provided to the unit.

2. A manually adjustable, self-relieving, pressure regulator with an operating range of 0-1724 kPa (0-250 psig) to be positioned on the "outlet" side of the control valve. A "push/pull" safety lock to be incorporated in the regulator to avoid inadvertent resetting during usage.

3. Mounted on the low-pressure side of the regulator to be a 0-2000 kPa (0-300 psig) pressure gauge to ensure that the proper operating pressure has been achieved and is being maintained.

4. A DISS nitrogen or air outlet to be supplied for connection to pneumatic tools. All components to be conveniently mounted to an anodised aluminium facia assembly. The entire assembly to be housed in a 1.5 mm (0.060") steel back box with supports to secure the unit within the wall or partition. Two type "K" washed and degreased copper inlet/outlet connections to be provided for direct connection to main distribution and for remotely located nitrogen or air outlets.

5. Unit to be suitably packaged to prevent contamination prior to installation. Contractor to exercise care in storing units to ensure cleanliness.

6. Gas Control Panel to be UL/CSA listed.

I. PRESSURE SWITCHES

1. High-Low pressure switches for oxygen, nitrous oxide, medical air, and carbon dioxide to be pre-set to alarm at 276 kPa (40 psig) decreasing pressure and at 414 kPa (60 psig) increasing pressure.

2. Pressure switch to have an adjustable range of 0-552 kPa (0-80 psig), proof pressure of 1103 kPa (160 psig). Electrical characteristics to be: dual control with two single pole, double-throw snap action switches rated at 10 amps, 125 volts AC. All pressure switches to be wired to accommodate a normally open alarm circuit.

3. Switches to be UL listed, CSA approved, and cleaned for oxygen service. Construction of the switch to be weatherproof die cast aluminium and brass bellows sensing element. Pressure connection into the switch to be 6 mm (¼") FNPT. Switches to be attached to piping using gas specific DISS connectors.

4. Pressure switches to be Barksdale CDIH, CD2H Diaphragm Switch or approved alternate.

J. HIGH PRESSURE CYLINDER MANIFOLD (PRIMARY RESERVE SOURCE OF SUPPLY)

1. Manifold to consist of two high-pressure header bar assemblies to facilitate connection of primary and secondary cylinder supplies. Each header bar to be provided with the appropriate number of CGA cylinder pigtail connections incorporating a check valve at the header connection. The high-pressure header bar to be designed in such a manner that it can be extended to facilitate additional cylinder connections. Each header bar assembly to be provided with a high-pressure shut-off valve. The manifold to be fully automatic in operation and will not require any levers or handles for resetting by maintenance staff.

2. Control equipment to be made up of a series of regulators to reduce the cylinder pressure to line delivery pressure. The unit to be capable of automatically changing over from a primary bank of cylinders to a secondary bank of cylinders without interruption or fluctuation in delivery pressure. The manifold will be housed in a NEMA 1 enclosure.

3. A Microprocessor circuit board assembly to provide a relay output to give indication when or just before the manifold switches from one bank of cylinders to another. The switch over to be mechanically controlled. Manifolds using electrically controlled shuttling devices will not be acceptable.

4. To avoid excess pressure being supplied to the distribution system, a pneumatically relief valve for the line regulator will be incorporated. An intermediate pressure relief valve will be installed between the high-pressure regulators and the line delivery regulators.

5. Gauges to be installed within the enclosure downstream of each high-pressure regulator and also at the output end of the delivery pressure pipe. Gauges to indicate the regulated pressures of the left and right banks of the manifold.

6. The control panel incorporates six coloured LED's, three for the Left Bank and three for the Right Bank: Green for Bank in use, Amber for Bank ready and Red for Bank empty. Both the Left and Right bank pressures and the main line pressure are displayed on the front door of the cabinet by means of LED's. All pressure transducers, micro switches, and display LED's will be pre-wired to an internal microprocessor circuit board. The manifold will interface with the BMS.

7. Manifold to have provision for field selection of psi, kPa or BAR display.

8. Manifold to have an auto-switching power supply, 90 – 240VAC.

9. Manifold to be UL/CSA listed.

K. **EMERGENCY OXYGEN INLET STATION - (LOW PRESSURE)**

1. The Emergency Gaseous Oxygen Inlet to be housed in a weathertight enclosure.

2. A brass ball valve and a supply pressure gauge to be used to introduce the oxygen into the oxygen pipeline.

3. The enclosure door to be labelled "Emergency Gaseous Oxygen Inlet" and to be equipped with a staple for padlocking to allow entry only by authorised personnel. A print pocket to be included on the door interior for storage of instructions. A mounting frame to extend completely around the enclosure to trim recessed mounting on an exterior wall.

4. The interior of the enclosure to be clearly labelled with instructions for connection and operation of the emergency oxygen inlet.

5. Bronze body check valves with female pipe threads on each end to be provided for installation in the main and emergency supply pipeline in accordance with NFPA-99.

6. A brass body relief valve with the relief pressure set @ 75 PSI to be provided for installation in the emergency supply line. The relief valve to be supplied factory cleaned for oxygen service and to automatically reset after discharging to provide a positive seal.

Medical Vacuum Systems (Refer to CSA Standards)

Medical Compressed Air Plant with Desiccant Dryers (Refer to CSA Standards)

Laser Smoke Evacuation System as per NIOSH Standard – Evaluation of s Smoke Evacuator used for Laser Surgery, Lasers Surg. Med 9:276 281 (1989) or latest edition

Anaesthetic Gas Scavenging Disposal System shall be Active type operating at 22" of mercury and in compliance with CSA Standard -Z7396-2-02.

APPENDIX 3D - ACOUSTIC AND NOISE CONTROL MEASURES

See separate document ACOUSTIC AND NOISE CONTROL MEASURES

APPENDIX 3E – AUTHORITY IMIT INFRASTRUCTURE SPECIFICATIONS

See separate document AUTHORITY IMIT INFRASTRUCTURE SPECIFICATIONS V2.1.

APPENDIX 3F – NOT USED

APPENDIX 3G – NOT USED

APPENDIX 3H - SYSTEMS RESPONSIBILITY MATRIX

See separate spreadsheet

APPENDIX 3I - ROOM REQUIREMENTS

See separate spreadsheet.

APPENDIX 3J - SITE SERVICES

See separate drawings

APPENDIX 3K – STAFF SAFETY GUIDELINES FOR HEALTHCARE FACILITY DESIGN PROJECTS

See separate document

APPENDIX 3L - 1:50 STANDARD PLANS

See separate drawings.

APPENDIX 3M – UBC STANDARDS

- SPECIFICATIONS AND REQUIREMENTS FOR CLINICAL EDUCATION FACILITIES
- SIGNAGE GUIDELINES FOR UBC FACULTY OF MEDICINE ACADEMIC FACILITIES AND SPACES LOCATED AT HEALTH AUTHORITY SITES
- DESIGN GUIDELINES FOR LEARNING SPACE AV SYSTEMS & ASSOCIATED INFRASTRUCTURE CLINICAL SKILLS ROOMS
- DESIGN GUIDELINES FOR LEARNING SPACE AV SYSTEMS & ASSOCIATED INFRASTRUCTURE ENHANCED CLINICAL SKILLS ROOMS
- DESIGN GUIDELINES FOR LEARNING SPACE AV SYSTEMS & ASSOCIATED INFRASTRUCTURE SMALL SEMINAR ROOMS
- UBC FACULTY OF MEDICINE INFRASTRUCTURE REQUIREMENTS AND INDICATIVE DESIGN FOR SMALL VIDEOCONFERENCE ROOMS AND CLINICAL SKILLS ROOMS