SCHEDULE 3

DESIGN AND CONSTRUCTION SPECIFICATIONS

SRO RENEWAL INITIATIVE

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SCHEDULE 3

DESIGN AND CONSTRUCTION SPECIFICATIONS

PART 1. INTERPRETATION

1.1 Definitions

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

"**Accessible Residential Room**" has the meaning set out in Section 5.1.1.3(1) of this Schedule;

"**Beacon**" means the Beacon (Backpacker's Inn) building located at 7 West Hastings Street in the City;

"**BMS**" has the meaning set out in Section 6.15.6.1(1) of this Schedule;

"**Building Envelope**" means any building enclosure, assembly, or system that acts as a physical separation between distinct environmental conditions, including but not limited to perimeter walls, floors, or roofs.

"**Buildings**" means, together, the following buildings to be renovated by Project Co pursuant to this Agreement, and includes all additions and improvements thereto over the term of this Agreement:

(a) Beacon;

(b) Cordova Residence;

(c) Dominion Hotel;

(d) Gastown Hotel;

(e) Hazelwood Hotel;

(f) Marble Arch Hotel;

(g) Marr Hotel;

(h) Molson's Bank Building;

(i) Orange Hall;

(j) Rice Block;

(k) Sunrise Hotel;

(l) Tamura House; and

(m) Washington Hotel;

"**Building Specifications**" has the meaning set out in Section 2.1.2 of this Schedule;

"**CFT Report**" means the report prepared by CFT Engineering Inc. for the Authority entitled "Request for Building Bylaw Relaxation for Replacement of Smoke Alarms with Combined Smoke/Heat Detectors in BC Housing Operated SRO/SRA Hotels" and dated May 28, 2008 (revised July 16, 2008);

"**Cladding**" means any exterior facer element, component, or material of an enclosure assembly or system of a Building Envelope exposed to the direct impact of exterior environmental elements, including moisture, heat or air;

"**Common Spaces**" means common use building spaces, including kitchens, amenity spaces, washrooms, shower rooms, laundry rooms, corridors, stairwells and entries;

"**Cordova Residence**" means the Cordova Residence building located at 54 East Cordova Street in the City;

"**Dominion Hotel**" means the Dominion Hotel building located at 210 Abbott Street in the City;

"**Gastown Hotel**" means the Gastown Hotel building located at 110 Water Street in the City;

"**Hazelwood Hotel**" means the Hazelwood Hotel building located at 342 East Hastings Street in the City;

"**Heritage Conservation Plan**" means the conservation plan and drawings for each Building that are attached to and form part of the relevant Building Specification;

"**Marble Arch Hotel**" means the Marble Arch Hotel building located at 518 Richards Street in the City;

"**Marr Hotel**" means the Marr Hotel building located at 401 Powell Street in the City;

"**Molson's Bank Building**" means the Molson's Bank building (Roosevelt) located at 166 East Hastings Street in the City;

"**Orange Hall**" means the Orange Hall building located at 349 Gore Avenue in the City;

"**Residential Room**" means a single room occupancy residential unit in a Building;

"**Rice Block**" means the Rice Block building located at 404 Hawks Avenue in the City;

"**Room Data Sheets**" means the room data sheets for each Building that are attached to and form part of the relevant Building Specification;

"**Sunrise Hotel**" means the Sunrise Hotel building located at 101 East Hastings Street in the City;

"**Tamura House**" means the Tamura House building located at 396 Powell Street in the City;

"**Vancouver Building Bylaw**" or "**VBBL**" means the City of Vancouver Building Bylaw No. 9419 (2007), as amended;

"**Vancouver Fire Bylaw**" means the City of Vancouver Fire Bylaw No. 8191 (2000), as amended; and

"**Washington Hotel**" means the Washington Hotel building located at 177-179 East Hastings Street in the City.

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

1.3 Acronym List

1.3.1 ANSI - American National Standards Institute

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

1.3.3 ASME - American Society of Mechanical Engineers

1.3.4 ASPE - American Society of Plumbing Engineers

1.3.5 ASTM - American Society for Testing and Materials

1.3.6 BMS – Building Management System

1.3.7 CCTV – Closed Circuit Television (security cameras)

1.3.8 CEC – Canadian Electrical Code

1.3.9 CFM – Cubic Feet per Minute

1.3.10 CGSB – Canadian General Standards Board

1.3.11 CIF – Common Intermediate Format

1.3.12 CMOS – Complementary Metal Oxide Semiconductor

1.3.13 CPTED – Crime Prevention Through Environmental Design (pronounced Sep-ted)

1.3.14 CSA – Canadian Standards Association

1.3.15 DVR – Digital Video Recorder

1.3.16 EMT – Electrical Magnetic Tubing

1.3.17 FPR – Fire Protection Rating

1.3.18 FRR – Fire Resistance Rating

1.3.19 GB – Gigabyte

1.3.20 GWB – Gypsum Wall Board

1.3.21 IESNA – Illuminating Engineering Society of North America

1.3.22 IT – Information Technology

1.3.23 JPEG – Joint Photographic Experts Group

1.3.24 LCD – Liquid Crystal Display

1.3.25 MJPEG – Motion JPEG

1.3.26 MPI – Master Painters Institute

1.3.27 NDVR – Network Digital Video Recorder

1.3.28 NFPA – National Fire Protection Association

1.3.29 NIOSH – National Institute of Occupational Safety and Health

1.3.30 RCABC – Roofing Contractors Association of B.C.

1.3.31 RFID – Radio Frequency Identification

1.3.32 SRO – Single Room Occupancy

1.3.33 TCP – Transmission Control Protocol

1.3.34 WC – Water Closet

PART 2. GENERAL

2.1 General and Building-Specific Specifications

2.1.1 Parts 1 – 6 of this Schedule are applicable to Design and Construction of all of the Buildings except with respect to the Dominion Hotel and the Orange Hall Parts 1 – 6 are applicable only to the extent described in Appendix 3C [Dominion Hotel] and Appendix 3I [Orange Hall] respectively.

2.1.2 Building-specific specifications for each Building, including a Heritage Conservation Plan and Room Data Sheets for each Building, are contained in Appendices 3A – 3M (together, the "**Building Specifications**").

2.1.3 Project Co will perform the Design and Construction:

2.1.3.1 of all Buildings in accordance with the provisions of Parts 1 – 6 of this Schedule, subject to Section 2.1.1 of this Schedule; and

2.1.3.2 of each Building in accordance with the specifications set out in the applicable Building Specification.

2.1.4 Parts 1 – 6 of this Schedule and each Building Specification are intended to be complementary. If there is a conflict between a provision contained in Part 1 – 6 of this Schedule and a provision of a Building Specification, the provision of the Building Specification will govern. Project Co will notify the Authority immediately if it discovers any conflict between any provision of Part 1 – 6 of this Schedule and a provision of a Building Specification and will not proceed with any work affected until the Authority and Project Co have discussed the conflict and the Authority notifies Project Co whether the Authority will require a Change.

2.2 Standards

2.2.1 Project Co will undertake the Design and Construction:

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

2.2.1.2 in accordance with all applicable Laws, including the VBBL and the Vancouver Fire Bylaw;

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

2.2.1.3(1) all persons who will be Buildings Users;

2.2.1.3(2) all Governmental Authorities; and

2.2.1.3(3) the community;

2.2.1.4 in accordance with Good Industry Practice; and

2.2.1.5 to the same standard that an experienced, prudent and knowledgeable long term owner of good quality and publicly operated SRO social housing buildings in North America would employ.

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

2.2.3 If Project Co wishes to make reference to a code or standard from a jurisdiction outside of Canada, then Project Co will demonstrate to the Authority's satisfaction that such code or standard meets or exceeds the requirements of this Schedule. If Project Co wishes to deviate from a requirement of the VBBL, Project Co will be responsible for obtaining alternative solutions in accordance with the VBBL.

2.2.4 Without limiting Section 2.2.1 of this Schedule, Project Co will undertake the Design and Construction in compliance with all applicable standards, including:

2.2.4.1 BCICA Quality Standards Manual for Mechanical Insulation

2.2.4.2 ANSI / ASHRAE

2.2.4.2(1) 52.2-2007: Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size;

2.2.4.2(2) 55-2004: Thermal Environmental Conditions for Human Occupancy;

2.2.4.2(3) 62.1-2007: Ventilation for Acceptable Indoor Air Quality;

2.2.4.2(4) 90.1-2007: Energy Standard for Buildings Except Low Rise Residential Buildings;

2.2.4.2(5) 111-2008: Practices for Measurement, Testing, Adjusting & Balancing of Building HVAC Systems;

2.2.4.2(6) 129-1997: Measuring Air Change Effectiveness; and

2.2.4.2(7) 135-2004: Data Communication Protocol for Building Automation & Control Networks.

2.2.4.3 ASHRAE

2.2.4.3(1) Handbooks: 2009 Fundamentals, 2006 Refrigeration, 2007 HVAC Applications, 2008 HVAC Systems and Equipment;

2.2.4.3(2) Design of Smoke Control Systems;

2.2.4.3(3) ASHRAE Guideline 12-2000 - Minimizing the Risk of Legionellosis Associated with Building Water Systems;

2.2.4.3(4) ASHRAE Guideline 1.1-2007 – HVAC & R Technical Requirements for the Commissioning process; and

2.2.4.3(5) ASHRAE Guideline 0-2005 – The Commissioning Process.

2.2.4.4 ANSI / ASME

2.2.4.4(1) B31.1 Power Piping;

2.2.4.4(2) B31.9 Building Services Piping;

2.2.4.4(3) Section VIII: Pressure Vessels;

2.2.4.4(4) Section IX: Welding Qualifications;

2.2.4.4(5) Unfired pressure vessels; and

2.2.4.4(6) AWS D1.3-98 - Structural Welding Code - Sheet Steel.

2.2.4.5 ANSI / EIA

2.2.4.5(1) 568-B.1 & 568-B.2 (CSA-0T529-M95) Commercial Building Telecommunications Cabling Standard – Parts 1 & 2:

2.2.4.5(2) 568-B3 (CSA-T529-M95) Commercial Building Telecommunications Cabling Standard – Part 3;

2.2.4.5(3) 569-B (CSA-T530) Commercial Building Standard for Telecommunications Pathways and Spaces;

2.2.4.5(4) 606A (CSA-T528) Administration Standard for Telecommunications Infrastructure of Commercial Buildings;

2.2.4.5(5) 607A (CSA-527) Commercial Grounding and Bonding Requirements for Telecommunications.

2.2.4.5(6) 758 Customer Owned Outside Plant Telecommunications Cabling Standard;

2.2.4.6 ANSI / TIA

2.2.4.6(1) 942 Telecommunications Infrastructure Standard for Data Centers;

2.2.4.6(2) TSB-162 Telecommunications Cabling Guidelines for Wireless Access Points;

2.2.4.7 ANSI / ESNA American National Standard Practice for Lighting

2.2.4.8 ASPE Plumbing Engineering Design Handbook, Volumes 1-4

2.2.4.9 ASTM

2.2.4.9(1) A185-06 - Standard Specification for Steel Welded Wire Fabric;

2.2.4.9(2) A82/A82M-05 - Standard Specification for Steel Wire, Plain, for Concrete Reinforcement;

2.2.4.9(3) ASTM C568-03 - Standard Specification for Limestone Dimension Stone;

2.2.4.9(4) ASTM C615-03 - Standard Specification for Granite Dimension Stone;

2.2.4.9(5) ASTM C503-05 - Standard Specification for Marble Dimension Stone;

2.2.4.9(6) ASTM C616-03 - Standard Specification for Quartz-Based Dimension Stone;

2.2.4.9(7) ASTM C67 - 11 Standard Test Methods for Sampling and Testing Brick and Structural Clay Tile

2.2.4.9(8) ASTM 270 C Mortar for Unit Masonry.

2.2.4.9(9) ASTM C5 - 10 Quicklime for Structural Purposes.

2.2.4.9(10) ASTM C144 - 11 Aggregate for Masonry Mortar.

2.2.4.9(11) ASTM C150 / C150M - 11 Portland Cement.

2.2.4.9(12) ASTM C476 - 10 Standard Specification for Grout for Masonry.

2.2.4.9(13) ASTM – A 653/A 653/M-03 Steel Sheet, Zinc-Coated or Zinc-Iron Coated (Galvanealed) by the Hot Dip Process.

2.2.4.9(14) ASTM- A 792/A 792/M-03 steel sheet,55% alluminum-zinc alloy coated by the Hot Dip process

2.2.4.9(15) BCSLA and BCLNA - BC Landscape Standard – Current Edition

2.2.4.10 CAN ULC

2.2.4.10(1) ULC C634 Connectors and Switches for use with Burglar Alarm Systems;

2.2.4.10(2) ULC-S101 Fire Endurance Tests of Building Construction and Materials;

2.2.4.10(3) ULC-S102 Test for Surface Burning Characteristics of Building Materials and Assemblies;

2.2.4.10(4) ULC-S102.2 Test for Surface Burning Characteristics of Flooring, Floor Coverings, and Miscellaneous Materials and Assemblies;

2.2.4.10(5) ULC-S102.3 Fire Test of Light Diffusers and Lenses;

2.2.4.10(6) ULC-S102.4 Fire and Smoke Characteristics of Electrical Wiring and Cables;

2.2.4.10(7) ULC-S104 Fire Tests of Door Assemblies;

2.2.4.10(8) ULC-S105 Fire Door Frames Meeting the Performance Required by CAN4-S104;

2.2.4.10(9) ULC-S106 Fire Tests of Window and Glass Block Assemblies;

2.2.4.10(10) ULC-S107 Fire Tests of Roof Coverings;

2.2.4.10(11) ULC-S109 Flame Tests of Flame-Resistant Fabrics and Films;

2.2.4.10(12) ULC-S110 Test for Air Ducts;

2.2.4.10(13) ULC-S112 Fire Test of Fire-Damper Assemblies;

2.2.4.10(14) ULC-S113 Wood Core Doors Meeting the Performance Required by CAN/ULC-S104 for Twenty Minute Fire Rated Closure Assemblies;

2.2.4.10(15) ULC-S114 Test for Determination of Non-Combustibility in Building Materials;

2.2.4.10(16) ULC-S115 Fire Tests of Firestop Systems;

2.2.4.10(17) ULC-S524 Installation of Fire Alarm Systems;

2.2.4.10(18) ULC-S531 Smoke-Alarms;

2.2.4.10(19) ULC-S537 Verification of Fire Alarm Systems;

2.2.4.10(20) ULC-S553 Installation of Smoke-Alarms;

2.2.4.10(21) ULC-S561 Installation and Services for Fire Signal Receiving Centres and Systems

2.2.4.10(22) ULC/ORD-C199P Combustible Piping for Sprinkler Systems

2.2.4.10(23) ULC/ORD-C1254.6 Fire Testing of Restaurant Cooking Area Fire Extinguishing System Units

2.2.4.10(24) ULC S306 Intrusion Detection Units;

2.2.4.10(25) ULC S303 Local Burglar Alarm Units and Systems;

2.2.4.10(26) ULC S525 Audible Signal Appliances;

2.2.4.10(27) UL 1076 Proprietary Burglar Alarm Units and Systems;

2.2.4.11 CSA

2.2.4.11(1) B44-07: Safety Code for Elevators and Escalators including Appendix E Elevator Requirements for Persons with Physical Disabilities;

2.2.4.11(2) B44.2-07: Maintenance Requirements and Intervals for Elevators, Dumbwaiters, Escalators and Moving Walks;

2.2.4.11(3) B52-05: Mechanical Refrigeration Code;

2.2.4.11(4) B51-2003: Boiler, Pressure vessel and Pressure Piping Code;

2.2.4.11(5) B149.1-05: Natural Gas and Propane Installation Code;

2.2.4.11(6) B651-95: Barrier Free Design;

2.2.4.11(7) C22.1 & C22.2 Canadian Electrical Code as adopted in British Columbia;

2.2.4.11(8) CSA 086-09 Engineering Design in Wood;

2.2.4.11(9) CSA C22.2 No.1 Audio, Video and Similar Electronic Equipment;

2.2.4.11(10) CSA 222-205, M1983 Access Control System Units;

2.2.4.11(11) C282 Emergency Electrical Power Supply for Buildings;

2.2.4.11(12) A23.4-05 - Precast Concrete - Materials and Construction;

2.2.4.11(13) W186-M1990 (R2002) - Welding of Reinforcing Bars in Reinforced Concrete Construction;

2.2.4.11(14) A370-04 - Connectors for Masonry;

2.2.4.11(15) A23.1-04/A23.2-04 - Concrete Materials and Methods of Concrete Construction / Methods of Test and Standard Practices for Concrete; and

2.2.4.11(16) S832-06 – Seismic Risk Reduction of Operational and Functional Components (OFCS of buildings).

2.2.4.11(17) S478 Guideline on Durability of Buildings

2.2.4.11(18) S413-07 Parking Structures

2.2.4.11(19) S16-01 Limit States Design of Steel Structures

2.2.4.11(20) S136-01 Design of Cold Formed Steel Members

2.2.4.11(21) S304-04 Masonry Design for Buildings

2.2.4.11(22) S832-06 Guidelines for Seismic Risk Reduction of Operational and Functional Components of Buildings.

2.2.4.11(23) CSA-080.1-97 Preservative Treatment of all Timber Products by Pressure Process

2.2.4.11(24) CSA-080.9-97 Preservative Treatment of Plywood by Pressure Process

2.2.4.11(25) CSA-080.34-97 Preservative Treatment of Wood for Building Foundation Systems, Basements, and Crawl

2.2.4.11(26) CSA-0121-M1981 Douglas Fir Plywood

2.2.4.11(27) CSA-CAN/CSA-0141-05 Softwood Lumber

2.2.4.11(28) CSA-0151-04 Canadian Softwood Plywood

2.2.4.11(29) CSA-CAN/CSA-0325.0-92 Construction Sheathing CSA-

2.2.4.11(30) 0437.0-93 OSB and Waterboard

2.2.4.11(31) CSA-CAN/CSA-A82.27/M91 Gypsum Board

2.2.4.12 CGSB

2.2.4.12(1) CGSB- CAN/CGSB-37.3/M89 Application of Emulsified Asphalts for Dampproofing or Waterproofing

2.2.4.12(2) CGSB-CAN/CGSB-37.4/M89 Fibrated, Cutback asphalt, Lap Cement for Asphalt Roofing

2.2.4.12(3) CGSB-CAN/CGSB-37.51/M90 Application for Hot applied Rubberized Asphalt for Roofing and Waterproofing

2.2.4.12(4) CGSB- CAN/CGSB-11.3/M87 Hardboard

2.2.4.12(5) CGSB-CAN/CGSB-11.5/M87 Hardboard, Precoated, Factory finish for Exterior Cladding

2.2.4.12(6) CGSB-CAN/CGSB-12.1/M90 Tempered or Laminated Safety Glass

2.2.4.12(7) CGSB-CAN/CGSB-12.3/M91 Flat, Clear Float Glass

2.2.4.12(8) CGSB-CAN/CGSB-12.20/M89 Structural Design of Glass for Buildings

2.2.4.12(9) CGSB-CAN/CGSB-19.13/M87 Sealing Compound, One Component, Elastomeric, Chemical Curing

2.2.4.12(10) CGSB-19-GP-14M-1984 Sealing Compound, One Component, Butyl-Polyisobutylene Polymer Base, Solvent Curing CGSB

2.2.4.12(11) CAN/CGSB-19.24/M90 Multicomponent, Chemical-Curing Sealing Compound

2.2.4.12(12) CGSB-CAN/CGSB-37.3/M89 Application for Emulsified Asphalts for Damp-proofing or Waterproofing

2.2.4.12(13) CGSB-CAN/CGSB-37.4/M89 Fibrated, Cutback Asphalt, Lap Cement for Asphalt Roofing

2.2.4.12(14) CGSB-CAN/CGSB-37.51/M90 Application for Hot Applied Rubberized Asphalt for Roofing and WaterproofingCGSB-37-GP-56M-1985 Membrane, Modified, Bituminous, Prefabricated and Reinforced for Roofing

2.2.4.12(15) CGSB-CAN/CGSB-51.32/M77 Seathing, Membrane, Breather Type

2.2.4.12(16) CAN/CGSB-51.34/M86 (amended 1988) Vapour Barrier, Polyethylene Sheet for use in Building Construction

2.2.4.12(17) CGSB-CAN/CGSB-82.5/M88 Insulated Steel Doors

2.2.4.13 NFPA

2.2.4.13(1) 10: Standard for Portable Fire Extinguishers;

2.2.4.13(2) 13: Standard for the Installation of Sprinkler Systems;

2.2.4.13(3) 14: Standard for the Installation of Standpipe System;

2.2.4.13(4) 90A - Standard for Installation of Air Conditioning and Ventilation Systems;

2.2.4.13(5) 92A - Standard for Smoke-Control Systems Utilizing Barriers and Pressure Differences;

2.2.4.13(6) 96 – Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations; and

2.2.4.13(7) 101 - Current Edition: Life Safety Code

2.2.4.14 IEEE

2.2.4.14(1) 802.1 series for Interworking, Security, Audio/Video Bridging and Data Centre Bridging;

2.2.4.14(2) 802.3 series of Ethernet Standards;

2.2.4.14(3) 802.11 series of Wireless Standards;

2.2.4.15 NETA

2.2.4.15(1) ATS International Electrical Testing Association (Acceptance Testing Specifications);

2.2.4.15(2) MTS Standards for Maintenance Testing;

2.2.4.16 BICSI Telecommunications Distribution Methods Manual (TDMM);

2.2.4.17 NIOSH

2.2.4.17(1) NIOSH 7400 Analytical Method: Asbestos and other fibers by PCM;

2.2.4.17(2) NIOSH 9002 Analytical Method: Asbestos Bulk Analysis by PLM; and

2.2.4.18 RCABC

2.2.4.18(1) RCABC Roofing Manual.

PART 3. DESIGN PRINCIPLES AND OBJECTIVES

3.1 General Objectives

3.1.1 General objectives of the Project are to:

3.1.1.1 provide buildings that respond to anticipated tenant's needs;

3.1.1.2 provide durable, affordable and secure housing that fosters a sense of community;

3.1.1.3 provide buildings that are cost effective, efficient and easy to maintain;

3.1.1.4 consider life cycle costs in response to the site’s geographical location, topography, climate and orientation when choosing rehabilitation materials and systems;

3.1.1.5 maintain and enhance the Buildings' heritage character and elements to sustain the Buildings' heritage value over the Term; and

3.1.1.6 provide for the special security considerations for the DTES community that the Buildings serve.

3.2 Design Principles

3.2.1 Project Co will apply the following design principles in undertaking the Design:

3.2.1.1 Durability

3.2.1.1(1) Except as required by the Building Specifications, avoid exterior use of products having exterior finishes that require regular interval renewal including coatings and small joint sealants.

3.2.1.2 Safety and Security

3.2.1.2(1) Site planning and design will apply Crime Prevention Through Environmental Design (CPTED) strategies. Submit a CPTED Report to the Authority outlining where CPTED strategies have been formally applied to planning and design.

3.2.1.3 Pest Control

3.2.1.3(1) Project Co will design wall and floor finishes to deter the ingress of insect and rodent pests into wall, floor and ceiling assemblies.

3.2.1.4 Use of Wood

3.2.1.4(1) To meet the intent of the *Wood First Act* (British Columbia), Project Co will incorporate wood products into its design to the extent that the use of wood products is consistent with the requirements of this Schedule.

PART 4. SITE DEVELOPMENT REQUIREMENTS

4.1 Urban Design and Site Development

4.1.1 Site Planning

4.1.1.1 Pedestrian Approach to Building

4.1.1.1(1) Include the following features:

4.1.1.1(1)(a) easy to read building identification;

4.1.1.1(1)(b) stairs and ramps to be easily usable by people with reduced mobility; and

4.1.1.1(1)(c) hard (compact, stable, slip resistant) walking surface.

4.1.1.2 Lighting

4.1.1.2(1) Provide lighting at all entries to each Building. Refer to Section 6.16.7.3 for minimum acceptable lighting levels.

4.2 Site Infrastructure

4.2.1 General

4.2.1.1 Project Co will upgrade existing infrastructure or provide new infrastructure for all necessary municipal services to the Buildings in accordance with the requirements of Governmental Authorities, including with respect to sanitary sewers, storm sewers and drainage, water, electrical, communications, gas and road works. The Authority anticipates that the City may require upgrades to the sewer connections for the Buildings, including providing additional storm sewer connections.

PART 5. BUILDING DESIGN REQUIREMENTS

5.1 Residential Rooms, Commercial Spaces, Common Spaces and Service Rooms

5.1.1 General

5.1.1.1 Project Co will, in accordance with this Schedule, the Building Specifications and the relevant Room Data Sheets, renovate all existing rooms and spaces, including all:

5.1.1.1(1) Residential Rooms;

5.1.1.1(2) Commercial Spaces;

5.1.1.1(3) Common Spaces;

5.1.1.1(4) service rooms, including:

5.1.1.1(4)(a) garbage/recycling rooms;

5.1.1.1(4)(b) equipment storage and maintenance;

5.1.1.1(4)(c) general storage;

5.1.1.1(4)(d) janitor closets; and

5.1.1.1(4)(e) bed bug treatment rooms; and

5.1.1.1(5) administrative/building manager's offices,

5.1.1.2 Residential Rooms

5.1.1.2(1) Maximise limited floor space in Residential Rooms to accommodate basic residential occupancy functions, including cooking/dining, sleeping, socializing, personal hygiene and storage.

5.1.1.2(2) Residential Rooms will be consistent with accommodation provided in compact SRO type units.

5.1.1.2(3) Provide in each Building at least the minimum number of Residential Rooms specified in the relevant Building Specification and provide a minimum cumulative total of 850 Residential Rooms in the Buildings. Project Co will provide up to 887 Residential Rooms in the Buildings as described in the Proposal Extracts (Design and Construction), subject to the approval of the City and subject to design development in accordance with this Agreement. Notwithstanding Section 3(d) of Schedule 1 [Definitions and Interpretation], this Section will prevail over the number of Residential Rooms included in the Proposal Extracts (Design and Construction).

5.1.1.3 Accessible Residential Rooms

5.1.1.3(1) Residential Rooms intended for use by Residential Tenants with limited mobility are referred to as "**Accessible Residential Rooms**". Provide a minimum of 3 Accessible Residential Rooms in each Building designated as an accessible Building.

5.1.1.3(2) For all Accessible Residential Rooms, provide the following in addition to all requirements on the relevant Room Data Sheets:

5.1.1.3(2)(a) entry doorways to a minimum of 914 mm;

5.1.1.3(2)(b) lever handle door hardware;

5.1.1.3(2)(c) a minimum of 610 mm clearance on the latch side;

5.1.1.3(2)(d) millwork accommodating a sink with a blade handle faucet and accessible to a person in a wheelchair;

5.1.1.3(2)(e) shelving units or millwork cupboards at an accessible height convenient to a person in a wheelchair; and

5.1.1.3(2)(f) electrical receptacles and switches at an accessible height.

5.1.2 Commercial Spaces

5.1.2.1 Project Co will retain existing Commercial Spaces as commercial space to the extent described in the Building Specifications.

5.1.2.2 Project Co will upgrade all Commercial Spaces retained as commercial space in accordance with the following:

5.1.2.2(1) If Project Co does not require a Commercial Space to be vacated by the Commercial Tenant, then Project Co will upgrade the building services and systems serving that Commercial Space consistent with the upgrades Project Co is performing in other parts of the Building in which that Commercial

Space is located, but Project Co will retain the Commercial Tenant's fixtures and finishes in place in their existing condition.

5.1.2.2(2) If Sections 6.12(a) and 6.12(b) of Schedule 2 [Design and Construction Protocols] apply to a Commercial Space and that Commercial Space is vacated by the Commercial Tenant (or if a Commercial Space is already vacant at the time of construction), then Project Co will upgrade the Commercial Space in accordance with the Base Building Requirements.

"**Base Building Requirements**" means the following:

(a) Ceilings:

(1) remove existing T-bar ceilings;

(2) gather all loose wire runs into cable trays or conduits, run if possible at the upper wall below beam lines;

(3) re-run any existing plumbing waste lines, water lines, and sprinkler lines tight to exposed original ceilings, and run new services in a similar manner;

(4) patch the fire separation for integrity and prepare and paint in the colour approved by the Authority;

(5) provide ceiling light boxes, with bare bulb ceramic lighting fixtures, within each structural bay at the ceiling; and

(6) relocate sprinkler heads to meet NFPA 13.

(b) Floors: remove existing floor surfaces and install new sheet vinyl flooring.

(c) Walls: patch existing GWB or plaster wall surfaces and prepare and paint. Prepare and paint any new GWB wall surfaces, including in new washroom.

(d) Washroom: except for in the Sunrise Hotel, provide rough-in connections for one accessible washroom for the following:

(1) a 4" sanitary line;

(2) a 1" domestic cold water line;

(3) a 1" domestic hot water line;

(4) a 2" vent line; and

(5) a 4” exhaust duct to the outside for future connection of an exhaust fan.

(e) Trim: prepare and paint all exposed window trim and install painted MDF 1”X6” baseboard at all interior walls.

(f) HVAC: provide electrical rough-in for future HVAC system, allowing for 150 W per square metre.

(g) Domestic Cold Water Line: at a minimum, provide a 1” domestic cold water line, complete with shut-off valve and capped for future connection.

(h) Sanitary Line: at a minimum, provide a 4” sanitary line, roughed-in to back area of the Commercial Space, capped for future connection.

(i) Sanitary Vent Pipe: at a minimum, provide a 2” sanitary vent pipe, directly run outside or connected to building sanitary venting system.

(j) Fresh Air Duct: at a minimum, provide a 8” diameter fresh air duct directly from outside, roughed-in and capped.

(k) Gas Service: provide gas service from separate gas meter and regulator, sized to allow for 500 MBH of load.

(l) Any other requirements applicable to Commercial Spaces in the Design and Construction Specifications.

5.1.3 Common Spaces

5.1.3.1 Amenity Rooms

5.1.3.1(1) Amenity rooms will provide an area for tenant relaxation, including watching TV, reading, and accessing the internet. Social interaction should also be promoted with spaces that allow tenants to socialize in a group environment.

5.1.3.1(2) Locate new amenity rooms in close proximity to the administration office to allow staff oversight.

5.1.3.2 Kitchens

5.1.3.2(1) Provide new kitchens as required in the Building Specifications. Kitchens are intended to foster life skills around food preparation and clean-up, provide a convenient facility for residents to prepare meals, and to promote social interaction. The configuration of each common kitchen and the population it is intended to accommodate (connoting its general size) are generally described in the Building Specifications, including in the Room Data Sheet. In all kitchens:

5.1.3.2(1)(a) provide new laminate faced millwork upper and lower cupboards and laminated faced countertops with integral backsplash, arranged for convenient food preparation and storage for the specified number of occupants;

5.1.3.2(1)(b) accommodate a full size refrigerator, range, and under-counter dishwasher;

5.1.3.2(1)(c) provide a microwave shelf;

5.1.3.2(1)(d) provide a double compartment stainless steel sink with integral strainers; and

5.1.3.2(1)(e) provide electrical receptacle layout for convenient table-top appliance use.

5.1.3.3 Shower/Bathrooms

5.1.3.3(1) Subject to Section 5.1.3.3(2) of this Schedule, Shower/Bathrooms are to include a new prefabricated shower enclosure with a single lever thermostatic mixing valve and a tamper-proof shower head, a floor drain at a central location in the room, a new toilet, a new lavatory with single lever trim, accessories, exhaust fan and vapour resistant ceiling lighting fixture, a wood bench mounted on robust triangulated wall brackets with in-wall support blocking, and new paperless GWB finishes.

5.1.3.3(2) Replace existing showers with new showers that meet the shower enclosure specifications in Section 5.1.3.3(1) of this Schedule. Replace existing bathtubs with new bathtubs with integral surround, curved curtain rod, shower curtain and integral shower units with single lever thermostatic mixing value and a tamper-proof shower head. Shower/Bathrooms with one or more existing bathtubs and no separate shower(s) do not require a new separate shower enclosure. Some existing bathtubs may be replaced with new showers if approved by Authority.

5.1.3.3(3) If replacement of a shower/bathroom or toilet room fixture in its existing location is not consistent with Plumbing Code clearance requirements or Good Industry Practice, Project Co will provide sufficient fixtures at new locations to maintain or exceed the current fixture to tenant ratio in the Building. If the Building design does not accommodate adding fixtures at new locations, Project Co will notify the Authority and Authority may in its discretion authorize a change to the fixture to tenant ratio in the Building or a change to the Building program to accommodate the fixtures at new locations.

5.1.3.4 Toilets

5.1.3.4(1) In all toilet rooms, provide:

5.1.3.4(1)(a) a small corner lavatory; and

5.1.3.4(1)(b) a new toilet, accessories and room finishes; and

5.1.3.4(1)(c) refer to Section 5.1.3.3(3) above regarding replacement of toilet room fixtures.

5.1.3.4(2) Replace existing urinals with new urinals with new traps and flush valves. Refer to Section 5.1.3.3(3) above regarding replacements of toilet fixtures.

5.1.4 Service Rooms

5.1.4.1 Garbage / Recycling Rooms

5.1.4.1(1) If a Building Specification requires a garbage room:

5.1.4.1(1)(a) provide an enclosed garbage room for garbage and recycling containers. Include mechanical ventilation for odour control, hose bib and floor drain. Do not heat room or only provide minimal heat; and

5.1.4.1(1)(b) locate the garbage room with direct access to the lane and with internal access to the upper residential floors, unless otherwise indicated in the Building Specifications.

5.1.4.2 Equipment Storage and Maintenance

5.1.4.2(1) In each Building with a basement:

5.1.4.2(1)(a) upgrade existing unfinished basement storage space to provide for heated and lit storage space; and

5.1.4.2(1)(b) provide anchored bike racks in the basement space for a minimum of twenty bicycles.

5.1.4.3 General Storage

5.1.4.3(1) Provide storage room(s) for additional general storage and to supplement the Residential Tenants' in-suite storage. Refer to the Equipment List and the Room Data Sheets regarding wire cages and shelving.

5.1.4.4 Janitor Closets

5.1.4.4(1) Provide one janitor closet, including a mop sink, on each residential floor, or as directed in the Building Specification.

5.1.4.5 Bed Bug Treatment Rooms

5.1.4.5(1) Provide a new bed bug treatment room in each Building (except for the Dominion Hotel) that meets the following requirements:

5.1.4.5(1)(a) is 3.0 m – 4.5m (10’ – 15’) long and 3.0 m – 3.6m (10’ – 12’) wide.

5.1.4.5(1)(b) if publicly accessible, includes a vestibule a min. 1.2 m x 1.2 m (4’x 4’).

5.1.4.5(1)(c) has a minimum 1 hour fire-resistant rating.

5.1.4.5(1)(d) locate the sauna heater controls in the vestibule or adjacent wall.

5.1.4.5(1)(e) electrical items can be placed inside the room but should remain in the bottom half of the room to avoid overheating.

5.1.4.5(1)(f) located in basement or service area and away from residential areas, Commercial Spaces, Common Spaces and support areas. If possible, the room should be in close proximity to the elevator and a building entrance.

5.1.4.5(1)(g) large enough to hold a three person couch, box spring and mattress, bed side table and chest of drawers. Furniture and other items are to be placed in the room to ensure that there is adequate air circulation to allow for heat penetration.

5.1.4.5(1)(h) ensure that the floor is insulated to a minimum R20, walls insulated to a minimum R22 and ceiling insulated to a minimum R28.

5.1.4.5(1)(i) wall construction to consist of an insulated stud wall, aluminum heat reflective foil, cementitious board and batten finish.

5.1.4.5(1)(j) ceiling construction to consist of insulated ceiling cavity, gypsum board, aluminum heat reflective foil, cementitious board and batten finish. The ceiling assembly to have gypsum board installed to provide a minimum 1 hour fire resistant rating.

5.1.4.5(1)(k) avoid placing electrical, plumbing or HVAC systems in the ceiling construction.

5.1.4.5(1)(l) number of sauna heaters is dependent on the room’s cubic foot print. Refer to the individual sauna heater specification as to the maximum cubic space allowed.

5.1.4.5(1)(m) sauna heater(s) to be set to maintain the room at a temperature of 90 degrees Celsius and run continuously for 2 hours. Sauna heater controls allow maximum 1 hour time settings, so controls will need to be manually reset for the second hour. Bed bug eggs, larva/nymph, and adults only need to be exposed to the designated temperature for 20 minutes.

5.1.4.5(1)(n) entry Vestibule (only if the bed bug sauna is accessible to the public): Vestibule doors should be in direct line of each other and must open out of the rooms. Provide a standard vision light or wired glass to the heat treatment room door. Vestibule doors are to latch closed.

5.1.5 Administrative/Building Manager's Offices

5.1.5.1 Administration/Control Desk

5.1.5.1(1) This is the first point of contact for residents and visitors entering the building and is staffed on a 7day/24 hour basis by Housing Operator staff. Quite often two persons occupy this space.

5.1.5.1(2) Provide a workstation for one to accommodate a personal computer, desk space and the security monitor and, at minimum, a ¼" (6mm) tempered glass vertical or horizontally operable glazed window enclosure to facilitate communication, pass-through functions and provide security.

5.1.5.2 Program Manager's Office

5.1.5.2(1) This is a standard office of approximately 110 sq.ft. (typical SRO room size) to accommodate the program manager, which would typically include an office desk and chair, two visitor chairs and a filing cabinet.

5.1.5.2(2) Provide communication and electrical receptacles for typical computer use and small office equipment.

5.2 Fire and Life Safety

5.2.1 General

5.2.1.1 Upgrade the fire and life safety systems as follows:

5.2.1.1(1) upgrade the fire alarm system as described in Section 6.16.9 of this Schedule;

5.2.1.1(2) upgrade the sprinkler and standpipe systems as described in Section 6.15.2 of this Schedule;

5.2.1.1(3) upgrade all means of ingress and egress as specified in the Design and Construction Specifications;

5.2.1.1(4) upgrade the exit lighting, emergency lighting, and access to exit ambient lighting to the requirements of the VBBL as described in Section 6.16.8 of this Schedule;

5.2.1.1(5) where the existing floor assembly between residential levels has a fire resistance rating of less than 45 minutes, upgrade the floor assembly to minimum 45 minutes;

5.2.1.1(6) where the existing residential public corridor walls and Residential Room walls have a fire resistance rating of less than 45 minutes, upgrade the assemblies to minimum 45 minutes;

5.2.1.1(7) where the existing walls in fuel fire service rooms have a fire resistance rating of less than 1 hour, upgrade the assemblies to minimum 1 hour;

5.2.1.1(8) where the existing Residential Room entry doors cannot be substantiated to have at least 20 minutes fire protection rating, upgrade the door assemblies to minimum 20 minutes, complete with self closer and latch;

5.2.1.1(9) where the existing roof assembly has a fire resistance rating of less than 45 minutes, and the interior vertical fire separations do not extend to the underside of the roof sheathing through the roof or attic space, upgrade the roof assembly to minimum 45 minutes – this requirement does not apply if the roof space is fully sprinkled;

5.2.1.1(10) where the existing floor and wall assemblies between residential and commercial areas has a fire resistance rating of less than 1 hour, upgrade the assemblies to minimum 1 hour;

5.2.1.1(11) where the existing floor assembly between the commercial floor and the basement has a fire resistance rating of less than 1 hour, upgrade the basement ceiling assembly to minimum 1 hour;

5.2.1.1(12) if Project Co upgrades the sprinkler system in a Building, provide sprinklers in the combustible roof and attic spaces;

5.2.1.1(13) where the existing wall assemblies at the exit stair have a fire resistance rating of less than 45 minutes, upgrade the assemblies to minimum 45 minutes;

5.2.1.1(14) provide means to protect the exit stairs from fire exposure from the unprotected openings from the adjacent fire compartments;

5.2.1.1(15) where a fire escape is provided, provide means to protect the fire escape from exit exposure from the adjacent unprotected openings;

5.2.1.1(16) provide means to protect the window openings or any unprotected opening where they have a limiting distance, as defined in the VBBL, of less than 1m;

5.2.1.1(17) if the Building has open stairs or enclosed interior stairs serving more than one floor:

5.2.1.1(17)(a) provide means to prevent movement of smoke and fire between floor levels;

5.2.1.1(17)(b) no more than three Residential Rooms per floor will open directly to this open stairs;

5.2.1.1(17)(c) at a minimum:

(c).1 separate the stairs from the public corridor with 45 minutes rated doors and wall assemblies equipped with a hold-open device conforming to Division B, Article 3.1.8.12. of the VBBL;

(c).2 upgrade Residential Room doors that open into the open stair shafts to minimum 45 minutes fire protection rating; and

(c).3 provide smoke detectors in all suites that open directly to the open stair shafts. Connect these smoke detectors with the building fire alarm system.

5.2.1.1(18) All door clearances will comply with VBBL and NFPA 80.

5.2.1.1(19) The fire resistance rating of the existing assemblies may be based on CAN/ULC-S101, HUD No. 8 Guideline on Fire Ratings of Archaic Materials and Assemblies, Fire Endurance of Light-Framed and Miscellaneous Assemblies, DBR Technical Paper No. 22, Division B, Appendix D of the VBBL, or other methods approved by Governmental Authorities.

5.2.1.1(20) Provide a quick response sprinkler head above any elevator door opening where the elevator door(s) opens directly into an exit stairs or exit stair shaft.

5.2.1.1(21) Where the window sill is below 1070 mm from the finished floor and there is a grade difference of more than 600 mm between the finished floor and the adjacent grade, provide a guard as per Division B, Article 3.4.6.5. of the VBBL. Fixed windows that are designed for guard load can be used as an alternative.

5.3 Structural Systems

5.3.1 Structural Design Principles

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

5.3.1.2 Project Co will cause its structural engineer of record to review for structural adequacy any major structural components that are uncovered or apparent during

the work (and all structural components referred to in Section 3.3 of each of the Building Specifications) and, subject to obtaining any approvals required under Appendix 2H [Cash Allowance for Undisclosed Rotting Structural Components], Project Co will reinforce or replace such structural components as required to ensure the integrity of each Building's structural components for the intended use and occupancy design loads.

5.3.1.3 Project Co will ensure that the Design and Construction does not reduce the structural integrity of the existing building; all work completed is to maintain or improve the existing building's structural integrity.

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

5.3.2 Design Loads

5.3.2.1 Where any new or remedial work is required, ensure that all floor and roof support is adequate for all live and dead loadings resulting from the intended occupancy and uses.

5.3.2.2 Design all new and remediated building elements in accordance with the VBBL.

5.3.3 Durability

5.3.3.1 Design and upgrade the structure and structural components of the Building to minimize the effects of corrosion and deterioration due to the environment.

5.3.4 Member Design Criteria

5.3.4.1 Design all new and remediated 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.

5.3.4.2 Design all new 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.

5.3.4.3 Cladding Support Design Criteria

5.3.4.3(1) If new Cladding is to be supported by the structural members, the members will:

5.3.4.3(1)(a) be designed to have sufficient strength and stability so that the factored member resistance is equal to or greater than the effects of the factored gravity, seismic and wind loads; and

5.3.4.3(1)(b) have sufficient stiffness so as to remain serviceable under the 1 in 50 year service wind pressure and gravity loads and prevent undue stress to the cladding elements. The deflection serviceability limits are shown in following table.

Maximum Deflection / Span Ratios – Cladding Support Members

Member Type	Specified Loading	Deflection Limits
All new brick veneer support members	1 in 10 year (Horizontal)	L/720
All other new Cladding support members	1 in 10 year (Horizontal)	L/360

5.3.5 Differential Shrinkage

5.3.5.1 Project Co will review the framing design to minimize differential shrinkage that may result from the use of steel, concrete or engineered wood framing in combination with sawn lumber and allow for the easy installation of mechanical and electrical services without causing actual physical damage to the existing structural floor.

5.4 Building Envelope Requirements

5.4.1 General Requirements

5.4.1.1 Sustainability

5.4.1.1(1) Use roof colours with a low heat gain, high reflectance.

5.4.1.1(2) provide energy efficient, double glazed units for:

5.4.1.1(2)(a) all new windows in new prepared openings; and

5.4.1.1(2)(b) new wood sash in refurbished existing frames,

on residential floors.

5.4.1.2 Project Co will determine all the limit states, relevant loads and load combinations that apply to a Building and will ensure that, for each limit state in each Building, the factored resistance provided is not less than the factored loads.

5.4.1.3 Limit States Design Method

5.4.1.3(1) Limit states of a Building Envelope will include the probable exposure to moisture based on the following conditions:

5.4.1.3(1)(a) the regional climate and weather;

5.4.1.3(1)(b) site influences, such as terrain, orientation, exposure and adjacent structures;

5.4.1.3(1)(c) building geometry, roof and façade features;

5.4.1.3(1)(d) use/occupancy of the Building; and

5.4.1.3(1)(e) health and safety.

5.4.1.3(2) Ultimate limit states for a Building Envelope objective include:

5.4.1.3(2)(a) deterioration;

5.4.1.3(2)(b) decay;

5.4.1.3(2)(c) corrosion; and

5.4.1.3(2)(d) mould.

5.4.1.3(3) Serviceable limit states for performance requirements of the Building Envelope include:

5.4.1.3(3)(a) preventing uncontrolled water penetration past exterior Cladding;

5.4.1.3(3)(b) controlling thermal heat transfer, vapour diffusion, and air movement through an environmental separator;

5.4.1.3(3)(c) managing the effects of differential movement, expansion, contraction and loads imposed by environmental conditions; and

5.4.1.3(3)(d) supporting heritage preservation, energy efficiency targets, indoor air quality, maintenance and operations.

5.4.1.4 Project Co will engage a qualified professional building science consultant with local knowledge and experience exemplary to their qualifications.

5.4.1.5 Project Co will cause its building science consultant:

5.4.1.5(1) to participate in the design process described in Section 5.2 of Schedule 2 [Design and Construction Protocols]; and

5.4.1.5(2) to provide written confirmation for the Authority's benefit that all Building Envelope enclosures, assemblies and elements conform with the requirements in this Schedule.

5.4.1.6 Project Co will ensure that its Submittals include sufficient detail indicating the selection, location and construction sequencing of exterior Cladding, opposing interfaces, penetrations, sheathings, sheathing membranes, air barriers, vapour barriers and insulation.

5.4.1.7 Thermal Resistance

5.4.1.7(1) The walls, floors, roofs, ceilings and openings of the Building Envelope will:

5.4.1.7(1)(a) provide thermal resistance. Project Co will cause its building science consultant to determine thermal resistance values and specify the appropriate insulation material and location within the assembly.

5.4.1.7(1)(b) provide resistance against the movement of air through a Building Envelope assembly. Project Co will cause its building science consultant to specify air barrier components, connected by air barrier accessories, that are designed to provide a continuous barrier to the movement of air through an environmental separator and which has an air leakage of 0.02 $L/(s \cdot m^2)$ or less at a pressure difference of 75 Pa.

5.4.1.8 Moisture Protection

5.4.1.8(1) The walls, floors, roofs and ceilings of the Building Envelope will:

5.4.1.8(1)(a) effectively manage all rainwater using principles for deflection, drainage and drying and promote durability.

5.4.1.8(1)(b) prevent moisture vapour diffusion through a Building Envelope assembly. Project Co's building science consultant will specify a vapour barrier element and location that resists diffusion of moisture through wall, ceiling and floor assemblies having a water vapour permeability of 57 $ng/sm^2 \cdot Pa$ or less.

5.4.1.8(2) Design and construct all interior walls and ceilings exposed to high levels of humidity and moisture, including in showers, with a physical separation between distinct environmental conditions.

5.4.1.8(3) Waterproof all interior walls and ceilings directly and regularly impacted by water including shower enclosures.

5.4.1.9 Accessibility

5.4.1.9(1) Where restrictions are imposed by existing conditions or the Heritage Conservation Plan prevents compliance with Sections 5.4.1.7 and 5.4.1.8 of this Schedule, Project Co will provide alternative solutions to improve environmental separations acceptable to the Authority.

5.4.2 Standards

5.4.2.1 In addition to the applicable standards noted in this Schedule, the following identifies additional standards for the design of the Building Envelope. These standards may exceed the referenced standards noted above.

5.4.2.1(1) Roof design and construction will comply with the current edition of standards and guidelines published by the Roofing Contractors Association of B.C. Guarantee Corporation (RGC) and Roofing Contractors Association of B.C. (RCABC).

5.4.2.1(2) Residential Window, Door and Skylight selection, design, and construction will comply with AAMA/WDMA/CSA 101/I.S.2/A440-08, NAFS - North American fenestration Standard/Specification for windows, doors, and skylights published by the American Architectural Manufacturers Association (AAMA), the Window & Door Manufacturers Association (WDMA), and the Canadian Standards Association (CSA).

5.4.2.1(3) Residential windows located above the ground floor will comply with ASTM F2090-10 Standard Specification for Window Fall Prevention Devices With Emergency Escape (Egress) Release Mechanisms and/or the VBBL requirements.

5.4.2.1(4) Residential window, door and skylight selection, design, and construction will comply with CAN/CSA-A440.2-09/A440.3-09 - Fenestration energy performance/User guide to CSA A440.2-09, Fenestration energy performance

5.4.3 Exemptions

5.4.3.1 Windows that are retained or restored in accordance with the Heritage Conservation Plans need not comply with AAMA/WDMA/CSA 101/I.S.2/A440-08, other than the requirements for water penetration and safety.

5.4.4 Products

5.4.4.1 Unless permitted in this Schedule 3 or approved by the Authority, all products will be new. Products which are not specified will be of a quality best suited to the purpose required and their use is subject to the approval of the Authority.

5.4.5 Constructed Elements

5.4.5.1 Exterior Wall Cladding

5.4.5.1(1) Masonry and masonry products to be used in the restoration of heritage facades will be engineered for durability and compatibility with the existing masonry system to be restored.

5.4.5.1(2) Refer to the Heritage Conservation Plans for masonry restoration requirements.

5.4.5.1(3) Fenestration openings in exterior walls will be designed and constructed to prevent water ingress and likelihood of air leakage.

5.4.5.1(4) Penetrations such as vents will be located, designed and constructed in a manner that their use and function does not negatively influence any other component, material, element or assembly.

5.4.5.1(5) Any new exterior Cladding will be designed and constructed with a sufficient level of redundancy in moisture protection including a capacity for drainage and drying.

5.4.5.2 Roofs

5.4.5.2(1) Project Co will upgrade or replace all existing roofs as necessary to provide:

5.4.5.2(1)(a) a design lifespan of 25 years; and

5.4.5.2(1)(b) a sufficient level of redundancy and moisture barrier protection to prevent water ingress.

5.4.5.2(2) All horizontal and sloped projections, elements and surfaces not intended to allow the passage of water through them regardless of the space conditioning below will be treated as a roof.

5.4.5.2(3) Sheet metal used in roofing systems will be coated on both sides and of thickness not less than 26 gauge.

5.4.5.2(4) Waterproofing will be included below any sheet metal roofing and seamed, jointed, or segmented capping, including parapets, cornices and curbs. If greater than 4 inches in width, the waterproofing and cap referred to in this Section will be sloped.

5.4.5.2(5) Roof top access will be provided on all buildings. Roof top access will be in the form of roof hatch, staircase, or ladder conforming to VBBL and WCB requirements.

5.4.5.2(6) Where access to installed roof top systems and accessories requiring maintenance is required, roof surfaces will be provided with pathways consisting of not less than 1 additional wearing layer.

5.4.5.2(7) Use SBS (Stryrene Butidene Stryrene) modified bitumen roof systems acceptable to the Roofing Contractors Association of B.C. (RCABC) and RCABC Guarantee Corporation (RGC) Standards Manual.

5.4.5.2(8) The installation of roof products will be performed by member companies, trade qualified personnel, and apprentices registered with RCABC. Do not use general labour to install roof products.

5.4.5.2(9) Comply with manufacturers' recommended procedures and requirements or exceed RCABC Safety Precautions - Torching for Modified Bituminous Systems as described in the RCABC Roofing Practices Manual. Torching membranes directly onto wood is prohibited.

5.4.5.2(10) Regulatory Requirements Roof Covering Materials: Tested in accordance with CAN/ULC S107M to achieve a Class A, B, or C rating as required by Governmental Authorities.

5.4.5.3 Windows and Doors

5.4.5.3(1) Unless otherwise specified in the Building Specifications:

5.4.5.3(1)(a) windows may be of fixed or operable glazing or in combination thereof.

5.4.5.3(1)(b) unless otherwise required by the VBBL, windows located within a common means of egress or access to exit will be comprised of fixed, laminated or tempered insulated glass units.

5.4.5.3(1)(c) exterior doors not located within storefronts will be comprised of prefinished, insulated pressed metal, slab type panel door set in matching frames.

5.4.5.3(1)(d) wherever conditions permit, provide clear glass view lites in all exterior doors.

5.4.5.3(1)(e) wired glass will not be accepted for any windows or doors unless approved by the Authority.

5.4.5.3(1)(f) safety glass will be used in any window located within a tub or shower.

5.4.5.3(1)(g) reinstate existing skylights with new structural frames and glazing to conform to CSA A440. Do not rehabilitate or use existing frames without the Authority's consent.

5.4.5.4 Quality Assurance

5.4.5.4(1) Quality assurance of the construction of a building envelope enclosure, assembly, or system is required including field review, reports, shop drawings, factory and in-situ testing.

5.4.5.4(2) Water penetration resistance tests of a representative sampling of all windows and transitions to adjacent construction will be performed in the field in accordance with ASTM E1105-00, "Field Determination of Water Penetration of Installed Exterior Curtain Walls and Doors, by Uniform or Cyclic Static Air Pressure Difference".

5.4.5.4(3) Project Co's building science consultant will specify the required testing, attend during the test, review the test results, and verify compliance.

5.5 Interior Wayfinding and Signage

5.5.1 Identify all interior levels by floor codes using a combination of colour coding and a numbering system. Make each floor level readily identifiable at each stairway and elevator landing.

5.5.2 Each floor will include wayfinding signage located at all access points that indicates the direction to Residential Rooms (by room number) and any Common Spaces, support services and the site service desk/office.

5.5.3 All Residential Rooms will be identified by number.

5.5.4 All Common Spaces and site service desks/offices, administrative/building manager's offices and service rooms will be identified by name and also be numbered as part of the overall door numbering system for building management purposes.

5.5.5 Install universal symbols on shower/bathrooms and toilets.

5.5.6 Signage that is raised from a surface will be secured against theft and laminated to resist graffiti and make clean up easier.

5.6 Sound Transmission

5.6.1 Project Co will ensure that all new or reconstructed floor and wall assemblies have an STC rating that, at minimum, complies with the VBBL.

5.7 Hazardous Materials

5.7.1 In undertaking any rehabilitation work that disturbs existing surfaces or construction containing hazardous materials, Project Co will comply with the requirements of all Applicable Laws.

PART 6. FACILITIES CONSTRUCTION SUBGROUP SPECIFICATIONS

6.1 Division 1 – General Requirements – NOT USED

6.2 Division 2 – Site Construction – NOT USED

6.3 Division 3 – Concrete

6.3.1 General (03300)

6.3.1.1 All new concrete must conform to CAN/CSA A23.1 – 00/CAN/CSA A23.2 – 00 Concrete Materials and Methods of Construction /Methods of Test for Concrete; Amendment 2001.

6.3.1.2 Project Co must appoint and pay for a CSA certified inspection agency to review concrete mix designs and perform concrete testing in accordance with CAN/CSA A23.1.

6.4 Division 4 – Masonry

6.4.1 General (04050)

6.4.1.1 Refer to the Building Specifications for Building-specific masonry restoration requirements and specifications.

6.4.1.2 All new masonry must conform to CSA S304.1-04 (R2010) Design of Masonry.

6.4.1.3 Do not remove, dispose of or delete any existing masonry without the Authority's prior consent.

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

6.4.1.5 Installers will be members in good standing of the Canadian Masonry Contractors Association, Masonry Institute of BC, and be qualified under the Technical Masonry Certification (TMC) program. (Effective January 1, 2003).

6.4.1.6 Installation to CAN3 A371-94 "Masonry Construction for Buildings".

6.4.1.7 For new construction:

6.4.1.7(1) Brick Veneer: To CAN/CSA A82.1 M87, Grade SW, Type FBS;

6.4.1.7(2) Concrete Block: To CSA – A165.1 - 94. Classification: H/15/A/M;

6.4.1.7(3) Connectors: To CSA A370-94 and CSA S 304.1-94, stainless steel;

6.4.1.7(4) Grout: ASTM C476 - 10 Standard Specification for Grout for Masonry and to be compatible with existing;

6.4.1.7(5) Non-Load Bearing Mortar Mixes: Use Type N or S mortar for brick veneer and non-load bearing masonry based on proportion specification in accordance with CSA-A179-94; and

6.4.1.7(6) Load Bearing Mortar Mixes:

6.4.1.7(6)(a) to ASTM 270 C Mortar for Unit Masonry;

6.4.1.7(6)(b) Types S or type SA Hydrated Lime for Masonry Purpose;

6.4.1.7(6)(c) ASTM C5 - 10 Quicklime for Structural Purposes;

6.4.1.7(6)(d) ASTM C144 - 11 Aggregate for Masonry Mortar; and

6.4.1.7(6)(e) ASTM C150 / C150M - 11 Portland Cement.

6.5 Division 5 – Metals

6.5.1 Structural Steel

6.5.1.1 All new steel design must conform to CSA S16-01 Design of Steel Structures.

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

6.5.2 Light Gauge Steel Studs

6.5.2.1 Quality Requirements

6.5.2.1(1) Design, detail and construct load bearing steel stud design and construction to comply with all applicable CAN / CSA standards.

6.5.2.1(2) The steel stud manufacturer will be certified in accordance with CSSBI Standard 30M-06 and all applicable CAN / CSA standards.

6.5.2.1(3) The steel stud fabricator and erector will be experienced in the type of work undertaken.

6.5.2.1(4) Conform to the Association of Wall and Ceiling Contractor's Specification Standards Manual (AWCC).

6.5.2.2 Performance Requirements

6.5.2.2(1) Limit maximum deflection under specified wind loads to L/360 (L/720 for masonry veneers), unless a smaller maximum deflection is specifically required due to wall finishes.

6.6 Division 6 – Wood, Plastics and Millwork

6.6.1 Basic Requirements

6.6.1.1 All wood framing will be designed in accordance with CAN/CSA-086-09.

6.6.2 Finish Carpentry (06200)

6.6.2.1 Workmanship must conform to Part 6 of the Quality Standards for Architectural Woodwork as published by Architectural Woodwork Manufacturers Association of Canada (AWMAC), 1991 edition.

6.6.3 Millwork

6.6.3.1 Seal all millwork surfaces and edges with plastic laminate to create surfaces that facilitate cleaning, resistance to regular and special maintenance and resistance to corrosive action of chemicals or agents used by the Authority.

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

6.6.3.3 Use marine-grade plywood substrate for countertops. Do not use fibreboard or particleboard.

6.7 Division 7 – Thermal and Moisture Protection

6.7.1 Firestopping and Smoke Seals

6.7.1.1 General

6.7.1.1(1) Provide all required firestopping and smoke seals within fire resistive walls and floor assemblies.

6.7.1.1(2) All firestopping and smoke seals will be listed by Underwriters’ Laboratories of Canada (ULC), Underwriters' Laboratories certified for use in Canada (cUL), Warnock Hersey Professional Services Limited (WH) or tested to the fire test method in ULC-S115, and will form a draft tight barrier to retard the passage of smoke, flame and hose stream as noted in the appropriate listing.

6.7.1.1(3) Mechanical and electrical penetrations through fire resistance rated floor, roof and wall assemblies inclusive of cable trays, receptacles, conduits, pipes, sleeves and poke through devices are to be fully coordinated with Division 15 and 16 respectively.

6.7.1.1(4) Design and Performance Requirements

6.7.1.1(4)(a) All firestopping for this project will conform to 'F' or 'FT' rating as per the VBBL.

6.7.1.1(4)(b) Fire protection ratings per CAN4-S115 in all seals.

6.7.1.1(4)(c) FTH fire protection ratings per CAN4-S115 in cable (in excess of 20 mm O.D.) and cable tray penetrations.

6.7.1.1(4)(d) Minimum 10% operational movement of all joints, and annuals of mechanical piping and electrical bus duct penetrations. Firestop sealants must be sufficiently flexible to accommodate other motions such as thermal expansion and other normal building movement without damage to the seal.

6.7.1.1(4)(e) Flexible seals for fire damper perimeters and mechanical piping penetrations.

6.7.1.1(4)(f) Use fire rated pathway devices in all locations where frequent cable moves, add-ons and changes will occur.

6.7.1.1(4)(g) When mechanical cable pathways are not practical, openings within walls and floors designed to accommodate voice, data and video cabling will be provided with re-enterable products specifically designed for retrofit.

6.7.1.1(4)(h) Provide products that upon curing, do not re-emulsify, dissolve, leach, breakdown, or otherwise deteriorate over time from exposure to atmospheric moisture, sweating pipes, ponding water or other forms of moisture characteristic during and after construction.

6.7.1.1(4)(i) Complete fire-tested (CAN4-S115) compatibility and operational compatibility without stress corrosion and/or any weakening effects within the following materials and/or combinations thereof in their respective applications:

(i).1 Black Steel (Piping, Sleeving & Structural)

(i).2 Copper (Piping)

(i).3 Aluminum (Cable Tray)

(i).4 Galvanized Steel

(i).5 Cast Iron (Piping)

(i).6 ASJ Vapour Barriers (Insulation, Jacketing)

(i).7 Concrete

(i).8 Masonry

(i).9 Power Cables (Min. 40% tray fill area rating)

(i).10 Communication Cables (minimum 40% tray fill area rating)

6.7.1.1(5) Plastic (Sprinkler Piping and/or Domestic Water Tubing)

6.7.1.1(5)(a) Inspection of installations must be simplified by using identifiable material colours such as red or orange.

6.7.1.1(5)(b) 25 mm (1") Head (0.0025 kg/cm^2) of water pressure resistance required for all fire stop seals.

6.7.1.1(5)(c) Non-slump ability in wall and overhead applications.

6.7.1.1(5)(d) Re-enterability in cable and cable tray penetrations without use of power tools.

6.7.1.1(5)(e) Minimum 250 psi (17.6 kg/cm^2) compression strength in cable and cable tray penetration.

6.7.1.1(5)(f) Obtain firestop systems for each type of penetration or joint opening and construction condition indicated from a single manufacturer.

6.7.1.1(6) Quality Assurance

6.7.1.1(6)(a) Project Co will retain a third party professional engineer to provide certification of the following:

(a).1 fire separations and their continuity;

(a).2 continuity of fire separations at HVAC penetrations;

(a).3 continuity of fire separations at plumbing (including fire suppression system) penetrations; and

(a).4 continuity of fire separations at electrical penetrations.

6.7.1.1(6)(b) All work to be in strict accordance with the manufacturer's printed trade specifications, by an approved specialist firestopping caulking firm employing only skilled tradesmen.

6.7.1.2 Products

6.7.1.2(1) Firestop Caulking Compound: Minimum requirements - National Standards System specifications.

6.7.1.2(2) Approved Firestop Caulking (Sealants) Compound: Only those products tested, approved and listed in the ULC - List of Equipment and Materials - Volume II - Building Construction, cUL, or WH directories may be used and only within specific firestop joint locations.

6.8 Division 8 – Doors and Windows

6.8.1 Doors

6.8.1.1 General

6.8.1.1(1) All new interior doors to be new pressed metal doors, with a stile dimension to accept the new proximity access control technology door hardware and meet the minimum fire protection rating required by the VBBL. Existing wood door frames may be used for residential door entries if they meet code requirements or are approved as an alternate solution acceptable to the City.

6.8.1.1(2) Maximize glazing in doors in public corridors including doors at fire separations, exit stairs and Common Spaces as permitted by the VBBL, to enhance building security. Georgian wired glazing is not acceptable.

6.8.1.1(3) For all accessible rooms, including Accessible Residential Rooms and accessible kitchens, showers and bathrooms, provide door leaf widths that are a minimum of 914 mm (3'-0").

6.8.1.1(4) Provide roll-over thresholds at all doors.

6.8.1.1(5) Provide closers as per the VBBL on all doors, as well as plastic seating grommets to mitigate door closure noise. Ensure that all door closers are 'boxed in' to prevent possible damage to fingers.

6.8.1.1(6) Provide commercial grade lever door handles throughout, except for service doors.

6.8.2 Metal Doors and Frames (08100)

6.8.2.1 General

6.8.2.1(1) Provide new steel doors and frames for all exit stairs and service rooms. Provide new steel doors for all Residential Room entrances. Existing Residential Room wood door frames may be used if they meet code requirements or are approved as an alternate solution acceptable to the City.

6.8.2.1(2) New steel door frames are to be set into the existing corridor partitions, in a manner that allows the installation of wood door casing on both sides of the door

6.8.2.1(3) New steel doors and frames must conform to Canadian Steel Door and Frame Manufacturer's Association (CSDFMA), Manufacturing Specifications for Steel Doors and Frames.

6.8.2.1(4) Fabricate fire-rated doors in accordance with the testing agency's requirements using material not less than the thickness specified herein, unless a greater thickness is specified in the rating requirements.

6.8.2.2 Products

6.8.2.2(1) Exterior Service Room and Exit Doors to be fully welded, 16 gauge steel to ASTM A525 prepared to ASTM A527, Class ZF075, wiped zinc coated.

6.8.2.2(2) Service/Mechanical Rooms, Interior Exit Doors

6.8.2.2(2)(a) New door and frame product will be manufactured from tension levelled steel to ASTM A924-97 (M-97). Galvanized to ASTM a653-97 (M-97), Commercial Steel (CS) dry passivated, coating

designation A40 (ZF 120), known commercially as painted galvanneal.

6.8.2.2(2)(b) New door frames for concrete and masonry walls: Fully welded, 16 gauge steel to ASTM A525 prepared to ASTM A527, Class ZF075, wiped zinc coated.

6.8.2.2(2)(c) For new doors in elevator vestibules, provide maximum glazing allowed by the VBBL.

6.8.3 Windows (08500)

6.8.3.1 General

6.8.3.1(1) Where new window systems are required, provide window systems that provide good energy conservation, occupant comfort and long term durability, and that impede the ejection of foreign materials to the exterior or accidental/intentional human falls.

6.8.3.1(2) Install bird spikes or similar on all light court window sills to control pigeon roosting, and prevent pigeon guano hygiene hazard.

6.8.3.2 Window Cleaning

6.8.3.2(1) Where windows cannot be cleaned from inside, Project Co will ensure that provision is made for windows that cannot to be cleaned from grade level, or roof top. Safety features such as roof top window washing anchors, or roof-top rolling booms to clear upper cornices, may be considered for higher buildings.

6.8.3.3 Drapes and Blinds

6.8.3.3(1) As approved by the Authority, provide horizontal or vertical louvered blinds to all exterior windows and doors.

6.8.3.3(2) Blinds are to be constructed of a durable, easily maintained material such as polyvinyl chloride.

6.8.4 Finish Hardware (08710)

6.8.4.1 Products

6.8.4.1(1) Doors: All doors will have proximity access technology in accordance with Section 6.10.3.

6.8.4.1(2) Latchsets: Minimum requirements - ANSI A156.2 Series 4000 Grade 1 c/w mortised faceplate latch and 6 pin cylinders.

6.8.4.1(2)(a) Lever handles are required on all lock and latch sets accessible to tenants.

6.8.4.1(2)(b) Exterior Doors or Gate Hardware: Hardware for exterior doors or gates will have stainless steel finish and corrosion resistant parts when exposed to weather, except where required otherwise by a Heritage Conservation Plan.

6.8.4.1(3) Electric Strikes: Minimum requirements - ANSI/BHMA A156.31, Grade 1.

6.8.4.1(4) Electronic Locks: Minimum requirements - ANSI/BHMA A156.25, Grade 1.

6.8.4.1(5) Magnetic Locks: Minimum requirements - ANSI/BHMA A156.23-1992 with a minimum holding force of 1200 LBF.

6.8.4.1(6) Exit Devices: All Exit Devices must be ULC listed for Accident Hazard and Fire Exit, and must be tested in accordance to ANSI A156.3, Grade 1.

6.8.4.1(7) Closers: Minimum requirements: All closers must be ULC listed and certified under ANSI Standards A156.4, Grade 1.

6.8.4.1(8) Ball Bearing Hinges: For all fire protection rated doors, provide ball bearing hinges with five knuckles and two sets of bearings.

6.8.4.1(9) Hinges: Residential Room doors will be fitted with three lift off hinges (not rise and fall and not removable hinge pin)

6.8.4.1(10) Door Stops: Provide door stops where required to prevent damage to finishes. Stops to be tamper resistant and of suitable durability for their location.

6.8.4.1(11) Peep Holes: Viewing hole to be provided at standard height; provide a hole at accessible height for accessible or wheelchair units.

6.8.4.1(12) Kick Plates: Minimum 254 mm (10”) high, full width of door, 1.6 mm (1/16”) thick, aluminum, C-28 finish, secured with corrosion resistant screws.

6.8.4.1(13) Push Plates: 102 mm x 580 mm, 1.6 mm thick (4” x 20” x 1/16”), aluminum, C-25 finish.

6.8.4.1(14) Pull Plates: Same as push plates, with 305 mm (12”) “D” handles.

6.8.4.1(15) Door Pulls for Pocket Doors, Cabinets, and Closets: Should be easily graspable by people with limited dexterity; minimum 102 mm (4”) D pulls.

6.8.4.1(16) Thresholds: Extruded aluminum, mill finish, bevelled, with no more than 13 mm (1/2”) floor offset

6.8.4.1(17) Weatherstripping: Fully weatherstrip doors using heavy-duty bulb type weatherstrips (not foam type). Weatherstripping must restrict air infiltration to not more than 0.05 m3 (1.76 ft3) per minute per 1.0 m (3'–4") of joint.

6.8.4.1(18) Labelled Doors: Hardware used in fire rated openings must bear Underwriter's Laboratory of Canada (ULC) label.

6.8.4.2 Execution

6.8.4.2(1) Install hardware to standard hardware location dimensions in accordance with the Door & Hardware Institute Guide.

6.9 Division 9 – Finishes

6.9.1 General

6.9.1.1 All finishes should be appropriate for the use of each space, with damage resistance and durable qualities capable of withstanding the heavy use of the 'hard to house' residents. Finishing systems are to be selected to facilitate maintenance, durability and pest control.

6.9.1.2 Unless otherwise specified by the Authority, carpet is not to be used as a floor finishing system.

6.9.1.3 Painted interior finishes will be eggshell or matt texture to facilitate ease of cleaning; stipple finish textures are not to be used.

6.9.1.4 Project Co to provide finishes that prevent habitation and migration of pests, including bed bugs, cockroaches, rodents, pigeons and seagulls.

6.9.1.5 Project Co will provide a finish schedule for each Building as part of the design development process.

6.9.2 Gypsum Wallboard (09250)

6.9.2.1 General

6.9.2.1(1) Existing lath and plaster wall and ceiling finishes that have remained well keyed to lath and with limited surface cracking and spalling may be retained, repaired, and prepared for a good paint finish. Project Co may also remove existing plaster finishes and install new finished GWB finishes.

6.9.2.1(2) Materials and workmanship must conform to The Specification Standards Manual as published by the Association of Wall and Ceiling Contractors of BC (AWCC).

6.9.2.2 Products

6.9.2.2(1) Standard Gypsum Board: to CAN/CSA A82.27-M and ASTM C36.

6.9.2.2(2) Fire-resistant Gypsum Board: Fire-resistant Type X or Type C to CAN/CSA A 82.27-M and ASTM C36.

6.9.2.2(3) Moisture-resistant Gypsum Board: to CAN/CSA-A82.27, ASTM C630; gypsum (noncombustible) core with hydrophobic treatment, or fire-resistance performance as required.

6.9.2.2(4) Water-resistant Gypsum Tile Backer Board: to ASTM C630/C 630M-96A Type X water resistant board with siliconized gypsum core and faces bonded to an inorganic fibreglass mat wrapping treated with one face coated with a heat cured copolymer water and vapour retardant coating.

6.9.2.2(5) Abuse-Resistant Drywall – Protection of drywall from damage in high-traffic corridors and hallways:

6.9.2.2(5)(a) Abuse-resistant drywall: the following abuse resistant gypsum board products are acceptable:

(1) CertainTeed ProRoc Abuse-resistant;

(2) Georgia Pacific Tough Rock; or

(3) other products approved by the Authority.

6.9.2.2(5)(b) Vinyl wall protection sheets to be .040N Acrovyn 4000 to a wainscot height, applied over acceptable substrate. Wall corner guards to be Acrovyn corner trims. Acceptable wall protection trims to be either Acrovyn 4000 trims (eg. at wainscot, outside corner, inside corner and ‘H” joint molding), or alternatively, applied wood 1”X4” batten-type trim, where appropriate.

6.9.2.2(6) Cementitious Tile Backer Board: Asbestos and formaldehyde free, non-combustible composite board of Portland cement, ground sand, cellulose fibre, selected additives and water, thickness and length to suit.

6.9.2.2(7) Fasteners: Use drywall screws for fastening gypsum wallboard in accordance with AWCC Manual. Use corrosion resistant screws for fastening cementitious / water-resistant gypsum tile backer board.

6.9.2.2(8) Thermal and Acoustic Insulation: If mineral fibre insulation is used, conform to CSA CAN/ULC S 702-97.

6.9.2.2(9) Corner Bead: Use tape-on corners with an abrasion resistant finish.

6.9.2.2(10) Tub/ Shower Surround:

6.9.2.2(10)(a) Behind one-piece plastic laminate surround: Use 13 mm (½”) moisture resistant gypsum wallboard.

6.9.2.2(10)(b) Ceramic tile shower/tub surround: Cementitious backer board.

6.9.2.3 Execution

6.9.2.3(1) Seal underside of wood stud plates with acoustical sealant, including as required for the rated assembly. Seal around penetrations in sound-rated walls including joints between dissimilar construction.

6.9.2.3(2) Finish gypsum wallboard surfaces in accordance with the Levels of Finish as prescribed in Section 9.6 of the AWCC Manual and as follows:

6.9.2.3(2)(a) Level 1 Finish: Use this finish in areas where the assembly will be completely concealed from view such as in ceiling spaces and behind solid wall and ceiling finishes.

6.9.2.3(2)(b) Level 4 Finish: Use this finish in areas that will receive a GL1, GL3 and GL5 paint finish.

6.9.3 Ceramic Tile (09310)

6.9.3.1 General

6.9.3.1(1) Quality Assurance

6.9.3.1(1)(a) All tile work in accordance with recommendations as set out in the latest edition (2002) of the Tile Specification Guide 09300 Tile Installation Manual as prepared by the Terrazzo, Tile and Marble Association of Canada (TTMAC) and to ANSI 108.1 & 108.5.

6.9.3.2 Products

6.9.3.2(1) Materials

6.9.3.2(1)(a) Cement: Type 10 Portland Cement conforming to CAN/CSA-A 3000-98, A5-98, colour grey.

6.9.3.2(1)(b) Sand: conforming to ASTM C144.

6.9.3.2(1)(c) Water: fresh, clean, potable, free from deleterious matter, acids or alkalis.

6.9.3.2(1)(d) Latex Additive: enriched latex emulsion additive conforming to ANSI A118.4-1992 for use in thin set mortar.

6.9.3.2(1)(e) Acrylic Grout Additive: acrylic liquid for use with Portland Cement grout in lieu of water to ANSI A118.6-1992.

6.9.3.2(1)(f) Shower Base Waterproof Membrane:

(f).1 Provide pre-manufactured sheet or trowelled membrane as required by applicable standards and Governmental Authorities.

(f).2 The Plumbing Officials Association of BC (POABC) allows trowelled membrane at slab on grade installations only. Comply with the POABC, manufacturer and TTMAC requirements.

6.9.3.2(1)(g) Reinforcing Mesh: to all flooring incorporating thickset mortar bed and waterproof membrane. Reinforcing mesh, as per TTMAC detail 309F-2002, to be 51 mm x 51 mm (2” x 2”) 16 gauge galvanized welded wire mesh.

6.9.3.2(1)(h) Wall Tile Edge Trim: Extruded aluminum trim for use at exposed washroom wall tile edges.

6.9.3.2(1)(i) Floor Tile Edge/Transition Trim: Extruded aluminum trim at all exposed floor tile edges.

6.9.3.2(2) Tile

6.9.3.2(2)(a) In accordance with CAN/CGSB-75.1-M88 complete with cushioned and bull nosed edges and necessary shapes as required. Provide floor tile with matching coved base and internal and external corners.

6.9.3.2(2)(b) All ceramic used at floor areas to meet static co-efficient of friction of 0.60 or greater conforming to CGSB 75.1 – M88/P&. 2.7.

6.9.3.2(3) Mixes

6.9.3.2(3)(a) Thin set mortar: portland cement with modified latex or acrylic additive.

6.9.3.2(3)(b) Latex grout: factory prepared mixture for use with Portland Cement and sand mortar.

6.9.3.2(3)(c) Grout colour additive: grout colour as approved by the Authority.

6.9.4 Resilient Flooring (09650)

6.9.4.1 General

6.9.4.1(1) Provide resilient sheet flooring to the wall joint with cove edges and cap to prevent pest ingress into the wall.

6.9.4.1(2) Provide inlaid designs in the corridor sheet resilient flooring to assist in wayfinding and to avoid an institutional character to the corridor.

6.9.4.1(3) Workmanship and materials must conform to the Specification Manual as published by the National Floor Covering Association, latest edition.

6.9.4.1(4) Flooring finishes are specified in the Room Data Sheets. For elevator cab floor finishes, refer to Section 6.14.1.4(5)(c).1 of this Schedule.

6.9.4.1(5) Provide a minimum of five percent of each type and colour of resilient floor covering supplied, for maintenance requirements.

6.9.4.2 Products

6.9.4.2(1)

Homogeneous Sheet Vinyl

6.9.4.2(1)(a) Standard: ASTM F1913 “Sheet Vinyl Floor Covering without Backing”.

6.9.4.2(1)(b) Type: Binder Content 50% minimum.

6.9.4.2(1)(c) Wear Layer Minimum Thickness: 2 mm (0.080”)

6.9.4.2(1)(d) Overall Thickness: 2 mm (0.080”)

6.9.4.2(2) Inlaid Sheet Vinyl

6.9.4.2(2)(a) Standard: ASTM F1303 “Sheet Vinyl Floor Covering With Backing”.

6.9.4.2(2)(b) Type: Type II Binder Content 34% minimum.

6.9.4.2(2)(c) Wear Layer Minimum Thickness: Grade 1, 1.2 mm (3/64”)

6.9.4.2(2)(d) Overall Thickness: 2.0 mm (5/64”)

6.9.4.2(3) Slip-Resistant Sheet Vinyl for Bathrooms

6.9.4.2(3)(a) Standard: ASTM F 1303-99, Standard Specification for Sheet Vinyl Floor Covering with Backing, Type 2, Grade 1, Class A backing.

6.9.4.2(3)(b) Static coefficient of friction of .60 or greater for level surfaces and .80 or greater for dry ramps, ASTM D 2047-99.

6.9.4.2(3)(c) Overall Thickness: 2.0 mm to 3.0 mm

6.9.4.2(4) Interior Stairs

6.9.4.2(4)(a) Provide tactile warning strips:

(a).1 at the top of a stairway and at intermediate landings intercepted by other paths of travel;

(a).2 that are a minimum 725 mm wide by the full width of the stairs;

(a).3 located one tread width back from the top riser;

(a).4 that are slip-resistant and durable;

(a).5 not more than 3 mm above or below the surrounding floor surface;

(a).6 that are detectable as being different from the surrounding flooring when walked upon; and

(a).7 that are of a colour that contrasts with the surrounding flooring.

6.9.4.2(4)(b) Provide a durable material that is slip resistant to cover the leading edge of a stair tread if such material is absent. The leading edge of a stair tread will have a contrasting colour with the surrounding floor surface, apparent from both directions of travel, to differentiate the leading edge of the tread and the leading edge of the landing.

6.9.4.2(4)(c) Make good or replace any stair tread leading edges that have been worn out extensively or damaged.

6.9.4.2(4)(d) Install new handrails conforming to Division B, Article 3.4.6.4. of the VBBL if the flight of stairs:

(d).1 has no handrail; or

(d).2 is equal to or greater than 1100 mm in width and has only one handrail.

6.9.4.2(5) Exit Stairs

6.9.4.2(5)(a) Tread, Riser and Landing: sheet vinyl with 2 mm (5/64”) thickness (refer to Section 6.9.4 of this Schedule).

6.9.4.2(5)(b) Nosing: highly contrasting colour to tread, riser and landing.

6.9.4.2(5)(c) Tactile Warning Strip: same colour as nosing; size and location as per the VBBL.

6.9.4.2(6) Floor Underlayment

6.9.4.2(6)(a) Provide floor underlay where plywood subfloor is provided.

6.9.4.3 Execution

6.9.4.3(1) Remove existing floor surfaces down to the original plywood subfloor and test the existing flooring substrates under the plywood subfloor for hazardous material using a methodology and protocol acceptable to the Authority. If such tests indicate that hazardous material is present, then remove all hazardous material before proceeding with flooring installation.

6.9.4.3(2) Lay flooring to provide a minimum number of seams. Avoid seams in bathrooms.

6.9.4.3(3) Seams in kitchens are permitted only under fridges, stoves, or in closets.

6.9.4.3(4) Floor drains in areas finished with sheet goods should be provided with a clamping system that will ensure positive water flow and a watertight flooring installation.

6.9.4.3(5) In accessible prefabricated shower units, exposed caulked joints are not acceptable.

6.9.4.3(6) In all shower and bathrooms, install a full membrane tub of the room, extending the membrane up the wall a minimum of 8”, prior to installing pre-fabricated shower or bath units and floor finishes. Tie the membrane into the room floor drain.

6.9.5 Painting (09900)

6.9.5.1 Products

6.9.5.1(1) Materials:

6.9.5.1(1)(a) Only materials (primers, paints, coatings, varnishes, stains, lacquers, fillers, etc.) listed in the latest edition of the MPI Approved Product List (APL) are acceptable for use on this project. All such material will be from a single manufacturer for each system used.

6.9.5.1(1)(b) Other materials such as linseed oil, shellac, thinners, solvents, etc. will be the highest quality product of an MPI listed manufacturer and will be compatible with paint materials being used as required.

6.9.5.1(2) Finish, Colour, Gloss / Sheen:

6.9.5.1(2)(a) Unless otherwise noted, all painting work will be in accordance with MPI Premium Grade finish requirements.

6.9.5.1(2)(b) Finishes and colours will be as approved by the Authority.

6.9.5.2 Execution

6.9.5.2(1) Condition and Preparation of Surfaces:

6.9.5.2(1)(a) The condition and preparation requirements for all surfaces will be in accordance with MPI Painting Manual requirements.

6.9.5.2(2) Application:

6.9.5.2(2)(a) Do not paint unless substrates are acceptable and/or until all environmental conditions (heating, ventilation, lighting and completion of other subtrade work) are acceptable for applications of products.

6.10 Division 10 – Specialty Areas

6.10.1 Miscellaneous Manufactured Specialties (10995)

6.10.1.1 Ensure that all equipment and material supplied to the site is installed in accordance with the manufacturer's instructions.

6.10.2 Safety and Security – General Performance Specifications

6.10.2.1 The main building entry design will incorporate a secured entry door with audio and visual screening of occupant and visitor at the street.

6.10.2.2 Control desk design will provide secure physical separation from the public side of the service counter with full surveillance of building entrants. Primary and secondary secured access doors will provide ingress and egress options for control desk staff.

6.10.2.3 Provide proximity access control technology for all doors, including manual key override.

6.10.3 Security Management System (SMS) – Proximity Access Control

6.10.3.1 Provide a proximity access control system that:

6.10.3.1(1) is PC or IT based operating on a Windows platform hosted on a Project Co supplied and commissioned server and include a keyboard, mouse and monitor;

6.10.3.1(2) will control, track and report the locking and unlocking of secured doors;

6.10.3.1(3) will have the ability to control doors, electronic locks, proximity readers, elevators, special devices, and additional alarm inputs and outputs;

6.10.3.1(4) will have the ability to communicate over a TCP/IP Ethernet connection, modem, or direct internet or intranet network; and

6.10.3.1(5) will include Radio Frequency Identification (RFID) encoder where RFID wristbands and keycards are used.

6.10.3.2 For each Building, Project Co will provide:

6.10.3.2(1) 2 RFID or proximity wristbands per Residential Room and an additional 20% percent for replacement;

6.10.3.2(2) 2 RFID or proximity keycards per Housing Operator employee and an additional 20% percent for contractors/consultants,

and will work with the Authority to determine if additional wristbands or proximity keycards are required.

6.10.3.3 All doors secured by the proximity access control system will require proximity reader technology, electric strike, bolt or latch, request-to-exit and alarm contact capability. Each secured door in the proximity access control system will also require manual key over-ride.

6.10.3.4 Provide a high security rated proximity reader for the exterior alley access door. If the exterior alley access door reader will be exposed to the elements, provide a weather proof rating. Alley access doors are intended for employee and contractor/consultant use only.

6.10.3.5 Provide and install delayed egress devices with annunciators at emergency egress doors and windows. Devices will be vandal resistant and robust to withstand abuse. Door annunciator will have a minimum decibel rating of 95db.

6.10.3.6 Provide a proximity reader in the elevator cab. Proximity reader will be mounted to be compliant with Division B, Section 3.8 of the VBBL.

6.10.3.7 Where elevator control has been integrated into the SMS, provide an on/off key switch and locate it in the site control office. Provide a single pole double throw relay installed in the elevator room and integrate with the elevator controller/panel and wired in a Fail Safe manner. 18/2 LVT wire will be used to connect the on/off switch and the single pole relay.

6.10.3.8 Provide all servers (with keyboard, mouse and LCD monitor), controllers, elevator controllers, RFID/proximity wristbands, proximity cards, RFID/proximity readers, locking hardware, request-to-exit devices, door contacts, door alarm annunciators, cable/wire, mounting hardware, conduit, power supplies, transformers, relays,

switches, modules, ports, isolators and battery backups required for the complete installation of the proximity access control portion of the SMS.

6.10.4 Security Management System – Closed Circuit Television (CCTV)

6.10.4.1 Remove all existing site CCTV cameras, domes, hardware and software, wire/cable and DVR's.

6.10.4.2 All existing CCTV cameras, hardware and software, cable/wire and materials associated with the CCTV system will remain the property of the Authority and be returned to the Authority.

6.10.4.3 Provide High Definition (HD) IP Megapixel colour CCTV H.264 formatted cameras with ½" CMOS sensor, forensic zooming, image cropping, motion detection capabilities throughout the Building, including any elevators and any exterior areas under the direct control or ownership of the Authority.

6.10.4.4 Install cameras in vandal resistant clear domes in accordance with IP66 (or better) rating. Mount all cameras out of reach where feasible, with tamper resistant hardware and installed so that they are braced, bracketed, wrapped and secured to structural (concrete) walls, ceilings or metal supports to resist theft.

6.10.4.5 Unless approved by the Authority, Project Co will ensure that cameras do not view and record movement into Residential Rooms.

6.10.4.6 The CCTV system will comply with the following:

6.10.4.6(1) Public Surveillance System Privacy Guidelines (PSSPG) from the Office of the Information and Privacy Commissioner (OIPC) for British Columbia;

6.10.4.6(2) Freedom of Information and Protection of Privacy Act (FIPPA) of British Columbia; and

6.10.4.6(3) The Authority's CCTV Guidelines for CCTV Placement and Adjustment.

6.10.4.7 Provide a separate physical network for the streaming, recording and administration of the CCTV system.

6.10.4.8 Provide a high quality NDVR capable of live viewing, storage, and play back of images from 1 to 32 IP network based cameras.

6.10.4.9 The NDVR will:

6.10.4.9(1) possess duplex operation, Windows XP Professional, checksum of each frame, external alarm events, internal video motion detection and scheduled event recording

6.10.4.9(2) be able to record images continuously, upon motion detection, or according to a time schedule;

6.10.4.9(3) store video images onto an internal hard drive array varying in size from 500 GB to 20TB, depending on model, with sufficient capacity to handle a recording rate of minimum 5 images per second (IPS) while maintaining at least 30 days of stored images;

6.10.4.9(4) provide as a minimum recording of network IP based cameras at resolutions from CIF (352x240) to 10 Mega pixels (3648x2752) and utilize an advanced algorithm to reduce the image storage file size when written to disk;

6.10.4.9(5) provide simultaneous playback viewing while recording live images in full-duplex operation;

6.10.4.9(6) provide schedules for programming by motion event, alarming input, or continuous recording;

6.10.4.9(7) provide password-protected user levels for setup functions, operation, and system exiting;

6.10.4.9(8) provide built-in motion detection for each camera and, upon detection of motion, start recording (the operator will be able to select the camera's detection area and the sensitivity of each camera);

6.10.4.9(9) provide full remote control operation via TCP/IP protocols, including all required software or hardware for viewing/controlling over the network;

6.10.4.9(10) provide a watchdog capability, automatically starting after an electric failure or operational error without having to change any settings;

6.10.4.9(11) provide a back-up management system to create backups and copies to external devices, (for example, CD or other storage devices), without interrupting hard disk recording;

6.10.4.9(12) provide on-screen programming and operation through a PC keyboard or PS/2 mouse;

6.10.4.9(13) provide the necessary software for image verification of each image recorded; and

6.10.4.9(14) provide all CCTV cameras, NDVRs, keyboards, mouses and LCD monitors, ethernet over coax converters, connections, cable/wire, mounting hardware, conduit, power supplies, ports, modules, relays, transformers, isolation transformers and battery backups required for the complete installation of the CCTV portion of the SMS.

6.10.5 Security Management System – Installation Performance Specification

6.10.5.1 All equipment and materials used will be standard components that are regularly manufactured and utilized in the manufacturer's system.

6.10.5.2 All equipment, materials, devices and components will be installed as per the manufacturer's installation guidelines and in accordance with all applicable standards and Laws pertaining to their safe, proper and legislated installation.

6.10.5.3 All wire and/or cabling will be individually and clearly identified at termination points and Project Co will provide the Authority with a detailed outline of identified cabling with device descriptions, their locations and terminations.

6.10.5.4 All wire/cabling will be neatly terminated/stored into applicable servers and/or controllers. Code cables with plastic tape or other means of identification at points where cable enters or leaves concealed spaces and at 15 m intervals.

6.10.5.5 The complete installation will be carried out and terminated in a neat wall mounted cable management system.

6.10.5.6 Concealed cabling will be strapped and all runs to follow building structure. No diagonal runs will be acceptable.

6.10.5.7 Project Co will maintain fire separation by using firestopping products.

6.10.5.8 All wire and/or cabling will be concealed wherever possible so as not to be exposed to tampering or vandalism.

6.10.5.9 Where wire/cabling is surface run, encase it in rigid metal conduit and install it in accordance with applicable standards. All exposed conduit runs will be secured with tamper resistant screws and mounting hardware.

6.10.5.10 Project Co will include a new pull string attached to the pulled cable on major runs of the SMS (access control and CCTV) to each hub/node in their cable configuration layout and to the elevator control room and building access doors.

6.10.5.11 All systems and components will be provided with the availability of a toll-free (Canadian), 24-hour, technical assistance program (TAP) from the manufacturer or dealer at no charge to the Authority.

6.10.5.12 For the avoidance of doubt, wherever SMS devices, components, or products are exposed to the reach or access of the public, Project Co will use security materials and mounting hardware to install, enclose, mount and secure the product against tampering, vandalism and theft.

6.10.5.13 SMS UPS/Battery Backups will be rated for a minimum of one (1) hour where there is a direct connection to an on-site emergency generator and a minimum of three (3) hours where there is no connection to an on-site emergency generator.

6.11 Division 11 – Equipment – NOT USED

6.12 Division 12 – Furnishings – NOT USED

6.13 Division 13 – Special Construction – NOT USED

6.14 Division 14 – Conveying Equipment

6.14.1 Elevators (14200)

6.14.1.1 General

6.14.1.1(1) Rehabilitate, upgrade and modernize all existing elevators in accordance with Sections 6.14.1.2 and 6.14.1.4 and the Building Specifications.

6.14.1.1(2) Provide new elevators as required in the Building Specifications in accordance with Sections 6.14.1.3 and 6.14.1.4 and the Building Specifications.

6.14.1.2 Existing Elevator Requirements

6.14.1.2(1) Existing Elevator Repairs and Restoration

6.14.1.2(1)(a) Existing elevators will be repaired and restored to safe, fully functional and reliable operation.

6.14.1.2(1)(b) Replace or restore cab and entrance finishes that are vandalized with graffiti or otherwise damaged. Repair and replace operating and signal fixtures, including the push buttons and illuminating indicators, lighting, telephones, emergency car lights, alarm bell(s), lenses and clean equipment to reasonable standards that can be maintained.

6.14.1.2(2) Existing Elevator Upgrades

6.14.1.2(2)(a) Relay logic control systems will be replaced and upgraded with new microprocessor based solid state control systems. Replace all car, hoistway and machine room wiring, including travelling cables.

6.14.1.2(2)(b) Open loop motion control and motor drive systems, single or two speed AC drives systems and drive systems employing motor generator field control will be replaced and upgraded with new solid state direct drives of the AC variable frequency type.

6.14.1.2(2)(c) Auxiliary braking and safety devices for uncontrolled motion and overspeed in the up direction protection will be provided where not already in place.

6.14.1.2(2)(d) Hoisting machines will be refurbished, repaired or replaced to provide good operation free of backlash, endplay, oil leakage and excessive noise during operation. Machine brakes will be refurbished or replaced to provide proper and safe braking under all load conditions up to and including the 125% tests required by the Elevator Safety Code.

6.14.1.2(2)(e) Wire suspension and governor ropes will be replaced where required based on the requirements of the Elevator Safety Code and the BC Safety Authority.

6.14.1.2(2)(f) Door operators that do not employ solid state control will be replaced with new medium to heavy duty closed loop door operators.

6.14.1.2(2)(g) Elevator car and landing doors will be upgraded to current safety standards including top and bottom door safety retainers, door closers, hoistway door unlocking devices at all landings and car door restrictors.

6.14.1.2(2)(h) Car and hall operating and signal fixtures, tactile and Braille markings, audible and visual signals, telephones, cab handrails, door control, car leveling accuracy and other aspects of the elevators will be brought into compliance with current requirements and guidelines for barrier free access.

6.14.1.2(2)(i) Elevators will be interfaced with the building fire alarm system for automatic recall, alternate floor recall, machine or control room or space recall as required by the B44-07 Elevator Safety Code and the corresponding VBBL requirements.

6.14.1.2(2)(j) Project Co will file elevating devices alteration submissions to the BC Safety Authority and will obtain and pay for any certificates and inspections required when performing work of this nature.

6.14.1.3 New Elevator Requirements

6.14.1.3(1) Type of Elevator and Machinery

6.14.1.3(1)(a) New elevators will be of the efficient and environmentally friendly Machine-Room-Less (MRL) traction type.

6.14.1.3(1)(b) Hoisting machines will be of the gearless traction type with energy efficient AC motors.

6.14.1.3(1)(c) Hydraulic elevators will not be permitted and will not be acceptable.

6.14.1.3(2) Capacity and Speed of Elevators

6.14.1.3(2)(a) Elevators will have a minimum capacity rating based on their net platform area plus 10%. Where an elevator is sized to fit into an existing hoistway the size of the elevator and its rated capacity will be maximized within the available hoistway/shaft dimensions. Elevators installed in an existing hoistway need not conform to the minimum dimensions and size requirements of the VBBL and Elevator Safety Code for barrier free access or for accommodating a mobile stretcher in the prone position.

6.14.1.3(2)(b) Where the elevator is installed in a new hoistway it will be sized appropriately to satisfy the VBBL for accommodating a mobile stretcher in the prone position as well as to satisfy Appendix E of the B44 Elevator Safety Code for barrier free access.

6.14.1.3(2)(c) New elevators will have a rated speed suited to the size and height of the Building and to meet the following guidelines:

Elevator Selection Criteria		
Number of Floors Above Ground	**Speed**	**Type of Elevator Equipment**
4 or less	150 – 200 fpm	Machine Room-Less Traction
5 - 20 Floors	200 - 350 fpm	Conventional or Machine Room-Less Traction

6.14.1.3(3) Lobby Size

6.14.1.3(3)(a) The size of the main lobby area will allow for the loading, unloading and queuing of passengers and other goods or materials that will be transported by the elevator(s).

6.14.1.3(3)(b) Excepting the limitations of existing corridor and room configuration, where a single elevator is provided, the lobby width at typical floors will not be less than 1.5 m (5 ft).

6.14.1.3(4) Control Room Location and Requirements

6.14.1.3(4)(a) MRL Traction elevators will be provided with a control room that permits full body entry for the purposes of performing maintenance, troubleshooting and repairs. A control closet or space that does not permit full body entry will not be acceptable.

6.14.1.3(4)(b) Control rooms will be located adjacent to the elevator hoistway and at the top landing served by the elevator or the hoistway overhead area where the floor layout permits this. Remote

control rooms will be provided only where space is not available near the top of the hoistway.

6.14.1.3(4)(c) Provide means to release the elevator brake from the elevator control room regardless of its location. Do not provide access panels into the hoistway for the purposes of brake release unless they are located within the elevator control room area.

6.14.1.4 Requirements for All Existing and New Elevators

6.14.1.4(1) Barrier Free Access

6.14.1.4(1)(a) Elevator equipment will meet the requirements of Appendix E of the B44-07 Elevator Safety Code, including with respect to fixture size, location, configuration, button heights and illumination, audible and visual signals, tactile and Braille markings and cab handrails. Existing elevator cabs and doors may be retained although their dimensions may be less than required for providing barrier free access.

6.14.1.4(1)(b) The leveling accuracy of the elevator operation will also meet the requirements of Appendix E of the B44 Code.

6.14.1.4(1)(c) Refer to Section 6.14.1.4(5)(b) regarding handsfree telephone devices for voice communication and for use by trapped passengers.

6.14.1.4(2) Fire and Life Safety

6.14.1.4(2)(a) Provide Firefighter's Emergency Operation Phase I & II for all elevators in accordance with the B44-07 Elevator Safety Code requirements. Provide Automatic Emergency Recall operation for all elevators initiated by the building fire alarm system. Provide Automatic Recall operation to an Alternate Level and automatic recall initiated by smoke detectors in the elevator machine and/or control room and/or machinery space. Provide Phase II Emergency in-car operation for each elevator. These features will be provided regardless of building height.

6.14.1.4(2)(b) Elevators will not be designated for use by firefighters as required by section 3.2.6 of the VBBL unless required by the VBBL. (i.e. only in "high" buildings). For Buildings that are classified as "high" buildings, the existing elevators that cannot fully comply with the VBBL requirements will be designated as classification "C" (converted) elevators for use by firefighters as permitted by the BC Elevating Devices Safety Regulation.

6.14.1.4(2)(c) Elevator emergency power operation will be required only for elevators that are designed for full compliance with the VBBL and designated for use by firefighters. If an elevator in a Building classified as a “high” building is not required to have emergency power, Project Co will post a sign at the first fire department response point in the Building to indicate that there is no emergency power to the elevator in that Building.

6.14.1.4(3) Fire Separation and Protection of Machine Rooms, Control Rooms and Hoistways

6.14.1.4(3)(a) New and existing elevator pits, shafts, machine rooms, control rooms, machinery spaces and control spaces will be designed built, constructed and/or upgraded to comply with the applicable fire separation and firestopping requirements of the VBBL.

6.14.1.4(3)(b) Access doors to elevator areas including elevator pits, machine rooms, control rooms will be self-locking, self-closing and protected against access by unauthorized persons.

6.14.1.4(3)(c) Pipes, ducts and other equipment not used in connection with the elevator must not be installed in any elevator hoistway, machine room, control room, control space or machinery space.

6.14.1.4(4) Security

6.14.1.4(4)(a) If the building security / maintenance office is not located at the main floor level, the elevator operation will be arranged such that the elevator will stop at the office level on each trip in both directions of travel. Upon stopping at the office level the elevator will open its doors fully before resuming travel.

6.14.1.4(4)(b) Provide means for the Authority to restrict access to non-Tenant levels, including basements, intermediate levels, storage areas, maintenance and mechanical areas to only authorized persons.

6.14.1.4(4)(c) Project Co will provide features, hardware, software and the necessary provisions for the installation of a proximity card reader access control system in elevator cab(s).

6.14.1.4(4)(d) Provide elevator controller security interfaces, travel cable conductors, accessible space for card reader mounting, card reader mounting supports and other provisions for the installation of the card access system.

6.14.1.4(4)(e) Provide wire, cable, dry contacts, call enabling circuits, an elevator security interface box, terminal blocks, ports, connections in the elevator cab and machine room and any

incidental elevator material/work necessary for the complete interconnection between the elevator and the access control system for the Building.

6.14.1.4(4)(f) Project Co will cause its elevator contractor to assist Project Co's security and electrical contractors with:

(f).1 the installation of a security card reader device in the elevator cab(s); and

(f).2 the installation, mounting and wiring of a CCTV camera in the elevator cab(s).

6.14.1.4(4)(g) Provide wiring in the elevator travelling cable for the installation of the security card reader, CCTV camera and future devices consisting of the following as a minimum over and above any wiring required by the elevator equipment and voice communication system:

(g).1 six (6) individually twisted shielded pairs of 18 or 20 AWG communication conductors;

(g).2 one (1) RG59 or RG6 coaxial cable; and

(g).3 four (4) stranded copper 18 AWG conductors.

6.14.1.4(5) Fixtures and Finishes

6.14.1.4(5)(a) All elevators will be provided with vandal resistant car and hall operating and signal fixtures if not already in place. Provide long life LED illumination for all car and hall fixtures.

6.14.1.4(5)(b) Each elevator will be provided with a handsfree vandal resistant speakerphone device for voice communication as required by the Elevator Safety Code. Where the elevator travel is greater than 60' (18 m) an elevator telephone device will also be provided in the Building in a location that is accessible to emergency personnel. The "lobby" phone will be located near the fire alarm annunciator, in the building lobby or other approved location.

6.14.1.4(5)(c) Finishes

(c).1 Eliminate tripping hazards in the elevator cab, at landings and at the sills. Remove and replace uneven floor surfaces in the elevator cab and at the elevator landings to repair damages and to provide a smooth and gentle transition to eliminate these tripping

hazards. Provide textured rubber flooring for elevator cabs.

(c).2 Provide cab finishes with maximum flame spread rating and smoke development classification in accordance with the elevator safety code.

(c).3 Restore any damaged finishes and remove graffiti from elevator cabs, entrances, doors and fixtures. Provide anti-graffiti finishes to aid in the on-going maintenance, repair and restoration of finishes at the site.

6.14.1.4(6) Performance and Operation

6.14.1.4(6)(a) All elevators are required to meet the following performance criteria:

Individual Elevator Performance Criteria	
Performance Criteria	**Traction Elevators**
Leveling Accuracy	+/- 3 mm (1/8”)
One Floor Run Flight Time	10 seconds
Door Open Time	2.5 seconds
Door Close Time	3.5 seconds
Maximum Rate of Acceleration	1.0 m/s^2 (3.5 ft/s^2)
Maximum Rate of Change of Acceleration	2.4 m/s^3 (8.0 ft/s^3)

6.14.1.4(6)(b) Consider energy efficient design and operation in the specification of elevator equipment.

6.14.1.4(6)(c) Sound Isolation: The machine room equipment, including controllers and traction machines, will be mounted securely to the machine room walls or floors and be sound isolated to prevent the transmission of sound to the building structure. An acoustic and vibration specialist will be consulted when selecting the equipment.

6.14.1.4(6)(d) Provide for independent service operation by a designated attendant to facilitate Residential Tenant moves and other service use of the elevator.

6.14.1.4(6)(e) Provide all elevators with AC Variable Frequency Motor Drives with closed loop feedback control to provide smooth acceleration, deceleration and accurate leveling.

6.14.1.4(6)(f) Provide a type ABC Fire Extinguisher in each elevator machine and/or control room.

6.14.1.4(6)(g) Provide complete, accurate and Building-specific wiring diagrams for each elevator. Wiring diagrams should be laminated, bound or otherwise protected from damage.

6.14.1.4(6)(h) Provide elevator maintenance log books to record all maintenance activity as required by the Elevator Safety Codes.

6.14.1.5 Heritage Elevator Components

6.14.1.5(1) Any original, old or antique elevator equipment that is discovered during building alterations, demolition and renovations will be reviewed with the Authority to determine its heritage value prior to removing or disposing of any such equipment. Components such as metal or glass car enclosures, landing doors, wooden platforms and enclosures and other components of unique or architectural design in particular will be identified in the manner described.

6.14.1.5(2) Project Co will retain on site for display and protect and preserve all elevator components identified by the Authority as having heritage value, including in accordance with the Building Specifications.

6.14.1.6 Elevator De-Commissioning

6.14.1.6(1) De-commission old or unused elevators in a safe manner acceptable to the BC Safety Authority.

6.14.1.6(2) Any suspended equipment including cabs, platforms, counterweights, etc. will be lowered and secured in place to prevent and eliminate hazards. All suspension wire ropes or other means will be removed.

6.14.1.6(3) Electrical power will be permanently removed from all de-commissioned or dismantled elevator equipment.

6.14.1.6(4) Protect floor openings, open hoistways and other areas and provide fall protection if necessary.

6.15 Division 15 – Mechanical

6.15.1 General

6.15.1.1 Project Co will provide mechanical systems (including HVAC, Plumbing, fire protection, and other systems) that:

6.15.1.1(1) are designed to provide a healing, comfortable and productive environment for the Building Users, and meet the required environmental conditions for all Equipment;

6.15.1.1(2) are located and designed to limit sound transmission to outdoor spaces and between Residential Rooms and Common Spaces as per ASHRAE noise criteria;

6.15.1.1(3) minimize impact on the natural and physical environment, through energy efficiency, optimization of resource use, and simplification of the systems;

6.15.1.1(4) are configured and located in such a way to avoid, as much as possible, entry into regularly occupied areas to perform maintenance and repairs;

6.15.1.1(5) are developed to provide reliability of continual operation. Standby capacity and redundancy will be included in system design;

6.15.1.1(6) are vibration isolated to eliminate noise and vibration through the structure or other components of the Buildings;

6.15.1.1(7) comply with all applicable standards, including acoustic requirements in the VBBL and ASHRAE standards; and

6.15.1.1(8) incorporate flexibility and adaptability for future expansion without major disruption or alteration to the Building infrastructure.

6.15.1.2 All motors will be high efficiency motors.

6.15.1.3 Where motors are to be controlled by variable speed drives, the motors will be rated for inverter duty.

6.15.2 Fire Protection (15300)

6.15.2.1 General

6.15.2.1(1) Project Co will review and assess all existing sprinkler systems and standpipes and will upgrade such systems and standpipes as required to suit the renovated Building and as required to meet the standards set out in Section 2.2 of this Schedule.

6.15.2.1(2) Project Co will provide and install new backflow preventer assemblies complete with tamper switches on all fire protection systems in accordance

with all requirements of NFPA 13 and the City. The assembly will be complete with OS&Y gate valves on both sides and tamper switches.

6.15.2.1(3) If any Building of 4 storeys or greater does not have a Class I standpipe system, add a Class I standpipe system conforming to NFPA 14.

6.15.2.1(4) If any Building of 4 storeys or greater has a standpipe system, replace the system with a Class I standpipe system conforming to NFPA 14.

6.15.2.1(5) Project Co will provide new tamper switches on all valves as required on sprinkler and standpipe systems.

6.15.2.1(6) Project Co will provide fire suppression systems to all commercial kitchens as required and as per NFPA 96 - Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations.

6.15.2.2 Quality Assurance

6.15.2.2(1) Sprinkler systems and all associated equipment will be installed by qualified contractors licensed and regularly engaged in the installation of automatic fire sprinkler equipment.

6.15.2.2(2) All pipe, sprinklers, valves, fittings, gauges, pipe hangers, and other accessories to be of a type which is listed or labeled by Underwriters Laboratories of Canada (ULC). Use of such materials and equipment will conform to all requirements and limitations of their listings. If suitable ULC listed or labeled products are not available, products listed by other testing agencies (FM, UL, Warnock Hersey, etc.) may be used subject to the prior written confirmation of the City.

6.15.2.3 Products

6.15.2.3(1) General

6.15.2.3(1)(a) Use materials that bear the manufacturer's identification mark in addition to all other markings required by the specifications.

6.15.2.3(2) Piping

6.15.2.3(2)(a) Piping to be schedule 40 standard weight, Allied XL threadable lightwall pipe, Victaulic style grooved pipe and fittings and shoulder rolled light wall pipe and fittings. Listed Blazemaster PVC pipe may be used if installed in accordance with the ULC listing, NFPA 13, Vancouver Building By-law, and applicable fire codes.

6.15.2.3(3) Sprinkler Heads

6.15.2.3(3)(a) Provide quick-response heads where required by NFPA 13 or the VBBL.

6.15.2.3(3)(b) Sprinkler heads within Residential Rooms and Common Spaces will be “residential” type sprinklers except where prohibited by NFPA 13 or the sprinkler listing. NFPA 13 allows quick response sprinklers but residential type sprinkler heads are considered to provide a greater level of safety.

6.15.2.3(3)(c) Provide standard brass upright or pendant heads for unfinished areas (mechanical rooms, ceiling spaces, etc.).

6.15.2.3(3)(d) Provide dry heads, standard brass upright or pendant, for cold concealed areas listed for such use.

6.15.2.3(4) Valves

6.15.2.3(4)(a) All valves to be ULC listed for 1200 kPa (175 psi) working pressure on sprinkler and standpipe systems.

6.15.2.3(5) Check Valves

6.15.2.3(5)(a) Check valves to be complete with 51 mm (2”) diameter drain, excess pressure pump, pressure switch and water pressure gauges. If a double check valve is provided, alarm check may be deleted and flow switches used for flow detection and alarm purposes.

6.15.2.3(5)(b) Dry system alarm check valve to be iron body, bronze trim, complete with quick opening device, and all accessories, interconnecting piping and sub-assembly valves and other necessary appurtenances required for complete installation.

6.15.2.3(6) Sprinkler System Zoning

6.15.2.3(6)(a) Provide zoning in accordance with the NFPA 13 and in accordance with any City requirements. As a minimum, provide separate zones for each floor and each attic.

6.15.2.3(7) Siamese Connections

6.15.2.3(7)(a) Provide appropriately labelled wall type ULC listed and approved Siamese fittings acceptable to the City Fire Marshall and all other Governmental Authorities.

6.15.2.3(7)(b) Install the Siamese connections at a location within the property line and in accordance with the Vancouver Building By-law and requirements of the Fire Marshall.

6.15.2.3(8) Pressure Gauges

6.15.2.3(8)(a) Provide ULC approved pressure gauges on both the upstream and downstream side of all pumps.

6.15.2.3(9) Air Compressors

6.15.2.3(9)(a) Provide air compressors, approved for use in sprinkler systems and ULC approved for the dry sprinkler systems.

6.15.2.3(9)(b) Compressors to be sized in accordance with the requirements of NFPA 13.

6.15.2.3(9)(c) The air compressor will be designed for quiet in operation, such as found in an oil lubricated, belt-drive unit designed for a maximum noise level of 80 dB when in operation.

6.15.2.3(10)Fire Extinguishers

6.15.2.3(10)(a) Provide fire extinguishers to comply with NFPA 10 and the Vancouver Fire By-law.

6.15.2.4 Execution

6.15.2.4(1) Installation

6.15.2.4(1)(a) Supply and install cabinet containing spare sprinkler heads corresponding to the types and temperature ratings as installed in the Buildings. Cabinet to be located in the sprinkler room and will include sprinkler wrench suitable for each head type. Provide a minimum of six spare heads for each type of head installed.

6.15.2.4(1)(b) Do not install wet sprinkler system piping in cold attics and exterior walls. Provide furred out drops and wall mounted heads in top floor units.

6.15.2.4(1)(c) Fire extinguishers, tamper resistant cabinets will be installed no more than 1219 mm (4’-0”) above the floor. Provide fire extinguishers in recessed enclosures in corridor walls. Do not compromise required fire separation or rating, or acoustic requirements.

6.15.2.4(1)(d) All tests and adjustments required by NFPA 13 will be performed. Copies of completed aboveground and underground

contractor's material and test certificates will be delivered to the Authority.

6.15.2.4(1)(e) Project Co will provide the hydraulic design for the system in accordance with the following as a minimum:

(e).1 Mechanical rooms, tenant laundry, maintenance shop: Ordinary Hazard Group 1;

(e).2 Mercantile: Ordinary Hazard Group 2; and

(e).3 Other areas: Light Hazard.

6.15.2.4(1)(f) Hydraulic calculations and working drawings to be presented in a manner acceptable to NFPA 13. Project Co will note and confirm compliance with all requirements of NFPA 13, including which edition of NFPA 13 was used in the design.

6.15.2.4(1)(g) Project Co will test the system flow to provide the final data for the sprinkler system design and will report the results of the flow test to the Authority.

6.15.2.4(2) Earthquake Protection

6.15.2.4(2)(a) Provide seismic bracing in accordance with the requirements of NFPA 13.

6.15.3 Plumbing Systems (15400)

6.15.3.1 General

6.15.3.1(1) Project Co will review and assess all plumbing systems and equipment, including sanitary, storm drainage, domestic water, domestic hot water and natural gas systems and equipment, and will upgrade such systems and equipment to suit new services and the renovated Building and as required to meet the standards set out in Section 2.2 of this Schedule.

6.15.3.1(2) Avoid sump pumps for storm and sanitary where systems can drain by gravity. If pumps are needed, route only that drainage through the pump that cannot be drained by gravity.

6.15.3.1(3) Insulate all existing and all new plumbing system components including hot water mains, recirculation and run outs to comply with ASHRAE 90.1. Insulate all existing and all new cold domestic mains, complete with vapour barrier to prevent condensation.

6.15.3.1(4) Provide separate plumbing systems for the residential area and for each Commercial Space in a Building so that each such area can be isolated from the other areas of the Building.

6.15.3.1(5) Unless approved by the Authority, avoid plumbing within party walls.

6.15.3.1(6) Domestic water system

6.15.3.1(6)(a) Street pressure system is to be used whenever possible. If the following conditions apply, install a booster system:

(a).1 minimum street water pressure, discounted 35 kPa (5 psi) for future unknowns, does not meet the minimum required pressure at the most remote fixture; or

(a).2 if the street pressure is below 276 kPa. (40 psi).

6.15.3.1(6)(b) Install a pressure reducer if the street pressure is greater than 551 kPa (80 psi).

6.15.3.1(6)(c) Provide a backflow preventer for any irrigation systems.

6.15.3.1(6)(d) Water supply piping in outside walls is not permitted unless it is installed in a furred-out chase completely inside the exterior wall. Do not embed piping in the wall insulation. Ensure the water supply piping is adequately freeze protected.

6.15.3.1(6)(e) Avoid drainage piping in outside walls. If unavoidable, ensure that the exterior wall insulation is between the pipe and the exterior wall, that the pipe is not embedded in the insulation and that the R value of the insulation complies with the required value for the assembly. Use EPS or polyisocyanurate insulation if the pipe must be installed in an exterior wall stud space.

6.15.3.1(6)(f) Provide a shut off for each riser. Valves 57 mm (2”) and less in diameter must be ball valves. Shut offs to be easily accessible to authorized parties.

6.15.3.1(6)(g) Provide a shut-off valve for each Residential Room. Provide a prefabricated, keyed metal access panel. Shut offs to be easily accessible.

6.15.3.1(6)(h) Provide pre-manufactured water hammer arrestors as per the VBBL and at the termination of all hot and cold water branch lines serving groups of fixtures or any fixture with a fast closing valve such as a dishwasher or clothes washer. Field fabricated arrestors are not permitted.

6.15.3.1(6)(i) Provide correctly sized sleeves for pipes through concrete or through masonry block walls, packed with insulation and smoke seal per code. Provide ULC listed firestopping at all penetrations of fire separations.

6.15.3.1(6)(j) Provide frost free hose bibbs complete with automatic draining vacuum breakers/ backflow preventer at the following locations:

(j).1 main entry; and

(j).2 any garbage enclosures.

6.15.3.1(6)(k) Locate hose bibbs to avoid conflict between hose and sidewalks.

6.15.3.1(6)(l) Provide independent water metering for:

(l).1 the residential area; and

(l).2 each Commercial Space.

6.15.3.1(6)(m) Domestic water piping in areas subject to freezing will be insulated and heat traced.

6.15.3.1(7) Domestic hot water systems

6.15.3.1(7)(a) Calculate domestic hot water demand in accordance with ASPE Plumbing Engineering Design Handbook and size domestic hot water generating systems accordingly.

6.15.3.1(7)(b) Hot water temperature must not exceed 43° C. (110° F) at faucets and showers used by tenants. Hot water distribution to kitchen and laundry facilities will be at 60° C (140° F). There will be no dead end runs of hot water piping, and hot water storage will not be below 60° C (140° F) to control the growth of Legionella bacteria.

6.15.3.1(7)(c) On central domestic water heating systems provide hot water re-circulating system or heat trace maintenance system to ensure delivery of hot water to all fixtures within a maximum of 20 seconds.

6.15.3.1(7)(d) Insulate all domestic hot water piping to ASHRAE 90.1 – 2007 requirements.

6.15.3.1(7)(e) Domestic hot water generation systems to meet or exceed the efficiency requirements of ASHRAE 90.1 - 2007.

6.15.3.1(8) Drainage Systems

6.15.3.1(8)(a) Provide floor drains with trap primer in all washrooms.

6.15.3.1(8)(b) Provide drains in new elevator pits as required by Governmental Authorities.

6.15.3.1(8)(c) Provide a membrane under any ceramic tiled shower areas and clamp the membrane into the membrane clamp of the floor drain.

The membrane will be in accordance with Part 7 of the Vancouver Building By-law.

6.15.3.1(8)(d) Use cast iron DWV piping for all vertical drainage risers, horizontal drainage over area with noise sensitivity and for all drainage in commercial areas.

6.15.3.1(9) Tenant Laundry

6.15.3.1(9)(a) Project Co will provide all required plumbing for tenant laundry rooms including domestic hot and cold water, sanitary and vent piping, gas piping and floor drain(s) complete with trap primers.

6.15.3.1(10) Kitchen Plumbing

6.15.3.1(10)(a) Project Co will provide new fire suppression systems, domestic cold and hot water, natural gas, and sanitary drainage and venting to all kitchens.

6.15.3.1(10)(b) Project Co will provide grease interceptors on sanitary drainage as per the requirements of the City and all other Governmental Authorities.

6.15.3.1(10)(c) For all commercial kitchens, Project Co will provide automatic shut-off of natural gas to all appliances upon activation of kitchen fire suppression systems as per NFPA 96 - Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations.

6.15.3.1(11) Approval of the plumbing system by the City is required before insulation and drywall work is started. Do not commence final boarding until plumbing has been reviewed for clearance.

6.15.3.1(12) Submit shop drawings showing equipment and installation details to isolate equipment. Supplier to visit site as necessary to ensure an acceptable installation.

6.15.3.2 Products

6.15.3.2(1) Potable Water Piping

6.15.3.2(1)(a) Use Type L copper pipe for all cold water supply piping.

6.15.3.2(1)(b) Use Type K copper pipe on hot water supply and recirculation piping

6.15.3.2(1)(c) Use only lead free solder in copper piping systems.

6.15.3.2(1)(d) Cross linked polyethylene (PEX) may be used for potable water piping for in-suite run outs subject to the following conditions:

(d).1 Approved PEX piping systems are acceptable in lieu of copper for in-suite run-outs to fixtures. The PEX piping and fitting system will conform with CSA B137.5 and will be approved for potable water use.

(d).2 Project Co will coordinate specifications and detailing for the installation of the system and confirm that all components meet the local authority's requirements including referenced standards, fire resistance rating, firestopping and STC rating.

(d).3 Project Co will submit written confirmation of approval for the specified system from the City and, where applicable, a copy of the approved equivalency, to the Authority prior to review of the construction documents.

(d).4 Distribution manifolds will be manufactured of brass or copper, in accordance with the piping manufacturer.

(d).5 In-line fittings will be in accordance with the piping manufacturer.

(d).6 Installation will comply with the manufacturer's specifications and be carried out by a trained installer, certified by the manufacturer.

(d).7 Potable water piping distribution outside the suite, such as risers and mains, will be copper. PEX will not be used for recirculation piping. Provide home run distribution from fixture to manifold.

(d).8 The potable water system will be designed to ensure that the maximum design temperatures and pressure of the piping material are not exceeded. Provide pressure reducing valves and controls if required to ensure that approved pressures and temperatures are not exceeded.

(d).9 PEX potable water piping will not be installed with radiant in floor systems, due to potential problems with heat gain in the DCW and conflict with the heating pipe layout.

(d).10 PEX piping will not be exposed to UV prior to or during installation and must be warranted for a minimum of 30 days exposure.

(d).11 Protect piping and manifolds from entry of contaminating material by installing suitable plugs in all open ends until installation. Where possible, connect pipes to assembled manifolds to eliminate possibility of contaminants.

6.15.3.2(1)(e) Notwithstanding the specifications for copper and PEX piping in this Section 6.15.3.2(1), Project Co may use other piping materials (such as stainless steel) for potable water piping if such use is permitted under applicable Laws, codes and standards, including the VBBL, and any Governmental Authority requirements. Project Co will, prior to ordering any materials, submit shop drawings and material specifications for all alternate piping materials to the Authority for review.

6.15.3.2(1)(f) Provide lockable metal access covers for all manifold locations.

6.15.3.2(2) Natural Gas Piping

6.15.3.2(2)(a) Steel Pipe: ASTM A53 Schedule 40 black.

(a).1 Fittings: ASME B16.3, malleable iron, or ASTM A234/A234M, forged steel welding type.

(a).2 Joints: NFPA 54, threaded or welded to ANSI B31.1, ANSI B31.2, ANSI B31.9, ASME Sec 1.

6.15.3.2(2)(b) Copper tube is acceptable for low pressure installations up to 2 psi. For underground lines, Type K or L with an external plastic coating must be used.

(b).1 Copper Tubing: ASTM B88M, ASTM B88, Type [K] [L] ASTM B68M, ASTM B68 or B75, General Purpose

(b).2 Fittings: ASME B16.26, cast bronze.

(b).3 Joints: Flared

6.15.3.2(3) Fixtures

6.15.3.2(3)(a) Provide fixtures of same make, model and colour throughout Building.

6.15.3.2(3)(b) Use low water consumption plumbing fixtures, e.g., toilet, sink and lavatory faucets, and shower heads.

6.15.3.2(3)(c) All faucets will meet the VBBL, American Disabilities Act Guidelines and ANSI A117.1 requirements for the physically disabled.

6.15.3.2(4) Water Closets

6.15.3.2(4)(a) Ultra Low Flush Water Closets: Vitreous China, free standing elongated rim, wash-down bowl, complete with pressure assisted close-coupled vitreous china tank with bolt-on cover, and china bolt caps, not to exceed 6 LPF in water consumption.

6.15.3.2(4)(b) Seat will be closed front with cover.

6.15.3.2(4)(c) Chrome-plated supply line, escutcheon plate and ball-valve type fixture stop.

6.15.3.2(5) Seismic Restraint and Vibration

6.15.3.2(5)(a) Seismic restraint must be provided for all mechanical and plumbing equipment and accessories including attachment to structural members.

6.15.3.2(5)(b) Plumbing (including RWL's) will be installed without direct contact to drywall or studs. Position risers/wastes in centre of wall chase to meet this requirement.

6.15.3.2(5)(c) Oversize sleeves through structure. Use firestopping and smoke seal in accordance with Section 6.7.1 (Firestopping and Smoke Seals). Support plumbing at floor level only.

6.15.3.2(5)(d) Maintain minimum 13 mm (1/2") clearance between pipes and studs, electrical conduit, or other pipes. If clearance is minimal, use resilient insulation (Armaflex) to avoid contact. This requirement is to avoid rattling between pipes.

6.15.3.2(5)(e) Do not use foam spray-on products for insulation.

6.15.3.2(5)(f) Isolate pumps and other equipment which may generate vibration on neoprene isolators or neoprene hangers, unless otherwise specified. Immediately upstream and downstream of all pumps, provide flexible pipe connectors. Provide shut-offs to allow replacement of connectors without draining system.

6.15.3.2(5)(g) Isolate all vibrating equipment, pumps and piping in mechanical rooms as described above. In penthouses, isolate boilers, hot water tanks, etc. on neoprene pads with hold down bolts and Hemi-grommets.

6.15.3.2(5)(h) Use cable restraints only on isolated piping and equipment. Do not bridge isolation elements.

6.15.4 Heating, Ventilation and Air Conditioning (15500)

6.15.4.1 General

6.15.4.1(1) Project Co will review and assess all existing HVAC systems and will upgrade such systems as required to suit the renovated Building and as required to meet the standards set out in Section 2.2 of this Schedule.

6.15.4.1(2) Provide separate heating and cooling systems for the residential area and for each Commercial Space so that each such area can be isolated from the other areas of the Building.

6.15.4.1(3) Unless other systems are permitted in the Building Specifications, only the following systems are permitted:

6.15.4.1(3)(a) in Residential Rooms and Common Spaces: baseboards, radiators (new or re-use of existing), radiant panels or in floor hydronic heating or electric heating;

6.15.4.1(3)(b) in Commercial Spaces: fan coil systems, split heat pumps, gas fired or electric split heating/cooling systems or variable refrigerant flow systems; and

6.15.4.1(3)(c) in storage and other unoccupied areas or service rooms: baseboards or unit heaters.

6.15.4.1(4) Project Co will design all hydronic systems for future connection to a district energy system in accordance with the City's "District Energy Connectivity Standards: Information for Developers".

6.15.4.1(5) Baseboard systems will not adversely affect furniture placement.

6.15.4.1(6) 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.

6.15.4.1(7) Pipes, ducts and fittings will be insulated to conserve energy, prevent condensation, attenuate noise and prevent accidental burns. All plumbing will be routed away from core communication rooms and server rooms.

6.15.4.1(8) Quality Assurance

6.15.4.1(8)(a) All heating, ventilating and air-conditioning systems will be designed and inspected by a Professional Mechanical Engineer, registered in the Province of British Columbia professional mechanical engineer.

6.15.4.1(8)(b) Installation must be by skilled tradesmen holding a valid TQ license of apprentices under the supervision of a licensed tradesman. As required, installers must be trained and certified by system and equipment manufacturers to conform to warranty provisions.

6.15.4.1(9) Design Requirements

6.15.4.1(9)(a) Provide positive pressurization in all common corridors. Provide ventilation to all areas of the Buildings to ASHRAE 62.1 - Ventilation for Acceptable Indoor Air Quality.

6.15.4.1(9)(b) Insulate all new and existing pipes and ducts to meet or exceed ASHRAE 90.1 - 2007 requirements.

6.15.4.1(9)(c) Design Temperatures (Heating): Design to indoor design temperature of 21°C (70°F) in occupied spaces, and 18 °C (65 °F) in unoccupied spaces (storage and service rooms). System design will be based on the climatic data for the 1% January design temperature as per the Vancouver Building By-law. Systems will be sized based on Good Industry Practice and as per ASHRAE procedures for calculating heating loads, with a maximum heating safety factor of 10%.

6.15.4.1(9)(d) Design Temperatures (Cooling): Design for maximum indoor temperature of 24-25°C (75-77°F) in Commercial Spaces. System design will be based on the climatic data for the 2-1/2% Summer design temperature as per the Vancouver Building By-law. Systems will be sized based on Good Industry Practice and as per ASHRAE procedures for calculating cooling loads.

6.15.4.1(9)(e) Design Humidity: Design for minimum indoor relative humidity of 20% at outdoor winter design conditions, and a maximum indoor relative humidity of 70% at outdoor summer design conditions.

6.15.4.1(9)(f) Provide separate base connections for the residential area and for each Commercial Space in a Building so that each such area can be metered independently from the other areas of the Building.

6.15.4.1(9)(g) Radiant heating systems will be designed to limit surface temperatures of ceiling mounted radiant panels to 60 °C, wall mounted radiant panels to 45 °C, and floors to 30 °C.

6.15.4.1(10)Air Conditioning

6.15.4.1(10)(a) Provide air conditioning for all Commercial Spaces.

6.15.4.1(10)(b) Project Co will account for Building specific factors such as climatic data, microclimate conditions, building envelope thermal resistance, orientation, glazing area and other relevant factors that affect heat gain to determine cooling requirements and to ensure compliance with the design temperature (cooling) performance requirements.

6.15.4.1(11)Heating System:

6.15.4.1(11)(a) Hydronic heating plants will have minimum rated efficiencies of 86% at non-condensing return water temperatures, and 90% at condensing return water temperatures. Project Co will use condensing return temperatures wherever possible.

6.15.4.1(11)(b) Heating plants will have redundancy such that if any single heating source fails, the remaining plant will have a capacity of 70% of the peak design heating load.

6.15.4.1(11)(c) Heating terminal units will be designed for a minimum 10 deg C heating water temperature drop at winter design conditions. Higher temperature drops are acceptable.

6.15.4.1(11)(d) Heating terminal units will be commercial quality, heavy duty construction, and vandal resistant.

6.15.4.2 Products

6.15.4.2(1) Heating Water Piping:

6.15.4.2(1)(a) Steel Pipe: ASTM A53, Schedule 40 black.

(a).1 Fittings: ASTM B16.3, malleable iron or ASTM A234, forged steel welding type fittings.

(a).2 Joints: Threaded up to and including 50mm (2”) dia., or AWS D1.1,welded for 65mm (2-1/2”) and over.

6.15.4.2(1)(b) Copper Tubing: ASTM B88, Type L hard drawn.

(b).1 Fittings: ASME B16.18, cast brass, or ASME B16.22, solder wrought copper.

(b).2 Joints: Solder, lead free, ASTM B32, 95-5 tin-antimony, or tin and silver, with melting range 220 to 280 degrees C (430 to 535 degrees F).

6.15.4.2(2) Radiant Heating Piping

6.15.4.2(2)(a) Polyethylene PEXa Pipe: ASTM F876 and ASTM F877, cross-linked polyethylene, 690 kPa (100 psig) operating pressure at 35 °C (95 °F) working temperature.

6.15.4.2(2)(b) Fittings: Brass and copper.

6.15.4.2(2)(c) Joints: Mechanical compression fittings.

6.15.4.2(3) Pump Systems:

6.15.4.2(3)(a) Piping systems will be designed to limit pressure drop as required by ASHRAE 90.1 – 2007.

6.15.4.2(3)(b) Pump systems with a combined horsepower of 5 hp or greater will be designed as variable flow systems, with 2-way valves on all terminal units and variable speed drives on pumps.

6.15.4.2(3)(c) Pump systems will have redundancy such that if any pump fails, the remaining pumps will be able to provide system flow at 70% of maximum design flow.

6.15.4.2(4) Cooling

6.15.4.2(4)(a) All new or retained cooling units (except for units in Commercial Spaces) will be:

(a).1 Energy Star rated or meet the efficiency requirements of ASHRAE 90.1- 2007; and

(a).2 connected to the BMS.

6.15.4.2(4)(b) Cooling will be provided with a minimum zoning of one zone per 1500 square feet of conditioned floor area.

6.15.4.2(4)(c) New and existing cooling systems will not use CFC or HCFC refrigerants.

6.15.4.2(4)(d) Installation: Install to manufacturer's recommendations.

6.15.4.2(5) Ventilation

6.15.4.2(5)(a) Provide new ventilation systems for all corridors and amenity rooms.

6.15.4.2(5)(b) Fresh air intakes must be galvanized steel or aluminum watertight hood type or weatherproof louver type with insect protection. Wall type grills are not acceptable. All exhaust hoods must have a backdraft damper. Intakes must be designed to prevent rain penetration at design wind pressure for the location. Connections must be sealed to the weather barrier of the wall assembly. Each hood must be connected to the duct it serves by a durable airtight connection. Screens must be removable for cleaning, without seal damage.

6.15.4.2(5)(c) Exhaust and fresh air intakes must connect directly with the exterior. Indirect venting through a soffit is not acceptable. Provide a minimum 3048 mm (10'-0") separation between exhaust vents and fresh air intakes.

6.15.4.2(6) Corridor Ventilation

6.15.4.2(6)(a) Provide corridor ventilation system that has sufficient air volume to make up exhaust air volumes and to provide ventilation to Residential Rooms and amenity areas as per ASHRAE 62.1 – Ventilation for acceptable indoor air quality.

6.15.4.2(6)(b) The supply air to the corridors will be through sidewall diffusers that provide a quiet, draft-free air flow.

6.15.4.2(6)(c) Corridor pressurization will be supplied to each floor to ensure even distribution of air to each tenant room.

6.15.4.2(6)(d) Corridor ventilation systems will be tempered to provide supply air at a minimum temperature of 18° C.

6.15.4.2(6)(e) Corridor ventilation systems will have filtration to a minimum of MERV 13.

6.15.4.2(6)(f) Ventilation systems with a capacity of 3000 cfm or greater will include sensible heat or total energy recovery with a minimum effectiveness of 50%.

6.15.4.2(7) Tenant Laundry Rooms

6.15.4.2(7)(a) Provide lint traps, accessed by hatch in all dryer exhaust systems.

6.15.4.2(7)(b) Provide make up air supplied directly from the exterior or other means as required. Make up air will be in equal volume to the exhausted air volume. The make-up air must be heated to temperature minimum of 18° C temperature with fully modulating controls. Transfer of excess air from surrounding rooms may be used.

6.15.4.2(7)(c) Exhaust dryers directly to building exterior (outside).

6.15.4.2(7)(d) Dryer exhaust ducts will be hard sheet metal duct, with a maximum of three (3) ninety degree elbows. Provide booster fans as required to ensure adequate flow. Flexible duct is not acceptable.

6.15.4.2(7)(e) Provide dryer exhaust duct connection(s) at 102 mm (4”) from floor level.

6.15.4.2(8) Washroom and Shower Exhaust

6.15.4.2(8)(a) Provide new washroom exhaust systems in all washrooms.

6.15.4.2(8)(b) Washroom exhaust systems will be designed to meet ASHRAE 62.1– Standard for Acceptable Indoor Air Quality.

6.15.4.2(8)(c) Washroom exhaust will exhaust directly to the outside, without transferring through occupied spaces.

6.15.4.2(8)(d) Washroom exhaust for separate common washrooms on the same floor may be connected together provided the following criteria are met:

(d).1 All exhaust ductwork within occupied spaces is under negative pressure relative to building pressure at all times when fan(s) are operational.

(d).2 Washroom exhaust ducts will not connect to any other supply or exhaust systems.

(d).3 Suitable means of balancing individual exhaust branches is provided to ensure that adequate exhaust is maintained in all areas.

6.15.4.2(8)(e) Washroom exhausts will not discharge within 10 feet of any outdoor air intake, including intakes serving adjacent buildings.

6.15.4.2(8)(f) Exhaust ducts installed in any areas where temperatures could result in condensation will be insulated, complete with vapour barrier.

6.15.4.2(9) Kitchen Ventilation Systems

6.15.4.2(9)(a) Project Co will provide new kitchen ventilation systems.

6.15.4.2(9)(b) Kitchen ventilation systems will:

(b).1 include exhaust and make-up air systems; and

(b).2 where kitchens will be used for commercial purposes, or as required by Governmental Authorities, meet all requirements of NFPA 96 - Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations.

6.15.4.2(10) Service Room Ventilation

6.15.4.2(10)(a) Project Co will provide ventilation systems in all service rooms, elevator rooms, storage areas, etc. as per ASHRAE 62.1, requirements of Governmental Authorities and Good Industry Practice.

6.15.4.2(10)(b) Provide elevator machine rooms and electrical rooms with ventilation controlled by reverse acting thermostats to limit temperatures in the rooms to 30 deg C maximum.

6.15.4.2(11)Labelling

6.15.4.2(11)(a) In Buildings with a central distribution system, clearly identify main valves, pipes and devices. In Residential Rooms, clearly identify each hot water heating zone indicating room, area of service and length of each loop if system is radiant in-floor heating.

6.15.4.2(11)(b) Band main piping with 51 mm (2”) wide pressure sensitive self-adhering plastic coated tape, colour-coded. Provide colour code and arrows and words to identify pipe or duct function and flow direction.

6.15.4.2(11)(c) Provide colour-coded piping in mechanical and equipment rooms complete with flow indication. Provide to each valve in these rooms a brass tag, embossed with valve number. Install charts listing these valves and their purposes, together with remarks concerning operation, in glassed-in frames fixed to the walls of rooms.

6.15.4.2(11)(d) Provide a directory of these valves**.**

6.15.4.3 Execution

6.15.4.3(1) Connect natural gas supply lines to equipment with CGA approved flexible connectors.

6.15.4.3(2) Construction assembly penetrations:

6.15.4.3(2)(a) Install wall finishes and cabinet backs neatly around openings for supply and waste piping where pipes are hidden in cabinetry.

6.15.4.3(2)(b) All gaps between wall finishes and pipes are to be covered or filled. All openings through fire separations will have fire dampers or will be firestopped, and repaired to maintain the integrity of the fire separation.

6.15.4.3(2)(c) Provide vibration and acoustic isolation treatment for mechanical equipment, to prevent vibration and noise transference to adjacent living spaces.

6.15.4.3(3) Piping

6.15.4.3(3)(a) Insulate heating and cooling piping with preformed glass fibre type insulation. Insulate all existing and new supply and return piping as required by ASHRAE 90.1 -2007

6.15.4.3(3)(b) Provide supports for pipes. Maintain required grading by adjustment; allow for expansion and contraction and maintain a neat appearance. Design supports to suit loading and services. Prevent undue stress to structural members. Supports must secure pipe and prevent vibration.

6.15.4.3(3)(c) Provide tamperproof access panels to concealed valves and clean-outs. ULC rating required in rated assemblies.

6.15.4.3(3)(d) Install escutcheon plates at piping penetrating wall.

6.15.4.3(3)(e) Flush and clean all hydronic piping systems and treat with corrosion inhibiters.

6.15.4.3(3)(f) Provide isolation and balancing valves on all branch lines. Variable flow systems will have pressure independent balancing valves.

6.15.4.3(4) Ducts

6.15.4.3(4)(a) All duct joints must be sealed to ensure no air leakage into surrounding space. Where a duct passes through cold space, it must be insulated complete with vapour barrier to prevent condensation.

6.15.4.3(4)(b) Ducts which penetrate the weather barrier of the exterior wall assembly must be sealed to the weather barrier using a method specifically designed to provide a water and air tight connection to the weather barrier of the exterior wall assembly.

6.15.4.3(4)(c) Make up air duct to be insulated where it passes through a heated space.

6.15.4.3(5) Seismic Restraint

6.15.4.3(5)(a) Seismic restraint must be provided for all mechanical equipment and accessories including attachment to structural members.

6.15.5 Mechanical Rooms

6.15.5.1 Project Co will provide and install all HVAC equipment in existing mechanical rooms wherever possible. Where not possible, Project Co will ensure that equipment locations are easily accessible for maintenance and do not interfere with day to day

operations. Mechanical rooms will be secure to prevent entry by unauthorized personnel.

6.15.5.2 Project Co will upgrade all existing mechanical rooms or build new mechanical rooms to meet the requirements of the VBBL, the Gas Code, and all other applicable requirements of Governmental Authorities, including upgrading all fire separations and ventilation.

6.15.6 Integrated Automation

6.15.6.1 Basic Requirements

6.15.6.1(1) Provide a building management system ("**BMS**") that performs the following functions:

6.15.6.1(1)(a) automatically operates, monitors and manages the Building's mechanical systems to provide a high level of occupant comfort and maintain a healthy and productive environment without disruption to the occupants;

6.15.6.1(1)(b) provides an internet based means of external monitoring for the Authority, including all associated hardware and software;

6.15.6.1(1)(c) interfaces with the building mechanical, electrical and communication systems and controls;

6.15.6.1(1)(d) meters, trends and archives all data related to the flow of services into and out of the Building, including gas, domestic water, and electricity and takes into account seasonal variations in flow rate;

6.15.6.1(1)(e) annunciates building and equipment alarms, including fire alarm, security alarms, lighting, UPS, and emergency power systems; and

6.15.6.1(1)(f) acquires and collates all data associated with energy measurement and verification.

6.15.6.1(2) Design the controls systems to allow monitoring and operation of the Building from a BMS location in the Building. Display building related alarms at the administration/control desk.

6.15.6.1(3) The BMS will:

6.15.6.1(3)(a) be a completely integrated (front-end and back-end) Native BacNET DDC system;

6.15.6.1(3)(b) be non-proprietary and designed with open protocol;

6.15.6.1(3)(c) optimize the system performance under all operating conditions to minimize Building energy usage;

6.15.6.1(3)(d) accommodate future technological changes and permit expansion of the system for future renovations;

6.15.6.1(3)(e) be an independent system separate from the fire alarm and other control systems; and

6.15.6.1(3)(f) be provided as a complete package from one manufacturer, not a composite system from several manufacturers.

6.15.6.1(4) Provide a separate physical network and any required network equipment for the BMS.

6.15.6.2 Performance Criteria

6.15.6.2(1) Zoning for HVAC systems will be based on occupancy, room location within the Building, room orientation, and room heating and cooling loads. Provide independent zone for each Residential Room. For Common Spaces, maximum of 1500 sq.ft. will be on one zone.

6.15.6.2(2) For all zones other than Residential Rooms, the BMS will:

6.15.6.2(2)(a) allow for off-hour controls and setback of temperatures;

6.15.6.2(2)(b) prevent simultaneous heating and cooling in the same zone;

6.15.6.2(2)(c) allow the Housing Operator to adjust the main setpoint for each zone; and

6.15.6.2(2)(d) allow the Housing Operator to control the heating plant equipment in the Building and the overall Building temperature by adjusting water flow or water temperatures.

Residential Rooms do not need to be monitored or controlled by the BMS.

6.15.6.2(3) In each Residential Room, provide an adjustable, vandal resistant type thermostat or temperature sensor with:

6.15.6.2(3)(a) temperature read out; and

6.15.6.2(3)(b) Residential Tenant adjustment range limited to plus/minus 2 deg C from the main setpoint determined by the Housing Operator,

and provide radiator valves that are protected from damage and are tamper resistant.

6.15.6.2(4) The BMS will monitor, control, indicate alarms, and provide trending where applicable for all connected sensors and control points.

6.15.6.2(5) The BMS documentation will include a detailed narrative description of the sequence of operation of each system.

6.15.6.2(6) User interface will be graphical in nature with animated graphics to indicate equipment operation. Graphics will be grouped in systems and in departments.

6.16 Division 16 – Electrical

6.16.1 General

6.16.1.1 Project Co will review and assess all existing electrical systems and equipment and will upgrade such systems and equipment as required to suit the renovated Building and as required to meet the standards set out in Section 2.2 of this Schedule.

6.16.1.2 Project Co will provide electrical systems and equipment that:

6.16.1.2(1) allow the Authority to deliver the program described in this Schedule and the Building Specifications;

6.16.1.2(2) provide protection, continuity of service and a comfortable and safe working environment for Tenants and staff; and

6.16.1.2(3) integrate systems where integration provides efficiency, operational and cost advantage.

6.16.1.3 Project Co will integrate any requirements in Schedule 2 [Design and Construction Protocols] or in Schedule 4 [Services Protocols and Specifications], including any energy incentive programs, into the new electrical system designs.

6.16.1.4 Project Co will co-ordinate and arrange equipment in proper relation with other apparatus, ducts, pipes, etc. and with building construction and finishes. Plan installation of equipment to facilitate easy access to other systems and equipment which may require inspection or maintenance.

6.16.1.5 Project Co will install all equipment in existing electrical rooms wherever possible. If not possible, Project Co will ensure that equipment locations are secure from unauthorized entry and do not interfere with day to day operations.

6.16.1.6 Project Co will correct all non-CEC compliant electrical installations.

6.16.1.7 Project Co will remove all redundant unused electrical distribution/equipment, wiring, cabling and raceways.

6.16.1.8 Project Co will install electrical systems and equipment in a fixed and permanent manner, seismically restrained to meet the VBBL.

6.16.1.9 Project Co will provide all required ULC listed firestopping of electrical penetrations to ensure building fire ratings are maintained.

6.16.1.10 Project Co will clean all equipment during construction and will thoroughly clean all equipment to “as new” condition.

6.16.1.11 Project Co will ensure that all material and/or equipment installed will bear evidence of CSA approval or special CSA certification acceptable to the responsible Governmental Authority.

6.16.1.12 Refer to Section 6.14 for electrical requirements specific to elevators. Project Co will ensure that the following is provided as a minimum for all Buildings with elevators:

6.16.1.12(1) existing pit lights and switches replaced with new;

6.16.1.12(2) elevator pit and machine room provided with duplex GFCI receptacles – where there are existing duplex receptacles, these will be replaced with new duplex GFCI receptacles;

6.16.1.12(3) elevator controller will be interfaced with the building fire alarm system to allow for elevator recall;

6.16.1.12(4) fire alarm initiating devices will be provided in the elevator machine room, and elevator pit; and

6.16.1.12(5) telephone line to elevator controller in elevator machine room.

6.16.2 Electrical Utility Service

6.16.2.1 General

6.16.2.1(1) Upgrade the main incoming electrical service as required for the renovated Building. Any upgrades that may be required by BC Hydro to the main incoming electrical service for a Building that are additional to the upgrades required to suit the renovated Building, such as a requirement that the electrical service be relocated from above ground to underground or a requirement to add a new or upgrade an existing transformer, will be the Authority's responsibility.

6.16.2.1(2) Determine service connection point and locations of all B.C. Hydro cables and ducts before commencing installation. Provide termination for incoming B.C. Hydro cables and ducts and provide nylon pull cord for B.C. Hydro ducts. Any B.C. Hydro installation or connection charges will be to Project Co’s account. All utility connections will be underground unless approved by the Authority and the relevant Governmental Authority.

6.16.2.1(3) Main service voltage will not exceed 250 unless approved by the Authority.

6.16.2.1(4) Provide electricity revenue metering, including any required meter cabinets, meter sockets assemblies, etc. Initial installation to include a single electricity revenue meter for the entire Building. Also provide for separate electricity revenue metering of:

6.16.2.1(4)(a) the residential area of the Building; and

6.16.2.1(4)(b) each Commercial Space.

6.16.2.2 Products

6.16.2.2(1) Meter bases and transformer cabinets will be sheet metal construction enclosure, conforming to B.C. Hydro requirements. Size will be as required by the relevant Governmental Authority. Meter cabinets and meter sockets will be provided by the relevant Governmental Authority.

6.16.2.3 Installations

6.16.2.3(1) Install all metering equipment in the main electrical room in the Building.

6.16.2.3(2) Install transformer pad, transformer grounding, primary/secondary duct banks, nylon pull cords, metering transformer cabinets, and meter base as required by the relevant Governmental Authority.

6.16.2.3(3) Include secondary conductors if required by the relevant Governmental Authority.

6.16.3 Electrical Distribution Equipment

6.16.3.1 General

6.16.3.1(1) Upgrade existing electrical rooms and provide new electrical rooms as necessary for the renovated Buildings to meet all applicable standards and any other requirements of the responsible Governmental Authorities, including upgrading fire separations and ventilation.

6.16.3.1(2) Locate new electrical rooms:

6.16.3.1(2)(a) as close as possible to the entry point for utilities; and

6.16.3.1(2)(b) for efficient distribution, including space for servicing.

6.16.3.1(3) Project Co will review and assess all electrical distribution equipment, including panel boards, disconnect switches and transformers, and upgrade such equipment to suit the renovated Building, including the equipment layout in the Building.

6.16.3.1(4) Power throughout the Building will comprise of 120/208V for all power, lighting and equipment loads.

6.16.3.2 Products

6.16.3.2(1) Main incoming service distribution equipment will be rated for service entrance.

6.16.3.2(2) Distribution equipment enclosures will be rated: Interior Dry Locations: Type 1 and Exterior Locations: Type 3R.

6.16.3.2(3) Panel boards will be bolt on (or equal) moulded case circuit breaker type, with copper mains, rated for the available interrupting capacity. Panel boards will be provided with main disconnecting means (main breaker) and the panel covers will be lockable.

6.16.3.2(4) Switch Assemblies will be CSA-C22.2 No. 4, Type HD with externally operable handle interlocked to prevent opening front cover with switch in ON position, enclosed load interrupter knife switch. Handle lockable in OFF position. Provide fuse clips where required by CEC.

6.16.3.2(5) Transformers will be constructed in accordance with CSA Standard C9 / NEMA ST 20, factory-assembled, air cooled dry type transformers, ratings as required. Transformer will be at a minimum 'K13' rated. Each unit will be complete with grounding lugs, capacity taps. Transformer enclosure will be sprinkler proof.

6.16.3.2(6) Transient Voltage Surge Suppression, will have a minimum surge current capacity based on ANSI / IEEE C62.41 location Category C (250kA per phase, 125kA per module).

6.16.3.3 Installations

6.16.3.3(1) Provide all required clearances around all electrical distribution equipment.

6.16.3.3(2) For each Commercial Space that is being renovated, provide one panel board dedicated for the space electrical loads. Panel board will have main breaker and space for 42 circuits.

6.16.3.3(3) Each residential floor will have, as a minimum, one common floor area electrical panel board installed in an accessible secure location. Common area distribution equipment and metering may also be located in the main electrical room.

6.16.3.3(4) Provide, as a minimum, 20% spare capacity for all panel boards.

6.16.3.3(5) All two and three pole breakers will have common trip type with single handle.

6.16.3.3(6) Panel board phases will be balanced to within 15%.

6.16.3.3(7) Provide ARC Fault breakers for all Residential Room receptacles as per CEC requirements.

6.16.3.3(8) Transient Voltage Surge Suppression (TVSS), as a minimum, will be provided on the main distribution and will be installed as close as possible to the distribution equipment. TVSS installation will conform to UL 1449 Standard for Safety for Surge Protection Devices.

6.16.3.3(9) Local disconnect switches will be provided as required for all mechanical and equipment connection.

6.16.4 Wiring Methods

6.16.4.1 General

6.16.4.1(1) Project Co will review and assess all wiring and raceways and upgrade the wiring and raceways to suit the renovated Building, including the equipment layout in the Building. In addition, Project Co will provide new electrical distribution wiring and raceways for all Residential Rooms.

6.16.4.1(2) All new installations will be designed to reduce the ability for the general public to access building wiring and limit possible tampering and or vandalism.

6.16.4.1(3) Project Co will ensure that voltage drop:

6.16.4.1(3)(a) on main feeders will be less than 2%; and

6.16.4.1(3)(b) on branch circuits will be less than 3%.

6.16.4.2 Product

6.16.4.2(1) Wiring

6.16.4.2(1)(a) All wiring will be copper, except for main distribution feeder conductors and residential area panel feeders in sizes #6 AWG to 1000 kcmil which may be aluminum conductor material. Maintain equivalent current carrying capacity.

6.16.4.2(1)(b) Aluminum alloy conductors will have the following characteristics:

(b).1 Be compact stranded conductors of NUAL® (AA- 8030) also known as Aluminum Conductor Material as manufactured by Alcan Cable or of a recognized 8000 Series aluminum alloy conductor material by the Aluminum Association. Aluminum conductor terminations will be completed using appropriately approved plating, hardware and processes.

(b).2 Insulation for use in raceways: Sizes #6 AWG to 1000 kcmil Type RW90, temperature rating 90º C.

(b).3 Connectors will be dual rated (AL7CU or AL9CU) and Listed by CSA for use with aluminum and copper conductors and sized to accept aluminum conductors of the ampacity specified.

6.16.4.2(1)(c) Copper conductors will have the following characteristics:

(c).1 Use solid conductors for #12 AWG and #10 AWG gauge wiring and stranded conductor for #8 AWG and larger.

(c).2 Use stranded conductors for control circuits. Conductors will not be smaller than 18 AWG for control circuits.

(c).3 Insulation rating will be 600 volts and insulation type will be as allowed by CEC.

(c).4 Use manufacturer recommended wiring connectors for wire and cable splices and taps.

6.16.4.2(1)(d) Distribution and Panel board feeders will use either multiple conductor in conduits or multi conductor cables.

6.16.4.2(1)(e) Minimum conductor size will be #12 AWG except for 15 Amp branch circuits within residential units, where #14 AWG may be used. The use of code accepted 20A branch circuit wiring is not intended to be excluded, #12 AWG will be used for 20A branch circuit wiring in residential units.

6.16.4.2(1)(f) Armoured cable Type AC90 copper conductors will only be used in concealed locations.

6.16.4.2(1)(g) NMD 90 cable in stud partitions may be used where permitted by CEC.

6.16.4.2(2) Raceways

6.16.4.2(2)(a) Minimum EMT conduit size is 21mm (3/4”), except that minimum EMT conduit size for security, telephone and data drops is 27mm (1”).

6.16.4.2(2)(b) Underground conduits for branch circuit wiring and conduits in slab will be heavy wall Rigid PVC or EMT where permitted by CEC.

6.16.4.2(2)(c) Underground Installations:

(c).1 More than 525 mm (5 feet) from foundation wall: Use rigid PVC Type DB2 duct.

(c).2 Within 1525 mm (5 feet) from foundation wall: Use rigid PVC Type DB2 duct.

6.16.4.2(2)(d) Outdoor Locations, Above Grade: Use rigid galvanized steel up to 1525 mm (5 feet) above the ground or finished floor level, and electrical metallic tubing (EMT).

6.16.4.2(2)(e) In Slab Above Grade: Use rigid non-metallic conduit unless indicated otherwise.

6.16.4.2(2)(f) Wet and damp Locations: Use rigid galvanized steel conduit unless indicated otherwise.

6.16.4.2(2)(g) Dry Locations:

(g).1 Concealed: Use electrical metallic tubing (EMT) unless indicated otherwise.

(g).2 Exposed: Use rigid steel and electrical metallic tubing. Rigid galvanized steel conduit will be used where conduits are subject to physical damage, i.e. between finished grade to 1525mm (5 feet) above finished grade.

6.16.4.2(2)(h) Review all uses of ENT, commonly referred to as coreline, with the Authority on a Building to Building basis and obtain the Authority's approval prior to use. Under no circumstance will ENT be utilized for telecommunication pathways.

6.16.4.2(2)(i) Conduit connections to equipment will utilize flexible conduit. Use liquid-tight flexible conduit with watertight connectors in damp or wet locations. Use flexible conduit for all final connections:

(i).1 to devices located on suspended ceilings; and

(i).2 to vibrating equipment, such as transformers and motors.

6.16.4.2(2)(j) Minimum flexible conduit size is 21mm (3/4") and maximum length of any flexible conduit run is 1.5 metres.

6.16.4.3 Installation

6.16.4.3(1) All wiring connections and terminations will be completed as per the manufacturer's recommend methods.

6.16.4.3(2) All wiring and cabling will be installed in conduit raceways.

6.16.4.3(3) All conduits and receptacles will be installed concealed in slabs, ceiling space or partitions except in corridors, unfinished spaces or where

permission is specifically obtained from the Authority for running on the surface. Where conduits are exposed, use vandal resistant conduit and paint it to match the surrounding finishes.

6.16.4.3(4) Conduits will be EMT type except where susceptible to mechanical damage, where rigid threaded galvanized steel conduit will be used.

6.16.4.3(5) Conceal all wiring in finished areas. Install conduit exposed in mechanical, electrical and telephone equipment areas. Run exposed conduit at right angles or parallel to the building lines. Do not install exposed conduit on exterior building walls and or in Residential Rooms. Where exposed, conduits will be painted to match surroundings.

6.16.4.3(6) Provide pull boxes and splitter boxes/gutters as required. Locate boxes in areas that are not accessible by the general public.

6.16.4.3(7) Use suitable cable fittings and connectors.

6.16.4.3(8) Use vandal resistant screws in all areas that are exposed to the general public.

6.16.4.3(9) Provide proper support for all new and existing raceways. Armoured cable (AC90 / BX) will be used only for final connections from concealed junction boxes to lighting fixtures on suspended ceilings. The maximum length of any individual piece of AC90 cable is 3.0 metres.

6.16.4.3(10) Where accepted, ENT conduit runs will be installed neatly parallel or at right angles to building lines, will be supported using appropriate methods (tie wire is not appropriate), will be oversized and at no time will conduit less than 3/4" be used.

6.16.5 Grounding

6.16.5.1 General

6.16.5.1(1) Project Co will provide a complete system of grounding and bonding for all electrical equipment and systems in the Building, including communications and security equipment, 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.

6.16.5.1(2) Grounding system resistance will be no more than 5.0 ohms.

6.16.5.2 Product

6.16.5.2(1) Master Ground Bus: Suitable length of 6 mm x 75 mm (1/4" x 3") solid copper on 25 mm (1") stand-off insulators, complete with fastenings and connections.

6.16.5.2(2) Grounding/Bonding wires will be insulated green, stranded copper. Size of cable to meet CEC requirements.

6.16.5.3 Installation

6.16.5.3(1) If grounding system resistance is higher than the set limit, provide additional grounding components (grounding electrodes, plates) as required.

6.16.5.3(2) Provide new master building ground bar in the electrical room.

6.16.5.3(3) Provide bonding conductor within the metallic raceways and bond raceways continuously.

6.16.6 Wiring Devices

6.16.6.1 General

6.16.6.1(1) Project Co will review and assess all wiring devices and upgrade the devices to suit the renovated Building, including the equipment layout in the Building. In addition, Project Co will replace all receptacles in Residential Rooms with new.

6.16.6.1(2) Locations of receptacles will comply with all applicable codes and standards.

6.16.6.2 Product

6.16.6.2(1) Outlet boxes will be sized to suit the number of conductors. Boxes in concrete will be PVC.

6.16.6.2(2) Residential Room coverplates will be thermoplastic residential grade, white finish.

6.16.6.2(3) Common Spaces coverplates will be unbreakable or stainless steel.

6.16.6.2(4) All wiring devices will be tamper proof.

6.16.6.2(5) Receptacles will be specification grade, duplex, polarized type complete with parallel and U-grounding slots and rated at 15/20 Ampere, T-slot, 125 Volt.

6.16.6.2(6) 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.

6.16.6.3 Installations

6.16.6.3(1) Receptacles, telecommunications and television outlets on common or party walls will be installed such that the continuity of the fire separation is maintained. All communication outlets will be provided with back boxes.

6.16.6.3(2) All wiring devices in residential areas will be tamper proof, residential grade white finish, “Décor a” style or as agreed by the Authority.

6.16.6.3(3) Provide vapour barriers for all outlet boxes that are installed in perimeter walls.

6.16.6.3(4) Mount electrical devices at the following heights, unless otherwise specified in the Building Specifications:

Table: Electrical Device Mounting Heights

Device Description	Height above floor (mm)	Height above floor (ft - in)
Light switches - to centre	914 mm	3’-0”
Duplex receptacles - to centre	508 mm	1’-8”
Thermostats – to centre; align vertically with light switch	1067 mm	3’-6”

6.16.6.3(5) Commercial Spaces: electrical design will have one dedicated quadplex receptacle by the panel.

6.16.6.3(6) Residential Rooms: electrical system design will follow the CEC requirements. Refer to the Building Specifications for additional requirements.

6.16.6.3(7) Common Spaces: for the additional electrical systems design requirements, refer to the Building Specifications.

6.16.6.3(8) Exterior building, electrical system design will have one weatherproof GFCI duplex receptacle for exterior building maintenance. This receptacle will be vandal resistant and located to avoid misuse. Receptacle will be controlled by switch located at the main reception desk.

6.16.6.3(9) Provide all final connections to all new and/or existing equipment, mechanical units and control devices. Mechanical units for the Commercial Space will be connected to the electrical panel for the relevant Commercial Space.

6.16.6.3(10) 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 208 volt 3phase.

6.16.7 Lighting

6.16.7.1 General

6.16.7.1(1) Project Co will provide new interior/exterior lighting and building lighting controls.

6.16.7.1(2) Project Co will provide an energy efficient lighting design that:

6.16.7.1(2)(a) uses energy efficient lighting and automated lighting controls to achieve 10% less than the lighting targets set out in ASHRAE 90.1 2007;

6.16.7.1(2)(b) provides illumination in all areas; and

6.16.7.1(2)(c) conforms to applicable standards, including IESNA, IESNA G-1-03 and ASHRAE 90.1-2007.

6.16.7.2 Products

6.16.7.2(1) Lamps and Ballasts

6.16.7.2(1)(a) Incandescent lamps will not be acceptable. Replace incandescent lamps with compact fluorescent or other more energy efficient lighting.

6.16.7.2(1)(b) Fluorescent lamps will be energy efficient, tri-phosphor, instant start lamps with 4100 Kelvin colour temperature, and have a minimum 85 color rendering index. All fluorescent lamps of the same type and colour will be by the same manufacturer

6.16.7.2(1)(c) LED lamps will bear the “Lighting Facts®” label.

6.16.7.2(1)(d) Pulse start metal halide sources will have a 5000 Kelvin colour temperature and have a minimum 70 color rendering index.

6.16.7.2(1)(e) Fluorescent ballasts will be high power factor, rapid start, sound rating “A”, energy saving electronic type where appropriate.

6.16.7.2(1)(f) Pulse start metal halide ballasts will be as recommended by the fixture manufacturer and will be compatible with the lamp specified.

6.16.7.2(1)(g) LED driver life expectancy will match the LED lamp it serves.

6.16.7.2(1)(h) All ballast and driver temperature ratings will be rated to suit environmental temperatures where it is installed.

6.16.7.2(2) Interior Lighting

6.16.7.2(2)(a) Fluorescent lighting will be used throughout the Buildings. LED source lighting will be an acceptable alternative lighting source.

6.16.7.2(2)(b) Fluorescent luminaires will incorporate either compact or linear style lamps for Common Spaces. Energy efficient technology will be integrated into the chosen luminaire.

6.16.7.2(2)(c) Ensure that all light fixtures are selected to minimize glare.

6.16.7.2(2)(d) Light fixtures in Residential Rooms and corridors will contain two or more lamps.

6.16.7.2(3) Exterior Lighting

6.16.7.2(3)(a) Provide pulse start metal halide lamps for general exterior lighting.

6.16.7.2(3)(b) Provide LED lighting for exterior accent / building display lighting.

6.16.7.2(3)(c) All exterior lighting will be vandal resistant and dark sky compliant.

6.16.7.2(4) Lighting Controls

6.16.7.2(4)(a) Provide specifically rated lighting controls for the application/condition in locations where they may be subjected to excessive moisture or to chemicals that might cause deterioration.

6.16.7.2(4)(b) Wall lighting switches will be line voltage switches in service areas will be specification grade, rated for 120 Volt, 20 Amp operation with quiet, quick make/break toggle movement and totally enclosed case.

6.16.7.2(4)(c) Occupancy sensor lighting switches:

(c).1 will be line voltage rated for 120 Volt, 20 Amperes.

(c).2 Wall occupancy sensors will utilize either PIR or Dual Technology (PIR and Ultrasonic) complete with manual off override and will be capable to set 30-minute time delay.

(c).3 Ceiling mounted occupancy will utilize Dual Technology (PIR and Ultrasonic) and will be capable to set 30-minute time delay.

6.16.7.2(4)(d) Switches will be of one manufacturer throughout the Buildings.

6.16.7.2(4)(e) Time clocks will be astronomical and of analog type. Digital time clocks will be acceptable, but will come complete with battery backup.

6.16.7.2(4)(f) Exterior photocell will be capable of sensing from 1-60,000 lux.

6.16.7.3 Installations

6.16.7.3(1) New lighting design illumination levels will conform to the following minimum requirements:

Table: Minimum Lighting Levels

Minimum Lighting Levels			
Room or Space Description	Light level Average in Lux (lm/m^2) (Foot-candles) (lm/ft^2)		Preferred Lighting source CRI (Colour Rendering Index) Lamp Colour Temp in °K
a) Common Areas			
Storage Rooms	55 (5)		Fluorescent, 85 CRI, 4100°
Service Rooms, Laundry	550 (51)		Fluorescent, 85 CRI, 4100°
Office	400 (40)		Fluorescent, 85 CRI, 4100°
Kitchen	550 (51)		Fluorescent, 85 CRI, 4100°
Public Washrooms	110 (10)		Fluorescent, 85 CRI, 4100°
Main Entry Lobby, Public Corridors and Stairs, including service stairs and halls.	110 (10)		Fluorescent, 85 CRI, 4100°
Recreation Rooms	325 (30)		Fluorescent, 85 CRI, 4100°
Exterior Walkways	55 (5)		High Intensity Discharge
Exterior Entrances	110 (10)		High Intensity Discharge
Emergency Lighting - Stair	50 (5)		Fluorescent, 85 CRI, 4100°
Emergency Lighting – Stair Landing	20 (2)		Fluorescent, 85 CRI, 4100°
b) Residential Rooms			

Residential Room	325 (30)		Fluorescent, 85 CRI, 2700°

6.16.7.3(2) No lighting fixtures will have exposed lamps.

6.16.7.3(3) Vandal resistant luminaires will be used in all Residential Tenant accessible areas. Crawl spaces and accessible attic spaces will be illuminated utilizing luminaires with mechanical protection of lamps.

6.16.7.3(4) With the exception of stairwells and corridors, provide occupancy sensor light switches in all enclosed Common Spaces, including kitchens, amenity rooms and tenant laundry rooms. Stairwell and corridor lighting will be on all the time (not switched).

6.16.7.3(5) Provide occupancy sensor light switches in all storage rooms and service rooms.

6.16.7.3(6) Provide a period reproduction alcove soffit ceiling fixture for each entry alcove of restored facades.

6.16.7.3(7) Commercial Space

6.16.7.3(7)(a) For each Commercial Spaces that is being renovated, provide general construction lighting that is controlled by a light switch located by the panel.

6.16.7.3(8) Exterior of Building

6.16.7.3(8)(a) Provide an efficient and effective façade lighting installation which provides a narrow shaft of light up each front façade window pier, with limited spillage across windows, and an even spread of light across the upper cornice. Where applicable, augment the upper wall scheme with storefront downlighting in the form of period-character gooseneck metal shade fixtures illuminating the commercial storefront areas.

6.16.7.3(8)(b) Layouts will be designed to limit light trespass onto adjacent properties and to reduce glare from hot spots. Luminaires will be located to provide easy maintenance.

6.16.7.3(8)(c) Exterior lighting will be controlled by time clock and exterior photocell. Provide additional contactors as required. Mount time clock in main electrical room.

6.16.8 Exit Signs and Emergency Lighting

6.16.8.1 General

6.16.8.1(1) Project Co will upgrade all exit signs and emergency lighting to facilitate the safe exiting from the Building.

6.16.8.2 Product

6.16.8.2(1) EXIT Signs

6.16.8.2(1)(a) EXIT signs will be LED type: power consumption will be equal or less than 3-watts

6.16.8.2(1)(b) EXIT signs will be connected to both normal power source and approved emergency power source. Separate raceways will be provided for each source. Use of self-powered EXIT signs is acceptable.

6.16.8.2(2) Emergency Lighting

6.16.8.2(2)(a) Use:

(a).1 emergency battery packs and remote emergency lighting heads; or

(a).2 emergency lighting integrating battery backup in lighting fixtures.

Provide a consistent system for each Building.

6.16.8.2(2)(b) Emergency battery packs will be 12 Volt of the sealed lead acid type with a minimum 10 year lifespan, wall mounted with manufacturer's approved bracket supports.

6.16.8.2(2)(c) Emergency remote heads will be 12 Volt seal beam style.

6.16.8.2(2)(d) The total load (lighting heads and exit signs connected) connected to the battery pack will operate for time required by the VBBL with a minimum of 87.5% of rated battery voltage output.

6.16.8.3 Installations

6.16.8.3(1) EXIT signs will be located to clearly indicate the direction of travel at locations required by the VBBL and be clearly visible.

6.16.8.3(2) EXIT signs will be posted at all exits and the building entrance regardless of building height.

6.16.8.3(3) Emergency lighting will be provided where required by the VBBL and installation will be as per the CEC.

6.16.9 Fire Alarm System

6.16.9.1 General

6.16.9.1(1) Upgrade the fire alarm system to the current VBBL requirements.

6.16.9.2 Product

6.16.9.2(1) Control Panel

6.16.9.2(1)(a) Fire alarm main control panel will accommodate new and existing system devices, with an additional 25% spare capacity.

6.16.9.2(1)(b) Panel will be lockable and come complete with 24-hour battery backup.

6.16.9.2(2) Annunciator Panel

6.16.9.2(2)(a) Annunciator panels will have LED displays. Graphic annunciators will be provided by annunciator panels.

6.16.9.2(2)(b) A lockable vandal resistant enclosure will be provided for remote annunciator panels that are located in Common Spaces.

6.16.9.2(3) Fire Alarm Initiating Devices will consist of:

6.16.9.2(3)(a) Manual pull stations: Provide enclosure cover plates for all manual pull stations to help limit nuisance alarms

6.16.9.2(3)(b) Heat Detectors

6.16.9.2(3)(c) Smoke Detectors

6.16.9.2(3)(d) Duct Type Smoke Detectors

6.16.9.2(3)(e) Combination Smoke Heat Detectors: Install the heat (but not the smoke) detector component of the combined detector to transmit an alarm signal to the Fire Department on activation. Refer to the CFT Report.

6.16.9.2(4) Fire Alarm Signaling Devices will consist of:

6.16.9.2(4)(a) either:

(a).1 fire alarm bells and/or alarm strobes; or

(a).2 fire alarm horns and/or combination alarm horn strobes; and

6.16.9.2(4)(b) in “high buildings”, speakers as part of the voice communication system as per Division B, Sentence 3.2.6.8.(1) of the VBBL.

6.16.9.2(5) Signaling devices will have RED finish and have labelling that clearly indicates the device use.

6.16.9.2(6) Signalling devices will have capability to tap signal levels.

6.16.9.2(7) Control/Monitoring Modules will:

6.16.9.2(7)(a) be provided where required with fire alarm devices;

6.16.9.2(7)(b) be provided for all sprinkler valves (flow, tamper, pressure);

6.16.9.2(7)(c) connect to security, elevator controller, kitchen suppression system where required; and

6.16.9.2(7)(d) be provided for all fire alarm interlocks with other equipment (re-circulating air equipment, magnetic door holders, etc.)

6.16.9.2(8) Isolator Modules: Provide a minimum of one isolator module for each floor or protected zone in the Building.

6.16.9.2(9) Provide fire alarm wiring as recommended by system manufacturer. All fire alarm system wiring will be installed in conduit. In “high buildings” as defined by Division B, Sentence 3.2.6.1.(1) of the VBBL, provide protection of electrical conductors in accordance with Division B, Sentence 3.2.6.9.(1).

6.16.9.3 Installation

6.16.9.3(1) Install a fire alarm control panel in an accessible secure location.

6.16.9.3(2) A primary annunciator panel will be located in close proximity to the main entrance to the building for ease of emergency personnel response. Panel is to indicate to authorized building staff and/or Fire Department response the location and event of the in-suite smoke/heat detectors.

6.16.9.3(3) Provide a secondary annunciator at the on-site building manager’s office in order to indicate for authorized building staff the locations of the in-suite smoke detector portion of an approved smoke/heat detector.

6.16.9.3(4) Install the primary and secondary annunciator panels to provide audible and visual supervisory condition of the smoke detector component of the in-suite device.

6.16.9.3(5) If requested by the Authority or the Housing Operator, provide the option to silence the audibility of a combined smoke/heat detector in a specific suite(s). Refer to the CFT Report.

6.16.9.3(6) Cause the fire alarm system to be supervised, including to indicate a supervisory (trouble) signal on the primary and secondary annunciator, for each of the following:

6.16.9.3(6)(a) movement of a valve handle that controls the supply of water to sprinklers;

6.16.9.3(6)(b) loss of excess water pressure required to prevent false alarm in a wet pipe sprinkler system;

6.16.9.3(6)(c) loss of air pressure in a dry pipe sprinkler system;

6.16.9.3(6)(d) loss of power to any automatically starting fire pump;

6.16.9.3(6)(e) a temperature approaching the freezing point in any dry pipe sprinkler system valve enclosure;

6.16.9.3(6)(f) movement of a valve handle that controls the supply of water to the standpipe system (except for standpipe system hose valves);

6.16.9.3(6)(g) kitchen suppression system;

6.16.9.3(6)(h) mechanical equipment; and

6.16.9.3(6)(i) elevator controller.

6.16.9.3(7) Fire alarm system zoning: within each storey, separate zones are required for each device type (sprinkler flow switch, smoke detectors, and manual pull stations).

6.16.9.3(8) Provide manual stations on every floor near every required exit and near the principal entrance to the Building and additionally where required by the VBBL. Manual stations to be mounted no higher than 1200 mm above the finished floor.

6.16.9.3(9) Provide smoke detectors:

6.16.9.3(9)(a) at the top of each exit stair shaft and in all public corridors serving Residential Rooms;

6.16.9.3(9)(b) at the elevator lobbies spaces on each floor to facilitate the elevator recall requirements; and

6.16.9.3(9)(c) wherever additionally required by the VBBL.

6.16.9.3(10) The VBBL requires smoke alarms to be provided in each Residential Room. With the City's approval, replace existing smoke alarms with combined smoke/rate-of-rise heat detectors.

6.16.9.3(10)(a) Smoke detectors will incorporate a “tamper-resistant” capability that will prevent removal of the detector from the base without a special tool.

6.16.9.3(10)(b) Note that the “high sensitivity level” setting cannot be used in the Residential Rooms as it is unlikely that those rooms can be considered smoke-free, environmentally controlled environments.

6.16.9.3(11) Provide duct mounted detectors where air handling systems serve more than one Residential Room or more than one storey.

6.16.9.3(12) Provide all fire alarm interlocks with other equipment (re-circulating air equipment, fire suppression system, security system, magnetic door holders, and elevator controller).

6.16.9.3(13) Install audible signal devices throughout the Building as required by the VBBL. Meet the requirements for audibility of signal devices in Residential Rooms using devices installed outside of the Residential Rooms.

6.16.9.3(14) The fire alarm system will be designed to automatically transmit alarm signals to the Fire Department via an independent central station (ULC listed central station) and supervisory and trouble signals to the central station. Install the combined smoke heat detector so that:

6.16.9.3(14)(a) operation of the heat detector component of the in-suite combined detector transmits an alarm signal to the Fire Department on activation; and

6.16.9.3(14)(b) the smoke detection portion of an in-suite combined device does not transmit an alarm signal to the Fire Department on activation.

6.16.9.3(15) The fire alarm system will be installed in conformance with CAN/ULC-S524-M, “Standard for the Installation of Fire Alarm Systems” and tested in conformance with CAN/ULC-S537-M, “Standard for the Verification and Testing of Fire Alarm Systems”.

6.16.9.3(16) Fire alarm verification will include verification of the transmitted signal between the fire alarm system and the remote monitoring facility. A letter documenting the type of signal received by the monitoring facility must be submitted prior to occupancy. The fire alarm monitoring facility must receive separate signals for Fire Alarm, Fire Alarm Trouble and Sprinkler Supervisory.

6.16.10 Electric Heating

6.16.10.1 General

6.16.10.1(1) Project Co will provide electric heating only as directed in Section 6.15 or in the mechanical sections of the Building Specifications.

6.16.10.2 Product

6.16.10.2(1) Electric heating units will be low watt density, equipped with anti-ticking guides to eliminate expansion / contraction ticking and sized to suit the specific Building designs.

6.16.10.2(2) Electric heating units will be controlled by wall-mounted thermostats. Built-in thermostats will not be permitted on heating appliances. All thermostats will provide sensitivity to -16.6°C (2°F.). Night set back thermostats will be provided for rooms exceeding 2000 watts of electric heat.

6.16.10.2(3) Equivalent of RSI 3.5 (R20) insulation will be provided above, below and behind wall insert heating unit.

6.16.11 Communications

6.16.11.1 General

6.16.11.1(1) Determine service connection point and locations of all telephone, internet and cable television (CATV) service cables and ducts. Provide termination for all incoming telephone, internet and CATV service cables and ducts. Provide nylon pull cord for all telephone, internet and CATV service ducts. Any telephone, internet and CATV service provider installation or connection charges will be to Project Co's account. All utility connections will be underground unless approved by the Authority and the relevant Governmental Authority, if any.

6.16.11.1(2) Project Co will upgrade the telecommunications cable plant, including all components to support telecommunications services from the service provider demarcation point to the telecommunications outlet, to allow the Authority to access telephone, internet and cable television providers of their choice. Project Co will remove all unused and unnecessary telecommunications cabling and equipment.

6.16.11.1(3) The cable plant will, as a minimum, support all systems mentioned in this Schedule (e.g. entryphone system, CATV, telephone, ADSL Internet access etc.).

6.16.11.1(4) The cabling system must meet or exceed Category 5e permanent link as defined in ANSI/EIA 568-b.1.

6.16.11.2 Products

6.16.11.2(1)Backbone Cabling

6.16.11.2(1)(a) Voice tie cables will have at least 50% spare capacity.

6.16.11.2(1)(b) Provide data backbone cabling as required to support voice and data applications. If fibre optic cabling is required, provide 50 micron, multimode fibre.

6.16.11.2(2)Voice / Data Cabling

6.16.11.2(2)(a) Telephone and data network and end-use equipment will be provided by the Authority or the Housing Operator.

6.16.11.2(2)(b) All communication (telephone and data) cabling will be Category 5e, 4-pair, UTP, plenum rated.

6.16.11.2(2)(c) Jacks must accept either RJ45 or RJ11 modules without causing any damage or degradation to the connectors.

6.16.11.2(2)(d) All data cabling will terminate on patch panels. Panels to be sized to suit project parameters.

6.16.11.2(2)(e) All voice cabling will be terminated on BIX mounts. BIX to be sized to suit project parameters.

6.16.11.2(2)(f) Patch panels will be mounted in wall bracket. Bracket will be large enough to house Authority data equipment.

6.16.11.2(2)(g) Patch cords and cross connect wiring will be provided for all terminate jacks.

6.16.11.2(3)Cable Television Cabling

6.16.11.2(3)(a) Cables will be plenum rated RG-6U coaxial cables.

6.16.11.2(3)(b) Coaxial connectors will be type RG-11 and RG-56 as required.

6.16.11.2(3)(c) TV splitters will be sized to suit building requirements.

6.16.11.2(4)Entryphone System

6.16.11.2(4)(a) Provide a new door entry system consisting of:

(a).1 one exterior vandal resistant call station; and

(a).2 one master interior call station.

6.16.11.2(4)(b) Master interior call station will be able to release the front entry door.

6.16.11.3 Installation

6.16.11.3(1)Telecommunication Rooms

6.16.11.3(1)(a) There will be one main telecommunications room/area per Building. This room/area will be the location for service provider demarcation points as well as other base building system equipment.

6.16.11.3(1)(b) Sub-telecommunications closets will be provided as required by TIA/EIA standards to service the building.

6.16.11.3(1)(c) Provide fire rated plywood backboard for the telephone distribution equipment and wiring in the main distribution room.

6.16.11.3(1)(d) Sub distribution closets will be provided as required by Telus and TIA/EIA requirements.

6.16.11.3(2)Telecommunications Pathways

6.16.11.3(2)(a) Main telecommunications room will have conduits to all sub-telecommunications room/closets.

6.16.11.3(2)(b) Project Co will provide a conduit system for all telecommunication cabling. Minimum conduit size is 1".

6.16.11.3(2)(c) For each Commercial Spaces that is being renovated, provide one dedicated 1.5" (41mm) conduit complete with pull string back to the main telecommunications room.

6.16.11.3(3)Voice / Data Cabling

6.16.11.3(3)(a) Provide backbone cabling connectivity from the main telecommunications room to the sub-telecommunications room/closets.

6.16.11.3(3)(b) Mount main server and wall bracket rack in main reception office.

6.16.11.3(3)(c) Provide and install patch cords and cross connect wiring for every communication jack that is terminated.

6.16.11.3(3)(d) Provide communication outlets in all Residential Rooms and in Common Spaces, including as required in the Building Specifications. All communication outlets will consist of one telephone and one data jack. Locate communication outlets to suit room and equipment layouts.

6.16.11.3(4) Cable Television

6.16.11.3(4)(a) Provide a complete CATV outlet and wiring system in accordance with the recommended standards of the local CATV provider.

6.16.11.3(5) Entryphone System

6.16.11.3(5)(a) Provide a new entryphone system, including:

(a).1 provide a master call station in the main reception office. Master call station will be interlocked with the main entry door security hardware; and

(a).2 provide an exterior call station mounted at the front entry door to the Building.

APPENDIX 3A

BEACON SPECIFICATIONS

APPENDIX 3B

CORDOVA RESIDENCE SPECIFICATIONS

APPENDIX 3C

DOMINION HOTEL SPECIFICATIONS

APPENDIX 3D

GASTOWN HOTEL SPECIFICATIONS

APPENDIX 3E

HAZELWOOD HOTEL SPECIFICATIONS

APPENDIX 3F

MARBLE ARCH HOTEL SPECIFICATIONS

APPENDIX 3G

MARR HOTEL SPECIFICATIONS

APPENDIX 3H

MOLSON'S BANK BUILDING SPECIFICATIONS

APPENDIX 3I

ORANGE HALL SPECIFICATIONS

APPENDIX 3J

RICE BLOCK SPECIFICATIONS

APPENDIX 3K

SUNRISE HOTEL SPECIFICATIONS

APPENDIX 3L

TAMURA HOUSE SPECIFICATIONS

APPENDIX 3M

WASHINGTON HOTEL SPECIFICATIONS