SCHEDULE 3

DESIGN AND CONSTRUCTION SPECIFICATIONS

April 15, 2014

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Part 1. INTERPRETATION

1.1 Definitions

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

1.1.1.1 "Ambulatory Care Building" is the building identified as the "Ambulatory Care Building" on the Site Plan, Schedule 2- Appendix 2H (Site Plan);

1.1.1.2 "Acute Care Centre" means the Building;

1.1.1.3 "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;

1.1.1.4 "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).

1.1.1.5 "Building" - means the building to be designed and constructed by Project Co pursuant to his Agreement and generally referred to as the "Acute Care Centre" building, including Building Connections to adjacent buildings.

1.1.1.6 "Building Connection"- has the meaning set out in Section 4.3 of this Schedule;

1.1.1.7 "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;

1.1.1.8 "Campus Plant"- means the campus steam supply system located in the Plant Services Building;

1.1.1.9 "Clinical Spaces"- spaces used primarily in the direct care of patients and families;

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

1.1.1.11 "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.

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

1.1.1.13 "C&W Campus" has the meaning set out in Schedule 1;

1.1.1.14 "Direct Access" – Physical access between rooms or components through the use of a minimal amount of horizontal and/or vertical general or internal circulation;

1.1.1.15 "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.

1.1.1.16 "Emergency Operations Centre" has the meaning set out in Section 5.3.8 of this Schedule;

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

1.1.1.18 "Facility" has the meaning set out in Schedule 1;

1.1.1.19 "Function Protection"- designates the highest level of disaster preparedness with the goal to protect life and investment, and to ensure that the facility continues to operate post disaster.

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

1.1.1.21 "Hazardous Substance" has the meaning set out in Schedule 1;

1.1.1.22 "Headcount" – The translation of FTE's into the actual number of people. This includes part time and full time employees;

1.1.1.23 "Healing Environment" has the meaning set out in Section 3.7.1.3 of this Schedule;

1.1.1.24 "Hospital" has the meaning set out in Schedule 2;

1.1.1.25 "Human Scale" is the set of physical qualities, characterizing the human body, its motor, sensory, or mental capabilities, and human social institutions;

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

1.1.1.27 "Lean" – as defined in APPENDIX P: Glossary of Terms;

1.1.1.28 "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;

1.1.1.29 "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;

1.1.1.30 "Patient area" an area used primarily for diagnosis, therapy or treatment.

1.1.1.31 "Podium Roof" lower roof level over lower floor levels;

1.1.1.32 "Project Co Construction Site Boundary" is the work area defined in the Site Plan, Schedule 2-Appendix 2H (Site Plan);

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

1.1.1.34 "Protective Isolation Room" is a space with positive 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;

1.1.1.35 "Shaughnessy Building" is the building identified as ""Shaughnessy Building" on the Site Plan, Schedule 2- Appendix 2H (Site Plan);

1.1.1.36 "Vancouver Building By-law" refers to the current version of the building code in effect in the City of Vancouver;

1.1.1.37 "Workstation" – All workstations include a computer, phone, desk or counter and chair; and

1.1.1.38 "1982 Building" (or unless the context otherwise requires, "1982") is the building identified as "BC Children's, 1982 Building, BC Women's" shown on the Site Plan, Schedule 2-Appendix 2H (Site Plan).

1.2 Interpretation

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

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

1.2.3 Unless a specific date for a standard is stated, each reference to a standard in this document will be deemed to mean the current version of that standard.

1.3 Acronym List

1.3.1 ABS - Acrylonitrile Butadiene Styrene

1.3.2 ACB – Ambulatory Care Building

1.3.3 ACC - Acute Care Centre

1.3.4 ACLS – Advanced Cardiac Life Support

1.3.5 ACML – Angus Consulting Management Ltd.

1.3.6 ACU - Anesthetic Care Unit

1.3.7 ADP – Admit Day of Procedure

1.3.8 ADT – Admissions, Discharge and Transfer

1.3.9 AFFL – Above Finished Floor Level

1.3.10 AFUE - Annual Fuel Utilization Efficiency

1.3.11 AIR –Airborne Isolation Room

1.3.12 ALOS – Average Length of Stay

1.3.13 ANSI - American National Standards Institute

1.3.14 APER - Access Provider's Equipment Room

1.3.15 ARO – Antibiotic Resistant Organism

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

1.3.17 ASME - American Society of Mechanical Engineers

1.3.18 ASPE - American Society of Plumbing Engineers

1.3.19 ASTM - American Society for Testing and Materials

1.3.20 ATM – Automated Teller Machine

1.3.21 AV / IT – Audio Visual / Information Technology

1.3.22 AWMAC – Architectural Woodworker Manufacturers Association of Canada

1.3.23 BCERMS - British Columbia Emergency Response Management System

1.3.24 BCICA - British Columbia Insulation Contractors Association

1.3.25 BCLNA - British Columbia Landscape & Nursery Association

1.3.26 BCSLA - British Columbia Society of Landscape Architects

1.3.27 BE – Biomedical Engineering

1.3.28 BE/RT – Biomedical Engineering/Respiratory Therapy

1.3.29 BGSM – Building Gross Square Metres

1.3.30 BICSI - Building Industry Consulting Service International

1.3.31 BiPAP – Bi-Level Positive Airway Pressure

1.3.32 BISS – Business Initiatives and Support Services

1.3.33 BMS - Building Management System

1.3.34 BMT - Bone Marrow Transplant

1.3.35 BMV – Bedside Medication Verification

1.3.36 BP – Blood Pressure

1.3.37 CAC – Clinical Academic Campus

1.3.38 CATV – Community Access Television

1.3.39 CBC – Complete Blood Count

1.3.40 CBS – Canadian Blood Services

1.3.41 CCD – Charge Couple Device

1.3.42 CCT – Core Care Team

1.3.43 CCTV – Closed Circuit Television

1.3.44 CDU - Clinical Decision Unit

1.3.45 CEC – Canadian Electrical Code

1.3.46 CFC - Chlorofluorocarbon

1.3.47 CFL – Compact Fluorescent Lamp

1.3.48 CGA - Compressed Gas Association

1.3.49 CGSM – Component Gross Square Metres

1.3.50 CIF – Common Intermediate Format

1.3.51 CIS – Clinical Information System

1.3.52 CISCA - Ceiling Interior Systems Construction Association

1.3.53 CIVA – Centralized Intravenous Additives

1.3.54 CLSI – Clinical Laboratory Standards Institute

1.3.55 CMR - Communications Media Riser

1.3.56 CMP - Communications Media Plenum

1.3.57 CMU – Concrete Masonry Unit

1.3.58 CNC – Clinical Nurse Coordinator

1.3.59 CNL – Clinical Nurse Leader

1.3.60 CODEC – Coder/Decoder

1.3.61 COG – Children's Oncology Group

1.3.62 COPD – Chronic Obstructive Pulmonary Disease

1.3.63 CP- Consolidation Point

1.3.64 CPOE – Computerized Prescriber Order Entry

1.3.65 CPTED - Crime Prevention Through Environmental Design

1.3.66 CPU – Central Processing Unit

1.3.67 CRN – Clinical Resource Nurse

1.3.68 CRT – Cathode Ray Tube

1.3.69 CRTC – Canadian Radio-television and Telecommunications Commission

1.3.70 CSA - Canadian Standards Association

1.3.71 CSF – Cerebral Spinal Fluid

1.3.72 CT - Computer Tomography

1.3.73 CTAS – Canadian Triage Acuity Scale

1.3.74 CVP – Central Venous Pressure

1.3.75 C & W – Children's & Women's Health Centre of British Columbia Branch

1.3.76 Cx - Commissioning

1.3.77 DDC - Direct Digital Controls

1.3.78 DFO - Department of Fisheries and Oceans

1.3.79 DID – Direct Inward Dialling

1.3.80 DHS&R – District Heating Water Supply and Return

1.3.81 DISS - Diameter Index Safety System

1.3.82 DSSS – Direct Sequence Spread Spectrum

1.3.83 EBD-Evidence Based Design

1.3.84 EBM – Expressed Breast Milk

1.3.85 ECG – Electrocardiography

1.3.86 ECLS – Extracorporeal Life Support

1.3.87 ED –Emergency Department

1.3.88 EEG - Electroencephalogram

1.3.89 EGB – Electrical Ground Breaker

1.3.90 EHR – Electronic Health record

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

1.3.92 EM BC – Emergency Management and Business Continuity

1.3.93 EMCO – Extracorporeal membrane Oxygenation

1.3.94 EMS - Emergency Medical Services

1.3.95 EMT – Electric Metallic Tubing

1.3.96 ENT – Ear Nose Throat

1.3.97 EOC-Emergency Operations Centre

1.3.98 ESA – Environmental Site Assessment

1.3.99 ETO – Ethylene Oxide

1.3.100 ETL - ETL Testing Laboratories – product testing laboratory for U.S. and Canada

1.3.101 FA – Fire Alarm

1.3.102 FACP – Fire Alarm Control Panel

1.3.103 FATO – Final Approach and Take-off Area

1.3.104 FDC - Fiber Distribution Centre (Fiber splice tray or termination tray)

1.3.105 FEMA – Federal Emergency Management Agency

1.3.106 FIPPA – Freedom of Information and Protection of Privacy Act

1.3.107 FM – Factory Mutual

1.3.108 FP – Family Practice/Practitioner

1.3.109 FR – Formula Room

1.3.110 GPS – Global Positioning System

1.3.111 GSM – Gross Square Metres

1.3.112 HAZMAT - Hazardous Materials

1.3.113 HCF-Health Care Facility

1.3.114 HDU - High Dependency Unit

1.3.115 HEPA – High Efficiency Particulate Air

1.3.116 HID - High Intensity Discharge

1.3.117 HIMSS – Healthcare Information and Management Systems Society

1.3.118 HIS – Health Information Services/Hospital Information System

1.3.119 HL7 – Health Level 7

1.3.120 HOA – Hand/Off/Auto

1.3.121 HP – Horsepower

1.3.122 HPLC – High Performance Liquid Chromatography

1.3.123 HRC – High Rupting Capacity (fuse type)

1.3.124 HSSBC – Health Shared Services BC

1.3.125 HVAC - Heating, Ventilating and Air-Conditioning

1.3.126 IAQ-Interior Air Quality

1.3.127 ICP – Inductively Coupled Plasma

1.3.128 ICU – Intensive Care Unit

1.3.129 IDF - Intermediate Distribution Frame

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

1.3.131 IEEE - Institute of Electrical and Electronics Engineers

1.3.132 IFD – Integrated Facility Design

1.3.133 IMG – International Medical Graduates

1.3.134 IMIT – Information Management and Information Technology Services

1.3.135 IP – Internet Protocol

1.3.136 IPC - Infection Prevention and Control

1.3.137 IPS – Infant Protection System

1.3.138 IPU - Inpatient Unit

1.3.139 IR – Interventional Radiology

1.3.140 ISO – International Organization for Standardization

1.3.141 IT/IS – Information Technology/Information Systems

1.3.142 IT/Tel – Information Technology / Telecommunication

1.3.143 IV – Intravenous

1.3.144 IWS – Integrated Workplace Strategies

1.3.145 KW – Kilowatt

1.3.146 KWH – Kilowatt hours

1.3.147 KV – Kilovolt

1.3.148 KVA – Kilovolt Ampere

1.3.149 LAN – Local Area Network

1.3.150 LCD – Liquid Crystal Display

1.3.151 LDR – Labour Delivery and Recovery Room

1.3.152 LEED- LEED® Leadership in Energy and Environmental Design

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

1.3.154 LED – Light Emitting Diode

1.3.155 LIS – Laboratory Information System

1.3.156 LOS – Length of Stay

1.3.157 LOTO - Lock-Out Tag-Out)

1.3.158 LPN – Licensed Practical Nurse

1.3.159 MAR - Medication Administration Record

1.3.160 MAW - Maintenance/Administration Workstation

1.3.161 Mb – Megabit

1.3.162 MCFD – Ministry of Children & Family Department

1.3.163 MCP – Motor Circuit Protector

1.3.164 MD – Medical Doctor

1.3.165 MDR - Medical Device Reprocessing

1.3.166 MEGB - Main Electrical Ground Busbar

1.3.167 MER – Main Equipment Room

1.3.168 MFM – Maternal Fetal Medicine

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

1.3.170 MH&A – Mental Health and Addictions

1.3.171 MI - Medical Imaging

1.3.172 MIGB – Iodine Meta-Iodobenzylguanidine

1.3.173 MIL – Military Standard

1.3.174 MORE – Managing Obstetrical Risk Effectively

1.3.175 MPI – Master Painters Institute

1.3.176 MR – Magnetic Resonance

1.3.177 MRI - Magnetic Resonance Imaging

1.3.178 MRP – Most Responsible Provider

1.3.179 MW - Midwife

1.3.180 NEMA - National Electrical Standards Association

1.3.181 NFPA - National Fire Protection Association

1.3.182 NICU - Neonatal Intensive Care Unit

1.3.183 NM – Nuclear Medicine

1.3.184 NNP – Neonatal Nurse Practitioner

1.3.185 NP – Nurse Practitioner

1.3.186 NRC-National Research Council

1.3.187 NRP – Neonatal Resuscitation Program

1.3.188 NS - Network Support

1.3.189 NSM – Net Square Metres

1.3.190 NTSC – National Television Standards Committee

1.3.191 OB – Obstetrician

1.3.192 OEL - Occupational Exposure Limits

1.3.193 OFDM – Orthogonal Frequency Division Multiplexing

1.3.194 OHSR – Occupation Health and Safey Regulations

1.3.195 OPD – Outpatient Diagnostics

1.3.196 OR - Operating Room

1.3.197 OSCE – Objective Structured Clinical Examinations

1.3.198 OS&Y - Open Stem and Yoke

1.3.199 OT - Occupational Therapy/Therapist

1.3.200 PAC – Pre-Anesthesia Assessment Clinic

1.3.201 PACS - Picture Archiving and Communication System

1.3.202 PACU- Post Anaesthetic Care Unit

1.3.203 PAPR – Powered Air Purifying Respirators

1.3.204 PBX – Private Branch Exchange

1.3.205 PC – Personal Computer

1.3.206 PCB- Polychlorinated Biphenyl

1.3.207 PCC – Patient Care Coordinator

1.3.208 PCP – Principal Care Provider

1.3.209 PCR – Polymerase Chain Reaction

1.3.210 PDA – Personal Digital Assistant

1.3.211 PET - Positron Emission Tomography

1.3.212 PHSA – Provincial Health Services Authority

1.3.213 PI – Privacy Index

1.3.214 PICU - Paediatric Intensive Care Unit

1.3.215 PIPEDA – Personal Information Protection and Electronic Document Act

1.3.216 PIR - Protective Isolation Room

1.3.217 PLIS – Provincial Laboratory Information System

1.3.218 POA – Patient Observation Alcove

1.3.219 POCT - Point-of-care testing

1.3.220 PoE – Power Over Ethernet

1.3.221 POU - Point-of-Use

1.3.222 PPE - Personal Protective Equipment

1.3.223 PT - Physiotherapy/Physiotherapist

1.3.224 PTS – Pneumatic Tube system

1.3.225 PTZ – Pan Tilt Zoom

1.3.226 PVC – Polyvinyl Chloride

1.3.227 PYXIS – Name of locked storage system for pharmacy medications

1.3.228 RCABC – Roofing Contractors Association of British Columbia

1.3.229 RCDD – Registered Communications Distribution Designer

1.3.230 RFID – Radio Frequency Identification

1.3.231 RIS – Radiology Information System

1.3.232 RN – Registered Nurse

1.3.233 RMS – Root Mean Square

1.3.234 RO – Reverse Osmosis

1.3.235 ROP – Retinopathy of Pre-Maturity

1.3.236 RPN – Registered Practical Nurse

1.3.237 RT – Respiratory Therapy/Therapist

1.3.238 RTLS – Real Time Location System

1.3.239 SAGA - System of Approach Azimuthal Guidance

1.3.240 SANE – Sexual Assault Nurse Examiner

1.3.241 SES – Safety Engineering Society

1.3.242 SHY – Shaughnessy Building

1.3.243 SIP – Session Initiated Protocol

1.3.244 SLP – Speech Language Therapy

1.3.245 SMACNA – Sheet Metal and Air Conditioning Contractors National Association

1.3.246 SMD – Senior Medical Director

1.3.247 SMDR – Station Message Detail Recording

1.3.248 SMFPR – Satellite Milk and Formula Preparation Room

1.3.249 SNR – Signal to Noise Ratio

1.3.250 SPD- Surge Protective Device

1.3.251 SPDC – Special Products Distribution Centre

1.3.252 SPEP – Structured Practice Education Program

1.3.253 SRMC – Single Room Maternity Care (formerly LDRP)

1.3.254 SQL – Structured Query Language

1.3.255 STAT – Statim ("immediately")

1.3.256 STC – Sound Transmission Coefficient

1.3.257 STI – Sound Transmission Index

1.3.258 SW – Social Worker

1.3.259 TAB – Testing, adjusting and balancing

1.3.260 TAT – Turn Around Time

1.3.261 TCO – Total Cost of Ownership

1.3.262 TCP – Transmission Control Protocol

1.3.263 TDM – Time Division Multiplexing

1.3.264 TGB - Telecommunications Ground Bus bar

1.3.265 THD -Total Harmonic Distortion

1.3.266 TIA – Telecommunications Industry Association

1.3.267 TMGB - Telecommunications Main Ground Bus bar

1.3.268 TML – Transfusion Medicine Laboratory

1.3.269 TO - Telecommunications Outlet

1.3.270 TPN – Total Parental Nutrition

1.3.271 TR - Telecommunications Room

1.3.272 TTMAC – Terrazzo and Tile Manufacturers Association of Canada

1.3.273 TVOC – Total Volatile Organic Compounds

1.3.274 TVSS Transient Voltage Surge Suppressor

1.3.275 UBC - University of British Columbia

1.3.276 ULC - Underwriters' Laboratories of Canada

1.3.277 UPS – Uninterruptible Power Supply

1.3.278 US – Ultrasonography/Ultrasound

1.3.279 UTP - Unshielded Twisted Pair

1.3.280 V – Volt

1.3.281 VAD – Ventricular Assist Device

1.3.282 VAR – Volt Ampere Reactive power

1.3.283 VBBL- Vancouver Building By-Law

1.3.284 VDC - Video Display Controller

1.3.285 VGA - Video Graphics Array

1.3.286 VGH – Vancouver General Hospital

1.3.287 VFD - Variable Frequency Drive

1.3.288 VLAN – Virtual Local Area Network

1.3.289 VOC – Volatile Organic Compounds

1.3.290 VoIP – Voice Over Internet Protocol

1.3.291 WA - Work Area

1.3.292 WAN – Wide Area Network

1.3.293 WAP2 – Wireless Application Protocol 2

1.3.294 WMM – WiFi Multimedia

Part 2. **GENERAL**

2.1 Standards

2.1.1 Project Co will undertake the Design and Construction:

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

2.1.1.2 in accordance with the Vancouver Building By-law and all applicable codes, standards and laws;

2.1.1.3 in accordance with CSA Z8000 Canadian Health Care Facilities unless otherwise agreed to by the Authority; provided however that in the event of any conflict between CSA Z8000 and the express provisions of this Schedule 3, the express provisions of this Schedule 3 prevail;

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

2.1.1.4(1) all persons who will be Facility Users;

2.1.1.4(2) all Governmental Authorities; and

2.1.1.4(3) the community, by being respectful of other uses and activities in and around the site.

2.1.1.5 in accordance with Good Industry Practice; and

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

2.1.2 If more than one standard 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 North America, then Project Co will demonstrate to the satisfaction of the Authority and the authorities having jurisdiction that such code or standard meets or exceeds the requirements of this Schedule.

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

2.1.4.1 BCICA Quality Standards Manual for Mechanical Insulation;

2.1.4.2 Wood First Act [SBC 2009] CHAPTER 18;

2.1.4.3 ANSI / ASHRAE:

2.1.4.3(1) 52.2: Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size;

2.1.4.3(2) 55: Thermal Environmental Conditions for Human Occupancy;

2.1.4.3(3) 62.1: Ventilation for Acceptable Indoor Air Quality;

2.1.4.3(4) 111: Practices for Measurement, Testing, Adjusting & Balancing of Building HVAC Systems;

2.1.4.3(5) 129: Measuring Air Change Effectiveness; and

2.1.4.3(6) 135: Data Communication Protocol for Building Automation & Control Networks.

2.1.4.4 ASHRAE:

2.1.4.4(1) Handbooks: 2009 Fundamentals, 2006 Refrigeration, 2007 HVAC Applications, 2008 HVAC Systems and Equipment;

2.1.4.4(2) Design of Smoke Control Systems;

2.1.4.4(3) ASHRAE Guideline 12- Minimizing the Risk of Legionellosis Associated with Building Water Systems;

2.1.4.4(4) ASHRAE Guideline 1.1– HVAC & R Technical Requirements for the Commissioning process;

2.1.4.4(5) ASHRAE Guideline 0– The Commissioning Process; and

2.1.4.4(6) ASHRAE Standard 90.1– Energy Standard for Buildings Except Low-Rise Residential Buildings; if the City of Vancouver requires compliance to a version date earlier than the current date in effect at BP submission this version may be used for project compliance.

2.1.4.5 ANSI / ASME:

2.1.4.5(1) B31.1 Power Piping;

2.1.4.5(2) B31.9 Building Services Piping;

2.1.4.5(3) Section VIII: Pressure Vessels;

2.1.4.5(4) Section IX: Welding Qualifications;

2.1.4.5(5) Unfired pressure vessels; and

2.1.4.5(6) AWS D1.3 - Structural Welding Code - Sheet Steel.

2.1.4.6 ANSI / EIA:

2.1.4.6(1) 568-B.1 & 568-B.2 (CSA-0T529-M95) Commercial Building Telecommunications Cabling Standard – Parts 1 & 2;

2.1.4.6(2) 568-B3 (CSA-T529-M95) Commercial Building Telecommunications Cabling Standard – Part 3;

2.1.4.6(3) 569-B (CSA-T530) Commercial Building Standard for Telecommunications Pathways and Spaces;

2.1.4.6(4) 606A (CSA-T528) Administration Standard for Telecommunications Infrastructure of Commercial Buildings;

2.1.4.6(5) 607A (CSA-527) Commercial Grounding and Bonding Requirements for Telecommunications; and

2.1.4.6(6) 758 Customer Owned Outside Plant Telecommunications Cabling Standard.

2.1.4.7 ANSI / TIA:

2.1.4.7(1) 942 Telecommunications Infrastructure Standard for Data Centers; and

2.1.4.7(2) TSB-162 Telecommunications Cabling Guidelines for Wireless Access Points.

2.1.4.8 ANSI / ESNA American National Standard Practice for Lighting;

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

2.1.4.10 ASTM:

2.1.4.10(1) A185-06 - Standard Specification for Steel Welded Wire Fabric;

2.1.4.10(2) A82/A82M-05 - Standard Specification for Steel Wire, Plain, for Concrete Reinforcement;

2.1.4.10(3) ASTM C568-03 - Standard Specification for Limestone Dimension Stone;

2.1.4.10(4) ASTM C615-03 - Standard Specification for Granite Dimension Stone;

2.1.4.10(5) ASTM C503-05 - Standard Specification for Marble Dimension Stone; and

2.1.4.10(6) ASTM C616-03 - Standard Specification for Quartz-Based Dimension Stone.

2.1.4.11 BCSLA and BCLNA - BC Landscape Standard – Current Edition;

2.1.4.12 CAN ULC:

2.1.4.12(1) S524 Standards for the Installation of Fire Alarm Systems; and

2.1.4.12(2) S537 Standards for Verification of Fire Alarm Systems.

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

2.1.4.14 CSA:

2.1.4.14(1) A23.1 09 Concrete materials and methods for concrete construction/ Test methods and standard practices for concrete;

2.1.4.14(2) B52-05: Mechanical Refrigeration Code;

2.1.4.14(3) B51: Boiler, Pressure vessel and Pressure Piping Code;

2.1.4.14(4) B149.1: Natural Gas and Propane Installation Code;

2.1.4.14(5) B651: Barrier Free Design;

2.1.4.14(6) C22.1 & C22.2 Canadian Electrical Code as adopted in British Columbia;

2.1.4.14(7) C282 Emergency Electrical Power Supply for Buildings;

2.1.4.14(8) A23.4- Precast Concrete - Materials and Construction;

2.1.4.14(9) W186- - Welding of Reinforcing Bars in Reinforced Concrete Construction;

2.1.4.14(10) A370- Connectors for Masonry;

2.1.4.14(11) A23.1/A23.2-09 - Concrete Materials and Methods of Concrete Construction / Methods of Test and Standard Practices for Concrete;

2.1.4.14(12) CAN/CSA S832— Seismic Risk Reduction of Operational and Functional Components (OFCs) of Buildings;

2.1.4.14(13) S478Guideline on Durability of Buildings;

2.1.4.14(14) S413Parking Structures;

2.1.4.14(15) A23.3 (R2010) Design of Concrete Structures;

2.1.4.14(16) S16Limit States Design of Steel Structures;

2.1.4.14(17) S136Design of Cold Formed Steel Members;

2.1.4.14(18) S304 (R2010) Design of Masonry Structures;

2.1.4.14(19) S832 Guidelines for Seismic Risk Reduction of Operational and Functional Components of Buildings;

2.1.4.14(20) Z32.04 Electrical Safety and Essential Electrical System in Health Care Facilities;

2.1.4.14(21) Z314.7 Steam sterilizers for Health Care Facilities;

2.1.4.14(22) Z314.15 Warehousing, Storage, and Transportation of clean Sterile Medical Devices;

2.1.4.14(23) Z317.1Special requirements for plumbing installations in Health Care facilities;

2.1.4.14(24) Z317.2: Special Requirements for Heating, Ventilation, and Air Conditioning (HVAC) Systems in Health Care Facilities;

2.1.4.14(25) Z317.5 Illumination Systems in Health Care Facilities;

2.1.4.14(26) Z317.11Area requirements for Health Care Facilities;

2.1.4.14(27) Z317-10 Handling of waste materials in Health Care Facilities and Veterinary Health Care Facilities;

2.1.4.14(28) Z317.13 "Infection Control During Construction, Renovation, and Maintenance of Health Care Facilities;

2.1.4.14(29) Z318.0: Commissioning of Health Care Facilities;

2.1.4.14(30) Z318.1: Commissioning of HVAC Systems in Health Care Facilities;

2.1.4.14(31) Z318.5 Commissioning of Electrical Equipment and Systems in Health Care Facilities;

2.1.4.14(32) Z7396.1 Medical Gas Pipeline Systems – Part 1: Pipelines for Medical Gases and Vacuum;

2.1.4.14(33) Z7396.2 Medical Gas Pipeline Systems – Part 2: Anaesthetic Gas Scavenging;

2.1.4.14(34) Z614 Children's Playspaces and Equipment Standard;

2.1.4.14(35) Z15190-05 (R2010) - Medical Laboratories; and

2.1.4.14(36) CSA Z8000 Canadian Health Care Facilities.

2.1.4.15 NFPA:

2.1.4.15(1) 10: Standard for Portable Fire Extinguishers;

2.1.4.15(2) 13: Standard for the Installation of Sprinkler Systems;

2.1.4.15(3) 14: Standard for the Installation of Standpipe System;

2.1.4.15(4) 56F: Non-flammable Medical Gas System;

2.1.4.15(5) 90A - Current Edition: Standard for Installation of Air Conditioning and Ventilation Systems;

2.1.4.15(6) 92A - Current Edition: Standard for Smoke-Control Systems Utilizing Barriers and Pressure Differences; and

2.1.4.15(7) 101 - Current Edition: Life Safety Code.

2.1.4.16 IEEE:

2.1.4.16(1) 802.1 series for Interworking, Security, Audio/Video Bridging and Data Centre Bridging;

2.1.4.16(2) 802.3 series of Ethernet Standards; and

2.1.4.16(3) 802.11 series of Wireless Standards.

2.1.4.17 NETA:

2.1.4.17(1) ATS International Electrical Testing Association (Acceptance Testing Specifications); and

2.1.4.17(2) MTS Standards for Maintenance Testing.

2.1.4.18 BICSI Telecommunications Distribution Methods Manual (TDMM);

2.1.4.19 Master Municipal Construction Document (MMCD);

2.1.4.20 Equivalent in City of Vancouver Engineering Department Supplementary Master Municipal Construction Documents;

2.1.4.21 BC Supplement to TAC Geometric Design Guide;

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

2.1.4.23 BC Guidelines for Decontamination of Patients in Health Facilities;

2.1.4.24 Laser Safety Program, Fraser Health, Feb 2010. Equivalent in City of Vancouver Engineering Department Design Criteria Manual;

2.1.4.25 Best Practices for Hand Hygiene In All Healthcare Settings and Programs, British Columbia Ministry of Health;

2.1.4.26 British Columbia Ministry of Health and Ministry Responsible for Seniors – Standards for Hospital-based Psychiatric Emergency Services: Observation Units; and

2.1.4.27 "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.

2.2 Use of Wood

2.2.1 As contemplated by the *Wood First Act* Bill 9-2009(British Columbia), Project Co will incorporate wood products into the design of the Facility to the extent that the use of wood products is consistent with the requirements of this Schedule.

2.3 Clinical Specification

2.3.1 The Clinical Specification is attached as Appendix 3A.

2.3.2 Project Co will design and construct the Facility:

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

2.3.2.2 in accordance with the requirements of the Clinical Specification, subject to any adjustments or refinements made in accordance with the Schedule 2 Design Process.

2.4 Additional Rooms and Spaces

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

Part 3. DESIGN PRINCIPLES AND OBJECTIVES

3.1 Evidence Based Design

3.1.1 In undertaking the design of the Facility, Project Co will apply Evidence Based Design methodologies to achieve the Project Design Objectives. "Evidence Based Design" or "EBD" means that decisions about the design of the Facility will be based on credible research, information derived from comparable 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 customer and staff satisfaction.

3.2 Project Design Objectives

3.2.1 Create a Children's & Women's Acute Care Centre that is appropriate in design for a facility that is a leader in: clinical excellence, delivery of patient and family-centred care for women and children, clinical teaching and research.

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

3.2.2.1 master planning (as described in Section 3.3);

3.2.2.2 sustainability (as described in Section 3.4);

3.2.2.3 optimized outcomes (as described in Section 3.5);

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

3.2.2.5 environmental quality (as described in Section 3.7).

3.2.3 In addition to the descriptions of the objectives described in 3.2.1, specific requirements related to these objectives are included in Parts 4 – 8 of this Schedule.

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

3.3 Master Planning

3.3.1 Project Co will design the Facility and surroundings:

3.3.1.1 to comply with the "BC Children's and BC Women's Redevelopment Project Master Plan Guidelines";

3.3.1.2 to comply with the site wayfinding requirements described in Appendix B- Wayfinding Guidelines;

3.3.1.3 so that it is an integrated part of the C&W Campus, with functional connections both operational and physical to adjacent buildings, and accordingly:

3.3.1.3(1) clearly organizes patient/public, staff and service flows within the Facility and connect these flows to rest of the C&W Campus;

3.3.1.3(2) provides pedestrian access to the Facility from major C&W Campus entry points;

3.3.1.3(3) effectively and efficiently integrates with existing C&W Campus infrastructure;

3.3.1.3(4) integrates IT services (including infrastructure, wired and wireless network, telecom etc.) seamlessly with adjacent buildings; and

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

3.3.1.5 be a good neighbour, respectful of other uses and activities in and around the site;

3.3.1.6 to support community access and include a highly visible main entry to the Building and lobby (designed with appropriate high profile architectural scale and features) ; and

3.3.1.7 taking into consideration plans for expansion of the Facility and the C&W Campus buildings as generally contemplated in the "BC Children's and BC Women's Redevelopment Project Master Plan Guidelines".

3.3.2 Project Co will consider all design decisions within the context of enhancing the C&W Campus as a whole.

3.4 Sustainability

3.4.1 Project Co will achieve LEED Gold Certification in accordance with 3.4.1 and the provisions of Schedule 2 Design and Construction Protocols.

3.4.1.1 Project Co will achieve LEED Gold certification using one of the following LEED rating systems:

3.4.1.1(1) LEED HC 2009 (USGBC); or

3.4.1.1(2) LEED Canada NC 2009 (CaGBC).

3.4.1.2 The following LEED credits will be mandatory:

3.4.1.2(1) EA credit 3: Enhanced Commissioning;

3.4.1.2(2) EA credit 5: Measurement and Verification:

3.4.1.2(2)(a) LEED HC 2009 EA credit 5: Measurement and Verification; or

3.4.1.2(2)(b) LEED Canada NC 2009 Credit 5.1 Measurement and Verification: Base Building.

3.4.1.2(3) IEQ credit 4: Low Emitting-Materials:

3.4.1.2(3)(a) LEED HC 2009: IEQ credit 4 Low Emitting-Materials: (Group 1 and 2); or

3.4.1.2(3)(b) LEED Canada NC 2009:

(b).1 Credit 4.1 Low- Emitting Materials: Adhesives and Sealants; and

(b).2 Credit 4.2 Low-Emitting Materials: Paints and Coatings.

3.4.1.2(4) All prerequisites required for certification.

3.4.1.3 The Authority has preference for the following LEED credits:

3.4.1.3(1) IEQ credit 1: Outdoor Air Delivery Monitoring; and

3.4.1.3(2) IEQ credit 5 Indoor Chemical and Pollutant Source Control.

3.4.1.4 The following will not be considered as acceptable LEED credits:

3.4.1.4(1) EA credit 6: Green Power; and

3.4.1.4(2) EA credit 2 On-Site Renewable Energy credits based the proposed low carbon EcoEnergy System.

3.4.2 In addition to LEED requirements, Project Co will:

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

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

3.4.2.3 materials on the interior of the Building that are detrimental to human health will not be permitted;

3.4.2.4 give priority to efficiencies and innovations that may be possible through integration of systems within the C&W Campus and Hospital to minimize operational costs for the Authority; and

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

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

3.4.3.1 LEED 2009 for Health Care Reference Manual - US Green Building Council;

3.4.3.2 LEED® Canada Reference Guide for Green Building Design and Construction 2009;

3.4.3.3 The Green Guide for Health Care;

3.4.3.4 Green Globes – Environment Assessment for New Buildings;

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

3.4.3.6 ASHRAE Green Healthcare Construction Guidance Statement, Jan 2002;

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

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

3.4.3.9 Natural Resources Canada Energy Innovators Initiative;

3.4.3.10 Building Materials for the Environmentally Hypersensitive, CMHC;

3.4.3.11 ASHRAE Proposed Standard 189- Standard for the Design of High Performance Green Buildings; and

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

3.5 Optimized Outcomes

3.5.1 Project Co will:

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

3.5.1.2 recognize the value to the Authority of LEAN healthcare 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; and

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; and

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

3.6.2 Project Co will provide the infrastructure, including tower structure and service connections, which would allow for the relocation of the existing Cellular phone, Satellite, PageNet and Emergency Ham antennas located on buildings at the Hospital to the roof of the new Facility.; refer to item 7.7.20.1(3) and 7.8.7.1.

3.7 Environmental Quality

3.7.1 Project Co will design and construct the Facility:

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

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

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

3.7.1.3(1) Evidence based design supports incorporating into the design of health care facilities light, sound, art, air quality, colour, and nature. The interiors of the new Building will be enriched with play corners, recreation areas, colourful signage, and art work – designed to make patients and their families feel more at home and less than in a health care facility. Three factors have been found to reduce stress in patients, visitors and staff:

3.7.1.3(1)(a) a sense of control;

3.7.1.3(1)(b) access to social support; and

3.7.1.3(1)(c) access to positive distractions.

3.7.1.3(2) design features such as sound and music, colour, pattern, air quality, nature and view of nature, art and aesthetic forms, as tools for creating an environment that will support and distract patients and families, but does not negatively impact staff safety or performance.

3.7.1.3(3) Patients and visitors entering the campus may be disoriented or anxious and many will be younger

patients who may feel overwhelmed by the experience. Every effort will be made to minimize the potentially intimidating nature of the typical institutional setting. Highly technical areas should be visually and acoustically isolated. Patients, visitors and staff will perceive the environment as open and accessible rather than regimented and intimidating.

3.7.1.3(4) The main entry/lobby facilities and admitting is a common destination and often the location where first impressions are made and therefore, will be easily accessible and welcoming to visitors.

3.7.1.3(5) The design of the Building will maximize aesthetics, technology, and the environment to ensure the wellbeing and comfort of patients, families, and staff. The Building's healing environment will be safe and secure, and be a backdrop for varying ages and cultures. The healing environment will be designed to encourage patients to arrange their space to suit their individual needs.

3.7.1.3(6) The healing environment will acknowledge ethnic diversity.

3.7.1.3(7) The site and Building will provide a gradual continuum from public to private areas.

3.7.1.3(8) Positive distractions that engage all five senses, offer variety and delight will be provided.

3.7.1.3(9) Natural materials, such as wood, to be used as much as possible throughout public areas.

3.7.1.4 to include an easily legible configuration for Facility circulation, and an indoor way finding and signage system that is simple, intuitive, and fully coordinated within the C&W Campus and Hospital; and

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

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

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

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

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

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

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

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

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

3.7.3 Project Co will design the Facility to be appropriate for a pediatric hospital, using the following criteria:

3.7.3.1 Design the Facility to appeal to children of the different ages that will use that part of the Facility;

3.7.3.2 design the Facility to be appropriately scaled for children where applicable;

3.7.3.3 provide ergonomically correct features to suit children where appropriate;

3.7.3.4 use space design, daylight, colour, pattern and texture to achieve results;

3.7.3.5 encourage playfulness and interaction with the environment where appropriate; and

3.7.3.6 design the Facility to have the look and feel of a pediatric facility without using overly representational or themed elements.

Part 4. SITE DEVELOPMENT REQUIREMENTS

4.1 Master Planning

4.1.1 Project Co will perform an overall site planning study to understand the site context and opportunity, in order to validate the Building siting.

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

4.1.3 Design the Facility and the site services to accommodate the strategies for future expansion envisioned by the "BC Children's and BC Women's Redevelopment Project Master Plan Guidelines" and to avoid blocking services for future phases with the construction of the Facility.

4.2 Urban Design and Site Development

4.2.1 General

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

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

4.2.1.3 Design the Facility to limit view impacts to residential properties on all sides of the campus.

4.2.1.4 Design the ACC development to limit shadowing to ensure compliance with the City of Vancouver requirements.

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

4.2.1.6 Contribute to an urban, pedestrian-oriented campus environment. Consider the increased vehicular and pedestrian permeation of the Site by creating pedestrian oriented walkway connections to the main entry from Oak Street and 28th Avenue. Reinforce the physical relation of the structures with the major city streets of Oak Street, 28th Avenue, and 33rd Avenue. Create a legible site layout and pattern to foster a strong sense of place and identity. Provide site furniture and pedestrian scale

lighting to complement the existing Wellness Walkway furniture and lighting. Create vehicular connections between Oak St, Ring Road and along the Building facade.

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

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

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

4.2.1.10 Install a tote storage enclosure:

4.2.1.10(1) in the location indicated on the Site Plan, Schedule 2 Appendix 2H (Site Plan);

4.2.1.10(2) with the same storage capacity as the tote storage enclosure that will be removed see Appendix 3G-Demolition and Related Work; and

4.2.1.10(3) visually screened from roads and pathways.

4.2.1.11 Maintain access to the Shaughnessy B block, Shaughnessy D block and Women's H block loading areas at all times; refer to Site Plan, Schedule 2 Appendix 2H (Site Plan).

4.2.1.12 Maintain ambulance access to ED and NICU departments in the existing 1982 building at all times prior to these functions being operational in the Facility; include the following features:

4.2.1.12(1) a two way ambulance road to the ED trauma doors in the 1982 Building;

4.2.1.12(2) an ambulance turnaround (hammerhead type) which can be used by an ambulance to turn around after a patient has been dropped off at the ED trauma doors;

4.2.1.12(3) install seven new short term parking stalls in the existing landscaped area north of the existing 1982 entrance and opposite the ACB; and

4.2.1.12(4) install a gate to deter the public from proceeding beyond the location of the overhead bridge connecting ACB and the1982 Building.

4.2.1.13 Maintain access to all ACB entrances.

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

4.2.1.15 Design for maximum access to the Facility. Provide separate, appropriate and distinct passenger-side drop-off areas at the main entrance to the Building and at the Emergency walk-in entrance. Avoid congestion and interference with the Emergency flow. These drop off areas will:

4.2.1.15(1) be large enough to accommodate a minimum of 2 cars for the ED walk-in drop off and 4 cars for the Main Entry drop off;

4.2.1.15(2) be covered with canopies that extend a minimum of 300mm over curbs to allow shelter from inclement weather along the entire length of the drop off; and

4.2.1.15(3) include waiting space for seated, in-wheelchair and standing users.

4.2.1.16 Provide for ambulance access to the ED. Under the Ambulance Shelter provide parking spaces to accommodate 4 ambulances, which allow for rear loading and unloading of patients, and allow for drive through capability.

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

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

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

4.2.1.19(1) all inpatient rooms;

4.2.1.19(2) patient areas to the greatest extent possible; and

4.2.1.19(3) staff lounges and workspaces wherever possible.

4.2.1.20 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.

4.2.2 Public Realm and Open Space

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

4.2.2.2 Provide a hierarchy of open spaces as follows:

4.2.2.2(1) public open spaces;

4.2.2.2(2) semi–private open spaces (hospital staff, family/visitors); and

4.2.2.2(3) private open spaces (patient, dedicated staff areas).

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

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

4.2.3 Site Wayfinding and Exterior Signage

4.2.3.1 Provide site wayfinding and exterior signage in compliance with the requirements of Appendix B- Wayfinding Guidelines.

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

4.2.3.3 Provide visually connected pathways with required signage.

4.2.3.4 Provide all external signage identified in the Appendix B- Wayfinding Guidelines and falling within the Project Co Construction Site Boundary.

4.2.3.5 Exterior signage design should minimize light spillage.

4.2.4 Site Access for the Disabled

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

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

4.2.5 Site Lighting

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

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

4.2.5.3 Lighting on pedestrian paths will illuminate not just the path but also the surrounding area adjacent to the path.

4.2.5.4 Provide exterior lighting to protect the safety and security for nighttime staff, patients and visitors without contributing to light pollution.

4.2.6 Landscaping

4.2.6.1 Provide landscaping that contributes to the creation of a livable, healthy and responsive community

4.2.6.2 Provide landscaped areas between the Building and adjacent buildings.

4.2.6.3 Provide an open space for respite and repose dedicated to patient and family use directly accessed from the Building.

4.2.6.4 Provide healing gardens in landscaped areas on the roof with the following features:

4.2.6.4(1) provide contrast in terms of colour, texture and sounds;

4.2.6.4(2) provide a sensory experience which engages all five senses, include the ability to touch plants;

4.2.6.4(3) provide distractions in the form of flowers that attract birds; and

4.2.6.4(4) provide landscape that encourages you to walk through it.

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

4.2.6.6 Deciduous trees will have a minimum 6 cm diameter, measured 15cm above the ground, at the time of planting. Evergreen trees will have a minimum 3m height at the time of planting.

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

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

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

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

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

4.2.6.12 Shrubbery within 2 m of walkways will not exceed 50 cm in height according to CPTED principles.

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

4.2.6.14 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.

4.2.6.15 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.

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

4.2.6.17 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.

4.2.6.18 Minimize grade changes for drop curbs and raised crossings. Drop curbs will be aligned to pedestrian crossings.

4.2.6.19 Provide substantial tree planting to the northeast of the Building to replace trees removed on the site at a ratio of 1.6:1.0. Replacement trees must comply with the City of Vancouver Protection of Trees Bylaw.

4.2.7 Parking

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

4.2.7.1(1) Provide parking stall sizes, locations and drive aisle sizes as per City of Vancouver Parking By-Law;

4.2.7.1(2) provide, within the Project Co Site Construction Boundary, 305 parking stalls total at a minimum (disability parking spaces will count as one stall only),

4.2.7.1(3) a maximum of 125 of the total number of parking stalls will be surface parking stalls, the rest will be located underground in the parkade;

4.2.7.1(4) A minimum of 1 per 15 stalls will be disability parking spaces.

4.2.7.1(5) A maximum of 25% of parking stalls will be small car spaces.

4.2.7.1(6) set parking layouts in an orderly and logical design to minimize confusion and excessive internal circulation;

4.2.7.1(7) a well-lit secure and weatherproof bicycle locking/parking facility for the number of bicycles as defined by City of Vancouver Bicycle Parking By-Law; based on considering the Building as being developed in isolation and not part of the overall C&W Campus. Omit the application of part 6.2A(b) of the By-Law.

4.2.7.1(8) apply CPTED principles, including the following:

4.2.7.1(8)(a) reduce opportunities for graffiti through the use anti graffiti coatings; at a minimum provide anti graffiti coating on the exterior of the basement and first floor levels; and

4.2.7.1(8)(b) reduce opportunities for hiding spaces.

4.2.7.1(9) provide a method for users to readily summon help if in distress or danger in both above ground locations and in the parkade;

4.2.7.1(10) provide one parking payment machine for every one hundred, or fraction of one hundred, parking stalls at exterior parking areas and in the parkade; Project Co to provide concrete base and service connections, machines to be supplied and installed by the Authority)

4.2.7.1(11) locate parking payment machines in the parkade close to entrances to elevators;

4.2.7.1(12) locate parking payment machines in the parking lot spread throughout the parking area to provide easy access (note that the present parking kiosks with gates will be removed); and

4.2.7.1(13) design traffic flow which minimizes car speed on the C&W 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.

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

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

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

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

4.2.7.2(4) design parking levels and their vehicular circulation for ease of expansion and connectivity to parking levels below planned future development according to the "BC Children's and BC Women's Redevelopment Project Master Plan Guidelines" ;

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

4.2.7.2(6) provide glazing and visibility between parking areas and shuttle elevator lobby;

4.2.7.2(7) ensure the interior is well lit ; clearly number and mark all parking spaces on edge of drive aisle and to be visible if car is parked;

4.2.7.2(8) paint all stall lines and stall numbers;

4.2.7.2(9) paint all parkade walls and soffits white;

4.2.7.2(10) use way finding strategies, including signage, to allow each floor to be identifiable and to assist in orientation and ease of finding/identifying parking stalls;

4.2.7.2(11) use vehicle ramps that do not exceed recommended slope as per City of Vancouver Parking By-Law;

4.2.7.2(12) lay out public parking such that it does not require a vehicle to back up for more than 10m;

4.2.7.2(13) maximum allowable slope or cross-fall is 5% applicable to both the parking stalls and access aisles;

4.2.7.2(14) provide an overhead security gate at access points to parkade; and

4.2.7.2(15) provide employee card swipe access and egress.

4.2.7.3 Walkway through Parking Areas:

4.2.7.3(1) Provide a walkway for pedestrians to access the Facility approaching from the south (between the SHY and the Plant Services Building); the walkway will run approximately along the north east side of the Project Co Construction Site Boundary adjacent to the trees, traversing the parking areas and connecting with the wellness walkway on 28th Avenue.

4.3 Connections to Existing Hospital and Site Services

4.3.1 General

4.3.1.1 The Facility will not function autonomously but instead will contribute to an overall integrated Hospital. Accordingly, Project Co will design the Facility to provide relevant connections to the existing C&W Campus buildings, such as the 1982 Building, Ambulatory Care Building, and the Shaugnessy Building. Connections to other buildings should enhance the ability for the existing C&W Campus buildings and the Facility to function in a cohesive manner.

4.3.1.2 Design the Facility connections as follows:

4.3.1.2(1) a maximum slope of 1% as described in 4.3.2.4(2), 4.3.2.4(3)and 4.3.2.4(6);

4.3.1.2(2) a maximum slope of 2% as described in 4.3.2.4(1);no switchbacks;

4.3.1.2(3) a maximum slope of 3% for the connection described in 4.3.2.4(4); this connection must accommodate the movement of carts and motorized linen trains; and

4.3.1.2(4) any slope greater than 1% will require handrails to assist individuals with mobility impairments.

4.3.2 Connections for People and Materials

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

4.3.2.2 Provide connections to deliver the functionality described in Appendix 3A-Clinical Specification.

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

4.3.2.4 At a minimum, provide the following connections:

4.3.2.4(1) One interior connection between ACC Building level 1 and 1982 Building level 1; design the link to accommodate public and patient flow to and from the 1982 building, BC Women's Hospital and to connect the Main Entrance lobby to the 1982 building;

4.3.2.4(2) One interior connection between ACC Building level 2 and 1982 Building Level 2 (referred to as VFP bridge); designed as a visitor/ family/ provider dedicated bridge. The bridge should connect to the south side of existing lobby 2H.42 west of existing stair 2S.16 in the 1982 Building, adjacent to Anatomical Pathology and Autopsy Services (phase 1 renovation area). An alternate connection point for this bridge will be considered for approval by the Authority, depending on appropriateness within the overall design of the Facility;

4.3.2.4(3) One interior connection between ACC Building level 2 and 1982 Building level 2 (referred to as PP bridge); designed as a restricted patient/provider dedicated connection. This connection will complete a direct passage from the Birthing program in the Facility to the Urgent Care Suite/Assessment Room in the1982 Building (Renovation within the 1982 Building will result in new Urgent Care Suite/Assessment Room). The connection will be provided by a bridge from the Facility to the1982 Building leading into a structure/ corridor which will run over the roof of the 1982 Building north of the Balsam Inpatient unit and south of the Arbutus Inpatient Unit. The connection should not contain turns or corners in order to safely accommodate the critical transportation of patients on stretchers. The entire connection should not cross public corridors or vestibules and will enable fast passage of critical transport by minimizing doors and providing fast acting door openers. An alternate connection point for this bridge will be considered for approval by the Authority, depending on appropriateness within the overall design of the Facility;

4.3.2.4(4) One interior connection between ACC Building level 1 and Shaughnessy Level 1, B Block for the flow of supplies, linen, food and providers (referred to as Service Link). The link **shall** connect to the main corridor in Shaughnessy B Block and **shall** accommodate trains and other required flows between the buildings. The main corridor in Shaughnessy B Block **shall** be modified for a distance of 4 metres in either direction from the corner to adequately accommodate traffic flows in terms of layout and durability of finishes. Provide exterior doors on each side of the connection;

4.3.2.4(5) One interior connection between ACC Building level 1 and ACB Level 1, design the link to have integrated ramp design to accommodate any difference in levels, suitable for use by wheelchairs; and

4.3.2.4(6) One interior connection between ACC Building level 3 and Shaughnessy Level 4, E Block for the flow of patients, students, patients on stretchers and

providers. The patient flow will include mental health patients travelling from ED to the Mental Health Building. These flows will not cross clinical areas on ACC Building Level 3.The bridge should connect at the location of the main corridor in Shaughnessy E Block.

4.3.2.5 All connections listed in 4.3.2.4 are to be designed and constructed as follows:

4.3.2.5(1) One storey in height;

4.3.2.5(2) offer transparency, natural light and views to the exterior by providing exterior walls that are a minimum 50 percent glazed;

4.3.2.5(3) the PP bridge will have glazing that provides day light, but respects the privacy of patients by not allowing direct views into the bridge from the outside;

4.3.2.5(4) design connections to be perpendicular to existing buildings and to the ACC Building;

4.3.2.5(5) include upgrades triggered in existing buildings to which the connection is being made to meet all code and City of Vancouver requirements;

4.3.2.5(6) provide ramps suitable for the anticipated connection usage to accommodate any difference in floor levels. Stairs are not an acceptable method of accommodating any difference in floor levels;

4.3.2.5(7) connection width to be, at a minimum, as wide as adjacent corridors or lobbies, but in no case should this dimension be less than 2.4m;

4.3.2.5(8) punch through existing building exterior walls as required to provide connection;

4.3.2.5(9) provide transparency in required doors and vestibule constructions between the existing buildings and the ACC Building; provide access control at all doors.

4.3.2.5(10) above ground connections to be designed as bridge structures with minimal structure extending down to the grade;

4.3.2.5(11) landscape below connections will be design for the micro climate created;

4.3.2.5(12) designed to be attractive when viewed from above and below;

4.3.2.5(13) to be well integrated into existing buildings so as not compromise functionality of interior or exterior spaces adjacent to, or above and below the connections;

4.3.2.5(14) adjacent openings in existing buildings will not be blocked unless they become interior space partially or fully as a result of the connection;

4.3.2.5(15) to accommodate differential movement between the ACC Building and existing buildings; and

4.3.2.5(16) patch and make good existing building surfaces to match the quality of existing adjacent surfaces.

4.3.2.6 As an alternative to the connections required in 4.3.2.4 the Authority will consider alternate flow patterns or existing connection reuse opportunities which meet all other requirements of Schedule 3 and appendices.

4.3.3 Existing Hospital Work

4.3.3.1 Wherever possible, design and construct the Building 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 Facility construction with code compliant exits and ingress/egress routes agreed to by the Authority.

4.3.3.2 Perform all upgrades and modifications to existing hospital buildings required for code compliance as a result of design and construction of the Facility including, but not limited to:

4.3.3.2(1) requirements to accommodate alternate solutions;

4.3.3.2(2) modifications to existing building systems and existing building structures;

4.3.3.2(3) upgrading existing fire protection systems;

4.3.3.2(4) relocating existing fire department response points; and

4.3.3.2(5) relocating existing annunciator panels.

4.3.3.3 Repair the integrity of existing building envelopes that are impacted by the design and construction of the Facility.

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

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

4.3.3.6 Windows in existing buildings will not be blocked. Fire shutters may be installed on the northwest side of the Shaughnessy Building if required.

4.3.3.7 Provide sprinkler water curtains where required.

4.3.3.8 Perform work in existing buildings to comply with the requirements of Appendix 3G-Demolition and Related Work.

4.3.3.9 Note that the Shaughnessy heritage entrance is to be maintained and undamaged.

4.3.3.10 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.

4.3.3.11 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.

4.3.3.12 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. "Making Good" shall be defined as 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.

4.3.3.13 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.

4.3.3.14 Project Co will accommodate the heat exchanger and associated mechanical equipment indicated in 7.1.1.1(1)(a) in consultation and agreement with the Authority; possible solutions include:

4.3.3.14(1) modifying the Plant Services Building; or

4.3.3.14(2) building a new enclosure close to the Plant Services Building.

4.3.4 Service Connections

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

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

4.3.4.3 Any shut down of existing Hospital services, or any work required to connect to the existing Hospital, must be completed in accordance with a Work Plan agreed to by the Authority in accordance with the requirements of Schedule 2.

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

4.3.4.5 Provide for existing decontamination trailer to be relocated from adjacent to the existing BC Children's ED to adjacent to the BC Children's front entrance as directed by the Authority; provide all the required service connections for the trailer, include work required in the existing building.

4.4 Site Infrastructure

4.4.1 General

Project Co will:

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

4.4.1.2 Undertake the design and construction in compliance with all applicable standards, codes and specifications

4.4.1.3 achieve the required SS PQ 1 – Construction Activity Pollution Prevention to achieve LEED Gold Certification in accordance with Section 3.4 Sustainability.

4.4.1.4 achieve all necessary credits and points required to achieve the LEED Gold Certification in accordance with Section 3.4 Sustainability.

4.4.1.5 On-site services in Section 4.4 refer to the construction of works within the boundaries of the C&W Campus property lines and outside the Building's footprint.

4.4.2 Municipal Off-Site Services Infrastructure

Project Co will:

4.4.2.1 design and construct all municipal off-site services to provide the infrastructure necessary to support the Facility in accordance with the requirements of the City and other Governmental Authorities, including with respect to sanitary sewers, storm sewers and drainage, water and all trench restorations.

4.4.2.2 if the City of Vancouver or other authorities having jurisdiction determine that upgrades are required to the existing municipal/offsite system to service the Facility, the parties acknowledge that pursuant to the Project Agreement, the Project Co will either:

4.4.2.2(1) at its cost, complete such upgrades; or

4.4.2.2(2) pay the City of Vancouver for the full cost of such upgrades as determined by the City of Vancouver.

4.4.2.3 provide water, storm sewer, sanitary, district heating supply/return and gas service alignments to the Authority's systems as required. Project Co to submit a work plan of the proposed alignments and tie-in points for approval by the Authority, City of Vancouver and/ or other authorities having jurisdiction.

4.4.3 On-Site Services Infrastructure

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

4.4.3.2 Sanitary Sewers

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

4.4.3.3 Storm Sewers and Drainage

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

4.4.3.3(2) Provide site storm water management system to ensure compliance with the campus wide "CWHC Campus Rainwater Management Plan, March 31, 2013" and City of Vancouver requirements.

4.4.3.3(3) Provide adequately sized water quality/sediment control inlet chambers as a component of the drainage system for both surface and underground

parking lots, before discharging to the offsite drainage system.

4.4.3.4 Watermain and Appurtenances

4.4.3.4(1) Provide a primary and a secondary water service capable of providing domestic cold water for the Facility by connecting to the existing onsite water system at a suitable tie-in point. The Authority will provide an isolation valve at the point of connection, and Project Co will perform all work (including providing all necessary parts and components) required to connect to the Authority's piping at this location. Refer to Schedule 2, Section 6.11 (Connections and Integration to Existing Hospital) regarding Work Plan and other requirements regarding work in existing C&W Campus buildings.

4.4.3.4(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 Facility.

4.4.3.5 District Hot Water Supply and Return

4.4.3.5(1) Project Co will provide all necessary parts, components and appurtenances for a DHWS&R system from the existing Campus Plant to the Facility . Project Co will perform all work required for installation and turn over to Authority for operation and maintenance.

4.4.3.6 Road Works

4.4.3.6(1) Design and construct on-site roadway, including the pavement, curbs and gutters, sidewalks, walkways, signage, pavement markings, and traffic calming devices, that are handicapped accessible and wheel-chair friendly, to provide safe passage between parking areas, loading areas, emergency vehicle areas and drop off areas.

4.4.3.7 Street Lighting Around the Facility

4.4.3.7(1) Provide lighting for on-site roadways and new Emergency drop-off, walkways and parking areas to

ensure safe vehicle and pedestrian traffic with respect to collisions, personal safety, and building access and egress.

4.4.3.8 Electrical, Telecommunications and Gas Services

4.4.3.8(1) The onsite work will include electrical, telecommunication and natural gas services to the Facility.

Part 5. BUILDING DESIGN REQUIREMENTS

5.1 Adaptability and Flexibility

5.1.1 Project Co will:

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

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

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

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

5.1.1.5 minimize interior columns and provide larger spans where appropriate for ease of planning and re-planning of care areas;

5.1.1.6 avoid interior shear walls if possible; some are required, but placement is critical; limiting shear walls to cores is preferred;

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

5.1.1.8 standardize the design and layout of recurrent room types, including but not limited, to: Med/Surg medical inpatient rooms, Medical/Surg surgical inpatient rooms, Oncology inpatient rooms, PICU patient rooms, NICU patient rooms (single), ED treatment rooms, critical care rooms, CDU patient rooms, Oncology exam/treatment rooms; LDR patient rooms, OR's general, Minor OR's, C-section OR's, Procedures Suite general ACU patient rooms, Interventional Radiology Procedure Rooms-Special, PICU tactical centres, ante rooms, stretcher/bed alcoves, Procedures Suite storage alcoves, MI stretcher alcoves, MI Procedure suite scrub areas, PTS stations, Renal Dialysis cubicles, MI ACU rooms, Oncology inpatient rooms BMT, NICU Patient Rooms (twin), ED assessment rooms, ACU 24 hr patient room, AIR rooms Med/Surg, Bariatric rooms Med/Surg, PICU AIR rooms, Oncology exam treatment rooms AIR, renal dialysis patient room AIR, Oncology AIR rooms, Oncology inpatient rooms bariatric, NICU patient rooms single, ED treatment rooms AIR, patient treatment safe rooms, ED seclusion rooms, Birthing HDU patient rooms, MI Procedure rooms, MI general radiology rooms, ACU patient rooms with AIR and washroom, Med/Surg, oncology Birthing Medications rooms, NIC/ Procedures Medication rooms, ED/ PICU/ Procedures mediations rooms and MI/ Renal Dialysis Unit medications rooms.

5.1.1.9 demonstrate the ongoing adaptation and reuse of the Facility as it relates to sustainable building design;

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

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

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

5.1.1.13 provide a system to accommodate access for raceways for cable and fibre optic connections under and over each IT service space.

5.2 Expandability

5.2.1 Project Co will:

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

5.2.1.2 design the Facility to allow for future expansion envisioned by the "BC Children's and BC Women's Redevelopment Project Master Plan Guidelines",

5.2.1.2(1) the Building design is to allow for future horizontal expansion at all floor levels, including the parking garage, at the south and west sides of Building; and

5.2.1.2(2) provide knock out panel in the parking garage to accommodate the expansion west described in 5.2.1.2(1); the panel is to allow for two way traffic; and

5.2.1.2(3) provide for the expansion of planning components as described in Appendix 3A- Clinical Specification.

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

5.2.1.4 utilize open planning to create soft zones responsive to rapid change and growth; and

5.2.1.5 provide excess capacity in all building systems as described in this Schedule.

5.2.1.6 Design the Building to allow for future uses in the Future Intra-Operative Imaging Room (Space ID11239) and the Future Operating Room OR Interventional Radiology (Space ID 11212 &11211) as follows:

5.2.1.6(1) provide structure capable of supporting anticipated radiology equipment;

5.2.1.6(2) provide mechanical ventilation, including shaft requirements, to accommodate future use and equipment;

5.2.1.6(3) provide radiation shielding to accommodate future use and equipment; and

5.2.1.6(4) provide sufficient mechanical, electrical and communications services to accommodate future use and equipment.

5.2.2 Provide access routes for the delivery and removal of all large pieces of equipment (including replacement equipment and anticipated future equipment) which avoid demolition of the Building or disruption to building operation.

5.3 Post Disaster Requirements

5.3.1 In undertaking the Design, Project Co will provide Function Protection, the highest level of post-disaster preparedness. The goal of Function Protection is to protect life and investment, and to ensure that the Facility continues to operate post-disaster.

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

5.3.3 The structural design should, where practical, include recommendations and guidelines found in "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.

5.3.4 Design and construct essential services to post disaster standards. Locate these services in utilities enclosures that meet post disaster standards as defined in the VBBL.

5.3.5 Design and construct the Facility and services so that essential clinical requirements are met for a minimum period of 72 hour following a disaster (except that the temporary sewage storage tank capacity can be 24 hours).

5.3.6 In addition to 5.3 refer to Part 7 and Part 8 for post disaster and redundancy requirements.

5.3.7 Provide connection to temporary service tanks at accessible locations on the exterior of the Building for the delivery of water, generator fuel and sanitation removal. These service tank connection points should be in service areas away from public areas.

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

will be designed and constructed as indicated in Appendix -3A Clinical Specifications and according to CSA Z8000.

5.3.9 Project Co to provide for catastrophic event management including provision of the following:

5.3.9.1 additional headwalls located as described in 6.10.10.1;

5.3.9.2 outbreak control zones as described in 5.5.1.1(9);

5.3.9.3 an emergency exterior disaster response area meeting the following requirements:

5.3.9.3(1) CSA Z8000;

5.3.9.3(2) as indicated in Appendix 3A- Clinical Specification, 3AC Disaster Response Area;

5.3.9.3(3) located under cover;

5.3.9.3(4) provided with sufficient services to plug in trailers;

5.3.9.3(5) ability for drop down curtains;

5.3.9.4 hardware for storing fire extinguishers in all inpatient rooms; and

5.3.9.5 capability to fully lock down all exterior doors to restrict access.

5.4 Architecture

5.4.1 Building Form and Character

5.4.1.1 The Facility will embody the following design principles:

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

5.4.1.1(2) Roof top mechanical/electrical equipment will be housed in a penthouse structure. Small scale rooftop mechanical equipment will be screened and incorporated in architectural elements;

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

5.4.1.1(4) Use wood as a featured material in both the interior and exterior of the Facility; not limited to public spaces.

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) recognize that the lower "podium" levels will be more solid in character with a higher proportion of wall to window area, while the upper floors will be expressed in lighter materials and a greater extent of glazing; and

5.4.1.2(1)(h) variation of glazing type, pattern and frequency to reduce Building scale and massing, and to clearly distinguish the inpatient units from the diagnostic and treatment areas.

5.4.1.2(1)(i) 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 textured concrete or textured or polished concrete masonry units in warm colours 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. All exterior wall cladding materials must be 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; 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(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 utilization of internal courtyards or light wells (sized and proportioned to allow for ease of building envelope servicing and maintenance of patient privacy) to increase exterior wall exposure;

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

5.4.1.3(2)(g) the provision of tubular daylighting devices to increase daylight within spaces ; and

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. (Landscaping features, play equipment and outdoor furniture are not considered an impediment) ;

(d).3 the maximum sill height to be 800mm;

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

(d).5 width of the windows to be full width of the available exterior wall for rooms with outboard washrooms ;

(d).6 equivalent width as described in 5.4.1.3(3)(d).5 for similar inpatient rooms without outboard washrooms ; and

(d).7 width of window for corner rooms to be the same as the immediately adjacent inpatient room.

5.4.1.3(3)(e) HDU rooms in the birthing suite will have borrowed light provided by clerestory windows or skylights;

5.4.1.3(3)(f) All Team Care Stations will have daylight and a view to the exterior;

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

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

(h).1 All staff lounges (MDR Conference/ Lunch room (10773) is permitted to have borrowed light if Direct Natural Light is not possible);

(h).2 Oncology Dispensary / Production area;

(h).3 SMFPR Dispensary production area;

(h).4 TML staff work area;

(h).5 PICU Classroom (EOC) (10832);

(h).6 PICU Radio/ Communication Room (EOC) (10833); and

(h).7 PICU computer Lab (EOC) (10834).

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; and

5.4.1.3(6) Provide half height interior glazing at lounges and reception areas.

5.4.1.4 Roofs

5.4.1.4(1) Provide landscaping and other "green" treatments of roof area, including provision of useable outdoor spaces.

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) Small scale roof top equipment and exit facilities located on visible roofs must be screened and integrated into the Building design and set back from the Building perimeter to reduce visual impact from ground level.

5.4.1.4(4) Provide helicopter warning lights and wind socks on upper roofs.

5.4.1.5 Green Roof and Accessible Roof Areas

5.4.1.5(1) Project Co will provide green roof or accessible roof areas to extend over no less than 75% of the podium roof area beneath the inpatient floor levels.

5.4.1.5(1)(a) 25 % of the podium roof area will be an accessible roof area;

5.4.1.5(1)(b) 50% of the accessible roof area on the podium roof mentioned in 5.4.1.5(1)(a) will be patient-oriented outdoor spaces.

5.4.1.5(2) Project Co will provide Oncology Outdoor Space which meets the following requirements:

5.4.1.5(2)(a) Will be a patient oriented accessible roof area compliant with the requirements of section 5.4.1.5(5);

5.4.1.5(2)(b) located in a sheltered area;

5.4.1.5(2)(c) provide a variety of spaces to accommodate different activities and levels of privacy;

5.4.1.5(2)(d) provide a view from inpatient windows for patients who are unable to go outside;

5.4.1.5(2)(e) provide seat and seat backs which minimize the retention of heat and cold which may not be comfortable for patients;

5.4.1.5(2)(f) provides healing gardens; and

5.4.1.5(2)(g) includes a play area with a suitable surface.

5.4.1.5(3) Green roof areas will have the following features:

5.4.1.5(3)(a) designed to be appropriate for the Facility;

5.4.1.5(3)(b) will be landscaped throughout meeting the requirements of 4.2.6;

5.4.1.5(3)(c) all landscaping will be suitable for the rooftop location and installation;

5.4.1.5(3)(d) will be visible from the inpatient units wherever possible;

5.4.1.5(3)(e) provided with a suitable way to water vegetation;

5.4.1.5(3)(f) provided with discreet garden maintenance equipment storage.

5.4.1.5(4) Accessible roof areas will have the following features:

5.4.1.5(4)(a) will have extensive vegetated areas complying with the requirements of green roof areas described in 5.4.1.5(3);

5.4.1.5(4)(b) provide both quiet contemplative spaces and interactive play areas for children;

5.4.1.5(4)(c) will provide a play environment;

5.4.1.5(4)(d) will provide permanent and moveable seating for a variety of group sizes; provide a variety of seating types to suit users. Provide shading over 75% of seating areas using trellises, canopies and/or trees.

5.4.1.5(4)(e) must be designed so as not to create areas for a person to hide and must maintain adequate site lines for safety and security.

5.4.1.5(5) Patient oriented accessible roof areas will have the following features:

5.4.1.5(5)(a) Comply with the requirements for accessible roof areas listed in 5.4.1.5(4);

5.4.1.5(5)(b) will include healing gardens with the following features:

(b).1 provide contrast in terms of colour, texture and sounds;

(b).2 provide a sensory experience which engages all five senses, include the ability to touch plants;

(b).3 provide distractions in the form of flowers that attract birds; and

(b).4 provide landscape that encourages you to walk through it.

5.4.1.5(5)(c) be secure, easily accessible from adjacent indoor spaces, and provided with separation and privacy from other outdoor spaces;

5.4.1.5(5)(d) provide for privacy, allow for exercise and create a change in environment for inpatients and their families;

5.4.1.5(5)(e) be accessible to and usable by patients in wheel chairs with IV's and provide a firm, smooth surface for patient pathways; and

5.4.1.5(5)(f) provide power source for patients to plug in equipment.

5.4.1.6 Courtyards

5.4.1.6(1) All courtyards, both interior and exterior, will be landscaped.

5.4.1.6(2) Exterior courtyards used to provide direct natural light will:

5.4.1.6(2)(a) have a height from the courtyard surface to the roof of not greater than three storeys;

5.4.1.6(2)(b) will have an area of more than 180 square meters.

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 points 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 patient, visitor and ambulance areas will be covered and be protected from the elements.

5.4.2.1(3) 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(4) Provide large glazed expanses at major entrances to reinforce public access and permeability.

5.4.2.1(5) Provide clearly separate, distinct designed major entrances to:

5.4.2.1(5)(a) Main entrance to ACC lobby; and

5.4.2.1(5)(b) ED component.

5.4.2.1(6) Project Co will be responsible for grade changes; patching, repairing and generally reinstate as existing the paved surfaces to coordinate the Facility's access and loading with the operations and functions of the existing adjacent service entrances. Provide a weather protected service entrance which will allow for access and loading.for the following vehicles:

5.4.2.1(6)(a) one 14m long transport truck; and

5.4.2.1(6)(b) two cube vans to load at the same time.

5.4.2.1(7) Provide three entrances to the ED component:

5.4.2.1(7)(a) walk-in emergency entrance;

5.4.2.1(7)(b) ambulance and stretcher emergency entrance; and

5.4.2.1(7)(c) Decontamination Suite entrance.

5.4.2.1(8) Entrance vestibules will be configured as airlocks and sized such that if a single person were to enter only one set of doors will open at one time in order to minimize heat loss. Ensure adequate distance

between the sets of doors to allow stretchers and wheelchairs to fit lengthwise into the vestibule. Locate entrance vestibules at a minimum in the following locations:

5.4.2.1(8)(a) Main entrance to ACC lobby;

5.4.2.1(8)(b) ED patient entrance; and

5.4.2.1(8)(c) other entrances that adjacent to patient areas.

5.4.2.1(9) At all main entrances, provide automatic doors activated by sensor and by handicapped accessible push-button controls located on the inside and outside of both sets of doors. Doors will be configured for push-pull manual operation in addition to automatic operation. In locations that are served with double doors both door leaves will operate automatically.

5.4.2.1(10) Entrance doors to the Emergency Component and patient care areas will be sufficiently wide to allow access for stretchers surrounded by medical staff.

5.4.2.1(11) Pedestrian interest and comfort at entries will be provided through specifically designed seating, signage, lighting and features that signal the Facility's use.

5.4.2.1(12) Reduce visibility of secondary entrances and fire exits.

5.4.2.2 Exit Stairs

5.4.2.2(1) In addition to exiting requirements, locate exit stairs strategically for the convenience of staff moving between related clinical components.

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

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

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

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

5.4.2.3 Convenience Stairs

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

5.4.2.3(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(3)(a) If NICU is split onto two floors, provide a stair between each floor area;

5.4.2.3(3)(b) Between NICU and Procedures floor areas (is permitted to have secure and direct access within an exit stair in lieu of convenience stair); and

5.4.2.3(3)(c) Between Procedures Suite (Special) and Procedures Suite (General) floor areas (is permitted to have secure and direct access within an exit stair in lieu of convenience stair).

5.4.2.4 Corridors

5.4.2.4(1) Corridor widths will be as follows:

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

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

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

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

5.4.2.4(3) Provide alcoves accessible from corridors to accommodate the Disaster Response Cabinets indicated in Schedule 2 Appendix 2E (Equipment and Furniture).

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

5.4.2.5 Acoustics and Noise Control

5.4.2.5(1) Design and construct the Facility in consultation with a Consultant in Acoustics and Noise Control.

5.4.2.5(2) Design and construct the Facility to comply, at a minimum, with the requirements described in Appendix 3D-Acoustics and Noise Control.

5.4.2.5(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.

5.4.2.5(4) Appropriate acoustic and noise control measures shall be considered to meet the functional requirements of the space by:

5.4.2.5(4)(a) attenuation of sound within public, patient and staff environments;

5.4.2.5(4)(b) sound isolation between the exterior and interior spaces;

5.4.2.5(4)(c) sound isolation between interior spaces within the Building at both horizontal and vertical separations;

5.4.2.5(4)(d) sound and vibration isolation of building service noises and sound isolation of Building service rooms;

5.4.2.5(4)(e) sound isolation as required for specialty rooms such as video-conferencing;

5.4.2.5(4)(f) sound attenuation of noise from equipment within rooms; and

5.4.2.5(4)(g) sound masking system.

5.4.2.5(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.

5.4.2.5(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.

5.4.2.5(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 3D –Acoustics and Noise control. Seal around conduits.

5.4.2.5(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.

5.4.2.5(9) Use acoustic screens, vibration isolators, and carefully selected exterior equipment to prevent exterior noise that neighbours may find offensive.

5.4.3 Building Envelope

5.4.3.1 Project Co to design and construct a building envelope as follows:

5.4.3.1(1) to prevent the accumulation and stagnation of rain, snow, ice and dirt on the horizontal and vertical surfaces of the building envelope(s) appropriate for the climate the Facility is situated in;

5.4.3.1(2) meet all the requirements of VBBL and ASHRAE 90.1;

5.4.3.1(3) in accordance with pressure equalized rain-screen wall design principles with an exterior insulated wall assembly and demonstrate that the proposed details fulfill the rainscreen principles;

5.4.3.1(4) the wall assembly will be insulated primarily exterior to the interior wythe or back-up wall;

5.4.3.1(5) Provide a continuous air, vapour and moisture membrane installed exterior to and supported by the wall structure. Include a continuous air space;

5.4.3.1(6) with a predicted service life that exceeds 50 years as defined in CSA S478-95:

5.4.3.1(6)(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;

5.4.3.1(6)(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

5.4.3.1(6)(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.

5.4.3.1(7) ensure continuation of the air barrier, vapour barrier, thermal barrier and moisture barrier across the entire envelope including foundations, walls and roofs;

5.4.3.1(8) to accommodate the high humidity service conditions expected inside the Building;

5.4.3.1(9) below grade assembly will resist the ingress of water;

5.4.3.1(10) to avoid thermal bridging;

5.4.3.1(11) utilize a building envelope consultant through design and construction process and provide for review during construction;

5.4.3.1(12) 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

5.4.3.1(13) Submit building envelope test results to the Authority verifying that the building envelope is meeting all requirements.

5.4.4 Interior Walls and Partitions

5.4.4.1 Design and construct interior walls and partition systems that:

5.4.4.1(1) provide acoustic separations as required for the specific functions to be carried out in the spaces affected, and in accordance with the requirements of Appendix 3D-Acoustics and Noise Control; and

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

5.4.4.2 Design and construct interior walls and partition systems with seismic resistance capabilities conforming to the requirements of CSA S832-06 Guidelines for Seismic Risk Reduction of Operational and Functional Components (OFCs) of Buildings.

5.4.4.3 Design and select interior walls and partitions, partition systems and interior finishes to comply with the following criteria:

5.4.4.3(1) cleaning, maintenance and infection prevention and control as relevant for the particular or specific functions enclosed ;

5.4.4.3(2) wall finishes shall be washable. In the vicinity of plumbing fixtures, wall finishes shall be smooth and water resistant;

5.4.4.3(3) in nourishment and kitchenette areas wall construction, finish and trim , including the joints between the walls and floors, shall be free of spaces that could harbour insects or rodents;

5.4.4.3(4) in OR's, LDR'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;

5.4.4.3(5) in the MDR reprocessing areas ceiling, walls, and work surfaces in this area will be impervious to moisture.

5.4.4.3(6) permanence and durability including impact resistance as relevant for the particular or specific functions enclosed ;

5.4.4.3(7) resist damage due to normal wear and resist damage due to collision in high traffic areas;

5.4.4.3(8) non-toxic/ non-allergenic;

5.4.4.3(9) low VOC emissions so as to minimize adverse impact on indoor air quality and indoor environmental quality; and

5.4.4.3(10) flexibility to permit adaptability of the internal spaces, if required to suit future process revisions.

5.4.4.4 The interior partitions between ID 10392 Retail/Coffee Shop and the adjacent ED spaces will be easily removed to allow for expansion of the ED component in the future with a minimum amount of reconfiguration or repair.

5.4.4.5 Team Care stations and storage areas descried in Appendix 3A-Clinical Specifications may be split or divided by interior partitions if:

5.4.4.5(1) the split is required for functional reasons; and

5.4.4.5(2) the split is agreed to by the Authority.

5.4.4.6 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.

5.4.4.6(1) provide full height glazing for a minimum of 1.5m where line of site is required and a partition is required;

5.4.4.6(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;

5.4.4.6(3) provide low height furniture, millwork and equipment where line of sight is required.

5.4.4.7 Provide line of sight:

5.4.4.7(1) as required for functionality and as indicated in Appendix 3A-Clinical Specifications.

5.4.4.7(2) from Team Care Stations to patient bedroom doors; and

5.4.4.7(3) from Team Care Stations to Team Communication Rooms.

5.4.4.8 Provide fittings, attachments and internal bracing/backup as required to accommodate and support wall mounted equipment indicated in Schedule 2 Appendix 2E (Equipment and Furniture) and in the [*IT Equipment List].

5.4.4.9 All patient or inpatient room bathrooms must have a "pony wall" which is 305mm lower than the ceiling height, between the bedroom and bathroom to allow for use or future use of a single gantry style patient lift system.

5.4.4.10 Partition design to allow for built in pass throughs

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

5.4.5 Surfaces

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

5.4.5.1(1) Resistant to microbial spread and growth;

5.4.5.1(2) non porous or smooth;

5.4.5.1(3) durable;

5.4.5.1(4) seamless;

5.4.5.1(5) resilient and impact resistant;

5.4.5.1(6) non toxic/ non allergenic;

5.4.5.1(7) presenting minimal glare;

5.4.5.1(8) constructed in a way that will not soak up or harbour moisture; and

5.4.5.1(9) water impermeable in areas where water or dampness can occur.

5.4.6 Ceilings

5.4.6.1 Provide ceilings in all spaces except for service areas.

5.4.6.2 Ceilings shall prevent contamination of treatment areas by falling dust and debris and prevent the passage of particles from above the ceiling plane into the clinical environment.

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

5.4.6.4 Ceiling systems will comprise a major component of the acoustic or sound attenuation function as required in the spaces in which they are installed and will comply with the requirements of Appendix 3D-Acoustics and Noise Control.

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

5.4.6.5(1) ceiling heights in corridors, storage rooms and toilet rooms will be not less than 2.4 metres (except that ceiling heights in small, normally unoccupied spaces such as storage closets may be reduced to a minimum of 2.1 meters);

5.4.6.5(2) suspended tracks, rails and pipes located in the traffic path for patients in beds and/or on stretchers, including those in patient service areas, will not be less than 2.2 meters above the finished floor, including door frame clearances;

5.4.6.5(3) ceiling heights in OR's, IR and PICU to be of a height to accommodate booms and be a minimum 3 meters; and

5.4.6.5(4) ceilings in Seclusion Rooms to be of sufficient height to ensure that the lights and camera housings are out of reach and to meet the requirements of though Ministry of Health: Hospital-

Based Psychiatric Emergency Services Observation Units.

5.4.6.6 Design and select ceiling systems and ceiling finishes to comply with the following criteria:

5.4.6.6(1) cleaning, maintenance and infection prevention and control relevant to the particular or specific functions of the space ;

5.4.6.6(2) flexibility relevant to the particular or specific functions of the space;

5.4.6.6(3) access to the spaces above where required to access services and equipment;

5.4.6.6(4) compatibility with mechanical, plumbing, electrical, communications services and fixtures;

5.4.6.6(5) non-toxic/ non-allergenic;

5.4.6.6(6) low VOC emissions so as to minimize adverse impact on indoor air quality and indoor environmental quality; and

5.4.6.6(7) aesthetic and design qualities to provide a healing environment for the patients, staff and public.

5.4.6.7 Provide fittings, attachments and structure as required to accommodate and support ceiling mounted equipment in all rooms. Support structures for ceiling mounted equipment will be provided above the finished ceiling and in accordance with the equipment manufacturer's instructions.

5.4.6.8 In the Mental Health Care Area provide tamper resistant ceiling devices.

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

5.4.6.9(1) AIR rooms and anterooms

5.4.6.9(2) PIR rooms ad anterooms

5.4.6.9(3) Clean corridors

5.4.6.9(4) Clean rooms

5.4.6.9(5) Specialized radiographic rooms

5.4.6.9(6) Minor surgical procedure rooms

5.4.6.10 Ceilings in restricted rooms such as OR's, shall be monolithic and shall be constructed with drywall or removable ceiling panels complying with the requirements of 6.9.2.4(3)(g).

5.4.6.11 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.

5.4.6.12 Ceilings will be designed for seismic restraint according to the VBBL.

5.4.7 Floor Finishes

5.4.7.1 Provide a finished floor covering in all rooms. Sealed or painted floors will be allowed in service rooms only.

5.4.7.2 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.

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

5.4.7.4 Flooring designs and patterns may comprise a component of the "way-finding" system of the Facility.

5.4.7.5 Project Co will design and select floor finishes complying with the following criteria:

5.4.7.5(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;

5.4.7.5(2) imperviousness to concentrations of moisture anticipated to be existing on the floors and duration of that moisture;

5.4.7.5(3) free of seams and creases that could harbour bacteria;

5.4.7.5(4) resistant to food acids (including seams and joints);

5.4.7.5(5) permanence and durability and resistance to concentrated service traffic both pedestrian and vehicular;

5.4.7.5(6) aesthetic and design qualities to provide a healing environment for the benefit of patients, staff and public;

5.4.7.5(7) non-toxic/ non allergenic products;

5.4.7.5(8) products do not contain PVC or phalates;

5.4.7.5(9) limits the transmission or reflection of sound and vibrations where noise control is needed;

5.4.7.5(10) do not require polishing;

5.4.7.5(11) cleanable and maintainable without toxic stripping and finishing;

5.4.7.5(12) provides the necessary stability and traction for foot traffic and wheeled traffic as appropriate;

5.4.7.5(13) non-slip;

5.4.7.5(14) of a type that does not create resistance for patients using walking aids and wheelchairs;

5.4.7.5(15) resists damage by water, chemicals;

5.4.7.5(16) low VOC emissions so as to minimize adverse impact on indoor air quality and indoor environmental quality; and

5.4.7.5(17) compatibility of patterns and textures with the requirements for pedestrian safety.

5.4.7.6 Flooring will be seamless and coved at all walls in all clinical spaces and service spaces; cove base application will be permitted in other areas.

5.4.7.7 Patient shower floors and handicap accessible staff area shower floors will be provided with a positive slope to drains and be flush-walk-in without ridges for water retention.

5.4.8 Entry Facilities

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

5.4.8.1(1) Enhanced flooring

5.4.8.1(1)(a) if sheet flooring is provided create a pattern design using different flooring colours;

5.4.8.1(2) design that is appropriate for a pediatric focussed hospital providing positive distractions and a welcoming environment to children;

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; and

5.4.8.1(7) three dimensional ceiling design.

5.5 Interior Environment

5.5.1 Infection Control

5.5.1.1 General

5.5.1.1(1) Design the Facility to minimize the transmission of micro organisms. Provide the necessary spaces to support routine infection and control practices.

5.5.1.1(2) Design the Facility in compliance with all applicable infection control standards, including CSA Z8000 Canadian Health Care Facilities.

5.5.1.1(3) All furnishing, surfaces, millwork and finishes for patient care areas, clinics, waiting rooms, pause areas, support rooms etc will be cleanable and able to withstand frequent cleaning and low level hospital disinfection.

5.5.1.1(4) Project Co shall use vinyl or non-woven upholstery with a non-institutional appearance. Use of fabric furnishings and/or finishes will only be permitted where Project Co demonstrates to the Authority's satisfaction that the materials/finishes meet the Authority's requirements for infection control and meet the Authority's requirements for cleaning (including the PICNet British Columbia Best Practices for Environmental Cleaning for Prevention and Control of Infections in All Healthcare Setting and Programs document of April 2013).Design the Facility to mitigate and prevent, where possible, the spread of infection including via contaminated surfaces and airborne pathogens.

5.5.1.1(5) Select appropriate materials and use simple detailing leading to quality workmanship and ease of accessibility for routine cleaning and maintenance.

5.5.1.1(6) 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(7) 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(8) Design the Facility to mitigate the spread of airborne infections during an outbreak by creating outbreak control zones as follows:

5.5.1.1(8)(a) Create Outbreak Control Zones that can be isolated in area with partitions and doors and negatively pressurized from the surrounding areas to mitigate the spread of airborne infections;

5.5.1.1(8)(b) Outbreak Control Zones will contain space that can be converted into an anteroom adjacent to the entrance to the pod (for example a meeting room);

5.5.1.1(8)(c) At a minimum provide Outbreak Control Zones as follows:

(c).1 One12 bed pod on each Medical/Surgical inpatient floor;
(c).2 One 12 bed neighbourhood in NICU;
(c).3 One 14 bed neighbourhood in PICU; and
(c).4 16 bed positions in ED.

5.5.1.1(8)(d) provide Outbreak Control Zones with the mechanical requirements described in 7.4.4.1(4)of this Schedule.

5.5.1.2 Hand Hygiene Sinks and Waterless Hand Hygiene Stations

5.5.1.2(1) Prepare a workflow pattern and risk assessment in collaboration with the Authority to address placement of hand hygiene sinks and waterless hand hygiene stations.

5.5.1.2(2) At minimum, provide hand hygiene sinks in the following locations:

5.5.1.2(2)(a) as indicated in CSA Z8000 7.5.11.2;

5.5.1.2(2)(b) as indicated or required for functionally in Appendix 3A- Clinical Specification; and

5.5.1.2(2)(c) at other locations determined in consultation with the Authority.

5.5.1.2(3) Hand hygiene sinks will meet the requirements of:

5.5.1.2(3)(a) CSA Z8000; and

5.5.1.2(3)(b) Best Practices for Hand Hygiene In All Healthcare Settings and Programs, British Columbia Ministry of Health.

5.5.1.2(4) Provide waterless hand hygiene stations:

5.5.1.2(4)(a) as indicated in CSA Z8000 7.5.11.3.1; and

5.5.1.2(4)(b) at other locations determined in consultation with the Authority.

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(1)(a) As indicated in CSA Z8000 7.5.12.

5.5.1.3(1)(b) as indicated in Appendix 3A-Clinical Specification.

5.5.1.3(2) 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, NICU patient areas, PICU patient areas , Birthing patient 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:

5.5.1.5(1)(a) meet the requirements of CSA Z314.15 Warehousing, Storage and Transportation of Clean and Sterile Medical Devices;

5.5.1.5(1)(b) are cleanable with required cleaning and disinfection products;

5.5.1.5(1)(c) are 460mm-510mm from ceiling to ensure adequate functioning of fire sprinklers; and

5.5.1.5(1)(d) include seismic restraints.

5.5.1.5(2) If open shelving is provided for storage, the bottom and top shelf of such shelving will be a solid surface.

5.5.1.5(3) Storage shelving should not be exposed to direct airflow from the HVAC system.

5.5.1.5(4) Shelving should be made of materials that are non-porous on all surfaces, no shedding, easily cleanable, and free of burs and sharp or rough edges.

5.5.1.5(5) Provide storage required to meet the Facility operating at HIMSS stage 5.

5.5.2 Interior design

5.5.2.1 Project Co to provide interior design as follows:

5.5.2.1(1) reflects the values of the Facility;

5.5.2.1(2) overall interior design throughout the Building is integrated;

5.5.2.1(3) provides a distinct character for the Facility which relates to its purpose and the patients using the Facility;

5.5.2.1(4) appropriate to a pediatric facility;

5.5.2.1(5) individual design concepts for each component area;

5.5.2.1(6) sensitive to the user groups in different areas;

5.5.2.1(7) provides child centric design elements;

5.5.2.1(8) less stark and clinical character than existing campus facilities;

5.5.2.1(9) complementary environmental wall graphics and other thematic décor with a wide range of themes and colours; and

5.5.2.1(10) coordinates with wayfinding concepts.

5.5.3 Ergonomic Design

5.5.3.1 Project Co will provide:

5.5.3.1(1) detailed design features, which expressly facilitate the physical activities of the staff and patients to increase their safety, efficiency and general well being, and assist in eliminating ergonomic risk factors;

5.5.3.1(2) lifting and transfer devices for all specified patient care and treatment spaces (including washrooms); and

5.5.3.1(3) ergonomic design, consistent with Good Industry Practice, of all work spaces including millwork, modular casework, furniture, lighting, and finishes to eliminate strain and injury to health care workers; refer to Appendix 3E- Occupational Health and Safety.

5.5.4 Colour

5.5.4.1 Project Co will:

5.5.4.1(1) Provide colour schemes consistent with interior design requirements;

5.5.4.1(2) provide component colour palettes appropriate for the emotional and psychological needs of patients;

5.5.4.1(3) provide colour schemes that are appropriate to type of patient care being provided in each component;

5.5.4.1(4) provide natural colour palettes that contribute to the creation of a healing environment;

5.5.4.1(5) provide distribution of ambient full-spectral colour within typical staff and patient environments;

5.5.4.1(6) avoid glare-creating finishes; and

5.5.4.1(7) provide three options for colour palettes for the Authority's approval.

5.5.5 Interior Wayfinding

5.5.5.1 Interior wayfinding to be in compliance with the requirements of Appendix B- Wayfinding Guidelines .

5.5.5.2 Interior Wayfinding to be developed in coordination with the Authority.

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

5.5.5.4 Locate major destinations, such as department entrances, directly off of entry spaces and/or along primary circulation paths for easy access, make waiting and pause areas as open as possible to circulation routes without requiring wayfinders to pass through waiting or pause areas.

5.5.5.5 Provide significant, recognizable, easily named and identified elements in key and easily found locations that can become 'meeting points' for patients and visitors.

5.5.5.6 Design public elevator and stair lobbies and public circulation routes to be distinct from service routes and other non-public routes.

5.5.5.7 Orient all building plan directories to reflect the direction from which they are viewed.

5.5.6 Signage

5.5.6.1 Project Co will provide signage for the Facility as follows:

5.5.6.1(1) Exterior and interior signage according to the requirements of Appendix B- Wayfinding Guidelines;

(a).1 Provide services and structure as required for complete signage installations,

(a).2 Provide services for, and install, electronic signs indicated in Schedule 2, Appendix 2E Equipment and Furniture;

5.5.6.1(2) in coordination with the Authority; and

5.5.6.1(3) including all code and mandatory signage.

5.5.6.1(4) including violence prevention signage.

5.5.6.2 Signage will have the following characteristics:

5.5.6.2(1) signage will be highly visible (day and night), clear, concise, and well-differentiated from surrounding information, notices, advertising, etc.;

5.5.6.2(2) design signage such that the materials, colours, letter fonts, sizes and other aesthetic and functional considerations, such as Braille, conform to the overall way finding design system;

5.5.6.2(3) signage will be resistant to graffiti and physical damage;

5.5.6.2(4) exterior signage will be designed to be weatherproof;

5.5.6.2(5) provide signage that directs visitors to all patient destinations and all other components and rooms within. Prioritize patient destinations over non-patient destinations; and

5.5.6.2(6) orient all important signs, including all patient destination signs, to be perpendicular to the line of patient travel on approach.

5.5.6.3 Project Co will provide internal directional signs as follows:

5.5.6.3(1) include a main directory, installed at or near the main public entrance to the Building that indicates the Building in relation to the overall C&W Campus and the location of every area and component within the Building that is accessible to the public;

5.5.6.3(2) provide a continuous 'trail' of signage from the entrances to each of the reception/information points listed on the directories;

5.5.6.3(3) installation of signage at each point at which a directional decision is required;

5.5.6.3(4) incorporate consistent terminology; and

5.5.6.3(5) provide door signage to identify every space (e.g. rooms, alcoves, corridors and stairwells) in the Facility. Door signage will:

5.5.6.3(5)(a) be developed in consultation with the Authority;

5.5.6.3(5)(b) be located in a consistent location for every space in the Facility;

5.5.6.3(5)(c) indicate restrictions on entry and warn of hazards;

5.5.6.3(5)(d) not be obscured by the emergency systems and Code Blue system call; and

5.5.6.3(5)(e) be consistent with the following room numbering protocol :

(e).1 each room and alcove/space has a unique identifier number;

(e).2 rooms are numbered in a manner that reflects normal movement through the Facility;

(e).3 labelling anticipates a person attempting to follow numbering along corridors in sequence;

(e).4 blocks of numbers are periodically skipped to allow for future expansion of the numbering system if rooms are added through renovations; and

(e).5 each room and space requires a unique number for service reasons. It is important that room numbers be determined early in design and maintained following occupancy. Follow the same numbering system on design and construction documentation for all disciplines (architectural, mechanical, electrical, etc.).

5.5.6.4 Project Co will design and provide donor recognition signs and installations as follows:

5.5.6.4(1) In consultation with the Authority and agreed to by the Authority; and

5.5.6.4(2) to comply with the requirements in Appendix B-Wayfinding Guidelines.

5.5.6.4(3) Provide:

5.5.6.4(3)(a) Exterior donor name signs;

5.5.6.4(3)(b) Interior donor name signs;

5.5.6.4(3)(c) Interior lobby donor wall:

(c).1 as a main feature of the ACC Building lobby area;

(c).2 designed to present donor names and information in an innovative and appropriate manner;

(c).3 designed to occupy 9 m minimum of wall space;

(c).4 provide appropriate wiring for interactive touch screen elements; and

(c).5 well lit with feature lighting.

Interior grouped donor wall tiles.

5.5.6.4(4) Provide feature lighting for donor signage as indicated in Appendix B-Wayfinding Guidelines.

5.5.6.4(5) All locations to receive donor recognition signs and installations must be free of wall devices such as light fixtures, pull boxes, fire extinguishers etc. to allow for proper installation.

5.6 Structural Design

5.6.1 Structural Design Principles

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

5.6.1.2 Carry out the Design and Construction so that Construction-caused settlement of existing buildings and structures does not exceed 6 mm at any location. At joints in floors between new and existing construction, provide a recess in the new slab to be filled in just prior to flooring application to accommodate differential settlement between structures and provide a smooth transition across the joint.

5.6.2 Structural Analysis Methods

5.6.2.1 Perform the structural analysis of the Facility generally in accordance with the provisions of the VBBL, 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 VBBL, Section 4.1.8.12, be used.

5.6.3 Sub Structures

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

5.6.3.2 Underpinning of existing structures will be provided as required for both temporary excavations and permanent construction. If underpinning is to remain in the final structures, Design and Construction will provide for long term durability.

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, including piling, conventional footings, or raft slabs, will be designed by the Building engineer-of-record.

5.6.3.4 Refer to Schedule 2 Design and Construction Protocols, for requirements regarding noise and vibration from Construction activities.

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

5.6.4 Design loads

5.6.4.1 Performance criteria

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

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

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

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

5.6.4.1(1)(d) Outdoor common areas, concourses and landscaped areas accessible to the public: 4.8KPa (100 psf); and

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

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

equipment indicated in Schedule 2, Appendix 2E (Equipment and Furniture) and patient lifting devices;

5.6.4.1(3) Design for the loading on the structure imposed by patient lifting devices in all inpatient rooms and washrooms, treatment rooms, procedure rooms and specified exam rooms. This applies to rooms having patient lifts installed, as well as designing all other rooms listed for future installations.

5.6.4.1(4) Design floors for a minimum superimposed specified dead load allowance of 1.0 KPa to allow for partitions, and 0.5 kPa to allow for ceilings and mechanical equipment; (other than medical equipment indicated in Schedule 2, Appendix 2E (Equipment and Furniture)).

5.6.4.1(5) Design roofs for a minimum net uplift wind load of 1.5 kPa for the minimum snow and rain loads required by the VBBL. Notwithstanding other requirements, the minimum specified live load for design of roofs will be 2.4 KPa (50 psf) and roofs will be designed to accommodate concentrated loads from equipment, machinery and features, whether roof or ceiling-mounted, including medical equipment indicated in Schedule 2, Appendix 2E (Equipment and Furniture) and patient lifting devices.

5.6.4.1(6) Design roofs for the superimposed specified dead load of roofing materials, green roofs, ceilings, mechanical equipment, but not less than 1.5 kPa (30 psf) to allow for future re-roofing alternatives.

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

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

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

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

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

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

5.6.4.1(13) The design loads are to be determined in accordance with the VBBL and the User's Guide - National Building Code Structural Commentary – Part 4.

5.6.5 Flexibility for Future Change

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

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

5.6.5.3 Select a structural system that will readily accommodate future changes for similar design load parameters without the addition of structural members, welding, noise, dust, or demolition should be a primary structural design criteria.

5.6.5.4 The minimum primary structural support grid will be 9 meters by 9 meters to accommodate flexibility in the layout of the Facility. This may be reduced in some

locations if this is beneficial to the overall layout (and possible future layouts) and minimizes the number of interior columns that interfere within spaces.

5.6.6 Deflection limitations

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

5.6.6.2 Design the structure to meet the deflection limits of the VBBL, and in accordance with the applicable materials design standards listed in Section 2.1 of this Schedule as a minimum and as appropriate for the non-structural components of the Facility. Notwithstanding the above, the deflection limit will not exceed the levels specified in this Section.

5.6.6.3 Performance criteria:

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

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

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

5.6.6.3(4) The lateral Building inter-story seismic drift will not exceed 1 percent of the storey height.

5.6.7 Vibration limitations

5.6.7.1 Design the structural system to minimize the effects of floor vibration due to use, occupancy, and equipment. Vibration is to be limited to acceptable levels for the use and occupancy of the floors.

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

5.6.7.3 Performance criteria:

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

5.6.7.3(2) Machinery that could be a source of vibration is to be mounted using vibration isolation techniques;

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

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

5.6.7.3(5)

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 Durability

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

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

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

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

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

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

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

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

5.6.8.3(6) epoxy coated reinforcing steel in parkade entry ramps and ramp slabs including any areas of suspended concrete slab subjected to traffic loads.

5.6.9 Equipment Supports

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

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

5.6.9.3 Performance criteria:

5.6.9.3(1) Design floor and roof assemblies to support the gravity and seismic loads for floor, wall, or ceiling-mounted medical equipment indicated in Schedule 2, Appendix 2E (Equipment and Furniture). Ensure that steel content of structural members is compatible with equipment which is sensitive to steel content of the surrounding structure.

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

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

5.6.9.3(4) Drilled insert-type anchors for medical equipment indicated in Schedule 2, Appendix 2E (Equipment and Furniture) supports and anchorage are to be rated by the insert manufacturer for seismic and cyclic loading applications and drop-in sleeve anchors will not be permitted.

5.6.10 Member Design Criteria

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

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

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

5.6.10.3 Lateral Load Resisting System Design Criteria (wind)

5.6.10.3(1) Design all structural framing members to have sufficient strength and stability so that the factored member resistance is equal to or greater than the effects of the factored lateral wind pressures or seismic loads, whichever produces the more unfavourable effect.

5.6.10.3(2) Design all structural framing members to have sufficient stiffness so as to remain serviceable under the specified wind pressures. The maximum inter-storey drift under the 1 in 50 year service wind pressure and gravity loads shall not exceed 1/500 of the storey height.

5.6.10.4 Cladding Support Design Criteria

5.6.10.4(1) If the cladding system is to be supported by the structural members design, the members to have sufficient strength and stability so that the factored member resistance is equal to or greater than the effects of the factored gravity and wind pressures.

5.6.10.4(2) Where the cladding system is to be supported by the structural members design, the members to have sufficient stiffness so as to remain serviceable under the 1 in 50 year service wind pressure and gravity loads and prevent undue stress to the cladding elements. The deflection serviceability limits are shown in following table:

5.6.10.4(3)

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

5.6.10.5 Structural Integrity

5.6.10.5(1) Various levels of structural integrity, ranging from the minimum level of structural integrity as stipulated in the VBBL to enhanced integrity as determined by a rigorous blast-resistant design approach will be considered. Design any structure and its structural members to have sufficient structural capacity and structural integrity to safely and effectively resist all loads and effects of loads and influences that may reasonably be expected over the service life of the structure.

5.6.10.6 Thermal Expansion

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

5.6.10.7 Seismic Isolation

5.6.10.7(1) Design the structure to be completely independent from any existing adjacent structures 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 Vancouver Building By-law.

5.7 Guard Rails

5.7.1.1(1) Design guardrails on the interior of the Building in interconnected floor spaces, atriums and open areas to:

5.7.1.1(1)(a) meet the requirements of VBBL;

5.7.1.1(1)(b) be of a height and design to prevent any possibility of a person climbing over the guard; and

5.7.1.1(1)(c) be of design allowing for extensive visual connection between floors.

5.7.1.1(2) Design guardrails at accessible roof areas to meet the requirements of VBBL and WorkSafe BC; in addition the guardrails will be of a height to prevent any possibility of a person climbing over the guard. The guardrails to be of a transparent design to allow for extensive views through the guardrail.

5.8 Bariatric Design

5.8.1 Definition of obesity:

5.8.1.1 For the purposes of this document, bariatric individuals are considered to be those within the range of 225 kg to 453 kg.

5.8.2 Bariatric Inpatient room requirements:

5.8.2.1 Bariatric inpatient bedrooms will comply with CSA Z8000- 7.8.8.2.3 (Accommodation of Bariatric Persons);

5.8.2.2 The minimum dimension (in any direction) of the Bariatric bedroom will be 4500mm;

5.8.2.3 Clear space of at least 1500mm will be provided on three sides of three sides of the bed;

5.8.2.4 Sufficient clear space will be provided to accommodate large mobility aids and other portable equipment as well as family space;

5.8.2.5 For room entry door requirements see 6.8.1.2(5)(k) ;

5.8.2.6 Service connections (e.g.: medical gas, electrical) will be spaced farther apart to accommodate a wider bed;

5.8.2.7 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, and from the bed to the washroom; and

5.8.2.8 The room will be equipped with handrails that can support at least 454kg.

5.8.3 Washrooms for inpatient bedrooms for bariatric patients should be designed with the following features:

5.8.3.1 door conforming to 6.8.1.2(5)(k) ;

5.8.3.2 sink that can support at least a 363 kg downward force;

5.8.3.3 floor-mounted toilet that can support 454 kg;

5.8.3.4 toilet position compatible with the use of a bariatric commode;

5.8.3.5 distance from the toilet centre line to wall of 533mm to 610mm;

5.8.3.6 clear space of at least 1118mm on one side of the toilet for transfer use;

5.8.3.7 toilet paper dispenser mounted in a location where it can be easily reached by a bariatric patient;

5.8.3.8 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;

5.8.3.9 Shower area that:

5.8.3.9(1) is open to the toilet area, with no floor lip, and with floor sloped to a drain;

5.8.3.9(2) has a minimum dimensions of 1220mm x 1520mm; and

5.8.3.9(3) is equipped with a moveable/portable shower seat and grab bars.

5.8.4 A privacy curtain will be provided at the door;

5.8.5 Patient controlled room lights, temperature, and TV from bed; and

5.8.6 Waiting Room and Pause Area Requirements:

5.9 Seclusion Rooms-Psychiatric Patient Observation Units

5.9.1 All Seclusion rooms will meet the requirements of the "Ministry of Health: Hospital-Based Psychiatric Emergency Services Observation Units".

5.9.2 Seclusion room walls should be of concrete block construction.

5.9.3 Seclusion Rooms will conform to CSA Z8000 Canadian Health Care Facilities, 8.4 Mental Health and Addiction Services.

5.10 Safe Rooms

5.10.1 Safe Rooms will conform to CSA Z8000 Canadian Health Care Facilities, 8.4 Mental Health and Addiction Services for patient rooms, and 9.4 Emergency Care for exam rooms.

5.10.2 Include a "Garage door" in Safe Rooms to meet the following requirements:

5.10.2.1 Provide interior partitions to enclose and protect all wall mounted services, headwalls, carts, workstations and supplies; and

5.10.2.2 provide "garage door" openings which give full access to enclosures with overhead , rolling shutters.

5.10.3 Provide locks on the following doors of Safe Room locations:

5.10.3.1 Safe Room door to corridor, corridor side; and

5.10.3.2 door to washroom within room or nearest washroom, room side.

5.10.4 Provide venetian-type blinds between glass for all interior windows in Safe Rooms.

5.10.5 Provide dimmable lighting in Safe Rooms.

5.11 Telehealth Capable Rooms

5.11.1 Provide Telehealth capable rooms as follows:

5.11.1.1 the location should be away from internal and external noise and vibration sources, such as fans, air conditioners or plumbing. Ensure that the ventilation system is quiet. Public address systems should not be included within the room;

5.11.1.2 doors to the room should be out of view of the main camera; and

5.11.1.3 in addition to other requirements in Schedule 3 and Appendix 3A-Clinical Specification, provide the following at a minimum :

5.11.1.3(1) three network drops, one for the Videoconference, one for a computer and one for a networked printer/fax;

5.11.1.3(2) a regular telephone line;

5.11.1.3(3) a clock mounted on the wall near the telemedicine workstation; and

5.11.1.3(4) video camera placed to ensure that the recipients perceive the exchange as happening eye to eye.

5.11.1.4 Provide a unique colour scheme for finishes.

5.11.1.5 If there are interior or exterior windows provide black out blinds.

5.12 Transfusion Medicine Laboratory

5.12.1 Design the Transfusion Medicine Laboratory to comply with CSA-Z15190-05 Medical Laboratories.

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 Assessment

6.2.1.1 Refer to Schedule 2 Design and Construction Protocols regarding available Site reports.

6.2.2 Site Preparation – Demolition

6.2.2.1 Project Co will perform demolition and related work complying with the requirements of Appendix 3G- Demolition and Related Work.

6.3 Concrete (Division 3)

6.3.1 Overriding Principles

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

6.3.1.2 Use formwork for all cast in place concrete.

6.3.2 Quality Requirements

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

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

6.3.3 Performance Criteria

6.3.3.1 Finish concrete floors with a smooth, dense, steel trowel finish with a Class A Flatness Classification in accordance with CSA A23.1 09 and of sufficient flatness and levelness to provide for proper floor finish installation. Overlay toppings to level floors will not be used.

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

6.3.3.3 Water proof foundation walls for basement occupied spaces, including any occupied spaces in underground parkade levels, to prevent any groundwater ingress. Waterproofing shall include but not be limited to exterior water-proofing from top of

footing to exterior grade level and may also include the addition of crystalline waterproofing such as Xypex or equivalent to the concrete mix for all below grade exterior foundation walls and retaining walls. Crystalline waterproofing admixture will be provided in all concrete for elevator pit walls below the parking slab elevation, and elevator base slab/footings. All construction joints will have purpose-made water stops tied in place prior to concrete pours. A perimeter draining system will be installed around the exterior of the earth-retained foundation and additionally as directed by the geotechnical consultant.

6.3.3.4 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.

6.4 Masonry (Division 4)

6.4.1 Basic Requirements

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

6.4.1.2 Masonry construction may be considered for interior walls and wall systems when priorities include permanence and maintenance, sound transmission control, fire resistance and separation requirements and security, providing Infection Control Standards are met.

6.4.2 Concrete Masonry Units

6.4.2.1 Concrete unit masonry may be considered for:

6.4.2.1(1) independent exterior walls which are not part of the building envelope; and

6.4.2.1(2) part of exterior rain-screened wall systems as a structural backing to other finish materials.

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 areas, public areas or corridors.

6.4.2.4 Where concrete unit masonry is used as the exposed finish all exposed corners will be chamfered by a minimum 50mm.

6.4.2.5 Masonry design and construction will comply with all applicable standards.

6.4.2.6 The masonry contractor will be a member in good standing of the Masonry Institute of BC, and be qualified under the Technical Masonry Certification (TMC) program.

6.4.3 Brick Masonry

6.4.3.1 Exterior wall systems with brick masonry on the exterior will be designed as rain screened cavity wall systems.

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 required infection prevention and control requirements.

6.4.4 Stone Masonry

6.4.4.1 Stone masonry may be considered as an outer wythe. Exterior wall systems in such applications will be designed as rain screened cavity wall systems.

6.4.4.2 Stone will be sound, hard and durable, well-seasoned and of uniform strength, colour and texture, and free of quarry sap, flaws, seams, sand holes, iron pyrites or other mineral or organic defects.

6.5 Metals (Division 5)

6.5.1 Basic Requirements

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

6.5.2 Performance Criteria

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

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

6.5.2.3 For steel floor and roof construction, the deflection of steel beams, joists, and girders due to the wet weight of concrete topping slabs is to be considered. Topping slab thickness may have to vary to maintain floor levelness tolerances. The additional concrete ponding weight is to be considered in the design of the structure.

6.5.2.4 Concrete topping slabs will be finished with a smooth, dense, steel trowel finish with a Class A Flatness Classification in accordance with Section 6.3.3.1 of this Schedule. Thin overlay toppings to level floors will not be used.

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

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

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

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

6.5.3 Structural Steel and Steel Joists

6.5.3.1 Quality Requirements

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

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

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

6.5.4 Structural and Miscellaneous Steel Finish

6.5.4.1 Exterior steel to be galvanized.

6.5.4.2 Interior steel to be shop primed.

6.5.5 Load Bearing Steel Studs

6.5.5.1 Overriding Principles

6.5.5.1(1) Load bearing steel studs may be considered as a component of the exterior wall systems to support

exterior wall finishes and form an integral part of the perimeter envelope.

6.5.5.1(2) Load bearing steel studs may be part of the structural framing or may be independent of the principal structural system.

6.5.5.2 Quality Requirements

6.5.5.2(1) Design, detail and construct load bearing steel stud design and construction to comply with all applicable CAN/CSA standards.

6.5.5.2(2) The steel stud manufacturer will be certified in accordance with CSSBI Standard 30M- and all applicable CAN/CSA standards.

6.5.5.2(3) The steel stud fabricator and erector will be experienced in the type of work undertaken.

6.5.5.2(4) Conform to the Association of Wall and Ceiling Contractor's Specification Standards Manual (AWCC).

6.5.5.3 Performance Requirements

6.5.5.3(1) Limit maximum deflection under specified wind loads to L/360, unless a smaller maximum deflection is specifically required due to wall finishes or functional bearing capacity of items attached to the wall.

6.5.5.3(2) Design components to accommodate erection tolerances of the structure.

6.5.5.3(3) Design wind bearing stud end connections to accommodate floor/roof deflections and to ensure that studs are not loaded axially.

6.5.5.3(4) Design steel studs to take into account the anchorage of other materials being supported including but not limited to: sub-girts supporting metal cladding and composite panels, soffit finishes and the provision of lateral support at window heads.

6.5.6 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 Medical Imaging Component 3A.9; and

6.5.6.1(2) future medical imaging spaces in the Procedures Suite Component 3A.8.

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 formaldehyde in the Facility.

6.6.1.2 Provide rough carpentry, wood backing materials, backing boards for all walls in mechanical rooms and electrical/communication rooms, roof sheathing, copings, cant strips, finish carpentry and architectural woodwork, including but not limited to exterior fascias, cabinets, casework, counters (excluding laboratory casework and modular casework , which is included in Division 12), frames, paneling, ceiling battens, trim, installation of doors and hardware, and other wood-related products and applications as required to meet the requirements of this Schedule, support functionality as defined in the Clinical Specification and as required for operation of the Facility.

6.6.1.3 Wood products that are exposed in finished interior and exterior installations will create surfaces that provide resistance to caustic action of chemicals or agents used to achieve the required infection control..

6.6.1.4 Use pressure treated wood for exterior exposed wood.

6.6.1.5 Provide acrylic plastic, stainless steel or epoxy products as required for wall cladding, wall protection, trims, and other applications to achieve a quality of interior finish suitable for use by patients and staff; all products for this purpose should be PVC free.

6.6.2 Finish Carpentry, Millwork and Architectural Woodwork

6.6.2.1 All finish carpentry, millwork and architectural woodwork in the Facility will conform to Architectural Woodwork Manufacturer's Association of Canada (AWMAC) Architectural Woodwork Standards for minimum "Custom Grade", for the design, fabrication, materials, installation, and workmanship of finish carpentry and architectural woodwork.

6.6.2.2 Provide wood products, such as wood veneered panels, on 25% of all wall surfaces and 25% of all ceiling surfaces in all public areas, family areas and staff support areas of the Facility to AWMAC custom grade.

6.6.2.3 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 to meet the functional requirements of Appendix 3A-Clinical Specification.

6.6.3.2 Millwork will be provided to comply with the requirements of Appendix 3F- Modular Casework and Millwork; these appendix requirements are a minimum, additional millwork items will be needed to provide complete functionality.

6.6.3.3 Submit the millwork layout and configuration for review and approval by the Authority.

6.6.3.4 In undertaking the design and construction of work stations, refer to Appendix 3E-Occupational Health and Safety.

6.6.3.5 Provide architectural millwork including all counters, cabinet units, shelving, hardware, finishing and installing as follows:

6.6.3.5(1) to meet the requirements of AWMAC custom grade;

6.6.3.5(2) all composite wood products and laminating adhesives used in the millwork, will not contain added urea-formaldehyde resins;

6.6.3.5(3) 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;

6.6.3.5(4) seal all wood surfaces and edges for infection control;

6.6.3.5(5) use wood veneer for the exposed surfaces of architectural woodwork in public areas, plastic laminate in other areas;

6.6.3.5(6) in general use medium density fibreboard for millwork substrate; use marine-grade plywood substrate for all millwork countertops and the bottoms of sink cabinet boxes; do not use particleboard for mill work construction;

6.6.3.5(7) all cabinets to be enclosed with doors;

6.6.3.5(8) all cabinets will be flush overlay construction;

6.6.3.5(9) design millwork so that no sharp edges are exposed, provide radiused corner to countertops;

6.6.3.5(10) do not include shelves under sinks;

6.6.3.5(11) all door, drawer and other exposed millwork edges will have an applied, appropriately sized, ABS edge strip; do not use plastic laminate edges.

6.6.3.5(12) all cabinets to be provided with locks except for nourishment areas;

6.6.3.5(13) 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;

6.6.3.5(14) Coordinate millwork with equipment indicated in Schedule 2, Appendix 2E (Equipment and Furniture);

6.6.3.5(15) provide built in valance lighting as required for task oriented and staff areas; and

6.6.3.5(16) all architectural woodwork hardware to be stainless steel of durable quality to meet the standards of AINSI/BHMA grade 1 Cabinet Hardware;

6.6.3.5(17) Provide stainless steel counters and shelves as follows:

6.6.3.5(17)(a) fabricate from Type 316, No. 4 finish stainless steel;

6.6.3.5(17)(b) 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;

6.6.3.5(17)(c) 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

6.6.3.5(17)(d) 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.

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

6.6.3.6(1) wardrobes will be a minimum 600 mm in length and come with hanging space, shelving and a keyless lockable cupboard for valuables;

6.6.3.6(2) 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;

6.6.3.6(3) all storage closets will be a minimum along 50% of the available wall perimeter in a room or space;

6.6.3.6(4) all storage closets will be a minimum 2100 mm high with a top surface designed to be easily cleaned;

6.6.3.6(5) all nourishment/ kitchenette areas will be provided with millwork as follows:

6.6.3.6(5)(a) counter, upper cupboards and under counter cupboards as follows:

(a).1 nourishment/ kitchenette areas (except those located in lounges and dining areas): along 100% of the wall space available;

(a).2 nourishment/ kitchenette areas in lounges and dining areas: dimensions of millwork to suit function and have a counter, upper cupboards, under the counter cupboards and drawers at a minimum.

6.6.3.6(5)(b) to accommodate all the requirements of the equipment listed in Schedule 2, Appendix 2E (Equipment and Furniture), for microwaves, integrated sinks etc. ;

6.6.3.6(5)(c) 1000 mm of uninterrupted counter space; and

6.6.3.6(5)(d) a minimum of three drawers in lower cupboards.

6.6.3.6(6) pneumatic tube station millwork as follows if the tube station is not provided by the PTS manufacturer:

6.6.3.6(6)(a) fully coordinate with the pneumatic tube manufacturer's requirements to integrate PTS sending and receiving unit;

6.6.3.6(6)(b) provide a wall recess for the tube station;

6.6.3.6(6)(c) provide a soft landing feature for tubes; and

6.6.3.6(6)(d) be similar in design to tube stations in the existing hospital.

6.6.3.6(7) provide alcove workstations as follows:

6.6.3.6(7)(a) To extend across the width of the alcove and be 760 mm deep; and

6.6.3.6(7)(b) accommodate indicated uses, allow for a minimum two monitors to be used on the work surface.

6.6.3.6(8) Provide digital display millwork as follows:

6.6.3.6(8)(a) freestanding millwork structures or wall mounted millwork installations; and

6.6.3.6(8)(b) designed to accommodate digital displays so that they are highly visible by the public and

visitors and the digital interface is easily accessed.

6.6.3.6(9) Provide Patient Shelf, TV and refrigerator cabinet as follows:

6.6.3.6(9)(a) to accommodate and house the TV and refrigerator separately;

6.6.3.6(9)(b) TV should be at proper position for optimum patient and family viewing; and

6.6.3.6(9)(c) provide a patient shelf which is a minimum 600 mm long and 300mm deep; either integrate shelf with 6.6.3.6(9)(a) or provide shelf separately.

6.7 Thermal and Moisture Protection (Division 7)

6.7.1 Basic Requirements

6.7.1.1 Design construction assemblies according to best practices building envelope principles.

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

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

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

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

6.7.2 Performance Criteria

6.7.2.1 Dampproofing

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

6.7.2.2 Waterproofing

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

6.7.2.2(2) Provide membrane waterproofing system for below water table conditions to prevent all water ingress.

6.7.2.2(3) Use membrane waterproofing to prevent water ingress over suspended slabs and decks and associated walls over habitable areas, including service and parking, where water collection is anticipated. Use fluid-applied waterproofing for mechanical room floors.

6.7.2.2(4) Provide waterproof membranes in exterior walls as part of the building envelope and integral with rain screen and/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 designed to meet the risks of the local climate and hospital interior conditions.

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.

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

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

6.7.2.5(4) Do not provide insulation containing flame retardants inside the weather barrier of the Building;

6.7.2.5(5) Minimum insulation values will be in accordance with VBBL and ASHRAE 90.1.

6.7.2.5(6) Batt insulation products will:

6.7.2.5(6)(a) not contain added formaldehyde resins;

6.7.2.6 Roofing

6.7.2.6(1) Project co will provide roofing systems that:

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

6.7.2.6(1)(b) use roofing materials that comply with RGC Roofing Practices Manual "Acceptable Materials List".

6.7.2.6(2) Roof membrane will be SBS modified two-ply system throughout.

6.7.2.6(3) Hot asphalt mop-on type roofing application will not be permitted.

6.7.2.6(4) Roof to comply with Class A, B or C.

6.7.2.6(5) Use foamed plastic insulation that is CFC-free and HCFC-free for all roofing applications.

6.7.2.6(6) Use lead free materials on the roof.

6.7.2.6(7) Provide a complete horizontal barrier to weather and climate using the roofing system.

6.7.2.6(8) Green roof and terraced roofs assemblies will be designed 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(9) Roofing systems will include:

6.7.2.6(9)(a) flashings and sheet metal;

6.7.2.6(9)(b) thermal insulation;

6.7.2.6(9)(c) assembly components for green roofs and terraced roofs;

6.7.2.6(9)(d) roofing specialties and accessories required for completion;

6.7.2.6(9)(e) interior access systems to roof areas;

6.7.2.6(9)(f) protection from pedestrian traffic and solar radiation; and

6.7.2.6(9)(g) roof drainage, including an internal drainage system and overflow scuppers; provide a positive slope to drains in all locations.

6.7.2.6(10) Provide sheet metal flashings that divert water away from membrane flashing termination and protect the membrane from deterioration due to the exterior elements and mechanical damage. Provide roofing membrane continuously under the metal.

6.7.2.6(11) Green roof areas will have assemblies to support areas of extensive and intensive vegetative landscape. Provide landscape engineered growing medium, structural support and drainage of a depth to allow for a wide variety of bushes, shrubs, flowers

and large trees and meet the requirements of this schedule.

6.7.2.6(12) Accessible roof areas will use paver system designed to meet the requirements of the RCABC guarantee.

6.7.2.6(13) 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.

6.7.2.6(14) In designing the Facility, including any roof systems, ensure that entrance ways are protected from sliding snow and ice and that there are no accumulations of snow and ice in roof valleys.

6.7.2.7 Fire and Smoke Protection

6.7.2.7(1) Spray-applied cementitious fireproofing for floor decks may not be used to achieve a fire resistance rating, but may be used in other locations.

6.7.2.7(2) Integrate barriers into vertical and horizontal fire rated and non-rated fire 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 ULC approved firestopping and smoke seal systems that consist of asbestos-free materials and systems, capable of maintaining an effective barrier against flame, smoke, and gases.

6.7.2.7(5) Use firestopping that:

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

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

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

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

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

6.7.2.8 Sealants

6.7.2.8(1) All sealants and sealant primers used on the interior of the Facility will be low VOC and comply with the requirements of LEED IEQ 4.

6.7.2.8(2) Apply sealant materials to achieve:

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

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

6.7.2.8(2)(c) sealed joints between dissimilar or similar materials to provide a smooth transition; and

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

6.7.2.8(3) All joints in clinical areas will be sealed.

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

6.7.2.8(5) For the interior; use sealants (at frames such as those at doors, windows and skylights), to completely fill joints between dissimilar materials

using one component, acrylic emulsion, paintable type.

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

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

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

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

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

6.7.2.9 Traffic Coatings

6.7.2.9(1) Design and construct the parking structures to meet S413-07 Parking Structures.

6.7.2.9(2) Protect the structural concrete floor slabs and ramps of parkade structures with an applied traffic coating to prevent the ingress of moisture into the slab.

6.7.2.9(3) Use traffic coating that complies with the following:

6.7.2.9(3)(a) Membrane: Fluid applied aliphatic polyurethane waterproof traffic membrane (colour as selected by the Authority), liquid applied, two component 100% solids, and meeting or exceeding the following specifications:

6.7.2.9(3)(b)

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(3)(c) Topping: Polyurethane compound wear course.

6.7.2.9(3)(d) Filler and Primer: As recommended by membrane manufacturer.

6.7.2.9(3)(e) Sealant: polyurethane type, compatible with system and adjacent materials.

6.7.2.9(4) Provide fluid applied integral flashings at all locations where a horizontal surface butts a vertical surface and at all deck projections. Apply the membrane over the prepared surfaces at a minimum thickness of 500 microns thick and extend the membrane a minimum of 10 cm on vertical and horizontal surfaces.

6.8 Openings (Division 8)

6.8.1 Basic Requirements

6.8.1.1 Provide openings, including interior and exterior windows, doors and skylights of sufficient quantity and quality to meet all the requirements described in Appendix 3A-Clinical Specification and the daylight and view requirements described in 5.4.1.3.

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) Submit the door schedule for review by the Authority.

6.8.1.2(3) Doors to comply with CSA Z8000 12.2.3 except that sliding or automatic sliding doors will be permitted as required in this Schedule.

6.8.1.2(4) Exterior doors will meet the requirements of ASHRAE 90.1.

6.8.1.2(5) Size Requirements for Doors:

6.8.1.2(5)(a)	Provide door openings of adequate width to suit the intended purpose of rooms on either side of the doors and allow the movement of people and equipment associated with those rooms;
6.8.1.2(5)(b)	Unless required otherwise minimum door width will be 915mm;
6.8.1.2(5)(c)	Unless required otherwise minimum door openings for clinical rooms will be 1065mm where no pallet, stretcher or bed will be required;
6.8.1.2(5)(d)	Minimum door opening for clinical rooms accommodating bed, stretcher or pallet movement will be 1675mm and minimum single leaf dimension will be 1220mm;
6.8.1.2(5)(e)	Unless required otherwise, provide doors to patient care areas with a minimum width of 1220 mm. Provide a minimum 1220mm wide door to rooms which handle equipment supplies and utility carts;
6.8.1.2(5)(f)	Provide glazed double doors into corridors and major rooms to ease access where patients in beds or stretchers will be attended to or accompanied by a large number of medical staff and medical equipment indicated in Schedule 2, Appendix 2E (Equipment and Furniture); including, but not limited to all OR's and Procedure Rooms.
6.8.1.2(5)(g)	Provide adequate sized double doors into rooms where large pieces of equipment will be moved in or out during the lifetime of the Facility, including all mechanical and electrical rooms.
6.8.1.2(5)(h)	At all primary building entries, provide main entrance doors that are a minimum 2440 mm wide;
6.8.1.2(5)(i)	Minimum door openings for sliding door between patient rooms will be 915mm with no break away function;

6.8.1.2(5)(j) In PICU, NICU, Oncology, ACU and ED component the wall of each patient room into the corridor will be fully glazed (clear) with large breakaway sliding panels for unencumbered access and be suitable for ICU areas. The minimum opening width with breakaway will be 2135mm and without breakaway it will be 1363.6mm;

6.8.1.2(5)(k) Entry door for bariatric inpatient rooms will be at least 1500m side provided with an uneven pair of doors; doors to Pause areas or Lounge areas that could be used by bariatric patients should be a minimum 1220 m wide;

6.8.1.2(5)(l) Follow the door requirements described in 5.7 Bariatric Design; and

6.8.1.2(5)(m) Doors to have a minimum height of 2135mm.

6.8.1.2(6) Acoustic Requirements for Doors: refer to Appendix 3D-Acoustics and Noise Control.

6.8.1.2(7) For doors into or between major components or main public corridors through which cart, stretcher, wheelchair or bed traffic is anticipated on a routine basis, provide automatic activation by an electronic device, located to allow emergency access without the necessity to stop movement; design in consultation with the Authority. For all other doors through which cart, stretcher, bed, or frequent patient or staff traffic is anticipated on a routine basis, provide appropriate hardware or automatic activation that allows the doors to stay in an open position.

6.8.1.2(8) Provide 30% of publically accessible washrooms with automatically opening doors.

6.8.1.2(9) One public washroom per component and public area must accommodate a bariatric wheelchair and open automatically.

6.8.1.2(10) Apply door sizes and designs consistently to rooms of similar use, location, and configuration.

6.8.1.2(11) Avoid doors swinging into corridors in a manner that may obstruct traffic flow or reduce the corridor width, except doors to seclusion rooms, mental health interview rooms or to spaces that are used infrequently and are not subject to occupancy such as small closets.

6.8.1.2(12) Doors will not have floor mounted tracks, rails or slides and locking devices will not penetrate the floor (top mount only).

6.8.1.2(13) Exposed "Barn type" sliding doors may be used for inpatient bathrooms as well as Oncology clinic exam rooms, but not elsewhere.

6.8.1.2(14) Pocket doors are not acceptable.

6.8.1.2(15) Wood doors will be limited to interior applications. Wood doors will be used for public, patient and staff areas (including component area entrances) except in areas which anticipate heavy cart traffic or high humidity. If the hardware requirements undermine the structural integrity of the door the Authority will consider alternate door types. Use wood exposed veneer on wood doors in public, visitor and staff support areas.

6.8.1.2(16) Component entrance doors will have glazed upper and lower panels.

6.8.1.2(17) Metal doors will be used for service areas where high impact to doors is frequent. Metal doors will be provided in all Telecommunications Rooms and Main Equipment Rooms.

6.8.1.2(18) Provide all doors with appropriate hinges, edge protection, and face protection to minimize damage and resultant disruptive maintenance.

6.8.1.2(19) Finish doors and frames with a suitable finish that prevents dirt and fingerprint accumulation, and can be easily cleaned and disinfected and that meets infection control standards.

6.8.1.2(20) Glazing requirements for doors:

6.8.1.2(20)(a) Be consistent with the extent of glazing in a door, or the size and quantity of sidelights, and balance these between the nature of observation required and the privacy requirements of the occupants of the room. Where possible and appropriate, provide glazing in an adjacent sidelight rather than within the door itself.

6.8.1.2(20)(b) Glazing in doors will be required to allow for proper security, sight lines and natural lighting requirements.

6.8.1.2(21) Provide glazing as sidelights or door inserts to allow operational safety of the spaces they serve. At a minimum provide sidelights in all patient, family and treatment rooms.

6.8.1.2(22) 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(23) 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(24) In locations requiring radiation protection, line doors with lead and label such doors with lead thickness to suit radiation protection requirements.

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. Provide borrowed light through interior windows to occupied rooms that do not have daylight. The intent is to borrow light from areas that have daylight from windows and skylights and consequently create a more comfortable and less closed-in atmosphere.

6.8.1.3(2) Coordinate glazing heights with adjacent wall protection, handrails, and other accessories to achieve functional and aesthetic cohesiveness.

6.8.1.3(3) Size, configure, and adequately construct glazing between all patient rooms in the PICU to ensure direct visibility from care provider work areas within a patient room to a patient's head and face in an adjacent room. Extend glazing appropriately in patient rooms where there is a shared head wall.

6.8.2 Performance Criteria

6.8.2.1 Hollow Metal Doors and Frames

6.8.2.1(1) Materials and manufacture of metal doors and will comply with the requirements of the Canadian Steel Door and Frame Manufacturer's Association (CSDFMA).

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

6.8.2.1(3) Provide exterior metal doors:

6.8.2.1(3)(a) To comply with ASHRAE 90.1 requirements and have the following features:

6.8.2.1(3)(b) flush face construction, continuously welded, seamless edges and construction using steel sheet;

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

6.8.2.1(3)(d) prepared surfaces to receive finishes that resist corrosion from exposure to weather. Provide ZF 180 galvannealed coating;

6.8.2.1(3)(e) An insulated core; and

6.8.2.1(3)(f) Be capped to avoid water collecting in welding channels.

6.8.2.1(4) Provide pressed metal frames with:

6.8.2.1(4)(a) fully welded construction;

6.8.2.1(4)(b) thermally-broken door frames for non-fire rated exterior locations ;

6.8.2.1(4)(c) for exterior frames, prepare surfaces to receive finishes that resist corrosion from exposure to weather. Provide ZF 180 galvannealed coating; and

6.8.2.1(4)(d) anchors to each jamb to suit wall type and receive the frame.

6.8.2.1(5) Door Glazing

6.8.2.1(5)(a) For exterior hollow metal door glazing, use sealed units with warm edge, space in thermally-broken frames to prevent heat loss.

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

6.8.2.2 Wood Doors

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

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

6.8.2.2(3) All wood door edges must be sealed.

6.8.2.2(4) Construct, finish, and install wood doors to minimize the requirement for maintenance and resulting disruption to Facility operations.

6.8.2.2(5) Provide wood doors in flush design, to AWMAC Custom Grade with solid particleboard or agrifiber core.

6.8.2.2(6) Provide wood doors of a performance duty level suitable for usage within the Building.

6.8.2.2(7) Composite wood products and laminating adhesives used in wood doors will:

6.8.2.2(7)(a) not contain added urea-formaldehyde resins;

6.8.2.2(8) Provide fire-resistance rated doors with a homogeneous non-combustible mineral core and AWMAC Quality Standards Option 5 blocking.

6.8.2.2(9) 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(10) In public spaces, visitor areas and staff support areas provide wood doors with B-Grade hardwood veneer with AWMAC No. 3 edge, finish to suit the intended use.

6.8.2.2(11) Do not use wood veneer-faced doors in patient care areas for reasons of cleanliness and infection prevention and control, unless suitably finished to mitigate such concerns.

6.8.2.2(12) In locations requiring radiation protection, line doors with lead and label such doors with lead thickness.

6.8.2.3 Specialty Doors

6.8.2.3(1) Overhead Rolling Service Doors

6.8.2.3(1)(a) Restrain lateral movement of door curtain slats. Provide windlocks as required by door size or wind load requirements.

6.8.2.3(1)(b) Provide interlocking flat slats, complete with bottom bar and contact type bottom astragal.

6.8.2.3(1)(c) Motor operation may be provided on all overhead service doors.

6.8.2.3(1)(d) For fire doors, provide automatic closing device operated by fire door release device connected to the fire alarm system.

6.8.2.3(1)(e) Provide enclosure for door mechanism that blends with the interior finishes and is easily cleanable and consistent with infection control procedures.

6.8.2.3(2) Overhead Rolling Grilles

6.8.2.3(2)(a) Provide grilles that allow visual access to secure areas.

6.8.2.3(2)(b) Provide aluminum or steel guides that are: fabricated to withstand vertical and lateral loads; counterbalanced by helical torsion springs; and sound-deadened.

6.8.2.3(2)(c) For manually operated closures, provide inside lift handle and locking bar or chain hoist. Motor operation may be provided on grilles requiring constant usage. Chain operation will be by means of reduction gears and heavy chrome plated hand chain.

6.8.2.3(3) Overhead Rolling Shutters / horizontal sliding grilles

6.8.2.3(3)(a) Provide shutter curtains fabricated with extruded aluminum or stainless steel interlocking flat slats, complete with guides of similar materials.

6.8.2.3(3)(b) Provide closures that are manually operated and with locking capability. Provide key locking mechanism on room side at "garage door" applications.

6.8.2.3(4) Interior Aluminum Sliding Doors and Sidelights

6.8.2.3(4)(a) Provide interior aluminum sliding doors and sidelights with recessed overhead mounted track, sliding and fixed panel(s) single glazed with minimum 6 mm clear fully tempered float glass.

6.8.2.3(5) Overhead Doors

6.8.2.3(5)(a) Provide aluminum overhead panelized doors which are guided by movement in sections;

6.8.2.3(5)(b) All overhead doors to be insulated steel;

6.8.2.3(5)(c) All overhead doors to be motorized

6.8.2.4 Aluminum Storefront and Entrances

6.8.2.4(1) Aluminum storefront framing may form part of the exterior envelope of the Building at entrances in locations protected from the weather.

6.8.2.4(2) Provide glazed aluminum storefront interior partitions as appropriate to comply with the functions of the spaces as defined by the Clinical Specifications.

6.8.2.4(3) Use aluminum doors within aluminum curtain wall and storefront.

6.8.2.4(4) Use frames that are thermally-broken, flush glazed, aluminum sections, to accept insulating glass units.

6.8.2.4(5) 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(6) Provide assemblies that resist local seismic conditions and 1-in-100 year climatic events (with a safety factor).

6.8.2.4(7) Aluminum Entrances

6.8.2.4(7)(a) Use aluminum entrance doors within aluminum curtain wall and storefront framing.

6.8.2.4(7)(b) For exterior aluminum entrance door glazing, use sealed units with warm edge spacers in thermally-broken frames to prevent heat loss.

6.8.2.4(7)(c) Use aluminum swing entrance doors that are heavy-duty commercial or institutional grade that may be automatically operated, motion-detector controlled.

6.8.2.4(7)(d) 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(8) Automatic Exterior Entry Sliding Doors

6.8.2.4(8)(a) Automatic sliding doors complete with break-away capability for exiting may be installed at main entrance, provided that the size and configuration of the entrance vestibule is designed such that both sets of doors will not be open at the same time.

6.8.2.4(8)(b) Provide door operators, including the motion and presence detection system, that are: capable of operating within the temperature ranges existing at the Facility; and unaffected by ambient light or ultrasonic interference.

6.8.2.4(8)(c) Provide energy-saving devices to reduce conditioned air loss.

6.8.2.4(9) Automatic Swing Doors

6.8.2.4(9)(a) Use automatic swing doors for interior and exterior locations where appropriate, including entrances, cross-corridor double-egress doors, entrances to components and areas where stretchers and equipment are frequently wheeled, and doors to exterior spaces that are required to be handicapped accessible.

6.8.2.4(9)(b) Provide directional motion sensor control device that are unaffected by ambient light or ultrasonic frequencies at automatic swing doors

6.8.2.4(9)(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(9)(d) Implement longer hold-open times to accommodate the elderly and frail at automatic doors..

6.8.2.4(10) Sliding Glass Entrances to patient rooms in PICU, NICU, Oncology, ACU and ED component between the room and the corridor will meet the following requirements:

6.8.2.4(10)(a) Automatic operation for NICU and ACU component areas only;

6.8.2.4(10)(b) be of suitable design for ICU applications;

6.8.2.4(10)(c) aluminum, fully glazed;

6.8.2.4(10)(d) telescopic unit;

6.8.2.4(10)(e) come with breakaway panels for exiting; and

6.8.2.4(10)(f) floor tracks will not be permitted.

6.8.2.5 Aluminum Curtain Walls

6.8.2.5(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.

6.8.2.5(2) Curtain wall to comply with VBBL and ASHRAE 90.1.

6.8.2.5(3) 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.

6.8.2.5(4) Provide curtain wall framing that incorporates a thermal-break.

6.8.2.5(5) For exposed aluminum surfaces, provide a finish that is permanent and resistant to corrosion resulting from weather exposure and climate.

6.8.2.5(6) Provide assemblies that resist local seismic conditions and 1-in-100 year climatic events (with a safety factor).

6.8.2.5(7) Provide fire stopping at the joint between the curtain wall and floor slab.

6.8.2.6 Aluminum Windows

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

6.8.2.6(2) Windows to comply with VBBL and ASHRAE 90.1 .

6.8.2.6(3) 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.

6.8.2.6(4) Provide windows that incorporate a thermal-break.

6.8.2.6(5) For exposed aluminum surfaces, provide a finish that is permanent and resistant to corrosion resulting from weather exposure and climate.

6.8.2.6(6) Provide assemblies that resist local seismic conditions and 1-in-100 year climatic events (with a safety factor).

6.8.2.7 Skylights

6.8.2.7(1) Skylights will comply with all applicable standards, including the Aluminum Association Standards (AAS), and the American Architectural Manufacturers Association (AAMA) field testing specifications.

6.8.2.7(2) Skylights to comply with CAN/CGSB-63.14-M VBBL and ASHRAE 90.1,

6.8.2.7(3) Roof or skylight glazing may be provided where natural light is required in interior spaces to augment or complement interior ambient lighting.

6.8.2.7(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) Roof and skylight glazing is designed to limit glare for users of the Facility.

6.8.2.8 Tubular Daylighting Devices (light tubes)

6.8.2.8(1) Tubular daylighting devices may be provided in interior spaces to augment or complement interior ambient lighting.

6.8.2.8(2) Provide tubular daylighting devices as follows:

6.8.2.8(2)(a) transparent roof mounted skylight dome and self flashing curb, reflective tube and ceiling level diffuser assembly.

6.8.2.8(2)(b) complying with the International Code Council ICC AC-16.

6.8.2.8(2)(c) minimum tube diameter to be 530mm.

6.8.2.9 Glass and Glazing

6.8.2.9(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.

6.8.2.9(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.

6.8.2.9(3) Provide glazed assemblies that resist local seismic conditions as a post-disaster building as defined in the Vancouver Building By-law and Part 5.3.

6.8.2.9(4) Except where wired glass is required in accordance with the Vancouver Building By-law, construct interior windows and sidelights of tempered glass.

6.8.2.9(5) Use translucent glazing in patient areas that are adjacent to pedestrian areas privacy; clear glazing should be provided above the height required to provide privacy in order to maximize daylight.

6.8.2.9(6) Use laminated safety glass in, entry doors and sidelights, or as the inboard light of a double-glazed skylight.

6.8.2.9(7) Provide one-way glass which allows for transparency from one side of the glass and does not permit viewing from the other side of the glass.

6.8.2.9(8) Provide low-e glass in all exterior glazing applications.

6.8.2.9(9) Provide insulating glass units with warm air edge spacers to all exterior glazing applications.

6.8.2.9(10) Mirrors

6.8.2.9(10)(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.

6.8.2.9(10)(b) For wall mounted posture mirrors, use framed type; one piece, rectangular, 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 Finish Hardware

6.8.2.10(1) Finish hardware will comply with all applicable standards, including the quality standards of the Door and Hardware Institute (DHI).

6.8.2.10(2) Provide all finish hardware from one supplier that is a member in good standing of the DHI and has in its employ one or more Architectural Hardware Consultant (AHC).

6.8.2.10(3) Hardware will be fully integrated with the security requirements and coordinated with electrical wiring and power requirements.

6.8.2.10(4) Select finishes to provide maximum longevity and preservation of the finish.

6.8.2.10(5) Provide, where applicable, ULC-listed hardware for the required fire rating.

6.8.2.10(6) Use heavy-duty Grade 1 quality hardware; locksets and latch sets fully mortised type and lever handles of solid material.

6.8.2.10(7) Hardware will not penetrate the floor.

6.8.2.10(8) Provide hardware to suit the purposes unique to all spaces. Submit the hardware schedule for approval by the Authority.

6.8.2.10(9) Provide keying as follows:

6.8.2.10(9)(a) Supply and install high security key cylinders, 6 pin (factory pinned);

6.8.2.10(9)(b) Implement a new 5-level system;

6.8.2.10(9)(c) Keying groups will be assigned by the Authority;

6.8.2.10(9)(d) Supply minimum two blank keys for each lock cylinder; and

6.8.2.10(9)(e) Approved Manufacturers: Schlage, Corbin Russwin, Sargent & Co. or equivalent product.

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 Finishes complying with CSA Z8000.

6.9.1.3 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.

6.9.1.4 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.

6.9.1.5 Give priority to infection prevention and control in the selection of finishes for all patient care areas.

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

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

6.9.1.8 Select finish materials that do not use known carcinogenic material or chemicals in their manufacture or disposal.

6.9.2 Performance Criteria

6.9.2.1 Interior Wall Framing

6.9.2.1(1) Interior wall framing 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 indicated in Schedule 2, Appendix 2E (Equipment and Furniture) 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) Provide an engineered design for all interior partitions.

6.9.2.1(6) Provide galvanization to studs suitable for humid service conditions of the Facility

6.9.2.1(7) When a partition is used for sound isolation, extend the studs from slab to slab if the required STC rating for the walls is 45 or higher.

6.9.2.1(8) Provide steel plate backer boards as required.

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 not be less than 16 mm in thickness.

6.9.2.2(3) Use cement board backing panels in all wet areas, behind sinks and in critical care areas.

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 abuse-resistant gypsum board with full height plywood backing in all emergency mental health areas.

6.9.2.2(6) Use glass mat surfaced gypsum sheathing board wherever exterior gypsum sheathing is required at exterior walls.

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. Do not locate back to back recessed wall fixtures such as cabinets or electrical, telephone and television outlets and medical gas outlets, which perforate the gypsum board surface. In addition, carefully cut any opening for fixtures to the proper size and appropriately seal piping penetration. Seal conduit/duct/piping penetrations with tape and fill at the plenum barrier. Make the entire perimeter of a sound insulating assembly airtight to prevent sound flanking. Use an acoustic caulking compound or acoustical sealant to seal between the assembly and all dissimilar surfaces (including at window mullions) in accordance with the recommendations of an acoustic consultant. Provide quality assurance testing to compliance team to assure air tightness required by standards is achieved.

6.9.2.3 Ceramic Tilework

6.9.2.3(1) Ceramic tile may be considered as an interior wall finish in public spaces.

6.9.2.3(2) Ceramic tilework will comply with all applicable standards, including the Terrazzo Tile and Marble Association of Canada (TTMAC) Specification Guide 09300 Tile Installation Manual.

6.9.2.3(3) For installations on 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; and

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 grout with epoxy grout.

6.9.2.4 Ceilings

6.9.2.4(1) Wood ceilings may be used in public, family and staff support areas of the Facility.

6.9.2.4(2) Wood ceilings will comply with the following criteria:

6.9.2.4(2)(a) Meet AWMAC custom standards;

6.9.2.4(2)(b) be fire retardant treated;

6.9.2.4(2)(c) be sealed on all sides;

6.9.2.4(2)(d) meet infection control standards; and

6.9.2.4(2)(e) installation design will provide acoustic requirements of the space.

6.9.2.4(3) Acoustic Tile Ceilings will meet the following requirements:

6.9.2.4(3)(a) Acoustic Panel: Non-directional, fissured pattern, white ceiling panel, trim edge detail (square) to fit a standard 24mm T-bar grid size.

6.9.2.4(3)(b) T-bar grid system to be 24mm with duty rating to suit location. 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(3)(c) Provide accessibility to the ceiling spaces where access is required to mechanical, electrical or other service systems.

6.9.2.4(3)(d) 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(3)(e) Typically 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 in a room or space, use of acoustical units specifically designed for such applications.

6.9.2.4(3)(f) 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(3)(g) 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)(h) Acoustic Ceiling Tiles used in NICU patient rooms will meet the requirements for cleaning to accommodate open procedures.

6.9.2.4(4) Gypsum Wallboard Ceilings will meet the following requirements:

6.9.2.4(4)(a) Constructed with gypsum wallboard having a minimum thickness of 16mm;

6.9.2.4(4)(b) constructed as part of a fire rated assembly where required;

6.9.2.4(4)(c) 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; and

6.9.2.4(4)(d) painted as per the paint specifications outlined in Section 6.9.2.7.

6.9.2.4(4)(e) Provide gypsum wallboard ceilings in the following spaces:

- (e).1 housekeeping and utility rooms;
- (e).2 washrooms, tub rooms and shower rooms;
- (e).3 procedure rooms and any other rooms where invasive procedures may be performed;
- (e).4 sterile supply rooms;
- (e).5 AIR's and anterooms
- (e).6 burn units;
- (e).7 secure rooms, safe room and mental health assessment rooms; and
- (e).8 other areas where infection prevention and control may be an issue.

6.9.2.5 Flooring

6.9.2.5(1) Provide solid resilient sheet flooring for all rooms except as specified in this Schedule.

6.9.2.5(2) Provide solid cushioned sheet flooring for all patient care areas.

6.9.2.5(3) Provide sheet rubber flooring in the NICU component.

6.9.2.5(4) Do not use flooring that contains PVC or phthalates.

6.9.2.5(5) Floors subject to traffic when wet will have a cleanable non-slip surface.

6.9.2.5(6) Floors in operating rooms and rooms used for caesarean sections shall be monolithic and joint free

6.9.2.5(7) Floors in critical care areas, treatment rooms and inpatient bedrooms shall incorporate flood-resistant bases which prevent infiltration of water into walls.

6.9.2.5(8) Anti-fatigue flooring should be provided at work areas where there will be prolonged standing.

6.9.2.5(9) Flooring will comply with all applicable standards, including the National Floor Covering Association of Canada "Floor Covering Reference Manual".

6.9.2.5(10) Use anti static flooring material for telecommunication rooms.

6.9.2.5(11) Where there is no wall or partition to butt against, finish edging with finishing strip or transition strip.

6.9.2.5(12) Finish flooring to be installed as per manufacturers' specification.

6.9.2.5(13) Floor areas with penetrations will be tightly sealed.

6.9.2.5(14) Provide integral cove base in all clinical and service areas, minimum 150mm high.

6.9.2.5(15) Resilient Flooring is to comply with the following:

6.9.2.5(15)(a) Choose products with exposed surface having anti-bacterial properties to prevent entry of gram-positive and gram-negative micro-organisms.

6.9.2.5(15)(b) Use low VOC flooring adhesive meeting the requirements of LEED IEQ credit 4.

6.9.2.5(16) Linoleum flooring is to comply with the following:

6.9.2.5(16)(a) 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.

6.9.2.5(16)(b) Hot weld all seams.

6.9.2.5(17) Rubber flooring is to comply with the following:

6.9.2.5(17)(a) formulated with at least10% virgin rubber and 20% SBR compounded to create durability, excellent cleaning characteristics, and exceptional slip resistance;

6.9.2.5(17)(b) smooth finish;

6.9.2.5(17)(c) GreenGuard Children and Schools Certified;

6.9.2.5(17)(d) slip resistance: has a coefficient of friction (James test) using ASTM D2047 > 0.8;

6.9.2.5(17)(e) provide sound absorption of 8dB as defined by ISO 140-8 and 49 IIC as defined by ASRM E2179;

6.9.2.5(17)(f) hot weld all seam joints;

6.9.2.5(17)(g) form flash cove bases 150 mm high, straight cut, finished with clear silicone caulking. Do not cap;

6.9.2.5(17)(h) finish flooring with high speed buffing as per manufacturers specification; and

6.9.2.5(17)(i) provide rubber tactile warning strips and stair nosings to assist the visually impaired and meet the requirements of VBBL.

6.9.2.5(18) For stair covering:

6.9.2.5(18)(a) Use one piece treads and sheet risers with carborundum strip (or an equivalent product approved in advance by the Authority); and

6.9.2.5(18)(b) Use low VOC adhesive meeting the requirements of LEED IEQ credit 4.

6.9.2.5(18)(c) Treads to comply with US Federal Specification RR-T-650E

6.9.2.5(19) Quartz Epoxy Flooring

6.9.2.5(19)(a) If used, provide seamless epoxy flooring with 100% solids, zero VOC, solvent-free comprised of a two-component epoxy primer, a two-component epoxy resin and curing agent, coloured quartz aggregate broadcast into both primer and undercoat, and a high performance, UV-resistant two-component, clear epoxy sealer. .

6.9.2.5(19)(b) Where epoxy flooring is used in wet areas, use water and slip-resistant grade and prevent water or moisture transmission to the substrate.

6.9.2.5(19)(c) Terminate epoxy flooring at the walls in the form of 150mm high integral flash coves.

6.9.2.5(20) Carpets and Carpet Tiles

6.9.2.5(20)(a) Carpet will not be installed in the Facility.

6.9.2.5(21) Access flooring

6.9.2.5(21)(a) Access flooring may be considered where electronic and data cabling, outlets, junctions, etc., in the floor are in heavy concentration and must be regularly serviced, added to or altered.

6.9.2.5(21)(b) Access flooring may be considered where flexibility of access points over a floor area, or part thereof, is required rather than a focused or distributed single access point.

6.9.2.5(21)(c) Provide access flooring in Main Equipment Rooms.

6.9.2.5(21)(d) Materials, workmanship, and test methods will conform to the "Recommended Test Procedures for Access Floors" as published by the Ceilings and Interiors Systems Construction Association (CISCA).

6.9.2.5(21)(e) The electrical resistance of the access floor system will be tested in accordance with NFPA 99.

6.9.2.5(21)(f) Panel-to-understructure (metal-to-metal) connections will provide less than 10 ohms resistance without grounding clips.

6.9.2.5(21)(g) The access floor system assembly will consist of modular floor panels laid out on a grid system, supported by and secured to the floor structure. Panels will be supported by an adjustable pedestal base that positively locates, engages, and secures panels, and that accommodates horizontal grid members only as required.

6.9.2.5(21)(h) All components of the access floor system will be of steel construction with manufacturer's standard corrosive-resistant finishes, except for panel-cementitious core.

6.9.2.5(21)(i) Panels will be easily removable by one person with standard tools and a lifting device and will be interchangeable, except for cut-outs for special conditions. Cable cut-out panels will be interchangeable with solid panels.

6.9.2.5(21)(j) The completed surface of floor system will provide a continuous smooth floor surface and under-floor space to accommodate electrical, communication, computer service lines and mechanical ducting.

6.9.2.5(21)(k) Panels will be square, of welded steel components with an enclosed galvanized steel bottom pan formed in a flat or uniform pattern of square or round pockets. The unitized panels will be internally filled with lightweight concrete to improve sound characteristics and provide performance value.

6.9.2.5(21)(l) Panels may be surfaced with resilient floor tiles, where required.

6.9.2.5(21)(m) Pedestals, when secured to subfloor, will be capable of supporting a minimum axial load without deformation.

6.9.2.5(21)(n) Panels will support a minimum concentrated load of 566 kg on a 25 mm square point anywhere on the panel, with a deflection not to exceed 2.5 mm.

6.9.2.5(21)(o) Panels will support a rolling load of 453 kg on a 75 mm x 20.6 mm wheel at 10 passes, and 363 kg on a 150 mm x 38 mm wheel at 10,000 passes. Ultimate load will be 1721 kg

6.9.2.6 Acoustic Treatment

6.9.2.6(1) Install acoustic treatment to comply, at a minimum with the requirements described in Appendix 3D-Acoustics and Noise Control Measures. In addition, provide acoustic treatment in locations that sound attenuation, soundproofing or other sound control measures are necessary to create a healing environment for patients and a safe and comfortable environment for staff and where confidentiality is required.

6.9.2.6(2) When a partition is used for sound isolation, extend the sound control construction full height from the floor to the underside of the structure above or provide an equivalent alternate solution following the requirements of Appendix 3D – Acoustics and Noise Control Measures 1.3.2.

6.9.2.6(3) 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(4) Where penetrations are necessary, minimize placing them back-to-back and next to each other. Stagger electrical boxes and medical gas outlets, preferably by at least one stud space. Use mineral fibre insulation to seal joints around all cut-outs such as electrical, TV and telephone outlets, plumbing escutcheons, recessed cabinets, and bathtubs.

6.9.2.6(5) Provide formaldehyde free sound insulation.

6.9.2.6(6) Install sound insulation according to manufacturer's instructions to achieve the required acoustic and noise control requirements.

6.9.2.6(7)

6.9.2.7 Painting and Protective Coatings

6.9.2.7(1) Paint all unfinished surfaces inside and outside the Facility including mechanical or electrical services that will be exposed to view in the finished Building.

6.9.2.7(2) Comply with LEED IEQ credit 4 requirements for Low Emitting Materials- Paints and Coatings, for paints and coatings used on the interior of the Facility. In particular:

6.9.2.7(2)(a) architectural paints, coatings and primers: low VOC.

6.9.2.7(2)(b) anti-corrosive and anti-rust: low VOC.

6.9.2.7(2)(c) clear wood finishes, floor coatings, stains and shellacs: low VOC.

6.9.2.7(3) Walls, doors and shelving

6.9.2.7(3)(a) Use eggshell for all walls, doors and painted shelving.

6.9.2.7(4) Door frames and metal doors

6.9.2.7(4)(a) Use semi gloss for all door frames and metal doors.

6.9.2.7(5) Wood finish doors

6.9.2.7(5)(a) Use clear coat interior rub varnish for all wood finish doors.

6.9.2.7(6) Paint Grade Doors

6.9.2.7(6)(a) Use semi gloss for all paint grade doors.

6.9.2.7(7) Ceilings

6.9.2.7(7)(a) Use eggshell paint for all ceilings.

6.9.2.7(8) Floors, concrete

6.9.2.7(8)(a) Use a 2-component (base component A, curing agent B).

6.9.2.7(8)(b) Use a primer if part of coating system.

6.9.2.7(9) Paint painted patient care areas with a eggshell finish.

6.9.2.7(10) Conform to all applicable standards, including the material and workmanship requirements of Master Painters Institute (MPI) Architectural Painting Specification Manual.

6.9.2.7(11) Use paint systems recommended by the Master Painters Institute as suitable for the substrate and application, including all surface preparation, primers, undercoatings and top coats required.

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) Provide anti graffiti coating on surfaces that are susceptible to graffiti.

6.9.2.7(14) Achieve a visually harmonious and aesthetically coordinated appearance across all areas of the Facility.

6.9.2.7(15) 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(16) 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(17) 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(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.

6.9.2.7(21) If seamless epoxy wall coatings are used, provide a two-component, high solids, zero or low VOC, solvent-free, epoxy glaze wall coating that is seamless and abrasion, chemical, and UV-resistant.

6.9.2.8 Sheet Wall Covering

6.9.2.8(1) If used, provide high impact resistant rigid sheet wall covering, with colour-matched trim for joint/transitions.

6.9.2.8(2) Provide sheet wall covering to 1200mm height at a minimum; provide full height where required.

6.9.2.8(3) Products that do not contain PVC are preferred.

6.9.2.8(4) Furnish complete packaged system containing all primers and adhesive. Use low VOC and non-hazardous primer and adhesive materials meeting the requirements of LEED IEQ credit 4.

6.10 Specialties (Division 10)

6.10.1 Provide specialty products manufactured for the specific purposes intended, and installed in strict accordance with the manufacturer's directions.

6.10.2 Tackboards and Whiteboards

6.10.2.1 Provide, as appropriate throughout the Facility:

6.10.2.1(1) tackboard surfaces that allow pin penetration of the surface materials and have reasonable resistance to deterioration; and

6.10.2.1(2) whiteboard surfaces that allow use of felt-type writing instruments and allow erasing and cleaning with minimal effort. Use porcelain ceramic on steel surface, magnetic, scratch and abrasion-resistant

and have maximum contrast, glare control, and reflectivity.

6.10.2.2 Provide tackboards and whiteboards with extruded aluminum frames, accessory trays, maprails and maphooks.

6.10.2.3 Use non-toxic, lamination adhesive for tackboards and whiteboards.

6.10.3 Signage

6.10.3.1 Provide the signage indicated in Appendix B- Wayfinding Guidelines.

6.10.3.2 Aluminum signs to be fabricated using composite aluminum panels which meet the following requirements:

6.10.3.2(1) Composite aluminum panels fabricated from aluminum sheets sandwiching a polyethylene core: Alupanel or equivalent product.

6.10.3.2(2) Aluminum panels to be painted to match natural aluminum colour and have a stain finish, unless otherwise indicated; paint to be two part polyurethane paint.

6.10.3.3 Wall mounted aluminum panels will be a consistent thickness for the different sign types

6.10.3.4 Suspended or projected panels will be composed at a minimum of three built-up layers: two 3mm thick surface panels and 12mm core panel.

6.10.3.5 All panels mounted on glass to have an opaque backing film of 0.05mm thickness: Etchmark vinyl "silver shimmer" or equivalent.

6.10.3.6 All dimensional acrylic letter and headers to be minimum 12mm thick, opaque with a semi-gloss finish.

6.10.3.7 All applied vinyl to be 0.05mm thick, opaque, satin finish. Exterior vinyl to be 3M High Performance or equivalent product.

6.10.3.8 All applied vinyl pictograms to be to be minimum 2-mil thickness, opaque, gloss finish.

6.10.3.9 All suspension rods to be a minimum 10mm diameter with 75mm ceiling cover plates

6.10.3.10 All mounting hardware and metal signage components to be painted with two part polyurethane paint to match a natural aluminum colour with a stain finish or stainless steel.

6.10.3.11 Braille system to be raised clear polycarbonate or acrylic and comply with the National Building Code, VBBL and ADA standards.

6.10.4 Screened Graphics

6.10.4.1 Provide screened graphics in themed designs using vinyl film with adhesive backing. Use Avery Etchmark Cast Vinyl 0.05mm caliper or equivalent product.

6.10.5 Compartments and Cubicles

6.10.5.1 Provide compartments and cubicles including toilet partitions, change cubicles, shower partitions, and other compartments and cubicles requiring privacy and security.

6.10.5.2 Provide exposed surfaces that are permanent, water-resistant, corrosion-proof, and readily cleaned and maintained.

6.10.5.3 Secure partitions and standards to the floor or ceiling structure, and in a manner to resist lateral loading and impact.

6.10.5.4 For compartment/cubicle doors, use material matching the partitions and include permanent, purpose-made hardware. Design doors and hardware to provide barrier-free access.

6.10.5.5 Toilet Partitions

6.10.5.5(1) Provide toilet partitions as follows:

6.10.5.5(1)(a) Galvannealed sheet metal will conform to ASTM A653 with minimum ZF001 (A01) zinc coating. Finish in polyester, baked enamel or powder coating;

6.10.5.5(1)(b) For stainless steel, use Type 304 conforming to ASTM A240 with No. 4 finish;

6.10.5.5(1)(c) For plastic laminate, use Grade 10/HGS GP50 scuff-resistant, high pressure laminate, conforming to AINSI/NEMA LD 3;

6.10.5.5(1)(d) For particleboard core used for partitions, conform to CAN3-0188.1 Industrial Grade "R", urea formaldehyde free; and

6.10.5.5(1)(e) For fibre-reinforced plastic (fibreglass), use a moisture resistant grade.

6.10.5.6 Change Cubicle Partitions

6.10.5.6(1) Provide change cubicle partitions as follows:

6.10.5.6(1)(a) Change cubicles partitions that are not adjacent to showers, will comply with the above requirements for toilet partitions.

6.10.5.6(1)(b) Change Cubicle partitions that are adjacent to showers will comply with requirements for showers partitions.

6.10.5.7 Shower Partitions

6.10.5.7(1) Provide shower partitions that are solid phenolic laminated thick stock, factory-laminated with decorative finish both faces of core and conforming to CAN3-A172 or AINSI/NEMA LD 3.

6.10.6 Wall and Door Protection/ Handrails

6.10.6.1 Provide crash rails and corner guards as follows:

6.10.6.1(1) Provide protection of walls, with crash rails in all patient care areas, service areas, and other areas (as required) to prevent damage due to impact from traffic such as stretchers, equipment and service vehicles.

6.10.6.1(2) Provide corner guards at exposed wall corners that require protection.

6.10.6.1(3) Select materials appropriate to the amount and degree of impact anticipated.

6.10.6.1(4) Use extrusion models that are designed to be resistant to high impact.

6.10.6.2 Provide handrails as follows:

6.10.6.2(1) in all corridors and patient care areas of an appropriate type for patient support;

6.10.6.2(2) that comply with child friendly principles and are ergonomically designed for children where required;

6.10.6.2(3) that comply with elder friendly principles and meet the needs of the visually impaired; and

6.10.6.2(4) select materials and shapes appropriate for the use, provide continuous uninterrupted supports.

6.10.6.2(5) Provide an adjustable handrail in Oncology as follows:

6.10.6.2(5)(a) Located in a back corridor which provides a suitable location for therapy sessions;

6.10.6.2(5)(b) minimum length to be 4000mm;

6.10.6.2(5)(c) wall mounted;

6.10.6.2(5)(d) adjustable in height from 1200mm to 2400mm; and

6.10.6.2(5)(e) handrail material to be manufactured from stainless steel.

6.10.6.3 Provide wall protection as follows:

6.10.6.3(1) Apply sheet or panel wall protection to wall areas where the impact damage anticipated is of a larger area of wall than would be protected by crash rails and corner guards alone.

6.10.6.3(2) Provide wall splash back protection behind and surrounding hand sinks, scrub sinks and housekeeping sinks and any other areas required for infection control.

6.10.6.3(3) Secure wall protection, crash rails and corner guards to reinforcing and backing in the walls, such backing sufficient to withstand expected impact loads.

6.10.6.3(4) Use wall protection, handrails and corner guard products that are stain-resistant to pen marks, paint, and graffiti, and able to withstand commercial cleaners without fading or staining.

6.10.6.4 Provide Door Edge and Door Frame Protection as follows:

6.10.6.4(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.

6.10.6.4(2) Protect door edges and door frames in clinical and service areas from damage such as impact caused by regular and non-regular service vehicles.

6.10.6.4(3) 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.

6.10.7 Metal Lockers

6.10.7.1 Provide individual and shared storage facilities in designated staff areas in the Facility based on expected staffing requirements as described in the Appendix 3A-Clinical Specification and as appropriate for operation of the Facility. Such storage facilities may be metal lockers and metal locker systems of sizes, numbers, and groupings.

6.10.7.2 For sheet metal, use galvannealed steel conforming to ASTM A653 with ZF001 (A01) zinc coating.

6.10.7.3 Finish steel surfaces with polyester baked enamel or powder coating.

6.10.7.4 For single, double, multiple-tier, purse or "Z" type metal lockers for staff use, include a provision for locking with padlock, and complete with number plates, and hanging hooks.

6.10.8 Storage Shelving Systems

6.10.8.1 Provide storage systems for materials in designated storage areas.

6.10.8.2 Adjustable shelving systems may be specifically manufactured for storage purposes, such as steel-slotted angle industrial shelving for bulk materials of plastic laminate-faced plywood for clean storage.

6.10.9 Movable Partitions

6.10.9.1 Provide movable partitions where required to create flexibility.

6.10.9.2 Provide movable partitions with acoustic characteristics required in Appendix D Acoustics and Noise Control

6.10.9.3 Movable partitions will not contain any added urea formaldehyde.

6.10.9.4 Movable partitions to be folding panels with ceiling track and hardware for manual operation.

6.10.9.5 Provide 14 movable, operable, breakaway glass partitions in the Anesthesia Care Unit patient rooms as follows:

6.10.9.5(1) locations to be reviewed and agreed to by the Authority.

6.10.9.5(2) manually operated and top-supported series of individual glass panels and integrated suspension systems.

6.10.9.5(3) telescoping panel system that slides in same direction and end panel hinged to allow all panels to breakaway in the same direction.

6.10.9.5(4) support top of panel from suspension components and provide reinforcement for hardware attachment. Fabricate panels with concealed fasteners.

6.10.9.5(5) maximize opening and ensure system panels in the open position do not create an obstruction into the room greater than a width of 1m by a depth of 0.33m off the adjacent supporting wall.

6.10.9.5(6) locking device required for both closed and open positions.

6.10.9.5(7) partition track system will allow the ease of re-orientation of the patient bed over the track without impeding the movement or affecting patient safety and to be of similar material as partition.

6.10.9.5(8) refer to 6.8.2.9 for glass and glazing requirements.

6.10.9.5(9) all other partition finishes to be clear anodized aluminum or Authority approved alternate.

6.10.10 Patient Bed Service Walls (Headwalls)

6.10.10.1 Project Co will provide patient bed service walls (headwalls) to comply with the requirements of Appendix 3C Medical Gas and Headwall Requirements. Provide 50% more headwalls than the indicated in Appendix C-Medical Gas and Headwall Requirements. The additional headwalls with appropriate services will be located as determined by the Authority.

6.10.10.2 Headwall configurations will be determined through the service requirements of each headwall as indicated in Appendix 3C Medical Gas and Headwall Requirements.

6.10.10.3 Submit proposed headwall locations and configurations for review and approval by the Authority.

6.10.10.4 Provide purpose made manufactured headwalls which are configured to be appropriate in each location and that are wired and fitted for medical gas requirement, electrical and communications outlets in the factory in all locations.

6.10.10.5 Headwall design to complement the finishes in each room.

6.10.10.6 Coordinate electrical wiring, communications, patient call and medical gas connections to headwalls in a standardized and logical manner.

6.10.10.6(1) configuration of headwalls allow for multiple plug use (outlets spaced accordingly and headwall has flat surface area to allow for oversize plugs)

6.10.11 Washroom Accessories

6.10.11.1 Provide washroom accessories in all public, patient and staff washrooms as required and in accordance with the applicable high quality hospital standards. Provide accessories that are manufactured predominately from stainless steel, with recessed or semi recessed models as required to allow for the proper use of room space. Determine the type, size, and number of accessories with regard for the numbers and categories of users, in consultation with the Authority.

6.10.11.2 Staff and public washroom accessories will include the following:

6.10.11.2(1) soap dispensers – "hands free" type;

6.10.11.2(2) toilet paper dispensers;

6.10.11.2(3) paper towel dispensers – "hands free" type;

6.10.11.2(4) paper towel disposals;

6.10.11.2(5) mirrors ;

6.10.11.2(6) barrier-free grab bars (with integral tactile grip finish);

6.10.11.2(7) coat hooks;

6.10.11.2(8) sanitary napkin disposals; and

6.10.11.2(9) infant change tables (public washrooms only, stainless steel not required).

6.10.11.3 Patient washroom accessories will include the following:

6.10.11.3(1) soap dispensers – "hands free" type;

6.10.11.3(2) toilet paper dispensers;

6.10.11.3(3) paper towel dispensers – "hands free" type;

6.10.11.3(4) paper towel disposals;

6.10.11.3(5) mirrors;

6.10.11.3(6) shelf for personal items;

6.10.11.3(7) handicap grab bars (with integral tactile grip finish); and

6.10.11.3(8) coat hooks.

6.10.11.4 Shower rooms, showers in washrooms or showers in bathtubs will include the following accessories:

6.10.11.4(1) shower curtain and track or rod as appropriate;

6.10.11.4(2) soap dish;

6.10.11.4(3) handicap grab bars;

6.10.11.4(4) fold-down shower seat (not required for showers in bathtubs); and

6.10.11.4(5) use commercial grade accessories free from imperfections in manufacture and finish.

6.10.11.5 Bath tubs will include the following accessories:

6.10.11.5(1) soap dish; and

6.10.11.5(2) handicap grab bars.

6.10.11.6 Provide a mirror in all change compartments and exam rooms.

6.10.11.7 Install washroom accessories to allow cleaning and maintenance of the accessory and surrounding wall area.

6.10.11.8 Use fittings with concealed fastening for security and discouragement of tampering.

6.10.12 Point-of Care Stocking/ Room Pass Throughs

6.10.12.1 Provide for point of care stocking with manufactured room pass throughs in the following locations:

6.10.12.1(1) All Oncology/Hemotology and Medical/Surgical inpatient bedrooms.

6.10.12.2 Point of care stocking room pass throughs will allow for the following functions:

6.10.12.2(1) clean linen and supplies to be placed from the corridor into the pass through and removed from the room side

6.10.12.2(2) dirty linen to be deposited in dirty pass through from the room side and collected from the corridor side

6.10.12.3 Point of care stocking room pass throughs will have the following characteristics;

6.10.12.3(1) size sufficient to perform function

6.10.12.3(2) stainless steel shell, frame and hinges

6.10.12.3(3) safety glass viewing windows

6.10.12.3(4) door gasket and turn knob latch each side

6.10.12.3(5) adjustable shelves

6.10.13 Privacy Curtain, Track and IV Tracks

6.10.13.1 Provide privacy curtains in the following locations:

6.10.13.1(1) around each stretcher in stretcher holding area;

6.10.13.1(2) around each bed in spaces with multiple beds; and

6.10.13.1(3) at doors and glazed partitions in patient and inpatient rooms.

6.10.13.2 Provide IV tracks in the following locations:

6.10.13.2(1) All Clean Prep Rooms

6.10.13.2(2) NICU - all inpatient rooms, two in twin rooms

6.10.13.2(3) Emergency - Medications room and all Clinical Decision Unit (CDU) patient rooms;

6.10.13.2(4) Birthing – all High Dependency Units (HDU); and

6.10.13.2(5) PICU – all inpatient rooms.

6.10.13.3 Curtains will:

6.10.13.3(1) comply with CAN/CBSB-4.162-M, "Hospital Textiles - Flammability Performance Requirements";

6.10.13.3(2) be fabricated from PVC free materials;

6.10.13.3(3) be of suitable dimensions to suit function;

6.10.13.3(4) provided with mesh upper section; and

6.10.13.3(5) be easily removable from tracks to suit cleaning procedures and provided with sufficient supply of additional curtains.

6.10.13.4 For tracks, use extruded, anodized aluminum, entirely enclosed except for the track guide.

6.10.13.5 Use track 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.

6.10.13.6 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.

6.10.13.7 Curtain and IV tracks will be structurally supported.

6.10.13.8 Curtain and IV tracks will be complete installations provided with all necessary accessories.

6.11 Equipment (Division 11)

6.11.1 Equipment List

6.11.1.1 Design and construct the Building to accommodate all equipment and furniture included in Schedule 2, Appendix 2E (Equipment and Furniture).

6.11.1.2 Install and commission all equipment included in Schedule 2, Appendix 2E (Equipment and Furniture) in categories A1, A2, B1, B2, D, F1, F2 G1 and G2 which is intended to be permanently fixed to the Building.

6.11.2 Dock Levellers

6.11.2.1 Provide dock leveling devices as required to facilitate loading and unloading the expected items safely and quickly into and out of the Facility. The leveling devices will be of appropriate slope angle, dimensions and capacity to handle the expected flows.

6.11.3 Patient Lifts

6.11.3.1 Provide patient lift tracks in spaces as follows:

6.11.3.1(1) X-Y gantry track with traversing boom configuration;

6.11.3.1(2) provide full length coverage of the patient bed position(s) plus 1000mm beyond the edges into the lateral transfer zone;

6.11.3.1(3) provide full coverage in the washroom associated with the space;

6.11.3.1(4) refer to Appendix 3E-Occupation Health and Safety for patient lift requirements.

6.11.3.1(5) lifts and motors indicated in Schedule 2, Appendix 2E (Equipment and Furniture); accommodate and coordinate with the requirements of these items ;

6.11.3.1(6) be weight tested and approved to a minimum of:

6.11.3.1(6)(a) 300 kg in pediatric areas; and

6.11.3.1(6)(b) 454kg in Women's LDR rooms and bariatric rooms.

6.11.3.2 Provide patient lift tracks in the following locations as a minimum:

6.11.3.2(1) All Medical/Surgical bedrooms;

6.11.3.2(2) All PICU bedrooms;

6.11.3.2(3) All AIR rooms;

6.11.3.2(4) All HDU rooms;

6.11.3.2(5) All ACU short stay (24 hour) rooms;

6.11.3.2(6) All Bariatric inpatient and patient rooms;

6.11.3.2(7) 1 Patient Treatment Room (non AIR room) in Emergency;

6.11.3.2(8) Burn Bath/Assisted Bath/Shower Suite for transfer to bath;

6.11.3.2(9) Tub Room (PICU) for transfer to bath;

6.11.3.2(10) Physiotherapy/ OT Gym- two tracks (each 15m in length); and

6.11.3.2(11) 2 Oncology Rooms.

6.11.3.3 In all inpatient rooms with lift tracks, the ceiling lift track is to traverse from bedroom to bathroom over toilet and bathtub or shower. All patient room washrooms will have a "pony wall" between the bedroom and washroom, 305mm lower than the ceiling to allow for tracks running between the rooms; eliminating the use of a gated track system.

6.11.4 In- Floor Scales

6.11.4.1 Allow for the installation of in floor scales which have a weighing platform flush with the finished floor level.

6.11.5 Window Washing Systems

6.11.5.1 Provide equipment or appropriate anchors to facilitate window washing.

6.11.6 Fall Arrest System

6.11.6.1 Design and construct a permanent fall arrest system to meet the requirements of WorkSafe BC standards.

6.12 Furnishings (Division 12)

6.12.1 Furniture, Systems Furniture, Millwork and Modular Casework Basic Requirements

6.12.1.1 Refer to Schedule 2- Appendix 2E (Equipment and Furniture) for furniture.

6.12.1.2 In addition to Project Co's obligation to provide Equipment and Furniture in Schedule 2, design and install all furniture, systems furniture, millwork, modular casework, modular laboratory casework and stainless steel work required to support the programs and functions described in the Appendix 3A-Clinical Specification or as required to support the operation of the Facility, including all accessories and installation fittings;

6.12.1.3 Project Co must allow for all systems furniture, casework and millwork that is required to allow proper functional operation in each room or area;

6.12.1.4 The Authority will consider modular casework in lieu of fixed millwork where it is appropriate and all requirements are met.

6.12.1.5 Millwork, systems furniture and case work will comply with the requirements of Appendix 3F- Modular Casework and Millwork at a minimum.

6.12.1.6 Submit the modular casework layout and configuration for review and approval by the Authority.

6.12.1.7 Coordinate modular casework, systems furniture and millwork with equipment and furniture indicated in Schedule 2- Appendix 2E (Equipment and Furniture) for a seamless installation.

6.12.1.8 All furniture, systems furniture, millwork and modular casework supplied by Project Co will:

6.12.1.8(1) be ergonomically designed and functional;

6.12.1.8(2) have sealed surfaces or be covered in upholstery material that is inert and will not support microbial growth;

6.12.1.8(3) incorporate electrical and communications outlets and cabling that complies with Part 7; and

6.12.1.8(4) refer to Appendix 3E-Occupational Health and Safety for requirements.

6.12.1.8(5) provide barrier free work surfaces will be provided as required.

6.12.2 Modular Systems General (Systems Furniture, Modular Casework and Modular Laboratory Casework)

6.12.2.1 Basic requirements

6.12.2.1(1) Provide systems furniture, modular casework and modular laboratory casework to meet all the functional requirements described in Appendix 3A Clinical Specification.

6.12.2.1(2) Refer to Appendix 3F- Systems Furniture, Modular Casework and Millwork.

6.12.2.1(3) Systems furniture is a type of furniture with component parts supplied by a single manufacturer as a modifiable systems package. Compliant with 6.12.3 Modular Caseworks System.

6.12.2.1(4) Provide a complete and integral system of support elements, work surfaces and storage units.

6.12.2.1(5) Provide completely reconfigurable and reusable modular casework systems.

6.12.2.1(6) Provide height adjustability of components in 25mm increments.

6.12.2.1(7) All components will be modular based and shall be interchangeable to form a fully flexible system.

6.12.2.1(8) Provide accessible cable and wire management within the modular casework system.

6.12.2.1(9) Incorporate sinks into work surfaces and plumbing into the modular casework.

6.12.2.2 Performance Requirements

6.12.2.2(1) Modular casework and modular laboratory casework will be constructed from materials and finishes specifically designed for use in, multi-shift operational hospital settings.

6.12.2.2(2) Provide warranty to cover modular casework parts and labour for a minimum of 10 years from date of purchase.

6.12.2.2(3) Modular casework and modular laboratory casework will be Greenguard Air Quality Certified.

6.12.2.2(4) Manufacturer will be ISO 9000 and ISO 14001 certified.

6.12.2.2(5) All modular casework and modular laboratory casework will be 99% PVC free.

6.12.2.2(6) All modular casework and modular laboratory casework units will be lockable and closable without the lock.

6.12.2.2(7) Modular casework and modular laboratory casework will be manufactured to be inherently cleanable by design and will permit a minimum of 200mm of clearance from the bottom of the unit to the floor for cleaning purposes.

6.12.3 Modular Casework Systems

6.12.3.1 At a minimum the modular casework in the Facility will be as follows:

6.12.3.1(1) all counters will be minimum 1800 mm long;

6.12.3.1(2) all upper and lower storage units will be a minimum 1200 mm in width;

6.12.3.1(3) all work stations will meet the following requirements:

6.12.3.1(3)(a) provide a minimum 1800mm x 760mm of work surface and at least two lockable drawer per worker; and

6.12.3.1(3)(b) provide privacy panels as required and at a minimum along major circulation routes.

6.12.3.1(4) all touchdown work stations will meet the following requirements:

6.12.3.1(4)(a) provide a minimum 1200mm x 760mm of work surface per worker;

6.12.3.1(4)(b) provide privacy panels as required and at a minimum along major circulation routes.

6.12.3.1(5) reception/greeting work stations/ areas will meet the following requirements:

6.12.3.1(5)(a) be welcoming in nature and aesthetically pleasing;

6.12.3.1(5)(b) provide a minimum 1800 mm x 760 mm of work surface and at least two lockable drawer per worker;

6.12.3.1(5)(c) provide privacy panels as required and at a minimum along major circulation routes; and

6.12.3.1(5)(d) provide transaction level shelf to allow people to interact across the desk at the reception area, minimum 300 mm wide (overhanging 150 mm on the client side) and 1000 mm long.

6.12.3.1(6) Full height storage units to be minimum 1200 mm wide and 1800 mm high;

6.12.3.1(7) Point of care clinician work stations will meet the following requirements:

6.12.3.1(7)(a) Rotating and adjustable work surface fixed on vertical rail or wall complete with heavy duty hardware.

6.12.3.1(7)(b) Minimum work surface size: 1000 mm by 600 mm.

6.12.3.2 Support Components- Modular Caseworks Systems:

6.12.3.2(1) Provide sufficient support for the modular system components and seismic restraint.

6.12.3.2(2) Provide a steel or aluminum modular frame and tile system which allows for cable and wire management.

6.12.3.2(3) Support frames shall have pre-assembled steel hangers with slots on one inch intervals for suspension of work surfaces, shelf storage, adapter rails, frame supports, upper and lower storage units.

6.12.3.2(4) Frames shall have a wire management system that permits cabling to be accessible at both sides of the frame.

6.12.3.2(5) Provide vertical or horizontal wall strips for components to be suspended from architectural walls.

6.12.3.2(6) Provide tool and equipment rails.

6.12.3.2(7) Provide tile panels that are glazed, provide privacy or provide soundproofing as required.

6.12.3.3 Upper Storage Units- Modular Caseworks Systems:

6.12.3.3(1) Upper Storage units will be manufactured in a variety of heights, depths, and widths and will hang from both sides of the frame support structure or from wall strips on an architectural wall.

6.12.3.3(2) Storage units will have the following features:

6.12.3.3(2)(a) Provide option for open shelves and units with two self closing doors;

6.12.3.3(2)(b) constructed of high-pressure laminated finished medium density fibre board with the bottom being reinforced with 16 gauge steel; and

6.12.3.3(2)(c) storage units will have the option of 3 or 5 adjustable shelves.

6.12.3.4 Under Work Counter/Work Surface Storage Units - Modular Caseworks Systems:

6.12.3.4(1) Lower storage units will have the following features:

6.12.3.4(1)(a) the option of open shelves, closed door storage, a bank of full suspension drawers and plastic removable drawers;

6.12.3.4(1)(b) mounted on vertical wall strips, or underside of work counter/ work surface;

6.12.3.4(1)(c) be of a warp-resistant 16mm medium-density fibre board with both surfaces bound in melamine with the back panel being constructed of 18 gauge steel;

6.12.3.4(1)(d) adjustable shelves;

6.12.3.4(1)(e) pullout shelves;

6.12.3.4(1)(f) box drawers constructed of a 12mm thick medium-density fibre board. Drawer fronts are finished in high-pressure 19mm laminate and door pulls are constructed of extruded aluminum;

6.12.3.4(1)(g) full extension slides to provide for different bottle heights. At least three adjustable dividers must be provided with each bottle drawer; and

6.12.3.4(1)(h) plastic removable drawers.

6.12.3.5 Full Height Storage Module - Modular Caseworks Systems:

6.12.3.5(1) Full height storage module will be mounted on the wall.

6.12.3.5(2) Full height storage module will be configured to provide for filing.

6.12.3.6 Task Lighting- Modular Caseworks Systems:

6.12.3.6(1) Provide integral task lighting as part of the overall Building lighting strategy.

6.12.3.7 Work Counter/Work Surfaces- Modular Caseworks Systems:

6.12.3.7(1) Provide Heavy-duty work surfaces cantilevered from the vertical wall strips or hung from both sides of the support frame.

6.12.3.7(2) Work surfaces will be manufactured with a warp resistant composition that will provide sufficient weight-bearing capabilities as functionally required.

6.12.3.7(3) Work Surfaces will be fabricated from high-pressure 1.2 mm plastic laminate over at least 28mm fibre board core with high pressure laminate backer board.

6.12.3.7(4) Provide work surfaces of solid acrylic at sink locations.

6.12.3.7(5) Provide units with integral sinks (including hand hygiene sinks) with solid sides and front to conceal plumbing. Sink units will meet all infection control requirements.

6.12.3.8 Storage Module/Unit Interior Components- Modular Caseworks Systems:

6.12.3.8(1) Storage module/unit will provide a succession of modular volumes. The progression of storage containers is required to support the various storage requirements for a variety of work process and procedures.

6.12.3.8(2) Drawers and plastic shelves/trays will withstand a dishwasher and cart wash.

6.12.3.8(3) Drawers will have the ability to be removed from the module and used as procedure/tote tray which can be suspended on a wall rail.

6.12.3.8(4) Drawers will be capable of accepting lockable lids and locks to secure drawers.

6.12.3.8(5) Drawer will be a one piece unit without creases or seams, avoiding dust and bacterial accumulation.

6.12.3.8(6) Storage Containers and Dividers:

6.12.3.8(6)(a) A minimum of nine sizes of storage containers will be available.

6.12.3.8(6)(b) Dividers will provide a mechanism to organize and store various quantities of small, loose, or irregularly shaped items used in materials processing and distribution functions as well as IV bags and forms.

6.12.3.8(7) Storage Accessories

6.12.3.8(7)(a) Provide storage accessories mounted to rails.

6.12.3.8(7)(b) Provide storage accessories within storage modules/units.

6.12.4 Laboratory Modular Casework System

6.12.4.1 At a minimum laboratory modular casework in the Facility will be as follows:

6.12.4.1(1) all counters will be minimum 1800 mm long;

6.12.4.1(2) all workbenches will be minimum 1800 mm long;

6.12.4.1(3) provide a minimum 1800mm x 760mm of work surface per workstation;

6.12.4.1(4) all upper and lower storage units will be a minimum 1200 mm in width and will be provided at a minimum above and below 50% of counters and workbenches;

6.12.4.1(5) full height storage units to be minimum 1200mm wide and 1800 mm high;

6.12.4.2 Lab Module Support Components:

6.12.4.2(1) Provide a steel framed lab module system to create wall attached, island or peninsular arrangement of work surfaces and storage units. Lab module to consist of steel frame support system and utility chases and include steel access panels and closure panels.

6.12.4.2(2) Provide sufficient support and seismic restraint for the modular laboratory system components.

6.12.4.2(3) Provide vertical or horizontal wall strips for components to be suspended from architectural walls.

6.12.4.2(4) Support frames shall have pre-assembled steel hangers with slots on one inch intervals for suspension of work surfaces, shelf storage, adapter rails, frame supports, upper and lower storage units.

6.12.4.2(5) Frames shall have a wire management system that permits cabling to be accessible at both sides of the frame at every 200 mm increments from the base of the frame to the top of the frame.

6.12.4.2(6) Provide tool and equipment rails.

6.12.5 Work Counter/Work Surfaces- Laboratory Modular Casework System:

6.12.5.1(1) Provide Heavy-duty work surfaces cantilevered from the vertical wall strips or hung from both sides of the support frame with a positive locking system. Provide peninsular layouts and corner work surfaces where required.

6.12.5.1(2) Work surfaces will be manufactured with a warp resistant composition that will provide sufficient weight-bearing capabilities as functionally required.

6.12.5.1(3) Work Surfaces will be fabricated from high-pressure 1.2 mm acid resistant plastic laminate over at least 28mm fibre board core with high pressure laminate backer board.

6.12.5.1(4) Work surfaces at sink locations will be epoxy resin or stainless steel.

6.12.5.1(5) Provide units with integral sinks (including hand hygiene sinks) with solid sides and front to conceal plumbing. Sink units will meet all infection control requirements.

6.12.5.2 Storage Components- Laboratory Modular Casework System:

6.12.5.2(1) All components will be an exchange cart system for supply /distribution and components will be adaptable and interchangeable to fulfill these requirements.

6.12.5.2(2) All shelves to have moulded lip.

6.12.5.3 Above work surface storage- Laboratory Modular Casework System:

6.12.5.3(1) Upper Storage units will be manufactured in a variety of heights, depths, and widths and will hang from both sides of the frame support structure or from wall strips on an architectural wall.

6.12.5.3(2) Storage units will have the following features:

6.12.5.3(2)(a) Provide option for open shelves and units with two self closing doors.

6.12.5.3(2)(b) constructed of high-pressure laminated finished medium density fibre board with the bottom being reinforced with 16 gauge steel.

6.12.5.3(2)(c) Storage units will have the option of 3 or 5 adjustable shelves.

6.12.5.4 Under Work Counter/Work Surface Storage Units- Laboratory Modular Casework System:

6.12.5.4(1) Lower storage units will have the following features:

6.12.5.4(1)(a) the option of open shelves, closed door storage, a bank of full suspension drawers and plastic removable drawers;

6.12.5.4(1)(b) mounted on vertical wall strips, or underside of work counter/ work surface;

6.12.5.4(1)(c) be of a warp-resistant 16mm medium-density fibre board with both surfaces bound in melamine with the back panel being constructed of 18 gauge steel;

6.12.5.4(1)(d) adjustable shelves;

6.12.5.4(1)(e) pullout shelves;

6.12.5.4(1)(f) box drawers constructed of a 12mm thick medium-density fibre board. Drawer fronts are finished in high-pressure 19mm laminate and door pulls are constructed of extruded aluminum;

6.12.5.4(1)(g) full extension slides; and

6.12.5.4(1)(h) plastic removable drawers.

6.12.5.5 Full Height Shelf Storage Unit (locker type) - Laboratory Modular Casework System:

6.12.5.5(1) Shelf storage unit to have rounded exposed surfaces free from sharp edges.

6.12.5.5(2) Shelf storage units will be interchangeable and attached to panel systems, wall strips and lab modules.

6.12.5.5(3) All units to have door covers which with locks that can recede on the top of units to allow maximum use of interior space.

6.12.5.5(4) Storage module will be available in a number of different sizes and configurations. Units will be available with interior components that are interchangeable with one another for future flexibility.

6.12.5.6 Specialty shelving- Laboratory Modular Casework System:

6.12.5.6(1) Provide for different shelf combinations to suit different functions.

6.12.5.6(2) Shelves will be minimum 18 gauge painted steel.

6.12.5.7 Storage Module Interior Components- Laboratory Modular Casework System:

6.12.5.7(1) Components will provide a succession of modular volumes. The progression of storage containers is required to support the various storage requirements for a variety of work process and procedures.

6.12.5.7(2) Drawers and plastic shelves/trays will withstand a dishwasher and cart wash.

6.12.5.7(3) Drawers will have the ability to be removed from the module and used as procedure/tote tray which can be suspended on a wall rail.

6.12.5.7(4) Drawers will be capable of accepting lockable lids and locks to secure drawers.

6.12.5.7(5) Drawer will be a one piece unit without creases or seams, avoiding dust and bacterial accumulation.

6.12.5.7(6) Storage Containers and Dividers:

6.12.5.7(6)(a) A minimum of nine sizes of storage containers will be available.

6.12.5.7(6)(b) Dividers will provide a mechanism to organize and store various quantities of small, loose, or irregularly shaped items used in materials processing and distribution functions as well as IV bags and forms.

6.12.5.7(7) Storage Module Accessories

6.12.5.7(7)(a) Will have the capability to attach accessories by means of an above-cart rail or side or back mounted rail.

6.12.6 Window Coverings

6.12.6.1 Provide window coverings for:

6.12.6.1(1) all exterior windows

6.12.6.1(2) all interior windows where privacy may be a concern

6.12.6.1(3) all exterior and interior windows requiring black-out function.

6.12.6.2 All exterior windows will have roller shades.

6.12.6.3 Exterior window coverings will provide privacy, sun and heat control, glare-reduction, and provide external visibility.

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

6.12.6.5 Provide black-out window coverings in the following areas:

6.12.6.5(1) all patient and inpatient rooms in the NICU and Medical Imaging components.

6.12.6.6 Where window coverings are required for black-out functions, provide materials, tracks, seals, and operation suited to that purpose.

6.12.6.7 Use window coverings manufactured from materials and mechanisms that minimize cleaning and maintenance operations and maximize infection prevention and control. All window coverings will be easy to clean, will not support or provide a surface that encourages spread of infectious disease and will not become electro statically charged.

6.12.7 Window Shade Systems

6.12.7.1 Use shading fabric of fibreglass or TPO yarn and that:

6.12.7.1(1) Is PVC free;

6.12.7.1(2) is waterproof, washable, rot-proof, flame-resistant, colourfast to light;

6.12.7.1(3) conforms to CAN/CBSB-4.162-M, "Hospital Textiles - Flammability Performance Requirements"; and

6.12.7.1(4) is tested in accordance with ASHRAE Standard 74073 for shading coefficient, fungal resistance in accordance with ASTM G21, and bacterial resistance.

6.12.8 Venetian-Type Blinds between Glass

6.12.8.1 Provide integral blinds between glass in interior glazing windows and glazed sliding doors for patient and inpatient rooms in the PICU, NICU, ED, ACU and Seclusion Rooms.

6.12.8.2 Blinds will consist of tempered aluminum alloy slats uniformly spaced and 100% interlaced between cross-ladders on at least one tape. Use tapes with no special end rails required to attach the suspension members from the window opening to the blind.

6.12.8.3 Use a hardware/window design that does not allow air movement from a room to adjacent rooms. Openings in the glazing plane are not allowed.

6.12.8.4 The operator will be a specially constructed, permanent magnet capable of moving the blind assembly from a closed position in one direction to a closed position in the opposite direction.

6.12.8.5 An alternate to venetian-type blinds between glass which provides privacy and suitable infection control will be considered by the Authority.

6.12.9 Entrance Foot Grilles

6.12.9.1 Provide foot grilles inside and outside all entrances to the Building, except at exterior doorways that are used infrequently.

6.12.9.2 Foot grilles to be as wide as all the door openings and extend at least 3 meters from the entranceway inside the Building.

6.12.9.3 Entrance foot grilles are to be stainless steel rail and support system set in a stainless steel perimeter angle frame.

6.12.9.4 Provide foot grilles with a hidden lock down mechanism that allows for easy removal for cleaning.

6.12.9.5 Provide for a foot grille system with a load performance to suit all traffic passing through the Facility entrances.

6.12.9.6 Foot grille system to be flush with adjacent floor finish or exterior paving material.

6.13 Special Construction (Division 13)

6.13.1 Radiation Protection

6.13.1.1 Radiation protection will comply with "Safety Code 35 Safety Procedures for the Installation, Use and Control of X-Ray Equipment in Large Medical Radiological Facilities" and all applicable reports of the National Council on Radiation Protection and Measurement (NCRP).

6.13.1.2 A qualified Medical Physicist or Radiation Safety Officer will be responsible for specifying all aspects of radiation protection shielding during design, installation and operations of the Facility.

6.13.1.3 Provide radiation protection in walls, doors, floors, ceilings and windows as required and appropriate to protect staff, visitors and patients from x-ray and nuclear radiation emitted from equipment.

6.13.1.4 Provide radiation protection by incorporating lead sheet of appropriate weight and thickness into wall, floor and ceiling assemblies.

6.13.1.5 Design Requirements:

6.13.1.5(1) Provide materials and workmanship, including joints and fasteners, that maintain continuity of radiation protection at all points and all directions equivalent to materials specified in thicknesses and locations indicated.

6.13.1.5(2) Lead-Lined Assemblies: Provide lead thickness in doors, door frames, window frames, and other items located in lead-lined assemblies, not less than that indicated for assemblies in which they are installed unless indicated otherwise.

6.13.1.5(3) Lead Glazing: Provide lead equivalence not less than that indicated for assembly in which glazing is installed.

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 Architectural Woodwork Standards Industry Standard for wood doors and NCRP Report #147.

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 Provide radiation shielding barriers, mobile or fixed, modular and transparent barriers to protect medical personnel by providing a full body shield. Provide units with distortion-free, lead-plastic windows.

6.13.1.16 Provide radiation shielding in 100% of the walls, floors and ceilings of the following spaces:

6.13.1.16(1) All Functional areas within Medical Imaging

6.13.1.16(2) NICU Procedure Room 10303

6.13.1.16(3) Cardiac OR 10950

6.13.1.16(4) IR PR 11233

6.13.1.16(5) IR PR 11242

6.13.1.16(6) Interventional /Trauma Room 10952

6.13.1.16(7) Neuro OR 10510

6.13.1.16(8) Ortho OR 10996

6.13.1.16(9) CT Garage 11243

6.13.1.16(10) Dispensing Area10250

6.13.1.16(11) Equipment Room 10517

6.13.1.16(12) Future Inter Operative Imaging 11239

6.13.1.16(13) Storage and Clean Stores (Future IR Procedure Room) 11211/11212

6.13.1.16(14) One oncology patient room including bathroom.

6.13.2 Radio Frequency Shielding

6.13.2.1 Provide radio frequency shielding as required around magnetic resonance imaging equipment according to all equipment recommendations and regulations.

6.13.3 Pneumatic Tube Systems

6.13.3.1 Project Co will provide a computerized Pneumatic Tube System (PTS) that interconnects and serves Facility and locations in existing buildings with automated secure on-demand transport of light materials and health care products.

6.13.3.2 The PTS will be a six inch,150mm, Swiss Log Translogic system or equivalent system agreed to by the Authority. The system will be independent of the Hospital's existing Swiss Log Translogic PTS.

6.13.3.3 The PTS will include:

6.13.3.3(1) all necessary transfer units, user stations and carriers through a strategically designed network of 150mm tubing in a configuration that is optimized for overall PTS performance. "Transactions Times" will be at a minimum as supported through a pre-installation "Virtual System Simulation" conducted by Swiss Log Translogic; and

6.13.3.3(2) at a minimum, stations located at each of the pneumatic tube station locations described in Appendix 3A-Clinical Specification. All stations will be of the recessed type; no virtual stations will be allowed. Provide an appropriate number and logical distribution of stations in order to minimize staff travel. Determine the final number of stations in consultation with the Authority as part of the design process;

6.13.3.3(3) no more than ten stations per zone;

6.13.3.3(4) four carriers for each station included in the Facility; and

6.13.3.3(5) at least one spare port at each transfer unit.

6.13.3.4 The PTS system will be designed and constructed to have stations in the following locations:

6.13.3.4(1)(a) as indicated in Clinical Specifications and 6.13.3.3(2); and

6.13.3.4(2) locations in existing hospital buildings as follows:

6.13.3.4(2)(a) 3 stations in the lab in the 1982 building;

6.13.3.4(2)(b) 1 station in the pharmacy of the 1982 building; and

6.13.3.4(2)(c) I station in the Urgent Care Suite/Assessment Room in the 1982 building.

6.13.3.5 Refer to Schedule 2- 6.11 (Connections and Integration to Existing Hospital) regarding Work Plan and other requirements regarding work in the existing Hospital.

6.13.3.6 For PTS system in the existing hospital:

6.13.3.6(1) patch and repair the existing building to match existing adjacent surfaces related to installation;

6.13.3.6(2) provide stations of similar size and quality as required in the ACC Building, adapt the design to fit existing building conditions; and

6.13.3.6(3) route the tube system from the Facility to the existing buildings through Building Connections.

6.13.4 Modular Clean Room

6.13.4.1 Applicability

6.13.4.1(1) Provide modular clean room systems in the Oncology Satellite Pharmacy as indicated in Appendix 3A-Clinical Specification.

6.13.4.2 General

6.13.4.2(1) Provide a complete modular clean room system installation which is USP Chapter <797> compliant for the function to be performed in the spaces.

6.13.4.2(2) Modular clean room system will:

6.13.4.2(2)(a) be as manufactured by Grifols Misterium or an equivalent system that is agreed to by the Authority of similar quality; and

6.13.4.2(2)(b) include modular wall panels, modular ceiling panels, doors, windows, lights fixtures and HVAC outlets.

6.13.4.2(2)(c) be easily cleanable to meet infection control procedures.

6.13.4.3 Modular Walls will meet the following requirements:

6.13.4.3(1) steel sandwich plate sandwich construction.

6.13.4.3(2) Class 1 Flame-spread rating.

6.13.4.3(3) All vertical joints will be finished with a coving strip to allow for easy cleaning.

6.13.4.3(4) Include purpose made windows and doors by the modular clean room manufacturer in modular wall panels.

6.13.4.3(5) Provide glazing in wall panels as follows:

6.13.4.3(5)(a) double glazed windows that are flush with panels;

6.13.4.3(5)(b) all wall panels to be extensively glazed;

6.13.4.3(5)(c) accommodate required lines-of-sight; and

6.13.4.3(5)(d) offer transparency between adjacent spaces in the clean room area and beyond to adjacent spaces.

6.13.4.3(6) Floor finish to be self coved into the bottom of the wall panels for a flush joint.

6.13.4.3(7) Allow for cables to run between panels.

6.13.4.4 Ceiling Panels will meet the following requirements:

6.13.4.4(1) steel sandwich plate sandwich construction.

6.13.4.4(2) panels to have an integral frame along the entire panel perimeter for reinforcement and facilitate the

attachment suspension of equipment below the ceiling.

6.13.4.4(3) All joints at walls and ceiling will be finished with coving strip.

6.13.4.4(4) Ceiling height to be minimum 2740mm.

6.13.4.5 Doors

6.13.4.5(1) The doors must be designed to allow for the passage of laminar airflow hoods and biological safety cabinets to pharmacy areas.

6.13.4.5(2) Provide glazing in doors.

6.14 Conveying Equipment (Division 14)

6.14.1 Dumbwaiters

6.14.1.1 Provide dumbwaiters a follows:

6.14.1.1(1) locations and functionality as indicated in Appendix 3A- Clinical Specification;

6.14.1.1(2) capacity and size to suit use;

6.14.1.1(3) electric operation;

6.14.1.1(4) stainless steel car and shelves; and

6.14.1.1(5) minimum speed of 0.02 m/s.

6.14.2 Elevators

6.14.2.1 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.

6.14.2.1(1) Submit analysis conforming to performance requirements in 6.14.2.3 to demonstrate suitable design for contemporary hospital facility of this nature. Submit analysis report to authorities for review.

6.14.2.1(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.

6.14.2.1(3) Elevatoring 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.

6.14.2.2 Provide passenger, patient and service elevators meeting the performance criteria according to approved analysis. The elevators shall be provided as a minimum, but not limited to elevators as follows:

6.14.2.2(1) One (1) Hydraulic Parking Shuttle Elevators G1

6.14.2.2(2) Four (4) Traction Public Elevators 1-4

6.14.2.2(3) Three (3) Traction Material Elevators 5-7

6.14.2.2(4) Two (2) Traction Patient Elevators 8-9

6.14.2.2(5) One (1) Traction Trauma Patient Elevator 10

6.14.2.2(6) One (1) Clean and One (1) Soiled Traction MDR Elevators 11, 12

6.14.2.3 Passenger, patient and service elevators will meet the following performance requirements:

6.14.2.3(1) Code: Safety Code for Elevators and Escalators reference ASME A17.1/CSA B44.

6.14.2.3(2) Population: Provide elevators to serve the number of beds, number of outpatient visits, proposed vehicular traffic (beds, carts, medical equipment indicated in Schedule 2, Appendix 2E (Equipment and Furniture) etc.) and total staff above the main level of the Hospital.

6.14.2.3(3) 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). Combined Patient/Service elevators will be capable of transporting 68 vehicles and 82 staff for a peak 15 minute period.

6.14.2.3(4) Interval: For adequate elevator service the following average interval is required:

6.14.2.3(4)(a) Public (ambulatory passenger) Elevators 35 to 40 seconds

6.14.2.3(4)(b) Patient Elevators, 45 to 55 seconds

6.14.2.3(4)(c) Service Elevators, 55 to 60 seconds

6.14.2.3(4)(d) Clean & Soiled, 40 to 45

6.14.2.3(4)(e) The interval is defined as the average time between elevator departures from the ground floor in a peak period.

6.14.2.3(5) Load Factor: Passenger elevators will provide adequate service with a load factor below 40%. Load factor refers to the number of passengers transported by each elevator during one trip expressed as a percentage of the maximum number of passengers permitted by the Safety Code for Elevators and Escalators (CSA B44).

6.14.2.3(6) 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.

6.14.2.3(7) 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.

6.14.2.3(8) Elevator Locations: Elevators will be located to provide separation of traffic types as well as minimize walking distances. Horizontal distances up to 45-60m (150-200 feet) are generally acceptable for staff and visitor walking distances. Materials handling elevators are generally allowed greater distances of 86-92 horizontal meters (250-300 horizontal feet).

6.14.2.3(9) 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%.

6.14.2.3(10) 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.

6.14.2.4 Additional Requirements for Elevators: In addition to the requirements of Section 6.13.4.2 passenger elevators will, at a minimum, meet the requirements set out in the table below (without causing any passenger discomfort):

6.14.2.5 Summary of Elevators:

6.14.2.5(1) Parking Shuttle Elevator

Number:	Car – G1
Capacity:	1800 kg (4000 lb.)
Class Loading:	Passenger Class A
Contract Speed:	.75 M.P.S. (150 FPM)
Machine:	Hydraulic
Machine Location:	Adjacent
Operational Control:	Selective Collective Microprocessor- Based System
Motor Control:	Single Speed AC With Electronic Soft Start
Stops:	2
Openings:	2
Floors Served:	0, 1
Travel:	4.8 m ± Verify (16'-5" ±)
Platform Size:	2438mm Wide X 1880mm Deep (8'-0" Wide x 6'-2" Deep)
Minimum Clear Inside Car:	2337mm Wide X 1651mm Deep (7'-8" Wide x 5'-5" Deep)
Entrance Size:	1220mm Wide X 2134mm High (4'-0"" Wide x 7'-0" Deep)

Entrance Type:	Single Speed, Centre Opening, Brushed Stainless Steel #4
Door Operation:	High Speed, Heavy-Duty, Door Operator, Minimum Opening Speed 2-1/2 F.P.S.
Door Protection:	Infrared, Full Screen Device with Differential Timing, Nudging and Interrupted Beam Time
Guide Rails:	Planed Steel Tees
Buffers:	Spring
Car & Hoistway Sills:	Extruded Aluminum
Car Enclosure:	Car Interior Finishes – Glass covered wood veneer panels with stainless steel reveals, stainless steel panel ceiling with recessed LED illumination, handrails on all non-access walls
	2438mm (8'-0") Clear Height Under Canopy
Signal Fixtures:	LED Illumination Contractor's Standard, Brushed Stainless Steel #4
Hall and Car Pushbutton Stations:	Single Hall Pushbutton Riser
	Dual Car Operating Panels
Car Position Indicators:	Single Digital with Car Direction Arrows
	Security Control Panel
	Firefighters' Control Panel
Hall Lanterns:	At All Floors with Volume Adjustable Electronic Chime or Tone.
Communication System:	Intercom with Distress Signal
	Self-Dialing, Vandal Resistant, Push to Call, Two-Way Communication System with Recall, Tracking and Voiceless Communication
Additional Features, Car G1:	Car and Counterweight Roller Guides
	Car Top Inspection Station
	Firefighters' Service, Phase I And II, including Alternate Floor Return
	Standby Power Transfer (Automatic to Main Floor) with Manual Override in Firefighters' Control Panel
	Accessibility Signage
	Swing Car Return Panels Arranged for Integral Car Operating Panels
	Hoistway Access Switches Top and Bottom Floors
	Hoistway Door Unlocking Device All Floors
	Platform Isolation, Jack to Platen Connections

Independent Service Feature

Secure Access Provisions

Card Reader Provisions

CCTV Provisions

Security Control Panel and Remote Wiring

Firefighters' Control Panel and Remote Wiring

Hydraulic Pump Unit and Controller Sound Isolation

Tamper Resistant Fasteners for All Fastenings Exposed To The Public

One Year Warranty Maintenance with 24-Hour Call-Back Service

Emergency Paging Speaker Installation

Signage Engraving Filled with Black Paint or Approved Etching Process

Wiring Diagrams, Operating Instructions, and Parts Ordering Information

System Diagnostic Means and Instructions

6.14.2.5(2) Public Passenger Elevators - Centrally Located (Provide in accordance with analysis utilizing migration factor if separate split elevator locations are designed)

Number:	Cars 1-4
Capacity:	1800 kg (4000 lb.)
Class Loading:	Passenger Class A
Contract Speed:	1.75 M.P.S. (350 FPM)
Roping:	1:1
Machine:	Geared or Gearless
Machine Location:	Overhead
Supervisory Control:	Group Automatic Microprocessor- Based System
Motor Control:	AC Variable Voltage Variable Frequency; Microprocessor-Based With Digital Closed-Loop Feedback
Stops:	7
Openings:	7
Floors Served:	1-7

Travel:	28.6 m ± (93'–10" ±)
Platform Size:	2438mm Wide X 1880mm Deep (8'-0" Wide x 6'-2" Deep)
Minimum Clear Inside Car:	2337mm Wide X 1651mm Deep (7'-8" Wide x 5'-5" Deep)
Entrance Size:	1220mm Wide X 2134mm High (4'-0"" Wide x 7'-0"" Deep)
Entrance Type:	Single Speed, Centre Opening , Brushed Stainless Steel #4
Door Operation:	High Speed, Heavy-Duty, Door Operator, Minimum Opening Speed 2-1/2 F.P.S.
Door Protection:	Infrared, Full Screen Device with Differential Timing, Nudging and Interrupted Beam Time
Safety:	Flexible Guide Clamp-Type B, Car
Guide Rails:	Planed Steel Tees
Buffers:	Oil
Car & Hoistway Sills:	Extruded Aluminum
Car Enclosure:	Car Interior Finishes – Glass covered wood veneer panels with stainless steel reveals, stainless steel panel ceiling with recessed LED illumination, handrails on all non-access walls
	2438mm (8'-0") Clear Height Under Canopy
Signal Fixtures:	LED Illumination Contractor's Standard, Brushed Stainless Steel #4
Hall and Car Pushbutton Stations:	Dual Hall Pushbutton Riser
	Dual Car Operating Panels
Car Position Indicators:	Single Digital with Car Direction Arrows
	Security Control Panel
	Firefighters' Control Panel
Hall Lanterns:	At All Floors with Volume Adjustable Electronic Chime or Tone.
Communication System:	Intercom with Distress Signal
	Self-Dialing, Vandal Resistant, Push to Call, Two-Way Communication System with Recall, Tracking and Voiceless Communication
Fixture Submittal:	Submit Brochure Depicting Contractor's Proposed Designs with Bid
Additional Features, Cars 1-4:	Car and Counterweight Roller Guides
	Car Top Inspection Station

Firefighters' Service, Phase I And II, including Alternate Floor Return

Standby Power Transfer (Automatic to Main Floor) with Manual Override in Firefighters' Control Panel

Accessibility Signage

Swing Car Return Panels Arranged for Integral Car Operating Panels

Hoistway Access Switches Top and Bottom Floors

Hoistway Door Unlocking Device All Floors

Platform Isolation

Load-Weighing Device

Anti-Nuisance Feature

Independent Service Feature

Secure Access Provisions

Card Reader Provisions

CCTV Provisions

Security Control Panel and Remote Wiring

Firefighters' Control Panel and Remote Wiring

Machine, Power Conversion Unit, and Controller Sound Isolation

Tamper Resistant Fasteners for All Fastenings Exposed To The Public

One Year Warranty Maintenance with 24-Hour Call-Back Service

Emergency Paging Speaker Installation

Signage Engraving Filled with Black Paint or Approved Etching Process

No Visible Company Name or Logo

Wiring Diagrams, Operating Instructions, and Parts Ordering Information

System Diagnostic Means and Instructions

6.14.2.5(3) Material Service Elevators - Centrally Located (Provide in accordance with analysis utilizing migration factor if separate split elevator locations are designed)

6.14.2.5(4)

Number:	Cars 5-7
Capacity:	2270 kg (5,000 lb)
Class Loading:	Service Class A
Contract Speed:	1.75 M.P.S. (350 FPM)
Roping:	1:1
Machine:	Geared or Gearless
Machine Location:	Overhead
Supervisory Control:	Group Automatic Microprocessor-Based System
Motor Control:	AC Variable Voltage Variable Frequency Microprocessor-Based With Digital Closed-Loop Feedback
Stops:	Car 5-6: 8 Car 7: 9
Openings:	Car 5-6: 8 Car 7: 9
Floors Served:	Car 5-6: 0, 1-7 Car 7: 0, 1-7, Mech. PH
Travel:	Car 5-6: 37.8 m ± (127'-4" ±) Car 7: 42.8 m ± (140'-5" ±)
Platform Size:	1828mm Wide X 2946mm Deep (6'-0" Wide X 9-8" Deep)
Minimum Clear Inside Car:	1727mm Wide X 2590mm Deep (5'-8" Wide X 8-6" Deep)
Entrance Size:	1372mm Wide X 2438mm High (4'-6" Wide X 8'-0" High)
Entrance Type:	Two Speed, Side Opening
Door Operation:	High Speed, Heavy-Duty, Door Operator, Minimum Opening Speed 2-1/2 F.P.S.
Door Protection:	3-Dimensional Infrared, Full Screen Device with Differential Timing, Nudging and Interrupted Beam Time
Safety:	Flexible Guide Clamp-Type B, Car
Guide Rails:	Planed Steel Tees
Buffers:	Oil
Compensation:	Contractor's Standard Application
Car & Hoistway Sills:	Extruded Nickel Silver
Car Enclosure:	Car Interior Finishes – Phenolic panel walls, stainless steel panel ceiling with recessed LED illumination, handrails and bumpers on all non-access walls

	2920mm Clear Height Under Canopy
Signal Fixtures:	LED Illumination Contractor's Standard
Hall and Car Pushbutton Stations:	Single Hall Pushbutton Riser
	Service Operation Riser For Cars Serving Additional Floors
	Single Car Operating Panels
	Vandal Resistant Car and Hall Pushbuttons
Car Position Indicators:	Single Digital with Car Direction Arrows
	Security Control Panel
	Firefighters' Control Panel
Hall Lanterns:	At All Floors with Volume Adjustable Electronic Chime or Tone.
Communication System:	Intercom with Distress Signal
	Self-Dialing, Vandal Resistant, Push to Call, Two-Way Communication System with Recall, Tracking and Voiceless Communication
Fixture Submittal:	Submit Brochure Depicting Contractor's Proposed Designs with Bid
Additional Features, Cars 5-7:	Car and Counterweight Roller Guides
	Car Top Inspection Station
	Firefighter Elevator – Elevator Closest to Response Point
	Firefighters' Service, Phase I And II, including Alternate Floor Return
	Standby Power Transfer (Automatic to Main Floor) with Manual Override in Firefighters' Control Panel
	Accessibility Signage
	Stationary Car Return Panels Arranged for Surface Applied Car Operating Panels
	Hoistway Access Switches Top and Bottom Floors
	Hoistway Door Unlocking Device All Floors
	Platform Isolation
	Load-Weighing Device
	Anti-Nuisance Feature
	Independent Service Feature
	Dual-Mode Operation For Cars Serving Additional Floors
	Secure Access Provisions

Card Reader Provisions

CCTV Provisions

Security Control Panel and Remote Wiring

Firefighters' Control Panel and Remote Wiring

Machine, Power Conversion Unit, and Controller Sound Isolation

Tamper Resistant Fasteners for All Fastenings Exposed To The Public

One Year Warranty Maintenance with 24-Hour Call-Back Service

Sill Support Angles

Emergency Paging Speaker Installation

Signage Engraving Filled with Black Paint or Approved Etching Process

No Visible Company Name or Logo

Wiring Diagrams, Operating Instructions, and Parts Ordering Information

System Diagnostic Means and Instructions

6.14.2.5(5) Patient Elevators - Centrally Located (Provide in accordance with analysis utilizing migration factor if separate split elevator locations are designed)

6.14.2.5(6)

Number:	Cars 8-9 – Grouped with Car 10
Capacity:	3175 kg (7000 lb)
Class Loading:	Service Class A
Contract Speed:	1.75 M.P.S. (350 FPM)
Roping:	1:1
Machine:	Gearless
Machine Location:	Overhead
Supervisory Control:	Group Automatic Microprocessor-Based System
Motor Control:	AC Variable Voltage Variable Frequency Microprocessor-Based With Digital Closed-Loop Feedback
Stops:	7 Front
Openings:	7 Front
Floors Served:	1-7

Travel:	28.6 m ± (93'–10" ±)
Platform Size:	2083mm Wide X 3200mm Deep (6'-10" Wide X 10-5" Deep)
Minimum Clear Inside Car:	1981mm wide X 2896mm Deep (6"-6" wide X 9'-6" deep)
Entrance Size:	1372mm Wide X 3048mm High (4'-6" Wide X 10'-0" High)
Entrance Type:	Two Speed, Side Opening
Door Operation:	High Speed, Heavy-Duty, Door Operator, Minimum Opening Speed 2-1/2 F.P.S.
Door Protection:	3-Dimensional Infrared, Full Screen Device with Differential Timing, Nudging and Interrupted Beam Time
Safety:	Flexible Guide Clamp-Type B, Car
Guide Rails:	Planed Steel Tees
Buffers:	Oil
Compensation:	Contractor's Standard Application
Car & Hoistway Sills:	Extruded Nickel Silver
Car Enclosure:	Car Interior Finishes - Phenolic panel walls, stainless steel panel ceiling with recessed LED illumination, handrails and bumpers on all non-access walls
	2921mm Clear Height Under Canopy
Signal Fixtures:	LED Illumination Contractor's Standard
Hall and Car Pushbutton Stations:	Single Hall Pushbutton Riser
	Medical Emergency 'Code Blue' Service Operation Riser
	Duplex Car Operating Panels
	Vandal Resistant Car and Hall Pushbuttons
Car Position Indicators:	Single Digital with Car Direction Arrows
	Security Control Panel
	Firefighters' Control Panel
Hall Lanterns:	At All Floors with Volume Adjustable Electronic Chime or Tone.
Communication System:	Intercom with Distress Signal
	Self-Dialing, Vandal Resistant, Push to Call, Two-Way Communication System with Recall, Tracking and Voiceless Communication
Fixture Submittal:	Submit Brochure Depicting Contractor's Proposed Designs with Bid

Additional Features, Cars 8-9:	Car and Counterweight Roller Guides
	Car Top Inspection Station
	Firefighters' Service, Phase I And II, including Alternate Floor Return
	Standby Power Transfer (Automatic to Main Floor) with Manual Override in Firefighters' Control Panel
	Accessibility Signage
	Stationary Car Return Panels Arranged for Surface Applied Car Operating Panels
	Duplex GFCI Utility Outlet at Car Operating Panel
	Hoistway Access Switches Top and Bottom Floors
	Hoistway Door Unlocking Device All Floors
	Platform Isolation
	Load-Weighing Device
	Anti-Nuisance Feature
	Medical Emergency 'Code Blue' Service Feature
	Independent Service Feature
	Secure Access Provisions
	Card Reader Provisions
	CCTV Provisions
	Security Control Panel and Remote Wiring
	Firefighters' Control Panel and Remote Wiring
	Machine, Power Conversion Unit, and Controller Sound Isolation
	Tamper Resistant Fasteners for All Fastenings Exposed To The Public
	One Year Warranty Maintenance with 24-Hour Call-Back Service
	Sill Support Angles
	Emergency Paging Speaker Installation
	Signage Engraving Filled with Black Paint or Approved Etching Process
	No Visible Company Name or Logo
	Wiring Diagrams, Operating Instructions, and Parts Ordering Information

6.14.2.5(7) Trauma Patient Elevator - Centrally Located (Provide in accordance with analysis utilizing migration factor if separate split elevator locations are designed)

6.14.2.5(8)

Number:	Car 10 – Grouped with Cars 8-9
Capacity:	6804 kg (15,000 lb)
Class Loading:	Service Class A
Contract Speed:	1.75 M.P.S. (350 FPM)
Roping:	1:1
Machine:	Gearless
Machine Location:	Overhead
Supervisory Control:	Group Automatic Microprocessor-Based System
Motor Control:	AC Variable Voltage Variable Frequency Microprocessor-Based With Digital Closed-Loop Feedback
Stops:	14
Openings:	7 Front
Floors Served:	1-7 Front
Travel:	28.6 m ± (93'–10" ±)
Platform Size:	2972mm Wide X 4470mm Deep (9'-4" Wide X 14'-8" Deep)
Minimum Clear Inside Car:	2750mm Wide X 4200mm Deep (9'-0" Wide X 13'-9" Deep)
Entrance Size:	2134mm Wide X 3048mm High (7'-0" Wide X 10'-0" High)
Entrance Type:	Two Speed, Centre Opening
Door Operation:	High Speed, Heavy-Duty, Door Operator, Minimum Opening Speed 2-1/2 F.P.S.
Door Protection:	3-Dimensional Infrared, Full Screen Device with Differential Timing, Nudging and Interrupted Beam Time
Safety:	Flexible Guide Clamp-Type B, Car
Guide Rails:	Planed Steel Tees

Buffers:	Oil
Compensation:	Contractor's Standard Application
Car & Hoistway Sills:	Extruded Nickel Silver
Car Enclosure:	Car Interior Finishes – Phenolic panel walls, stainless steel panel ceiling with recessed LED illumination, handrails and bumpers on all non-access walls
	2921mm Clear Height Under Canopy
Signal Fixtures:	LED Illumination Contractor's Standard
Hall and Car Pushbutton Stations:	Single Hall Pushbutton Riser
	Medical Emergency 'Code Blue' Service Operation Riser
	Two Duplex Car Operating Panels (front & rear)
	Vandal Resistant Car and Hall Pushbuttons
Car Position Indicators:	Single Digital with Car Direction Arrows
	Security Control Panel
	Firefighters' Control Panel
Hall Lanterns:	At All Floors with Volume Adjustable Electronic Chime or Tone.
Communication System:	Intercom with Distress Signal
	Self-Dialing, Vandal Resistant, Push to Call, Two-Way Communication System with Recall, Tracking and Voiceless Communication
Fixture Submittal:	Submit Brochure Depicting Contractor's Proposed Designs with Bid
Additional Features, Car 10:	Car and Counterweight Roller Guides
	Car Top Inspection Station
	Firefighters' Service, Phase I And II, including Alternate Floor Return
	Standby Power Transfer (Automatic to Main Floor) with Manual Override in Firefighters' Control Panel
	Accessibility Signage
	Stationary Car Return Panels Arranged for Surface Applied Car Operating Panels
	Duplex GFCI Utility Outlet at Car Operating Panel
	Hoistway Access Switches Top and Bottom Floors
	Hoistway Door Unlocking Device All Floors
	Platform Isolation

Load-Weighing Device

Anti-Nuisance Feature

Medical Emergency 'Code Blue' Service Feature

Independent Service Feature

Secure Access Provisions

Card Reader Provisions

CCTV Provisions

Security Control Panel and Remote Wiring

Firefighters' Control Panel and Remote Wiring

Machine, Power Conversion Unit, and Controller Sound Isolation

Tamper Resistant Fasteners for All Fastenings Exposed To The Public

One Year Warranty Maintenance with 24-Hour Call-Back Service

Sill Support Angles

Emergency Paging Speaker Installation

Signage Engraving Filled with Black Paint or Approved Etching Process

No Visible Company Name or Logo

Wiring Diagrams, Operating Instructions, and Parts Ordering Information

System Diagnostic Means and Instructions

6.14.2.5(9) MDR Elevators

Number:	Car 11 (Clean) Car 12 (Soiled)
Capacity:	2040 kg
Class Loading:	Service Class A
Contract Speed:	1.75 M.P.S. (350 FPM)
Roping:	1:1
Machine:	Geared or Gearless
Machine Location:	Overhead in Hoistway

Operational Control:	Duplex Selective Collective Microprocessor-Based System
Motor Control:	AC Variable Voltage Variable Frequency Microprocessor-Based With Digital Closed-Loop Feedback
Stops:	4
Openings:	4
Floors Served:	0, 2-4 (MDR, Birthing ORs, Procedures)
Travel:	20.2 m ± (66'-3" ±)
Platform Size:	1829mm Wide X 3251mm Deep
Minimum Clear Inside Car:	1727mm Wide X 2946mm Deep
Entrance Size:	1219mm Wide X 2134mm High
Entrance Type:	Two Speed, Side Opening
Door Operation:	High Speed, Heavy-Duty, Door Operator, Minimum Opening Speed 2-1/2 F.P.S.
Door Protection:	3-Dimensional Infrared, Full Screen Device with Differential Timing, Nudging and Interrupted Beam Time
Safety:	Flexible Guide Clamp-Type B, Car
Guide Rails:	Planed Steel Tees
Buffers:	Oil
Car & Hoistway Sills:	Extruded Nickel Silver
Car Enclosure:	Car Interior Finishes – Match MDR department walls, stainless steel panel ceiling with recessed LED illumination, handrails and bumpers on all non-access walls
	2134mm Clear Height Under Canopy
Signal Fixtures:	LED Illumination Contractor's Standard
Hall and Car Pushbutton Stations:	Single Hall Pushbutton Riser
	Single Car Operating Panels
	Vandal Resistant Car and Hall Pushbuttons
Car Position Indicators:	Single Digital with Car Direction Arrows

	Security Control Panel
	Firefighters' Control Panel
Hall Lanterns:	At All Floors with Volume Adjustable Electronic Chime or Tone
Remote Arrival Indicators:	At all floors with LED Lights and volume Adjustable Electronic Chime or Tone
Communication System:	Intercom with Distress Signal
	Self-Dialing, Vandal Resistant, Push to Call, Two-Way Communication System with Recall, Tracking and Voiceless Communication
Fixture Submittal:	Submit Brochure Depicting Contractor's Proposed Designs with Bid
Additional Features, Cars 11, 12:	Car and Counterweight Roller Guides
	Car Top Inspection Station
	Firefighters' Service, Phase I And II, including Alternate Floor Return
	Standby Power Transfer (Automatic to Main Floor) with Manual Override in Firefighters' Control Panel
	Accessibility Signage
	Stationary Car Return Panels Arranged for Surface Applied Car Operating Panels
	Hoistway Access Switches Top and Bottom Floors
	Hoistway Door Unlocking Device All Floors
	Platform Isolation
	Load-Weighing Device
	Independent Service Feature
	Secure Access Provisions
	Card Reader Provisions
	CCTV Provisions
	Security Control Panel and Remote Wiring
	Firefighters' Control Panel and Remote Wiring
	Machine, Power Conversion Unit, and Controller Sound Isolation
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	Sill Support Angles

Emergency Paging Speaker Installation

Signage Engraving Filled with Black Paint or Approved Etching Process

No Visible Company Name or Logo

Wiring Diagrams, Operating Instructions, and Parts Ordering Information

System Diagnostic Means and Instructions

6.14.2.6 Elevator performance will be at a minimum:

6.14.2.6(1) Car Speed: ± 3% of contract speed under any loading condition.

6.14.2.6(2) Car Capacity: Safely lower, stop and hold 125% of rated load.

6.14.2.6(3) Car Leveling: ±1/16" under any loading condition.

6.14.2.6(4) Door Opening Time: Seconds from start of opening to fully open:

6.14.2.6(4)(a) Car G1: 1.8 seconds

6.14.2.6(4)(b) Cars 1-4: 1.8 seconds

6.14.2.6(4)(c) Cars 5-7: 2.8 seconds

6.14.2.6(4)(d) Cars 8-9: 2.4 seconds

6.14.2.6(4)(e) Car 10: 2.8 seconds

6.14.2.6(4)(f) Cars 11, 12: 2.6 seconds

6.14.2.6(5) Door Closing Time: Seconds from start of closing to fully closed:

6.14.2.6(5)(a) Car G1: 3.0 seconds

6.14.2.6(5)(b) Cars 1-4: 3.0 seconds

6.14.2.6(5)(c) Cars 5-7: 5.5 seconds

6.14.2.6(5)(d) Cars 8-9: 4.0 seconds

6.14.2.6(5)(e) Car 10: 5.5 seconds

6.14.2.6(5)(f) Cars 11, 12: 5.0 seconds

6.14.2.6(6) Car Floor-to-Floor Performance Time: Seconds from start of doors closing until doors are 3/4 open (1/2 open for side opening doors) and car level and stopped at next successive floor under any loading condition or travel direction (5.0M typical floor height):

6.14.2.6(6)(a) Car G1: 14.6 seconds

6.14.2.6(6)(b) Cars 1-4: 10.6 seconds

6.14.2.6(6)(c) Cars 5-7: 12.9 seconds

6.14.2.6(6)(d) Cars 8-9: 11.2 seconds

6.14.2.6(6)(e) Cars 10: 13.7 seconds

6.14.2.6(6)(f) Cars 11, 12: 13.0 seconds

6.14.2.6(7) Car Ride Quality:

6.14.2.6(7)(a) Horizontal and vertical acceleration within car during all riding and door operating conditions, not more than 20 mg peak to peak (adjacent peaks) in the 1 - 10 Hz range.

6.14.2.6(7)(b) Acceleration and Deceleration: Smooth constant and not less than 3 feet/second^2 with an initial ramp between 0.5 and 0.75 second.

6.14.2.6(7)(c) Sustained Jerk: Not less than 6 feet/second^2 .

6.14.2.6(7)(d) Measurement Standards: Measure and evaluate ride quality consistent with ISO 18738, using low pass cutoff frequency of 10 Hz and A95 peak-to-peak average calculations.

6.14.2.6(8) Noise and Vibration Control

6.14.2.6(8)(a) Airborne Noise: Measured noise level of elevator equipment and its operation will not exceed 55 dBA inside car under any condition including door operation and car ventilation exhaust blower on its highest speed. Limit noise level in the machine room

relating to elevator equipment and its operation to no more than 80 dBA. All dBA readings to be taken 915 mm off the floor and 915mm from the equipment using the "A" weighted scale.

6.14.2.6(8)(b) Vibration Control: All elevator equipment provided under this contract, including power unit, controller, oil supply lines, and their support will be mechanically isolated from the Building structure and electrically isolated from the Building power supply and to each other to minimize the possibility of objectionable noise and vibrations being transmitted to occupied areas of the Building.

6.14.2.7 Selective Collective Microprocessor-Based, Cars G1, 11, 12:

6.14.2.7(1) Operate car without attendant from pushbuttons in car and located at each floor. When car is available, automatically start car and dispatch it to floor corresponding to registered car or hall call. Once car starts, respond to registered calls in direction of travel and in the order the floors are reached.

6.14.2.7(2) Do not reverse car direction until all car calls have been answered, or until all hall calls ahead of car and corresponding to the direction of car travel have been answered.

6.14.2.7(3) Slow car and stop automatically at floors corresponding to registered calls, in the order in which they are approached in either direction of travel. As slowdown is initiated for a hall call, automatically cancel hall call. Cancel car calls in the same manner. Hold car at arrival floor an adjustable time interval to allow passenger transfer.

6.14.2.7(4) Answer calls corresponding to direction in which car is traveling unless call in the opposite direction is highest (or lowest) call registered.

6.14.2.7(5) Illuminate appropriate pushbutton to indicate call registration. Extinguish light when call is answered.

6.14.2.8 Group Automatic, Cars 1-4, 5-7, 8-10: (Provide in accordance with analysis utilizing migration factor if separate split elevator locations are designed)

6.14.2.8(1) Approved microprocessor-based, group dispatch, car and motion control systems.

6.14.2.8(2) Include as a minimum, the following features:

6.14.2.8(2)(a) Operate cars as a group, capable of balancing service and providing continuity of group operation with one or more cars removed from the system.

6.14.2.8(2)(b) Register service calls from pushbuttons located at each floor and in each car. Slow cars and stop automatically at floors corresponding to registered calls. Make stops at successive floors for each direction of travel irrespective of order in which calls are registered except when bypassing hall calls to balance and improve overall service; stop only one car in response to a particular hall call. Assign hall calls to specific cars and continually review and modify those assignments to improve service. Simultaneous to initiation of slowdown of a car for a hall call, cancel that call. Render hall pushbutton ineffective until car doors begin to close after passenger transfer. Cancel car calls in the same manner. Give priority to coincidental car and hall calls in car assignment.

6.14.2.8(2)(c) Operate system to meet changing traffic conditions on a service demand basis. Include provisions for handling traffic which may be heavier in either direction, intermittent or very light. As traffic demands change, automatically and continually modify group and individual car assignment to provide the most-effective means to handle current traffic conditions. Provide means to sense long-wait hall calls and preferentially serve them. Give priority to coincidental car and hall calls in hall call assignment. Accomplish car

direction reversal without closing and reopening doors.

6.14.2.8(2)(d) Use easily reprogrammable system software. Design basic algorithm to optimize service based on equalizing system response to registered hall calls and equalizing passenger trip time to shortest possible time.

6.14.2.8(2)(e) Serve floors below main floor in a manner which logically minimizes delay in passing or stopping at main floor in both directions of travel. Provide manual means to force a stop at the main floor when passing to or from lower levels.

6.14.2.8(2)(f) Required Features:

(f).1 Dispatch Protection: Backup dispatching will function in the same manner as the primary dispatching.

(f).2 Delayed Car Removal: Automatically remove delayed car from group operation.

(f).3 Position Sensing: Update car position when passing or stopping at each landing.

(f).4 Hall Pushbutton Failure: Provide multiple power sources and separate fusing for pushbutton risers.

(f).5 Communication link: Provide serial or duplicate communication link for all group and individual car computers.

6.14.2.9 Medical Emergency 'Code Blue' Operation:

6.14.2.9(1) Provide feature as specified for Cars 8, 9 and 10.

6.14.2.9(2) Feature shall be activated via two-position on/off keyed switch, mounted in hoistway entrance jamb at all floors. Key removable in "off" position only. Activation of keyed switch at any floor shall cause the following operation of selected elevators. An adjacent small blue light jewel to illuminate at that floor and all other floors with a priority service keyed switch to indicate cars "in use." Illuminate corresponding small blue light jewel in lobby control panel. Registered car calls for selected car shall be cancelled. A blue light with the engraved signage

beneath "please exit car" at the top of the car operating panel shall pulsate indicating to riding passengers the car has been commandeered for priority service. Include audible annunciation verbiage as selected. A car traveling toward floor of activation shall express non-stop to that floor. A car traveling away from floor of activation shall stop at the next available floor, reverse without opening doors, and express non-stop to floor of activation.

6.14.2.9(3) Upon arrival of car at floor of activation, car shall open its door(s) and "park" for an adjustable time period of 60 - 90 seconds. Provide second keyed switch adjacent to blue light in car operating panel for attendant operation of car under priority service feature. Keyed switch shall be two-position, on/off, with key removable in "off" position only. Upon activation, car "park time" shall be voided and car shall be under control of attendant. Registration of a destination floor, followed by the activation of the door close button, shall cause express non-stop travel to selected floor. Upon arrival at selected floor, car shall open its doors and remain at that floor until another floor is selected, or the priority service switch is returned to the "off" position. Failure to activate car priority key switch within pre-set time constraints of 60 - 90 seconds or returning car switch to "off" position shall cause car to be automatically restored to normal service.

6.14.2.10 Emergency Backup Power Requirements: Standby Power Operation: Upon loss of normal power, adequate standby power will be supplied via Building electrical feeders to simultaneously start and run one car in each group and single cars at contract car speed and capacity.

6.14.2.10(1) Automatically return one car at a time, in each group and single car, nonstop to designated floor, open doors for approximately 3.0 seconds, close doors, and park car. During return operation, car and hall call pushbuttons shall be rendered inoperative. As each car parks, system shall immediately select the next car until all cars in a group have returned to the designated floor. If a car fails to start or return within 30 seconds, system shall automatically select the next car in the group to automatically return.

6.14.2.10(2) When all cars in a group have returned to the designated floor, one car in each group shall be designated for automatic operation. When a service demand exists for 30 seconds and designated car fails to start, next available car in the group shall be automatically selected for operation.

6.14.2.10(3) Provide separate group selection switches in firefighters' control panel and security control panel.

6.14.2.10(4) Switch shall override automatic return and automatic selection functions, and cause the manually selected car to operate. Manual selection shall cause car to start and proceed to designated floor and open and close its doors before standby power is manually transferred to next selected car.

6.14.2.10(5) Successive Starting: When normal power is restored or there has been a power interruption, individual cars in each bank shall restart at five-second intervals.

6.14.2.11 Monitoring:

6.14.2.11(1) The system will maintain a record of every status point change occurring on the monitored equipment and provide the ability to replay these events in a simulation at a later time in real time, slow speed, single step, reverse or fast forward. This information will be retained for a period of at least twenty-six weeks and a mechanism will be provided whereby this information may be archived.

6.14.2.11(2) The system will store traffic fault and statistical data for a period of at least three (3) years. The system will log error type, car number, floor position, and major system status points whenever a fault or logged event occurs.

6.14.2.11(3) The system will provide interactive control of certain features provided in the elevator control system. These features may be revised as the requirements of the Building change. Some of these interactive controls may include, but are not limited to, security floor lockouts, entering car and hall calls, Firefighters' service, lobby recall, VIP service, up/down peak service, etc.

6.14.2.11(4) Compliant with 6.14.2.11(3), when the MDR elevator arrives at designated floor, hold doors open until cart is removed and the car call is registered. Providing 6.14.2.11(4) is in accordance with the requirements of the City of Vancouver and applicable authorities having jurisdiction.

6.14.2.11(5) The remote arrival indicators will illuminate LED lights and volume adjustable electronic chime or tone upon registration of care pushbutton when sending car to destination floor. Sound level shall be adjustable from 20-80dBA measured at 5'-0" in front of fixture and 3'-0" off floor. Locate indicator fixtures in Procedures and MDR areas in consultation with the Authority. Provide fixtures with faceplates.

6.14.2.11(6) In the case of a power failure the system will be capable of connecting to emergency power back-up unit. The loss of power will not affect any stored data. The system will have the capability to detect the loss (disconnect) of any individual unit from the monitoring system by periodically polling all units to ensure that normal communications between the unit(s) and the terminals/server are maintained.

6.14.2.11(7) The system will automatically re-boot the program and continue to operate after a power loss or other system malfunction.

Part 7. FACILITIES SERVICES SUBGROUP SPECIFICATIONS

7.1 Mechanical Systems Design Principles

7.1.1 General Design Principles

7.1.1.1 Project Co will provide mechanical systems that:

7.1.1.1(1) are designed to provide a healing, comfortable and productive environment for the Facility Users, meet the required environmental conditions for all Equipment and meet the requirements set out in the Project Agreement including Appendices and all applicable standards.

7.1.1.1(2) are designed not to have an adverse effect on the existing C&W Campus;

7.1.1.1(3) are hidden from view or designed to integrate with the overall Building design;

7.1.1.1(4) are located and designed to mitigate noise transmission to outdoor spaces/places of respite intended for patient/staff use, and from adjacent residential properties surrounding the C&W Campus;

7.1.1.1(5) minimize impact on the natural and physical environment, through energy efficiency, optimization of resource use, and simplification of the systems;

7.1.1.1(6) are configured and located in such a way to avoid, as much as possible, entry into regularly occupied areas to perform maintenance and repairs;

7.1.1.1(7) are developed to provide reliability of continual operation. Adequate standby capacity and redundancy will be included in system design;

7.1.1.1(8) are vibration isolated to minimize noise and vibration through the structure or other components of the Facility;

7.1.1.1(9) incorporate flexibility and adaptability for future expansion without major disruption or alteration to the Facility infrastructure, including by designing and sizing all systems to suit the consumption and

discharge needs of the Facility as at the date of occupancy, plus:

7.1.1.1(9)(a) sizing distribution piping and ducting systems including air terminal boxes, grilles and diffusers for 15% additional capacity; and

7.1.1.1(9)(b) sizing fans and pumps with the capacity to deliver 10% additional flow through installed distribution systems without changing motors and with the capability to deliver 15% additional capacity through existing distribution systems by changing motors;

7.1.1.1(9)(c) making all provisions necessary to accommodate space and equipment requirements for future potential spaces as described in Appendix 3A – Clinical Specification (see 3A.8: future Intra-Operative Imaging space and future Interventional radiology space).

7.1.1.1(10) meet all the requirements needed to achieve the Building's LEED rating target as specified in Section 3.4.1 and Schedule 2, including specific credits that are mandatory or not-permitted.

7.1.1.1(11) meet all requirements needed to achieve the Building's Design and Construction Energy Target: refer to Schedule 2-Appendix 2D(Energy).

7.1.1.1(12) utilize advanced calculations and/or modeling, such as wind tunnel analyses with scale models, computer simulations, or computational fluid dynamics (CFD) analyses. The wind model will demonstrate the airflow effects around buildings and multiple other local variables, establishing separation distances that will confirm that the Facility air intake and exhaust design are designed per ASHRAE Handbooks (Chapter 24 of the 2013 ASHRAE Handbook – Fundamentals, Chapter 45 of the 2011 ASHRAE Handbook – HVAC Applications and CSA Z317.2-01). The model will evaluate all site and existing building specific conditions and variables, the BC Children's and BC Women's Redevelopment Project Master Plan Guidelines, the proposed Project Co. design and the normal

operation, emergency smoke operation and post disaster operation of the C & W hospital. The model will fully evaluate the Building and system design to satisfy the authority that there are no adverse effect on the operation of this facility.

7.1.1.2 The building heating and domestic hot water systems will be designed to be easily connectable and compatible with a future low carbon District Energy System to supply all heating and domestic hot water requirements, in accordance with City of Vancouver Rezoning and Development Permit requirements. Refer to Section 7.4 for other requirements regarding the building heating systems.

7.1.1.3 Steam, water, glycol and other fluids used within mechanical systems will be treated to prevent corrosion, algae growth, build-up of deposits, disease, bacteria and will prolong the equipment life. All piping will be routed away from core electrical, communication, main equipment, and telecommunication room(s).

7.1.1.4 All mechanical services installed within electrical, communication, and UPS rooms will maintain a minimum clear height of 2000 mm above finished floor. Do not install any equipment requiring a water connection in the ceiling of these spaces. Do not route plumbing or hydronics distribution piping in the ceiling of these spaces. Avoid running plumbing drain pipes in the ceilings of these spaces wherever possible, and provide drain pans under all drainage piping that is located in the ceiling space.

7.1.1.5 Pipes, ducts, and fittings will be insulated to conserve energy, prevent condensation, attenuate noise, and prevent accidental burns.

7.1.1.6 Refer to Section 7.7 regarding energy BC Hydro Power Smart New Construction Program (Whole Building Design). Integrate requirements of this program and any other applicable incentive programs into the mechanical systems. Coordinate incentive program applications with other disciplines.

7.1.1.7 Utilize a quality assurance system throughout the Design process to ensure all codes, standards, specifications, and regulations are being adhered to. Align the system with the LEED Commissioning requirements. Provide documentation of the quality assurance system to the Authority, at each milestone submission.

7.1.1.8 Coordinate with the electrical specification for all mechanical systems that must maintain operation during an expected or unexpected shutdown of the building electrical service. Where mechanical equipment and devices are required to be served by emergency power, provide UPS, vital, delayed vital, or conditional power as per Section 7.7.

7.1.1.9 Coordinate all mechanical systems with requirements of equipment supplied by the Authority, and provide all connections required from mechanical systems. Make allowances within the mechanical systems' designs so all equipment can be removed or replaced without disrupting the operation of other equipment connected to the

mechanical systems. Refer to the Schedule 2- Appendix 2E (Equipment and Furniture).

7.1.1.10 Provide demolition and deconstruction as per requirements in Appendix 3G-Demolition and Related Work. Demolition and deconstruction procedures will not disrupt the life and safety systems of the existing buildings.

7.1.2 Post-Disaster

7.1.2.1 Design all mechanical piping, equipment, supports, and seismic restraints in accordance with the requirements for post disaster buildings as outlined in Section 5.3.

7.1.2.2 List of additional requirements beyond the minimums within the referenced regulations:

7.1.2.2(1) Equipment will have sufficient redundancy, structural integrity, and seismic protection to assure the Facility remains operational after a disaster event.

7.1.2.2(2) Air-handling systems will be provided with sufficient redundancy at all times to ensure no disruptions in Facility operation. Type I spaces will maintain 100% redundancy. Type II and Type III spaces will maintain 75% redundancy. The Emergency Operations Centre ("EOC") will be treated as a Type I space. Refer to CSA Z317.2 for space Type definitions.

7.1.2.2(3) Provide a fuel storage system with sufficient capacity to supply fuel to the emergency generators for a minimum period of 72 hours.

7.1.2.2(3)(a) The storage system will be complete with accessories and/or an operational plan to ensure the stored fuel remains clean and available for its intended use at any time.

7.1.2.2(4) Provide water storage systems as follows:

7.1.2.2(4)(a) Domestic water with sufficient capacity to supply the Facility's requirements for a minimum period of 72 hours. The California Plumbing Code – 2010 Emergency Water Supply is an acceptable standard to achieve the patient portable water requirements.

7.1.2.2(4)(b) Utility water with sufficient capacity to supply the Facility's requirements for a minimum period of 72 hours. This includes all process loads and make-up water for heating and cooling systems. This excludes landscaping irrigation systems.

7.1.2.2(4)(c) Fire suppression water with sufficient capacity to supply the Facility's requirements for a major fire event, as established by the applicable NFPA standards.

7.1.2.2(4)(d) The utility water and fire suppression water storage systems may be interconnected to the domestic water storage system, provided that backflow prevention devices are in place as per the applicable codes and standards.

7.1.2.2(5) Provide a sewage waste storage system with sufficient capacity to contain the Building's sewage generation for a minimum period of 24 hours. Provide a separate waste storage system to serve the exterior mass decontamination area, with sufficient capacity to contain all flow from this area during a mass decontamination event. Decontamination tank should be sized for minimum 45,000 L.

7.1.2.2(6) Design the stormwater drainage system to be capable of handling flow from a 100-year storm event.

7.1.2.2(7) Design the medical gases system to be capable of maintaining a sufficient supply of all medical gases to supply the Facility's requirements for a minimum period of 72 hours.

7.1.2.2(8) Provide connections on the exterior face of the Facility:

7.1.2.2(8)(a) Inlet connections for each water system (domestic, utility, and fire) to allow for supply of water from a tanker truck. These connections will supply the Facility's storage tanks and the water would be circulated via the respective internal water pumping systems to feed the building systems. Final approval is subject to the local Authority having Jurisdiction;

7.1.2.2(8)(b) A sanitary sewer pump-out connection to a sewage pump truck for each sanitary storage tank system;

7.1.2.2(8)(c) Inlet connections for oxygen;

7.1.2.2(8)(d) All connections will be secure terminations (valved, capped and locked) to protect from tampering and vandalism;

7.1.2.2(8)(e) All connections will be located in service areas away from general circulation routes, and where they can be readily accessible by service vehicles.

7.1.2.2(8)(f) Project Co is responsible for all connections (size, fittings, pressure, etc), Consult with the Authority prior to final selection pursuant to Schedule 2, Appendix 2C.

7.1.3 Technical References

7.1.3.1 Project Co will undertake the Design and Construction in compliance with all applicable standards, including:

7.1.3.1(1) Vancouver Building By-law

7.1.3.1(2) City of Vancouver Noise Control Bylaw

7.1.3.1(3) British Columbia Drinking Water Protection Act

7.1.3.1(4) British Columbia Occupational Health and Safety (OHS) Regulation

7.1.3.1(5) ANSI / ASHRAE (American Society of Heating, Refrigeration and Air-Conditioning Engineers)

7.1.3.1(5)(a) 52.2: Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size.

7.1.3.1(5)(b) 55: Thermal Environmental Conditions for Human Occupancy

7.1.3.1(5)(c) 62.1: Ventilation for Acceptable Air Quality

7.1.3.1(5)(d) 90.1: Energy Efficient Design for New Buildings.

7.1.3.1(5)(e) 111: Practices for Measurement, Testing, Adjusting, & Balancing of Building HVAC Systems.

7.1.3.1(5)(f)	129: Measuring Air Change Effectiveness.
7.1.3.1(5)(g)	135: Data Communication Protocol for Building Automation & Control Networks
7.1.3.1(6)	ASHRAE (American Society of Heating, Refrigeration and Air-Conditioning Engineers)
7.1.3.1(6)(a)	Handbooks: Fundamentals, Refrigeration, HVAC Applications, HVAC Systems and Equipment
7.1.3.1(6)(b)	Design of Smoke Control Systems
7.1.3.1(6)(c)	ASHRAE Guideline 12-2000 - Minimizing the Risk of Legionellosis Associated with Building Water Systems
7.1.3.1(7)	ANSI / ASME (American National Standards Institute / American Society of Mechanical Engineers)
7.1.3.1(7)(a)	A13.1 Visibility Standard (Pipe Labeling)
7.1.3.1(7)(b)	B16 Piping Component Standards
7.1.3.1(7)(c)	B31 Pressure Piping Code
7.1.3.1(7)(d)	B36 Piping Standards
7.1.3.1(7)(e)	Z358.1: Emergency Eyewash and Shower Equipment
7.1.3.1(7)(f)	Section IX : Welding Qualifications
7.1.3.1(7)(g)	Unfired Pressure Vessels
7.1.3.1(8)	ASPE (American Society of Plumbing Engineers)
7.1.3.1(8)(a)	Plumbing Engineering Design Handbook, Volumes 1-4
7.1.3.1(9)	ASTM (American Society for Testing and Materials)
7.1.3.1(9)(a)	B88 : Copper Piping
7.1.3.1(10)	CGA (Canadian Gas Association)
7.1.3.1(10)(a)	P-2.1: Standard for Medical / Surgical Vacuum Systems in Hospitals

7.1.3.1(11) CSA (Canadian Standards Association)

7.1.3.1(11)(a) B45 Series-94 : Plumbing Fixtures

7.1.3.1(11)(b) B64 Series 94 : Backflow Preventers & Vacuum Breakers

7.1.3.1(11)(c) B52HB: Mechanical Refrigeration Code.

7.1.3.1(11)(d) B125: Plumbing Fittings

7.1.3.1(11)(e) B139: Installation Code for Oil-Burning Equipment

7.1.3.1(11)(f) B149.1: Natural Gas and Propane Installation Code

7.1.3.1(11)(g) B651: Barrier Free Design

7.1.3.1(11)(h) Z317.1: Special Requirements for Plumbing Installations in Health Care Facilities.

7.1.3.1(11)(i) Z317.2: Special Requirements for Heating, Ventilation, and Air Conditioning (HVAC) Systems in Health Care Facilities.

7.1.3.1(11)(j) Z318.0: Commissioning of Health Care Facilities.

7.1.3.1(11)(k) Z318.1: Commissioning of HVAC systems in Health Care Facilities.

7.1.3.1(11)(l) Z7396.1 - Medical Gas Pipeline Systems

7.1.3.1(11)(m) Z8000 : Canadian Healthcare Facilities

7.1.3.1(12) NFPA (National Fire Protection Association)

7.1.3.1(12)(a) 10: Standard for Portable Fire Extinguishers

7.1.3.1(12)(b) 13: Standard for Installation of Sprinkler Systems

7.1.3.1(12)(c) 14: Standard for Installation of Standpipe & Hose Systems

7.1.3.1(12)(d) 17: Standard for Dry Chemical Extinguishing Systems

7.1.3.1(12)(e) 20: Standard for the Installation of Stationary Pumps for Fire Protection

7.1.3.1(12)(f) 55: Compressed Gases and Cryogenic Fluids Code

7.1.3.1(12)(g) 56F: Non-flammable Medical gas System.

7.1.3.1(12)(h) 90A: Standard for Installation of Air Conditioning and Ventilation Systems

7.1.3.1(12)(i) 92A: Standard for Smoke-Control Systems Utilizing Barriers and Pressure Differences

7.1.3.1(12)(j) 101: Life Safety Code

7.1.3.1(13) USP <797> Guidebook to Pharmaceutical Compounding — Sterile Preparations

7.1.3.1(14) British Columbia Insulation Contractors Association (BCICA) Quality Standards Manual for Mechanical Insulation

7.1.3.1(15) City of Vancouver District Energy Connectivity Standards

7.1.3.1(16) European Standard EN 243: District heating pipes - Preinsulated bonded pipe systems for directly buried hot water networks - Pipe assembly of steel service pipe, polyurethane thermal insulation and outer casing of polyethylene

7.2 Fire Suppression (Division 21)

7.2.1 Fire Protection

7.2.1.1 Basic Requirements

7.2.1.1(1) Provide a sprinkler system and equipment that are designed to all applicable standards for the applicable occupancy classification.

7.2.1.1(2) Provide a double check valve assembly on the sprinkler system take-off connection from the water supply. The assembly will be complete with OS&Y gate valves on both sides and tamper proof switches.

7.2.1.1(2)(a) Installation will incorporate redundancy to maintain uninterrupted building operation while cleaning, repairing, or replacing devices

7.2.1.1(3) Provide a fire pump, if required, with a transfer switch that is part of the fire pump controller. Mount

the switch package in a separate mechanically attached enclosure that is approved by UL, ULC, FM and CSA and built to NFPA 20 standards for this application.

7.2.1.1(4) Provide dry type sprinkler heads and/or a dry type sprinkler system in areas that may be subject to freezing temperatures.

7.2.1.1(5) Provide a double-interlock dry pre-action sprinkler system in all critical areas where water damage may affect the operation of key areas or equipment, including:

7.2.1.1(5)(a) Electrical transformer and switchgear room(s),

7.2.1.1(5)(b) Main equipment and telecommunications room(s),

7.2.1.1(5)(c) Rooms with medical imaging equipment such as MRIs, CT Scanners, and gamma camera,

7.2.1.1(5)(d) MI Data Analysis Centre,

7.2.1.1(5)(e) Procedures Suites,

7.2.1.1(5)(f) Trauma Rooms,

7.2.1.1(5)(g) Pharmacy Satellite Clean Rooms.

7.2.1.1(6) Sprinkler heads in areas subject to vandalism will be vandal proof. This includes safe and seclusion rooms, and other areas where psychiatric patients may be present and unsupervised.

7.2.1.1(7) Provide water curtain sprinklers or other fire protection measures necessary to maintain fire ratings at or near adjacent buildings and their exits.

7.2.1.1(8) Provide fire extinguishers complete with fully recessed cabinets. Each fire extinguisher will be located and approved for the hazard and classification of the space that it serves.

7.2.1.1(9) Provide zone shut-off valves that are readily identifiable and accessible from the floor level, but not located in patient care areas.

7.2.1.1(10) Provide fire department connections at a location that is approved by the applicable authority having jurisdiction.

7.2.1.2 Performance Criteria

7.2.1.2(1) All equipment will be CSA or ULC approved.

7.2.1.2(2) Equipment installation will comply with manufacturers' requirements.

7.2.1.2(3) Fire protection systems and equipment will be installed, tested and certified by a qualified and licensed contractor, who is regularly engaged in such installations.

7.3 Plumbing (Division 22)

7.3.1 Site Services

7.3.1.1 Basic Requirements

7.3.1.1(1) Provide water & fire protection, natural gas, medical gas, sanitary, and storm services as required and sized to suit the usage needs of the Facility. Coordinate locations of these services with the requirements of Section 8.

7.3.1.1(2) Water supply to the Building will be by either separate or a combined domestic water/fire protection service. Provide services at two separate locations for redundancy. Calculate and submit to the Authority the estimated maximum flow requirement for the domestic water supply.

7.3.1.1(3) Provide water and medical gas inlet connections on the exterior of the Facility as per Section 7.1.2.

7.3.1.1(4) Provide sanitary storage and sanitary pump-out connections on the exterior of the Facility as per Section 7.1.2.

7.3.1.1(5) Provide a water storage and pump system as per Section 7.1.2. Provide and operate the system so that water in the storage tank does not remain stagnant and flows continuously in non-disaster situations.

7.3.1.1(6) Provide a strainer, water meter, reduced pressure backflow preventer, filter, and independent shut-off valve on the main water supply to the Facility.

7.3.1.1(6)(a) Installation will incorporate redundancy to maintain uninterrupted building operation while cleaning, repairing, or replacing devices

7.3.1.1(7) Provide subsurface drainage as required to alleviate water pressure exerted onto the bottom of foundations and/or floor slabs. Subsurface drainage will be sized and designed in accordance with the geotechnical conditions and recommendations of the geotechnical engineer.

7.3.1.2 Performance Criteria

7.3.1.2(1) Water delivered to the Facility will meet the water quality requirements of all applicable standards and laws, including CSA-Z317.1 and the Drinking Water Protection Regulation (British Columbia). Filter systems must be capable of operating at high turbidity levels.

7.3.1.2(2) Any point-of-use filtration implemented will use stainless-steel filter casings to minimize the occurrence of equipment failure and leaks.

7.3.1.2(3) Provide utilities-commission approved meters for domestic water and natural gas. The meters will be used to accurately measure water flow and natural gas consumption in all flow conditions.

7.3.1.2(4) Water and gas meter will have remote access capability and will be connected to the Building Automation System

7.3.2 Domestic Hot Water Systems

7.3.2.1 Basic Requirements

7.3.2.1(1) Provide a domestic hot water system with sufficient capacity and recovery rate for the hot water requirements of the Facility. Allow for expansion capacity within each system in accordance with Section 7.1.

7.3.2.1(2) Connect to the Campus Plant to provide all necessary domestic water heating for the Facility. Only temperature boosting for process uses (high-temperature water - above the C&W Campus district heating temperature, or steam) may be generated from a source other than the C&W Campus district heating water system.

7.3.2.1(3) Calculate domestic hot water demand in accordance with the standards referenced in Section 7.1.

7.3.2.1(4) Domestic hot water supply will be of adequate temperature to serve the needs of the Facility. Provide automatic mixing valves where the supply temperature at the fixture is required to be less than the system temperature.

7.3.2.1(5) Ensure delivery time of hot water to all fixtures does not exceed 5 seconds.

7.3.2.1(6) Design the domestic hot water system to prevent growth and spread of Legionella bacteria within the hot water generation plant, piping, fixtures, or any other component. Design methods may include heat-based control and/or active treatment systems; eliminating dead-leg piping; and minimizing uncirculated piping by connecting the circulation system as close as possible to fixtures.

7.3.2.2 Performance Criteria

7.3.2.2(1) Provide the hot water generating equipment with 100% redundancy.

7.3.2.2(2) Recirculate domestic hot water from the distribution system(s) back to the generating equipment.

7.3.2.2(3) Monitor hot water supply temperatures via the BMS and provide alarm outputs when the temperature exceeds or drops below the design setpoint range.

7.3.2.2(4) The domestic hot water generating equipment will meet or exceed the energy efficiency requirements of ASHRAE 90.1 as required by the Vancouver Building By-law; the project's energy use target; and the project's LEED criteria.

7.3.3 Plumbing Distribution Systems

7.3.3.1 Basic Requirements

7.3.3.1(1) Provide the plumbing systems to avoid disruption to the operation of the Facility or interference with other services during operation and maintenance activities. Design the systems so that, as much as possible, Type I and Type II 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. Refer to CSA Z317.2 for space Type definitions.

7.3.3.1(2) Distribute plumbing by means of risers to each floor area to a maximum of 25% of the total floor area. Provide isolation valves to each area.

7.3.3.1(3) Incorporate flexibility in the system designs to accommodate future alterations and allow for future expansion in accordance with Section 7.1.

7.3.3.1(4) Label all systems clearly, including painting and labelling of all pipes, ceiling identification dots, valve tagging, and emergency valve identification signage.

7.3.3.1(5) Provide the water systems to ensure that water is supplied at the required pressures to all water outlets. Water pressure will be maintained at minimum 35psi at all fixtures.

7.3.3.1(6) Provide a domestic water booster pumping system if required to meet water supply requirements. System will provide uninterrupted water service and constant pressure under all conditions to all areas of the Building. System will be optimized for energy performance including variable rate pumping and associated controls. System will be served by the vital electrical power system and include fail-safe features and controls. Include, at minimum, one redundant pump unit for each two (2) active pump units.

7.3.3.1(7) Provide durable materials to allow for 24 hour a day operation with minimal downtime. Where copper

piping is used for domestic water distribution, Type-K pipe will be used.

7.3.3.1(8) Provide all systems to meet the infection control requirements of the Authority.

7.3.3.1(9) Provide a central reverse osmosis filtered water system as follows:

7.3.3.1(9)(a) Supply hemodialysis machine connection points at a minimum of 6 patient positions within the Renal Unit (4 in the general open patient area and 2 within isolation rooms).

7.3.3.1(9)(b) Include a single central water filtration package with continuously circulating distribution loops.

7.3.3.1(9)(c) Install distribution piping in accessible locations to allow replacement with minimal disruption of patient care areas.

7.3.3.1(9)(d) Provide piping and outlets that are suitable for use in both of the following disinfection systems: automated heat sterilization method; and a chemical sterilization method.

7.3.3.1(9)(e) The connection points will be specific for dialysis machine connection and will be of a type that ensures complete continuous water circulation through the assembly when not connected to a dialysis machine.

7.3.3.1(9)(f) The system will be sized for minimum simultaneous use of 100% of all connection points.

7.3.3.1(9)(g) The system, including water filtration equipment, distribution system, and dialysis machine connection points, will be a packaged system provided by a company specializing in dialysis water systems. The entire packaged system will be located in the Water Treatment Room.

7.3.3.1(10) Provide appropriate domestic water supply connections for specialty uses in patient care areas, laboratories, or other areas. Provide accessories needed to make the connection suitable for the intended use, to meet relevant codes and

standards, and to meet manufacturer's requirements for any connected equipment. This includes point-of-use micron filtration, thermostatic mixing valves, and backflow preventers. The following specialty uses are specific requirements:

7.3.3.1(10)(a) Dental water supply in two minor procedure rooms;

7.3.3.1(10)(b) Outlets suitable for connection of portable Reverse Osmosis machines at each patient bed within the PICU.

7.3.3.1(11) Provide natural gas and fuel gas piping as needed for all uses within the Facility and in accordance with the standards referenced in Section 7.1.

7.3.3.2 Performance Criteria

7.3.3.2(1) Insulate storm drainage, domestic water piping, cooling water, and p-traps in exterior areas in accordance with the standards referenced in Section 7.1, including BCICA quality standards. Where piping and/or piping components are subject to freezing, provide insulation and heat tracing. Ensure life-safety systems are not installed in locations subject to freezing.

7.3.3.2(2) Provide flushing and disinfection of domestic water systems. Provide independent testing of piping systems once flushing and cleaning has been completed. Supply the testing reports to the Authority.

7.3.3.2(3) All piping will be accessible. No in-slab plumbing piping is permitted. No under-slab plumbing piping is permitted except drains.

7.3.3.2(4) Provide isolation valves for all plumbing services and clearly identify the location of all valves. Valves will be located at a minimum at each set of piping branches from the main distribution line, and at all locations where the branches serve group of rooms with similar uses.

7.3.4 Plumbing Fixtures

7.3.4.1 Basic Requirements

7.3.4.1(1) Provide fixtures as indicated and as necessary to achieve the functionality described in Appendix 3A - Clinical Specification, and as needed to comply with all applicable codes and regulations. Select all fixtures to meet the Building's LEED rating target indicated in Section 3.4.1 and Schedule 2.

7.3.4.1(2) All plumbing fixtures will be made of impervious, durable materials suitable for a hospital facility. Fixtures selected must have proven acceptable hospital performance from previous installations.

7.3.4.1(3) Pursuant to Schedule 2, Appendix 2C, consult with the Authority on the selection of fixtures, and give particular attention to performance relative to infection prevention and control.

7.3.4.1(4) Provide stainless steel combination lavatory/toilet security fixtures in Seclusion Rooms, and other areas where psychiatric patients may be present and unsupervised.

7.3.4.1(5) Provide bariatric plumbing fixtures in patient rooms and spaces designated for bariatric patient use.

7.3.4.1(6) Where barrier-free plumbing fixtures, fittings, and carriers are required and provided, they will be suitable for use by bariatric users. Toilets not designated specifically for bariatric use will be of a type that can be used with portable bariatric commode chairs as required.

7.3.4.1(7) Select toilets that will reduce the spread of infection. The bowl must be designed to accommodate the flow of the flush valve. 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.

7.3.4.1(8) Provide lids for all toilets. Ensure all flush valve operators extend above the height of the open lid.

7.3.4.1(9) Public toilets will consist of wall hung elongated bowls with an open front seat and manual flush valves.

7.3.4.1(10) Patient toilets will consist of wall hung or floor mounted elongated bowls, an open front seat and manual flush valves.

7.3.4.1(11) Urinals will be wall-hung and low-consumption with manual flush valves.

7.3.4.1(12) 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.

7.3.4.1(13) The following applies to all sinks and sink/faucet selections for the Facility:

7.3.4.1(13)(a) Select all sink basin and faucet combinations to minimize the potential for splatter and contamination. Ensure the faucet does not discharge directly onto the drain.

7.3.4.1(13)(b) Provide anti-splash, anti-aerosolizing, faucet fittings (i.e. laminar flow) that do not retain air. Provide gooseneck faucet fittings. Avoid low profile gooseneck faucet fittings.

7.3.4.1(13)(c) 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.

7.3.4.1(13)(d) Provide double- or triple-basin sinks where required.

7.3.4.1(13)(e) Sink sizes will at minimum meet the dimensional requirements of CSA Z8000.

7.3.4.1(13)(f) All lavatory sinks in all patient rooms will have faucets to the side, for the purpose of bathing babies.

7.3.4.1(13)(g) All sinks will be equipped with a drain that can accommodate the intended basin discharge. Basins will not have an overflow.

7.3.4.1(14) Hand Hygiene Sinks will have blade handle faucets with gooseneck spouts. Basins will be adequately sized for proper washing and scrubbing of hands. See Section 5.5.1.2(2) for required locations of hand washing sinks.

7.3.4.1(15) Patient and public washroom Lavatory Sinks will have blade handle faucets with gooseneck spouts.

7.3.4.1(16) Kitchen Sinks will have blade handle faucets with gooseneck spouts. Utility Sinks and other equipment cleaning sinks will be made of stainless steel with blade handle faucets and gooseneck spout. Sinks will be large and deep enough to accommodate proper washing of equipment.

7.3.4.1(17) Process Sinks in all areas including modular clean rooms, scrub rooms and ante rooms, and dispensary areas, will be made of stainless steel with blade handle faucets and gooseneck spout. The basins will be stainless steel of an alloy suitable for the intended use. All sinks will be connected to the drainage system appropriate for the intended use. Provide backdraft ventilation as required by CSA-Z8000.

7.3.4.1(18) Scrub Sinks and surgical prep sinks will be stainless steel with integral backsplash and hands-free faucet for hand hygiene, suitable for a user conducting surgery or other sterile procedures. Refer to Section 5.5.1.3 and Appendix 3A - Clinical Specification for required locations of scrub sinks. If there are two scrub sinks that are adjacent they should be a double- basin unit.

7.3.4.1(19) NICU Scrub Sink will be 16 gauge, type 304 stainless steel with integral backsplash and infrared hands-free faucet for hand hygiene, point of use thermostatic mixing valve suitable for NICU procedures. Refer to Section 5.5.1.3 and Appendix 3A - Clinical Specification for required locations of scrub sinks. Provide a trough style 4 wash station NUCU Scrub Sink

7.3.4.1(20) Provide suitable quantities of janitors' Floor Sinks, hose bibs, eye wash stations, emergency showers, and water bottle fillers to provide sufficient service to the Facility.

7.3.4.1(20)(a) Eye wash stations will be fully plumbed complete with a water receptor and drain piping.

7.3.4.1(20)(b) Emergency showers throughout the Building, including at the interior and exterior decontamination areas, will be designed to supply tempered water within an acceptable timeframe in accordance with the OHS regulation.

7.3.4.1(21) Provide all appropriate services and connections to all equipment for patient care, laboratory and all other areas. Provide all accessories as needed.

7.3.4.2 Performance Criteria

7.3.4.2(1) Provide accessible clean-outs for all sinks and lavatories above the flood-level rim of the sink.

7.3.4.2(2) Construct working mock-ups (at appropriate heights) of all sinks with faucets, as outlined in Schedule 2, for review by the Authority during the design process.

7.3.4.2(3) The following applies for all electronic sensor activated fixtures:

7.3.4.2(3)(a) All sensors will be hardwired and served by the emergency power system so water is available at all times.

7.3.4.2(3)(b) All sensors will be able to operate for a minimum of 30 seconds without interruption of flow, to facilitate proper hand washing. Sensors will retain the ability to turn off automatically when hands are no longer in the sensor range.

7.3.4.2(3)(c) The domestic hot water recirculation system will be connected to the fixture's hot water supply immediately next to the fixture shut-off at the wall.

7.3.4.2(4) Provide water hammer arresters at the cold water and hot water supply to each fixture or bank of fixtures served by a single branch.

7.3.4.2(5) Flush valves will also have a manual flush operator.

7.3.4.2(6) If system pressure exceeds the acceptable delivery pressure, then provide pressure reducing valves with 100% redundancy. Place the valves in accessible locations.

7.3.5 Plumbing Drainage and Venting Systems

7.3.5.1 Basic Requirements

7.3.5.1(1) Provide sanitary, storm, specialty drainage, and venting systems to avoid disruption to the operation of the Facility or interference with other services during operation and maintenance activities. Design the systems so that, as much as possible, Type I and Type II rooms do not need to be entered when performing these functions. Refer to CSA Z317.2 for space Type definitions.

7.3.5.1(2) Provide all drainage systems such that the system connects to the site drainage services, utilizing gravity drainage wherever possible.

7.3.5.1(3) If the geotechnical engineer determines that the soil is incapable of supporting any piping systems, buried below the ground floor slab, the piping will be supported (hung) from the concrete slab above. Hangers and rods will be of sufficient strength and be installed at intervals to carry the pipe and load and maintain the required slope. Hangers and rods will be corrosion resistant. Install light-weight fill above all piping that is supported (hung) from the concrete slab above.

7.3.5.1(4) Provide a storage tank system for all drains serving the decontamination area(s). Drains are permitted to connect directly to building services during normal building operation. When this decontamination area is in use, the drains must divert all flow to an isolated storage tank system for containing the discharge and run-off. Provide sampling ports for the decontamination storage tank. Refer to Section 7.1.2.2(5).

7.3.5.1(5) 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 sump will have twin compartments (separate chambers for settling and pumping) and will be sized to prevent short cycling of the pump. Provide engineered packaged system(s) complete with controls and alarms including but not limited to high

water level and pumps failure alarms. Provide local alarms annunciation with audible and visible alarms indication and remotely via the BMS.

7.3.5.1(6) All drainage and venting piping and fittings will be of a material suitable for the expected effluent. This includes but is not limited to dialysis systems and other specialty systems with acidic, high-temperature, or radioactive discharges. Drainage piping material will only be changed downstream at a point where the hazardous property of the effluent is reduced so a different piping material is suitable. For example:

7.3.5.1(6)(a) where the branch connects into a main drain line, such that the additional effluent flow dilutes the discharge.

7.3.5.1(6)(b) where a device is placed in-stream to reduce the hazard of the discharge, such as an acid neutralizer.

7.3.5.1(7) Provide drains suitable for discharge from dialysis machines at all locations where reverse osmosis water connections are provided, as well as all locations in the PICU or Biomedical Workshop where portable dialysis machines may be connected.

7.3.5.1(8) Provide floor drains in all mechanical rooms and other rooms where water spillage from equipment or operations can be reasonably expected.

7.3.5.1(8)(a) Provide drains for all devices that may discharge water, including but not limited to emergency showers, reverse osmosis systems, and backflow prevention devices. Provide floor drains in the central reverse osmosis water treatment room.

7.3.5.1(8)(b) Floor drains in patient care areas will be installed only as needed for the specific use of the room and as per CSA-Z317.1 and CSA-Z8000.

7.3.5.1(8)(c) Ensure all equipment drain piping is directly connected to a drainage system or terminated in a floor drain. Provide air gaps where required by the equipment manufacturer or applicable standards.

7.3.5.1(8)(d) Floor drains serving backflow preventers or other devices will be sized to accommodate the discharge flow rate of the device.

7.3.5.1(9) Provide neutralizers, interceptors, and sediment buckets to intercept oil, grease, dirt, solids, and fuel where necessary.

7.3.5.1(9)(a) Interceptors will be provided in accordance with the manufacturer's specifications.

7.3.5.1(9)(b) Install plaster traps in well-ventilated closets or other service areas, so odours released during trap cleaning do not migrate beyond the immediate service area to other parts of the Building.

7.3.5.1(9)(c) Provide acid neutralizers at both the point of acid discharge to the drainage system and at the acid waste drainage system termination,

7.3.5.1(9)(d) Provide appropriate systems at all fuel storage tanks and filling stations to prevent fuel leakage beyond the designated containment area, in accordance with all applicable standards.

7.3.5.1(10) Provide automatic trap primers at drains that are subject to losing the trap seal, including infrequently used fixtures and p-traps in negatively pressurized rooms. Locate trap primers in a location where they can easily be accessed, inspected, and repaired.

7.3.6 Medical Gas Systems

7.3.6.1 Basic Requirements

7.3.6.1(1) Provide medical gases for the Facility as required by Appendix 3C - Medical Gas Requirements.

7.3.6.1(2) Provide a connection(s) for medical gas supply from an exterior truck as per Section 7.1.2.

7.3.6.1(3) Provide a central bulk oxygen plant to serve the Facility. Locate exterior to the Facility in a location that can be accessed by a standard oxygen refuelling truck. Location to be reviewed and approved by Authority. . In recognition of site constraints and the code requirements governing the location of an oxygen storage facility, the

Authority would entertain proposals for the locating the bulk oxygen storage outside of the project boundary.

7.3.6.1(4) Provide centralized manifold supply systems for the following medical gases: oxygen, nitrogen, nitrous oxide. 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);

7.3.6.1(5) Include in the Facility an enclosed room with adequate space for the storage of medical gas bottles, including bottles of gases supplied by the centralized supply systems described above and bottles of the additional medical gases required.

7.3.6.1(5)(a) Only medical gas valving and piping that is necessary for the connection of new bottles into the centralized systems will be included in the bottle room.

7.3.6.1(5)(b) All piping and components associated with distribution of medical gases throughout the Building will be located in a separate room or enclosure, adjacent to the bottle room, which has a separate access door.

7.3.6.1(5)(c) Provide sufficient space for storage of enough medical gases so the Facility can remain operational for the full post disaster timeframe as per Section 7.1.2.

7.3.6.1(6) Provide central medical air and medical vacuum systems with redundancy so that if 50% of the units in either system were to fail or be shut down, there will be no degradation of the systems' ability to meet the capacity requirements of the Facility. Provide 'fail-safe' controls: all units will continue to run and maintain service in the event of failure of the electronic controls, without human intervention. Provide multiple and/or variable speed systems to allow for varying conditions.

7.3.6.1(7) Connect central medical air and medical vacuum systems to emergency power. Provide emergency

power from at least two (2) separate circuits such that these essential services are maintained in the event a motor control centre is de-energized.

7.3.6.1(8) If the laboratories or any other non-clinical use requires a vacuum system, this system will be independent from vacuum intended for patient use. Refer to Appendix 3A - Clinical Specification for laboratory requirements.

7.3.6.1(9) Locate all medical gas outlets in a head wall system or ceiling-mounted boom that incorporates medical gases, electrical and data outlets. Refer to the Section 6.10.6 for additional requirements.

7.3.6.1(10) Provide medical gas service outlets as follows:

7.3.6.1(10)(a) Provide recessed service outlet boxes designed for concealed piping and fabricated for straight insertion of secondary equipment.

7.3.6.1(10)(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.

7.3.6.1(10)(c) Provide 2-part DISS type outlet connections for each medical gas.

7.3.6.1(11) Provide a waste anaesthetic gas scavenging system for all points of anaesthetic gas use. Gas scavenging systems will be designed to applicable standards including CSA-Z7396.1.

7.3.6.1(12) All pipe and pipe fittings will be in accordance to ASTM 88, de-greased copper Type 'L'.

7.3.6.1(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.

7.3.6.1(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.

7.3.6.2 Performance Criteria

7.3.6.2(1) Provide the medical gas system so that there is a minimum of one zone shut off valve per programmed area as well as isolation valves for each patient room.

7.3.6.2(2) All medical gas piping in normally inaccessible areas (e.g. behind walls and boarded ceilings) will be clearly identified.

7.3.6.2(3) All piping, valves and filters will be factory cleaned and capped or sealed to prevent contamination.

7.3.6.2(4) Provide a local alarm panel for each zone. Alarm panels will be connected to emergency power. Provide a master medical gas alarm panel to monitor all medical gas functions. Remote alarm annunciation will be provided at a location with 24 hour continuous monitoring by personnel. Provide an inter-connected status and alarm point and signal to the BMS.

7.3.6.2(5) Individually connect all master alarm panels to the BMS. Provide an alarm interface signal to the BMS for critical alarms such as low or high pressure.

7.3.6.2(6) All medical gas systems will be tested and certified in accordance with CSA standards by an independent and qualified testing agency. Supply the testing reports to the Authority.

7.3.6.2(7) All systems components requiring electrical power will be on emergency power.

7.3.6.2(8) The medical gas supply system will be for patient consumption only. If equipment and/or procedure(s) require medical grade gas supply, then provide separate dedicated source equipment, piping, valving and monitoring to accommodate that application.

7.4 Heating, Ventilating and Air Conditioning (Division 23)

7.4.1 Building Heat Source

7.4.1.1 Connect into the Campus Plant and provide Energy Transfer Stations (ETS) and District Heating Water Supply and Return (DHS&R) piping to integrate into the campus network as follows:

7.4.1.1(1) Provide a primary connection from the Campus Plant to the Building as follows:

7.4.1.1(1)(a) Provide an ETS including steam-to-hot water heat exchangers, DHS&R piping, circulation pumps, and controls within the Plant Services Site at a location to be coordinated with the Authority. Do not connect into steam/condensate existing pipe cap-offs. Project Co to provide a new header connection with steam header spool and valve assembly into the steam/condensate pipe complete with new service catwalk for the valve operation and maintenance.

7.4.1.1(1)(b) Design the system to the temperature and flow constraints of the City of Vancouver District Energy Connectivity Standards. Note: maximum building return water temperature requirement and penalty in Section 7.4.1.2(4). The system (ETS in plant, DHS&R pump, and DHS&R line from the plant to the Building) capacity shall be suitable to meet the peak heating load of the Building plus the maximum transferrable load to the ACB and the Mental Health Building. The ACB and Mental Health Building are intended for future connection to the DHS&R. (Note: The ACB is served by an existing high-temperature hot water heating system inside the building which is currently fed from the existing campus steam distribution system. Service from the existing campus steam distribution system will be maintained. The Health Authority plans to complete the hot water conversion to both the ACB and Mental Health Building in the near future. The campus DHS&R infrastructure must be in place to allow for DHS&R extension to the ACB and Mental Health Building in the Future. The peak thermal load for the ACB is 500 kW. The peak thermal load for the Mental Health Building is 400 kW. Provide valves and caps on the DHS&R piping to the ACB and the Mental Health Building.

7.4.1.1(1)(c) Design the ETS within the Plant Services Site so that it can be modified should the Authority retrofit the

Campus Plant from steam supply to a hot-water supply in the future. Future hot water supply and return temperatures, temperature differential, and flow characteristics for DHS&R from the Campus Plant will align with the City of Vancouver District Energy Connectivity Standards.

7.4.1.1(1)(d) Provide minimum 200mmØ DHS&R piping from the ETS within the Plant Services Site to serve the ACC and future connections to the ACB and Mental Health Building.

7.4.1.1(2) Provide a second connection from the campus steam piping network to the Building as follows:

7.4.1.1(2)(a) Provide steam/condensate piping from the valve chamber within the tunnel extension between the ACB and the Building. Connect into steam/condensate pipe cap-offs provided by the Authority.

7.4.1.1(2)(b) Provide an ETS including steam-to-hot water heat exchangers, DHS&R piping, circulation pumps, and controls within the Building.

7.4.1.1(2)(c) The system capacity shall be suitable to meet the peak heating load of the Building.

7.4.1.1(3) Provide a third connection from the ACB to the Building as follows:

7.4.1.1(3)(a) Provide DHS/DHR piping from the valve chamber within the tunnel extension between the ACB and the Building. Provide a valve and cap-off for future expansion of the District Heating system.

7.4.1.1(4) Provide an ETS within the Building including steam-to-hot water and hot water-to-hot water heat exchangers, and controls so the system can function as follows:

7.4.1.1(4)(a) Thermal energy supplied via the primary connection from the Campus Plant to the Building.

7.4.1.1(4)(b) Thermal energy supplied via the secondary connection from the campus network at the valve

chamber within the tunnel extension between the ACB and the Building.

7.4.1.1(5) All DHS&R piping run within a building will be installed per these specifications for heating water piping and all applicable standards. All DHS&R piping run external to a building (across the campus) will be insulated, protected, and direct-buried as per European Standard EN253 and other applicable standards. Refer to Section 8.4.2.3 for information regarding the routes of these services and locations of other services beyond the Facility site boundary.

7.4.1.1(6) All ETS installations will incorporate redundancy to maintain uninterrupted building operation while cleaning, repairing, or replacing devices.

7.4.1.1(7) The District Energy System including ETS and DHS&R piping installed by the Project Co shall be handed over to the Authority. Refer to "Drawing SK-1: C&W Campus Heating System Connections" for schematic of C&W Campus Thermal Energy System Demarcation. Project Co will be responsible for the design, installation and commissioning of the District Energy System components. The Authority will assume responsibility for the operation and maintenance of the primary side of the system after commissioning, operational demonstration, maintenance manuals and as-built drawings have been completed. Operational demarcation will be on the Building side of the ETS heat exchangers."

7.4.1.2 Design the Building ETS and associated heating plant to meet the maximum simultaneous facility demand for all systems served by the ETS and plant, as well as being capable of controlling and responding to periods of low usage. All systems must meet the requirements of the standards referenced in Section 7.1.

7.4.1.2(1) The connections from the District Heating Water system will be the thermal energy source for all necessary heating within the Facility, except where the high temperature required for a service or process cannot be achieved from the District Heating Water. In these cases, supplemental heating equipment within the Facility is permitted to achieve the required temperature.

7.4.1.2(2) The connections from the District Heating Water system will also provide the thermal energy required by building systems in a post disaster event.

7.4.1.2(3) Apply energy recovery systems to offset plant heating requirements. Provide analysis of energy savings, life-cycle costing, and maintenance concerns.

7.4.1.2(4) Refer to Schedule 4-Appendix 4C (Plant Services) for the maximum DHR temperature from the Building and associated penalties for exceeding the maximum DHR temperature.

7.4.1.2(5) It is not permitted to use steam from the Campus Plant or campus steam piping network to generate steam or perform any other function within the Facility.

7.4.1.3 Provide humidification for the Building so that all spaces meet the requirements of the standards listed in Section 7.1.

7.4.1.3(1) Provide stand alone steam generation equipment for all humidification and process steam requirements within the Facility. It is not permitted to use steam from the Campus Plant or campus steam piping network to generate steam or perform any other function within the Facility.

7.4.1.4 The project's heating systems will be designed to meet or exceed the energy efficiency requirements of ASHRAE 90.1 as required by the Vancouver Building By-law; the project's energy use target; and the project's LEED criteria. Use of building's heat recovery systems including heat recovery chillers is acceptable. Use of geoexchange systems is not acceptable.

7.4.2 Cooling Plant

7.4.2.1 Design the cooling plant to meet the maximum simultaneous facility demand for all systems served by the cooling plant, as well as being capable of controlling and responding to periods of low usage. All systems must meet the requirements of the standards referenced in Section 7.1.

7.4.2.1(1) Provide equipment for all necessary cooling, including the required redundancy in the cooling systems and cooling required by building systems in a post disaster event.

7.4.2.1(2) Provide 100% outdoor air for free cooling as the first means of space cooling.

7.4.2.1(3) Apply sensible and latent energy recovery systems as required to reduce plant cooling requirements. Provide analysis of energy savings, life-cycle costing, and maintenance concerns. Supply the analysis to the Authority.

7.4.2.2 Chillers will be rated in accordance with AHRI 550/590-11.

7.4.2.3 Chillers will have multiple individual refrigerant circuits. Prime mover nameplate ratings for each circuit will not exceed 200 KW for groups Al, A2, or B1 refrigerants.

7.4.2.4 Cooling towers performance will be certified in accordance with CTI (Cooling Tower Institute) Standard STD-201. No open-type cooling towers are allowed except the following:

7.4.2.4(1) Spray coil (closed circuit evaporative fluid cooler) type cooling towers.

7.4.2.5 Chillers and cooling towers will be designed and located so as not to have an adverse effect on the mechanical systems for this or any adjacent building.

7.4.2.6 Provide chillers and cooling towers for ease of operation, accessibility for maintenance, safety and appearance.

7.4.2.7 Installation will comply with ASHRAE Guideline 12-2000 for Minimizing the Risk of Legionellosis Associated with Building Water Systems.

7.4.3 Space Heating and Cooling

7.4.3.1 Basic Requirements

7.4.3.1(1) Provide all necessary space, ventilation, and process heating and cooling for the Facility.

7.4.3.1(2) Space heating and cooling capacity must be sufficient to meet the required indoor design temperature to comply with the standards referenced in Section 7.1.

7.4.3.1(3) Sources of heating and cooling that serve Type I and Type II spaces will be connected to the emergency power supply. Refer to CSA Z317.2 for space Type definitions.

7.4.3.1(4) 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.

7.4.3.1(5) Pump construction and installation will permit complete pump servicing without disrupting piping or motor connections.

7.4.3.1(6) Insulate all piping, equipment and accessories in accordance with all applicable standards.

7.4.3.1(7) Provide seismic mitigation and building separation devices for all piping that crosses buildings and/or utility corridors.

7.4.3.1(8) Provide adequate expansion compensation for 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.

7.4.3.1(9) Ensure that no air within the air conditioning system, outside of the central air handling equipment, drops below its dewpoint temperature.

7.4.3.1(10) All refrigerants used must comply with the project's LEED rating target.

7.4.3.1(11) Provide dedicated and continuously available condensing water systems for all areas requiring cooling to manage continuous internal heat gains, such as rooms containing specialized medical equipment indicated in Schedule 2, Appendix 2E (Equipment and Furniture), telecommunications equipment, elevator machines, server systems, or electrical equipment. Provide a dedicated condensing water system with 100% standby capacity for the fluid coolers. Design HVAC terminal components in conjunction with equipment location in order to mitigate unnecessary heat gain into the space.

7.4.3.1(12) Once-through cooling is not permitted for any process or service within the Facility.

7.4.3.1(13) Space heating for the decontamination suite will be by radiant means to ensure minimal air velocity within the space.

7.4.3.2 Performance Criteria

7.4.3.2(1) Install piping in an orderly manner (aligned with structural elements and at right angles). Slope piping to permit complete drainage of the system. Make allowances in all pipe sizing to provide flexibility for future renovations, in accordance with Section 7.1.

7.4.3.2(2) Equipment and piping will be installed with adequate service space, access panels, and the ability to remove equipment for servicing or replacement. 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.

7.4.3.2(3) All high points in piping will be equipped with air removal devices such as air collection chambers and air vents.

7.4.3.2(4) 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(5) Provide balancing valves, flow-measuring devices, temperature and pressure sensors throughout the system to facilitate system balancing.

7.4.3.2(6) All piping will be accessible. No under-slab piping is permitted. No in-slab piping is permitted except as follows:

7.4.3.2(6)(a) Piping embedded in concrete for radiant heating and/or cooling systems are permitted in areas 3A.11 (Entry Facilities) and 3A.15 (Medical Equipment and Logistics Centre). Refer to Appendix 3A - Clinical Specification.

7.4.4 Ventilation

7.4.4.1 Basic Requirements

7.4.4.1(1) Provide all necessary ventilation for the Facility to comply with the standards referenced in Section 7.1.

7.4.4.1(2) Ventilation systems for the Facility will be designed so all systems shall have the capacity to operate with 100% outdoor air at all times of the year.

7.4.4.1(3) NICU and PICU rooms will be designed to support minor invasive procedures. Surgical procedure suites will be designed to support both major and minor invasive procedures.

7.4.4.1(4) Design the ventilation systems so all areas designated as Outbreak Control Zones can operate as follows. Refer to Section 5.5.1.1(9) for Control Zone requirements.

7.4.4.1(4)(a) The ventilation system can be converted by the Building operator into a negative pressure condition with respect to adjacent floor areas by proportionally changing the supply, return, and exhaust air ratio for all rooms within the zone.

7.4.4.1(4)(b) Configure the ventilation systems to ensure that no airborne infection can be re-circulated into any ventilation system from any Outbreak Control Zone.

7.4.4.1(5) 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 Appendix 3A – Clinical Specification, applicable infection control standards, and CSA Z317.2 for the relative pressurization and other minimum indoor air quality requirements for the Facility.

7.4.4.1(6) Provide HVAC systems with adequate backup capacity and equipment redundancy to ensure continuous Facility operations at all times.

7.4.4.1(7) Provide air handling units with sectional heating and cooling coils and manual isolation valves that will enable isolation and repairs to damaged sections of coils without stoppage of the system.

7.4.4.1(8) Air handling units will provide redundant capacity so that, in the event of a failure or scheduled shutdown of one unit for servicing, the remaining unit will continue to run and building operation will not be affected. Type I spaces will maintain 100% redundancy. Type II and Type III spaces will maintain 75% redundancy. Refer to CSA Z317.2 for space Type definitions.

7.4.4.1(9) Provide air filtration in accordance with all applicable standards. All HVAC systems will perform such that any indoor contaminants are maintained at less than 50% of their occupational exposure limits (OELs).

7.4.4.1(10) Provide dedicated supply air with HEPA filters for spaces as required by applicable standards and as required in Appendix 3A - Clinical Specification.

7.4.4.1(11) Provide fans with Variable Frequency Drives (VFDs) for energy savings under part-load conditions. Motor loads of 100 hp or greater will be provided with reduced voltage motor starter acceptable to BC Hydro.

7.4.4.1(12) Air handling equipment will be custom factory-fabricated to ensure the highest construction standard.

7.4.4.1(13) Laboratory ventilation systems will supply 100% outdoor air and will provide sufficient make-up air for exhaust systems to maintain proper pressurization throughout the Building.

7.4.4.1(14) Provide vandal-proof HVAC fixtures in safe and seclusion rooms, and other areas where psychiatric patients may be present and unsupervised.

7.4.4.2 Performance Criteria

7.4.4.2(1) Provide Indoor Air Quality (IAQ) plans to meet the project's IAQ requirements

7.4.4.2(2) Incorporate a strategy to allow the installation and removal of major building equipment such as fans without disrupting Facility operations.

7.4.4.2(3) 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(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 that will be located exterior to the Building will be designed and constructed to withstand the exposure to outdoor conditions.

7.4.4.2(6) Make allowances in duct sizing and equipment selections to provide flexibility for future changes in spaces. Refer to Section 7.1.

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, parking areas, or loading docks. All intakes will be located in areas that are not accessible by the public and will not be located near exhaust air outlets.

7.4.4.2(9) All supply, return, and exhaust air will be fully ducted to the space being served. Ceiling area may not be used as return air plenums.

7.4.4.2(10) Locate services that require access for regular maintenance above non-critical spaces so that there is minimal disruption to the delivery of health care services.

7.4.4.2(11) Insulate all ductwork to all applicable standards.

7.4.4.2(12) Provide seismic mitigation and building separation devices for all ductwork that crosses buildings and/or utility corridors.

7.4.4.2(13) Do not install ducts below the slab on grade.

7.4.5 Exhaust Systems

7.4.5.1 Basic Requirements

7.4.5.1(1) Design exhaust air discharges such that the Facility air intake and exhaust design shall be designed per ASHRAE Handbooks – 2013 Fundamentals, 2012 HVAC Systems and Equipment, 2011 HVAC Applications, 2010 Refrigeration taking into consideration the outdoor air intakes for the Facility and for existing adjacent buildings.

7.4.5.1(2) Provide exhaust fans and locate them at the end of the exhaust ductwork systems. Ensure that the fans will be readily serviceable.

7.4.5.1(3) Provide exhaust systems for enclosed parking areas controlled by carbon monoxide-monitors tied to BMS.

7.4.5.1(4) Integrate the control of the exhaust systems with the ventilation supply air systems for spaces with differential pressure requirements from adjacent spaces.

7.4.5.1(5) 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.

7.4.5.1(6) Provide exhaust systems at the emergency generators for radiator cooling and engine exhaust. Ensure exhaust termination points are located so flue gases are not entrained in air intakes, operable windows, or any other building opening for the Facility or adjacent buildings.

7.4.5.2 Performance Criteria

7.4.5.2(1) Isolation rooms and their associated washrooms (including the Decontamination Unit –See Appendix

3A – Clinical Specification) will be provided with dedicated exhaust systems with 100% redundancy. HEPA filters will be provided in the exhaust ductwork in readily accessible locations for servicing.

7.4.5.2(2) Biosafety cabinets will be provided with dedicated exhaust systems that are appropriate for their class and type. Where multiple cabinets are tied into a common system, a 100% redundant central exhaust system will be provided.

7.4.5.2(3) Fume hoods and other smoke/fume generating process booths/space will be provided with dedicated exhaust systems that are corrosion/ chemical resistant to the exhaust media.

7.4.5.2(3)(a) Ensure all exhaust systems serving modular clean rooms, or the equipment within, are designed to comply with the most current version of USP 797.

7.4.5.2(4) Provide dedicated exhaust systems as required for medical equipment indicated in Schedule 2, Appendix 2E (Equipment and Furniture).

7.4.5.2(5) Provide either a dedicated exhaust system or allowance within the Building design for a future exhaust system to accommodate space and equipment requirements for future potential spaces as described in Appendix 3A – Clinical Specification (see 3A.8: future Intra-Operative Imaging space and future Interventional radiology space).

7.4.5.2(6) All ductwork that exhausts humid air at or near saturation will be constructed of welded stainless steel of a suitable alloy, or of a material equally resilient to corrosion. All duct sections will be sloped to drain points and will be accessible for inspection and cleaning.

7.4.6 Metering Requirements for Energy Measurement and Verification

7.4.6.1 Provide meters on all services connecting to the Building from an external infrastructure including but not limited to District Heating Water supply and return; natural gas service; domestic water; and electrical service.

7.4.6.2 Provide all required meters, sensors, and trend logging equipment at end uses within the Building to meet the project's LEED rating target.

7.4.6.3 All meters will be connected to an integrated energy management system to monitor, record, report, and analyze energy consumption. Coordinate electrical metering and the energy management system with the requirements of Section 7.7.17.

7.4.6.4 Metering intervals will be fifteen minutes or less.

7.4.7 Sound Attenuation and Vibration Isolation

7.4.7.1 Provide all mechanical systems to prevent sound and vibration transmission between spaces, to prevent transmission from mechanical equipment to the spaces, and to minimize sound and vibration transmission to the outside of the Facility. Provide sound attenuation to limit sound levels in accordance with the standards referenced in Section 7.1 and according to Appendix 3D – Acoustics and Noise Control (Background Noise – Interior Space).

7.4.7.2 Provide vibration isolation devices on all equipment with rotating components as needed to meet these requirements. All hung equipment will utilize spring isolators designed for the weight and vibration characteristics of the equipment.

7.4.7.3 Provide flexible connections where needed to isolate mechanical equipment sound and vibration from ducting, piping and electrical wiring systems.

7.4.7.4 Ensure duct silencers meet or exceed the requirements of the ductwork for cleanliness and inspection.

7.4.7.5 Utilize fibre free internal insulation in exhaust systems.

7.4.8 Testing, Adjusting, Balancing (TAB) and Commissioning (Cx)

7.4.8.1 Perform Testing, Adjusting and Balancing and Commissioning (TAB & Cx) of all mechanical equipment and systems in accordance with the standards referenced in Section 7.1.

7.4.8.2 Retain an independent commissioning authority (CxA) as required to meet the Building's LEED prerequisites and LEED rating target. Utilize a process where the CxA reports directly to the Authority as required by LEED.

7.4.8.3 Integrate the TAB & Cx into the project construction and start-up schedules. Configure the TAB & Cx plan so it will support a phased occupancy of the Building, if required by construction conditions and approved by the Authority.

7.4.8.4 Utilize a quality assurance system throughout the TAB & Cx process to ensure that TAB & Cx has been performed to all equipment and systems requiring TAB & Cx. Demonstrate the quality assurance system to the Authority prior to beginning TAB & Cx.

7.4.8.5 Ensure any construction or installation errors are identified and systems have been balanced prior to the start of Cx functional testing.

7.4.8.6 Perform follow-up TAB & Cx services during each season over the first year of the Building's operation.

7.4.8.7 Make all TAB & Cx reports available to the Authority. The reports will identify how much additional capacity is available for all systems, as required by Section7.1.1.1 (9).

7.4.8.8 Retain complete records of all TAB & Cx data and submit one copy to Authority for record purposes.

7.4.8.9 TAB shall include air balancing at connection points to existing facilities. Refer to Section 4.3.3.2.

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

7.6 Integrated Automation (Division 25)

7.6.1 Controls

7.6.1.1 Basic Requirements

7.6.1.1(1) Provide an integrated Building Management System (BMS) for the Facility that performs the following functions:

7.6.1.1(1)(a) automatically operates, monitors and manages the Facility's mechanical systems to provide a high level of occupant comfort and maintain a healthy and productive environment without disruption to the delivery of clinical and patient treatment services;

7.6.1.1(1)(b) provides an internet based means of external monitoring by the Authority, including all associated hardware and software;

7.6.1.1(1)(c) interfaces with the building mechanical, electrical and communication systems and controls;

7.6.1.1(1)(d) meters, trends and archives all data related to the flow of services into and out of the Facility, including domestic water, steam, condensate, medical oxygen, and electricity and takes into account seasonal variations in flow rate;

7.6.1.1(1)(e) annunciates building and equipment alarms, including fire alarm, security alarms, freezer alarms,

lab alarms, medical equipment indicated in Schedule 2, Appendix 2E (Equipment and Furniture) alarms, lighting, UPS, emergency power systems switchgear alarms; temperature and humidity setpoint deviation alarm.

7.6.1.1(1)(f) monitors the status, temperature, humidity and alarms for equipment identified in consultation with the Authority, including freezers, coolers, labs and medical equipment indicated in Schedule 2, Appendix 2E (Equipment and Furniture); and

7.6.1.1(1)(g) acquires and collates all data associated with energy measurement and verification as required by Section 7.4.6.

7.6.1.1(2) Design the controls systems to allow monitoring and operation of the Facility from a BMS location in the Facility, or from any location with appropriate security controls in place via an integrated Building Automation System over IP (BAS/IP). BMS to operate on dedicated network. Refer to Schedule 4-Appendix 4D(Help Desk Services) for BMS monitoring requirements via the Help Desk Services.

7.6.1.1(3) The BMS will be a completely integrated (front-end and back-end) Native BacNET DDC system. The BMS will also facilitate integration of a wide range of building systems and protocols through a system which normalizes the data into a common representation.

7.6.1.1(4) The BMS will be non-proprietary and designed with open protocol.

7.6.1.1(5) The BMS will be provided as a complete package from one manufacturer, not a composite system from several manufacturers

7.6.1.1(6) The BMS will optimize the system performance under all operating conditions to minimize Facility energy usage.

7.6.1.1(7) The BMS will accommodate future technological changes and the architecture of the BMS will permit expansion of the system for future renovations.

Provide minimum 20% spare point capacity at each BMS control panel.

7.6.1.1(8) Provide airflow sensors at infectious control isolation dampers in ductwork to ensure isolation has been achieved.

7.6.1.1(9) Provide sensors to monitor outdoor air volumes, space CO2 levels, and other levels that are required to meet this project's LEED rating target

7.6.1.1(10) Provide continuously-operating sensors between all spaces requiring differential pressurization to monitor that the required pressure differential is in place. In addition to BMS alarms, provide local audio and visual alarms at the room entrance and also at the local monitoring station if applicable.

7.6.1.1(11) Provide BMS complete with Automated Fault Detection, Diagnosis and Reporting (AFDDR) software. Configure and operate the AFDDR software to ensure building systems remain continuously optimized, and the need for fault diagnosis by the Building operator is minimized. AFDDR software will provide customizable web-accessible reports available to the Authority.

7.6.2 Performance Criteria

7.6.2.1(1) Zoning for HVAC systems will be based on occupancy, room location within the Facility, room orientation, and room heating and cooling loads. Configure zoning to minimize reheat/recool.

7.6.2.1(1)(a) Provide an independent zone for each of the following spaces at a minimum: patient care rooms, procedure rooms, consult rooms.

7.6.2.1(1)(b) For non patient care areas, a maximum of 3 rooms will be on one zone.

7.6.2.1(2) Zone floor areas to provide control of smoke in a fire situation.. Provide floor area zoning to ensure infection control for each of the care team stations.

7.6.2.1(3) Provide thermostats throughout the Facility to meet all space control requirements and to meet the

project's LEED target. Mercury-containing components will not be permitted.

7.6.2.1(3)(a) Provide adjustable type thermostats with temperature read out in all individual rooms that are also independent zones. The temperature range will be controlled by the BMS.

7.6.2.1(4) Provide local pressure control for each isolation room and anteroom. Provide a local annunciator panel located at a central station near the rooms.

7.6.2.1(5) Failsafe components will be hard-wired to provide reliable operation in all circumstances.

7.6.2.1(6) The BMS will monitor, control, indicate alarms, and provide trending where applicable for all connected sensors and control points.

7.6.2.1(7) The BMS will be connected to emergency power and UPS to ensure continued availability during utility power disruptions.

7.6.2.1(8) The BMS will monitor critical alarms for essential building and life safety systems. Upon activation of a critical alarm, Project Co will notify the Authority. Critical alarms include but are not limited to:

7.6.2.1(8)(a) fire alarm system for alarm, supervisory and trouble;

7.6.2.1(8)(b) all temperature alarms resulting from setpoint deviations;

7.6.2.1(8)(c) failure of any major HVAC or plumbing equipment;

7.6.2.1(8)(d) medical gas system high and low pressure alarms; and

7.6.2.1(8)(e) all alarms relating to the fire protection system.

7.6.2.1(9) The BMS documentation will include a detailed narrative description of the sequence of operation of each system.

7.6.2.1(10) User interface will be graphical in nature with animated graphics to indicate equipment operation. Graphics will be grouped in systems and in departments.

7.6.2.1(11) The Energy Management System will be connected to the BMS as per Section 7.7.16.

7.7 Electrical - Division 26

7.7.1 General

7.7.1.1 Basic Requirements

7.7.1.1(1) All electrical systems, materials and equipment will be of a type and quality intended for use in a health care facility. Electrical systems to meet requirements of the identified program and patient care needs in an efficient manner, with optimal utilization of space, staff and equipment resources.

7.7.1.1(2) Provide electrical systems that provide redundancy as outlined in this Schedule and applicable codes and regulations, protection, continuity of service and a comfortable and safe working environment for patients, visitors and staff.

7.7.1.1(3) All electrical systems within the new facility to be designed to post disaster standards.

7.7.1.1(4) Integrate systems where integration provides efficiency, operational and cost advantage.

7.7.1.1(5) Incorporate into the design and construction the principle that change will be a constant and inevitable fact within the Facility. Completed electrical systems will permit change while minimizing the cost of change and the amount of interruption to the regular Facility activities.

7.7.1.1(6) Include systems and equipment coordinated to provide synergy and reliable electrical performance for the various Facility functions.

7.7.1.1(7) If not specifically mentioned otherwise, ensure all new electrical systems and equipment are compatible with the existing electrical systems.

7.7.1.1(8) Provide provisions to minimize the noise and vibrations of electrical equipment / components (transformers, luminaries, etc.) to below an

acceptable level as required in a health care facility as detailed in Section 1.4 of Schedule 3D.

7.7.1.1(9) .Locate electrical rooms and power distribution equipment in order to minimize the distances for feeder runs, to provide easy access for equipment move and to avoid interference with other services and equipment.

7.7.1.1(10) .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. Allow clear exit pathway for installation of the future imaging equipment.

7.7.1.1(11) .Outlets and connections for equipment must be provided to accommodate all the equipment indicated in Schedule 2- Appendix 2E (Equipment and Furniture).

7.7.1.1(12) .All outlets to be installed at a height which allows for good ergonomics not less than 1100 mm above finished floor except in corridors, unless noted otherwise or as developed and agreed upon through the design submittals review process. Note that outlets in corridor alcoves will be installed not less than 1100 mm above finished floor. Outlets in corridors will be installed not less than 400mm above finished floor unless noted otherwise or as specified during design submittal review process with Authority.

7.7.1.1(13) .Incorporate energy management systems to minimize demand pressures on the building systems and minimize the anticipated increase to energy costs.

7.7.1.1(14) .Refer to LEED 2009 HC (USGBC) or LEED Canada NC 2009 (GaGBC) and BC Hydro Power Smart New Construction Program regarding energy incentive programs. Integrate any requirements of those programs into the electrical systems.

7.7.1.1(15) Electromagnetic Interference (EMI) to be considered in installation of all electrical equipment. EMI reduction to be achieved by electromagnetic shielding for transformers and switchgear, use of ferrous raceways such as EMT, close spacing of conductors in feeders, running all the phases 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. Do not use busways and busducts for power distribution. Project Co shall mitigate the electromagnetic field with appropriate techniques should there be an electromagnetic field that results in interference to equipment.

7.7.1.1(16) Reference all Clinical, Non Clinical, and FM sections of the Output Specification, Appendices including Schedule 2- Appendix 2E (Equipment and Furniture) for requirements affecting Division 26 and incorporate any relevant requirements from those Sections into electrical design and systems as required.

7.7.1.1(17) Electrical design to comply with mandatory LEED 2009 HC (USGBC) or LEED Canada NC 2009 (CaGBC) requirements (for example Measurements and Verification points are mandatory) – refer to Schedule 2 and 3.4 (Sustainability) of this document for LEED registration and requirements.

7.7.1.1(18) Electrical and communication systems within new Facility must meet post disaster requirements as identified in Section 5.3.

7.7.1.1(19) Electrical and communication systems within new Facility must provide required connections for Help Desk Services as identified in Schedule 4-Appendix 4D (Help Desk Services).

7.7.1.2 Performance Criteria

7.7.1.2(1) Install electrical systems and equipment in a fixed and permanent manner, seismically restrained to meet post disaster building standards. Plan installation of equipment to allocate space for future additions and to facilitate easy access to other

systems and equipment, including but not limited to mechanical equipment, building systems access ways, and architectural components which may require inspection or maintenance.

7.7.1.2(2) .Implement the latest proven technologies in the design of the electrical systems and equipment.

7.7.1.2(3) .Incorporate redundancy into the electrical system design such that the single failure of any electrical equipment or feeder will neither impair entire department operation, nor the clinical or administrative activities nor leave any patient treatment room or area of the department or Facility without at least one active light and one active receptacle unless stated otherwise.

7.7.1.2(4) .Design and construct all systems with protection, grounding, isolation and control to address the functional requirements for areas where they are located.

7.7.1.2(5) .Power throughout the Building will comprise of a combination of 347/600V and 120/208V for all power, lighting and equipment loads. 277/480V power distribution to be provided as required for specific equipment as indicated in the (Equipment list)*.

7.7.1.2(6) .In addition to allowing for known future requirements, operating factors and safety factors, design and construct the Facility electrical systems with a minimum 25% spare capacity. For example, if a 100A breaker is provided, the load capability is 100A x 80% = 80A / 1.25 for a maximum load of 64A. This spare capacity is to be provided throughout the distribution network. Submit load calculations to verify this is provided. Provide 3 meters of linear clear wall space with 2 meters clearance in front of it in each electrical room for future panels or equipment installation.

7.7.1.2(7) .All electrical equipment shall be located interior to the Building with exception of exterior electrical equipment such as exterior lighting, exterior security cameras and devices, antenna etc.

7.7.1.2(8) .Do not specify and install mercury containing equipment, including thermostats, switching devices and other building system sources (lamps are excluded).

7.7.1.2(9) .This section describes the general minimum requirements for the design of the new Facility and references to sizing, capacity, performance, etc. of the systems and equipment are not intended to reflect possible design solutions. Such sizing, capacity, performance, etc. shall be used as minimum guidelines for Project Co. to calculate, engineer, design and build the new Facility.

7.7.1.2(10) .Access Doors

7.7.1.2(10)(a) Supply flush-mounted access doors in non-accessible type ceilings and walls where necessary for access to service and/or to inspect electrical equipment and accessories or life safety devices.

7.7.1.2(10)(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.

7.7.1.2(10)(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 Authority.

7.7.2 .Project Co will undertake the Design and Construction in compliance with all applicable standards, including

7.7.2.1(1) .All electrical systems shall be designed and installed to meet health care and hospital industry standards.

7.7.2.1(2) Proposed design, equipment, material and installation to conform to the most stringent enforced requirements of all the applicable codes, standards and regulations. The codes, standards

and regulations shall include, but not limited to the following:

7.7.2.1(3) .Codes:

7.7.2.1(3)(a) .Canadian Electrical Code;

7.7.2.1(3)(b) .National Fire Code (NFC);

7.7.2.1(3)(c) .City of Vancouver Building Bylaw;

7.7.2.1(3)(d) .Applicable Municipality Bylaws Ministry of Environment (MOE); and

7.7.2.1(3)(e) .CSA B44 Elevator Code 2007.

7.7.2.1(4) .Standards:

7.7.2.1(4)(a) .CSA Z32 "Electrical Safety and Mandatory Electrical systems in Health Care Facilities", 2009 edition or later;

7.7.2.1(4)(b) .CSA Standard Z317.5 "Illumination Systems in Health Care Facilities";

7.7.2.1(4)(c) .CAN/CSA-B72 Installation Code for Lightning Protection Systems;

7.7.2.1(4)(d) .Illuminating Engineering Society of North America Lighting Handbook - Reference & Application;

7.7.2.1(4)(e) .ANSI/ASHRAE/IESNA 90.1 2010 "Energy Standards for Buildings Except Low-Rise Residential Buildings";

7.7.2.1(4)(f) .All other applicable CSA standards;

7.7.2.1(4)(g) .CSA Z318.0-05 Commissioning of Health Care Facilities;

7.7.2.1(4)(h) .CSA C282 Emergency electrical power supply for buildings;

7.7.2.1(4)(i) .CSA-C22.3 No. 1, Overhead Systems;

7.7.2.1(4)(j) .CSA/CAN3-C235, Preferred Voltage Levels for AC Systems, 0 to 50,000 V;

7.7.2.1(4)(k) .ANSI C37.121, Unit Substations Requirements;

7.7.2.1(4)(l) .CSA G40.20/G40.21, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel;

7.7.2.1(4)(m) .CSA C9, Dry Type Transformers;

7.7.2.1(4)(n) .IEEE C57.19.91, IEEE Standard test code for dry-type distribution and power transformers; and

7.7.2.1(4)(o) .NEMA PB2.2, Application Guide for Ground Fault Protection Devices for Equipment.

7.7.2.1(5) .Guidelines:

7.7.2.1(5)(a) .LEED 2009 HC (USGBC);

7.7.2.1(5)(b) LEED NC Canada; and

7.7.2.1(5)(c) .BC Hydro High Performance Building Program.

7.7.2.1(5)(d) HSSBC Structured Cabling Guidelines and Specifications

7.7.3 .Wiring Methods, Materials and Devices

7.7.3.1 .Basic Requirements

7.7.3.1(1) .Use wiring methods, materials and devices that result in a safe reliable and flexible electrical power, lighting control, communication, data, low voltage and life safety systems.

7.7.3.1(2) .Install all wiring in a neat and secure manner so that it is protected from damage, is not in conflict with mechanical or architectural components and allows for future changes and additions.

7.7.3.2 .Performance Criteria

7.7.3.2(1) .Utilize non-alloyed copper for all conductors and all conducting components of electrical equipment, which form part of the Facility's wiring systems. Minimum conductor size will be #12AWG. Aluminum conductor installed in conduits may only be used for feeders greater than 100 Amp current rating.

7.7.3.2(2) .Feeders 100 Amp and larger to be installed in EMT conduit. Do not install armoured flexible cable (example: TECK or ACWU cable) for feeders unless approved by the Authority.

7.7.3.2(3) .Provide panel boards, feeders and branch circuiting with double neutral(s) capacity where significant non-linear load(s) are anticipated. This includes open office and other areas with a medium to high density of personal computers.

7.7.3.2(4) .Conceal all wiring and wiring support systems from public view except where approved by the Authority.

7.7.3.2(5) .Separate all wiring for systems of different voltages and from different sources and do not run in common raceways. Maintain adequate shielding and separation between wiring for power and communication systems to prevent interference.

7.7.3.2(6) .Identify system voltage, phase, neutral and grounding of all pull boxes, junction boxes, conduits and wiring. Provide additional colour coding for wiring and "P Touch" self-adhesive labelling for receptacles and switches.

7.7.3.2(7) .Provide hospital grade receptacles in patient rooms and medical / treatment areas. Provide childproof receptacles in child-occupied areas as described in Z8000. Receptacles in all other areas will be specification grade.

7.7.3.2(8) .Use colour coded receptacles to identify circuits for Emergency power, Uninterruptable Power Supply (UPS), and Non-Essential power circuits. Use red receptacles for Emergency power (Vital and Delayed Vital), green receptacles for Conditional, orange receptacles for UPS, and ivory for non-essential power circuits.

7.7.3.2(9) .Provide a combination of smooth nylon and stainless steel cover plates for receptacles and switches. Where receptacles and switches are grouped, they will have a single cover plate for the whole group. Fourplex receptacles (two duplexes in one double gang box) is not allowed. Use stainless steel cover plates for main entrance lobby and

Facility public spaces. All devices are to be Decora style.

7.7.3.2(10) Provide minimum quantity of receptacles as indicated in CSA Z32, unless a higher quantity is indicated in this Schedule, required for equipment indicated in Schedule 2-Appendix 2E (Equipment and Furniture) or indicated in Appendix 3A - Clinical Specification.

7.7.3.2(10)(a) All bed receptacles to be in addition to the listed counts below. Circuits may be shared between not more than two beds.

7.7.3.2(10)(b) In each intermediate care area allow for 6 duplex receptacles on the headwall at each bed and additional 4 duplex receptacles in the room. Allow for 2 dedicated branch circuits per patient care location.

7.7.3.2(10)(c) In each critical care area allow for 12 duplex receptacles on the headwall or boom at each bed location and additional 8 duplex receptacles on the wall in the room. Allow for 6 dedicated branch circuits per patient care location. NICU and PICU are to be classified as critical care areas for the purpose of the receptacles count.

7.7.3.2(10)(d)

In addition, allow for 300 duplex receptacles connected to 200 20A breaker/circuits to be placed as required by the Authority during Authority review of the project submittals and connected to the Vital, and Delayed Vital power branches.

7.7.3.2(10)(e)

Procedure rooms are to be classified as Operating rooms for the purpose of the receptacles count as shown in CSA Z32.

7.7.3.2(11) Unless otherwise requested by the Authority or elsewhere in this specification, provide Emergency (Vital or UPS) power for 75% of the receptacles

within the Emergency Department. The remainder of the receptacles in the Emergency Department will be provided with Conditional power.

7.7.3.2(12) .Unless defined otherwise, connect maximum of three (3) receptacles to one circuit. Where dedicated circuits are required, provide dedicated neutral as well.

7.7.3.2(13) .Provide special receptacles and required electrical connections for fixed and moveable equipment as listed in the Schedule 2-Appendix 2E (Equipment and Furniture). Coordinate details with equipment vendors as required.

7.7.3.2(14) .Final location and elevations of all receptacles will be determined during design submittals review process.

7.7.3.2(15) .Provide, at a minimum, one (1) duplex receptacle rated at 15A, 125V in all rooms, closets, shower rooms and vestibules. Connect maximum of three (3) to one circuit. Provide additional receptacles identified in this Schedule, as required in the Schedule 2-Appendix 2E (Equipment and Furniture), and as required by code.

7.7.3.2(16) Provide a minimum of 6 duplex receptacles in each alcove. Connect to 3 20A dedicated circuits from Vital source of power.

7.7.3.2(17) Provide a minimum of 40 power outlets on 13 20A circuits in the Equipment Depot along the perimeter of the room and at an appropriate height for equipment recharging. Connect to delayed vital source of power.

7.7.3.2(18) Provide a minimum of 10 duplex receptacles in equipment storage areas along the perimeter of the room and at an appropriate height for equipment recharging. Connect to 5 20A circuits from delayed vital source of power.

7.7.3.2(19) .Utilize CSA5-20R 15/20Amp style receptacles for fax machines, printers and copiers. Provide separate 20A dedicated circuits with dedicated neutrals for each fax machine, printer and copier.

7.7.3.2(20) .Utilize CSA5-20R 15/20Amp style receptacles for housekeeping. Provide housekeeping receptacles staggered on alternate sides of the hallways , corridors and lobbies and waiting areas spaced a maximum of 10 meters apart throughout the Building. Each wall will have minimum one (1) duplex receptacle. Allow a maximum connection of three (3) housekeeping receptacles to one circuit. Connect housekeeping receptacles to Conditional or Non-Essential power branch.

7.7.3.2(21) .Provide minimum of one (1) housekeeping receptacle in each operating room. Connect to Vital or UPS power branch.

7.7.3.2(22) .Provide one duplex receptacle for every 35 square meters, or portion thereof, of service, housekeeping, janitor and storage space. One GFCI duplex receptacle will be provided on each wall in housekeeping rooms.

7.7.3.2(23) .Medical Device Reprocessing (MDR) departmental areas will be provided with minimum one (1) duplex receptacle on the walls at 10 meters on centre. 50% of these receptacles to be connected to the Vital power branch and the remaining 50% of receptacles to be fed from the Conditional power branch.

7.7.3.2(24) .In public washrooms, provide minimum of one (1) GFCI duplex receptacle connected to Conditional power and locate above the counter on each side of every sink. In patient washrooms, provide at least one GFCI receptacle above counter. In all washrooms provide at least one (1) additional duplex receptacle at lower elevation.

7.7.3.2(25) .For operating rooms, each articulated arm / boom, shall be provided with six (6) -15A duplex receptacles and two (2) -20A duplex receptacles or as required by Schedule 2-Appendix 2E (Equipment and Furniture) whichever is higher. Connect 50% of the receptacles on the boom to UPS power branch and the remaining 50% on Vital power branch.

7.7.3.2(26) .In operating rooms, provide duplex receptacle for the laser on boom or on wall as required by Schedule 2-Appendix 2E (Equipment and Furniture)

and the Authority. Connect laser receptacle to the Vital power branch or as required by the Authority. Provide local switching for receptacles within the operating rooms.

7.7.3.2(27) .In operating rooms, provide one (1) -15A duplex receptacle at 2 meters on centre. Connect 50% of receptacles to Vital power branch and remaining 50% to UPS power branch or as determined by the Authority through the design submittals review process.

7.7.3.2(28) .In operating rooms, provide duplex receptacles for A/V equipment and monitors as required by this Schedule and Schedule 2-Appendix 2E (Equipment and Furniture) or as defined by Authority during project submittals review. Connect to UPS power branch.

7.7.3.2(29) .Provide a "Laser-in-use" and "OR-in-use" light above each door of operating rooms. Provide 'Laser-in-use' or 'X-RAY in use' or applicable text light above the doors for all Diagnostic Imaging rooms.

7.7.3.2(30) .In all PICU patient rooms, connect 50% of receptacles on the boom to UPS branch and the remaining 50% on Vital branch. In these rooms allow for eight (8) duplex wall mounted receptacles in the room with 50% of them connected to UPS power branch and the remaining 50% to Vital power branch.

7.7.3.2(31) .In all PACU patient bays, connect 50% of receptacles to UPS power branch and the remaining 50% to Vital branch. In these rooms allow for ten (10) duplex wall mounted receptacles at bed location 50% of them connected to UPS power branch and the remaining 50% Vital power branch.

7.7.3.2(32) .In all patient care areas (not specified above) provide two (2) duplex receptacles on each side of the patient bed or treatment station. Connect 25% of those to UPS power branch and 75% to vital branch. Allow for additional one (1) duplex receptacle for the patient bed power (if required).

7.7.3.2(33) In offices allow for two (2) duplex receptacles on a dedicated circuit at each desk location.

7.7.3.2(34) In meeting rooms, group rooms, conference rooms, etc. provide one (1) duplex receptacle for each 2 meters of linear wall.

7.7.3.2(35) Provide 20 duplex receptacles on dedicated circuits for kiosks throughout the Facility. Locations to be as defined in this Schedule and Schedule 2-Appendix 2E (Equipment and Furniture) or as defined during design submittals review process. Connect to UPS power branch.

7.7.3.2(36) Allow for duplex receptacles on head walls as indicated in this Schedule. Locations to be as defined in this Schedule and Schedule 2-Appendix 2E (Equipment and Furniture) or as defined during design submittals review process. Connect 50% to Vital and 50% to UPS power branch.

7.7.3.2(37) Provide 25 locations in the Facility with the following connections at each location for videoconferencing and telehealth:

7.7.3.2(37)(a) One duplex receptacle in the ceiling space connected to 15A circuit

7.7.3.2(37)(b) One duplex receptacle on the wall at low elevation connected to 20A circuit

7.7.3.2(37)(c) One duplex receptacle on the floor connected to 20A circuit

7.7.3.2(37)(d) Two duplex receptacles on the wall connected to 15A circuits

7.7.4 Raceways

7.7.4.1 Basic Requirements

7.7.4.1(1) Provide raceways for all wiring and cabling to support, protect and organize all wiring and cabling systems.

7.7.4.1(2) Design raceways to provide ease of access and install with capacity for expansion and change,

consistent with the requirements of the equipment and systems that they serve.

7.7.4.1(3) .Unless otherwise noted, install power wiring in EMT with steel couplings and connectors.

7.7.4.1(4) .Install low tension wiring (unless otherwise required by applicable Laws) in EMT with steel couplings and connectors and cable trays. Install EMT (or flex) conduits with low tension conductors between individual backboxes of devices (on walls or ceilings) and cable tray. Provide conduits and cable trays for low tension system wiring such that the maximum length of exposed wire between tray and conduit is less than 200mm.

7.7.4.1(5) .EMT is to be surface mounted in service rooms and concealed in ceiling spaces and partition walls. Do not encase EMT in concrete, unless such installation is:

7.7.4.1(5)(a) .approved by the Authority as necessary to achieve a concealed installation in finished; and

7.7.4.1(5)(b) .Provide a concealed installation in concrete finished spaces such as exposed concrete stairwells.

7.7.4.1(6) .If EMT conduit is encased in concrete, such conduit runs will:

7.7.4.1(6)(a) .Be as short as possible; and

7.7.4.1(6)(b) .Emerge from the concrete in the closest adjacent space above suspended ceilings.

7.7.4.1(7) .Minimum EMT conduit size is 21mm (3/4"), except that minimum EMT conduit size for telephone and data drops is 27mm (1").

7.7.4.1(8) .Armoured cable (BX) for the office / service areas or Iso-BX for patient care areas may be used only for final connections from concealed junction boxes to lighting fixtures on suspended ceilings or for final connections to motors or vibrating equipment such as transformers. The maximum length of any individual piece of BX cable is 3.0 meters.

7.7.4.1(9) .Use rigid PVC, Schedule 40 conduits for the underground portion of services to lighting, exterior security devices, and power outlets located outside of the Facility.

7.7.4.1(10) .Install individual ground conductor in each conduit and/or raceway carrying power wiring. The raceway shall not be used as a means of bonding/grounding.

7.7.4.1(11) .Provide cable trays for installation of all low tension wiring for data, telephone, public address, security and other low tension-systems. Install cable trays from communication rooms and above all corridors. If cable trays pass through walls with fire resistance ratings, provide removable adjustable mechanism for fire stopping to allow easy installation of cables in the future. EZ path is not acceptable. Cable fill through each Adjustable Mechanism Fire Stop sleeve will not exceed 40% of the available internal cross-sectional area

7.7.4.1(12) .Cable tray will be aluminum ladder or steel wire mesh, ladder type with manufactured fittings. All edges will be smooth with no rough finishes.Provide continuous #6AWG minimum bare copper ground wire in the tray. Provide #6AWG bare copper bonding jumper between the cable tray and every associated conduit to ensure continuous bond between tray and low tension raceways. Provide separations on the cable tray to create separate channels within the cable tray to separate wiring used for different systems – for example data from security.

7.7.4.1(13) .Identify all conduits, raceways, pull boxes, and junction boxes using painted colour bands. Colouring scheme will be determined by the Authority at a later date. Provide high voltage power, lighting, fire alarm, Nurse Call, paging, security, BMS, 347/600V power, 120/208V power, UPS power etc. with unique colours in accordance with the colouring scheme. Major colour band to be 100 mm wide and minor colour band 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

7.7.4.2 Performance Criteria

7.7.4.2(1) Construct separate raceways or provide barriers in raceways to isolate systems of different voltages and use to prevent EMI.

7.7.4.2(2) Design and install raceways without sharp edges or sharp bends so that cables can be pulled in or laid in and removed without damage to the cables. Any bends in raceways not to exceed the soft 90 degree bend as per TIA cabling standards.

7.7.4.2(3) Provide all cable trays with minimum 40% spare capacity for the installation of future cables. If multiple raceways are required in a group, such as a duct bank or tray system interconnecting two or more major areas, provide matching empty raceway equal to a minimum of 50% of the capacity of the total used group.

7.7.4.2(4) Provide a minimum of four (4) spare 103 mm conduits from the main electrical room to each local electrical room. For example, if the main electrical room is in the basement and there are three local electrical rooms per floor that are stacked through the tower, provide four (4) spare 103mm conduits from the main electrical room to each stacked local electrical room on the first level. The rooms above, that are stacked, can have four (4) spare 103mm conduits interconnecting the stacked rooms.

7.7.4.2(5) Install all conduits in finished areas within finished walls and above finished ceilings.

7.7.5 Electrical Utilities (Underground Distribution)

7.7.5.1 Basic Requirements

7.7.5.1(1) .Electrical power to the Facility will be obtained from within the ACB -. The incoming 12.47kV BC Hydro High Voltage (HV) primary service is a double dual radial supply (two 12.47kV, 3 phase, normal feeders and one 12.47kV, 3 phase, stand-by feeder) and it is terminated at existing HV unit substation in the existing ACB. The equipment is located in the basement of the ACB.

7.7.5.1(2) .The existing HV switchboard in ACB is Cutler Hammer and there are two (2) empty cells (one per section). These cells are to be equipped with HV equipment and utilized to supply power to the new Facility.

7.7.5.1(3) As part of the SD submission provide detailed load calculations to indicate the anticipated power requirements for the new Facility (demand load plus required 25% spare capacity).

7.7.5.1(4) .The capacity and design of services will anticipate the need for future expansion to accommodate projected future growth of the Facility and the connected load.

7.7.5.2 .Performance Criteria

7.7.5.2(1) .Provide service conduits from the Facility's main electrical room to the existing ACB HV room.

7.7.5.2(2) .Provide concrete encased PVC conduit duct banks for service conduits and major feeders outside the footprint of the Facility.

7.7.5.2(3) .Identify the location of existing underground service lines in the area to avoid interference with proposed routing of new services and future services. Use latest techniques (ground penetration radar test) to verify and confirm all existing underground services in the direction of service lines to the Facility.

7.7.5.2(4) .Obtain prior written authorization from the Authority for all service connections. Service connections must be installed to the Authority's satisfaction. Refer to Schedule 2 Design and Construction Protocols, Part 6.10 Connections and Integration to

Existing Hospital regarding Work Plan and other requirements regarding work in existing buildings.

7.7.5.2(5) .Prepare and submit to the Authority a detailed Arc Flash study signed and sealed by a professional engineer registered in British Columbia and provide equipment labelling indicating available energy levels and level of PPE required when servicing the equipment. The study should include the existing HV -switchgear located in the ACB.

7.7.5.2(6) .Prepare and submit to the Authority a detailed short-circuit and protective device coordination study signed and sealed by a professional engineer registered in British Columbia that:

7.7.5.2(6)(a) .indicates all new and relevant existing service equipment from the point of utility supply and standby generators;

7.7.5.2(6)(b) .includes all transformers, distribution equipment, UPS and panelboards; and

7.7.5.2(6)(c) .includes ground study. The ground study to include soil resistivity testing, grid computer modelling, grid impedance measurements, step and touch calculations and ground fault isolation analysis.

7.7.6 .High Voltage Distribution (12.47kV) and 600V unit substation

7.7.6.1 .Basic Requirements

7.7.6.1(1) .Utilize distribution equipment that are robust, reliable, easily operated and maintained. Design with additional capacity to accommodate load growth and equipment additions.

7.7.6.1(2) .Modify and equip the existing cells #7 and #23 in the existing HV -switchgear in the ACB and provide fused disconnect equipment and metering in them to match existing equipped cells.

7.7.6.1(3) .Provide 100% redundancy in incoming HV services to the Facility such that it will be possible to support the entire Building load, including identified future expansions plus 25% spare capacity on either one of the incoming feeders when the other incoming

feeder is unavailable. The total calculated capacity will not exceed 80% of the rating of the service. The 80% loading applies to equipment that is 100% rated. For equipment that is 80% rated, maximum loading will be 64%.

7.7.6.1(4) .The 12.47kV HV switchgear in the new Facility will be configured in a primary selective configuration using main-double ended tie-main draw-out breakers with manual interlock on the HV breakers. Each HV main breaker will supply power to HV distribution section A and HV distribution section B. The double-ended tie may consist of a breaker and isolating switch but the breaker shall match the mains.

7.7.6.1(5) The HV distribution section A will have one (1) draw-out HV breaker and two (2) empty compartments (HV breaker enclosure only) for future expansion. The HV distribution section B will have one (1) draw-out HV breaker and two (2) empty compartments (HV breaker enclosure only) for future expansion. In total, between both HV boards, there will be two (2) breakers and four (4) empty compartments (HV breaker enclosure only).

7.7.6.1(6) .The main 600V low-voltage power distribution will be derived from two 12.47kV – 600V step-down power transformers. The transformers will be fed from HV section A and HV section B respectively in a 100% redundant scheme.. 600V distribution boards, will be fed from the transformers in a main-tie-main configuration, using identical 100% rated breakers.

7.7.6.1(7) The 600V switchboard and transformers shall be sized to carry the maximum anticipated demand load, including identified future expansions, plus 25% spare capacity. The overload capability of the temperature rise and additional fans must not be included in the sizing of the transformers.

7.7.6.2 .Performance Criteria

7.7.6.2(1) Last two spaces in existing 12.47kV switchgear in ACB will feed the two main 12.47kV feeders to the new Facility.

7.7.6.2(2) The two 12.47kV feeders from the ACB to the new Facility will be installed in a separate underground reinforced concrete-encased duct bank for the portion of run between the buildings. Each of the duct banks will be designed to also have three 125mm diameter spare conduits for future use.

7.7.6.2(3) Each incoming 12.47kV feeder will terminate on a draw out main breaker in the Facility, These breakers, will feed the HV primary switchgear primary switchgear comprised of:

7.7.6.2(3)(a) two main breakers for the incoming feeders;

7.7.6.2(3)(b) a double-ended tie breaker or tie breaker and isolating switch;

7.7.6.2(3)(c) A manual 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;

7.7.6.2(3)(d) Outgoing feeder breakers connected to the 12.47kV - 347/600V step down transformers;

7.7.6.2(3)(e) revenue-grade metering at each of the mains;

7.7.6.2(3)(f) 3-phase, solid-state multi-function type protective relay at each circuit breaker with ANSI functions 50/51, 50N/51N, 86 and additional functions as required. Protective relay will also have integral digital metering capable of displaying V, A, KVA, KW, wave capture, power factor, loggings and harmonic parameters;

7.7.6.2(3)(g) Communication port integrated with the Facility's Building Management System to indicate status of each breaker;

7.7.6.2(3)(h) 125V DC battery-backed power supply with charger for protective relays and controls with 10 years design life battery;

7.7.6.2(3)(i) Two outgoing breaker empty compartments per section (total of four) for future use; and

7.7.6.2(3)(j) Two breakers for incoming feeders from each of the two 12.47kV emergency generators, controlled and provided with protective relaying in a closed transition, soft transfer, transfer scheme with the main incoming breakers to the main high voltage boards.

7.7.6.2(4) The main 12.47kV/600V Power transformers:

7.7.6.2(4)(a) will be dry-type, with copper or aluminum windings. The kVA capacity indicated will be based on 80 degree Celsius temperature rise 220 degree insulation rating;

7.7.6.2(4)(b) will have delta connected primary windings and star-connected secondary windings. The secondary star point will be solidly grounded;

7.7.6.2(4)(c) will have ANN/ANF (air cooled natural circulation/ air cooled forced circulation) ratings and have cooling fans that will provide an additional 33% capacity over the base ANN rating;

7.7.6.2(4)(d) will have four 2½% full capacity primary taps, two above and two below nominal voltage;

7.7.6.2(4)(e) will 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;

7.7.6.2(4)(f) will have integral intermediate class lightning arrestors connected to the primary terminals;

7.7.6.2(4)(g) will be suitable for interior installation with CSA type 2 ventilated housing with overhanging drip proof louvers; and

7.7.6.2(4)(h) Will have impedance to restrict maximum fault levels to 65kA.

7.7.7 Low Voltage Distribution (600 Volts and below)

7.7.7.1 Basic Requirements

7.7.7.1(1) .Provide electrical power distribution from the main sources of supply (power transformers and diesel generators) to meet all requirements of the Facility and Project Agreement.

7.7.7.1(2) .Design the distribution system to provide security of supply and the flexibility to allow concurrent safe maintenance without impacting hospital operations.

7.7.7.2 .Performance Criteria

7.7.7.2(1) .Design and construct the Facility with a minimum of 25% spare capacity and include 25% physical space for future devices when sizing distribution equipment.

7.7.7.2(2) . Each of the main power 600V switchboards will be fed from the main transformers, one fed from HV section A and one fed from HV section B. The switchboard will be configured as double-ended with a Main/Tie/Main configuration and outgoing breakers as required. Two spare circuit breakers and two spaces will be provided on each half (side) of the switchboard. The breaker and space will be sized to match the two largest breakers in the switchboard.

7.7.7.2(3) .The main 600V switchboard(s) will directly feed:

7.7.7.2(3)(a) .Fire pump;

7.7.7.2(3)(b) .Non essential Motor Control Centres;

7.7.7.2(3)(c) .Non essential Distribution Panels;

7.7.7.2(3)(d) .large individual non-essential loads; and

7.7.7.2(3)(e) .automatic power factor correction systems, one on each side of the switchboard.

7.7.7.2(4) .Configure the distribution downstream of the main distribution board such that a pair of breakers (one on either side of the board) feed a double-ended 600V switchboard for Vital and Delayed vital emergency power, and single breakers to feed a single ended 600V switchboard for conditional power and normal power, with redundant feeds from the other main 600V boards to balance load and

provide redundancy in lieu of double-sided bypass transfer switches.

7.7.7.2(5) .600V Switchboards:

7.7.7.2(5)(a) .will be designed, factory-assembled and tested in accordance with CSA C22.2 No.31-10 "Switchgear Assemblies";

7.7.7.2(5)(b) .will 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;

7.7.7.2(5)(c) .will have circuit breakers with solid-state protective relays with adjustable time and current elements for Long time, Short time, Instantaneous, and Ground fault pickup settings. The protective relays will also 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 will be connected to the overall metering system and the Building Management System;

7.7.7.2(5)(d) .will have circuit breaker auxiliary contacts connected to the Building Management System to indicate operational status of each breaker;

7.7.7.2(5)(e) .will have colour coded lamacoid mimic bus single line diagram riveted on the front; and

7.7.7.2(5)(f) .will have engraved lamacoid nameplates for cubicle and circuit identification on front and rear sections.

7.7.7.2(6) .Provide minimum two double-ended 600V switchboards. Connect them so they will directly feed:

7.7.7.2(6)(a) .Vital and Delayed Vital 600V Distribution Panels. Provide a minimum of one distribution panel for each of the Vital, and Delayed-vital-branches in each electrical room on each floor;

7.7.7.2(6)(b) .Motor Control Centres for Delayed vital loads; and

7.7.7.2(6)(c) .large individual loads. (Example: process chillers).

7.7.7.2(6)(d) Conditional and normal power boards, elevator boards via redundant feeds, and large mechanical loads including the fire pump via redundant feeds.

7.7.7.2(7) .Provide minimum one single-ended Conditional 600V Switchboard. Connect so it will directly feed:

7.7.7.2(7)(a) .Conditional 600V Distribution Panels;

7.7.7.2(8) .Provide individual dry-type step-down 600V – 120/208V transformers in each electrical riser room on each floor level of the Building for each of the following distribution branches: non-essential, Vital, Delayed-vital, Conditional, and UPS.

7.7.7.2(9) .The individual step-down transformers for each of the non-essential, vital, delayed-vital, conditional, and UPS, branches on each floor should be fed from the corresponding Distribution Panel serving that branch.

7.7.7.2(10) .Provide a minimum of two local electrical rooms on each floor level to house 600V and 120/208V step-down transformers and distribution panels serving that floor. Vertically stack the electrical rooms on all floors throughout the height of the Building. If an additional electrical room is required on any floor, spatially separate the rooms on plan such that each room can serve equal parts of the floor plate.

7.7.7.2(11) .Install 120/208V dry type transformers for small equipment loads in electrical rooms on concrete pads or suspend from structure. Install transformers so that removal can be facilitated without removal of any other equipment or conduit.

7.7.7.2(12) .600V – 120/208V Transformers:

7.7.7.2(12)(a) .Type: ANN, 600 volts, 3 phase delta primary with taps 2 x 2 1/2% full capacity taps above and 2 x 2 1/2% taps below the nominal voltage.

7.7.7.2(12)(b) .Secondary: 3 phase, 60 Hz 120/208V 4 wire Y Electrostatic shielded grounded star secondary.

7.7.7.2(12)(c) .Class H, 220°C insulation with temperature rise not exceeding 115°C maximum in 40°C ambient.

7.7.7.2(12)(d) .Windings: High grade aluminum or copper windings, VPE or VPI type or approved method.

7.7.7.2(12)(e) .Impedance: per ANSI recommendations but must not be less than 4%.

7.7.7.2(12)(f) .Average Sound Level: Noise emission shall not exceed requirements per ST20 standard.

7.7.7.2(12)(g) .Enclosure: air ventilated EEMAC 1, removable metal front panel "sprinkler-proof" design. Provide angled louvres for ventilation slots to prevent entrance of water from the sprinkler fire protection system. Air cooled type, natural circulation in ventilated enclosure.

7.7.7.2(12)(h) .Mounting: provide external vibration isolator kit. Provide "Super W Pads" Neoprene.

7.7.7.2(12)(i) .Minimum efficiency of 98% or NEMA PREMIUM, whichever is more stringent.

7.7.7.2(12)(j) .Harmonic mitigation type transformers shall include the following in addition to the above:

(j).1 .3rd harmonic and other zero sequence currents shall be treated in the secondary windings of the transformer through flux cancellation, and shall not be coupled into the primary winding. Trapping these currents in the primary delta winding, as is the case for the delta-wye transformer configuration, is not acceptable;

(j).2 .5th and 7th harmonics are treated by introducing the appropriate primary-to-secondary phase-shift in the transformer such that these currents subtract at the common bus with 5th & 7th harmonic currents produced by other similar harmonic current sources fed from the same bus;

(j).3 .Fundamental current imbalance shall be reduced on the primary side of the transformer compared to the secondary side;

(j).4 .Load Compatibility: K-13 load current handling capability, crest factor up to 5; up to its nameplate kVA rating without derating; and

(j).5 .Electrostatic Shielding: Each winding is independently single shielded with a full-width copper electrostatic shield.

7.7.7.2(13) .Distribution Panels:

7.7.7.2(13)(a) .will utilize moulded-case circuit breakers;

7.7.7.2(13)(b) .600V Distribution Panels will directly feed the corresponding 600-120/208V step-down transformers located on each floor for non-essential, Vital, Delayed-vital, Conditional-and UPS branches; and

7.7.7.2(13)(c) .The 120/208V distribution panels, in turn, will feed the corresponding lighting/receptacle panels for each branch.

7.7.7.2(14) .Locate the main electrical room above the water table 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. No plumbing or HVAC equipment should be located or routed through this room. If the room is cooled, place cooling units outside the room and duct in/out as required.

7.7.7.2(15) .Locate major electrical equipment to minimize run length of feeders and branch circuits, and locate within the Facility so as to provide a clean, dry, safe, accessible installation protected from unauthorized access.

7.7.7.2(16) .Provide one (1) dedicated ATS for-firefighter elevator and separate ATSs for remaining elevators. Connect the fire fighter elevator ATS between Vital and Delayed Vital branches, and the ATSs for the remaining elevators between Delayed Vital and Conditional branches. Provide distribution board for remaining elevators, splitters not allowed.

7.7.7.2(17) .Rate all distribution devices to handle available fault current at line terminals. Perform a computer generated fault study to ensure that all devices are properly rated and coordinated.

7.7.7.2(18) .Design and install protection equipment so that the initial electrical installation, future additions and modifications will be fully coordinated to isolate only the faulty portion of the system.

7.7.7.2(19) .Provide a networked digital metering system to monitor electrical loads and quality of power in the Facility.

7.7.7.2(20) .Provide automatic power factor correction equipment within the Building to ensure the Building power factor does not fall below the 90% lag threshold. Coordinate capacitors with adjustable frequency drives and other harmonic generating equipment to avoid resonance conditions.

7.7.7.2(21) .Provide transformation equipment for diagnostic imaging equipment as required by the imaging equipment vendors.

7.7.7.2(22) .Provide circuit breaker type panelboards fully rated to handle calculated fault current level. Series rating of breakers and panel boards are not acceptable.

7.7.7.2(23) .All panelboards to have minimum of 10 single spaces and 5 spare 20A-1P breakers matching the sizes of the breakers installed in the panel.

7.7.7.2(24) .Construct flush mounted panel boards with five spare 25mm conduits stubbed into ceiling space above and two spare 25mm conduits stubbed into ceiling space below.

7.7.7.2(25) .Provide panel boards with integral Surge Protective Devices (SPD) to serve electronic equipment susceptible to electrical transients. Panel boards serving the main computer room and the on-floor communication rooms to have integral SPD.

7.7.7.2(26) .Install distribution panels and panelboards on the same floor as the loads they serve.

7.7.7.2(27) .Components of the distribution systems in any public, clinical, administrative or staff area will have long life expectancy without perceptible

deterioration and a good appearance. Design and install so as to permit easy and complete cleaning.

7.7.7.2(28) .Provide individual enclosed motor starters for individual motors. Utilize motor control centres for groups of four or more motors that require individual motor starters.

7.7.7.2(29) .Motor starters will be combination of magnetic MCP (Motor Circuit Protector) type with integral control power transformers, Hand-Off-Auto (HOA) or start/stop control and at least two auxiliary contacts in addition to seal-in contacts.

7.7.7.2(30) .Provide combination starters for all motors 1/2 HP and larger that are not already controlled by adjustable frequency drive or include an integral control package. All motors of ½ HP or more will be 600 volt 3 phase.

7.7.7.2(31) .Provide SPD for the main 600V switchboards and 120/208V panel loads and all other panels serving sensitive electrical loads including diagnostic equipment, lab equipment and adjustable frequency drives.

7.7.7.2(32) .Locations of receptacles will comply with all applicable codes and standards and the requirements for each program area as described in the Appendix 3A-Clinical Specification.

7.7.8 .Emergency Power

7.7.8.1 .Performance Criteria

7.7.8.1(1) .Provide an emergency power system to supply emergency power for code-required loads and additional loads as indicated in the event of normal power failure.

7.7.8.1(2) .The emergency power system will include a minimum of two (2) synchronized diesel generator units of equal capacity each one capable of supplying power to 100% of the Vital branch, Delayed-vital branch, Conditional branch, and UPS branch loads In addition, provide 25% spare capacity for future load. Generators should have

100% redundancy (not N+1 configuration) to cover to load. Provide space to allow additional switchgear cubicles.

7.7.8.1(3) .Provide diesel generators and support systems that are capable of running continuously for at least 72 hours at 100% rated load (initial and future) of all the units combined.

7.7.8.1(4) .Generators shall be located so as to permit convenient servicing and monitoring, to prevent unauthorized access and to avoid interruption due to floods and seismic event.

7.7.8.1(5) .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 and should go to alarm when fuel supply drops below 24 hours. Fuel system to comprise main fuel tanks (underground although important to consider locating tanks indoors and above ground), day tank for each generator, duplex redundant electric fuel pumps with backup manual fuel pumps to allow maintenance staff to manually transfer fuel from main tank to day tank. Day tank to be double wall construction with float alarm.

7.7.8.1(6) .Locate each diesel generator in a separate dedicated fire rated room.

7.7.8.1(7) .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. Locate the diesel generator exhaust outlet above roof level and prevent re-entrainment of emissions into air-intakes of any building on C&W Campus. 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.

7.7.8.1(8) .Generators shall be located, vibration isolated, and muffled so that sound level is not exceeding 90dB at 2 meters from the generator and the vibration is 97% isolated within the rooms 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.

7.7.8.1(9) Design the system with redundant power paths to maintain full and continuous service to clinical operations at all times, including during system maintenance.

7.7.8.1(10) Provide emergency power to serve essential loads as defined by CSA Z32 and as required to meet the Appendix 3A-Clinical Specification and Schedule 2-Appendix 2E (Equipment and Furniture) requirements, including, but not limited to:

7.7.8.1(10)(a) Vital branch loads:

(a).1 Path of egress illumination;
(a).2 Exit signs;
(a).3 Elevator cab and machine room luminaires;
(a).4 Fire alarm system and sprinkler system;
(a).5 Smoke control fans;
(a).6 Fire pump and jokey pump if provided;
(a).7 Stair and ramp illumination;
(a).8 Receptacles and luminaires in service rooms for emergency distribution;
(a).9 Medical gas alarm panels;
(a).10 Smoke venting fans;
(a).11 Telecommunications systems and Network equipment in all IT Communication Rooms;
(a).12 100% of lighting, receptacles, and permanently connected equipment in Operating Rooms (ORs), Labour Delivery Rooms (LDRs), Post Anesthetic Care Unit (PACU), Pediatric Intensive Care Unit (PICU), Neonatal Intensive Care Unit (NICU), Ventilator Unit, Emergency Department rooms, Triage, Dialysis Unit and Procedure rooms, split as follows: 50% to Vital branch and 50% to the UPS power branch;
(a).13 50% of receptacles and lights in all patient care rooms, other than patient care areas in inpatient rooms, PICU and NICU;
(a).14 50% of luminaires and outlets in care team stations, other than patient care areas in inpatient rooms, PICU and NICU;
(a).15 Patient/team call system power supplies;

(a).16 Medical vacuum pumping systems;
(a).17 50% of receptacles and lights in laboratories;
(a).18 Luminaires and receptacles in Satellite Pharmacy, Satellite Pharmacy modular clean room, Pharmacy dispensing areas;
(a).19 Equipment indicated on Equipment and Furniture List as requested by the Authority during user meetings;
(a).20 PICU and NICU department, 75% of each system to be connected to Vital;
(a).21 Lab analyzers;
(a).22 Hands-free sinks with electronic operators.
(a).23 Elevators – one in each group/location and each stand alone elevator; and
(a).24 50% of exterior lighting

7.7.8.1(10)(b) Delayed vital branch loads including but not limited to:

(b).1 Ventilation systems serving patient care areas;
(b).2 Sump pumps and sewage ejector pumps;
(b).3 Medical air pumping systems;
(b).4 Fume hoods / Bio-hazard hoods.
(b).5 Essential heating, ventilation and plumbing systems;
(b).6 Radiology, MRI, Ultrasound and CT Scan equipment as per Schedule 2-Appendix 2E (Equipment and Furniture) and Appendix 3A Clinical Specification;
(b).7 Alarmed freezers and refrigerators;
(b).8 Pneumatic Tube system;
(b).9 All equipment in Medical Device Reprocessing (Central Sterilization) area;
(b).10 Ventilation and air conditioning/cooling equipment serving the main computer room, and on-floor communication riser rooms, and 24x7 cooling loads as defined by the CSA-Z317.5; and
(b).11 Ventilation and air-conditioning/cooling equipment serving the main electrical room, electrical riser rooms on each floor and the central UPS room.
(b).12 Videoconferencing and telehealth equipment

7.7.8.1(10)(c) Conditional branch loads:

(c).1 main chiller(s);
(c).2 panels and loads for leased spaces;
(c).3 FF elevator load;
(c).4 remaining elevators; and
(c).5 window washing system.

7.7.8.1(11) The BMS will monitor and record the operation of emergency loads.

7.7.8.1(12) Provide a UPS branch panel board and a Vital branch panel board in the main computer 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.

7.7.9 Uninterruptible Power Supply (UPS) Systems

7.7.9.1 Basic Requirements

7.7.9.1(1) Provide centralized Uninterruptible Power Supply (UPS) systems for all essential areas, equipment and systems that require a continuous and uninterrupted source of power as per the requirements of the Schedule 2-Appendix 2E (Equipment and Furniture), and for the following additional outlets, equipment and systems:

7.7.9.1(1)(a) 50% of luminaires, receptacles, and permanently connected equipment in Operating Rooms, LDRs, ACU, PICU, NICU, ED and inpatient rooms;

7.7.9.1(1)(b) 100% of the Operating Room surgical task lights in ORs, LDRs, NICU, ACU and PICU;

7.7.9.1(1)(c) 100% of the Operating Room audio-visual system in ORs, LDRs, NICU, ACU and PICU;

7.7.9.1(1)(d) Provide UPS capacity allowance to add up to 25% of the initial quantity of luminaires, receptacles and equipment as requested by the Authority during Design Consultation phase;

7.7.9.1(1)(e) the Building Management System;

7.7.9.1(1)(f) panic duress system;

7.7.9.1(1)(g) electronic access control systems;

7.7.9.1(1)(h) intrusion detection system;

7.7.9.1(1)(i) medical equipment indicated in Schedule 2, Appendix 2E (Equipment and Furniture) which is deemed life-critical; and

7.7.9.1(1)(j) all equipment and systems located in Main Equipment Room, Equipment rooms, each telecommunication room and including, but not limited to:

(j).1 network equipment for the wired and wireless networks;
(j).2 wireless access points;
(j).3 PBX and other telephone equipment, excluding the handsets;
(j).4 wireless communications system;
(j).5 paging system;
(j).6 intercom;
(j).7 RTLS system;
(j).8 Security system; and
(j).9 CCTV system

7.7.9.2 Performance Criteria

7.7.9.2(1) The centralized UPS system will be fed from the vital branch of emergency power system supplied by diesel generators.

7.7.9.2(2) Where Vital functions are connected to a UPS circuit, include an audible or visual warning in the Vital function area 5 minutes before the UPS battery supply is exhausted. Provide additional monitoring by the BMS.

7.7.9.2(3) All UPS loads will be connected to centralized UPS distribution system. All connections for those loads

will be rated for connected load plus 25% spare capacity.

7.7.9.2(4) .Connect UPS units to an emergency generator circuit and provide adequate batteries rated for a minimum of 60 minutes at full UPS capacity.

7.7.9.2(5) .Centralized UPS system:

7.7.9.2(5)(a) .Will have modular architecture with no system-level single-point-of-failure;

7.7.9.2(5)(b) .Will have two (2) or more UPS modules connected in parallel providing N+1 redundancy, to ensure UPS power to support 100% of the initial load and 25% spare capacity when one UPS module is unavailable;

7.7.9.2(5)(c) .Will have a dedicated battery string for each UPS module rated to provide 30 minutes of back up time when the UPS module is carrying 100% rated load;

7.7.9.2(5)(d) .Will be online, double-isolation type having input power factor of minimum 0.9;

7.7.9.2(5)(e) .Will 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;

7.7.9.2(5)(f) .Will have static bypass to automatically bypass each UPS module in the event of UPS module failure;

7.7.9.2(5)(g) Will have external maintenance bypass switching cabinet for servicing each UPS module and one for the entire UPS system; and

7.7.9.2(5)(h) .Each UPS module and the static bypass will have a dedicated input feeder connected to the vital branch.

7.7.9.2(6) .The main distribution panel that is fed from the UPS system output will have an alternate input that can be energized directly from the main Vital switchboard in the event of a UPS system-failure. Provide interlocking as required.

7.7.9.2(7) .No stand alone small size UPS units that are rack mounted or on the floor are allowed.

7.7.10 Metering

7.7.10.1 Basic Requirements

7.7.10.1(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:

7.7.10.1(1)(a) HV feeders from the ACB;

7.7.10.1(1)(b) Secondary main of all 12.47kV-600V step-down transformers;

7.7.10.1(1)(c) 600V Switchboards, mains and each feeder breaker;

7.7.10.1(1)(d) UPS system;

7.7.10.1(1)(e) Distribution Panels at 600V and 208V;

7.7.10.1(1)(f) Motor control centres; and

7.7.10.1(1)(g) Panelboards feeding mechanical equipment and elevators.

7.7.10.1(2) Ensure that metering is provided to record total energy consumed by luminaires and equipment. Integrate information from all meters on a common software platform residing on a dedicated electrical metering server.

7.7.10.1(3) Metering will be provided on all Non-essential, Essential, Vital, Delayed vital, Conditional and UPS power branches.

7.7.10.1(4) 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 and mechanical sections for Energy Management.

7.7.10.1(5) Implement a networked metering system with terminals for maintenance and plant administration, and data transfer to the BMS.

7.7.10.1(6) Connect electrical demand and consumption meters to the BMS.

7.7.10.1(7) .Include trend logging equipment sensors to comply with and fulfill energy measurement and verification requirements. Logged information will not be overwritten and will be archived.

7.7.10.1(8) .Provide additional meters required to measure energy performance in order to determine performance in accordance with Schedule 2-Appendix 2D (Energy).

7.7.10.1(9) .Provide additional meters as required to achieve Measurements and Verification requirements for LEED 2009 HC (USGBC) HC EA5 M&V point.

7.7.10.2 .Performance Criteria

7.7.10.2(1) .Include display components for easily read local information for all distribution at primary voltage and for each secondary distribution switchboard.

7.7.10.2(2) .Metering intervals will be one hour.

7.7.10.2(3) .Design the metering system network to store historical data for a minimum of one year and with the capability to generate user configurable electronic and printed reports on demand.

7.7.10.2(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.

7.7.10.2(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 Current (all phases and neutral), KW (peak and average), KVA (peak and average), Power Factor, KWH, VAR hours , frequency, current and voltage harmonics.

7.7.10.2(6) .Utilize power quality type meters for monitoring harmonics and surges / sags. Provide power quality meters capable of monitoring harmonics on the Non-essential, Vital, Delayed vital and Conditional switchboards.

7.7.10.2(7) Draw-out circuit breakers 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.

7.7.11 Grounding and Bonding

7.7.11.1 Basic Requirements

7.7.11.1(1) Provide grounding and bonding for all electrical equipment and systems in the Facility for the safety of people and for protection against damage to equipment or property in the case of a fault occurring in any of the equipment or systems. Install grounding as required by all applicable standards, including TIA standards for communications and security equipment and systems.

7.7.11.2 Performance Criteria

7.7.11.2(1) Utilize non-alloyed copper for all conductors and all conducting components of electrical equipment which form part of the grounding and bonding systems in the Facility.

7.7.11.2(2) Provide solid system grounding including conductors and bussing.

7.7.11.2(3) Provide equipotential grounding systems and equipment for all patient care areas, including a common ground bus for each patient bed location.

7.7.11.2(4) Bond all exposed non-current carrying components of communication, radio or television equipment in patient care areas to ground using a properly sized equipment bonding conductor.

7.7.11.2(5) Provide a ground bus in each electrical and communication room connected to the central grounding system. The ground riser for the electrical and communication grounding system must be kept separate. The only connection point will be from the ground bus in the main communications room to the main Building ground.

7.7.11.2(6) Provide a copper ground conductor within all raceways for feeders and branch circuit wiring.

7.7.11.2(7) .Provide a minimum #6 AWG continuous copper ground conductor in the cable tray system and bond to each section of cable tray at minimum intervals of 15m.

7.7.11.2(8) .Complete a lightning protection study for the Facility, such study to be done by a specialist in lightning protection work and to be signed and sealed by a professional engineer registered in British Columbia. Implement a lightning protection study on any risk value of 4 or higher, as defined by CAN/CSA B72. Provide lightning protection if required by study.

7.7.12 .Seismic Requirements for Electrical Systems

7.7.12.1 .Basic Requirements

7.7.12.1(1) .Provide seismic restraint for all electrical equipment and components of electrical systems which are part of building electrical systems designed to meet the standards of a post disaster building as defined in the VBBL.

7.7.12.1(2) .Provide seismic restraint systems and methods that facilitate ease of maintenance and ease of replacement and reconfiguration of electrical equipment and systems and other equipment and building components.

7.7.12.1(3) .Provide seismic restraint systems and methods that coordinate with the Facility's architecture and finishes. Wherever practical, conceal components of seismic restraints from public view. Where concealment is not practical, provide systems that complement the Facility's architecture and finishes.

7.7.12.2 .Performance Criteria

7.7.12.2(1) .Provide seismic support for all electrical equipment and components of electrical systems that have the potential to cause injury or damage during or following a seismic event.

7.7.12.2(2) .Use seismic restraint systems that are designed by a professional engineer, registered in British Columbia, or, where an identified pre-designed

standard restraint device or system exists for a particular item, that equipment may be used provided that written confirmation of its acceptability for the installation is provided by a professional engineer registered in British Columbia. Provide signed and sealed drawings as well as typewritten field reports from a professional seismic engineer, registered in British Columbia. Obtain certification of the main electrical distribution equipment for "seismic withstand capability" and, to maintain the certification, anchor such equipment according to the manufacturer's instructions.

7.7.13 Power Quality

7.7.13.1 Basic Requirements

7.7.13.1(1) Establish and maintain an overall power quality which assures suitable conditions for operation of all electrical and electronic equipment throughout the Facility.

7.7.13.1(2) Provide equipment and systems which assure that electrical equipment and systems will not be harmed or impaired either by external events or conditions, such as lightning and disturbances on the utility service, or by internal events or conditions generated within the Facility.

7.7.13.1(3) Meet relevant standards for power quality where deemed necessary by IEEE including, but not limited to: Harmonic Mitigating Transformers, Harmonic Filters, Surge Protective Devices (SPD's), etc.

7.7.13.1(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 12.47kV-600V step-down transformers. As part of commissioning, confirm compliance to tables 10-2 and 10-3 of IEEE 519 by field measurements after Facility occupancy and under normal operating conditions.

7.7.13.2 Performance Criteria

7.7.13.2(1) .Provide equipment, such as filters, Surge Protection Devices, etc, specifically designed to control and remove all adverse power quality conditions that could damage or impair function of sensitive electronic equipment used in the Facility. Adverse power quality conditions include voltage spikes, dips and droops, transients, harmonics, power factor and radio frequency interference.

7.7.13.2(2) .Provide the ability to demonstrate to the Authority at any time that there are no potentially harmful power conditions present and that equipment intended to guard against such conditions is in proper working order.

7.7.13.2(3) .The voltage phase imbalance will not exceed 3 percent between phases A, B, C anywhere within the power distribution system.

7.7.13.2(4) .Provide phase detection/protection at all switchboards feeding mechanical equipment, elevator equipment and medical equipment indicated in Schedule 2, Appendix 2E (Equipment and Furniture).

7.7.13.2(5) .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.

7.7.13.2(6) .Provide individual harmonic filters ahead of and coordinated with variable speed drive for every motor greater than 7.5 HP. Filters must control the THD within the values specified by IEEE 519. The Point of Common Coupling (PCC), referred to in IEEE 519, will be the electrical distribution board, Motor Control Centre (MCC) or panel board to which the variable speed drive is connected.

7.7.13.2(7) .Provide harmonic mitigation transformers for all loads fed by Vital, Delayed vital, and UPS power sources and any specific critical equipment.

7.7.14 .Lighting

7.7.14.1 .Basic Requirements

7.7.14.1(1) .Utilize premium grade quality luminaires with emphasis on energy efficiency and high colour rendition. Electronic ballasts will be high efficiency. Lamps will have the following minimum characteristics:
- Fluorescent - 3000°K or 4100°K with CRI 85;
- Ceramic Metal Halide - 3000°K with CRI 85; and
- LED - 2700°K to 4000°K with CRI 80.

7.7.14.1(2) .Provide luminaires and light sources that enhance safety and allow personnel to circulate throughout spaces and perform required tasks.

7.7.14.1(3) .Design lighting with the objective of creating a comfortable working environment and an environment conducive to healing and recovery.

7.7.14.1(4) .Utilize a combination of natural light, luminaries and controls to optimize daylight.

7.7.14.1(5) .Provide automatic lighting controls with flexibility to adjust lighting to suit functions and activities and permit simple and integrated control of lighting. Design controls to be easily operated and conveniently and appropriately located for each area and function.

7.7.14.1(6) .Lighting controls will comprise a significant part both of the energy management of the Facility and of the flexibility required to adjust lighting to suit functions and activities.

7.7.14.1(7) .Lighting will comply with all characteristics recommended by the CSA Standard Z317.5 Illumination Systems in Health Care Facilities.

7.7.14.1(8) .Lighting power density levels will comply with ASHRAE Standard 90.1 2010-and the lighting installed will meet the requirements of the Appendix 3A-Clinical Specification.

7.7.14.1(9) .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 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.

7.7.14.1(10) .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. The sign will be connected to an internally illuminated switch inside the room label "X-ray". The switch will be interlocked with the x-ray equipment such that the equipment will not operate with the switch in the "off" position. Internal illumination of the switch will be on only when the "X-ray in Use" sign is illuminated.

7.7.14.1(11) .Provide lighting for public outdoor to create an unobtrusive, human scale lighting concept, with a hierarchy of fixture types designed according to functional and security needs of the Facility. All exterior lighting to be controlled by internal to the fixtures photocells and clock.

7.7.14.1(12) .Provide exterior lighting to protect the safety and security for night staff, patients and visitors without contributing to light pollution.

7.7.14.1(13) .Provide lighting for parking areas to protect the safety and security for staff, patients and visitors as required by the current standards and codes.

7.7.14.2 .Performance Criteria

7.7.14.2(1) .Provide luminaires that are not point of collecting dust, require minimal cleaning and permit practical and easy access and disassembly. All lighting components will be hospital grade.

7.7.14.2(2) .Utilize fluorescent lighting predominantly. Use compact fluorescent or LED lighting for decorative purposes. Use high efficiency electronic fluorescent ballasts and linear T8 , T5 and T5HO lamps when possible. Do not use incandescent lighting unless otherwise indicated in this Schedule. Do not specify or install T9, T10 or T12 or mercury vapor type high intensity discharge (HID) lamps in the project. Do

not specify and install probe start metal halide HID lamps in interior spaces in the Facility.

7.7.14.2(3) .Light Emitting Diodes (LEDs) will have a minimum CRI of 80 and will be 1.2 to 3W per LED. For colour temperature consistency, LEDs will come 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. If LED lighting is to be used in patient care areas it shall meet the following requirements: 2700°K-3500°K, minimum of 95% CRI, with a minimum of 96% R9 value and 2 MacAdam Ellipse variation and not less than 5 years warranty on colour consistency and lumen maintenance of the LED module..

7.7.14.2(4) .Utilize electronic ballasts for fluorescent lamps with a THD of 10% and no more than 8% for third harmonic. Ballasts will not exceed Class A ambient noise levels. Power factor will be .98 or greater and efficiency will be 90% or higher. Ballasts for areas employing occupancy sensors will be programmed start.

7.7.14.2(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 inpatient areas, emergency distribution rooms, and mechanical areas.

7.7.14.2(6) .Connect, at a minimum, 20% of the lighting in critical care rooms to the UPS system.

7.7.14.2(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.

7.7.14.2(8) .Utilize low glare, recessed direct-indirect fluorescent luminaries specifically designed to eliminate indirect glare in treatment rooms, offices, reception areas, care team stations and other areas where computer terminals and similar screens are available.

7.7.14.2(9) .Design lighting in technology conference rooms and video conferencing facilities to maximize viewing of monitors and screens and provide suitable vertical and horizontal illumination of people being viewed. Lighting in those rooms to be dimmable to allow proper use of the videoconferencing image.

7.7.14.2(10) .Provide special hard wired task lighting designed for the types of procedures conducted for rooms and areas where treatment is provided and areas where specialized analytical or diagnostic work is carried out.

7.7.14.2(11) .As architectural features, design lighting in lobbies, pause 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.

7.7.14.2(12) .Where patients are being transferred and/or lying on a stretcher provide direct/indirect lighting to limit glare to patients.

7.7.14.2(13) .Utilize vandal resistant and dark sky compliant, LED type exterior luminaires. Lighting on pedestrian paths will illuminate not just the path, but the surrounding area adjacent to the path. Connect minimum of 50% of exterior lighting to emergency power.

7.7.14.2(14) .Utilize LED type exit signs, and steel in unfinished areas.

7.7.14.2(15) .Operating Rooms, LDRs, NICU and PICU

7.7.14.2(15)(a) .Provide IP65 rated luminaires suitable for a "Clean Room" environment.

7.7.14.2(15)(b) .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.

7.7.14.2(15)(c) .Connect Surgical Procedure Lights to the UPS branch.

7.7.14.2(15)(d) Provide connections and services (power, raceway, grounding, wiring, etc.) for all Operating Room lighting provided. Project Co to supply/install, set-up, test and commission.

7.7.14.2(15)(e) Provide dimmable downlights around the perimeter of the room.

7.7.14.2(15)(f) Provide separately switched dimmable downlights above the Observation Alcoves, Anaesthetist's Work Area and Storage areas.

7.7.14.2(15)(g) Provide dimmable linear fluorescents luminaires above the surgical field. In each luminaire, provide two greenlamps on separate dimming controls. Connect these luminaires to the Vital and UPS branch.

7.7.14.2(15)(h) In NICU, lighting shall not shine directly on the infants. All patient spaces will be provided with multi level switching and dimming capabilities. Overhead lighting should be adjustable, indirect and separately controlled to allow dimming or complete switch off, as well as the required high level of light required for procedures. Controls to be provided at door and bed head location.

7.7.14.2(16) Medical Device Reprocessing areas, Satellite Pharmacy, Sterile Core and Workrooms

7.7.14.2(16)(a) Provide IP65 rated luminaires suitable for a "Clean Room" environment.

7.7.14.2(16)(b) Provide separately switched task lighting at each of the workstations in addition to room/area lighting.

7.7.14.2(16)(c) In computer workstation/monitor locations, provide direct/indirect lighting and position ceiling luminaires to avoid direct and reflected glare.

7.7.14.2(17) Offices

7.7.14.2(17)(a) de separately switched task lighting at each of the workstations in addition to room/area lighting.

7.7.14.2(17)(b) In computer workstation/monitor locations, provide direct/indirect lighting and position ceiling luminaires to avoid direct and reflected glare.

7.7.14.2(18) Public Areas including all Reception areas,"Pause" areas, Waiting areas, Lobbies and Seating Areas

7.7.14.2(18)(a) Provide decorative lighting for visual interest, and lighting that illuminates feature wall and specialty signage, design features, and special features of the area.

7.7.14.2(18)(b) Wall sconces must comply with barrier free requirements. Use either fluorescent or LED type.

7.7.14.2(19) Care Team Stations, Decentralized Care Team Stations

7.7.14.2(19)(a) Provide direct/indirect lighting.

7.7.14.2(19)(b) Provide multilevel lighting so that there can be lower levels of lighting at nighttime.

7.7.14.2(19)(c) Provide decorative lighting.

7.7.14.2(19)(d) Provide task lighting.

7.7.14.2(19)(e) Provide controls for the corridor lighting at the Care Team Stations.

7.7.14.2(19)(f) Provide an override on/off switch for all patient bay lighting at the Care Team Stations.

7.7.14.2(20) Patient Washrooms

7.7.14.2(20)(a) Provide an amber, LED night light in each Patient Washroom that is switched. Locate the switch inside the washroom adjacent to the door. Provide a vanity light at the sink. Do not provide a heat lamp.

7.7.14.2(21) Patient Room, Inpatient room, Patient Holding, and Patient Stretcher Bay

7.7.14.2(21)(a) Provide two dimmable, asymmetrical, lensed 150mm x 1220mm or 200mm x 1220mm ceiling mounted patient exam luminaires with antimicrobial finish flanking the patient bed. The luminaires will be complete with dimmers and dimming ballasts to dim from 10%-to 100%.

7.7.14.2(21)(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.

7.7.14.2(21)(c) Provide separate controls to dim the 150mm x 1220mm or 200mm x 1220mm fixtures at each of the following locations:

(c).1 inside the room at the entrance from the corridor; the headwall; and

(c).2 the patient-controlled nurse call pillow speaker.

7.7.14.2(22) Patient Isolation Room

7.7.14.2(22)(a) Provide two dimmable, asymmetrical, lensed 150mm x 1220mm or 200mm x 1220mm ceiling mounted patient exam lights with antimicrobial finish flanking the patient bed. The luminaires will be complete with dimmers and dimming ballasts to dim from 10% - 100%.

7.7.14.2(22)(b) Provide an amber, LED night light that is switched inside the room at the entrance from the corridor, in the ante-room and through the patient-controlled nurse call pillow speaker.

7.7.14.2(22)(c) Provide separate controls to dim the 150mm x 1220mm or 200mm x 1220mm fixtures at the following locations:

(c).1 inside the room at the entrance from the corridor;

(c).2 the headwall;

(c).3 the patient-controlled nurse call pillow speaker; and

(c).4 the ante-room.

7.7.14.2(22)(d) Provide hard wired task lighting in the respective ante-room.

7.7.14.2(23) Connect 50% of exterior lighting to emergency power system.

7.7.15 Lighting Control

7.7.15.1 Basic Requirements

7.7.15.1(1) Lighting controls will comprise a significant part both of the energy management of the Facility's and

of the flexibility required to adjust lighting to suit functions and activities.

7.7.15.1(2) .Lighting control will permit simple and integrated control of lighting; controls will be easily operated and located for each area and function in consultation with the Authority.

7.7.15.1(3) .Lighting controls will be of the extra-low voltage type except where not permitted by the Canadian Electrical Code or CSA standards for healthcare facilities.

7.7.15.1(4) .All lighting control panels and relays to be installed within electrical rooms and not within ceiling spaces.

7.7.15.1(5) .All of the lighting in a space will be capable of being switched at all entrances to the space.

7.7.15.1(6) .Integrate the lighting control system with the Building Management System for remote control of the lighting.

7.7.15.1(7) .Staff and patients will have the ability to control the lighting in their environment. All patient or families areas will have staff and patient lighting control. All other rooms will have staff lighting control.

7.7.15.1(8) .Patient will have the ability to control the lighting levels in their room or bay directly and easily from their beds.

7.7.15.1(9) .Occupancy sensors and daylight control systems will be utilized to maintain light levels at levels based upon the occupancy of the room and the quantity of daylight. Provide manual 'ON' control for occupancy sensing controls.

7.7.15.1(10) .Multilevel lighting control is to be provided in the following areas – pharmacy, reception and entrance of each department, counselling, triage and assessment rooms, work rooms, trauma and resuscitation, care stations, break rooms, radiology, exam rooms, lounge, ORs, LDRs, NICU, ACU, PICU, patient rooms, recovery rooms, consultation rooms, charting rooms, sterile processing, patient and public corridors.

7.7.15.1(11) .Dimming control is to be provided in the following areas: inpatient rooms, conference, videoconference and meeting rooms, multipurpose rooms, charting, treatment rooms, radiology, procedure rooms, imaging department, group rooms, control rooms.

7.7.15.2 Performance Criteria

7.7.15.2(1) .Where lighting controls are required to be located in areas accessible to the public, they will be protected from unauthorized operation. Corridor lighting controls will be located at the Team Care Stations and reception desks, where applicable. Controls will 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.

7.7.15.2(2) .Lighting control system will be interfaced to the Building Management System to permit override '100% on' and night set back control. Lighting program will be established by Project Co and coordinated and approved by the Authority, to address different conditions such as power outage and fire alarm.

7.7.15.2(3) .Low voltage controls for all corridors, circulation and atrium areas to be interfaced to BMS system to provide zone control of the lighting in the Facility. Zoning control to include floor by floor, and department by department as a minimum and to provide automatic night set back in non critical areas.

7.7.15.2(4) .All manually operated lighting controls will be of a type, which can be completely cleaned and disinfected without requiring any disassembly. Manually operated controls will not deteriorate or otherwise adversely be affected by frequent cleaning and disinfections.

7.7.15.2(5) .Lighting controls in locations where they may be subjected to excessive moisture or to chemicals that might cause deterioration are to be rated specifically for the application.

7.7.15.2(6) .Locate all lighting control panels and relay devices within electrical rooms and non-public corridor walls, and not within ceiling spaces.

7.7.15.2(7) .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. Authority to review controls as per Schedule 2 .

7.7.15.2(8) .Lighting in open areas and common areas will be zoned and subdivided to permit energy management control and variation of light levels.

7.7.15.2(9) .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.

7.7.15.2(10) .Occupancy sensors will be automatic on/off type and will control both room lighting and HVAC systems (via sensor contact interface to BMS).

7.7.15.2(11) .Vacancy sensors, a subset of occupancy sensors, will be manual on/off/dimming, automatic off type.

7.7.15.2(12) .Occupancy sensors will be provided in the following areas – offices, record rooms, storages, workstations and work rooms, conference and meeting rooms, interview and counseling rooms, assessment rooms, public washrooms, housekeeping, multipurpose rooms, nourishment stations, clean and soiled utility, medication rooms, break rooms, lockers, changing rooms for staff, on-call rooms, equipment rooms, lounges and receiving.

7.7.15.2(13) .Daylighting controls will be provided for all lighting in areas adjacent to exterior glazing and will provide dimming to 10% of lamp output. Provide

combination daylight harvesting and occupancy control to the rooms exposed to daylight and requiring occupancy sensors.

7.7.15.2(14) Daylighting will meet the following performance criteria:

7.7.15.2(14)(a) The average illumination across a representative portion of the task surface will be at least 30% of the target design level for that space type within 5 meters of the daylight source; and

7.7.15.2(14)(b) Overhead lights within the space will be dimmed as low as possible (or turned off) while satisfying above criteria in 7.7.15.2(14)(a).

7.7.15.2(15) Occupancy sensors and daylighting controls will be extra-low voltage type, integrated into the lighting control system and located on ceilings to avoid interference with furniture. Occupancy sensors will typically be dual technology type with other types to suit application.

7.7.15.2(16) Exterior lighting will be controlled via BMS and photocell.

7.7.15.2(17) Lamp output dimming will be adjustable down to 10% within all rooms except in conference and meeting rooms designated to have dimming capability. Conference and meeting rooms will have lamp output dimming adjustable down to 5%.

7.7.16 Energy Management

7.7.16.1 Basic Requirements

7.7.16.1(1) Provide an integrated energy management system to monitor, record, analyze report on and control energy consumption from all sources that supply energy to the Facility. This system may be connected to the BMS. Refer to Schedule 2, Appendix 2D Energy.

7.7.16.1(2) Design the system to provide sufficient information to enable the Authority to make the Facility-wide "demand-side management" decisions relating to overall energy demand, with the intent of reducing

overall energy consumption and demand throughout the Building. Incorporate data from the digital meters required by Schedule 2, Appendix 2D Energy.

7.7.16.1(3) .Provide a system and equipment that is flexible, controllable, and will form an integral part of the Facility.

7.7.16.2 .Performance Criteria

7.7.16.2(1) .Design the energy management system to be accessible from any networked computer using appropriate software.

7.7.16.2(2) .Provide a minimum of five site software licenses if licensing is required

7.7.17 .Mechanical Equipment Connections

7.7.17.1 .Basic Requirements

7.7.17.1(1) .Provide electrical power control and monitoring connections to all mechanical equipment as required for proper operation, protection and maintenance of the equipment. Materials and installation methods will result in safe, reliable and serviceable mechanical equipment and systems in the Facility.

7.7.17.2 .Performance Criteria

7.7.17.2(1) .Utilize institutional or industrial quality cables, connectors, conduit systems, fittings and hardware used to make connection to mechanical equipment so as to provide for high levels of reliability, durability and ease of maintenance of the equipment.

7.7.17.2(2) .Design connections made to motors and/or motor driven equipment or equipment with noticeable levels of vibration to accommodate the vibration.

7.7.17.2(3) .Design connections to mechanical equipment to easily permit removal and replacement of the equipment.

7.7.17.2(4) .Size motor control centres, main feeders to motor control centres, and mechanical distribution centres to accommodate the current mechanical equipment with an additional 50% spare capacity. For example, a 1,000A breaker feeding an MCC will have a maximum connected load of 400A if the breaker is 80% rated. If the breaker is 100% rated, then the maximum load can be 500A.

7.7.17.2(5) .Utilize motor control centres when three 3-phase motors that require a starter are located within 50m of each other.

7.7.17.2(6) .Provide labelling on MCC's to match motors.

7.7.17.2(7) .Provide wiring diagrams of each starter type.

7.7.17.2(8) .Provide full size starters.

7.7.17.2(9) .For motors 20HP and above, provide reduced current starters. Provide integral harmonic cancellation devices such as filters, to limit harmonics to 5% current harmonics (iTHD) of the full load fundamental current if solid-state starters are employed. Filters must control the THD within the values specified by IEEE 519. The Point of Common Coupling (PCC), referred to in IEEE 519, will be the electrical distribution board, MCC or panel board to which the variable speed drive is connected.

7.7.17.2(10) .Starters and MCC's to be indoor sprinkler-proof, type 2 enclosures.

7.7.17.2(11) .Provide individual control transformers for each starter.

7.7.17.2(12) .Starters or MCC's connected to emergency and non-essential power to be coloured to match on the exterior. All interiors to be white.

7.7.17.2(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.

7.7.17.2(14) Provide connection to the heat tracing equipment as required.

7.7.18 Major Medical Equipment/Medical Device Reprocessing Equipment and all equipment listed in the Equipment List Schedule 2-Appendix 2E (Equipment and Furniture).

7.7.18.1 Basic Requirements

7.7.18.1(1) Provide all electrical requirements for connection, operation and monitoring and control of all supplied medical or medical device reprocessing equipment.

7.7.18.1(2) Provide all electrical connections as required for charging of specified equipment (for example additional power outlets for patient lifts).

7.7.18.2 Performance Criteria

7.7.18.2(1) Each item of equipment will be installed and electrically connected for proper and full operation.

7.7.18.2(2) Electrical characteristics of this equipment, including but not limited to voltage, wattage, phase, demand, inrush, frequency, connection method and control and monitoring requirements will be confirmed by the designer and provided for.

7.7.18.2(3) Space, access and ventilation requirements and other operation critical characteristics of this equipment will be provided for and outlets and connection points will be located correctly for installation and so as to permit proper and safe isolation for servicing and disconnection for removal or replacement.

7.7.18.2(4) Any motorized equipment is to be equipped with a local lockable disconnect switch.

7.7.18.2(5) Feed all major medical equipment indicated in Schedule 2, Appendix 2E (Equipment and Furniture) (imaging, procedure, OR) from a dedicated transformer.

7.7.19 Medical Service Headwall Units Systems

7.7.19.1 Basic Requirements

7.7.19.1(1) .Incorporate headwall power, communications, equipment mounting, medical gases, lighting control into the medical service units specified under Section 6.10.10.

7.7.19.2 .Performance Criteria

7.7.19.2(1) .Provide Patient Bed Service Walls as identified in (3C Medical Gas and Headwall Requirements). Refer to 6.10.10 Patient Bed Service Walls (Headwalls)

7.7.19.2(2) .Coordinate and install the required electrical services, including but not limited to, patient call, non-essential, emergency and UPS power, communications outlets and light switches, in the medical service units.

7.7.19.2(3) .Conceal within walls all of the mechanical and electrical services feeding the medical services unit.

7.7.19.2(4) .Outlet exact location and elevation will be developed through the project submittals and Authority review and agreement.

7.7.19.2(5) .Each medical service unit will have 40% space capacity for additional power and communications outlets.

7.7.19.2(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.

7.7.19.2(7) .Exact medical service unit dimensions and configurations will 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 clear from the width of the bed.

7.7.20 .Specialty Systems

7.7.20.1 .Basic Requirements

7.7.20.1(1) .Special electrical and communications systems are required in the Facility and form essential parts of the Facility. Provide power supply, specially

conditioned power and communication conduits and other electrical operational support equipment to meet all requirements of these special electrical and electronic systems.

7.7.20.1(2) .Provide power connections for the parking pay stations as required. Connect to delayed vital branch.

7.7.20.1(3) .Provide power connection for the relocation of the existing Cellular phone antenna. Exact new location of the cellular phone antenna to be confirmed with Authority prior to installation of this connection.

7.7.20.1(4) .Provide helicopter warning light at the tallest structure of the Facility. Connect to UPS source of power.

7.7.20.2 .Performance Criteria

7.7.20.2(1) .Utilize institutional or industrial quality cables, connectors, conduit systems, fittings and hardware to make connection to special equipment and to provide for high levels of reliability, durability and ease of maintenance of the equipment.

7.7.20.2(2) .Provide connections to special equipment that easily permit removal and replacement of the equipment.

7.7.21 .Clock System

7.7.21.1 .Basic Requirements

7.7.21.1(1) .Provide a synchronized wireless clock system to assure accurate consistent time is available at key control and clinical spaces in the Facility. The system will provide automatic correction for daylight savings time and self-correct if power fails.

7.7.21.1(2) .Supply master time controllers and all clocks by a recognized industry leader with all components by the same manufacturer.

7.7.21.1(3) .Wireless clocks within the Facility will be compatible with the existing GPS wireless clock system and will work with the signal received from the existing central controller.

7.7.21.1(4) .All synchronized clocks will incorporate the Authority's logo on the face to identify the clock as a synchronized clock.

7.7.21.1(5) .The finish and appearance of the clocks are to complement the architectural finishes and be flush mount type within rooms.

7.7.21.2 .Performance Criteria

7.7.21.2(1) .Install battery-operated analog type synchronized clocks that will receive correction signals from the master clock. Use batteries rated to last a minimum of 5 years.

7.7.21.2(2) .Provide synchronized clocks minimum 300 mm in diameter with sweeping second hand and 24 hour numbering. Numbering will include hours 1-12 in large numbers on outer ring and hours 13-24 in smaller numbers on inner ring.

7.7.21.2(3) .Locate synchronized clocks in areas including:

.Each patient care area including treatment rooms, patient rooms, care stations, patient therapy rooms, procedure rooms, interview/consult rooms, medication rooms, locker rooms, imaging rooms and corridors;

.Conference rooms, meeting rooms, care team stations, staff lounges, family rooms, reception desks and staff work rooms.

7.7.21.2(4) .The elapsed time clocks will include control pushbuttons to allow for interval timing and reset. Provide elapsed clock in each OR, procedure room and imaging room.

7.7.21.2(5) .In the event of a power loss, the control system will continuously maintain proper internal time.

7.7.21.2(6) .Provide local satellite transmitters to provide signals to all clocks in the Facility where required.

7.7.21.2(7) .The clock system will have an independent wiring system and raceway system to any other building system.

7.8 Communications - Division 27

7.8.1 General

7.8.1.1 Principles and Guidelines

7.8.1.1(1) Information Technology will be a key enabler and essential service required for the efficient delivery of patient care and general Facility operations. Project Co will support this requirement by delivering technology and supporting infrastructure that seamlessly integrates with the Authority's systems and existing campus infrastructure.

7.8.1.1(2) Project Co and the Authority will work closely together in developing, implementing, and integrating technology into the Facility. The Authority will provide leadership and direction for the technology design and implementation and will be consulted in the areas where Building design may impact delivery of technology services.

7.8.1.1(3) A substantial amount of vital and private information will be transmitted through the communications system and supporting infrastructure. Project Co will design the physical environment to ensure reliability and physical security of the technology infrastructure.

7.8.1.1(4) The Authority has set a goal for this site to achieve HIMSS (Healthcare Information and Management Systems Society) Level 5, at Building opening and Level 7 in the future, fully electronic health record (EHR). The Facility should support and enhance the EHR by providing physical spaces and facilities appropriate for an advanced digital hospital, but initially should allow for the current paper and film system. The EHR will also provide increased privacy and security of patient records. Equipment should be Health Level Seven International (HL7)compliant where the requirements are applicable. The Facility design should help enable and enhance secure retrieval and viewing of patient data.

7.8.1.1(5) The Authority intends that electronic patient information will be available at the bedside to assist

clinical staff in performing their duties. This data will be made available through a variety of methods including bedside terminals and portable devices utilizing either the wired or wireless network.

7.8.1.1(6) Term 'server' in this section refer to any servers that are Network and IT servers excluding servers related to clinical and other building systems.

7.8.1.2 Basic Requirements

7.8.1.2(1) The communications systems in the new Facility will be an extension of the existing campus communications systems While Project Co. will lead the design, implementation, and interconnection to the existing systems all work will be agreed to by the Authority and extensive consultation will be required throughout the process. Project Co will provide a dedicated and qualified technical team to lead all technology related design activities. The Project Co. technical team will be available throughout the life of the project. Project Co. will design the infrastructure in alignment with industry standards. Project Co. will include sufficient lead time to develop and obtain agreement of designs ensuring that all technology integrates efficiently and seamlessly into the building and construction schedule.

7.8.1.2(2) Project Co shall design the Building such that Main Equipment Rooms (MER), Equipment Rooms (ER) and Telecommunications Rooms (TR) align with Industry Standards and are located such that they are: optimized to serve the floor they are on, maximize the area they serve, minimize the distances for cable runs, and avoid interference with other services and systems. Note that WAP outlets with 10m patch cord will limit horizontal cable length to 80 m so room spacing needs to be adjusted accordingly.

7.8.1.2(3) Project Co will procure and facilitate the installation of the communications infrastructure. The infrastructure will include routers, switches, gateways, all structured cabling and associated supports, cabinets and racks including but not

limited to; power distribution units, horizontal managers, vertical managers, proper ventilation, cooling, and other paraphernalia required to deliver high quality, medical grade technical services.

7.8.1.2(4) All design and installation work must be reviewed and agreed to by the Authority. Refer to submittal process as defined Section 2C.

7.8.1.2(5) Project Co will procure server hardware, and procure and install base operating systems for systems that require computer servers.

7.8.1.3 Performance Criteria

7.8.1.3(1) All communications services will at a minimum comply with applicable standards:

7.8.1.3(1)(a) Generic Telecommunications Cabling for Customer Premises ANSI/TIA-568-C.0

7.8.1.3(1)(b) Commercial Building Telecommunications Cabling Standard ANSI/TIA C.1includingAddendum C.1-2.

7.8.1.3(1)(c) Balanced Twisted-Pair Telecommunications Cabling and Components Standard ANSI/TIA-568-C.2

7.8.1.3(1)(d) Optical Fiber Cabling Components ANSI/TIA-568-C.3 including Addendum C.3-1

7.8.1.3(1)(e) Telecommunications Pathways And Spaces TIA 569-C.

7.8.1.3(1)(f) ANSI/TIA-606-AAdministration Standard For Commercial Telecommunications Infrastructure.

7.8.1.3(1)(g) Generic Telecommunications Bonding and Grounding (Earthing) for Customer Premises ANSI/TIA-607-B .

7.8.1.3(1)(h) Healthcare Facilities Standard TIA-1179

7.8.1.3(1)(i) Information Technology Systems Design and Implementation Best Practices for Healthcare Institutions and Facilities, BICSI 004-2012

7.8.1.3(1)(j) Telecommunications Distribution Methods Manual, BICSI TDMM, 12th Edition

7.8.1.3(1)(k) IEEE 802.3 series standards (esp. af, at, etc.)

7.8.1.3(1)(l) IEEE 802.11 series standards (esp. 2012, a, b, e, g, i, k, n, prov for ac, etc.)

7.8.1.3(1)(m) NEBSTM Requirements: Physical Protection, Telcordia GR-63-CORE

7.8.1.3(1)(n) Seismic risk reduction of operational and functional components (OFCs) of buildings CAN/CSA-S832-06 (r2011)

7.8.1.3(1)(o) Health Shared Services British Columbia (HSSBC) Telecommunication documents

7.8.1.3(1)(p) FIPPA , PIPA, E-Health (Personal Health Information Access and Protection of Privacy) Act

7.8.1.3(2) All communications services shall be medical grade and redundant; including but not limited to:

7.8.1.3(2)(a) The Building will contain diverse Entrance Facilities (EFs, ER, TR etc. in this section are as described in ANSI/TIA 568-C.1) and Access Provider or Service Provider spaces to allow for diverse providers. All feeds (fibre, copper, or other) entering the Building from the C&W Campus or from external parties will be facilitated through physically diverse paths into two separate EFs, minimum 20 m separation. EF, ER and TRs will be constructed to accommodate shared use. (between Authority and Proponent). MERs will be dedicated for exclusive use by the Authority. For any shared spaces (ERs and TRs)the Authority equipment must be secured within the shared rooms. Provide proper cooling for all types of communication rooms including heat generated from Authority equipment as follows: 50kW for each MER and 8kW for each TR.

7.8.1.3(2)(b) The EFs will be passive with no Project Co or Authority active network gear installed.

7.8.1.3(2)(c) Connectivity from the EFs will be routed into adjacent Main Equipment Rooms (MERs).

7.8.1.3(2)(d) Provide redundant feeds from each MER to each ER and from two MER(s) or ER(s) to each TR. Paths should be such that a loss of a single MER, ER or TR (eg. fire) will not impact connection from at least one MER to any other ER or TR.

7.8.1.3(2)(e) Redundancy will extend to each wall jack location that is critical or where more than one cable or jack is provided at one location. Physically adjacent ports should be connected to different switch equipment within the same MER (only if containing TR), ER (only if containing TR) or TR. Each data jack should have an associated power outlet unless intended to be exclusively POE or independently powered, and in critical areas be provided with redundant (different circuits from the same panel) and/or diverse (different branches) power where readily available in the area. Second power outlet providing redundancy can be within 3m measured along the walls.

7.8.1.3(2)(f) All copper end run distributions will be horizontal to zoned Telecommunications Rooms (i.e. they will not traverse floors).

7.8.1.3(3) The Building will not contain a data centre. The MERs and ERs will house the equipment required for the autonomous survivability of the Building to the extent that the Building can subject to WAN redundancy and offsite services remaining operational.

7.8.1.3(3)(a) Main Equipment Rooms, Equipment Rooms and Telecommunications Rooms shall be designed and provisioned according to the requirements in TIA-1179 (including the growth factor of 100%), and TIA-569-C.

7.8.1.3(3)(b) The MERs, ERs, and TRs will house campus network distribution infrastructure equipment, network building distribution systems, all telecommunications equipment required for the new Facility, all specialty systems and servers required (due to design or network latency) within the new Facility, and any other communications equipment required by the Authority or Project Co.

7.8.1.3(3)(c) The MERs will be at least 50 net square metres (or greater depending on final design and standards). The ERs and TRs will be at least 12 net square metres. The spaces should be rectangular and provide the highest density of easily accessible rack space possible.

7.8.1.3(3)(d) The MERs, ERs, and TRs, will be architecturally designed to integrate with the building infrastructure distribution systems while considering and mitigating where possible the risks associated with the vertical transport of liquids and gases. The MERs should be inline with or in close proximity to the vertical risers.

7.8.1.3(3)(e) The MERs will be restricted to Authority equipment and personnel only. Any non-Authority equipment will be installed in an alternate and separate Equipment Room (ER). Non-Authority ERs can function as TRs also.

7.8.1.3(4) Project Co will ensure the physical infrastructure supporting the technology is designed and deployed such that it will remain operational during and after a disaster.

7.8.1.3(4)(a) Enclosures and cabinets (for horizontals, fiber backbone, network equipment, clinical equipment, etc.) will meet the Telcordia GR-63-CORE Zone 4 seismic standard. All components shall be installed in accordance with CSA-S832.

7.8.1.3(4)(b) Rooms will be designed to be seismically safe as outlined in the VBBLand referenced standards.

7.8.1.3(4)(c) Entrance Facilities and their associated Access provider and service provider spaces should not be located below water level unless preventative measures against water infiltration are employed. The space shall be free of water or drain pipes not directly required in support of the equipment within the space. Sprinkler systems in MER, ER and TR rooms, will be double-interlock pre-action system.

7.8.1.3(5) Where equipment and services, which will be the responsibility of the Authority to maintain, are acquired and installed by Project Co. during the course of construction such that manufacturers warranties will expire within six months of the first day of patient service, Project Co will provide extended warranties for the period of at least one year beyond the first day of patient service which meet or exceed the remedies identified in the manufacturers original warranty.

7.8.1.3(6) Where equipment or services are implemented during construction and significant updates (i.e. a full point release update to firmware or software or new features/functionality are added) are made available following installation but prior to the first patient service day Project Co shall furnish, install, and provide all necessary support to expeditiously implement and ensure full integration and functionality of the available update at no cost to the Authority.

7.8.1.4 Quality Requirements

7.8.1.4(1) Project Co will comply with all applicable standards current at the time of construction..

7.8.1.4(2) Provide equipment and materials that are marked or labeled by CSA, ULC, or other product certification or inspection bodies accredited by the Standards Council of Canada.

7.8.2 Interface with Authority Systems

7.8.2.1 Basic Requirements

7.8.2.1(1) Project Co will not, without the Authority's prior agreement, install or use any software that resides on, accesses or otherwise interacts with the Authority's network. Project Co will complete, and submit to the Authority, the Authority's software assessment form for each such software installation.

7.8.3 Structured Cabling

7.8.3.1 Basic Requirements

7.8.3.1(1) Project Co shall provide and install a complete structured cabling solution for the Facility. Where not otherwise specified Category 6A will be used where UTP cable is required. If necessary to maintain compatibility, patient/team call may use Cat. 6. For 25 pair cable (analog voice backbone – provide minimum two 25 pair cables per TR installed, terminated on Giga-BIX IDCs), Cat 5E is acceptable. Type OM-4 multi-mode fiber will be used where multi-mode is required (provide minimum 12 strands from each MER to each TR based on 2 strands for each 96 ports of horizontal cabling (drops, including future, to allow for VLANs and use-based network segmentation) LC connectors. Type OS-2 single mode fiber will be used where single-mode is required (provide minimum 12 strands from each MER to each TR and/or ER) LC connectors.

7.8.3.1(2) Project Co will provide the Authority with all network documentation including: a final network design database, network mapping documentation, visually diagrammed network mapping and topology layouts, updated final electrical/communications building drawings, and any other network documentation created or required to maintain the new network infrastructure. Two bound and printed copies of documentation as well as two electronic copies (native editable version, drawings in bound AutoCAD or customized REVIT workset) provided on separate USB storage devices.

7.8.3.1(3) The structured cabling will be installed and tested by a vendor pre-qualified by the manufacturer as being able to provide the extended warranty required.

7.8.3.1(4) Project Co will provide a manufacturer's twenty-five year extended product, performance, application and labour warranty that will warrant all passive components used in the technology infrastructure. Additionally, this warranty will cover components not manufactured by the technology infrastructure manufacturer, but approved by the technology infrastructure manufacturer for use in the technology infrastructure.

7.8.3.1(5) Provide flush floor mounted power and data outlets for Greeter/Wayfinding Stations not mounted adjacent to walls. Allow for ten (10) locations throughout the Building; also allow for 140 miscellaneous flush floor mounted, power and data, outlets throughout the Building for boardrooms, lecture theatres, etc. where outlets on the walls are ineffective.

7.8.3.1(6) All data outlets jacks to be black with the exception of the following

a) Patient Monitoring – Red
b) Wireless access points – Green
c) IT CCTV and Security cameras – Violet
d) Patient/Team call system - Yellow

All conduits or cable raceways associated with the specific data outlets listed above are to be color coded as well.

7.8.3.1(7) All horizontal wiring to have white sheath with the exception of Patient/Team call system, which is to be yellow.

7.8.3.2 Performance Criteria

7.8.3.2(1) Cabling and cross-connections will be designed to the applicable standards. Many facilities, particularly critical care areas, may be severely impacted by a loss of telecommunications services. All cabling will be run in conduit, removable cover surface raceway, and cable tray, except that cable in fully accessible (T-bar) ceiling areas may utilize cable hangers (J-hooks) spaced no more than 1.5m

apart.. Conduit should be EMT or PVC where permissible. Cable tray shall prevent micro-bending of fiber optic cabling even when buried under other cables (solid tray being the most suitable, but mesh or basket are also considered acceptable).

7.8.3.2(2) In addition to the 40% maximum fill cable ratio, spare conduit and cable tray capacity will provide at minimum:

7.8.3.2(2)(a) At least two spare four inch conduits for vertical backbone conduits.

7.8.3.2(2)(b) Four inch dedicated entrance conduits for each service provider accessing the Building plus two spare four inch conduits.

7.8.3.2(2)(c) Maxcell inner ducts shall be installed inside the entire length of the entrance conduit.

(c).1 Detectable Outdoor Textile Innerduct: Micro (33mm), 2-inch, 3-inch and 4-inch single or multi-cell polyester/nylon textile innerduct containing 1250lb polyester flat woven pull tape, and a solid copper, polyvinyl color coated conductor (19AWG minimum) for tracing

7.8.3.2(3) Project Co will provide equipment and work area patch cords for all end-use equipment in sufficient quantity to make each device is operational plus 10% spare. 30% of the total count of provided patch cords to be 5ft long, 30% of the total of the provided patch cords to be 7ft and the remaining 40% of the total count to be 10ft long. Cross-connect cables, harness cables and equipment cords will provide end-to-end connections.

7.8.3.2(4) Project co will cause all cable infrastructure to be tested to ensure compliance with standards. Channel Link testing to TIA/EIA-568-C.2 standard or current equivalent at the time of construction will be used to certify the cabling system (from harness cable through patch cord) for all installed equipment. Permanent Link testing will be used to certify initially installed outlets. Project Co will be responsible for providing the Authority with both

electronic and paper copies of all cable infrastructure test results.

7.8.3.2(5) Project Co will ensure the termination of all cables in telecommunication rooms is in accordance with the applicable standards.

7.8.3.2(6) Project Co shall assign each room and space in the Building a communications cable density in accordance with the TIA-1179 Healthcare Facility Telecommunications Cabling Standard.

7.8.3.2(7) When defining room densities the high end of the TIA-1179 specification should be used (Low=6, Medium=14, High=24).

7.8.3.2(8) Notwithstanding the communications cable density assigned in the TIA-1179 cabling standard, assign the following rooms or spaces a High communications cable density:

7.8.3.2(8)(a) Emergency – Exam Rooms

7.8.3.2(8)(b) Classrooms or Computer Labs

7.8.3.2(9) Project Co. will ensure that specialized systems requiring multiple drops, POE or POE+ will have sufficient and appropriate drops at each location to ensure system operation.

7.8.3.2(10) Project Co. will ensure that data and power locations and densities are aligned so that sufficient and appropriate power is located at each network drop location.

7.8.3.2(11) Patient/team call structured cabling will be neatly organised and clearly labelled. .

7.8.3.2(12) All ceiling spaces will have cable drops for wireless network access points, information display systems, and other ceiling mounted digital devices. Ceiling space outlets to be located at a minimum one centered per maximum 10x10m square tile, and each shall be provided with a 10m long work area patch cord. In Plenum areas, work area patch cord shall be no more than 9m long in accordance with the VBBL.

7.8.3.2(13) All conduit pathways will have spare capacity minimally achieving the healthcare specific TIA standards, and all communications rooms will have physical floor and wall space to accommodate such expansion. Provide a BIX wall for voice cross-connects in each TR, and ER, provide adequate space to accommodate 50% expansion on the same and adjacent wall. Provide adequate floor space to facilitate at least 2 expansion racks or cabinets to be located adjacent to required racks or cabinets.

7.8.3.2(14) Provide cable for public phones in the main lobby area, Emergency Department entry ways and two other locations as specified by the Authority based on the final design.

7.8.3.2(15) Dedicated outlets / network drops will be provided for all Authority end-use fixed equipment. Switches or hubs will not be permitted in work areas.

7.8.3.2(16) The Structured Cabling system and all of its components will have capacity to expand as outlined in the applicable standards.

7.8.3.2(17) If Shelled spaces are provided Telecommunication Rooms, raceways, and cabling infrastructure shall be provided for the TR and geographic outlets such as ceiling space outlets, payphones, etc.

7.8.3.2(18) All data/voice/video cables will be routed on open plated, mesh or basket steel cable trays that are located in the ceiling space of main corridors and from there run to the top of the wall in conduit. Cable hangers (eg. J-hooks) are only to be used for distribution from cable tray where ceiling space is fully accessible and number of runs is limited (less than 15 initial drops). Data/voice/video cables shall run from the top of the wall to the outlet in conduit.

7.8.3.2(19) Provide at least three quarters of a cabinet space for Authority equipment in each TR or ER. Provide vertical wire management 12"widex10"deep between cabinets, 6"widex10"deep on edges; front and back; and horizontal wire management for each 2U 48 port patch panel or 1 U 48 port switch.

7.8.4 Network Equipment

7.8.4.1 Basic Requirements

7.8.4.1(1) Project Co will procure, install, rack, mount, and refresh, all the hardware elements as determined through consultation with the Authority and with the Authority's agreement. The Authority will provide and perform the "logical" configuration of the associated elements.

7.8.4.1(2) The network equipment will support and reinforce the overall campus architecture required for a Medical Grade Network including: Core, Distribution, and Access layer devices.

7.8.4.1(3) The network equipment will include all components necessary to deliver services such as: Access Control/Security, Wireless LAN Control, Intrusion Prevention, Network Analysis, and Network Access Control.

7.8.4.1(4) Network Equipment will include all of the support equipment required for a high quality Medical Grade Network. This includes: enclosures, cabinets, cable management, etc.

7.8.4.2 Performance Criteria

7.8.4.2(1) Performance criteria for Network Equipment will support the delivery of a Medical Grade Network designed to the Industry standards current at the time of procurement.

7.8.4.2(2) Wherever redundant data ports are allocated, sufficient, appropriate, and redundant power will be provided to allow for the operation of equipment.

7.8.4.2(3) The network equipment includes all components required to provide secured wired and wireless access (LEAP, PEAP, Radius, VPN, IPSec, PPTP, etc.), quality of service for real-time applications (QOS, multi-media priority support, WMM, SVP, etc.).

7.8.4.2(4) Active ports should be provided for all equipment provided by Project Co, or identified as requiring it

including those for ceiling space outlets even if the initial wireless access point deployment study does not indicate they are required initially, and for redundancy.

7.8.5 Telephone Equipment

7.8.5.1 Basic Requirements

7.8.5.1(1) Project Co will procure, install, rack, mount and refresh, all the hardware elements (IP-PBX, gateways, wired and wireless handsets, etc.), required to integrate building services with existing campus infrastructure. Dedicated wired and wireless handsets will not be considered end-user devices for the purposes of procurement and are to be provided by Project Co. However, user cellular/smart phones, which are to be integrated on a small scale basis, can be considered end use devices as they would not be procured or maintained by Project Co, but would be integrated by them and work over the wireless network and distributed antenna system. Final design and equipment lists will be developed in consultation with Project Co's technical team. The Authority will provide and perform the "logical" configuration of the associated elements.

7.8.5.1(2) Project Co will work and collaborate closely with the Authority to ensure that all disparate building systems which integrate with the telephone system are compatible.

7.8.5.1(3) Project Co will ensure all external services required for telephone services are delivered to the appropriate locations within the building allowing for maximum physical redundancy.

7.8.5.1(4) Project Co will ensure the Building is designed to accommodate easy access, maintenance, and upgrading of both internal and external telephone services.

7.8.5.1(5) Project Co will ensure that all necessary facilities are in place to allow public pay telephones in four locations determined by the Authority in consultation with Project Co. Locations will include the main

public lobby and all entrances to the Emergency Department as well as two additional areas to be defined based on the final Building design.

7.8.5.1(6) Project Co will ensure that cellular, UHF, and pocket paging services function effectively in all areas of the Building including stairwells, elevators, basement, and other shielded areas where these services are required through the inclusion of a distributed antenna system. Coverage should support all current technologies and all cellular service providers and public safety bands generally in use by the Authority or its staff.

7.8.5.1(7) Project Co will provide eighty emergency phone connections to locations throughout the Building. Only 30 of these lines may be active following construction, the remainder will be activated as necessary in the event of a disaster. The emergency lines will be direct analog connections to phone service providers. These connections should be designed in such a way as to maximize the potential they will continue to function in the event of a disaster. These lines will be routed through diverse physical paths from diverse entry points and service providers.

7.8.5.2 Performance Criteria

7.8.5.2(1) The Telephone Equipment shall comply with the regionally applicable Industry Standards current at the time of construction.

7.8.5.2(2) Project Co will coordinate with the Authority and the Authority vendor to ensure successful integration with existing systems.

7.8.5.2(3) Voice equipment will comply with Industry (BICSI/IEEE/IETF/ITU) current at the time of construction (esp. SIP, Cisco Telephony, Microsoft Telephony, etc.) and support a common dialing plan, voice-mail, etc. system with the rest of the campus. Activated handsets are to be provided wherever phones are identified in the documents.

7.8.5.2(4) Telephony equipment and services will be designed to support all staff and clinical requirements; for

example: patient team call, fire alarm, dictation, emergency systems, overhead paging, building systems, faxing, and other systems which require connectivity.

7.8.6 Wireless Staff Communications Systems

7.8.6.1 Basic Requirements

7.8.6.1(1) Project Co will procure, install, and refresh, an interactive voice response based wireless staff communication system including hardware (gateways, servers, chargers, badges, additional access points and other network hardware), software, supporting infrastructure, interfaces, related system integration, and licenses required to deliver a complete wireless staff-to-staff communication system at the direction of the Authority.

7.8.6.1(2) The Wireless Staff Communication System will integrate with the Authorities current systems and will be designed by Project Co's technical team in collaboration with the Authority .

7.8.6.1(3) The Wireless Staff Communication System shall have access to and will integrate with the Patient/team call System (Context sensitive Call Management), the Building Telephone System, user smart phones, Fire Alarm (Context sensitive alarm notification), Building Management System (Context sensitive alarm notification, including medical gas system), Building Security System (Context sensitive alarm notification, including intrusion, duress, abduction, equipment theft, etc.), and other data network system and portable clinical software applications. Project Co shall ensure that appropriate hardware, software, and licensing are procured to allow this integration.

7.8.6.1(4) Project Co will ensure that adequate space and power is planned within each department for the charging and storage of wireless devices.

7.8.6.1(5) Allow for three-hundred staff communication devices, a spare battery per device, a single bay

charger for each device plus one multi-bay charger for each eight spare batteries, servers, etc.

7.8.6.2 Performance Requirements

7.8.6.2(1) The Wireless Staff Communication System will comply with all applicable Industry Standards current at the time of construction.

7.8.6.2(2) The Wireless Staff Communication System will function seamlessly throughout the Facility including, but not limited to, in all links between buildings, inner courtyards, stairways, elevators, and mechanical or support areas. Allowance should be made to permit forty devices to operate simultaneously in areas where multiple staff are likely to gather such as cafeterias, including a minimum of eight transmitting voice simultaneously and the others receiving data.

7.8.6.2(3) The Wireless Staff Communication System will provide high availability and redundancy. The system will be connected to the UPS and emergency power generator.

7.8.6.2(4) Staff shall receive notifications based on their geographic work area (by department), role and responsibility, with non-pertinent notifications filtered out.

7.8.6.2(5) For staff who choose to use cellular smartphones or wireless phones, alarms shall be based on similar criteria as to those using dedicated devices, and keypads shall function as normal phones.

7.8.7 Existing rooftop antennas

7.8.7.1 Provide all required connections for relocation of the existing Cellular phone, Satellite, PageNet and Emergency Ham antennas on the campus to the roof of the new Facility. Required connections to include, but not limit to the following – vital power for the equipment, analog riser of two 25 pairs, fiber riser for connectivity to Authority network, additional spare fiber connection. Provide all required infrastructure (raceway from antennas closet/room to roof, power on the roof, lightning protection, grounding of the antenna structure, etc.) to support this relocation. Provide required wall and rack space in a secured closet/room on the top floor of the Building to accommodate existing hardware equipment (panels, terminations, etc.) associated with those antennas. Dedicated closet/room to have fire rated plywood on two walls and to be

properly heated/cooled for installation of electronic hardware. Dedicated closed/room housing the electronics for the antenna to be within 40m from the roof top antenna mount. Provide connectivity to Authority network and ability for the associated service providers to connect to their networks. Provide all required connections.

7.8.8 Wireless Network Infrastructure (Wifi)

7.8.8.1 Basic Requirements

7.8.8.1(1) Project Co will procure, install, rack, mount, and refresh, all hardware elements of network equipment required to deliver a high quality, Medical Grade Network including cabling, switches, controllers, security appliances, and access points. Enough network equipment is to be installed by ProjectCo to demonstrate that those systems provided by ProjectCo (eg. wireless staff communication system, CCTV, and RTLS if WiFi) work properly including network segmentation to avoid contention and quality of service performance for real time data. The Authority will provide and perform the "logical" configuration of the associated elements.

7.8.8.1(2) Project Co will furnish equipment as specified by the Authority to integrate with existing campus infrastructure. Final design and equipment lists will be developed in consultation with Project Co's technical team.

7.8.8.1(3) Project Co's technical team will contain resources with extensive experience designing, implementing, testing, and maintaining robust wireless networks in clinical environments. The experience will include the delivery of clinical, voice, and real-time location services utilizing wireless technology.

7.8.8.1(4) Project Co will facilitate any changes required to the physical design and layout of the wireless network following the last post occupancy site survey.

7.8.8.2 Design Requirements

7.8.8.2(1) Project Co's technical team will work closely with the Authority to design a wireless network which

integrates with and augments the existing wireless network.

7.8.8.2(2) Project Co will conduct at least one pre-deployment site survey as well as at least two post-deployment site surveys. The pre-deployment site survey will be provided sufficiently early for the Authority and Project Co technical teams to use the information to design the deployment of access points and other wireless equipment. One post-deployment site survey will be conducted shortly after all wireless equipment is deployed and another at least one month after the Building is fully operational and all sources of potential interference are active.

7.8.8.2(3) All site surveys will provide measurements taking into account all uses of the Wireless Infrastructure including voice and location services. All site survey information will be documented thoroughly and provided electronically and in hard copy to the Authority.

7.8.8.2(4) Provide the wireless network management tool configuration file to the Authority at the completion of the wireless network testing.

7.8.8.2(5) The wireless network will be redundant with no single points of failure, allow for rapid convergence use industry proven architecture for securing Protected Health Information (PHI) promote interaction between care providers and patients allowing authorized individuals to access clinical information, and be flexible to adapt to evolving Authority requirements.

7.8.8.2(6) 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.

7.8.8.2(7) Provide wireless coverage for areas outside the Building to ensure seamless integration and transfer to the wireless system in other C&W Campus buildings. Coverage areas to include but not limited to parking area, waiting areas, links and courtyards.

7.8.8.2(8) Work with the Authority in creating an operational plan for the wireless network complete with management strategy alerts notification and resource requirements for maintenance.

7.8.8.2(9) Retain a certified network engineer with expertise and experience in working with the Authority approved equipment to design the wireless network.

7.8.8.2(10) Deploy the wireless switches such that there is at a minimum 5% spare access point licenses per switch and an overall minimum of 100% spare access point licenses.

7.8.8.2(11) Include the switch ports required by the wireless network access points in the total port count for the Building. The list of layer 2/3 switch ports will be provided indicating the ports connected to a given access point, and the power load on the switch with the remaining available PoE power on the switch. The wireless network documentation will include a list of access points with the switch identification and port number indicated in a spreadsheet.

7.8.8.2(12) Project Co will coordinate all vendors that require Wireless Network access to ensure proper coverage and performance for all systems.

7.8.8.2(13) Project Co will coordinate with the Authority vendor current at the time of implementation to ensure a successful integration with the existing campus Wireless System.

7.8.8.2(14) Project Co will be responsible for any hardware, software or licence upgrades required to connect the Facility Wireless Network to the existing Authority Wireless Network.

7.8.8.2(15)

7.8.8.3 Performance Criteria

7.8.8.3(1) The wireless network will support the delivery of healthcare and will be designed to meet or exceed the relevant Industry and Authority standards including performance and security standards current at the time of procurement.

7.8.8.3(2) Ensure wireless management tools include access point locations mapped to a floor plan with RF characteristics defined for structural layers including glass, concrete, wood, drywall and metal permanently mounted RF obstacles.

7.8.8.3(3) The wireless network will support all services active in the Facility and on C&W Campus including but not limited to:

7.8.8.3(3)(a) the Authority's administrative data services. These services do not require prioritization and will be on the default VLAN;

7.8.8.3(3)(b) the Authority's voice services which consist of push to talk devices with multicast requirement. Voice traffic will be prioritized on the wireless and wired LAN. WMM and SVP protocols will be supported by the wireless infrastructure. Voice traffic will be on a separate VLAN(s);

7.8.8.3(3)(c) clinical wireless devices which consist of handheld or mobile wireless medical devices and could include but are not limited to: barcode scanners, bed side lab test equipment, mobile imaging systems, and vital statistics gathering systems. Clinical devices will be on a separate VLAN(s);

7.8.8.3(3)(d) Real Time Location Services (RTLS), equipment location system which uses a triangulation or characterization method to locate devices that beacon a signal at regular intervals. Project Co must ensure that the network design is at least reviewed and approved by the RTLS vendor(s) and the Authority.

7.8.8.3(4) Wireless network equipment will function as part of the existing network management tools and methods within the Authority.

7.8.8.3(5) Provide data rates consistent with the strictest specifications provided by the wireless end-use equipment.

7.8.8.3(6) Provide channel dB separation consistent with the strictest specifications provided by the wireless end-use equipment.

7.8.8.3(7) Provide an RF environment consistent with the noise floor and signal strength requirements (SNR) and consistent with the strictest specifications provided by the wireless end-use equipment.

7.8.8.3(8) Provide signal strength of at least 75Dbm at the boundaries of the Site.

7.8.9 Patient/Team Call Systems

7.8.9.1 Basic Requirements

7.8.9.1(1) Project Co will procure, install, configure and refresh a Patient/Team Call System.

7.8.9.1(2) Project Co will ensure the Patient/Team Call System is deployed complete with all hardware and software necessary to meet or exceed requirements of this section:

7.8.9.1(2)(a) Project Co will review with the Authority clinical staff the technical capabilities of the Patient/Team Call System including the hardware.

7.8.9.1(2)(b) Project Co shall highlight integration issues and provide recommendations regarding system layout and functionality prior to designing and installing the System.

7.8.9.1(2)(c) Project Co shall design the Patient/Team Call System in consultation with the Authority including hardware and software functionality.

7.8.9.1(2)(d) Project Co shall implement the System including to install, program, test, and commission the system.

7.8.9.1(2)(e) Project Co shall train the Authority end-user staff to use the System.

7.8.9.1(3) Project Co will procure and install the most current version of the Patient/Team Call System selected.

7.8.9.1(4) Provide a full feature audio and visual Patient/team call System with full duplex communications and all inpatient rooms, and patient exam and treatment rooms in clinical areas.

7.8.9.1(5) Project Co will ensure that the Patient/team call System is designed to seamlessly integrate stand-alone alarm systems to annunciate alarms including code red (fire), code white (panic duress), code blue (cardiac arrest), patient monitoring system alarms, and medical equipment indicated in Schedule 2, Appendix 2E (Equipment and Furniture) alarms.

7.8.9.1(6) The Patient/team call System will annunciate alarms at the nursing station consoles and on wireless devices based on Authority requirements. All security codes will be alarmed at the security system and forwarded to the security office(s), those and all other emergency codes will also be alarmed at the main switchboard, at the patient/team call master stations, on dome lights dedicated to the rooms, zone lights, and have capacity to annunciate to or integrate with other communications systems (such as the Wireless Communication System).

7.8.9.1(7) Zone lights will be located to assist staff in emergency calls. Final locations and quantities will be determined through a consultative design process lead by Project Co with final authority resting with the Authority.

7.8.9.1(8) The Patient/team call System shall provide Open System and HL7 standard interfaces.

7.8.9.1(9) Wherever possible the Patient/team call System shall utilize standard cabling and connectors.

7.8.9.1(10) All Patient/team call System cabling shall be terminated in accordance with Industry cabling standards.

7.8.9.1(11) Each floor shall be served by a dedicated patient/team call field panel(s) located in local Telecommunication Rooms and shall be networked together such that the connections are physically diverse and redundant.

7.8.9.1(12) IP based call systems shall have horizontal cables installed from end devices and plugged directly into a rack-mount proprietary call system controller/switch.

7.8.9.1(13) The Patient/Team Call system shall be terminated in a Vendor rack reserved for low voltage systems other than data.

7.8.9.1(13)(a) A high availability switch shall be installed in the Vendor rack and configured to network with low voltage equipment installed in the same rack.

7.8.9.1(13)(b) A voice tie patch panel shall be installed in the Vendor rack and labelled as VP1, VP2, etc. Provide a minimum of one 25 pair per rack or as specified from the panel to the wall-mount GigBIX to access the voice backbone cables.

7.8.9.1(13)(c) Cable management shall be accomplished with double sided vertical cable managers on each side of the side, and 2U horizontal cable management trough at the top of the rack. When ganged together with other racks to form a row, the cable managers provide organized access for routing of cables within each rack and through the row of racks.

7.8.9.2 Performance Requirements

7.8.9.2(1) The Patient/team call System shall comply with all applicable standards including UL1069, CSA C22.2 and CSA Z32.09.

7.8.9.2(2) The Patient/team call System shall be highly available and provide 99.999% uptime or better.

7.8.9.2(3) All components of the Patient/team call System shall be supplied from a single manufacturer and shall be the same model number from that manufacturer.

7.8.9.2(4) The Patient/team call System shall be provided power from the Building UPS system and be backed up to the emergency power generating system.

7.8.9.2(5) The Patient/team call System will provide full duplex, high quality, voice communications between the master control station and patient and staff locations.

7.8.9.2(6) Minimally one master control station will be provided in each team care area and other areas designed into the Building where staff gather to monitor patients or manage work. The control station including the master station will be the newest full feature station provided at time of procurement. The infrastructure, including power, cabling, and any services required to deliver VoIP features will be installed for each master control station.

7.8.9.2(7) Patient/Team call stations will be individually programmable and will allow multiple call classification and priority levels. Patient/Team call alarms will include all calls as defined by the Authority. Examples include but are not limited to: normal patient call, staff emergency call, priority patient call, bathroom call, shower call, clean room call, and porter call. Each call type will be located in the appropriate room types.

7.8.9.2(8) The System will allow for cascading of calls to higher priorities if they are not answered and will have time out call cascading if the calls are not cancelled.

7.8.9.2(9) The system will be fully integrated with the main hospital switchboard.

7.8.9.2(10) All calls will be capable of displaying on all call display locations including mobile stations such as the wireless staff communications system or user smart phones.

7.8.9.2(11) The System will provide visual alert components at each inpatient room and patient exam/treatment rooms in clinical areas to annunciate various types of calls (coloured lights, flashing patterns, etc.). Each alert type will be located at the appropriate room types.

7.8.9.2(12) Visual Alert Component locations will be determined in consultation with the Authority to allow staff to

view alerts from outside of the room. Directional Visual Alerts will be provided as defined by the Authority for example at corridor intersections, team care stations, and team work locations.

7.8.9.2(13) The System will provide emergency activation stations that are the newest version available at the time of procurement at all locations as defined by the Authority including but not limited to: patient toilets, shower rooms, and dressing locations complete with audio and staff emergency alarms.

7.8.9.2(14) Provide VoIP staff terminals of the latest design at the point of procurement at every workflow station in locations to be determined in consultation with the Authority including but not limited to: each individual patient location, staff locations, exam rooms, interview rooms, trauma rooms, secure rooms, and treatment rooms.

7.8.9.2(15) Locate staff terminals in close proximity to the room entrance, not at the patient bedside or at the side of the patient exam table. Exact locations of staff terminals will be reviewed by the Authority.

7.8.9.2(16) All patient care rooms and patient bed or stretcher locations will have separate multiple input jacks with the ability to connect medical equipment indicated in Schedule 2, Appendix 2E (Equipment and Furniture) over and above the standard room setup.

7.8.9.2(17) Project Co shall ensure that the system includes workload and workflow management functionality for all areas.

7.8.9.2(18) Project Co shall ensure that the system allows the alarms assigned to one individual to be redirected to another person or location on a temporary basis.

7.8.9.2(19) Project Co will provide the training, configuration and/or support, and communication devices required to allow team care station computers access to monitor the status of the System and to implement programming changes.

7.8.9.2(20) Project Co will ensure that adequate duty stations are provided for each patient/team call system to

ensure that they can be heard throughout each department including, but not limited to, the following locations:

7.8.9.2(20)(a) Clean Utility Rooms,

7.8.9.2(20)(b) Soiled Utility Rooms,

7.8.9.2(20)(c) Medication Rooms,

7.8.9.2(20)(d) Equipment Storage Rooms,

7.8.9.2(20)(e) Technician workstations,

7.8.9.2(20)(f) Care team stations,

7.8.9.2(20)(g) Meeting Rooms / Conference Rooms, and

7.8.9.2(20)(h) Staff lounges and staff locker rooms.

7.8.9.2(21) Project Co will ensure that the Patient/team call System integrates with the Authorities existing Globestar Connexall system for additional monitoring and vectoring of calls.

7.8.9.2(22) Project Co will ensure that the Patient/team call System design integrates with the Telecommunication System and provides sufficient audio channels.

7.8.9.2(23) The Patient/team call System will be integrated with current systems and the central Patient/team call server to track calls via management software.

7.8.9.2(24) The system will be support integration with clinical systems including but not limited to the telemetry and monitoring systems, electronic health record system, and other biomedical equipment indicated in Schedule 2, Appendix 2E (Equipment and Furniture) for alerting and monitoring using industry standard protocols.

7.8.9.2(25) Project Co will ensure that adequate support is provided to integrate the System with the existing call system throughout the remainder of the C&W Campus.

7.8.9.2(26) Project Co will achieve fully integrated functionality for all systems including any upgrades required to the existing system to facilitate the integration.

7.8.10 Public Address System

7.8.10.1 Basic Requirements Basic Requirements

7.8.10.1(1) Provide the infrastructure required for a Public Address paging system in the Facility. Integrated with the C&W Campus Public Address system.

7.8.10.1(2) The Public Address System is intended to deliver emergency pages. Other communication systems will be used for routine communication between staff and other Facility occupants. Provide complete speaker coverage throughout the Facility excluding ORs so that pages can be heard throughout with high intelligibility and low loss of articulation of consonants.

7.8.10.2 Performance Requirements

7.8.10.2(1) The Public Address System will be separate from and act independently of the Fire Alarm System and its emergency voice communication system to provide redundancy

7.8.10.2(2) Project Co will ensure the full functionality of the Public Address System is available via the telephone system. No zone paging will be required, just all-call.

7.8.10.2(3) The Public Address System will include authentication and other security measures required for remote access and at any access point where physical security alone is not sufficient. Provide a hard-wired microphone at switchboard for use in the event of phone system failure.

7.8.10.2(4) Provide sound levels as follows throughout the Facility:

7.8.10.2(4)(a) Normal paging: 60 dB minimum.

7.8.10.2(4)(b) Paging sound levels will be at least 10 dB above ambient noise levels in all locations.

7.8.10.2(5) Provide all equipment necessary for a fully operational public address system including but not limited to:

7.8.10.2(5)(a) Paging amplifiers.

7.8.10.2(5)(b) Flush ceiling speakers in finished areas

7.8.10.2(5)(c) Enclosed ceiling speakers in unfinished areas

7.8.10.2(5)(d) Trumpet type speakers in mechanical and other high ambient noise locations.

7.8.10.2(5)(e) Microphones

7.8.10.2(5)(f) Telephony interface modules Mixers

7.8.10.2(5)(g) Power supplies and other support equipment.

7.8.10.2(6) Size amplifiers to handle the total load plus 20% spare capacity.

7.8.10.2(7) Maximum of one second delay between accessing the system and the ability to transmit a page from either a local station or remotely.

7.8.10.2(8) Wire alternate speakers to different amplifier channels such that a fault on one channel does not render paging in an area inaudible.

7.8.11 Clinical Camera System

7.8.11.1 Basic Requirements

7.8.11.1(1) Provide point-to-point cameras and viewing monitors for clinical purposes (not security cameras) as required and at locations listed in the Clinical Specification.

7.8.11.1(2) Millwork design should coordinate with the monitors to ensure ergonomic viewing and usage in conjunction with other systems.

7.8.11.1(3) Clinical cameras are not to be viewable by site security staff or recorded on the Building security system.

7.8.11.1(4) Cameras required for specialized environments (e.g. seclusion rooms) must be approved by the manufacturer for that specific use.

7.8.11.2 Performance Criteria

7.8.11.2(1) Provide colour, high-resolution, high sensitivity cameras with auto-iris lens operation.

7.8.11.2(2) Mounting should be appropriate for the environment, unobtrusive, matching in colour with other furniture and fixtures in the area.

7.8.11.2(3) Cabling shall be hidden and secured to prevent tampering or damage to equipment or bodily harm.

7.8.11.2(4) Cameras will be CCD image capture technology and will have at least 720p resolution.

7.8.11.2(5) Infrared illuminated cameras are required for patient observation in low or no light (sleeping) environments.

7.8.11.2(6) Viewing monitors will be LCD type with LED backlighting with a minimum of 24" diagonal viewing surface.

7.8.11.2(7) The system will use standard transport protocols for the video signal and will allow for easy integration between systems or expansion of the system not requiring proprietary adapters or converters at any point.

7.8.11.2(8) The system will be real time viewing with no perceptible latency or delay.

7.8.11.2(9) The system shall include audio monitoring and controls.

7.8.12 Video Conferencing

7.8.12.1 Basic Requirements

7.8.12.1(1) Project Co will provide expert Audio Visual professionals with expertise in the design and integration of audio/video conferencing systems who will work with the Authority to procure, install, rack, mount, and refresh, all the hardware elements

of the required video conferencing facilities and equipment. The Authority will provide and perform the "logical" configuration of the associated elements.

7.8.12.1(2) Project Co will construct the spaces defined as video conferencing or Telehealth rooms including all necessary building and video conferencing infrastructure.

7.8.12.1(3) Provide 25 locations in the Facility with videoconferencing and telehealth capabilities. Exact locations to be coordinated with Authority.

7.8.12.2 Performance Requirements

7.8.12.2(1) Design and construct video conference rooms such that microphones, video cameras, video monitors, lighting systems, room finishes, and sound attenuation structures/materials optimize the performance of the video conferencing systems.

7.8.12.2(2) Coordinate with the Authority to collaborate in the design and integration of the video conferencing systems with current systems.

7.8.13 Meeting Rooms / Conference Rooms

7.8.13.1 Basic Requirements

7.8.13.1(1) Project Co will coordinate with the Authority to ensure meeting rooms / conference rooms are designed to support the technology and services required.

7.8.13.1(2) Project Co will design meeting rooms / conference rooms to facilitate flexibility of the space through the provision of appropriately distributed in-floor cable distribution systems to deliver power, data, and video signals throughout the rooms. Meeting rooms / conference rooms will facilitate flexible room layouts allowing furniture and screens to be relocated as required or to facilitate various equipment or furniture types.

7.8.13.2 Performance Requirements

7.8.13.2(1) All meeting rooms / conference rooms will be wired to support both an overhead projector and wall mounted display or smartboard.

7.8.13.2(2) All meeting rooms / conference rooms will have power, high definition video cables (two), network cables (two), audio, and USB cables routed to both the ceiling and at least one wall mount location.

7.8.13.2(3) Rooms where smartboards or monitors can be mounted in more than one location will have at least two locations with reinforced wall structures capable of supporting at least 250lbs (for a large monitor). These locations will also have conduits, power and the same cables identified above and spare capacity as outlined below. The spare conduit and cables will terminate in a box with a faceplate identical to the one provided for the active location.

7.8.13.2(4) Meeting rooms / conference rooms will facilitate power, network, and video connections to be run to the meeting table without requiring poles or cables to be run across the floor or to impede the flows of people or materials through the room.

7.8.13.2(5) All cables will be hidden and where possible run in conduit through walls or floors and not surface mounted.

7.8.13.2(6) Cables will be terminated in high quality wall or floor plates with appropriate connectors for each service.

7.8.13.2(7) Wall and floor boxes will have sufficient capacity to allow for two additional VGA video cables to be pulled and terminated.

7.8.13.2(8) Wall mounted cable boxes will have flush mounted faceplates with appropriate cable terminations (not a hole allowing cables to pass through) which match and augment room décor.

7.8.13.2(9) Conduit run to floor and wall access locations will have sufficient excess capacity to allow an additional 3.5cm by 2.5cm (typical VGA connector) cable to easily be pulled.

7.8.13.2(10) Project Co will provide woven polyester tape pull cords in each AV conduit.

7.8.13.2(11) Room lighting will allow for both dimming and segmented light controls to provide optimal viewing of displayed images. The lights directly in front of the locations where projector screens or monitors may be located will be controlled independent from the remaining room lights.

7.8.13.2(12) Meeting rooms / conference rooms will be planned to provide high-quality acoustics including design which facilitates easy communication in a normal conversational tone and volume.

7.8.14 Patient Entertainment System

7.8.14.1 Basic Requirements

7.8.14.1(1) Provide and install all infrastructure required for a Patient Entertainment System capable of delivering: television, internet, games, audio services, and clinical applications as specified by the Authority.

7.8.14.1(2) All cabling required for the system will adhere to the requirements outlined in the Structured Cabling Section (7.8.3).

7.8.14.1(3) Project Co shall provide additional cabling or components set out by the Patient Entertainment System vendor or manufacturer's specifications required to provide system performance acceptable to the Authority acting reasonably.

7.8.14.1(4) Project Co shall arrange and facilitate the installation of television services throughout the Building and will be responsible for the costs of cabling and installation. . Television service and wiring to be able to provide television services, HDTV, patient educational materials provided by the Authority, promotional materials provided by the Authority.

7.8.14.1(5) Project Co will provide and install the power, television, and data cabling as well as physical infrastructure including appropriate termination, face places, and any reinforcement required to support

monitors for the delivery of Patient Entertainment services in all public spaces; minimally including: all waiting areas, family respite, family lounges and staff lounges throughout the Building and all patient rooms.

7.8.14.1(6) Provide appropriately sized televisions (37"-42") for the functional requirements of the space. A minimum 37" screen size is required. All devices must be appropriate for use at their intended location. TVs of smaller dimension may be agreed to with the Authority if appropriate for a space.

7.8.14.1(7) Project Co will ensure that the Authority is able to deliver customized patient education programming to each location. This will be delivered via appropriate data networking and through the appropriate location and quantity of the terminals throughout the Building.

7.8.14.1(8) The Authority will be responsible for the ongoing costs of all subscription services.

7.8.14.2 Performance Requirements

7.8.14.2(1) Project Co will provide a distribution system that will support bi-directional communication. They will coordinate with the local service provider to ensure the cabling types and the specifications of any other equipment required meet or exceed the requirements set out to deliver unrestricted services from that vendor.

7.8.14.2(2) The patient entertainment system will be manufactured by an industry leader and all components will be of that manufacturer.

7.8.14.2(3) The patient entertainment system will meet the CRTC standards and will operate in the 8dBmv to 16dBmv range.

7.8.14.2(4) The Patient Entertainment system will be compatible with the existing system used on the C&W Campus

7.8.15 .Patient/Staff Education System

7.8.15.1 Basic Requirements

7.8.15.1(1) The Authority will provide all head end components required for the delivery of the Patient/Staff Education System.

7.8.15.1(2) The Patient/Staff Education System will integrate with the Patient Entertainment System and allow the Authority to display electronic education materials on televisions, video conferencing equipment, personal computers or integrated bedside terminals.

7.8.15.1(3) The patient education system will be distributed via the data network. The content will be available via multiple channels of streaming media in a format which will be made available on all patient entertainment devices.

7.8.15.2 Performance Criteria

7.8.15.2(1) All cabling will follow the specifications set out in the Structured Cabling Specifications as defined in section 7.8.3.

7.8.16 Patient Monitoring and Telemetry System

7.8.16.1 Basic Requirements

7.8.16.1(1) Provide infrastructure for all patient monitoring systems including but not limited to cardiac monitoring, pulmonary monitoring, vital signs monitoring, and others identified in the Schedule 2, Schedule 2E Equipment.

7.8.16.1(2) All patient care rooms will be wired to allow patient monitoring devices to be connected to a centralized patient monitoring system.

7.8.16.1(3) Any specialized wiring needed to connect centralized monitors will be provided by Project Co to form a complete system.

7.8.16.1(4) Wireless telemetry monitoring will be provided in all OR areas, NICU component and MI-ACU as defined by the Authority's Patient Monitoring (Vendor for existing facility). Project Co to ensure the Building Wireless System does not interfere in any way with the Wireless Telemetry system

7.8.16.1(5) Coordinate with the Authority's Patient Monitoring vendors the installation and requirements of the Patient Monitoring and Wireless Telemetry Systems

7.8.16.2 Performance Criteria

7.8.16.2(1) All Patient Monitoring systems will be monitored at the nursing desk for each medical department. All alarms will be annunciated on the wireless Staff Communication devices issued to the nursing staff. Project Co will provide the wiring and integration to accommodate this.

7.8.16.2(2) The wiring for the Patient Monitoring and Telemetry System shall form part of the structured cabling system.

7.8.17 Central Dictation

7.8.17.1 Basic Requirements

7.8.17.1(1) The Authority intends to provide a central dictation system for the Facility, which will form part of the overall centralized system of the Authority.

7.8.17.1(2) Project Co will collaborate with the Authority to ensure physical spaces are designed to provide the necessary privacy and other functionality required to perform dictation services.

7.8.17.2 Performance Requirements

7.8.17.2(1) All telephones will allow staff the ability to dictate onto the central dictation systems. An access code will be required to access the dictation system. All dictation stations will be provided with a full featured phone and connect to the PBX via the structured cabling system.

7.8.18 Intercommunication System

7.8.18.1 Basic Requirements

7.8.18.1(1) Entry Intercommunication Systems are required at locked entrance doors where delivery personnel or the public will require access. A central intercom is required for staff to staff communication in the event

of an emergency, or for one to many communication.

7.8.18.1(2) The entry Intercommunication Systems will connect to the telephone system allowing for automatic dialling of extensions and providing the ability to unlock the door at the remote location.

7.8.18.1(3) Provide video surveillance and remote display at call receiving locations of all entrance locations where additional security is required. These locations are to be determined in consultation with the Authority, based on the Facility Threat and Risk Assessment

7.8.18.1(4) Provide programmable central all-master Intercommunication System with the following features:

7.8.18.1(4)(a) Loud-speaking full-duplex, hands-free operation

7.8.18.1(4)(b) Two or three digit number series

7.8.18.1(4)(c) Line lock out: A fault on the line blocks only extension line concerned.

7.8.18.1(4)(d) Camp-on busy: Automatic recall when busy extension becomes free.

7.8.18.1(4)(e) Priority feature: Incoming calls prevented from being connected "direct-in" and are announced by repeated call tone and flashing pilot lamp until manually accepted.

7.8.18.1(4)(f) All-call: All extensions can initiate or receive all-call.

7.8.18.1(4)(g) Three-way conference call capability

7.8.18.1(4)(h) Ability to create multiple groups on the same system with blocked access as required by users.

7.8.18.1(4)(i) Minimum of 8 channels or more to ensure no busy signals based on number of stations in system. Provide additional channels after the

Building is occupied if staff experience busy signals.

7.8.18.1(5) Provide desk loud-speaking master station with handset at locations as determined through the Submission process including each Operating Room control room, nursing station, reception desk.

7.8.18.1(6) Provide flush wall loud-speaking master station without handset at required locations including but not limited to IV mixture area in Medication Rooms.

7.8.18.1(7) Video Intercoms will be mounted in such a way that the area behind and beside the person requesting access is visible such that it can be determined if other individuals are present.

7.8.18.2 Performance Requirements

7.8.18.2(1) The Intercommunication Systems will be manufactured by recognized industry leaders.

7.8.18.2(2) All wiring for the Intercommunication Systems will be to the specifications of the manufacture.

7.8.19 Real Time Location Systems (RTLS)

7.8.19.1 Basic Requirements

7.8.19.1(1) Project Co's technical team will work closely with the Authority to design and implement a Real Time Location System which integrates with the current Authority systems and is capable of identifying: equipment, patient, and staff locations as well as monitoring staff/patient interactions and room utilization.

7.8.19.1(2) Project Co will procure, install test and refresh systems and infrastructure to support a RTLS system including but not limited to: cabling, equipment, software, maintenance, and tags.

7.8.19.2 Performance Requirements

7.8.19.2(1) The RTLS must allow for tracking within all locations in and around the facility including: elevators, stairways, maintenance areas, and green space and parking lots.

7.8.19.2(2) The tracking must be to at least the room level within the facility. Tracking should be by floor and within a 4mX4m or smaller area.

7.8.19.2(3) The tracking system should update every 20 seconds or better.

7.8.19.2(4) Tags must be non-line of sight and must work when covered with linen or other minor obstructions.

7.8.19.2(5) Tags must be submersible and cleanable within the Authorities Infection Control Standards.

7.8.19.2(6) Alerting should be available based on: location, proximity to location, duration in location, proximity to other tagged items, quantity of devices at a given location/area (surplus or deficit from a target amount), movement within the Building, or temperature outside of bounds.

7.8.19.2(7) Reporting should be available within the RTLS system identifying: the health and availability of tags, tag movement over time (movement and location relative to other tag locations), tag button press and alerting based on button press.

7.8.19.2(8) Tags must support configuration in 'always on' mode.

7.8.19.2(9) Tags must have multiple attachment options, including integration with patient wrist bands and staff ID badge lanyards.

7.8.19.2(10) Provide a RTLS or threshold alarm based system to assist in the prevention of infant abductions from the NICU and maternity departments in the Facility including the following capabilities:

7.8.19.2(10)(a) patient location tracking;

7.8.19.2(10)(b) patient location reporting;

7.8.19.2(10)(c) integration with patient/team call and Security systems allowing for activation of equipment and building systems including alarms, and elevator controls.

7.8.19.2(11) Design the RTLS to include features that assist the Authority to achieve the highest possible tag recovery rate.

7.8.19.2(12) Project Co will coordinate with all wireless system vendors to ensure proper coverage of the RTLS system via the Wireless System.

7.8.19.2(13) Project Co will coordinate and facilitate the tagging of all equipment entering the Facility according to the Equipment List and will provide the Authority with sufficient appropriate tags for existing equipment at least four months prior to service commencement. Provide additional tags for 300 pieces of equipment, and patient tags for 100 patients. Provide allocation / assignment software and interface hardware.

7.8.20 Authority's End-Use Equipment

7.8.20.1 Basic Requirements

7.8.20.1(1) Project Co will install the Authority Supplied End-Use Equipment as part of the move-in schedule.

7.8.20.1(2) Project Co will assist the Authority to define locations for the Authority Supplied End-Use Equipment.

7.8.20.1(3) Project Co will provide adequate power and network drops for the Authority Supplied End-Use Equipment.

7.8.20.1(4) Project Co will provide jack number information in alignment with the requirements outlined in the Structured Cabling section to the Authority to facilitate placement of the Authority Supplied End-Use Equipment.

7.8.21 Project Co's Own Equipment

7.8.21.1 Basic Requirements

7.8.21.1(1) Provide End-Use Equipment and Communications Equipment to provide a fully operational Building and that Project Co may require for its own use for the performance of its obligations under this Agreement.

7.8.21.1(2) Do not connect any of Project Co's End-Use Equipment to the Authority's network, both wired and wireless, without written prior approval from the Authority. Project Co is responsible for paying any additional cost incurred by the Authority for Project Co's use of Project Co's End-Use Equipment on the Authority's network.

7.8.21.1(3) Servers and related equipment for Project Co's End-Use Equipment are to be located in a separate Project Co equipment room. No Project Co equipment will be located in the Main Equipment Rooms or the Telecommunications Rooms.

7.8.21.1(4) Any wireless infrastructure or devices used by Project Co shall not interfere with the Authority's wireless infrastructure or devices.

7.9 Electronic Safety and Security - Division 28

7.9.1 General

7.9.1.1 Project Co will ensure a safe environment for staff, patients and visitors by proper utilization of electronic access control, video monitoring and intrusion detection systems.

7.9.1.2 Any servers that are required under this section are to be separate from the Network and IT servers and as such are to be provided by Project Co.

7.9.1.3 Reference all Clinical, Non Clinical, and FM sections of this Schedule including Equipment List for requirements affecting Division 28 and include requirements noted.

7.9.2 Fire Alarm System

7.9.2.1 Basic Requirements

7.9.2.1(1) Project Co will provide and refresh a fire alarm system for the Facility and ensure that that system meets or exceeds the requirements of this section.

7.9.2.1(2) Project Co will provide a complete two stage (general and evacuation), supervised, 24 VDC fire detection and alarm system that includes addressable, intelligent, automatic and manual initiation devices and audio/visual alarm devices with voice evacuation capabilities. Alarm activation will be initiated by manual pull stations, smoke / heat detection, and fire sprinkler water flow devices.

Alarm indication will consist of audible, visual and combination visual/audible devices.

7.9.2.1(3) The fire alarm system will comply with all applicable standards, including:

7.9.2.1(3)(a) CAN/ULC S524 Standard for Installation of Fire Alarm Systems;

7.9.2.1(3)(b) CAN/ULC S537 Standard for Verification of Fire Alarm Systems;

7.9.2.1(3)(c) Elevator Code CSA-B44.

7.9.2.1(3)(d) CSA C22.1 Canadian Electrical Code

7.9.2.1(3)(e) Vancouver Building By-Law

7.9.2.2 Performance Criteria

7.9.2.2(1) Project Co will install all fire alarm wiring in conduit. Provide one or two hour rated cable, or protective construction, where required to meet survivability requirements of VBBL and ULC S139. Include smoke control systems for health care applications as outlined in the current VBBL and already identified in the current NBCC and BCBC.

7.9.2.2(2) Project Co will provide addressable smoke detectors as required by code, self correcting analog type to maintain consistent sensitivity. The following areas will be provided with smoke detectors, in addition to sprinklers, for early detection:

7.9.2.2(2)(a) Electrical equipment rooms

7.9.2.2(2)(b) Communication rooms

7.9.2.2(2)(c) Operating rooms

7.9.2.2(2)(d) Corridors

7.9.2.2(2)(e) Patient bays

7.9.2.2(2)(f) Patient bedrooms

7.9.2.2(2)(g) Exit stairwells

7.9.2.2(2)(h) Elevator lobbies and machine rooms, pits and shafts as applicable

7.9.2.2(2)(i) Air handling systems serving more than one storey or patient sleeping room fire compartment

7.9.2.2(3) All Facility addressable fire alarm devices, fire alarms and fire troubles will be incorporated on the Authority's network True Site computers. Provide manual pull stations at all exit doors and entrances to exit stairs as required.

7.9.2.2(4) Project Co will provide visual notification devices at all public, patient and staff toilets and noisy locations such as mechanical rooms, cafeteria, and assembly type rooms.

7.9.2.2(5) Project Co will connect the sprinkler system to the fire alarm system and provide full annunciation of all alarms and trouble conditions (wet, dry and pre-action).

7.9.2.2(6) Project Co will provide fire alarm speakers throughout the Facility. Speaker system will be available to announce alarm conditions and for use as emergency voice communication announcements. Provide microphone at main reception desk, with telephone interface, for use of the speaker system. Audible alert and alarm levels will be 10dBA above ambient with a minimum of 75dBA, and be audible in every room or area of the Facility.

7.9.2.2(7) Alternate fire alarm speakers will be wired to the same circuit with a minimum of two (2) circuits per floor (riser wiring in two separate locations)

7.9.2.2(8) Project Co will use combination audible alarm and visual notification devices where applicable.

7.9.2.2(9) Project Co will include control devices and connection to close fire and smoke doors on activation of alert or alarm condition.

7.9.2.2(10) Incorporate smoke control systems with control fans and dampers.

7.9.2.2(11) Project Co will provide a minimum of 2 isolation modules per floor for alarm circuits to isolate wire to wire shorts

7.9.2.2(12) Project Co will provide a graphic annunciator complete with LCD display at the main reception area for the Facility, as required and approved by the local fire department. Upgrade all impacted graphic annunciator panels and screens located at C&W Campus to reflect the addition of the Facility. Provide remote annunciators at all Care Stations (Nurse Stations) in the Facility.

7.9.2.2(13) Project Co will provide LED type indicators for remote indication that a heat and/or smoke detector has been activated in a lockable room (located outside room adjacent to door), in an elevator shaft (located at elevator lobby ceiling) or duct sensors that are not readily visible (located on ceiling or at visible location nearest to sensor installation).

7.9.2.2(14) The fire alarm system will control the smoke control system. Building controls will interface with the fire alarm system to provide an integrated system.

7.9.2.2(15) Cross-corridor doors will be equipped with electromagnetic hold-open devices. These, electric locks, and magnetic locks and will be released on first stage fire alert.

7.9.2.2(16) Project Co will provide elevator homing and sequencing on first stage alert of elevator specific detectors.

7.9.2.2(17) The fire alarm system will have the capability for remote notification.

7.9.2.2(18) Full automatic smoke detection coverage for major egress corridors will be provided, in addition to the patient sleeping room and inpatient corridors.

7.9.2.2(19) The fire alarm system will monitor fire pumps and generators for supervisory and trouble conditions.

7.9.2.2(20) The smoke detector in the patient sleeping room will also annunciate at the patient/team call dome light located outside of the patient room, and at the

patient/team call zone light in the corridor and at the patient/team call master station.

7.9.2.2(21) Project Co will provide a computer work station in maintenance department, main security office and telephone switchboard room.

7.9.2.2(22) The fire alarm control panel (FACP), and remote annunciators will indicate general alarm, supervisory, and trouble conditions.

7.9.2.2(23) Project Co will 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 VBBL.

7.9.2.2(24) Project Co will include transmission of alarm signal to remote monitoring facility as per VBBL.

7.9.2.2(25) Project Co will provide and connect interface to existing central monitoring system. The Facility's fire alarm system will be seamlessly integrated with the existing C&W Campusfire alarm system.

7.9.2.2(26) Project Co will train staff on operation of system and incorporate fire safety plan in training to alert staff to policy and procedures in case of fire alarm, and safe gathering points in case of evacuation

7.9.3 Electronic Security Systems

7.9.3.1 General

7.9.3.1(1) Project Co. will design, provide and install a security system to meet the Authority's security programs within a healthcare facility campus environment.

7.9.3.1(2) Project Co will provide and refresh a 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 detection alarm systems to detect and report unauthorized entry into protected spaces, and a Facility wide panic duress system (wired and wireless) to protect staff.

7.9.3.1(3) Project Co will develop the Facility design based on the Facility Threat and Risk Assessment conducted by a third party acceptable to the Authority

7.9.3.1(4) All security systems will reside on a Virtual Local Area Network (VLAN) as part of the Authority's information technology infrastructure connected via the structured cabling system and network devices to segregate security system data from patient and other clinical data. System shall allow the Authority the opportunity to review events and monitor the status of security systems from off-site locations. The system will be fully accessible through the Authority's network. The Security network will be designed to meet or exceed the specifications of the Administrative Network as specified in the document. Security system will be scalable to allow for future additions and interconnections of many devices and subsystems from different manufacturers.

7.9.3.1(5) The security system will incorporate commercial off-the–shelf equipment and proven designs from manufacturers regularly engaged in the production of models and types of equipment used in the security industry. Products will be quality control tested and verified for the intended operation prior to installation at site

7.9.3.1(6) All materials, including hardware and software provided will be new and most current version or production model.

7.9.3.1(7) Electronic security systems will maintain dependability and reliability under all operational environmental conditions, capable of 24 hours per day, seven days per week continuous operation.

7.9.3.1(8) Project Co will interconnect security systems to the fire alarm system as required by applicable Laws or standards.

7.9.3.1(9) Project Co will arrange meetings with the Authority to coordinate system interconnections and programming requirements to integrate with the Authority's Lenel equipment infrastructure.

7.9.3.1(10) Project Co will train Authority staff on the use and operation of security systems and location of all security devices. Coordinate and schedule training with the Authority. Follow up training sessions will be required and provided by Project Co following the full commissioning of the system to ensure proper operation.

7.9.3.2 Access Control

7.9.3.2(1) Basic Requirements

7.9.3.2(1)(a) Project Co will provide and refresh a Lenel based access control system for the building interconnected and integrated to the card access system to lock and unlock doors via time schedule and card readers utilizing proximity field effect technology to grant or restrict access to employees via a programmable classification system and operate over a standard TCP / IP Ethernet network.

7.9.3.2(2) Performance Criteria

7.9.3.2(2)(a) Card access system will utilize a file server and allow multiple workstations to access this file server for control and annunciation purposes. All alarms will be annunciated at system workstations as required throughout the C&W Campus.

7.9.3.2(2)(b) The access control system will be complete with mapping capability implemented to match existing format.

7.9.3.2(2)(c) Each access controlled door will have a local sounder to enunciate door held open and door forced open alarms. Provide the ability to turn this feature on and off via software.

7.9.3.2(2)(d) The access control system will use proximity type readers and will be capable of reusing all existing cards presently distributed across the Authority. The access control system will be compatible with the Authority's existing systems to allow existing Authority cards to work on the system and allow new cards for the Facility to work on systems in the rest of the Authority's regions. Coordinate base programming requirements for access cards in the Facility's system with the Authority.

7.9.3.2(2)(e) CWHC is currently using the G-Prox card reader system and their own "Corporate 1000" cards on a Lenel OnGuard system. 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.

7.9.3.2(2)(f) Project Co will provide five hundred (500) blank 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. Project Co to program the security.

7.9.3.2(2)(g) Determine, through the Submission process as defined in Schedule 2C, 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:

(g).1 main entrances;
(g).2 All links to existing buildings
(g).3 drug storage & medication rooms;
(g).4 departmental main and auxiliary entrances;
(g).5 entrances to locker change rooms;
(g).6 telecom equipment/server rooms & equipment rooms;

(g).7 areas for data entry and patient record reports;
(g).8 elevators (public & service);
(g).9 Restricted areas within the Building or individual departments;
(g).10 areas designated as high risk by the Authority; and
(g).11 Areas identified in the Appendix 3A-Clinical Specification

7.9.3.2(2)(h) Project Co will provide combination pin code/proximity card readers or biometric technology 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. Combination pin code/proximity card readers will be fully integrated into the Building's access control platform (stand alone, non-integrated pin pads are acceptable in certain areas as directed by the Authority). Combination pin code/proximity card readers will facilitate access by the following methods:

(h).1 pin code only;
(h).2 card read only;
(h).3 pin code and card read; and
(h).4 biometric functions to be determined by the Authority

7.9.3.2(2)(i) Project Co will 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. Refer to the intercom system specifications.

7.9.3.2(2)(j) Project Co will provide delayed egress operation and alarms at emergency exit doors; alarms to annunciate both locally and via the integrated access system.

7.9.3.2(2)(k) Project Co will interconnect and interface all electronically controlled doors for remote "lock & unlock" capability through the access

control system on a door-by-door or global command basis.

7.9.3.2(2)(l) Project Co will provide clear signage indicating entry procedures. Consult with the Authority for appropriate and acceptable wording.

7.9.3.2(2)(m) All security alarms will 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.

7.9.3.2(2)(n) Security recording will provide, as a minimum, the following information for each alarm:

(n).1 date;
(n).2 time;
(n).3 device identification;
(n).4 descriptive code;
(n).5 user/cardholder ID (when applicable); and
(n).6 acknowledgement and action taken (when applicable).

7.9.3.2(2)(o) Provide interconnection access to the applicable control and reporting capabilities included with the Lenel platform to existing site security workstations as required by the Authority

7.9.3.2(2)(p) Project Co will provide a maintenance/administration workstation (MAW) PC complete with operating & application software, monitor, keyboard, mouse and interconnection to the security system network. Locate main MAW in a secure space, accessible to authorized personnel and Authority staff.

7.9.3.3 Panic Duress System

7.9.3.3(1) Basic Requirements

7.9.3.3(1)(a) Project Co will provide and refresh wired and wireless panic duress systems to operate in tandem in appropriate areas throughout the

Facility in accordance with the level of security risk in each location.

7.9.3.3(2) Performance Criteria

7.9.3.3(2)(a) Project Co will provide wired panic duress system for staff with buttons to initiate emergency assistance calls in areas of the Facility as determined through consultation with the Authority's Security department and as required by the Facility Risk and Threat Assessment prepared by third party. Areas may include:

(a).1 Reception areas
(a).2 each department team/care station and substation;
(a).3 care/sub-care station reception desks;
(a).4 each strictly controlled clinical station & main reception area;
(a).5 area where medications is dispensed ; 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.

7.9.3.3(2)(b) Duress buttons will be strategically located, suitably sized and identified/clearly labelled for "security emergency". Wired alarms shall be handled by the integrated access control system.

7.9.3.3(2)(c) Project Co will 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 Building or the rest of the C&W Campus. Provide 10 ten wireless transmitter pendants per Authority department

7.9.3.3(2)(d) The panic duress system will report the alarm location to the remote Authority central call

centre and simultaneously enunciate a local audible and visual alarm sufficient so that it may be seen and heard by all staff throughout all areas of the applicable Facility department.

7.9.3.3(2)(e) The hard wired system and wireless duress systems to be fully integrated on to the same platform for reporting, alarm response and enunciation purposes.

7.9.3.4 Intrusion Detection

7.9.3.4(1) Basic Requirements

7.9.3.4(1)(a) Intrusion detection systems will be installed in all areas where protection of physical assets is critical.

7.9.3.4(2) Performance Criteria

7.9.3.4(2)(a) The intrusion detection system(s) will utilize industry proven devices for intrusion alarm detection and reporting capable of 24 hours per day, seven days per week continuous operation, with battery backup operation in the event of power outages.

7.9.3.4(2)(b) Project Co will provide intrusion detection system(s) including alarm controllers, local keypads, motion sensors, shock sensors, glass break sensors, door contacts, strobes, sirens and other alarm initiating devices as needed for a reliable and fully operational system(s).

7.9.3.4(2)(c) Control each system with keypad(s) located inside the department or area being protected.

7.9.3.4(2)(d) Local alarm controllers will be integrated with the access control system. The system may require reporting off Site via standard telephone lines to the Authority's central monitoring building and / or to the Authority's choice of central monitoring building

providers. Each panel will report via its own phone line.

7.9.3.4(2)(e) Project Co will 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 Submission process. Some areas may include:

(e).1 MDR;
(e).2 Exterior Doors;
(e).3 Nuclear medicine
(e).4 Pharmaceutical areas
(e).5 Critical infrastructure areas
(e).6 Ground level departments and
(e).7 Areas designated as high risk by the Authority

7.9.3.4(2)(f) Duress alarm points will inter-connect to intrusion alarm system and separately report duress/panic alarms to the Authority's contracted service provider's central station to allow security monitoring staff to individually identify the location point and origin of the alarm.

7.9.3.4(2)(g) Intrusion alarm system and all associated alarm panels must be compatible and remotely programmable from existing Authority system equipment.

7.9.3.5 CCTV

7.9.3.5(1) Basic Requirements

7.9.3.5(1)(a) Project Co will provide and refresh CCTV throughout the Facility, including exterior areas for the purpose of viewing and recording video to enhance the level of security and assist Authority staff in providing a safe environment for patients, staff, visitors and the general public while protecting the physical assets.

7.9.3.5(1)(b) Project Co may use cameras and peripheral devices compatible with the Avigilon

recording platform as approved by the Authority.

7.9.3.5(1)(c) Existing CCTV security of the C&W Campus must be maintained

7.9.3.5(1)(d) The CCTV system may reside on the Authority's network. However, if a separate network is required to meet the CCTV system vendor's or manufacturer's specifications or a separate network is necessary to provide system performance acceptable to the Authority acting reasonably, Project Co will provide a separate physical network for the CCTV System.

7.9.3.5(1)(e) Areas which have CCTV cameras installed will have signage posted at the main entrances to the Building. The signage will notify the public that this area is under video surveillance. CCTV processes will be governed by the Public Surveillance System Privacy Guidelines for the Province of BC as well as the Freedom of Information and Protection of Privacy Act (British Columbia).

7.9.3.5(1)(f) The system must be able to record clear images of the following (day or night):

(f).1 Individuals, which would allow distinction of gender, ethnicity and age category;

(f).2 Vehicles by colour, make, and model; and

(f).3 License plate recognition for vehicles entering underground parking and Emergency Department pickup & drop off area.

7.9.3.5(1)(g) The system will provide recorded images of sufficient quality to be used as court evidence in Canada.

7.9.3.5(2) Performance Criteria

7.9.3.5(2)(a) Project Co will provide CCTV cameras at locations determined in consultation with the Facility Risk and Threat Assessment prepared by third party. Some areas may include:

(a).1 main entrances & exits to the Building;

(a).2 all parking, drop-off and pick-up zones;
(a).3 entrance and exit corridors to all departments;
(a).4 public lobbies and waiting and gathering areas;
(a).5 elevator lobbies (public &service);
(a).6 perimeter walkways and walkways connecting to other buildings on campus;
(a).7 public thoroughfares and walkways; and
(a).8 cash offices or areas where cash is exchanged.
(a).9 Exterior courtyard.
(a).10 Pharmacy, drug storage and medication rooms;
(a).11 Entrances to locker change rooms;
(a).12 Telecom equipment/server rooms & equipment rooms;
(a).13 Computer rooms;
(a).14 Restricted areas within the Building or individual departments;and
(a).15 Areas designated as high risk by the health Authority

7.9.3.5(2)(b) All entry and exit points to strictly controlled high risk departments and associated areas require recorded video surveillance integrated to the CCTV security system. Provide video monitors for department staff to locally monitor cameras associated with the general activity outside the main entrance to the area and adjoining waiting areas.

7.9.3.5(2)(c) Project Co will provide CCTV equipment to monitor and record the specific identity of all persons entering and exiting the Building's main entrance, corridor/links and utilizing elevators in strictly controlled high risk departments and associated areas, as identified in consultation with the Authority.

7.9.3.5(2)(d) System(s) will be a software-based virtual matrix.

7.9.3.5(2)(e) Project Co will provide the appropriate encoding/decoding capability to support 2 way (video and control) communications with any and all CCTV camera,

7.9.3.5(2)(f) Project Co will provide digital CCTV system consisting of digital colour CCTV cameras,

colour monitors located as needed, digital PC based video recorder (network video recorder) complete with software that controls all parameters of each individual camera, pan tilt zoom functionality, frame by frame recording, pre and post alarm recording, motion detection, sequence switching, multiplexing, adjustable frame speeds.

7.9.3.5(2)(g) System will record all cameras 24-hours per day, 7 days a week in a resolution satisfactory to the Authority.

7.9.3.5(2)(h) Project Co will provide video storage capacity for minimum of 30 days. Provide file servers, workstations, and optical storage devices and connect to network. System will have the ability to choose recording rates and quality for each camera.

7.9.3.5(2)(i) CCTV system will integrate with access control, panic stations, intercoms and intrusion detection to allow for higher recording rates during alarm conditions.

7.9.3.5(2)(j) CCTV display and review system will be network-based client application allowing for authorized users to remotely view, control and manage all aspects of the CCTV system across the network. System will have network and web access for remote monitoring, using predefined user authentification.

7.9.3.5(2)(k) Display and review for all the cameras will be accessible through dual screen workstations located in the new Facility 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.

7.9.3.5(2)(l) Project Co will provide color high-resolution, high sensitivity (day/night) fixed smoke dome type with an auto iris fixed dome cameras with auto-iris lens operation. Mounting will be appropriate for the environment, unobtrusive,

matching colour with hidden cabling. Fixed cameras will be vandal resistant wall mounted and / or mounted at protective locations and heights.

7.9.3.5(2)(m) PTZ color dome cameras will be high resolution, high-speed with low light day/night acceptable to the Authority. Domes will mount on poles, parapets and walls located to provide optimum unobstructed viewing of the area under surveillance. PTZ cameras will have the ability to mask portions of view through software and remote programming.

7.9.3.5(2)(n) Outdoor cameras will be complete with weatherproof housing and internal heater/ defroster/blower/wiper as required for suitable operation under varying environmental conditions.

7.9.3.5(2)(o) 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.

7.9.3.5(2)(p) CCTV workstations for live viewing may be required in some clinical areas.

7.9.3.6 UHF radio

7.9.3.6(1) Basic Requirements

7.9.3.6(1)(a) Project Co will provide required infrastructure (transmitters, est.) throughout the Facility, including exterior areas, stair cases, basement and parking for the purpose of providing security two way radio coverage in the entire Building.

7.9.3.6(1)(b) Confirm with Authority the existing UHF radio system and required acceptable level of the UHF radio signal.

7.9.3.6(1)(c) Project Co will provide verification reports for complete coverage to the existing security provider prior completion of the project.

Part 8. SITE AND INFRASTRUCTURE SUBGROUP SPECIFICATIONS

8.1 General

8.1.1 Project Co will provide site infrastructure and utilities that:

8.1.1.1 are designed and constructed in accordance with all applicable Standards and By-Laws

8.1.1.2 in addition to the requirements of Schedule 3 and the Agreement, Project Co will perform the work in accordance with the MMCD as a minimum. For greater certainty the clauses that refer to Measurement and Payment, the Construction Administrator and obligations of the Owner set out in the MMCD do not apply.

8.2 Earthwork (Division 31)

8.2.1 Project Co will design and construct the Facility in accordance with the specifications and requirements set out in this Section:

8.2.1.1 MMCD Volume II – Platinum Edition Division 31 Earthworks

8.2.1.2 inspect and prepare the site to permit the construction of the Facility, and to provide clear sightlines around the Facility and the site.

8.2.1.3 achieve the required SS PQ 1 – Construction Activity Pollution Prevention and other prerequisites to achieve LEED Gold Certification in accordance with Section 3.4 Sustainability.

8.2.2 Site Clearing (Section 31 10 00)

8.2.2.1 Project Co will undertake site clearing in accordance with the following principles:

8.2.2.1(1) selectively clear the site of trees, shrubs and other vegetation to provide clear sightlines around the Facility and the site.

8.2.2.1(2) remove any existing redundant underground utilities that will be within 10m of an operational building or future expansion area.

8.2.2.1(3) remove existing site improvements and/or structure(s), as required for the construction.

8.2.2.1(4) removal of the large tree outside the L-wing entrance. Wood to be re-used within the project and/or recognize its former existence in the Building.

8.2.2.2 Project Co will undertake site clearing to the following quality requirements:

8.2.2.2(1) clearing, pruning, and tree protection will comply with the latest edition of the British Columbia (BC) Landscape Standards.

8.2.2.2(2) topsoil stockpiling, protection, preparation and placement will comply with the latest edition of the BC Landscape Standards.

8.2.2.3 Project Co will undertake site clearing in accordance with the following performance requirements:

8.2.2.3(1) clear and grub out stumps and roots to not less than 200 mm below ground surface.

8.2.2.3(2) selectively clear trees and brush vegetation as required for construction.

8.2.2.3(3) prevent damage to existing trees and shrubbery which are determined to be retained. Protection of existing trees and shrubbery will conform to the latest edition of the BC Landscape Standards.

8.2.2.3(4) selectively remove, prune and trim trees and shrubs to minimize tall foliage near pedestrian walkways.

8.2.2.3(5) strip and stockpile topsoil before construction starts to avoid compaction and preserve and protect suitable topsoil for re-use and incorporation into finish grading and landscaping.

8.2.2.3(6) no burning debris on site and use of herbicides will be avoided.

8.2.2.3(7) demolition and relocation of existing services will include installation of temporary and relocated services so that the services to other buildings are not disrupted and as required to comply with Demolition requirements in Appendix 3G-Demolition and Related work.

8.2.2.3(8) coordinate clearing work with utility companies as required.

8.2.3 Earth Moving (Section 31 20 00)

8.2.3.1 Project Co will design and construct the Facility in accordance with the following, related to earth moving:

8.2.3.1(1) .perform earth moving activities including excavation, backfilling, soils compaction, and soils preparation as required for the construction of the Facility, including landscaping improvements.

8.2.3.2 .Project Co will undertake earth moving in accordance with the following quality requirements:

8.2.3.2(1) .grading, excavation, trenching and backfill will comply with applicable standards including the following:

8.2.3.2(1)(a) .ASTM C117: Standard Test Method for Material Finer Than 0.075 mm Sieve in Mineral Aggregates by Washing.

8.2.3.2(1)(b) .ASTM C136: Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.

8.2.3.2(1)(c) .ASTM D422: Standard Test Method for Particle-Size Analysis of Soils.

8.2.3.2(1)(d) .ASTM D698: Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort 600 kN-m/m 3.

8.2.3.2(1)(e) .ASTM D1557: Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort 2,700 kN-m/m 3.

8.2.3.2(1)(f) .ASTM D4318: Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.

8.2.3.2(1)(g) .CAN/CGSB-8.1: Sieves, Testing, Woven Wire, Inch Series.

8.2.3.2(1)(h) .CAN/CGSB-8.2: Sieves, Testing, Woven Wire, Metric.

8.2.3.2(1)(i) .CAN/CSA-A3000-A5: Portland Cement.

8.2.3.2(1)(j) .CAN/CSA-A23.1: Concrete Materials and Methods of Concrete Construction.

8.2.3.2(2) .Project Co will:

8.2.3.2(2)(a) backfill under roadways and sidewalks will conform to applicable City of Vancouver standards.

8.2.3.2(2)(b) repair roadways, sidewalks, and curbs that are required to be cut and restored during construction, or damaged by construction to applicable City of Vancouver standards.

8.2.3.2(2)(c) conduct inspection and testing of soil compaction to be carried out by a testing laboratory designated by ULC.

8.2.3.2(2)(d) review the following reports all completed by exp Services Inc. and provided by the Authority to evaluate the level of environmental risk associated with the subject site:

(d).1 CWHC Redevelopment Project Stage 1 Preliminary Site Investigation dated March 31, 2013

(d).2 CWHC Redevelopment Project Stage 2 Preliminary Site Investigation dated March 31, 2013

(d).3 CWHC Redevelopment Project Soil Management Plan dated March 31, 2013

8.2.3.3 Project Co will undertake earth moving in accordance with the following performance requirements:

8.2.3.3(1) requirements prescribed in the document titled "CWHC Redevelopment Project Soil Management Plan dated March 31, 2013"(by exp Services Inc.) in accordance with the BC Ministry of Environment, City of Vancouver and applicable authorities.

8.2.3.3(2) excavate, backfill and grade site as necessary to provide levels and elevations for foundations, facility access, exterior improvements including roadways and walkways, service trenching, drainage, site contours, landscaping, and other required improvements.

8.3 Exterior Improvements (Division 32)

8.3.1 Project Co will undertake all exterior improvements in accordance with the specifications and requirements set in this Section.

8.3.1.1 MMCD Volume II – Platinum Edition Division 32 Roads and Site Improvement

8.3.2 Aggregate Base and Subbase Courses

8.3.2.1 Basic requirements for aggregate base and subbase courses:

8.3.2.1(1) utilize granular sub-base for stability of surface treatment through freeze thaw cycles and for its ability to store rainwater.

8.3.2.2 Performance criteria for aggregate base and subbase courses:

8.3.2.2(1) exceed limits defined by regional average freeze thaw cycles averaged over a twenty year period.

8.3.3 Pavement Surface Cleaning and Removal of Pavement Markings

8.3.3.1 Basic requirements for pavement surface cleaning and removal of pavement markings:

8.3.3.1(1) cleaning and removal includes but are not limited to cleaning of protruding sealing compounds, dust, contaminants, loose and foreign materials, oil and grease, pavement markings.

8.3.3.2 Performance criteria for pavement surface cleaning and removal of pavement markings:

8.3.3.2(1) cleaning and removal to be performed with abrasives or solvents specifically designed for pavement cleaning.

8.3.4 Asphalt Paving

8.3.4.1 Basic requirements for asphalt paving:

8.3.4.1(1) utilize asphalt paving in areas where vehicle traffic and snow clearing equipment require a smooth surface for travel on roads only and prohibited on pathways or pedestrian walkways.

8.3.4.2 Performance criteria for asphalt paving:

8.3.4.2(1) asphalt mix is to be suitable for use in climatic conditions found at the site.

8.3.5 Permeable Paving

8.3.5.1 Basic requirements for permeable paving:

8.3.5.1(1) .permeable surface materials will be incorporated and considered in selected areas within the site.

8.3.5.1(2) .all new or rebuilt surface parking stalls to be finished with permeable paving.

8.3.5.2 .Performance criteria for permeable paving:

8.3.5.2(1) .paving will allow infiltration of surface storm water to the subsurface structure for retention.

8.3.6 .Unit Paving on Sand Bed

8.3.6.1 .Basic requirements for unit paving on sand bed:

8.3.6.1(1) .utilize unit pavers in areas where a high level of finish is desired and/or a requirement for removal and replacement of paved surface in the future.

8.3.7 .Concrete Paving

8.3.7.1 .Basic requirements for concrete paving:

8.3.7.1(1) .utilize concrete paving in areas that require firm, long lasting hard surfaces for activities such as pedestrian pathways, loading docks and Facility entrances.

8.3.8 Painted Pavement Markings

8.3.8.1 Basic requirement for painted pavement markings

8.3.8.1(1) provide temporary and permanent painted pavement markings.

8.3.8.1(2) all pavement markings to be in accordance with the latest edition of TAC Manual of Uniform Traffic Control Devices.

8.3.8.2 Performance criteria for painted pavement markings

8.3.8.2(1) taped, painted and thermoplastic pavement markings to be selected for their suitability and durability or at the discretion of the Authority.

8.3.9 .Exterior Site Furnishings

8.3.9.1 .Basic requirements for exterior furnishings:

8.3.9.1(1) .provide the following exterior furnishings: wood/steel/composite benches, garbage containers, bicycle racks.

8.3.9.2 .Performance criteria for exterior site furnishings:

8.3.9.2(1) .select products for their suitability and durability in the climatic conditions found at the site.

8.3.10 .Growing Medium

8.3.10.1 .Basic requirements for growing medium:

8.3.10.1(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.

8.3.10.2 .Performance criteria for growing medium:

8.3.10.2(1) .seed mix will have demonstrated suitability to the climatic and soil conditions found at the site.

8.3.11 .Sodding

8.3.11.1 .Basic requirements for sodding:

8.3.11.1(1) .planting of indigenious species will be considered a priority over sodding.

8.3.11.1(2) . sod to be provided only in limited areas where planting of indigenious species is not practical.

8.3.11.2 .Performance criteria for sodding:

8.3.11.2(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.

8.3.12 .Trees, Shrubs and Ground Cover Planting

8.3.12.1 .Basic requirements for trees, shrubs and ground cover planting:

8.3.12.1(1) .provide plantings to support the landscape design by reinforcing spatial relationships and way-finding. The plant selection and placement will address micro-climates surrounding the Facility and mitigation of heating and cooling loads. Refer to 4.2.6 Landscaping for further requirements.

8.3.12.2 .Performance criteria for trees, shrubs and ground cover planting:

8.3.12.2(1) .select and place trees, shrubs and ground covers to mitigate temperature fluctuations and winds.

8.3.12.2(2) .retain any healthy existing trees that do not conflict with the development and site grading.

8.3.12.2(3) .engage an arborist to evaluate existing trees.

8.3.12.2(4) .select trees, shrubs and ground covers from species that are indigenous or adapted to the region.

8.3.12.2(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)

8.4.1 .Project Co will undertake all utility works in accordance with the specifications and requirements set in this Section

8.4.1.1 MMCD Volume II – Platinum Edition Division 33 Utilities

8.4.1.2 .Project Co will design and construct utilities in accordance with the following basic requirements:

8.4.1.2(1) .on-Site services refers to the construction of works within the boundaries of the C&W Campus property lines & outside of the Building's footprint.

8.4.1.2(2) .review existing site utilities and coordinate design with new site services for the Facility without disruption to the effective operation of the existing infrastructure and the Facility.

8.4.1.2(3) .design and construct on-site services for the Facility.

8.4.1.2(4) .all materials will be accordance with CSA standards.

8.4.2 .Water Utility Distribution Piping (Section 33 10 00)

8.4.2.1 .Project Co will design and construct water utility distribution piping in accordance with the following basic requirements:

8.4.2.1(1) .Project Co will provide an on-site watermain system as required to provide domestic and fire fighting capacity for the Facility connected to the City water supply system.

8.4.2.1(2) .Project Co will provide a connection from the Campus Plant to provide all necessary heating for the Facility to meet the standards referenced in Section 7.1 Mechanical Systems Design Principles.

8.4.2.1(3) New system shall be designed to allow for future water connections from other buildings within the C&W Campus.

8.4.2.2 .Project Co will design and construct water utility distribution piping in accordance with the following performance requirements. Project Co will provide:

8.4.2.2(1) .a watermain system will be a looped system of capable of providing domestic and fire fighting capacity for the Facility.

8.4.2.2(2) .a watermain system will include reduced pressure backflow preventer(s) to protect the municipal system and onsite facilities from contaminants.

8.4.2.2(3) .fire hydrants around the site in accordance with NFPA-24 and the City of Vancouver Fire Department requirements.

8.4.2.2(4) .water quality monitoring and treatment equipment to maintain the water to the Canadian Drinking Water Guidelines. Monitor water quality on the BMS.

8.4.2.2(5) .construct the domestic water storage tank in two equal sized chambers, with interconnecting piping and valves such that either chamber can be isolated for servicing, maintenance or if it becomes damaged. Provide lockable covers on all access and inspection hatches. Provide monitoring of the water level on the BMS.

8.4.2.2(6) .redundant duplex or triplex domestic water booster pump packages connected to the domestic water

storage tank, complete with dedicated local control panels, each on emergency power. Each package is to be capable of 100% of the system design demand in order to provide full system redundancy.

8.4.2.2(7) .all system components requiring electrical power including domestic booster pumps, and tank water treatment and water level monitoring equipment will be on emergency power.

8.4.2.3 .Project Co will provide the following District Heating Water Supply & Return (DHWS&R) connections from the Campus Plant to the Facility. Project Co to submit a workplan of the proposed alignments and tie-in points for approval by the Authority. The required connections are to suit the performance and capacity of the system and are as follows:

8.4.2.3(1) .provide minimum 200mm diameter DHWS&R piping from the Campus Plant to the east side of the Building.

8.4.2.3(2) .refer to Section 7.4.1.1 for connections between the Building and ACB.

8.4.2.4 Project Co to install DHWS&R lines and turn over to Authority for operation and maintenance.

8.4.2.5 .Post disaster requirements include:

8.4.2.5(1) .In addition to the secondary water supply connections, provide a water storage system as described in Section 7.1.2.2 (4). The tank capacity will have sufficient capacity to meet the post disaster occupancy requirements. After such time, if the service connections and / or municipal infrastructure are still not operational, it is anticipated a water supply vehicle will be able to access the site to replenish the water storage system.

8.4.3 .Sanitary Utility Sewerage Piping (Section 33 20 00)

8.4.3.1 .Project Co will design and construct sanitary utility sewerage piping in accordance with the following basic requirements:

8.4.3.1(1) .Project Co will provide an on-site sanitary sewer system to convey all effluent to the City sewer system.

8.4.3.1(2) sanitary sewerage drainage piping, fittings, accessories, and bedding.

8.4.3.1(3) connection of building sanitary drainage system to municipal sewers.

8.4.3.1(4) clean out access.

8.4.3.1(5) New system shall be designed to allow for future sanitary connections from other buildings within the C&W Campus.

8.4.3.2 Project Co will provide an adequately sized and deeply buried sanitary connection northwest of the existing SHY, B wing, near manhole 47, connected to the site's sanitary sewer system. The connection shall be sized for future flows and capacity from future redevelopment of the C&W Campus buildings south east of the Facility.

8.4.3.3 Post Disaster Requirements

8.4.3.3(1) In addition to the sanitary sewer connection to the municipal sewer system, design and construct a sewage waste storage system as described in Section 7.1.2.2 (5). Provide access to permit a sewage disposal vehicle to be able to pump out the sewage holding tank.

8.4.4 Storm Utility Drainage Piping (Section 33 30 00)

8.4.4.1 Project Co will design and construct storm utility drainage piping in accordance with the following basic requirements:

8.4.4.1(1) Project Co will provide an on-site storm sewer system to accommodate and control on-site storm water with connection to the City storm drainage system.

8.4.4.1(2) New system shall be designed to allow for future storm connections from other buildings within the C&W Campus.

8.4.4.2 Project Co will design and construct storm utility drainage piping in accordance with the following quality requirements:

8.4.4.2(1) all on-site services will meet or exceed the quality requirements for the corresponding off-site City servicing.

8.4.4.3 Project Co will design and construct storm utility drainage piping in accordance with the following performance requirements. Project Co will provide:

8.4.4.3(1) a storm sewer system of a diameter, grade and depth to safely convey all storm water to the municipal storm drainage system. The system will include an on-site stormwater management plan designed and constructed in accordance with the City's requirements and the campus wide "CWHC Campus Rainwater Management Plan, March 31, 2013". The stormwater management plan may include, but not be limited to the following best management practices:

8.4.4.3(1)(a) green roof to reduce the imperviousness of the site.

8.4.4.3(1)(b) swales where feasible to direct run-off to stormwater control facilities.

8.4.4.3(1)(c) underground detention facilities as required to meet the requirements for on-site stormwater management.

8.4.4.3(1)(d) permeable paving as specified in 8.3.3.

8.4.4.3(2) duplex or triplex storm water pumps where the drainage cannot flow by gravity. Connect all storm water pumps to emergency power and monitor the high water levels of pump chambers on the BMS.

8.4.4.3(3) intercept, collect and dispose of all existing or created surfaces and subsurface water courses while minimizing disruption to undeveloped portions of the site.

8.4.4.3(4) flooding / ponding are not permitted onsite except in the designated stormwater detention facilities.

8.4.4.4 Project Co will provide an adequately sized and deeply buried storm connection northwest of the existing SHY B wing, near MH 47, connected to the site's storm sewer system. The connection shall be sized for future flows and capacity for future redevelopment of the campus buildings south east of the Facility.

8.4.4.5 Post Disaster Requirements

8.4.4.5(1) Design and construct the storm sewer system to Post Disaster requirements to prevent breach of the

system and / or flooding of the site which could impair access to or from the site.

8.4.4.5(2) Design and construct the storm sewer system and the site grading to protect the Facility and existing C&W Campus building(s) against a 100 year storm event.

8.4.5 Existing Utility Diversions

8.4.5.1 Project Co will design and construct utility diversions to City of Vancouver's approval.