<table>
<thead>
<tr>
<th>Date of Update</th>
<th>Sections Updated</th>
</tr>
</thead>
<tbody>
<tr>
<td>20xx-xx-xx</td>
<td></td>
</tr>
</tbody>
</table>

Technical Standards for Offices 2019 – Tenant Improvements © Government of British Columbia

This material is owned by the Government of British Columbia and is protected by copyright law. It may not be reproduced or redistributed without the prior written permission of the Government of British Columbia.

Disclaimer

This document was prepared for the purposes of the Government of British Columbia and is not intended to be used for other purposes. This document may be revised periodically without notice and may not accurately reflect the current state of the law in British Columbia. A reference to a product or service contained in this document does not constitute an endorsement or recommendation of that product or service by the Government of British Columbia.

This document and all the information contained are provided "as is" without warranty of any kind, whether express or implied. All implied warranties, including, without limitation, implied warranties of merchantability, fitness for purpose, accuracy, completeness and non-infringement, are hereby expressly disclaimed. The information in this document may not be suitable for your purposes; any person relying upon any information in this document does so at his or her own risk.

Under no circumstances shall the Government of British Columbia be liable to any person or business entity for any direct, indirect, special, incidental, consequential, or other damages based on any use of this document, including, without limitation, any lost profits, business interruption, or loss of programs or information, even if the Government of British Columbia has been specifically advised of the possibility of such damages.
## Table of Contents

1. **GENERAL REQUIREMENTS** ................................................................................................................. 5
   1a  Introduction ................................................................................................................................................. 5
   1b  Design Requirements ................................................................................................................................. 5
   1c  Project Documents .................................................................................................................................. 6

2. **INTERIOR ARCHITECTURE** .................................................................................................................... 7
   2a  Non-Permanent Interior Walls ................................................................................................................. 7
   2b  Doors, Frames, Hardware and Interior Glazing  .................................................................................... 7
   2c  Floor Finishes .......................................................................................................................................... 8
   2d  Wall Finishes .......................................................................................................................................... 10
   2e  Ceilings .................................................................................................................................................. 11
   2f  Millwork .................................................................................................................................................. 12
   2g  Acoustic Separation ................................................................................................................................. 13
   2h  Janitor Facilities .................................................................................................................................... 17
   2i  Washroom Accessories ............................................................................................................................ 18
   2j  First Aid Room Fit-up .............................................................................................................................. 18
   2k  Interior Signage ....................................................................................................................................... 18
   2l  Commissioning ....................................................................................................................................... 19
   2m  Wood First Act ...................................................................................................................................... 19
   2n  Accessibility ............................................................................................................................................ 19
   2o  Universal Multi-Stall Washrooms .......................................................................................................... 22
   2p  Change Rooms and showers: .................................................................................................................. 23

3. **HVAC** ...................................................................................................................................................... 24
   3a  HVAC General .......................................................................................................................................... 24
   3b  Space Requirements - HVAC .................................................................................................................... 27
   3c  HVAC Elements - General ....................................................................................................................... 32
   3d  HVAC Central Plant .................................................................................................................................. 34
   3e  HVAC Systems - General .......................................................................................................................... 35
   3f  HVAC System Types ................................................................................................................................ 35

4. **HVAC SYSTEM CONTROLS** .................................................................................................................. 38
   4a  General Requirements – DDC .................................................................................................................... 38
   4b  Programming – DDC ................................................................................................................................. 40
   4c  Components - DDC .................................................................................................................................. 40
   4d  Completion – DDC ................................................................................................................................... 41
   4e  Non-DDC HVAC Controls ....................................................................................................................... 42

5. **PLUMBING** .............................................................................................................................................. 44
   5a  Plumbing – General ................................................................................................................................... 44
   5b  Drainage Systems .................................................................................................................................... 46
   5c  Domestic Water Systems .......................................................................................................................... 47
5 d Plumbing Fixtures .............................................................................48
6 FIRE SUPPRESSION .............................................................................50
  6 a Fire Suppression – General .............................................................50
  6 b Fire Extinguishers .........................................................................50
  6 c Sprinkler Systems .........................................................................51
7 POWER ..................................................................................................53
  7 a Performance requirements .............................................................53
  7 b Prescriptive Requirements ............................................................53
8 LIGHTING ...............................................................................................58
  8 a Performance Requirements .............................................................58
  8 b Prescriptive Requirements ............................................................58
9 STRUCTURED CABLING ....................................................................63
  9 a Performance Requirements .............................................................63
  9 b Prescriptive Requirements ............................................................63
10 BUILDING FABRIC SECURITY UPGRADES ........................................71
  10 a General ..........................................................................................71
  10 b Performance Requirements ............................................................72
11 PHYSICAL SECURITY ............................................................................74
  11 a Performance Requirements ............................................................74
  11 b Prescriptive Requirements ............................................................74
12 COMMISSIONING ...............................................................................75
  12 a Commissioning Scope of Work .......................................................75
  12 b Letter of Conformance - Architectural .............................................76
  12 c OPR Check Sheet - Architectural ......................................................77
  12 d Letter of Conformance – Mechanical ..............................................78
  12 e OPR Check Sheet - Mechanical .......................................................79
  12 f Letter of Conformance – Electrical ..................................................80
  12 g OPR Check Sheet - Electrical ..........................................................81
13 PROJECT SPECIFIC .............................................................................82
1 GENERAL REQUIREMENTS

1 a Introduction

1 a 1 These technical requirements apply to office space. Requirements for other occupancies or building types are described in other documents.

1 a 2 These standards are intended to provide technical requirements for the design and construction of existing space that Real Property Division (RPD) leases or builds for its clients. The standards apply to all office spaces, any area.

1 a 3 RPD requires design solutions that are to current industry standard and practice, that maximize economic potential over the projected life of the building, without prestige amenities.

1 a 4 In the absence of a specific edition of a standard being referred to for the BC Building Code, Vancouver Building Bylaw or the Technical Standards, the current edition including all addenda at the time of the building permit application shall apply.


1 a 6 The design and construction of office space in City of Vancouver shall comply to VBBL Part 10 (Energy standards and conditions) for First Time TI projects not previously occupied. Energy Statement on drawings as required in VBBL Part 10 submission shall also be included in RPD’s drawing review process.

1 a 7 The design and construction of office space in City of Vancouver shall comply to VBBL Part 11 (Energy standards and conditions) for TI projects previously occupied.

1 a 8 The design and construction of office space (including Plumbing Facilities) for Accessibility as required in British Columbia Building Code Section 3.8 shall also be included in RPD’s drawing review process.

1 a 9 The completion of all commissioning Letters of Conformance, Section 12 Commissioning apply to all work undertaken and completed.

1 a 10 The IPT (Integrated Project Team) will determine the applicability of these Technical Standards as per the defined roles and responsibilities used for all RPD projects.

1 a 11 For accessibility requirements refer to section 2n.

1 a 12 For Universal Multi-Stall Washrooms (gender, neutral / inclusive) washrooms refer to section 2o.

1 a 13 It is expected the various disciplines consultants to coordinate and be familiar with the entire Technical Standards document so that an adequate interdisciplinary coordination occurs.

DEFINITIONS

Performance requirements: This section specifies construction requirements per performance criteria. Each of these sections are identified by colour blue throughout the technical standards.

Prescriptive requirements: This section specifies construction requirements per materials and construction methods. Each of these sections are identified by colour green throughout the technical standards.

1 b Design Requirements

1 b 1 Performance Requirements

a. The following Technical Standards summarize basic technical requirements of the tenant improvements in the building. Obtain approval from RPD for any proposed deviations from the Technical Standards prior to implementation.

b. Gap analysis: Building System Review should be completed as part of the consultant’s scope of work during schematic design.
1 b 2 Prescriptive Requirements

a. On projects where LEED V4 ID+C certification is required, “Short-listed” Proponents shall include their initial LEED V4 Checklist, indicating the strategies they intend to utilize to capture the various LEED V4 credits. This LEED V4 checklist will be updated and revised over the term of the project, and the initial checklist will serve as the starting point for future revision, requiring that alternate credits be attained by the proponent to replace any credits found to be unattainable during the project.

b. Integrated Design Process (IDP)

.1 An Integrated Design Process shall be utilized for the project.

.2 The successful proponent shall invite the project stakeholders to participate in the initial visioning design workshop. The list of invitees shall be co-ordinated with RPD.

1 c Project Documents

1 c 1 Prescriptive Requirements

a. The following individual items in Paper copy and Digital files must be submitted to RPD:

.1 Conceptual/Schematic Design and Design Development. (including ID+C: Commercial Interiors Project Check List for LEED V4 projects)

.2 Final Design and Construction Drawings

.3 Project Specifications

.4 LEED V4 Documentation

.5 Final Record of Construction Drawings

.6 Operation & Maintenance Manuals

.7 Construction Progress Photographs

.8 Commissioning Records

For Glossary and Definitions refer to:

http://www.accommodationandrealestate.gov.bc.ca/Doing_Business_With_Us/Technical_Manuals

----- End General Requirements Section -----
2 INTERIOR ARCHITECTURE

2 a Non-Permanent Interior Walls

2 a 1 Performance requirements

a. The most cost-effective method of providing the partitions shall be used. Partitions may be either wood or steel studs finished with painted drywall or a non-progressive demountable partition system, depending on the required acoustical separation - refer to Acoustic Separation sub-section.

b. In seismic zones, as required by the local authority, an engineer shall analyze the partition structure and layout, providing bracing only as required. If partitions of adjoining enclosed rooms can act together in resisting seismic forces, bracing may not be necessary.

c. Select materials and products that are compliant with LEED v4 criteria.

2 a 2 Prescriptive requirements

a. Floor, permanent wall and ceiling finishes shall be completed before non-permanent partitions are erected so that no gaps in finishes are left upon removal of partitions.

b. Fasteners used for fixing partitions to floors, walls and ceilings shall be of types which will cause minimum damage to finished surfaces on removal of partitions. Fix base track to floor with carpet hook fasteners, and fix ceiling tracks without screw holes, e.g. use T-Bar clips.

c. The base shall be coved rubber or vinyl 100 mm (4”) high.

d. Interior partitions layout, including low height partitions between workspaces, shall comply with current codes in terms of exiting.

e. Office and meeting rooms walls, if adjoining a waiting room or washroom, shall extend above the ceiling to the underside of the slab or roof above.

f. Modular glass wall systems are permitted provided they don’t impact negatively the acoustic performance of the spaces.

g. Washroom walls shall extend to the underside of slab above.

h. Reinforce walls and / or provide backing behind wallboard as required to support and fasten surface mounted fixtures/fittings such as shelving units or equipment. Specify which rooms, in addition to file rooms, require this support and for which equipment.

i. Secure filing rooms are to be a minimum of 1 hr. fire rated steel stud with painted gypsum wall board. Walls shall extend above the ceiling to the underside of the slab above for security purpose.

j. Acoustic performance of interior walls and partitions must be established in accordance with subsection 2g “Acoustic Separation”.

k. Demising walls must be constructed between any government and non-government space, from floor to underside of floor or roof deck above, even if not required by BC Building Code. For projects with high acoustics requirements, slab to slab walls must be installed between tenant spaces, even if adjacent office spaces are BC Government spaces.

l. Ensure that electrical boxes are not back-to-back in key party walls. Keep at least one insulated stud space separation.

2 b Doors, Frames, Hardware and Interior Glazing

2 b 1 Performance requirements

a. Commercial Steel Doors & Frames and Wood Doors shall be:

   .1 Resistant to expected use and abuse

   .2 Easily maintainable and repairable
.3 Fabricated complete with cut outs and reinforcing and drilled and tapped to receive the appropriate finish hardware required

.4 Surfaces prepared to receive finishes as required

b. Reference Standards for Doors:


c. New exterior doors, if required by specific project, will be identified in Section “Project Specific Requirements”

2 b 2 Prescriptive requirements

a. Doors must comply with fire resistance requirements when used in a rated wall assembly.

b. All doors shall be painted solid core wood, paint grade high density hardboard face. Door size shall be 914 mm wide by 2134 mm high by 44 mm thick (3’0” x 7’0” x 1 3/4”) minimum for wheelchair access. Frames shall be compatible with door and adjacent partition / wall assembly, in terms of anchorage, fire protection, weight of door. Door thickness must be confirmed before hardware is ordered.

c. Sectional steel frames shall be factory painted. When doors and frames are site painted, acrylic latex gloss enamel (minimum 2 coats) shall be used. All paint applied on site shall be compliant with LEED criteria.

d. All latch and locksets shall be standard/medium duty commercial ANSI A156.2 (latest edition), Series 4000 Grade 2 certified quality such as Schlage AL, Sargent 7 Line, Corbin Russwin CL3900 and Falcon B Series. Locksets are only provided for identified needs. All latch and locksets shall have full return lever handles. In spaces where existing doors are maintained, height of door handles for new doors to match existing.

c. Interior glazing (where provided), shall have a minimum sill height of 305 mm (1’0”) above floor and a head height to match that of adjacent door. If safety glass is required by local authority for interior glazing, sill height may be less than 305 mm. Width of glazing, to a maximum of 1829 mm (6’0”), shall be project specific.

f. Window coverings for exterior windows and interior glazing shall be commercial 25 mm (1”) horizontal aluminum blinds, adjustable for raising, lowering and blade tilt, with transparent non-slip tilter wand and steel cord lock. Standard of acceptance: Levolor (Contract) Monaco or Abbey Classics Supreme. To avoid glare on computer screens, do not select highly reflective finishes for exterior window application.

g. Acoustic Isolation: Partitions around enclosed offices shall meet the Noise Isolation Class (NIC) ratings required for the type of space enclosed. Refer to Acoustic Separation sub-section.

h. Windows / glazing in partitions between adjacent offices are not permitted.

2 c Floor Finishes

2 c 1 Performance requirements

a. Schedule of Floor Finishes:

<table>
<thead>
<tr>
<th>SPACE</th>
<th>FINISH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Open office areas</td>
<td>Glue-down carpet/carpet tile</td>
</tr>
<tr>
<td>Private offices</td>
<td>Glue-down carpet/carpet tile</td>
</tr>
</tbody>
</table>
Conference, Interview rooms, Libraries and similar areas | Glue-down carpet/carpet tile
---|---
Circulation and Reception, Office Copiers | Glue-down carpet/carpet tile
Mailrooms, Copy Centres | Glue-down carpet/carpet tile/sheet vinyl
Break Areas | Sheet vinyl
Service Rooms (e.g., Mechanical/Electrical) | Sealed concrete
Telecommunication Closet | Sealed concrete or antistatic sheet vinyl
Washrooms (slope minimally to drains) | Sheet vinyl or Methyl Methacrylate (MMA)
First Aid Rooms | Sheet vinyl
Storage Rooms/Spaces | Sealed concrete to match adjoining area
Main Entrances, Foyers, and similar public areas | Sheet vinyl/stained and polished concrete
Janitor Rooms | Sheet vinyl/sealed concrete

b. Materials and Installations

1. Carpets: Carpet shall meet the following minimum specifications:

| BROADLOOM CARPET CONSTRUCTION SPECIFICATIONS |
|---|---|
| Fibre | 100% bulked continuous filament (BCF) nylon 6 or nylon 6,6 with built-in antistatic fibre |
| Style | Level loop |
| Pattern | Directional |
| Pile Weight | Minimum 949 g/m² (28 oz./yd²) |
| Dyeing | Manufacturer’s recommended method |
| Appearance Retention | Carpet and Rug Institute CRI TM101, minimum 4 ARR |
| Static Level | Not to exceed 3.5 kV - AATCC-134 |
| Warranties | Ten-year maximum 10% wear (by weight) |
| | Lifetime antistatic |
| | Ten-year light fastness |
| | Ten-year no edge ravel and no zippering |
| | Ten-year no delamination – chair pads not required |
| Product Availability | Product available for no less than 10 years regarding pattern and colour |
| Indoor Air Quality | Carpet and Rug Institute CRI Green Label Plus™ Indoor Air Quality Carpet Testing Program requirements (Maximum 0.5 mg / m² / hr TVOC) after installation |
| Carpet Flammability | ≥ 0.45 watts/cm², Class 1 (ASTM E648) |
| Smoke Density | ≤ 450 Flaming Mode (ASTM E662) |

<p>| CARPET TILE CONSTRUCTION SPECIFICATIONS |
|---|---|
| Fibre | Nylon 6 or Nylon 6,6; Modification ratio of 2.5 or less |
| Style | Level loop, textured loop, or cut &amp; loop acceptable |
| Pattern | Non-directional patterns preferred |
| Tile Size | Minimum 45 x 45 mm (18” x 18”), maximum 1000 x 1000 mm (3’3” x 3’3”) |
| Pile Height | Minimum 2.7 mm (0.105”), maximum 3.8 mm (0.149”) |
| Dyeing | No less than 80% solution dyed |
| Appearance Retention | Minimum rating of 3.5 using CRI TM-101 Reference Scale |
| Antimicrobial | Built in; to AATCC 174 Parts 2 &amp; 3, 90% reduction, 0% growth |</p>
<table>
<thead>
<tr>
<th>Static Level</th>
<th>Not to exceed 3.5 kV - AATCC-134</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Warranties</strong></td>
<td></td>
</tr>
<tr>
<td>Ten-year dimensional stability (Aachen Method DIN 54318) ≤0.1% change or ISO 2551 ≤0.2% change</td>
<td></td>
</tr>
<tr>
<td>Ten-year maximum 10% wear (by weight)</td>
<td></td>
</tr>
<tr>
<td>Lifetime antistatic</td>
<td></td>
</tr>
<tr>
<td>Ten-year light fastness</td>
<td></td>
</tr>
<tr>
<td>Ten-year no edge ravel and no zippering</td>
<td></td>
</tr>
<tr>
<td>Ten-year no delamination – <em>chair pads not required</em></td>
<td></td>
</tr>
<tr>
<td><strong>Product Availability</strong></td>
<td>Product available for no less than 10 years in regards to pattern and colour</td>
</tr>
<tr>
<td><strong>Indoor Air Quality</strong></td>
<td>Carpet and Rug Institute CRI Green Label Plus™ Indoor Air Quality Carpet Testing Program requirements (Maximum 0.5 mg / m² hr TVOC)</td>
</tr>
<tr>
<td><strong>Carpet Flammability</strong></td>
<td>≥ 0.45 watts/cm², Class 1 (ASTM E648)</td>
</tr>
<tr>
<td><strong>Smoke Density</strong></td>
<td>≤ 450 Flaming Mode (ASTM E662)</td>
</tr>
</tbody>
</table>

.2 Sheet Vinyl

.2.a To conform to CSA 126.3 (latest edition) Type II Grade 1 minimum gauge 2.0 mm (.079”).

.3 Carpet and Resilient Floor Installation

.3.a Carpet and resilient flooring installations shall be in accordance with the recommendations contained in the BC Floor Covering Association, info@bcfca.com.

.4 Concrete Floor Finishes

.4.a Steel trowel finish: to CSA CAN3-A23.1 with final finish to suit covering or treatment.

.4.b Sealed/hardened concrete: in accordance with manufacturer’s instructions.

.5 Stained and Polished Concrete

.5.a Produce a representative test section to RPD for acceptance prior to application.

.5.b Use no-VOC non-corrosive low pH organic salts concrete etching solution, neutralizing rinse, low VOC water based acrylic semi-transparent stain, overlaid for aesthetic effect, sealed with two coats of water-based urethane and wax top coat, all applied as per manufacturer’s instructions (especially regarding concrete curing and moisture content).

.6 Adhesives

.6.a Flooring shall be laid with adhesives that are acrylic based, low TVOC, 0 TVOC (calculated).

.6.b All carpet and resilient flooring shall be laid with an adhesive approved by the carpet and/or resilient flooring manufacturer for the substrate to which it is to be applied.

2 d  Wall Finishes

2 d 1 Performance requirements

a. Wall Finishes

.1 The most cost-effective method of finishing wall surfaces shall be used. All gypsum board surfaces are to be painted. The joint compound for gypsum board should be as per CSA A82.31 current edition asbestos free. Concrete and concrete block surfaces are to be filled as necessary and painted. Washrooms are to be painted and/or tiled as per specific project.

b. Materials and Installations

.1 Painting
.a Painting shall be in accordance with the recommendations of the Master Painters & Decorators Association of British Columbia Architectural Painting Specification Manual, current edition. Base coat shall be sealer/primer, top two coats shall be project specific finish.

.b Paint to walls shall be acrylic latex with low sheen, eggshell or semi-gloss finish. Flat latex is not an acceptable finish. Use waterproof products such as alkyd flat or semi-gloss enamel in janitor rooms, kitchens, and other high condensation and wet areas.

.c All materials must be LEED v4 compliant.

.d Where required, paints and coatings must meet the flame spread requirements of local authorities having jurisdiction.

2 Wall Tiling

.a Tiling shall be in accordance with the Tile Installation Manual, and Ceramic Tile and Maintenance Guide produced by Terrazzo Tile and Marble Association of Canada (TTMAC).

.b Ceramic tile adhesive VOC limit: 65 g/L.

.c Grout colour shall be complementary to the tiles and easy to be maintained. Do not use white grout.

3 Plastering


.b Plaster finish shall be smooth. However, wood float finish is acceptable for cement plaster if used in basement utility and storage rooms.

4 Gypsum Board Substitutes

.a To prevent decay, use cement-fibreglass backer board instead of gypsum board over studs in wet areas. Install backer board in accordance with the manufacturer's written instructions to full height of tiling or another wall finish. Protect substrate with a 0.15 mm (6 mil) thick sheet of polyethylene installed behind the backer board and extending the full area of the backer board without joints.

2 e Ceilings

2 e 1 Performance requirements

a. Ceiling Finishes

.1 All ceilings shall be lay-in panels except for washrooms, which shall be painted drywall. Mechanical, electrical and similar service rooms shall be exposed structure where permitted by code.

.2 Ceiling systems must comprise a major component of the acoustic or sound attenuation function as required in the spaces in which they are installed.

.3 Ceiling systems must form a component of fire resistance rated separations for areas requiring such separation.

.4 Fire and smoke separation and fire resistance ratings must conform to the requirements of the BC Building Code or Vancouver Building Bylaw.

.5 Where suspended ceilings are permitted, seismic resistance capabilities must conform to the requirements of the BC Building Code or Vancouver Building Bylaw.
2 e 2 Prescriptive requirements

a. Materials and Installation

.1 Ceilings shall be a commercial quality suspended acoustic lay-in panel T-bar system. Ceiling tiles are to be square edge 16 mm (5/8”) thick mineral fibre, non-directional fissured panels with a minimum NRC (Noise Reduction Coefficient) of .55 and minimum CAC 35 (Ceiling Attenuation Class) except as noted in sub-section Acoustic Separation. A flat ceiling grid of 610 x 1219 mm (2’0” x 4’0”) shall be used. Grid members shall be manufacturer’s standard suspension system with fully exposed, white finish T-bars.

.2 Ceiling heights in office areas shall be consistent throughout and not less than 2591 mm (8’ 6”).

.3 No light fixtures straddling partitions.

.4 Clip T-bar to top of partition on two parallel continuous strips of 6 mm X 12 mm (1/4” X 1/2”) neoprene tape.

b. Acoustic Isolation

.1 The CAC ratings of the ceilings around the perimeters of enclosed offices (where the walls do not extend from slab to slab) shall meet the NIC ratings required for the type of space enclosed. Minimum NRC 0.7.

2 f Millwork

2 f 1 Performance requirements

a. Wherever possible use standard size pre-manufactured and prefinished base cabinets and wall cabinets. Freestanding units are preferred. In any case fixing, shall be minimal. The standard size shall not be allowed to take precedence over any special size necessary to the client.

b. Millwork and casework materials and installations shall be in accordance with the requirements contained in the most recent Architectural Woodwork Manufacturers Association of Canada (AWMAC) Manual, distributed by AWMAC-BC. The AWMAC Manual shall be applied as follows:

.1 For occupancy less than 10 years “Custom” Grade shall be used. Melamine laminated particle board is acceptable as an alternative to plywood for doors and panels, in which case, use only hardware designed for particle board.

.2 For occupancy over 10 years “Custom” Grade shall be used. Laminated particle board, laminated with plastic laminate on the outer faces and Melamine on inner faces is acceptable as an alternative to plywood for doors and panels, in which case, use only hardware designed for particle board. AWMAC 2-year guarantee shall be obtained.

.3 “Premium” Grade shall be used in specific areas only, for example: Deputy Minister’s office.

c. Finishing Hardware: Finishing hardware shall be to CGSB 69-GP-8M.

d. Drawer Slides: Commercial grade drawer slides, suitable for the use and load requirements, shall be installed on all drawers.

e. Glass and Glazing: Glass shall be to CGSB CAN2-12.3-M76.

f. Painting: Painting shall be in accordance with the recommendations of the current edition of the MPI Architectural Painting Specification Manual.

g. Include the following clause in Prestigious projects where Architectural Woodwork is appropriate. The determination of what is a Prestigious project shall be made in consultation with the Client and RPD.
.1 Architectural woodwork such as ornamental door and window surrounds, wall paneling, columns, beam casing and the like shall only be used on major projects, for prestigious areas, as instructed by RPD.

.2 The quality of workmanship and materials for this work shall be 'premium' grade, as defined by AWMA-BC.

h. For specific requirements regarding accessibility for the disabled refer to section 2n.

2 g Acoustic Separation

2 g 1 Definitions

a. The NRC (Noise Reduction Coefficient) is a single number rating indicating the sound absorbing properties of a material. A 0.1 rating indicates very low sound absorption while 0.95 indicates very high sound absorption.

b. The STC (Sound Transmission Class) is a single number rating obtained within a laboratory setting. It allows a standardized comparison of the ability of a material to prevent sound passing through it. The higher the number, the better the barrier properties. This rating refers specifically to wall and floor/ceiling constructions as well as doors and windows. The “composite STC” can be calculated as a product of multiple materials that form the partition between two spaces.

c. The CAC (Ceiling Attenuation Class) is a single number rating of the sound transmission through suspended acoustical ceiling via the plenum path above ceiling high partitions. The higher the number, the better the ceiling is as a noise barrier.

d. The NIC (Noise Isolation Class) is a single number rating of the noise reduction between rooms. It considers the acoustical effect of the two rooms, the contribution of all flanking paths and embedded elements such as doors and windows, unlike the STC which refers to a specific element in the room (e.g. the partition, etc.). NIC is a numerical expression of the sound isolation achieved between two spaces and is influenced by the room geometry and finishes as well as by the Sound Transmission Class (STC) ratings of the assemblies separating spaces.

e. The RT (Reverberation Time) is the rate at which sound energy decays by 60 dB. It depends on the volume of the space and level of absorptive material. The higher RT is correlated with lower level of absorptive material or more reflections.

f. Impact Insulation Class (IIC) is an acoustical rating used to quantify impact sound absorption.

2 g 2 Performance requirements

a. Absolute acoustic separation is rarely required. Special attention is to be given in the following locations:

.1 Deputy Ministers’ (or similar) offices

.2 Arbitration/Union or other negotiation facilities

.3 Offices where matters of strict confidentiality must be discussed

.4 Separations between adjacent quiet areas (e.g. office to office or office to conference/meeting room)

.5 Areas with a high level of background noise that may affect the acoustical separation requirements (e.g. HVAC system - refer to “Noise and Vibration – HVAC” section).

.6 Determine NIC required from the following table
NIC required between different occupancies

A. 45
B. 45 40
C. 45 40 40
D. 45 40 35
E. 45 35 30 n/a
F. 45 40 35 35 30 n/a
G. 45 35 30 30 30 30 30 30 30 n/a
H. 45 45 45 45 30 45 n/a

A. B. C. D. E. F. G. H.

Space Types:

a) Areas requiring very high level of confidentiality (e.g. 2g2a.1 to 2g2a.3 noted above).
b) Libraries, meeting rooms and other enclosed areas (including enclosed offices) requiring normal confidentiality.
c) Enclosed areas requiring lower level of confidentiality (e.g. people in adjacent enclosed area would be able to hear conversation indistinctly).
d) Open office areas.
e) Public areas (busy or noisy).
f) Utility/maintenance areas (noisy).
g) Storage areas, Janitor Facility and other quiet areas.
h) Mechanical equipment rooms.

On the vertical and horizontal axes of the matrix above, select letters corresponding to the space types of two adjacent spaces being considered. The intersection on the table indicates NIC acoustic separation required between the two spaces.

Spaces with enhanced acoustic requirements (where specifically required by client for increased sound attenuation requirements): During design stage, location of these spaces or rooms must be carefully chosen within the building/leased space, so that construction work associated with its execution can be cost effective.

The following design and construction approaches could help to achieve desired results:

1. Constructing bulkheads above the partial-height corridor partitions to control sound flanking via the ceiling plenum.
2. Using high STC glazing in the corridor partitions and doors (e.g., double glazing, laminated glass).
3. Providing the corridor doors with effective perimeter gaskets, mechanical door bottoms, and door thresholds.

Note that a 3 STC point difference is usually not discernable to the listener, a 5 STC point difference is easily noticeable and usually considered significant, and a 10 STC point difference means that noise transmitting through the door will sound twice as loud or half as loud, depending whether it is a 10 STC point increase or decrease.

2 g 3  Prescriptive Requirements

a. Determine acoustic requirements, including NIC, in conformance to realistic needs of the user at the design stage.
b. Post construction acoustics testing by an acoustics professional is mandatory. Post construction acoustic testing must confirm that the project goals of acoustic separation have been achieved. Non-performing elements must be identified and rectified before client/tenant moves in.

c. “Mock-up” testing within select offices must be conducted during construction, to ascertain that project goals of acoustic separation can be achieved.

d. Cables or conduits that penetrate through the seals are not permitted.

e. Install an acoustical door bottom and threshold on the corridor doors.

f. NIC shall be no less than NIC 35 between any occupied enclosed space and any adjoining space.

g. Fire resistance rating requirements for closers (doors) take precedence over acoustic requirements.

h. For NIC 40, demountable partition that extends to underside of suspended ceiling must be upgraded to include mineral batt insulation above suspended ceiling. A vertical barrier could be introduced above the partitions either in the form of a continuous gypsum wallboard (GWB) panel, or a continuous sheet of 100 mm thick foil-faced semi-rigid insulation. Of these two options, the GWB panel would be a superior acoustical barrier.

i. For walls between meeting rooms or enclosed offices and washrooms, mechanical rooms or coffee nooks, extend wall frame to the underside of the slab/roof above. Board one side of the frame above the T-bar ceiling level.

j. Acoustically rated doors, hinged, swinging, with door stops at the jamb and head with manufacturer recommended hardware can achieve STC33 – 42.

k. Doors must apply pressure evenly along the seals.

l. Sliding doors, pivot doors, and frameless glass doors cannot meet STC ratings and should not be used anywhere that there is an STC, sound isolation, or speech privacy requirement.

m. The following details indicate typical constructions that can be used to achieve various NIC separations, and STC and NRC ratings of partitions and ceilings in the areas. The STC and NRC ratings can also be used as a checklist for assessing proposed designs once the NIC level has been established.

2 g 4 NIC Details

a. NIC 30

1. walls - STC 33 minimum. Typical wall construction detail as per BC Building Code.

2. ceilings - continuous suspended T-bar ceiling, CAC 35 minimum, ceiling NRC 0.7 minimum.

3. floors - STC 52 minimum, (example: 150 mm (6") concrete or BC Building Code floor construction F1a - 90 mm reinforced concrete with 20 mm minimum cover over reinforcing steel). Alternative floor constructions (such as wood frame) meeting the required minimum STC rating must be verified by an acoustical expert/specialist.

4. doors - solid core wood, no grilles or openings. Note that doors without perimeter seals limit NIC performance to NIC 20.

5. windows - non-opening, 6 mm (1/4") laminated minimum, perimeter gasket (neoprene tape or silicone sealant).

6. ventilation - no special precautions except as required in “Noise and Vibration – HVAC” section.

7. mullion/convector details - minimize openings

b. NIC 35

1. walls - STC 40 minimum. Typical wall construction detail as per BC Building Code. Seal top and bottom of partition with 6 mm thick neoprene tape. Back to back power and
telecommunication outlets are not acceptable inside the same stud cavity. Separate service penetrations by at least one stud centre width. Avoid sound leakage via the perimeter seals of the demountable walls.

.2 ceilings - continuous suspended T-bar ceiling. Extend wall frame to the underside of the slab above. Board one side of the frame above the T-bar ceiling level. Use CAC 35+ ceiling tile. No light fixtures straddling partitions. Clip T-bar to top of partition on 6 mm x 12 mm (¼” x ½”) neoprene tape.

.3 floors - STC 48 minimum. [example: 150 mm (6”) concrete or BC Building Code floor construction F1a - 90 mm reinforced concrete with 20 mm minimum cover over reinforcing steel]. Alternative floor constructions (such as wood frame) meeting the required minimum STC rating must be verified by an acoustical expert/specialist.

.4 doors - solid core wood or insulated metal. Acoustically rated door is required, complete with perimeter seals and threshold. No grilles or openings. Note that solid core wood doors would achieve a maximum STC of 30 only when properly fitted with perimeter seals. Without seals, they will limit assembly performance to NIC 20. NIC 35 could be achieved when the wall where the door is located has a large area (try to minimize glazing) and a better construction than what would be required for NIC 35. Doors must be also sealed along their bottoms, not just top and side.

.5 windows - non-opening, in corridor partitions, 10 mm (3/8”) laminated minimum, perimeter gasket (neoprene tape or silicone sealant) to top of door. Windows / glazing in partitions between adjacent offices are not permitted.

.6 ventilation - if return air openings are into common plenum, fit with an acoustically lined elbow designed to prevent line-of-sight condition through the elbow.

.7 mullion details - partitions abutting exterior glazing are to line up with or return to mullions. Fill gap between inner face of the wall and face of mullion (if they are not flush) with gypsum board and gasket between mullion and edge of partition with two parallel continuous strips of neoprene tape.

.8 piping - caulk piping at partitions with high temperature caulking

.9 acoustic measurements at project completion are intended to verify compliance with the contract requirements. Include this clause only if NIC 35 is required per Table 2g2 and as agreed with stakeholders.

c. NIC 45

.1 Walls (including demising walls) - STC 52 minimum. Partitions installed from floor slab to underside of slab above. Typical wall construction detail as per BC Building Code. Heavier than 25-gauge steel or wood studs not acceptable. Do not use demountable partitions. Gasket top of partition with neoprene tape or seal with acoustical sealant. Remove carpet under partitions and gasket with neoprene tape or seal with acoustical sealant. Back to back power and telecommunication outlets are not acceptable inside the same stud cavity. Separate service penetrations by at least one stud centre widths. All perimeter joints between walls to floor, wall to wall, wall to underside of structure must be acoustically sealed.

.2 ceilings - suspended T-bar ceiling, ceiling NRC 0.55 minimum.

.3 floors - STC 52 minimum, 152 mm (6”) concrete. Alternative floor constructions (such as wood frame) meeting the required minimum STC rating must be verified by an acoustical expert/specialist. Levelling of the floor surface may be necessary to provide a flat, even surface without flooring challenging installation.

.4 doors - STC 45 rated door and frame assembly supplied by one manufacturer, complete with hardware and all necessary seals and rated as an assembly. Consider double doors / vestibule for highly sensitive areas. It is important that the doors be cut properly to ensure that the
bottom of the door face compresses the threshold rubber gasket when the door is closed. Acoustical door assemblies come as a complete assembly from the door manufacturer and include door frame, door, hardware, and acoustical seals. The bottom seals on these doors must seal against a threshold saddle, not against carpet or any other floor finish. These acoustical doors are much heavier than a standard door. Wood and metal finished acoustical door assemblies are provided by several manufacturers. The doors must not include glazing, unless necessary. If glazing must be included, its size must be minimized, and the glazing must be 6 mm laminated glass. Vents or louvres must not be located in doors.

5 windows - non-opening, in corridor partitions: laminated acoustic glass STC 40 [6 mm (¼”) plate, 0.76 mm (0.030”) polyvinyl butyryl interlayer, 6 mm (¼”) plate], perimeter gasket (neoprene or silicone sealant) OR one 6 mm (¼”) lite separated from one 4.7 mm (3/16”) lite by 63 mm (2 ½”) airspace, install glass in neoprene gasket. If the NIC 45 rating must be achieved between the room and corridor, then specify minimum construction as 6L-25-6L. Windows / glazing in partitions between adjacent offices are not permitted.

6 ventilation - return and supply air shall be through a “Z” or “U” shaped acoustically lined transfer duct or silencer with appropriate insertion loss. Install transfer duct through least critical wall, not in party walls.

7 mullion details - partitions abutting exterior glazing are to line up with or return to mullions. Fill gap between inner face of the wall and face of mullion (if they are not flush) with gypsum board and gasket between mullion and edge of partition with two parallel continuous strips of neoprene tape.

8 piping - caulk piping at partitions with high temperature caulking.

9 Impact Insulation Class (IIC) must be considered so that impact noise such as footfall noise can be absorbed, keeping the noise and vibration from transferring to the ceiling below.

10 Acoustic measurements at project completion are intended to verify compliance with the contract requirements. Include this clause only if NIC 45 is required per Table 2g2.

11 During design stage, location of NIC 45 rooms must be carefully chosen within the building / leased space, so that construction work associated with its construction can be cost effective.

d. Solid core wood or insulated 18-gauge (maximum) metal doors 44 mm thick must have adjustable acoustic seals at the head and jambs and an automatic door bottom which seals against a saddle that is leveled and caulked or grouted in place. Note that acoustically rated doors must have a threshold saddle to seal against; simply having a smooth, hard threshold will not suffice.

2 h  Janitor Facilities

2 h 1 Performance requirements

a. Locate janitorial facilities in lockable, separate room as close as practical to entrances, elevators and washrooms, in spaces with a clear height of 2438 mm (8’0”).

2 h 2 Prescriptive requirements

a. Janitorial facilities shall be dedicated spaces. Do not locate any of the following in the same space: hot water tanks, telephone, electrical and security system equipment and controls, roof access, non-janitorial storage, recycling.

b. Janitor facilities located in a basement must have elevator access to upper floors.

c. Detailed Requirements - Facilities with rentable area under 4645 m² (50,000 sf):

.1 One floor sink size 610 x 610 x 152 mm (2’0” x 2’0” x 6”); if ceramic, provide stainless steel protection to lip. Waterproof backsplash to 1219 mm (4’0”) above floor behind floor style utility sink.
.2 Wall mounted hangers, for mops and brooms (double units: project specific). Standard of acceptance: Geerpres/Gripit #5047 or Rubbermaid 1993 (34") closet organizer. Install wet mop hangers 1524 mm (5'0") above floor over floor sink so that mops will drip into sink.

.3 Four adjustable wood shelves 406 mm (1’4") deep, full depth of room securely mounted to side wall to support a full load of janitorial supplies.

.4 Where the requirement is identified (e.g. where significant floor areas have flooring other than carpet), provide cleaning equipment battery charging room close to the main janitor facility. Provide a power receptacle for recharging station.

d. Detailed Requirements - Facilities with rentable area over 4645 m² (50,000 sf) - refer to Section Project Specific Requirements.

2 Washroom Accessories

2.1 Performance requirements

a. Accessories to be supplied and installed by the Landlord in leased buildings or included in the construction of Provincially owned buildings.

.1 Mirrors - 6 mm (¼") polished plate, triple silvered, fixed with hidden or low-profile hardware - from top of backsplash to door head height, minimum 914 mm (3’0") wide over each basin or in one continuous width where possible, and/or tilted for persons in wheelchairs as per BC Building Code requirements.

.2 Disposal bins - free-standing plastic containers (do not install recessed units) - Rubbermaid, White Mop or Continental, colour and model as directed by the Facility Manager.

.3 Dual napkin/tampon dispenser - to be provided in women’s public washrooms only - $0.50 coin operated, metal mechanism, white enamel finish (not stainless steel). Standard of acceptance: Rochester Midland J6-RC. Provide 2 copies of keys.

.4 Sanitary napkin disposal bins - welded 22-gauge steel, sloped top, stainless steel piano hinge, hinged bottom secured with friction catch, white enamel finish.

b. Accessories supplied by Service Provider and installed by the Landlord in leased buildings or installed in the construction of provincially-owned buildings - ensure that adequate space is provided. Coordinate installation with the Facility Manager.

.1 Toilet paper dispensers - locking large double roll type [approximate dimensions: 533 mm w x 318 mm h x 127 mm d (21” x 12 ½” x 5")].

.2 Towel dispensers - surface mounted (do not install recessed units), at all sink and basin units [approximate dimensions 483 mm w x 273 mm h x 229 mm d (19” x 10 ½” x 9")].

.3 Soap dispensers - surface mounted - do not install recessed units [approximate dimensions 133 mm w x 235 mm h x 127 mm d (5 ¼” x 9 ¼” x 5’)].

2 First Aid Room Fit-up

2.1 Prescriptive requirements

a. Fully equip a First Aid Room or Dressing Station as required by the current WorkSafeBC Occupational Health and Safety Regulation.

2. Interior Signage

2.1 Prescriptive requirements

a. All lettering is to be white Helvetica Medium, upper and lower case.

b. Except where matching existing building signage scheme, room identification signs, directional signs at elevator/stair landings / in corridors, on-floor identification signs at the main access point to the office shall be plastic removable insert style, with:
Room identification signs are to be approximately 57 mm x 178 mm (2 ¼" x 7") with a corner radius of between 12.7 - 15.9 mm (½" - 5/8"), and fastened by double-sided tape (or Velcro®, if on fabric office screen).

d. Directional signs are to be a size enough for legibility at the required distances, with corner radius of approximately 19 mm (¾"), two hanger tabs projecting approximately 12.7 mm (½") at the top of the ABS back and suspended from T-bar ceiling with commercial grade wire hangers and hooks.

c. Main entrance directories are to be like directional signs, but without hanger tabs, and wall mounted where appropriate or to match existing directory as required.

f. Washroom doors and doors to stairs shall be provided with internationally recognized symbols, / pictograms engraved in 3-ply plastic laminate material, with bevelled edges to expose the white core.

g. Provide only a room number to Telecommunication closets – no signage identifying the room as such.

h. Required signage such as “warning signs” must conform to the BC Building Code and all other relevant codes and regulations. International symbols must be used where and as applicable.

21 Commissioning

21.1 Prescriptive requirements

a. Refer to Section Commissioning.

2m Wood First Act

2m.1 Provides the basis on which the Province can recommend best practices and report on the use of wood in provincially-funded buildings.

2n Accessibility

2n.1 Section 8.1 of the BC Human Rights Code protects an individual’s access to accommodation, service or facility.

2n.2 On behalf of the Province, the Real Property Division (RPD) manages owned and leased properties which support customer program delivery. Accessibility is an important component of these buildings to ensure citizens’ access to services, facilitate interactions with citizens and to accommodate a diverse work environment. RPD is committed to providing accessibility, wherever possible, through the removal of physical barriers that restrict or inhibit access by any citizen or employee. Meaningful access enables all people to participate equally in social and economic life. Accessibility to all government owned and leased office spaces (where possible given heritage constraints) is a priority for the BC Public Service, and a high priority for RPD. Real Property Division expects that access to their facilities continually improve as tenant improvement projects are undertaken.
2 n 3 The BC Public Service acts to meet this legal obligation through several mandates:
   a. The Public Service Act
   b. The ‘Where Ideas Work’ Corporate HR plan (2016)
   c. The Diversity and Inclusion Action Plan (2017)

2 n 4 Performance requirements
   a. Universal single-user washrooms (accessible washrooms)
      .1 Single-use washrooms contain a single toilet and sink in a lockable room and are designated with appropriate signage. They are the most prevalent type of universal washrooms, and they are frequently built to meet accessibility requirements. They can be accessed by people requiring a larger and/or private washroom space, those requiring a gender-neutral washroom, people with chronic illness, or individuals with mobility impairments who use wheelchairs or scooters.

2 n 5 Prescriptive requirements
   a. Regarding BC Building Code 2018, Section 3.8, buildings or parts thereof and facilities that are required to be accessible shall be designed in accordance with either:
      .1 Subsection 3.8.3.1 of BC Building Code 2018,
      OR
      .2 the provisions of CSA B651, "Accessible Design for the Built Environment". Note that CSA B621 requires larger clear spaces for each accessible washroom
   b. Designers must choose at the schematic design phase to follow either design criteria contained in the BC Building Code, or to follow the design criteria in the CSA B651 Standard.
   c. Accessibility pertains to people who have a loss, or a reduction, of functional ability and activity. It includes persons with mobility and sensory disabilities, e.g. includes visual and hearing impairments. These types of impairments must be addressed in every project. As an example, to address accessibility for people with visual impairments, contrasting colours for flooring, between flooring and baseboard, etc., must be considered. Also, consideration should be given to paint door frames and doors in contrasting colours. To assist persons with a hearing impairment a visible warning system (strobe lights) shall be installed. The path of travel must be well-illuminated. Refer to Lighting sections in this document.
   d. **General:** The space must be wheelchair accessible. Persons using wheelchairs, scooters or with other mobility impairments must have easy access to the office space, starting from accessible parking spot to the office entrance. Access includes: ramps, curb ramps if level change, elevator, etc.
      .1 Access from the street to at least one main accessible entrance. Auto door opener to be installed at all accessible entrances, with convenient controls for manually-activated automatic doors.
      .2 Accessibility entryway signage shall be provided. Automatic door controls must be clearly visible with clear signage.
      .3 The principal entrance and at least 50% of all pedestrian entrances of a building shall be accessible.
      .4 Access from the parking area to an accessible entrance, where off-street parking is provided for persons with disabilities;
.5 Pathway from street to a main entrance must be a continuous surface (level entry or ramp &
handrail) and slip resistant. No obstacles on path or overhead, fixed items nearby shall be
highly visible and cane detectable.

.6 Access from the main entrance to at least one accessible washroom.

.7 Access to the elevator or lift, where a publicly accessible elevator or lift exits. Provide
signage for elevator / elevating device. Braille and tactile characters must be installed
adjacent to control panel buttons

.8 Doors must contrast visually with adjacent walls. Level threshold must be provided where
required at change in floor finishes. Kick plates must be provided on doors.

.9 Contrasting colour must be used between wall and floor, with no glare.

.10 Doors: accessibility compliant threshold saddle for the door bottom to seal against, where
wheelchairs will move through the doorway, the threshold saddle may be omitted, and the
threshold be finished with a flat, hard surface against which the automatic door bottom can
seal.

c. Washrooms: At least one universal washroom must be provided. If public has access in building
to utilize government services, separate provisions must be made for staff and public regarding
washrooms, i.e. two universal washrooms must be provided, one for the public and one for staff.
Access to building common washrooms is acceptable for staff.

.1 Universal washrooms to be provided with hand washing sink/accessories, a latch-operating
mechanism that allows the door to be locked from the inside and released from the outside in
case of emergency.

.2 Other accessibility features must be provided in the washrooms, such as clear space under
washbasin, graspable/reachable door handles and faucets, grab bars, and other accessories.

.3 Fixtures must be located to be useable and provide maximum maneuverability for persons in
wheelchair, scooters or with other mobility impairments. Wall mounted fixtures, such as
paper towel dispenser, may project into the required floor space if such projections do not
restrict the maneuvering space required for persons in wheelchair, scooters or with other
mobility impairments. Provide coat hook on the door.

.4 Soap dispensers must be placed so that they are within the direct reach of a person in a seated
position directly in front of the accessible lavatory. Soap dispenser shall be surface mounted.

.5 Surface mounted accessories: toilet tissue dispenser with stainless steel utility shelf, paper
towel dispenser, sanitary napkin disposal.

.6 Provide new directional sign to accessible and universal washrooms

f. Breakrooms:

.1 Accessible counter for break room seating; architect would be responsible for the layout of
the kitchen millwork. The electrical consultant will provide a receptacle at each location
designated for a microwave.

.2 Millwork: create a space on the front cabinetry to accommodate a front mounted receptacle to
be used mainly by people with accessibility challenges.

.3 Cabinets corners to be rounded to avoid potential injury.

.4 A valance is required under the upper cupboards to shield any under-cupboard lighting
provided for food preparation. This will help people with accessibility challenges.

.5 Microwave area to be on counter level to provide safe handling of hot food. Provide heat
resistant shelf beside microwave or pull-out shelf under the microwave door.

.6 Base cabinets to have toe space as per accessibility requirements.
Cabinets / drawer hardware should support use with closed fist.

Water supply pipes and P-trap drainage pipes should offset to rear of the Accessible use sink.

Sink: one lever handle or sensor controlled.

Provide clear space in front of sink in breakrooms, for easy access to the sink by a person in wheelchair.

Universal Multi-Stall Washrooms
(also called gender neutral washrooms or inclusive washrooms)

Performance requirements

a. The objective of the Universal Multi-Stall Washrooms is to modernize services to the public sector with transformative workplace changes, including implementation of the gender neutral (inclusive) washrooms program within government buildings. RPD is strategically shifting public assets and services to be more accessible and inclusive. Consideration is given not only to identity factors such as age, education, culture, language, income and physical abilities, but also to gender identity and expression. These evolving best practices apply to all provincially owned buildings to meet the needs of British Columbians now and in the future.

b. There is an increasing shift towards washrooms (single-user and multi-stall) that are more inclusive. Use design to support basic rights for everyone and address the evolving needs of a wider range of users, as well as higher standards of privacy, accessibility, and comfort. Universal Multi-Stall washrooms can be used by people of all abilities and genders.

c. Universal Multi-Stall Washrooms are multi-use, non-gender designated facilities with individual enclosed toilet stalls that can share a common sink area. Accessible / universal cubicles are separate.

d. Universal Multi-Stall Washrooms can be installed either alone or alongside gender designated washrooms. These washrooms do not prioritize certain users over others.

e. The BC Public Service acts to meet its obligation through several mandates:

1. The Public Service Act

2. Canadian Human Right Act, Bill C-16 and the BC Human Rights Code have added “gender identity or expression” as a prohibited ground of discrimination.

3. The Diversity and Inclusion Action Plan (2017): BC Provincial organizations have a “duty to accommodate” and offer staff an inclusive environment, one which promotes equality, values diversity and maintains a working and social environment in which the rights, safety and dignity of all staff is guaranteed.

f. Vancouver Building Bylaw recognizes universal multi-stall washrooms under article 3.7.2.11 (2014) which refers to them as gender neutral washrooms with individual toilet stalls. Their requirements include full height stall doors and walls, locks that indicate vacancy, and entrances with no doors.

Prescriptive requirements

a. It is the responsibility of the design team to identify the functional requirements specific to each project, depending on the existing building condition.

b. In all cases, washroom designs must either conform to all current regulatory requirements to ensure occupancy permits can be issued, or through a process of developing alternate solutions based on the BC Building Code. The alternate solution must be formally accepted by the Authority Having Jurisdiction as a written variance.

1. Conformance to all regulatory requirements including health and safety

2. Provides required capacity based on occupancy type and occupant load
Universal Multi-Stall Washrooms must include provision of an integrated environment (lighting, finishes, fixture selection, acoustics) which holistically responds to the needs of the user, Owner and other stakeholders.

c. Universal Multi-Stall Washrooms shall provide full-height enclosures for toilets, creating individual ‘toilet rooms’ as opposed to stalls separated by partial dividers. They must be clearly marked as universal with appropriate signage.

d. Universal Multi-Stall Washroom includes multi-user/common sink area.

e. Use of swing door or vestibule to provide visual screening to main washroom area.

f. Interior walls:
   1. Use full-height enclosures and doors to create visual/acoustic/olfactory separation. Washroom walls shall extend to the underside of slab above. Use solid walls for maximum privacy.

g. Doors, frames and hardware:
   1. No grilles or openings in the door
   2. Add kick plate at push side of doors, bottom of door and centered. Ensure no visible fasteners.
   3. Doors must be lockable on all stalls.
   4. Vacancy hardware: specify door lock fixtures that clearly indicate whether stalls are occupied to increase user comfort and facilitate staff monitoring. Provide door locks on cubicle partitions with clearly legible ‘vacant’ or ‘occupied’ graphics or text.
   5. Provide automatic door operator c/w pushbutton for wheelchair access for accessible stalls.
   6. Doors must be full height of the enclosure, from floor to ceiling.

h. Floor finishes: Methyl Methacrylate (MMA) Acrylic Resin System. Apply coving for base.

i. Ceilings: painted GWB

j. Provide waste receptacles in each toilet stall to ensure privacy around personal health and hygiene.

k. Provide hooks in each toilet stall.

l. Way finding & Signage Design
   1. Provide new signage, including Braille, on all new doors
   2. Signage must be clear, inclusive, function-based.
   3. Include signage near building entrance and in the lobby to help users identify which types of washrooms and change rooms are available and how to find them.

m. Wall mounted toilets shall be used for easy floor cleaning in the compartment.

n. Provide more than one entry/exit from corridor / public areas with open thresholds (no closed doors) to assist with circulation efficiency and ensure options for entering and leaving.

2 p Change Rooms and showers:
2 p 1 included only in projects with specific requirements.

----- End Interior Architecture Section -----
3 HVAC

3 a HVAC General

3 a 1 Design & Review Process – HVAC

a. Performance requirements:

1. Follow a design and review process that minimizes risks of poor value, non-compliance with standards, delays, re-work, and compromised installations.

2. The HVAC RP (Responsible Professional) shall be responsible for all submissions and responses required in Design and Review Process - HVAC.

3. Nothing in these Technical Standards or in questions asked, responses made, suggestions made, or assistance given by RPD or those acting for RPD shall transfer any responsibilities for the design and construction from the Engineer of Record or the Contractor, to RPD or to any other party.

4. Prior to proceeding beyond each stage, resolve all issues that could affect subsequent work or require rework, do all work needed to confirm and demonstrate in a manner acceptable to RPD that the OPR (Owners Project Requirements) will be met, and sign off the OPR Check Sheets).

b. Prescriptive requirements:

1. Concept Stage Submission

.a HVAC Concept Report that demonstrates ability to meet the Technical Standard requirements & includes:

1. System type(s), descriptions and approximate sizes

2. Basic design parameters including:

.a Design velocities through ducts, coils, AHUs and pipes

.b Minimum supply rates for ventilation and for comfort

.b Schematic sketch and preliminary equipment specification

1. Conceptual sketch schematics of air flow and hydronic systems

2. Conceptual sketch layouts and locations of equipment

3. Conceptual sketches of HVAC thermal zonings

4. Preliminary specification

.c Calculations

1. Preliminary ventilation and load calculations

2. Threshold calculations to determine if special Technical Standards requirements are triggered

2. Design Development Stage Submission

.a HVAC Concept Report reissue including any changes

.b Preliminary equipment selections for major pieces of equipment.

3. 95% Documentation Stage Submission

.a 95% Drawings and Specifications

.b Sequence of Operations:
.1 The 95% documents shall include a sequence of operations for every HVAC system.

c Ventilation Data Tables:

.1 On each floor plan, include Ventilation Data Tables in the format below for tenant fit-up design use.

<table>
<thead>
<tr>
<th>VENTILATION DATA for SYSTEM</th>
<th>System Name</th>
<th>Name</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>System Design Occupant Density$^1$</td>
<td>m$^2$/person</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Minimum OA Fraction in Primary SA$^2$</td>
<td>%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Minimum OA / Primary SA$^3$</td>
<td>%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Minimum OA Intake$^4$</td>
<td>L/s•m$^2$</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>VENTILATION DATA for each OCCUPIED SPACE TYPE</th>
<th>Space Type$^5$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Name</td>
</tr>
<tr>
<td>Design Maximum Occupant Density$^6$</td>
<td>m$^2$/person</td>
</tr>
<tr>
<td>Design Minimum OA per person$^7$</td>
<td>L/s/person</td>
</tr>
<tr>
<td>Minimum Primary SA / unit area$^8$</td>
<td>L/s/m$^2$</td>
</tr>
<tr>
<td>Minimum Total SA / unit area$^9,10$</td>
<td>L/s/m$^2$</td>
</tr>
</tbody>
</table>

Note: The above minimum flows are for outdoor air ventilation purposes only. Systems and spaces may need more supply or outdoor air for other reasons such as comfort or makeup.

1. Peak simultaneous occupant density averaged over the ventilated area served by system
2. This is the OA fraction in the primary supply air to each zone. It includes both airflow through the outdoor air intake and unused OA re-circulated from spaces where the OA supply is greater than that used by the occupants present at the time. It is NOT the airflow through the outdoor air intake divided by the design supply airflow
3. This is the minimum required airflow through the outdoor air intake, expressed as a fraction of the system primary air.
4. This is the system’s airflow through the outdoor air intake expressed in flow/unit of floor area
5. Show spaces by generic type. eg one space type “private office” may cover 200 different offices of varying sizes and shapes and another, “Mtg/Conf/Train” may cover 12 meeting, conference and training rooms with varying floor areas
6. Design peak occupant density for a typical space or room of the type listed
7. See Outdoor Air Ventilation Rates Clause above
8. Minimum SA rate per m$^2$ from the primary supply air system required to deliver enough outdoor air for the design occupancy. Spaces may require more for comfort or make-up where transfer air is unavailable.
9. Minimum total SA rate per m$^2$ including primary and Secondary supply. Spaces may require more for comfort or make-up.
10. “Secondary” supply air is air that is re-circulated or transferred from outside the space without being re-circulated through the primary air-handling unit. Sources include secondary central AHUs, fan powered terminals, transfer fans and airflow induced by exhaust or return from the space.

3 a 2 HVAC Operation and Maintenance Manual

a. Prescriptive Requirements:

.1 The manual shall be in accordance with ASHRAE Guideline 4, “Preparation of Operating and Maintenance Documentation for HVAC&R Systems” and shall provide the information needed for to operate, maintain and optimize the HVAC systems and to modify them to adapt to changing future needs.

.2 Prior to recommending acceptance of the project, the HVAC RP shall verify that manuals meeting these requirements have been provided.
3 a 3 HVAC Capacity
   a. Performance requirements:
      .1 Capacity
         .a The HVAC system shall have enough capacity to maintain the required Space Conditions at the BC Building Code’s 1% January and 2½% July outdoor design conditions.
         .b It shall also have enough capacity to restore spaces from night setback temperature to occupied temperature efficiently and within 4 hours.

3 a 4 Balancing - HVAC
   a. Performance requirements:
      .1 Test, adjust and balance all air and hydronic systems in accordance with the requirements and procedures described in Associated Air Balance Council (AABC) and National Environmental Balancing Bureau (NEBB).
      .2 Balance to ±5% of design flows at central equipment and main distribution runs
      .3 Balance to ±10% of design flows elsewhere and at outdoor air intakes
      .4 Measurements shall be accurate to ±5% of actual values.
      .5 Adjust systems so that balancing is achieved with minimal pressure loss. Change fan or pump speeds or pump impeller diameters so that at least one fluid path in each system has all balancing devises almost wide open.
   b. Prescriptive requirements:
      .1 Smoke and Fire Damper verification
         .a Verify the presence of fire dampers in all new fire separations, and smoke dampers in all smoke separations, and test the function of both.
      .2 Balancing Report
         .a Document the results of the balancing process in a written balancing report, that clearly identifies any outstanding problems and submit it to RPD after review and acceptance by the Responsible Professional (RP) and prior to substantial completion.
         .b Include signed pdfs in the balancing report showing:
            .1 All ductwork, fire separations and smoke separations and RA openings
            .2 All fire, smoke and balancing dampers circled and initialled to confirm accessibility, and functionality
            .3 The critical run for each air system and each hydronic system
            .4 Design and actual flow values at each balanced point

3 a 5 Commissioning - HVAC
   a. Performance requirements:
      .1 Refer to “Commissioning” section.

3 a 6 Maintenance Access - HVAC
   a. Performance requirements:
      .1 Provide practical and safe maintenance and service access to HVAC equipment and space to remove and replace equipment without having to disassemble it or remove other elements.
.2 HVAC equipment requiring inspection, servicing, or repair annually or more frequently shall be:
  .a Indoors, or in a fully enclosed and well-lit service space provided as part of custom rooftop equipment.
  .b Accessible from floor level without requiring a ladder
  .c Accessible through access routes that are completely clear of any pipes, conduits, sprinklers, lights, structure, equipment or any other obstruction from the floor surface to a height 2000 mm above it and at least 800 mm wide.

b. Prescriptive requirements:
  .1 All catwalks, stairways, ladders, roof hatches and other means of access and egress shall comply with WorkSafeBC Regulations and the BC Building Code (Code equivalencies not permitted).
  .2 Locate equipment and services so that maintenance access points for HVAC or any other services are not blocked by ducts, pipes, conduits, other equipment, walls, structure, or other parts of the building.
  .3 The layout of HVAC equipment and distributions systems shall provide service access as required to measure and adjust air and water flows as part of the system balancing process.
  .4 Duct and Plenum Cleaning
    .1 Provide access to all ducts and plenums for cleaning (Refer to “Ductwork”).

3 a 7 Spare Parts - HVAC
a. Performance requirements:
  .1 Provide a basic starting stock of commonly used spare parts
b. Prescriptive requirements:
  .1 Provide spare parts as follows:
    .a One complete set of replacement media or filters for each filter and filter bank, installed and servicing the tenant improvement space only (including both pre and final filters).

3 b Space Requirements - HVAC
3 b 1 Space Conditions
a. Performance requirements:
  .1 Temperature
    .a The winter indoor design temperature shall be 22° C in all occupied spaces.
    .b The summer indoor design temperature shall be 24° C in all occupied spaces.
    .c Indoor temperature setpoint shall be ±1°C adjustable by occupants from the zone temperature sensor.
    .d Control tolerance shall be 0.5 °C at the zone temperature sensor with no more than a 0.5° C swing in any 15-minute period.
    .e The temperature of separate spaces within a single control zone may vary by up to ± 2°C from the zone setpoint.
    .f The temperature gradient between 200 mm and 1800 mm above the floor at any point more than 300 mm from an exterior wall shall not exceed 3°C.
.2 Relative Humidity
   .a The summer indoor design humidity shall be 60% RH at 24°C.
   .b The winter interior design humidity shall be 20% RH at 22°C.
   .c If humidification is needed to maintain 20% RH in winter, it shall be set to maintain 30% and scheduled down in very cold weather as needed to prevent condensation on building surfaces.

.3 Draft and Stagnation
   .a Air shall be in motion but velocity within 1800 mm (6 Ft.) of the floor shall not exceed 0.25 m/s (50 ft./min) and shall not exceed 0.15 m/s (30 ft./min) on the head and shoulders of a person who is seated.

.4 Naturally Cooled and Hybrid Buildings
   .a Buildings without mechanical cooling will not be able to always meet the above conditions. See “Naturally Cooled Buildings” under HVAC Systems.

.5 Noise
   .a Refer to “Noise and Vibration- HVAC”.

3 b 2 Equipment Room HVAC
   a. Performance requirements
      .1 All equipment rooms
         .a Provide enough cooling to protect equipment function, reliability & lifespan.
         .b Prevent space temperature exceeding the ratings and warranty limits of wiring & equipment installed therein. This applies both in normal operation and in the event of failure of any one cooling related component.
         .c HVAC systems must not compromise security of room entry or equipment
      
      .2 Server and UPS Rooms
         .a Always maintain space temperature at 22°C ±1°C including the event of failure of any one cooling related component
      
      .3 Communication Rooms with cooling load =>1500 W
         .a Maintain space temperature at 22°C ±1°C in normal operation
         .b Maintain > 21°C and < 27° if any one cooling related component fails
   b. Prescriptive requirements:
      .1 Consultant to obtain heating rejection load of electronic network equipment such as network switches, servers, phone switches, rack mounted UPS’s typically provided by OCIO. The consultant shall evaluate the heating load (from the equipment) and to design HVAC equipment with enough cooling capacity accordingly.
      
      .2 Air supplied or drawn into a Server, UPS or Communication room must be filtered to min. MERV 8 or be transferred from a clean indoor area
      
      .3 Cooling in normal operation must not require operation of central plant that could otherwise be shut down.
      
      .4 Mechanical cooling must be maintained in the event of failure of any one cooling related component for Server and UPS rooms.
      
      .5 Communication rooms
During normal hours provide cooling from the building conditioning system.

For cooling when the building conditioning system is not operational, provide a thermostatically controlled fan powered transfer air that draws from an adjacent space and discharges into the ceiling space.

### Noise and Vibration - HVAC

**a. Performance requirements**

1. Provide HVAC systems that meet the following criteria for at least the projected average life of the equipment based on the ASHRAE Handbook.

2. Interior HVAC noise for each space
   - Sound level shall comply with either the NC or dBA level listed below.
   - Sound pressure in the 16 Hz and 32 Hz octave bands shall comply with either the level defined by the NC curve at 63 Hz, or the dBC level listed below.
   - Any discrete tone shall be at least 5dB lower than the listed Max NC

<table>
<thead>
<tr>
<th>Space Types Most Like</th>
<th>Max. NC</th>
<th>Max dB</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teleconference, Videoconference</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Conference, Interview, Meeting, Training,</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Office</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lobby, Corridor, Change, Washrooms</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**b. Prescriptive requirements**

1. Equipment on Metal Decks and/or OWSJ Structures
   - Provide effective isolation.
   - For equipment with motors larger than 10HP, provide a housekeeping pad at least double the equipment weight.
   - Prior to completing the design, provide an acoustical consultant’s report demonstrating that the specified interior noise requirements will be met.

2. Ceiling mounted equipment above Lay-In Acoustic Tiles
   - Back loading of ceiling tiles to meet HVAC noise criteria is not permitted.
   - Motor driven equipment selections shall allow for noise increase over their lifespan. The allowance shall not be less than 3dB (6dB for compressors).

3. Noise and Vibration Verification
   - Verify under the noisiest HVAC operating mode for each location
Measure dBA and dBC levels and listen for tones in each space and each outdoor location. Problem spaces may be re-measured for compliance based on NC level and low octave band SPLs.

Take any measures needed to bring the installation into compliance.

Provide a report, with measurement and observation records attached, verifying that all noise and vibration criteria have been met.

Prior to the end of the warranty period, repeat the process at any locations where RPD believes noise levels may have become non-compliant.

3 b 4 Zoning

a. Performance requirements:

.1 Provide enough thermal zoning to achieve reasonable occupant comfort and meet the requirements under “Space Conditions”

b. Prescriptive requirements:

.1 Each thermostatic control zone shall include only spaces with similar thermal load profiles and occupancy schedules.

   .a Office spaces
      .1 Perimeter and interior spaces in separate zones
      .2 Perimeter spaces zoned by exposure and limited to 100 m² max
      .3 Corner spaces with windows on two exposures shall be separate zones.
      .4 Private offices larger than 20 m² shall each be a separate zone.
      .5 Interior zones 200 m² max for open space & 100 m² for enclosed space
      .6 Open and private office areas on the same zone shall be no larger than 100 m² and be controlled by the average from a sensor in each space.

   .b High Occupancy and high Occupant Density Rooms
      .1 Separate rooms >20 m² shall each be a separate zone
      .2 Smaller enclosed spaces shall each have a separate temperature sensor with temperature control based on averaged zone temperature.
      .3 See also ventilation requirements including ventilation control

3 b 5 Ventilation

a. Performance requirements:

.1 Ventilation systems, ventilation calculations and ventilation documentation shall be in accordance with ASHRAE Standard 62.1-2016, 62-2001 (Addendum N), and the following.

b. Prescriptive requirements:

.1 Minimum Outdoor Air Calculations
   .a Calculations methods
      .1 Calculation minimum outdoor air ventilation for each space, and outdoor air intake, using the methods from ASHRAE Standard 62.1-2016 but applying the rates and occupant densities below.

   .b Outdoor Air Ventilation Rates
      .1 Provide enough outdoor air to each space to satisfy all the following:
c. Occupant Densities

.1 Base calculations on the largest of the following:

.a The programmed occupant density for the space

.b The occupant density from Table 2, ASHRAE Std. 62-2001

.c The occupant density from Table 6.2.2.1, ASHRAE Std. 62.1-2016

.d Office Space

.1 Private offices – 15 people / 100 m²

.2 Open plan office zones – 10 people / 100 m²

.e Office Area Systems with common recirculation serving >1000 m²

.1 Diversified population– 5 people / 100 m²

.2 Recirculation, Transfer and Exhaust

.a Design the building ventilation systems to minimize exhaust of conditioned air by maximizing recirculation and transfer of air between spaces and systems.

.b Do not use system or combinations of systems that unnecessarily exhaust air that could otherwise be used for ventilation or make-up purposes and thus reduce energy consumption.

.c Space exhaust air rates shall not be less than the exhaust rates in Table 6.5 “Minimum Exhaust Rates” of ASHRAE 62.1-2016, unless noted otherwise.

.3 High Occupancy Rooms

.a For rooms designed to accommodate more than 20 people, (e.g. meeting rooms =>40 m²), control minimum outdoor air ventilation as follows:

.1 Use a single sensor to sense space and outdoor CO₂ concentration.

.2 Control minimum ventilation so the CO₂ concentration rise doesn’t exceed that corresponding to the OA ventilation requirements of this standard.

.3 The first response to increasing demand shall be fan powered transfer of secondary supply air from other spaces. If this is insufficient then:

.a If the space is served by a separate AHU, adjust its outdoor air intake.

.b If it is served by a 100% OA system, increase flow to this space.

.c If the space is served by a central system that serves multiple spaces, then adjust the supply air flow to the space to match the greater of the ventilation demand or the thermal demand.

.4 High Occupancy Density Rooms
.a For high occupant density spaces that do not have their own dedicated variable control of outdoor air supply, provide secondary circulation of air from areas with surplus outdoor air; e.g.

.1 Local transfer air originating from other areas with surplus outdoor air.

   a. The required transfer air flow can be calculated from formulae in Appendix A of ASHRAE Standard 62.1. For office buildings, the total flow of primary air plus transferred air will typically be over 2 cfm/sq. ft.

   b. Direct transfer e.g.:
      1. A fan powered VAV box
      2. A fan injecting air into the supply downstream of a VAV box
      3. A fan injecting air into the room

   c. Indirect Transfer
      1. Combined exhaust, transfer and return flow from the room exceeds the air flow supplied to the room and induces inflow air flow from the most readily available sources along the paths of least resistance.

3 c HVAC Elements - General

3 c 1 Air Diffusion

   a. Performance requirements:
      1. Achieve good room air distribution without unacceptable noise, drafts, stagnation, stratification, or temperature gradients under all operating conditions.

   b. Prescriptive requirements:

3 c 2 Ductwork

   a. Prescriptive requirements:
      1. Duct connections to fans shall be configured to minimize system effect losses.
      2. Bends shall be full radius or have splitters placed so each air path is full radius.
      3. Ductwork shall be airtight joint sealed spiral formed round or oval type except that joint and seam sealed rectangular duct may be used in mechanical rooms and immediately adjacent to mechanical rooms, crossovers shafts and rooftop equipment.
      4. Diffusers and Supply grilles shall be connected using a straight rigid duct preceded by a rigid full radius bend. Other configurations may be used where performance is proven. Where practical, a single piece of flexible duct may be added to trap duct borne sound from the balancing damper and fan, to aid in alignment, and to eliminate sheet metal fittings.
      5. Balancing Dampers shall be acoustically remote from diffusers and grilles. Subject to that constraint they shall be placed for convenience of access, preferably at the takeoff connection.
      6. Duct Silencers shall be avoided where possible and their insertion resistance penalty shall not exceed 75pa.
      7. Duct Liner: Face and exposed edges to be covered with a smooth durable film and to be accessible for inspection and repair.
.8 Flexible Duct shall not be used in locations where it cannot be replaced. Its length shall be no greater than 10 duct diameters, the velocity of air within its is shall not exceed 1000 fpm and it shall be supported so that all bends are smooth and at least full radius.

.9 Duct and Plenum Access
  .a Provide access to all ducts and plenums for cleaning. This includes providing access at potential blockage points such as multi-blade dampers and Security Barriers and coils.
  .b Access to plenums shall be through access doors. Where possible, the openings shall be at least 450 mm wide and 1500 mm high.
  .c Access to ducts shall be through sturdy panels or doors with hand fasteners

3 c 3 Filters - Air
  a. Prescriptive requirements:
     .1 All supply systems, and all exhaust systems with heat recovery, shall have 50 mm deep MERV 8 high capacity pleated media panel filters.
     .2 Supply air systems >1000 L/s shall have 300 mm deep MERV 13 (min.) secondary filters and space for future final filters up to 600 mm deep
     .3 Size filters at a face velocity <400 fpm if scheduled operating hours are > 2500 Hrs pa and otherwise < 450 fpm
     .4 Filter banks for air streams >1000 L/s shall have universal 24” x 24” filter frames.
     .5 Filter banks for airstreams >5000 L/s shall be face mounted and front accessed from walk-in plenums without requiring a ladder to access either filters or plenum.
     .6 Replace existing air filter with new in all new and existing equipment servicing the tenant space only.

3 c 4 Perimeter heating
  a. Prescriptive requirements:
     .1 Heating with Air from standard ceiling diffusers
        .a Typical perimeter spaces may be heated with supply air from standard ceiling mounted diffusers provided:
           .1 Perimeter heat loss =<750W in any 3 m run or 500W in any 1 m run.
           .2 Supply air temperature =<8°C (15°F) above room temperature.
           .3 Ceiling height =<2700 mm above floor level
           .4 The supply air flow =>5 L/s/m² (1 cfm/sf) while heating
        .b Where any of these limiting conditions is not met, the permissible heat loss is adjusted proportionally for each criterion so:
           .1 If the supply air temperature is twice as far above room temperature, or the ceiling height is twice as high, or the supply air flow is half the above limit, then the permissible heat losses would halve to 375 W in any 3-meter run and 250 W in any one-meter run
           .2 If all the above changes apply, then permissible heat losses would reduce by ½ x ½ x ½ = 1/8 to 93W in any 3-meter run and 63 W in any 1-meter run
        .c Transient Occupancy (e.g. Corridors and Lobbies)
           .1 In spaces where occupancy is transient, and the occupants are not sitting down, the permissible perimeter heat loss is twice that permitted in normally occupied spaces.
.2 Supplementary Heating
   .a Avoid supplementary perimeter heating where possible.
   .b If the above conditions for heating with air can’t be met, provide separate perimeter heating to meet facility’s needs in the most economical manner.
   .c Subject to the needs of the space, such heating may be overhead radiant panels, baseboard heaters, in-slab heating or directed warm air.
   .d In secure areas, baseboard shall not be used, and overhead radiant panels shall be avoided unless there is no viable alternative.
   .e The output of this supplementary heating shall be scheduled with outdoor temperature. Radiant panels or baseboard may alternatively be modulated from a space temperature sensor in sequence with the space cooling.

3 c 5 Reheat
   a. Performance requirements:
      .1 Minimize direct and indirect reheat and eliminate it wherever possible.
   b. Prescriptive requirements:
      .1 Hot water Reheat
         .a Reheat coils shall have modulating 2-way valve control and be designed for low return water temperature to minimize heat losses and to optimize operation of condensing boilers.
         .b Supply water temperature shall be scheduled to reduce heat loss and improve controllability in mild weather.
      .2 Electric Reheat shall have modulating control (e.g. SCR).

3 c 6 Refrigeration - HVAC
   a. Performance requirements:
      .1 Project Specific Requirements section must be consulted prior to starting design if new or repair of existing refrigeration systems is considered.

3 c 7 Variable Speed Drives
   a. Performance requirements:
      .1 Project Specific Requirements section must be consulted prior to starting design if new or repair of existing variable speed drives is considered.

3 c 8 Air Intake
   a. Performance requirements:
      .1 Project Specific Requirements section must be consulted prior to starting design if new building air intake is considered.
      .2 The distance separation of new exhaust air termination from existing or new outdoor air intake in the building must satisfy the requirement in BC Building Code and ASHRAE 62.1 Table 5.5.1.

3 d HVAC Central Plant
   3 d 1 Air Handling Units
      a. Performance requirements:
         .1 Air Filters.
b. Prescriptive requirements:
   .1 Filter replacement
      .a Provide new filter replacement for AHU unit installed and servicing for the tenant space only.

3 d 2 Cooling & Hot Water Heating Plant
   a. Performance requirements:
      .1 Project Specific Requirements section must be consulted prior to starting design if new cooling & hot water heating plant is required.

3 c HVAC Systems - General
   3 e 1 LEED V4 ID+C - Energy (HVAC)
      a. Performance requirements
         .1 In projects requiring LEED V4 certification, design to meet the following mandatory LEED V4 Credits for existing building with Tenant Improvements “LEED V4 Gold” rating system:
            .a EA Credit: Optimize Energy Performance, HVAC:
               .1 The building shall attain the below referenced as a minimum Energy Performance requirement for this project.
               .2 The project shall attain minimum 20 out of 25 points under Option 1 Tenant – Level Energy Simulation or 12 out of 16 points under option 2 Prescriptive Compliance.
            .b EQ Credit: Enhanced Indoor Air Quality Strategies
               .1 The project shall attain minimum 1 out of 2 points from Option 1 Enhanced IAQ Strategies or Option 2 Additional Enhanced IAQ Strategies.
            .c EQ Credit: Indoor Air Quality Assessment
               .1 The project shall attain mandatory point of Option 1 Flush-Out, Path 1 Before Occupancy.
      b. Prescriptive requirements:
         .1 Planning shall include consideration of feasibility, space requirements, any structural implications, access, fuel delivery and storage, future fuel availability, order of final cost and order of cost for initial provisions.
         .2 Electric resistance heating is not an acceptable measure.

3 f HVAC System Types
   3 f 1 Dual Fan Dual Duct
      a. Prescriptive requirements:
         .1 Mixing boxes
            .a VAV boxes shall be pressure independent type with sensing and control of space temperature, zone supply airflow, and zone supply temperature.
         .2 Minimum flow
            .a Provide a minimum zone supply flow set point to meet the following requirements:
               .1 Deliver the minimum zone outdoor air requirement based on the outdoor air fraction in the supply air;
.2 Avoid air distribution and control problems from excessive turndown;

.3 Maintain space temperature in cold weather while limiting zone supply air temperature to 30°C max (reset function).

.b If zone exhaust make-up needs exceed the above minimum:
   .1 Use natural transfer air to meet the shortfall then increase the zone supply flow if transfer air is insufficient.

   .3 Dampers
   .a Do not provide balancing dampers between the AHUs and Mixing Boxes.

3 f 2 Fan Coil
   a. Prescriptive requirements:
      .1 Fan coil unit selection and installation shall meet the following criteria:
         .a Fan coils shall only be in accessible ceilings above readily accessible floor space rated for NC 35 or higher.
         .b Fan coils shall be selected to meet the required NC level in adjacent spaces allowing for any increase in noise over a 15-year lifespan.
         .c Maximum nominal cooling capacity for a single unit shall be 3 tons.
         .d They must be designed and located to permit easy access to replace filters, inspect and clean coils and drain pans, and service components.
         .e Fan coils must simultaneously meet Noise and Vibration requirements, supply air temperature limits and peak heating and cooling load.
         .f Fan motors shall be ECM type.
      .2 Outdoor air shall be filtered, heated or dehumidified as necessary, and ducted to discharge within 300 mm of, and directly toward, the air inlet of each fan coil.
      .3 Any new fan coil system shall be 4-Pipe type with separate supply and return of both chilled and hot water and standby pumps for both and chilled hot water supply and be designed to meet peak heating loads with 52°C (125°F) water.

3 f 3 Naturally Cooled Buildings
   a. Performance requirements
      .1 Project Specific Requirements section must be consulted prior to design a naturally cooled space.

3 f 4 Radiant Floor
   a. Performance requirements
      .1 Project Specific Requirements section must be consulted prior to starting design if new or repair of existing radiant flooring systems is considered.

3 f 5 VAV Reheat
   a. Prescriptive requirements:
      .1 VAV boxes
         .a VAV boxes shall be pressure independent type with sensing and control of space temperature, supply airflow, and supply temperature.
      .2 Minimum flow
.a Provide a minimum supply flow set point to meet the following requirements:

.1 Deliver the minimum zone outdoor air requirement based on the outdoor air fraction in the supply air;

.2 Maintain a minimum supply flow rate to occupied spaces of at least 0.5 cfm/ft²;

.3 Avoid air distribution and VAV box control problems from excessive turndown;

.4 Maintain space temperature in cold weather while limiting zone supply air temperature to 30°C max (reset function).

.b If zone exhaust make-up needs exceed the above minimums:

.1 Where possible, use natural or fan powered transfer air to meet the shortfall rather than increasing the minimum primary flow.

.2 If transfer air is insufficient then increase minimum supply flow setpoint.

.3 Reheat

.a Provide reheat for any zone with any exposure to the building exterior and any other zone where internal heat gains are not certain to offset the cooling effect of the supply air flow under all operating conditions.

.b Size reheat capacity to offset heating of cool supply air in addition to meeting zone heating requirements including any glazing, wall, floor and roof loss.

.c Size all heating coils to be able to heat with water supplied at 125°F

.d Reduce flow to minimum before reheating coils activate.

.e See additional requirements under Reheat in HVAC System Elements.

.4 Dampers

.a Do not provide balancing dampers between the AHU and VAV Terminals.

3 f 6 Variable Refrigerant Flow (VRF)

a. Prescriptive requirements:

.1 New VRF systems shall not be installed in either new or existing buildings. Project Specific Requirements section must be consulted prior to starting design if new or repair of existing VRF systems is considered.

.2 Existing VRF systems may be retained and may be adapted to new tenancy requirements if no better option is available.

3 f 7 Variable Volume & Temperature (VVT)

a. Prescriptive requirements:

.1 Existing VVT systems should be avoided. Where this is not possible, complete replacement may be necessary. Project Specific Requirements section must be consulted prior to starting design if new or repair of existing VVT systems is considered.

3 f 8 Water Loop Heat Pump (WLHP)

a. Performance requirements:

.1 Project Specific Requirements section must be consulted prior to starting design if new or repair of existing WLHP is considered.

----- End HVAC Section -----
4 HVAC SYSTEM CONTROLS

4 a General Requirements – DDC

4 a 1 HVAC System Controls Alternatives

a. A computerized DDC system is mandatory on all tenant improvement projects. An electro-
   mechanical system with programmable thermostats and setback capability or Smart Technology
   Thermostats is acceptable only if it meets the following conditions.
   
   .1 The tenant space is less than 300 square meters.
   .2 The Occupancy is less than five years.
   .3 The travel response time from closest property management contractor office is less than one
   (1.0) hr.

b. Regardless of the type of control used, the construction documents shall include a comprehensive
   and logically consistent sequence of operations for HVAC systems and equipment, detailing the
   designer’s requirements for normal occupied hours operation, normal start-up and shut-down
   sequences, all specified automatic responses to emergency or abnormal conditions, and any other
   provisions that may be included in the design.

c. Energy Analytic Software for enhanced Energy Management and Faulty Detection & Diagnostics
   must be consulted and approved by RPD and OCIO prior to starting design.

4 a 2 Design and Review Process – DDC

a. Prescriptive requirements:
   
   .1 Concept Stage Submission
   .a Confirm that all Technical Standards requirements will be met including those relating
     to the OPR (Owner’s Project Requirements).
   .2 Design Development Stage
   .a Details on proposed equipment types
   .b Details on system architecture and operator’s workstation location and layout
   .3 95% Documentation Stage
   .a 95% Drawings and Specifications including complete points list

4 a 3 General DDC

a. Prescriptive requirements:

   .1 General - DDC
   .a Provide a BACnet Direct Digital Control (DDC) system to control and monitor the
      HVAC systems and record mechanical system performance.
   .b DDC control shall be applied down to and including the terminal zone units. Local
      hardwired controls may be used for safety controls and local small exhaust fans.
   .c The DDC control system shall be a modular, flexible, and fully commissioned BACnet
      Testing Laboratories (BTL) certified and approved Direct Digital Control (DDC)
      System.
   .d The approved DDC system manufacturers are Delta Controls ORCA product line, both
      hardware and software, and Reliable Controls Mach-System product line and the current
      version of RC Studio software.
   .e DDC control shall not be monitored through BCSC system.
.f DDC systems shall be engineered, installed, programmed, and commissioned by trained and qualified personnel who have ample experience with the system and the task they perform and employed by companies that have demonstrated an acceptable quality of post construction service.

.2 Alarms - DDC
   .a Relay selected alarms to remote locations as directed by RPD.

.3 Connectivity - DDC
   .a Provide Ethernet connections between buildings on the same site.
   .b Provide for secure offsite support access by including a modem or serial device server for telephone or secure internet connectivity. Ethernet connections shall be provided between buildings.

.4 Monitoring
   .a The DDC systems shall be able to monitor the performance of the HVAC and lighting systems through system graphics, trend graphs and other monitoring features, and shall also be able to change zone set points remotely.
   .b To the extent possible with the DDC system type including all options:
      .1 Provide automatic data logging capability including all hard and soft points, unrestricted intervals and unrestricted number of data points.
      .2 Provide maximum ease and flexibility in setting up and displaying current and historical data both separately and together.
      .3 Provide for easy data storage expansion without having to reload the DDC software.

.5 Shop Drawings – DDC
   .a Provide DDC system shop drawings including detailed system architecture showing all DDC points associated with each controller, single line control diagrams and complete control point schedule.

.6 Lighting Controls - DDC
   .a Lighting Controls is an independent system and is not controlled from DDC system.
   .b Data including occupancy sensor status available from lighting control system via BACnet interface shall be used for DDC control as applicable.

4a4 DDC System Type
   a. Performance requirements:
      .1 Provide a current model DDC system that has operational, maintenance and programming compatibility with those in existing facilities and has a well established and proven support network.
   b. Prescriptive requirements:
      .1 DDC Systems shall be the latest hardware and software version current at the time of DDC system design and shall be Delta Controls Orca or Reliable Controls

4a5 Spare Parts – DDC
   a. Prescriptive requirements:
      .1 Provide spare parts as follows:
         .a One interior space temperature sensor and humidity sensor, of each type installed.
.b One DDC application specific controller (terminal unit controller) of each type installed.
.c One DDC controller power supply, of each type installed.

4 b Programming – DDC

4 b 1 Graphics

a. Performance requirements:
   .1 Provide system graphics in RPD standard format to facilitate operation and maintenance.

b. Prescriptive requirements:
   .1 Create dynamic graphics in the central control unit (CCU) for all mechanical systems.
   .2 Provide a graphics of each floor showing smoke control zones. Include all DDC controlled
      space temperatures and smoke dampers.

4 b 2 DDC Control Sequences

a. Performance requirements:
   .1 Meet all Owners project requirements including the control tolerances in the HVAC section
      of this technical standard

b. Prescriptive requirements:
   .1 Provide custom control sequences and programs where necessary.
   .2 Optimize all performance including comfort, IAQ, lifespan and energy use with measures
      including:
      .a Resetting HVAC water and air supply temperatures
      .b Providing resettable load sensitive optimum start and stop times for equipment and
         systems that do not operate 24 hours a day.
      .c Resetting control points for any humidifiers from outside air temperature
      .d Preheating, pre-cooling, and/or flushing, prior to occupancy as appropriate.

4 c Components - DDC

4 c 1 Control Station

a. Performance requirements:
   .1 Provide a suitable facility for operating and maintenance staff to interface with, and utilize,
      the DDC system to monitor, adjust, optimize and troubleshoot HVAC system operation.

b. Prescriptive requirements:
   .1 Provide a central DDC control station complete with computer, trend and alarm printers.
   .2 The control station shall have at hard drive capacity of at least 1 Terabyte.
   .3 Locate the DDC control station in a quiet well-lit space controlled by maintenance staff and
      with ample space to lay out plans, have small meetings, and store record drawings and other
      record documentation.

4 c 2 Field Devices

a. Performance requirements:
   .1 Provide field devices which are suitable for their purpose and can be expected to have a long
      service life

b. Prescriptive requirements:
.1 Control Panels  
   .a Provide at least 10% spare control points at each DDC controller for future expansion.

.2 Durability:  
   .a Select and install all field devices for long service life and minimum maintenance needs.

.3 Actuators:  
   .a Provide electrically powered proportional actuators to drive all valves, dampers and other control devices.

.4 Control Valves:  
   .a Select and size control valves to match the application and achieve reasonably linear control characteristics.
   .b Provide a low-flow control valve in parallel where high pressure drops at low load prevent a single valve from achieving stable control and long life.

.5 Dampers:  
   .a Match the damper type, face area, power of actuator, and method of rod and damper linkage to give a linear volume control characteristic.

.6 Terminal Controllers  
   .a Terminal controllers shall not be used for control of major equipment, i.e. boilers, air handling units, etc.

4 d Completion – DDC

4 d 1 End Point Verification  
   a. Performance requirements:  
      .1 Provide a detailed check and record of the basic wiring connections and setup of the DDC system.
   b. Prescriptive requirements:  
      .1 Verify every physical point.
      .2 Submit the following as part of the record documentation:
      .3 Point to point check sheets
      .4 Check sheets showing all calibration values.
      .5 Trend data showing that all control loops have been tuned.
      .6 Witness all start-up tests and perform point verifications.

4 d 2 Commissioning - DDC  
   a. Performance requirements:  
      .1 Refer to Commissioning Section.
      .2 DDC commissioning work includes controls changes, trends and charts to ensure and demonstrate that the Owner’s Project Requirements (OPR) are fully met.

4 d 3 Training – DDC  
   a. Performance requirements:  
      .1 Provide adequate training for operating and maintenance personnel and to make provision for training of future personnel.
b. Prescriptive requirements:
   .1 Initial on-Site Training:
      .a Provide detailed initial training for the operations and maintenance personnel prior to substantial completion.
      .b Provide multiple sessions with multiple threads so that operation and maintenance personnel who cannot attend training at the same time can all receive full training.
      .c Provide a detailed schedule and syllabus for acceptance by RPD at least one month before initial training is to occur.
      .1 This syllabus shall include complete explanation of the intended operating of each controlled system including:
         .a DDC control Sequences
         .b The role of any manual controls
         .c System optimization for minimum energy use
         .d System response in the event of problems
         .e Problems to watch for
         .f Elements to trend and what to watch for in the trend information
         .g Alarms, their significance and what to do about them
      .d Follow up Training and Support:
         .1 Provide operation and maintenance staff with remote email and phone training support at no additional cost as requested during the 1st year of operation.
         .2 Provide a follow up on-site training session at no additional cost during the first year of operation at a time acceptable to the person responsible for operation and maintenance.
   .e Training Documentation
      .1 Provide DVD copies of the training sessions as follows:
         .a One copy to be kept on site.
         .b One copy to be handed to RPD as part of the project documentation.
         .c A master to be retained by the DDC contractor who will provide replacement copies at no charge if either of the above copies is lost.

4 e Non-DDC HVAC Controls
   (Programmable Thermostats with setback capacity and Smart Technology IoT Thermostats)
   4 e 1 General
      a. Performance requirements:
         .1 Provide fully automatic temperature controls for all HVAC Systems and equipment.
      b. Prescriptive requirements:
         .1 Smart Thermostats IoT application shall be limited to specific tenant space local use only unless it is approved by OCIO of an access to external Internet Web network on further application such as the off-site remote-control feature via Internet Web-browser. The proposed IoT Smart Thermostat shall include following features:
.a Built-in software or server only, no external software or server is needed to interact and/or program the thermostat other than standard Internet Web browser. The device shall continue to run HVAC schedule as programmed and accessible locally in event of internet connection is lost.

.b Low Voltage installation only.

.c Energy & Water Metering with Real-Time data analytics.

.d No licensing fee to purchase or renew for the program software.

.e Real Time monitoring & alerting on critical points.

.f Remotely control of Heating & Cooling

.g Replacement parts must be available for deliverable to site on same day to next day shipment from factory.

.2 Programmable Thermostats shall have a set-back feature for unoccupied hours including a timer-operated manual override.

.3 Thermostats shall permit occupant adjustment within the following limits:
  .a at any give time, cooling setpoint cannot be lower than heating setpoint.
  .b maximum heating setpoint 22°C and,
  .c minimum cooling setpoint 24°C

----- End HVAC System Controls Section -----
5 PLUMBING

5 a  Plumbing – General

5 a 1  Plumbing System Type, Scope and Capacity:

a.  Performance requirements:

  .1  Cold Water Supply System:

  .a  The cold-water supply system shall be capable of providing domestic cold water to all
new and/or relocated plumbing fixtures and equipment.

  .2  Domestic Hot Water System:

  .a  The domestic hot water equipment and distribution system shall be capable of providing
hot water to all new and/or relocated plumbing fixtures and equipment requiring hot
water.

  .3  Sanitary Drainage System:

  .a  The sanitary drainage system shall be capable of collecting drainage from all new and/or
relocated plumbing fixtures and equipment.

  .4  Drinking Water Treatment Systems:

  .a  Installation of point-of-use or building water filtration or reverse osmosis systems shall
be prohibited unless the quality of the drinking water supply within the facility does not
meet the minimum Canadian Water Quality Drinking Guidelines and the local health
authority requirements.

  .b  If a water treatment system is required, the installation must meet with the BC Plumbing
Code requirements for piping installation, system approved by the local health authority,
equipment must be CSA approved, reduced pressure backflow installed and tested,
water sampling and monitoring program approved by the local health authority and NO
direct connection to the waste.

b.  Prescriptive requirements:

  .1  Water and Sanitary Pipe sizing:

  .a  Water and sanitary capacities for each type of plumbing fixture shall be based on the
Fixture Unit method in accordance with the design tables in the B.C. Building Code and
American Society of Plumbing Engineers (ASPE) Handbooks.

  .2  Plumbing Drawings:

  .a  Plumbing drawings shall include fixture loads at each branch, fixtures and service
connection for domestic water, sanitary and venting. Drawings shall include riser
diagrams and/or piping schematics.

  .b  No plumbing piping shall pass through HVAC and exhaust ducts.

5 a 2  Plumbing System Zoning:

a.  Performance requirements:

  .1  Provide isolation valves on water distribution systems such that shutting off the water to the
tenant improvement area does not affect other operational areas.

b.  Prescriptive requirements:

  .1  Provide domestic hot water and/or tempered water to designated areas for specific functions.

5 a 3  LEED V4 – Plumbing:

a.  Performance requirements:
Design plumbing systems to conserve water and to minimize sanitary discharge.

Prescriptive requirements:

1. Provide water conserving plumbing fixtures unless explicitly noted otherwise.

5.4 Maintenance Access – Plumbing:

Performance requirements:

1. Provide good access to all new and/or relocated plumbing services, components and equipment.

2. Install plumbing services such that they do not impede access to other building services for installation, testing, balancing, operation, maintenance or replacement.

Prescriptive requirements:

1. Major equipment and central valve stations:
   a. Provide unobstructed access routes that have at least 2m clear height and through which all new and/or relocated equipment can eventually be replaced without removing doors or demolishing parts of walls or roofs.
   b. Locate pipes, equipment, valves and other serviceable components so that:
      i. Maintenance points are:
         a. Not blocked by ducts, pipes, conduits, electrical boxes, other equipment, walls, columns, or other parts of the building or cabinetry.
         b. Are fully visible and are readily accessible with both hands by service personnel, when comfortably standing or kneeling, without stretching, reaching behind obstructions, or having to remove obstructions.
   
   c. Distribution Systems:
      i. No piping shall be in concrete or concrete block walls.
      ii. Vertical services shall be in accessible shafts with access provided to each floor. On floors where maintenance items are located, provide an access door. Elsewhere, provide either an access door or a permanently mounted steel ladder.

5.5 Acoustics – Plumbing:

Performance requirements:

1. Design the maximum velocity of water in pipes not to exceed 1.2 meters per second for hot water systems and 1.5 meters per second for cold water systems.

2. All new and/or relocated piping connecting to vibrating equipment shall be isolated from the structure with flex connectors within the mechanical room in which the vibrating equipment is located, or for a minimum of 5 meters both upstream and downstream of the equipment, whichever is greater.

3. Install flex connectors on all new and/or relocated pipes connected to vibrating equipment.

4. Continuous noise from plumbing fixtures and systems shall meet the same NC levels as HVAC systems.

5. Maximum noise from plumbing equipment and components shall not exceed the following dBA levels:
### Technical Standards for Offices 2019 – Tenant Improvements

#### Space Type

<table>
<thead>
<tr>
<th>Space Type</th>
<th>MAX NC</th>
<th>Max SPL dB</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>32 Hz</td>
</tr>
<tr>
<td>Conference, Meeting, Interview Rooms</td>
<td>30</td>
<td>50</td>
</tr>
<tr>
<td>Offices, Reception Areas</td>
<td>35</td>
<td>55</td>
</tr>
<tr>
<td>Other Occupied Areas</td>
<td>40</td>
<td>60</td>
</tr>
</tbody>
</table>

#### b. Prescriptive requirements:

1. Use a resilient sleeve around supply pipes with oversize clamps fastened to the structure, in areas where water flow noise may be a disturbance.

2. Ensure that pipes penetrating through drywall partitions are not rigidly connected to the wall. Provide an air space of 12 mm around the pipes and fill with an appropriate material such as mineral fiber, and seal with a resilient caulking or firestopping system as required for the application.

#### 5 a 6 Balancing – Plumbing:

#### a. Performance requirements:

1. Test, adjust and balance all new or modified domestic water distribution systems and their settable components.

#### b. Prescriptive requirements:

1. Domestic Hot Water Recirculation System Balancing:
   
   a. Provide domestic hot water recirculation systems with balancing valves at new tenant improvements recirculation branch lines.
   
   b. Balance the systems to maintain a minimum temperature drop of 6°C to the takeoff to the most hydraulically remote fixture on each branch.
   
   c. Design recirculation system to minimize the length and quantity of non-recirculated branch lines.

2. Tempered Water System Balancing:
   
   a. Set each tempering valve, pressure balanced valve and limit stop faucet so that the discharge temperature in each case is within the required tolerance.
   
   b. Central tempered water systems are not permitted.

#### 5 b Drainage Systems

#### 5 b 1 Sanitary Drainage:

#### a. Performance requirements:

1. Connect all new and/or relocated plumbing fixtures and equipment that discharge sanitary waste to the sanitary drainage system.

2. Design plumbing systems to prevent blockage, facilitate maintenance and resist vandalism.

3. Drain by gravity wherever possible and do not use pumping without first obtaining written approval from RPD.

4. Provide cleanouts along the entire new piping system.

5. New sewer piping system shall be dye tested to verify the sewer is not interconnected with the storm piping system.
.6 Fittings shall not be encased in concrete.

b. Prescriptive requirements:

.1 All above slab drainage and vent piping shall be metallic (cast iron and/or copper) for fire resistance, longevity, ease of disassembly and acoustic properties.

.2 Provide cleanouts in accessible locations and, where possible.

.3 Coordinate architectural and structural work so that all drains are at low points and remain so following any floor deflection.

.4 Provide floor drains:

.a Where reduced backflow preventers are installed. The size of the floor drain must be designed large enough to accommodate a full relief dump of the backflow preventer without causing property damage.

.b Service and Equipment Spaces:

.1 Adjacent to all new and/or relocated equipment that is likely to discharge water during operation or maintenance. (e.g. cooling coils, pumps, water heaters, boilers, backflow preventers, valve stations, test points).

.2 Do not permit water discharge to drain across the floor.

.3 Do not route drain piping across floors unless it is tight to walls or bases and does not create a tripping hazard.

.4 If no floor drain is required for the reasons above, provide at least one floor drain for wash down purposes.

.c In other locations as required to meet Code and the functional needs of the facility.

.5 Cleanouts:

.a Provide a readily accessible cleanout in the sanitary connection to each water closet.

.b Provide a cleanout on the vertical riser at the bottom of each pipe chase.

.6 Slope drainage lines at a minimum of 2%.

.7 Protect traps and water piping located in unheated areas from freezing and vandalism.

.8 Provide trap primers for new floor drains. Trap primers shall be controlled by a solenoid and on a timer. Water supply to the trap primer shall be installed with either an approved air gap or a reduced pressure backflow preventer.

.9 Provide drain connection for dilution tanks and/or acid neutralizers, associated with condensate drains from high efficiency gas fired heating appliances, to sanitary.

5 c Domestic Water Systems

5 c 1 Domestic Water – General:

a. Performance requirements:

.1 Connect the domestic cold and hot water system to all new and/or relocated plumbing fixtures and equipment that require water.

.2 Provide zone isolation valves to each separate area.

b. Prescriptive requirements:

.1 Piping:

.a Water distribution piping above slab shall be Type K copper for fire resistance and longevity.
.b Limit the velocities of flow in the piping to 1.5 meters per second for cold water and 1.2 meters per second for hot water (including recirculation systems).

.2 Isolation:
   .a Provide isolation valves on risers, at takeoffs on each floor level, at each floor, at each plumbing fixture, and at each piece of equipment.

.3 Provide sleeves for water piping penetrating through concrete.

.4 Provide backflow protection at each fixture considered to be a hazard to the drinking water system as in accordance with CSA B64.10

.5 Provide area isolation for severe hazard using a reduced pressure backflow preventer in areas accordance with CSA B64.10

5 c 2 Domestic Hot Water:

a. Performance requirements:
   .1 Provide domestic hot water and tempered hot water at the required temperature to new and/or relocated plumbing fixtures and equipment that require it.
   .2 Domestic hot water temperatures shall be adjustable to suit the needs of the occupants. Initial set points including temperature limit stops on individual fixtures shall be as follows:
       .a Showers 40ºC ±1ºC
       .b Janitor sinks 60ºC ±2ºC
       .c Staff showers 43ºC ±2ºC
       .d Kitchen sinks 60ºC ±2ºC

b. Prescriptive requirements:
   .1 Water Distribution and Temperatures:
       .a Generate, store and distribute domestic hot water at 60ºC to minimize Legionella risk.
       .b Recirculate domestic hot water from the distribution system back to the generating / storage equipment to maintain a minimum temperature of 55ºC at the most remote takeoff and a minimum temperature of 50ºC at the return point.
       .c Run outs from domestic hot water mains shall be recirculated where they exceed 5 meters in length.
       .d Minimum run outs from tempering valves shall not exceed 2 meters in length.

5 d Plumbing Fixtures

5 d 1 Plumbing Fixtures – General:

a. Performance requirements:
   .1 Comply with the B.C. Building Code regarding water efficiency.
   .2 Where accessible fixtures are required, comply with BC Building Code, Building Access Handbook including offset drainage P-trap, and hand free or accessible use water faucets.

5 d 2 Kitchen Sinks (staff rooms, lunch rooms):

a. Prescriptive requirements:
   .1 Bowl: 780 mm x 520 mm x 175 mm O.D., Type 302 stainless steel self-rimming bowl double compartment with under coating, 90 mm crumb cup, holes drilled in ledge back complete with under deck clamps.
5 d 3  Kitchen Sinks (Swallow bowl for Accessibility Use)
   a. Performance requirements:
      .1 Project Specific Requirements section must be consulted prior to starting design if new or replacement of existing sink is considered.

5 d 4  Counter Sink (meeting rooms):
   a. Prescriptive requirements:
      .1 Bowl: 510 mm x 520 mm x 175 mm O.D., Type 302 stainless steel self-rimming, single compartment with under coating, 90 mm crumb cup, holes drilled in ledge back complete with under deck clamps.
      .2 Trim: Sink supply faucet, lever handle, 200 mm swing spout with aerator, 200 mm centres, polished chrome finish.

5 d 5  Counter Sink (Swallow bowl for Accessibility Use)
   a. Performance requirements:
      .1 Project Specific Requirements section must be consulted prior to starting design if new or replacement of existing sink is considered.

5 d 6  Water closets:
   a. Performance requirements:
      .1 Project Specific Requirements section must be consulted prior to starting design if new or replacement of existing water closets is considered.

5 d 7  Urinals:
   a. Performance requirements:
      .1 Project Specific Requirements section must be consulted prior to starting design if new or replacement of existing urinals is considered.

5 d 8  Lavatories:
   a. Performance requirements:
      .1 Project Specific Requirements section must be consulted prior to starting design if new or replacement of existing lavatories is considered.

---- End Plumbing Section ----
6 FIRE SUPPRESSION

6a Fire Suppression – General

6a1 Maintenance Access – Fire Suppression:

   a. Performance requirements:
      .1 Provide good access to all fire suppression services.
      .2 Install fire suppression services such that they do not impede access to other building services for installation, testing, balancing, operation, maintenance or replacement.

   b. Prescriptive requirements:
      .1 Major equipment and central valve stations:
         .a Where fire protection system equipment or components are required to be higher than 2M above the floor, provide platform for service access.
         .2 Locate pipes, equipment, valves and other serviceable components so that:
            .a Maintenance points are:
               .1 Not blocked by ducts, pipes, conduits, electrical boxes, other equipment, walls, columns, or other parts of the building or cabinetry.
               .2 Are fully visible and are readily accessible with both hands by service personnel.
            .b No part of the fire suppression systems obstructs similar maintenance access to any other building system or its components.
      .3 Distribution Systems:
         .a No piping shall be in concrete or concrete block walls.
      .4 Heat Tracing:
         .a Provide heat tracing and insulation on wet fire suppression standpipe or sprinkler mains where they are required to pass through unheated areas.
         .b Heat tracing is not permitted on sprinkler branch lines.
         .c Provide an electronic heat trace controller to monitor and control the system. Monitoring shall include temperature, voltage, current and ground fault conditions and provide an output signal to a dedicated trouble signal on the fire alarm system.
         .d Provide identification labels on the outside of the pipe insulation to indicate that there is heat trace cable present.

6a2 Maintenance Manuals – Fire Suppression

   a. Prescriptive Measures
      .1 Provide a copy of the relevant sections of NFPA-25 to RPD.

6b Fire Extinguishers

6b1 Fire Extinguishers - General

   a. Performance requirements:
      .1 Provide fire extinguishers in accordance with NFPA-10 or municipal requirements.

   b. Prescriptive requirements:
      .1 Provide dry chemical fire extinguishers, rated in conformance with code.
In finished areas, provide semi-recessed cabinets suitable for required fire extinguisher, complete with plexiglass window, piano hinged door and latch. Provide wall mounted “Fire Extinguisher” signage that mounts perpendicular to the wall to which it is attached.

6 c Sprinkler Systems
6 c 1 Sprinklers – General:
   a. Performance requirements:
      .1 Provide an automatic sprinkler system in accordance with the B.C. Building Code, NFPA-13 and municipal requirements.
   b. Prescriptive requirements:
      .1 Provide wet sprinkler systems throughout all areas of the tenant improvement area unless noted otherwise below.
      .2 Provide a ULC listed manual supervised shut off valve and ULC listed flow switch for sprinkler zone. Locate these devices in mechanical rooms or service spaces.
      .3 Provide quick response sprinklers throughout.
      .4 Connect all manual shut off valves, solenoid shut off valves and flow switches to dedicated trouble signals in the fire alarm panel.
      .5 Provide hydrostatic tests conforming to NFPA-25 at not less than 200-psi.
      .6 Provide zone tags on all valves and piping.
      .7 Provide stock of spare sprinklers and wrench as per NFPA-25.

6 c 2 Pre-action and Dry Sprinklers:
   a. Performance requirements:
      .1 Project Specific Requirements section must be consulted prior to starting design if new or replacement of existing pre-action and / or dry sprinklers is considered.

6 c 3 Sprinkler Zoning and Isolation:
   a. Performance requirements:
      .1 Provide sprinkler zones in conformance to NFPA requirements.
   b. Prescriptive requirements:
      .1 Sprinkler Zoning:
      .2 Each sprinkler zone shall be complete with flow test station and drain assembly

6 c 4 Fire Suppression Systems
   a. Performance requirements:
      .1 Provide fire suppression systems for major computer rooms and where required by RPD.
      .2 System based on Halon as an extinguishing agent are NOT permitted.
   b. Prescriptive requirements:
      .1 Provide chemical based fire suppression systems in accordance with NFPA requirements.
      .2 Chemicals shall be non-damaging to the environment (FM200, Energen, or as reviewed with RPD)
      .3 Provide double interlocked system complete with detectors, wiring, control panel, abort switches, emergency dump switches and local alarm indication. Panel shall be interlocked to main building fire alarm system with separate zone indicated at building enunciator.
.4 Provide chemical storage tanks, distribution piping, discharge nozzles and all required components. Provide seismic restraint of all components.

.5 Provide technical assistance to conduct a live dump test and chemical to recharge and reset the system.

----- End Fire Suppression System Section -----
7 POWER

7 a Performance requirements

7 a 1 The intent of this standard is to provide the technical requirements for the design of a functional electrical system that is reliable, flexible, cost effective (based on triple bottom line), maintainable, and meets the tenant needs.

7 a 2 Strategies shall be implemented to ensure quality power is delivered to the tenant loads. Based on 100% non-linear tenant loads, the electrical service to the space shall meet the following criteria when space is occupied:

a. Total Power Factor > 0.95
b. Voltage Unbalance < 1%
c. Current Unbalance < 10%
d. Comply with IEEE 519 for Harmonic Distortion.

7 b Prescriptive Requirements

7 b 1 Distribution and Branch Wiring

a. Provide one, CSA 5-20R, commercial specification grade, duplex receptacle and associated circuiting as per Table 7.1. Unless noted otherwise receptacles shall be mounted at 450mm AFF.

b. Tenant space shall be supplied from a dedicated feeder. A means of disconnect shall be provided within the tenant space.

c. Each new panel shall have 25% spare space to add future bolt on circuit breakers.

d. Surge Protective Device (SPD) shall be installed on the tenant’s main panel. The SPD device shall be a Type 2 device as defined by UL 1449 standard. The device shall provide all mode protection with sine wave tracking.

e. Provide a handle lock on circuit breakers feeding tenant security equipment, exit signs, and emergency lighting.

f. In lieu of switched receptacles supply one smart power bar (current sensing) as per Table 7.1.

7 b 2 Metering

a. Provide a digital revenue grade metering system to enable RPD to measure and report consumption.

b. Provide the same meter type throughout.

c. Metering requirements shall be as follows:

.1 Tenant spaces > 10,000 ft2 - Segregate tenant plug, lighting and HVAC loads (dedicated to this tenant) on separate panels and install meters to separately measure energy/demand for each load type.

.2 Tenant spaces between 5000 ft2 and 10,000 ft2 – Install a single meter to measure total energy/demand for combined plug and lighting load (Lighting and plug loads can share the same panels). Heating and Air Conditioning loads (dedicated to this tenant) shall be segregated on panel and metered.

.3 Tenant spaces < 5000 ft2 - Install a single meter to measure total energy/demand for combined plug, lighting, and HVAC loads (dedicated to this tenant).

d. All meters shall be connected to the Building Utility Service network (as described in the Structured Cabling Section) with a web-based user interface to permit remote access to data.

e. A fully operational BACnet IP interface shall be provided to the DDC, as directed by RPD. Interface shall be BACnet Testing Laboratories (BTL) certified (with no custom programming).
f. System shall be capable of connecting to an enterprise system (without custom programming) to permit consolidation of information centrally for reporting. This software is not required as part of the tenant’s metering system.

7 b 3 Fire Alarm
a. In addition to code requirements, provide fire alarm strobe lights in all washrooms and corridors.

7 b 4 Installation
a. Locate all panelboards within tenant space, but not on/in walls adjacent to staff work areas. Panelboards supplying work area receptacles and lighting shall not supply HVAC loads.
b. Provide 2 spare 27 mm (1”) conduit from each panelboard to accessible ceiling space.
c. Provide complete project documentation at completion including following:
   1 Current panelboard directory using type written descriptors.
   2 Label each receptacle cover plate with type written label(s) indicating circuit identifier as follows; 2A10, where 2 is floor #, A is unique panel descriptor, 10 is circuit number. Include same label in outlet box using permanent marker.
d. Minimum wire size shall be #12 AWG. Each branch circuit shall be provided with a dedicated neutral.
e. All branch circuit wiring shall be routed vertically in stud cavity, not horizontally.
f. Final connections to receptacles, luminaries, and other electrical equipment, from adjacent junction boxes (J Bs) can be cable (as permitted by code) but home run conduit and wiring shall be used from panelboards to J Bs to minimize cable lengths.
g. Provide fully recessed poke-through style floor box to deliver power and communications to tables in Meeting Rooms, Training Rooms, Boardrooms and Workpoint islands.

<table>
<thead>
<tr>
<th>Space</th>
<th>Duplex Receptacles</th>
<th>Smart Power Bar</th>
<th>Data Jacks</th>
<th>HDMI</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Quantity</td>
<td>Circuiting</td>
<td>Comments</td>
<td>Quantity</td>
</tr>
<tr>
<td>Office</td>
<td>2</td>
<td>2 Offices per circuit</td>
<td>Receptacle on wall adjacent to desk.</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Receptacle on wall opposite desk.</td>
<td></td>
</tr>
<tr>
<td>Shared Office</td>
<td>3</td>
<td>1 Office per circuit</td>
<td>Receptacle on each wall (excluding wall with door)</td>
<td>2</td>
</tr>
<tr>
<td>Drop-In Office</td>
<td>2</td>
<td>2 Offices per circuit</td>
<td>Receptacle on wall adjacent to desk.</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Receptacle on wall opposite desk.</td>
<td></td>
</tr>
<tr>
<td>Small Meeting Room</td>
<td>4</td>
<td>1</td>
<td>Receptacle on wall behind TV.</td>
<td>0</td>
</tr>
<tr>
<td>Space</td>
<td>Duplex Receptacles</td>
<td>Smart Power Bar</td>
<td>Data Jacks</td>
<td>HDMI</td>
</tr>
<tr>
<td>--------------------</td>
<td>--------------------</td>
<td>----------------</td>
<td>------------</td>
<td>-----------------------------------</td>
</tr>
<tr>
<td></td>
<td>Quantity</td>
<td>Circuiting</td>
<td>Comments</td>
<td>Quantity</td>
</tr>
<tr>
<td>Large Meeting Room</td>
<td>7</td>
<td>2</td>
<td>Receptacle on wall behind TV. Receptacle on other 3 walls. Receptacle on wall below TV. One receptacle in each of 2 floor boxes installed under table (connected to a dedicated circuit).</td>
<td>0</td>
</tr>
<tr>
<td>Team Room</td>
<td>4</td>
<td>1</td>
<td>Receptacle on wall behind TV. Receptacle on wall opposite TV. 4-plex receptacle on wall between TV and table.</td>
<td>0</td>
</tr>
<tr>
<td>Copy / Print Room</td>
<td>6*</td>
<td>2*</td>
<td>* One receptacle connected to a dedicated 20-amp circuit for each MFD/Dedicated Fax machine. Two receptacles above counter. One receptacle on each wall without counter.</td>
<td>0</td>
</tr>
<tr>
<td>Break Room</td>
<td>6*</td>
<td>7*</td>
<td>* One receptacle connected to a dedicated circuit for each fridge and microwave. * Provide minimum 2 GFCI receptacles, each connected to dedicated circuits above counter backsplash. Provide one GFCI receptacle connected to a dedicated circuit on side wall or near front of counter to meet accessibility requirements. Provide dedicated hardwired circuit for each dishwasher. Confirm quantity based on actual tenant requirements. Provide housekeeping receptacle in room (refer to Corridor for circuiting).</td>
<td>0</td>
</tr>
<tr>
<td>Privacy Room</td>
<td>2</td>
<td>4 Privacy rooms per circuit</td>
<td>4-plex receptacle on wall above desk.</td>
<td>0</td>
</tr>
<tr>
<td>Quiet Room</td>
<td>3</td>
<td>1</td>
<td>Receptacle on wall behind TV. Receptacle on wall opposite TV. Receptacle on wall between TV and table.</td>
<td>0</td>
</tr>
<tr>
<td>Space</td>
<td>Duplex Receptacles</td>
<td>Smart Power Bar</td>
<td>Data Jacks</td>
<td>HDMI</td>
</tr>
<tr>
<td>------------------</td>
<td>--------------------</td>
<td>-----------------</td>
<td>------------</td>
<td>------</td>
</tr>
<tr>
<td></td>
<td>Quantity</td>
<td>Circuiting</td>
<td>Comments</td>
<td>Quantity</td>
</tr>
<tr>
<td>Cubicle</td>
<td>1</td>
<td>4 Cubicles per circuit</td>
<td>Receptacle adjacent to desk.</td>
<td>1</td>
</tr>
<tr>
<td>Mobile Workpoint</td>
<td>1</td>
<td>6 Mobile Workpoints per circuit</td>
<td>Receptacle adjacent to each desk.</td>
<td>0</td>
</tr>
<tr>
<td>Touch-down</td>
<td>1</td>
<td>6 Touch-down Stations per circuit</td>
<td>Receptacle adjacent to each desk.</td>
<td>0</td>
</tr>
<tr>
<td>Corridor</td>
<td>10 m.o.c</td>
<td>3 receptacles per circuit</td>
<td>Circuit to be used for housekeeping receptacles only</td>
<td>0</td>
</tr>
<tr>
<td>Network Counter</td>
<td>2 seats per receptacle</td>
<td>1</td>
<td>Every seat shall have access to duplex receptacle. Install below counter</td>
<td>0</td>
</tr>
<tr>
<td>Huddle Space</td>
<td>3</td>
<td>1</td>
<td>Receptacle on wall behind TV. Receptacle on wall between TV and table. Receptacle in end of millwork.</td>
<td>0</td>
</tr>
<tr>
<td>Chatpoint</td>
<td>0</td>
<td>N/A</td>
<td>N/A</td>
<td>0</td>
</tr>
<tr>
<td>Soft Seating</td>
<td>1</td>
<td>*</td>
<td>Receptacle adjacent to seats. * Connect to housekeeping circuit (see Corridor).</td>
<td>0</td>
</tr>
<tr>
<td>Meeting Booth</td>
<td>2</td>
<td>4 Meeting Booths per circuit</td>
<td>Receptacle on wall behind TV. Receptacle on wall between TV and table.</td>
<td>0</td>
</tr>
<tr>
<td>Washroom / Shower Rooms</td>
<td>1</td>
<td>1</td>
<td>GFCI receptacle on wall above counter (if within tenant space).</td>
<td>0</td>
</tr>
<tr>
<td>Janitor Closet</td>
<td>1</td>
<td>1</td>
<td>GFCI receptacle adjacent to door</td>
<td>0</td>
</tr>
<tr>
<td>Storage Room</td>
<td>1</td>
<td>2 Storage / File rooms per circuit</td>
<td>Receptacle adjacent to door</td>
<td>0</td>
</tr>
<tr>
<td>File Room</td>
<td>1</td>
<td>2 Storage / File rooms per circuit</td>
<td>Receptacle adjacent to door</td>
<td>0</td>
</tr>
<tr>
<td>Space</td>
<td>Duplex Receptacles</td>
<td>Smart Power Bar</td>
<td>Data Jacks</td>
<td>HDMI</td>
</tr>
<tr>
<td>---------------</td>
<td>--------------------</td>
<td>-----------------</td>
<td>------------</td>
<td>------</td>
</tr>
<tr>
<td></td>
<td>Quantity</td>
<td>Circuting</td>
<td>Comments</td>
<td>Quantity</td>
</tr>
<tr>
<td>Telecom Room</td>
<td>4*</td>
<td>4*</td>
<td>Provide one convenience receptacle connected to a dedicated circuit adjacent to door. Provide one receptacle connected to a dedicated circuit for security systems. Provide one receptacle connected to a dedicated circuit for WAN system. * Provide one dedicated 120V/20A circuits and one 5-20R receptacles for each 48 port PoE switch (Quantity to be confirmed during design).</td>
<td>0</td>
</tr>
<tr>
<td>Elect / Mech Room</td>
<td>1</td>
<td>1</td>
<td>Receptacle adjacent to door</td>
<td>0</td>
</tr>
</tbody>
</table>

7 b 5  Commission power system as per Section 12 – Commissioning.

----- End Power Section -----
8 LIGHTING

8 a Performance Requirements

8 a 1 Provide quality lighting throughout the tenant space which is suitable for tasks being performed.

8 a 2 The intent of this standard is to provide the technical requirements for the design of a functional lighting system that is reliable, flexible, scalable, cost effective (based on triple bottom line), maintainable, and meets the tenant needs.

8 a 3 Minimize energy consumption by selecting suitable luminaires with high efficacy and implementing advanced lighting control strategies.

8 a 4 Lighting design and associated controls shall comply with ASHRAE 90.1-2016 except where this standard indicates otherwise.

8 b Prescriptive Requirements

8 b 1 Refer to Table 8.1 for illumination levels, luminaire type and control requirements for each type of space.

8 b 2 Luminaires

a. General

.1 All luminaires shall be LED.

.2 Luminaires shall “fail on” to 100% output upon loss of control signal.

.3 All lighting loads shall be supplied from the tenant’s 120/208-volt panelboard to permit metering of total lighting load. In leased buildings confirm with landlord.

.4 Input to LED dimming driver shall utilize a 0-10 Volt (preferred) or DALI control signal.

.5 Colour temperature shall be 3500K

.6 CRI shall be 80 minimum

.7 Maximum THD shall be <20%

b. Primary Luminaires

.1 Luminaires shall be complete with an integral wireless control module and integrated occupancy/daylight sensor mounted within each luminaire housing. Integrated sensors shall not have any external wires to luminaire (sensor not tethered to luminaire).

.2 Each luminaire with an integral sensor shall be capable of individual or group control of multiple luminaires.

.3 Luminaires shall be recessed 610mm x 610mm (2’ x 2’) volumetric or direct/indirect luminaires. No flat lens troffers.

.4 Minimum efficacy of luminaires shall be 110 lumens per watt (LPW).

.5 All luminaires shall have a minimum dimming range from 5% to 100% with no adverse impact on lighting quality.

.6 Primary luminaires shall standardize on same lumen output. Dimming setpoints and low/high trim settings shall be used to adjust illumination levels to suit task.

c. Specialty Luminaires

.1 Includes downlights, pendants, and linear lighting as selected by design team.

.2 Downlights shall have fully integrated LED array and driver (no screw in lamps) with a minimum efficacy of 85 LPW.
.3 Linear lighting shall have fully integrated LED array and driver with a minimum efficacy of 110 LPW.

.4 LED strip lights shall be provided on the underside of Breakroom upper cupboards to provide supplemental illumination for food preparation.

.5 Luminaires shall have a minimum dimming range from 10% to 100% with no adverse impact on lighting quality.

8 b 3 Wireless Lighting Control System

a. General

.1 Provide a fully functional wireless lighting control system throughout the space.

.2 The lighting control system shall be compatible with the LED luminaires.

.3 The Lighting control system shall be secure to prevent unauthorized access.

.4 The lighting control network shall not cause interference on other wireless networks operating within the space.

b. System shall provide complete coverage throughout tenant space with no loss of communication signals to/from devices.

c. System shall permit low/high trim levels and setpoints to be pre-set. Low trim pre-set establishes the minimum illumination level a user can achieve from a dimmer switch. High trim pre-set establishes the maximum illumination level a user can achieve from a dimmer switch. A setpoint is programmed to establish a predetermined illumination level which can not be adjusted by the user.

d. In addition to ASHRAE 90.1-2016 requirements for daylight harvesting, provide daylight harvesting in all spaces with fenestration.

8 b 4 Wireless Devices

a. General

.1 Devices shall be capable of operating luminaires individually or in groups.

.2 Battery powered, wireless control devices (no wiring to device) shall be utilized. Battery life to be a minimum of 10 years based on normal usage.

.3 All devices shall be the same style from the same manufacturer.

b. Switches

.1 Switches shall be approved for mounting on glass (side light), walls, desk top bracket, or over existing switch box (CSA approved) as required. Mounting height max. 1200mm AFF

.2 Switches shall be selected based on functionality required:

   .a Non-dimming switch: on/off

   .b Dimming switch: on/off/raise/lower

.3 Enclosed spaces shall have switches installed on latch side of door within space.

.4 Open spaces shall have switches installed at each entrance to space.

c. Occupancy/Daylight Sensors

.1 All primary luminaires to have integrated occupancy/daylight sensor.

.2 Where integrated luminaire sensors do not provide full coverage of the space, supplemental wireless sensors shall be added.

.3 Utilize PIR style occupancy sensors.
.4 Integrated or standalone occupancy sensors shall be capable of controlling multiple lighting zones. (example; primary lighting and pendant lighting in Quiet Room).

d. Wireless Zone Control Module
.1 Provide wireless on/off control to a specialty luminaire that does not require dimming using a wireless relay control module.
.2 Provide wireless on/off and dimming control to a specialty luminaire that requires dimming using a wireless dimming control module. Controller provides relay switching and 0-10 volt control to luminaire.
.3 Where multiple luminaires are connected to the same zone a single zone control module can be utilized and wired accordingly.
.4 Controller receives power from line voltage source it is controlling.
.5 Wireless control modules shall be mounted above ceiling adjacent to luminaire.

c. Software
.1 Provide all software required to initialize, configure, control, modify, adjust settings, and troubleshoot the lighting control system. Software shall be installed on tablet at completion of project. Tablet shall be turned over to RPD project implementer.
.2 All passwords shall be provided for system access.
.3 Software shall not require licensing fees.
.4 A fully operational BACnet IP interface shall be provided to the DDC, as directed by RPD. Interface shall be BACnet Testing Laboratories (BTL) certified (with no custom programming).
.5 System shall be capable of connecting to an enterprise system (without custom programming) to permit consolidation of information centrally for reporting. The enterprise software is Not In Contract.

<table>
<thead>
<tr>
<th>Space</th>
<th>Illuminance Level (average maintained)</th>
<th>Primary Lighting</th>
<th>Specialty Lighting</th>
<th>Vacancy Control (manual on/off, auto off)</th>
<th>Occupancy Control (auto on/off)</th>
<th>Primary Dimming Switch</th>
<th>Specialty Dimming Switch</th>
<th>Low Trim</th>
<th>High Trim</th>
<th>First On</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Office</td>
<td>540 lux</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>N/A</td>
<td>No</td>
<td>540 lux</td>
<td>Last dimming level</td>
<td></td>
</tr>
<tr>
<td>Shared Office</td>
<td>540 lux</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>N/A</td>
<td>No</td>
<td>540 lux</td>
<td>Last dimming level</td>
<td></td>
</tr>
<tr>
<td>Drop-In Office</td>
<td>540 lux</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>N/A</td>
<td>No</td>
<td>540 lux</td>
<td>Last dimming level</td>
<td></td>
</tr>
<tr>
<td>Small Meeting Room</td>
<td>540 lux (horizontal)</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>N/A</td>
<td>No</td>
<td>540 lux</td>
<td>270 lux</td>
<td></td>
</tr>
</tbody>
</table>

Table 8.1 - LUMINAIRE TYPE, LIGHTING CONTROL, AND ILLUMINACE LEVELS*
<table>
<thead>
<tr>
<th>Space</th>
<th>Illuminance Level (average maintained)</th>
<th>Primary Lighting</th>
<th>Specialty Lighting</th>
<th>Vacancy Control (manual on/off, auto off)</th>
<th>Occupancy Control (auto on/off)</th>
<th>Primary Dimming Switch</th>
<th>Specialty Dimming Switch</th>
<th>Low Trim</th>
<th>High Trim</th>
<th>First On</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Large Meeting Room</td>
<td>540 lux (horizontal) 110 lux (vertical on walls)</td>
<td>Yes</td>
<td>Optional</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes (when provided)</td>
<td>No</td>
<td>540 lux</td>
<td>270 lux</td>
<td>Large meeting rooms shall have primary lighting separated into 2 dimming control zones (Zone 1 - front of room where TV monitor located. Zone 2 - Balance of luminaires). Any specialty lighting above table shall also be on a separate dimming zone with vacancy functionality.</td>
</tr>
<tr>
<td>Team Room</td>
<td>540 lux</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>N/A</td>
<td>No</td>
<td>540 lux</td>
<td>540 lux</td>
<td>Last dimming level</td>
</tr>
<tr>
<td>Copy/Print Room</td>
<td>320 lux</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>Setpoint 320 lux</td>
<td>Dimming setpoint set by software.</td>
</tr>
<tr>
<td>Break Room</td>
<td>320 lux</td>
<td>Yes</td>
<td>Optional</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>54 lux</td>
<td>320 lux</td>
<td>320 lux</td>
<td>Specialty lighting shall be on a separate vacancy control zone.</td>
</tr>
<tr>
<td>Privacy Room</td>
<td>540 lux</td>
<td>Yes</td>
<td>Yes (Pendant)</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>540 lux</td>
<td>Primary: 270 lux</td>
<td>Specialty: N/A</td>
</tr>
<tr>
<td>Quiet Room</td>
<td>540 lux</td>
<td>Yes</td>
<td>Yes (Pendant)</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>540 lux</td>
<td>Primary: 270 lux</td>
<td>Specialty: N/A</td>
</tr>
<tr>
<td>Cubicle*** (Open Office)</td>
<td>540 lux</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>N/A</td>
<td>320 lux</td>
<td>540 lux</td>
<td>Last dimming level</td>
<td>Last dimming level</td>
</tr>
<tr>
<td>Mobile Workpoint</td>
<td>540 lux</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>N/A</td>
<td>320 lux</td>
<td>540 lux</td>
<td>Last dimming level</td>
<td>Last dimming level</td>
</tr>
<tr>
<td>Touchdown</td>
<td>540 lux</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>N/A</td>
<td>320 lux</td>
<td>540 lux</td>
<td>Last dimming level</td>
<td>Last dimming level</td>
</tr>
<tr>
<td>Corridor**</td>
<td>110 lux</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>High Setpoint 110 Lux</td>
</tr>
<tr>
<td>Network Counter</td>
<td>220 lux</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>N/A</td>
<td>No</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Huddle Space</td>
<td>220 lux</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>N/A</td>
<td>Yes</td>
<td>No</td>
<td>220 lux</td>
<td>110 lux</td>
<td>N/A</td>
</tr>
<tr>
<td>Chatpoint</td>
<td>110 lux</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>N/A</td>
<td>No</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Soft Seating</td>
<td>220 lux</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>N/A</td>
<td>Yes</td>
<td>No</td>
<td>220 lux</td>
<td>110 lux</td>
<td>N/A</td>
</tr>
<tr>
<td>Space</td>
<td>ILLUMINANCE LEVEL (Average Maintained)</td>
<td>PRIMARY LIGHTING</td>
<td>SPECIALTY LIGHTING</td>
<td>VACANCY CONTROL (Manual On/Off, Auto Off)</td>
<td>OCCUPANCY CONTROL (Auto On/Off)</td>
<td>PRIMARY DIMMING SWITCH</td>
<td>SPECIALTY DIMMING SWITCH</td>
<td>LOW TRIM</td>
<td>HIGH TRIM</td>
<td>FIRST ON</td>
<td>COMMENTS</td>
</tr>
<tr>
<td>--------------------------</td>
<td>---------------------------------------</td>
<td>------------------</td>
<td>-------------------</td>
<td>------------------------------------------</td>
<td>--------------------------------</td>
<td>------------------------</td>
<td>------------------------</td>
<td>----------</td>
<td>-----------</td>
<td>---------</td>
<td>---------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Meeting Booth</td>
<td>220 lux</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>Each shower room shall have one 7x24 light for safety</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Dimming set point set by software.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Luminaires in Shower Room shall be suitable for the environment.</td>
</tr>
<tr>
<td>Washrooms / Shower Rooms</td>
<td>220 lux</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td></td>
<td>Setpoint 220 lux</td>
</tr>
<tr>
<td></td>
<td>110 lux (vertical for vanity)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Janitor Closet</td>
<td>320 lux</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>Dimming set point set by software.</td>
</tr>
<tr>
<td>Storage Room</td>
<td>220 lux</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>Dimming set point set by software.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>File Room</td>
<td>320 lux</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>Dimming set point set by software.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Service Room (Elect/Mech/Telecom)</td>
<td>320 lux</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>320 lux</td>
<td>Line voltage switching is acceptable. No automatic shut-off.</td>
</tr>
</tbody>
</table>

* Illuminance Uniformity Ratio not to exceed 3:1 (Average to Minimum) Task height for horizontal illumination level calculations shall be 760mm (30”), except corridors and washrooms shall be 0mm (0”)*

** Corridor shall be broken into separate zones based on physical layout (e.g. North, East, South, West). Corridor lighting shall not be completely de-energized for safety/security reasons.

*** Open office areas shall be separated into separate lighting control zones based on layout of space (spaces separated by lockers, walls, high screens, etc.) Each zone shall have independent lighting control.

**8 b 5** EXIT Signs

| a. Exit Signs shall be LED, commercial grade, pictogram style with white thermoplastic housing and power rating ≤2.5 watts. |

**8 b 6** Emergency Lighting:

| a. Unit equipment shall be utilized for emergency lighting, regardless if generator is present. |
| b. The batteries shall be centralized, with remote heads. Each battery shall be fed from a local lighting circuit from the area it is covering while minimizing the number of batteries required. |
| c. Lamps shall be LED. |

**8 b 7** Setup, testing and Commissioning

| a. Ensure lighting system is properly installed, programmed, calibrated to meet manufacturers requirements and this standard. |
| b. When setting dimmer high/low trims and set points, take field measurements of illumination levels in the affected space following the Illumination Engineering Society field measurement guidelines |
| c. Provide separate training and demonstration sessions to occupants and maintenance staff on lighting system. |
| d. Commission Lighting system as per Section 12 – Commissioning |

----- End Lighting Section -----
9 STRUCTURED CABLEING

9 a Performance Requirements

9 a 1 The intent of this standard is to provide the technical requirements for the design of a functional structured cabling system that is reliable, flexible, cost-effective (based on triple bottom line), maintainable, and meets the tenant needs.

9 a 2 A complete structured cabling system shall be installed and tested as outlined below for data, voice, multimedia, and Building Utility Service (BUS).

9 a 3 The design and installation of the structured cabling system shall follow the latest approved version of TIA/EIA 568, TIA/EIA 569, TIA/EIA 606, J-STD-607, TIA 526-14 standards and BiCSI TDM and TCIM manuals. This document takes precedence over above standards.

9 a 4 All products in the horizontal cabling system, when combined, shall meet channel performance as per TIA/EIA-568 for the cabling system installed.

9 a 5 At least 3 weeks prior to occupancy, the following work must be completed; structured cabling system installation completed/certified, Telecommunication Room must be completed/secured/cleaned, patch cords delivered to site, and copy of hand-written as-built drawing posted on telecommunication room door.

9 b Prescriptive Requirements

9 b 1 General

a. For spaces utilizing a Unified Communication (UC) voice system, the quantity and location of communication outlets to be installed shall be based on Table 7.1 (Located in Section 7 - Power). If UC is not being utilized, double the quantity of data jacks indicated in Table 7.1 at each outlet.

9 b 2 Cable

a. Cables and patch cord insulation shall contain no lead or other heavy metals.

b. Horizontal cabling to Wireless Access Points (WAPs) shall be 4 pair, Category 6A and all other horizontal cabling shall be 4 pair Category 6. Horizontal cabling shall be 23 AWG.

c. Category 3 voice backbone cables shall be installed between the Main Entrance Facility (MEF) and each tenant telecommunication room in a star wired configuration.

d. For Unified Communication (UC) sites, provide one (1) 25 pair voice backbone cable to each telecommunication room.

e. For non-UC sites the voice backbone shall be sized by allocating one pair for 50 percent of the horizontal cables originating from that telecommunication room and then rounded up to the next 25 pair multiple. Voice backbone cable shall be a minimum of one (1) 25 pair cable to each telecommunication room.

f. Data backbone cables shall be installed between the government’s main telecommunication room (determined by RPD) and each tenant’s telecommunication room in a star wired configuration.

g. Data backbone cable shall be a 12 strand OM3 fiber optic cable assembly with a maximum length of 300 meters. Cable assembly shall utilize straight through polarity with factory installed 12 strand, male MPO style connectors on each end. Cable assembly shall have 3 meters of spare cable length, on each end, neatly coiled and supported in telecommunication room.

9 b 3 Termination Hardware

a. Copper

.1 All horizontal cable terminations shall use TIA/EIA 568A pin configuration.
.2 All cables shall terminate on 483 mm (19”) rack mounted, RJ45 angled patch panels in the telecommunication rooms. The maximum density of the rack mounted patch panels is 48 port (2U), and the minimum is 24 port (1U).

.3 Horizontal cabling for WAPs shall terminate on a separate modular Category 6A rated patch panel. Horizontal cabling for BUS cables shall terminate on separate modular Category 6 rated patch panels. All other horizontal Workpoint cables shall terminate on separate fully populated Category 6 rated patch panels.

.4 All voice backbone cables shall terminate on BIX1A/110 blocks adjacent to the MEF telephone demarcation and on separate rack mounted, populated, patch panels (1 pair per RJ45 jack using TIA/EIA 568A pin configuration) in each tenant telecommunication room.

.5 All patch panels shall be front and back accessible.

.6 WAP outlet jacks shall be RJ45, Category 6A. All other outlet jacks shall be RJ45, Category 6. All jacks shall be same color.

b. Fiber

.1 Female MPO to duplex LC (straight through polarity) fiber optic cassettes shall be used to terminate the cable assembly in all telecommunication rooms. Maximum of 12 fiber strands per cassette.

.2 Rack mounted fiber patch panel, complete with cable management accessory, shall be installed in relay frame to accommodate the fiber optic cassettes. Size each patch panel to accommodate 2 future cassettes.

c. Patch Cords

.1 The quantity of patch cords supplied for cross-connects within the telecommunication rooms shall equal the total quantity of horizontal cables installed. Provide Category 6A patch cords for WAPs and Category 6 for all other patch cords. Patch cords shall be booted RJ45 style, stranded, 24 AWG, and be the same color. Provide 50% of the patch cords at a length of 1.2 m (4’0”) and 50 % of the patch cords at 1.8 m (6’0”).

.2 The quantity of patch cords supplied for workpoints shall equal the total quantity of horizontal cables installed. Provide Category 6A patch cords for WAPs and Category 6 for all other patch cords. Patch cords shall be RJ45 style, stranded, 24 AWG, and be the same color. Provide 50% of the patch cords at a length of 3.0m (10’), 25% of the patch cords at a length of 4.6 m (15”), and 25% of the patch cords at a length of 6.0m (20”).

.3 Fiber patch cords will be supplied by government (OCIO).

.4 Installation of all cross connects and patch cords will be completed by government (OCIO).

d. Racks

.1 All patch panels shall be installed on floor mounted 483 mm (19”) two-post, relay frame style racks. Rack shall be 2134 mm (84”) high. Racks shall have EIA universal hole spacing.

.2 Provide one (1) 5-20R receptacle, connected to a dedicated 120V/20A circuit, for each data network switch. Receptacle(s) shall be mounted on rack.

.3 Provide a rack mounted shelf 300mm below the horizontal patch panels.

.4 Full length vertical cable troughs shall be installed on both sides of relay frames for vertical patch cord management (no horizontal cables shall be installed in cable trough). The cable troughs shall have a hinged cover with a magnetic latch.

.5 The horizontal cable managers shall consist of 4 D rings, each ring shall be 38 mm x 102 mm (1.5”x 4”). The horizontal cable manager shall occupy only one (1) rack unit, fabricated from steels, and be suitable for installation in a 483 mm (19”) rack.

.6 Each data network switch shall have a horizontal cable manager located above and below.
CATV System

.1 Where requested by the tenant, each CATV outlet shall be cabled with a dual shielded RG6 cable terminated on a ‘F’ series connector on each end. The coverplate shall have an ‘F’ series coupler for the termination of the cable. Each cable shall be a home run to the CATV service entrance room.

Multimedia

.1 Provide a HDMI cable (minimum 18 Gbps) complete with male connectors to the desktop surface or floor box. (Note: Rooms containing a teleconference phone with a collaboration kit does not require this HDMI cable).

.2 Desktop Installation - Conceal the HDMI cable vertical drop inside wall by using a split-hole coverplate behind the TV monitor and a second split-hole coverplate between the TV monitor and desktop. Provide 1500mm (5’) slack cable coiled up on the desktop surface.

.3 Floor Box Installation - Conceal the HDMI cable vertical drop inside wall by using a split hole coverplate behind the TV monitor and run in conduit to floor box. Provide an HDMI female/female bulkhead in floor box. Provide a 3000mm (10’) HDMI patch cord c/w male connectors from the floor box to the tabletop and left coiled up neatly.

Wireless Access Points (WAP)

a. Provide 2 ceiling mounted telecommunication outlets at each POE wireless access point.

b. Wireless Access Points shall be spaced in a grid pattern as per the OCIO heat map. If heat map is not provided, install WAP outlets at a maximum spacing of 15 m (50’) o.c. and provide complete coverage throughout the entire space.

Wide Area Network (WAN)

a. If OCIO does not have connectivity in the building provide one 53 mm (2”) continuous conduit, c/w pull rope, from Service Providers Point of Presence to the government’s main telecommunication room (determined by RPD). WAN cable shall be installed by Service Provider (NIC).

b. If OCIO has connectivity in the building install a new fiber data backbone from the existing government main telecommunication room to each new telecommunication room. Consultant to advise RPD if length exceeds 300m.

Building Utility Service (BUS)

a. BUS provides remote access to building systems through the government WAN.

b. Outlets shall be installed for the following building systems as directed by RPD; intrusion alarm, access control, fire alarm, lighting control, metering, DDC, and other systems identified during design.

c. Each horizontal cable for the BUS shall be installed from the Telecommunication Room to the building system network interface for each building system. Terminate cable on BUS patch panel in Telecommunication Room and on a RJ45 jack adjacent to each building system network interface.

Fire Stopping

a. Product installed shall not require firestop materials to be removed or reinstalled when cables are added or removed.

b. If acceptable to Authority Having Jurisdiction (AHJ) use EZ-Path by Specified Technologies Inc.
9 b 8  Telecommunication Room

a. Minimum of one telecommunication room per floor, maximum floor area served from one room is 1000 m².

b. The telecommunication room shall be located within the tenant space on the floor that it serves and shall be the termination point for all horizontal cabling on that floor. Telecommunication rooms shall be vertically aligned and centrally located within the area it serves to limit horizontal cable length to 90 m (295’) maximum.

c. Minimum telecommunication room size shall be 1372 x 1829 mm (4’-6” x 6’-0”).

d. Only equipment associated with data, voice, and security services shall be located in Telecommunication rooms. (no pipes or ducts shall pass through Telecommunication Rooms)

e. Telecommunication rooms shall have 19 mm (¾”) G1S painted plywood backboard installed as indicated in Figure 1: Typical Telecom Room Layout.

f. If permitted by AHJ, telecommunication room door shall swing out. If the door must swing in, then the telecommunication room shall be redesigned to accommodate.

g. Unless required by code, a suspended ceiling is not required in the telecommunication room.

h. Layout of telecommunication room equipment shall follow Figure 1: Typical Telecom Room Layout.

i. Layout of relay frame equipment shall follow Figure 2: Typical Relay Frame Layout.

9 b 9  Installation

a. Walls shall have 102 mm x 102 mm (4”x 4”) outlet boxes installed with a single gang mud ring. A 27 mm (1”) conduit shall be installed from the outlet box to the ceiling space. The conduit shall have a grounding bushing installed in the ceiling space and be installed such that the minimum bend radius of the cable is not exceeded. If the wall is an internal partition with no insulation a low voltage mounting bracket with open wiring is acceptable.

b. Provide grommets to protect bare cables where they pass through metal framing.

c. Leave 305 mm (12”) of cable coiled in outlet box (or coiled behind wall if a low voltage mounting bracket is used) at wall jack location.

d. Where service poles are used leave 3 meters of spare cable coiled in ceiling space above service pole to permit relocation of service pole. Properly support cable coil to structure.

e. All cables shall be supported to structure independent of suspended ceiling and electrical/mechanical systems. Cable shall be installed using J hooks or similar approved support system (approved for use with Category 6/6A cable). Spacing of the J hooks shall be a maximum of 1524 mm (5”) and maximum cable sag permitted is 305 mm (12”). J hooks shall be installed in locations to group cables where possible. All cables shall be installed parallel to building grid lines.

f. Use 25 mm (1”) Velcro straps to support/bundle cables. Provide 100% spare cable capacity in Velcro straps. Tie wraps are not acceptable.

g. All cables installed in service spaces or outside the tenant space shall be installed in conduit. Where data backbone fiber is installed in a core telecom room, innerduct raceway may be used in lieu of conduit within that room.

h. Install 102 mm (4”) sleeves in floor to interconnect telecommunication closets. These sleeves shall be used to distribute riser cables. Provide 50% spare capacity in sleeves for future cables.

i. Install a complete grounding system to each telecommunication room and bond all equipment.

j. All patch cords supplied for the telecommunication room and the workstation area shall be turned over to RPD Project Manager.
9 b 10 Documentation

a. Every wall jack/patch panel jack shall be labelled with a unique label using a Brother “P Touch” labeller or similar. Handwritten labels are not acceptable. Cover plate shall be cleaned with isopropyl alcohol prior to installing label. Provide an identical label on cable in outlet box. Label Format shall be as described in Table 9.3.

<table>
<thead>
<tr>
<th>Label</th>
<th>Format</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Horizontal Cable/Jack</td>
<td>fs-p</td>
<td>1A-054 1st floor, Room A, Port 54 on Workpoint patch panel</td>
</tr>
<tr>
<td>MFD Fax Horizontal Cable/Jack</td>
<td>fs-p-m</td>
<td>1A-045-MFD Fax 1st floor, Room A, Port 45 on Workpoint patch panel used for MFD Fax line</td>
</tr>
<tr>
<td>WAP / BUS Horizontal Cable/Jack</td>
<td>fs-p-wb</td>
<td>1A-023-BUS 1st floor, Room A, Port 23 on BUS patch panel</td>
</tr>
<tr>
<td>Data Backbone</td>
<td>fs1/fs2-Dn</td>
<td>1A/2A-D2 Data backbone cable #2 from 1st floor Room A to 2nd floor Room A</td>
</tr>
<tr>
<td>Data Backbone Termination</td>
<td>fs1/fs2-Dn.d</td>
<td>1A/2A-D2.2 Connector #2 of data backbone cable #2 from 1st floor Room A to 2nd floor Room A</td>
</tr>
<tr>
<td>Voice Backbone Cable</td>
<td>fs1/fs2-Vn</td>
<td>1A/2A-V3 Voice backbone cable #3 from 1st floor Room A to 2nd floor Room A</td>
</tr>
<tr>
<td>Voice Backbone Termination</td>
<td>fs1/fs2-Vn.d</td>
<td>1A/2A-V3.1 Pair #1 of Voice backbone cable #3 from 1st floor Room A to 2nd floor Room A</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Identifier</th>
<th>Descriptor of Identifier</th>
</tr>
</thead>
<tbody>
<tr>
<td>f</td>
<td>Floor number telecommunication room is located (as per drawings)</td>
</tr>
<tr>
<td>s</td>
<td>Sequential telecommunication room identifier (starting at A)</td>
</tr>
<tr>
<td>p</td>
<td>Sequential patch panel(s) port number</td>
</tr>
<tr>
<td>m</td>
<td>Specialty port identifier for MFD Fax line</td>
</tr>
<tr>
<td>wb</td>
<td>Specialty Patch Panel Identifier: BUS = Building Utility Service</td>
</tr>
<tr>
<td></td>
<td>WAP = Wireless Access Point</td>
</tr>
<tr>
<td>fs1</td>
<td>Source telecommunication room with floor number and telecommunication room identifier (main telecommunication room)</td>
</tr>
<tr>
<td>fs2</td>
<td>Destination telecommunication room with floor number and telecommunication room identifier</td>
</tr>
<tr>
<td>n</td>
<td>Sequential cable number</td>
</tr>
<tr>
<td>d</td>
<td>Pair number in voice backbone cable, fiber connector number for fiber data backbone</td>
</tr>
<tr>
<td>D</td>
<td>Designates data backbone cable</td>
</tr>
<tr>
<td>V</td>
<td>Designates voice backbone cable</td>
</tr>
</tbody>
</table>

b. In addition to the above one of the two horizontal cables for each Multi-Functional Device (MFD) location shall be designated as a traditional fax line and shall have a second label indicating “MFD Fax” at both ends.
c. The BIX1A/110 blocks at the demarcation shall be labelled as per above for voice backbone terminations.

d. All WAP cables shall be tested to ensure compliance with Category 6A permanent link performance, and all other horizontal cables shall be tested to Category 6 permanent link performance, as defined by TIA/EIA 568B. Test results indicating “fail” and test results indicating “warning” (i.e. test results that do not pass within the accuracy of the tester) are not acceptable.

e. The voice backbone cables shall be tested for continuity and polarity. Contractor must sign off the test results indicating the testing has been completed and correct.

f. Each fiber strand shall be tested to ensure compliance with 10GB Performance requirements when tested using the “one cord reference method” as defined by TIA 526-14. Submit actual test results with calculated losses.

g. All test results shall be provided in electronic format only c/w manufacturer’s viewing software on disk with test results.

h. “As Built” drawings shall be provided in hardcopy and in electronic form. A copy of the “As Built” drawing, showing the jacks associated with that specific telecommunication room shall be mounted on the door of that telecommunication room. The “As Built” drawings shall show all jacks and the associated label for each jack. The drawings shall clearly indicate the location of the telecommunication rooms, voice backbone, and data backbone diagrams. The drawing legend shall be shown on each page.

i. Warranty on the complete system shall be one year.

j. Commission Structured Cabling system as per Section 12 – Commissioning.
Figure 1: Typical Telecommunication Room Layout

Notes
1. 7'0" Reel or frame
2. Vertical cable management trough (patch cords only).
3. Service provider equipment (by others).
4. Security equipment (by others).
5. 3/4" G1S plywood backboard (2' x 8').
6. Receptacle to be duplex 5-20RA (each on dedicated circuit, provide one duplex receptacle per switch).
7. Luminaire with light switch.
8. Copper ground bus. Connect to ground bus in panelboard supplying receptacles
9. 12" cable tray.
10. Duplex receptacle on dedicated circuit for service provider WAN equipment.
11. Duplex receptacle on dedicated circuit for security equipment.
12. Conduit stub-in location for service provider WAN riser cable.
13. Conduit stub-in location for fiber backbone cable (between tenant telecom rooms).
Figure 2: Typical Equipment Rack Layout

Rack Elevation Notes:
1. Fiber optic patch panel c/w fiber optic cassettes for network backbone running between tenant telecom rooms. Label = BGN BACKBONE PATCH PANEL.
2. Minimum CAT 5e, preloaded, angled patch panel for Voice riser. Label = VOICE RISER PATCH PANEL
3. Cat 6, 24 port, modular, angled patch panel for Building Utility Services (BUS) horizontal cable terminations. Label = BUILDING UTILITY SERVICE (BUS) HORIZONTAL PATCH PANEL.
4. Cat 6A, 24 port, modular, angled patch panel for Wireless Access Point (WAP) horizontal cable terminations. Label = WIRELESS ACCESS POINT (WAP) HORIZONTAL PATCH PANEL.
5. Cat 6, 48 port, preloaded, angled patch panel for Workpoint horizontal cable terminations. Label = WORKPOINT HORIZONTAL PATCH PANEL.
6. 1 RU horizontal cable manager
7. Network POE switch (by others)
8. Network router (by others)
9. 84" high (48 RU) 2-post relay frame.
10. Vertical cable management trough.
11. Front-mount (flush) equipment shelf.
12. 5-20R duplex receptacle(s). Provide one duplex receptacle for each network switch. Each duplex receptacle shall be fed from a dedicated 20A/120V circuit. Mount receptacle(s) to rigid, rack mounted panel.

----- End Structured Cabling Section -----
### 10 BUILDING FABRIC SECURITY UPGRADES

#### 10 a General

10 a 1 The following Security Upgrade Schedule summarizes security upgrades for rooms, spaces or areas. Upgrade details follow the schedule.

<table>
<thead>
<tr>
<th>Room/Space</th>
<th>Upgrade:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Comments</td>
</tr>
<tr>
<td></td>
<td>Exterior Doors and Frames</td>
</tr>
<tr>
<td></td>
<td>Locksets and Keyways</td>
</tr>
<tr>
<td></td>
<td>Exterior Door Glazing</td>
</tr>
<tr>
<td></td>
<td>Exterior Walls</td>
</tr>
<tr>
<td></td>
<td>Floors and Roofs</td>
</tr>
<tr>
<td></td>
<td>Windows and Glazing</td>
</tr>
<tr>
<td></td>
<td>Compounds and Parking Areas</td>
</tr>
<tr>
<td></td>
<td>Interior Doors &amp; Frames 1st Upgrade</td>
</tr>
<tr>
<td></td>
<td>Interior Doors &amp; Frames 2nd Upgrade</td>
</tr>
<tr>
<td></td>
<td>Interior Door Glazing</td>
</tr>
<tr>
<td></td>
<td>Locksets</td>
</tr>
<tr>
<td></td>
<td>Keyways 1st upgrade</td>
</tr>
<tr>
<td></td>
<td>Keyways 2nd upgrade</td>
</tr>
<tr>
<td></td>
<td>Interior Walls 1st upgrade</td>
</tr>
<tr>
<td></td>
<td>Interior Walls 2nd upgrade</td>
</tr>
<tr>
<td></td>
<td>Interior Walls 3rd upgrade</td>
</tr>
<tr>
<td></td>
<td>Reception Counters 1st upgrade</td>
</tr>
<tr>
<td></td>
<td>Reception Counters 2nd upgrade</td>
</tr>
</tbody>
</table>

---

Table 10.1: Building fabric security upgrades
10 b  Performance Requirements

10 b 1 The following requirements are security upgrades to the basic Technical Standards:

a. Exterior Shell of Building - Fabric Upgrades
   .1 Exterior Doors, Frames, Hardware and Glazing
      .a Exterior Doors and Frames Upgrade
         .1 Provide heavy duty 1.6 mm (16 ga.) solid core steel door (with steel stiffeners).
            All entry doors to be fitted with a full-length steel astragal. Standard of Acceptance: Fleming H16 or Steelcraft B 16 series doors.
      .b Locksets and Keyways Upgrade
         .1 Highest Level of Security: Keyways shall comply with UL 437 and be restricted from duplication of key blanks as provided by copyright law in Canada and shall be registered to provide absolute key control. Standard of Acceptance: Medeco or Mul-T_lock
      .c Exterior Door Glazing Upgrade
         .1 Door and sidelight glazing shall be a minimum of heavy-duty laminated glass or an approved equivalent.

b. Exterior Building Fabric (other than Doors)
   .1 Exterior Walls Upgrade
      .a Use normal commercial construction but provide 3.5 mm (10 ga.) expanded metal mesh under exterior wall sheathing.
   .2 Floors and Roofs Upgrade
      .a Roofs shall be constructed with 3.5 mm (10 ga.) expanded metal mesh under the roof sheathing.
   .3 Windows and Glazing Upgrade
      .a Exterior windows within 3 meters (10ft.) of the grade, shall be protected with laminated glass or protective film. All protective films shall be factory installed as per the manufacturer’s specifications or be field installed “edge to edge” under the window stops. Standard of Acceptance: Glass-gard GGL 800 or Ace Security Films SF9.
   .4 Compounds and Parking Areas
      .a Compound is to be enclosed with a 2134 mm high (7'0") secure galvanized chain-link fence topped with three (3) strands of barbed wire strung between steel posts making a total height of 2438 mm (8'0"); fence to have top and bottom rails, and to be fully secure at grade. 3048 mm (10'0") wide lockable gate is required for main access to compound.

10 b 2 Interior of Building - Fabric Upgrades

a. Interior Doors and Frames Upgrade
   .1 1st Upgrade: Provide heavy duty 1.6 mm (16 ga.) solid core steel door (with steel stiffeners). Standard of Acceptance: Fleming H16 or Steelcraft B 16 series doors.
   .2 2nd Upgrade: All doors to be heavy duty 1.6 mm (16 ga.) hollow steel door (with steel stiffeners). Additionally:
      .a All entry doors to be fitted with a full-length steel astragal.
      .b All doors to be equipped with NRP (non-removable pin) hinges.
Technical Standards for Offices 2019 – Tenant Improvements

.c All telecommunication closet doors, accessible from public space, to be equipped with a door-closer.
.d No “elephant foot” is to be installed.
.e No signage to identify the room as a telecommunication closet - room number only.

b. Locksets Upgrade

1. Locksets shall be heavy duty security hardware with steel dead-bolts into steel inserts, with ULC approval at the highest level. Locksets to be “Storeroom lock” type (outside lever fixed, entrance by key only. Inside lever always unlocked.)

c. Keyways Upgrade

1. **1st Upgrade:** Keyways shall be restricted to approved types such as Schlage D, G or T series or Falcon G series.
   
   a. All keys to be engraved “DO NOT COPY”.
   
   b. ARES/Service Provider to maintain a list of all keys distributed.

2. **2nd Upgrade:** Highest Level of Security: Keyways shall comply with UL 437 and be restricted from duplication of key blanks as provided by copyright law in Canada and shall be registered to provide absolute key control. Standard of Acceptance: Medeco or Assa Abloy.

d. Interior Perimeter Walls Upgrade

1. **1st Upgrade:** All interior demising walls to be full height (slab to slab).

2. **2nd Upgrade:** The interior perimeter walls shall be full-height, slab to slab, and constructed to resist penetration using a material such as 13 mm (1/2”) plywood or particle board as a backing to the outer layer of gypsum board wall finish.

3. **3rd Upgrade:** Partitions are to be full height, floor to underside of structure, with no openings. Interior walls to be of the following composite construction (from outside face inward):

   a. 16 mm (5/8”) gypsum wall board (or as per AHJ requirements)
   
   b. 3.5 mm (10 ga.) expanded metal mesh
   
   c. 19 mm Plywood or OSB
   
   d. Framing
   
   e. 16 mm (5/8”) gypsum wall board
   
   f. Where openings cannot be avoided at ceiling plenum area, then the area must be completely enclosed with 3.5 mm (10 ga.) expanded metal mesh.

e. Reception Counters Upgrade

1. **1st Upgrade:** Reception counters with increased depth, front to back, to discourage physical attack and/or protective barriers over counter (provide Millwork details).

2. **2nd Upgrade:** 1067 mm (42”) high multi-level counter, to be secured on with glazed partition between counter and minimum 2438 mm (8’) above floor.

----- End Building Fabric Security Upgrades Section -----
11 PHYSICAL SECURITY

11 a Performance Requirements

11 a 1 General

a. All security systems shall comply with the requirements detailed in the most current version of the Physical Security Standards for Government of B.C. Facilities (PSS). This standard is publicly available at: https://www2.gov.bc.ca/assets/gov/british-columbians-our-governments/services-policies-for-government/real-estate-space/physical_security_standards.pdf

b. Not all the systems or devices described in the PSS shall necessarily be included in each project. It is the responsibility of the design team (in coordination with the client) to build upon the minimum requirements of the standard to develop the appropriate deployment strategy, device, and functional requirements for each project.

c. All electronic security systems for government leased/owned space shall be managed solely by the Government of B.C. The use of landlord owned, and/or managed systems is acceptable for common areas of buildings only and must not provide access to government space.

11 b Prescriptive Requirements

11 b 1 General

a. All security systems shall comply with the requirements detailed in the most current version of the Physical Security Standards for Government of B.C. Facilities (PSS). This standard is publicly available at: https://www2.gov.bc.ca/assets/gov/british-columbians-our-governments/services-policies-for-government/real-estate-space/physical_security_standards.pdf

b. All new work must comply with the requirements of the PSS. Any substantial work or reconfiguration to existing space shall require the upgrading of the entire security system(s) to current standard requirements.

c. The consulting, design, engineering, and commissioning of all electronic security systems for the Government of British Columbia shall be by qualified personnel that shall:

.1 Have ten (10) year of security experience, at least five (5) years of which shall have been directly related to the design/engineering of physical and electronic security systems.

.2 Hold all applicable license categories as per the British Columbia Security Services Act regardless of any other professional designation (including P. Eng.).

d. An intrusion alarm system (IAS) is a mandatory minimum requirement for securing any office, building or other Government of B.C. space. The IAS is designed to detect unauthorized entry into protected spaces.

e. All inquiries, product approvals, proposed deviations or other questions related to the PSS or its application, may be submitted to PhysicalSecurity@gov.bc.ca for response.

----- End Physical Security Section -----
12 COMMISSIONING

12 a Commissioning Scope of Work

12 a 1 Provide Commissioning for the project that meets all requirements of this Section with the exception that existing building areas, systems & elements, that are unaffected by the project, need not be commissioned unless required by Code(s), AHJ or the Owners Project Requirements.

12 a 2 Commissioning scopes for building elements and systems are described in the included schedules. If a project has different commissioning needs, these differences need to be documented in a separate project specific commissioning scope at the preparatory stage of the project.

12 a 3 The Co-ordinating Registered Professional and the Engineer-of-Record for each discipline shall be responsible to complete and submit the “Letter of Conformance” included in this section
Letter of Conformance - Architectural

Project Name: __________________________________________________________

Instructions: Architect of Record circles the corresponding answer and initializes each clause below to confirm general compliance with each clause for the above project. Architect of Record shall sign this document indicating conformance.

Section A:

A1. YES / NO ______ All architectural systems have been designed in compliance with RPD Technical Standards for Offices and any deviations have been identified, recorded and approved by RPD. Identify all deviations in Section B.

A2. YES / NO ______ All architectural systems have been installed in compliance with RPD Technical Standards for Offices and any deviations have been identified, recorded and approved by RPD. Identify all deviations in Section B.

A3. YES / NO ______ Acoustics separations have been tested and all test results have been reviewed with no deficiencies noted.

A4. YES / NO ______ Record drawings have been received, reviewed and are complete.

A5. YES / NO ______ Interdisciplinary coordination has occurred, been recorded and indicates that TI space is following Work Safe BC and RPD Technical Standards for Offices.

A6. YES / NO ______ All fire separations and fire stops have been designed and installed as per BC Building Code.

A7. YES / NO ______ Architectural products and installation are in general conformance with contract documents and shop drawings.

Section B: Deviations as per A1 above (attach additional sheet if required)

B1. __________________________________________________________________________

B2. __________________________________________________________________________

B3. __________________________________________________________________________

Architect of Record:

Name: (print) ______________________________________________________________

Company: __________________________________________________________________

Date: __________________________, 20____
### OPR Check Sheet - Architectural

<table>
<thead>
<tr>
<th>Item #</th>
<th>System</th>
<th>Commissioning and Acceptance Testing Standard</th>
<th>Submission</th>
<th>Initial</th>
<th>Date Received</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Interior Architecture Design</td>
<td>RPD Technical Standards for Offices -TI</td>
<td>AR shall submit signed Letter of Conformance indicating all architectural systems and components have been designed in compliance with RPD Technical Standards for Offices – TI - and deviations recorded. Reason for deviation must be identified and recorded.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Architectural Installation</td>
<td>BC Building Code, Contract Documents and Shop Drawings</td>
<td>Letter of Conformance signed by AR indicating all architectural products and installation are in general conformance with contract documents and shop drawings. Also, attach a copy of final Declaration of Compliance. Letter also refers to design and installation of the interfaces, in addition to materials, components and systems themselves.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Acoustic Separation</td>
<td>BC Building Code, Vancouver Building Bylaw, and Technical Standards for Offices</td>
<td>Signed letter by AR indicating acoustics meets Technical Standards for Offices – TI - requirements. Also, see footnote 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Fire Stops</td>
<td>Manufacturer approved installation methods</td>
<td>Copies of applicable BC Building Code Schedules signed by AR with no exclusions.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Seismic restraint</td>
<td>Seismic Engineer Inspection Report</td>
<td>Copies of Building Code Schedule B-1, B-2, and C signed by ER with no exclusions.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Exit Signs</td>
<td>BC Fire Code and AHJ</td>
<td>Copies of applicable Building Code Schedules signed by AR with no exclusions.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Proposed penetration and opening details</td>
<td>BC Building Code and installation methods</td>
<td>Verification report with summary letter signed by AR. Letter includes statement that opening details described in the construction documents maintain the weather resistance of the exterior wall envelope (e.g. new exterior door – where applicable).</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Coordination Study</td>
<td>General Note “h”.</td>
<td>Copy of complete coordination study signed by registered architect with review letter signed by AR.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Record Drawings</td>
<td>RPD Technical Standards for Offices TI</td>
<td>Letter of Conformance signed by AR advising record drawings reflect changes to contract.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Contractor Quality Assurance &amp; Control</td>
<td>See General Note “g”</td>
<td>Letter of Conformance signed by AR indicating each interior space meets Work Safe BC requirements and RPD Technical Standards</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**General Notes**

a. AR = Architect of Record.
b. AR to provide a separate letter for each individual submission. Letter shall indicate test/verification results have been reviewed by AR and conform with testing standards, owner’s requirements and design intent.  
c. If manufacturer has specific acceptance/commissioning testing requirements they will be in addition to standards listed above. 
d. Commissioning and Acceptance Testing Standard is minimum requirements. AR to determine any additional requirements. 
e. AR to develop appropriate procedures in addition to all items shown above, to demonstrate compliance with the CaGBC LEED V4 Gold rating system, as per contract documents and owner requirements. 
f. Includes test results for all installed systems, products and assemblies identified in Technical Standards for Offices. Perform additional testing if site conditions warrant it.  
g. AR shall review and confirm all systems, products and assemblies installed meet required standards and ratings 
h. AR shall review coordination study and confirm all interior architectural building systems are selectively coordinated.  
i. Review acoustics study and indicate if calculated values are within acceptable levels as stated in the Technical Standards for Offices TI. Required for acoustics installations only. 

---

1 AR to develop functional tests to demonstrate acoustics systems functions as per contract documents and owner requirements.
Letter of Conformance – Mechanical

Project Name:  ____________________________________________________________

Instructions: Mechanical Engineer of Record circles corresponding answer and initializes each clause below to confirm general compliance with each clause for the above project. Mechanical Engineer of Record shall sign this document indicating conformance.

Section A:

A1. YES / NO _______ All mechanical systems have been desealed in compliance with RPD Technical Standards for Offices and any deviations have been identified, recorded and approved by RPD. Identify all deviations in Section B.

A2. YES / NO _______ Complete plumbing system has been inspected, pressure tested and all test results and inspection record have been reviewed with no deficiencies noted.

A3. YES / NO _______ Complete sprinkler system has been tested and all test results have been reviewed with no deficiencies noted. Fire alarm system has been re-certified.

A4. YES / NO _______ Fire Stops products and installation are in general conformance with contract documents, shop drawings, and building code requirement.

A5. YES / NO _______ Seismic restraint products and installation are in general conformance with contract documents, shop drawings, and building code requirement.

A6. YES / NO _______ O & M manuals have been received, reviewed and are complete.

A7. YES / NO _______ Record drawings have been received, reviewed and are complete.

Section B: Deviations as per A1 above (attach additional sheet if required)

B1.  ____________________________________________________________

B2.  ____________________________________________________________

B3.  ____________________________________________________________

Mechanical Engineer of Record:

Name: (print)  ____________________________________________________________

Company:  ____________________________________________________________

Date:  ________________________, 20____
### 12 c OPR Check Sheet - Mechanical

<table>
<thead>
<tr>
<th>Item #</th>
<th>System</th>
<th>Commissioning and Acceptance Testing Standard</th>
<th>Submission</th>
<th>Initial</th>
<th>Date Received</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>All Mechanical Systems</td>
<td>RPD Technical Standards for Offices (Tenant Improvement)</td>
<td>MER shall submit signed Letter of Conformance indicating all mechanical system have been designed in compliance with RPD Technical Standards for Offices (owner’s requirements) and deviations recorded.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Fire Alarm Test Certificate</td>
<td>ULC - S537</td>
<td>Copies of Building Code Schedule B-1, B-2, and C signed by MER with no exclusions.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Plumbing System</td>
<td>BC Building Code, AHJ (Local Plumbing Inspector), CSA B64.10 (Backflow annual testing)</td>
<td>Final Plumbing Inspection Certificate and Backflow Test Certificate from AHJ.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Sprinkler System</td>
<td>NFPA 13 and AHJ</td>
<td>Sprinkler Contractors Engineer of record inspection, testing, and Schedule C &quot;Letter of Assurance&quot;.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Fire Stops</td>
<td>Manufacturer approved installation methods</td>
<td>Copies of BC Building Code Schedule B-1, B-2, and C signed by MER with no exclusions.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Seismic restraint</td>
<td>Seismic Engineer Inspection Report</td>
<td>Copies of Building Code Schedule B-1, B-2, and C signed by a professional engineer with no exclusions.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>O&amp;M Manuals</td>
<td>RPD Technical Standards for Offices</td>
<td>Letter of Conformance signed by MER advising content of O&amp;M manuals reviewed and is complete.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Record Drawings</td>
<td>RPD Technical Standards for Offices</td>
<td>Letter of Conformance signed by MER advising record drawings reflect changes to contract.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### General Notes

a. MER = Mechanical Engineer of Record.
b. If manufacturer has specific acceptance/commissioning testing requirements they will be in addition to standards listed above.
Letter of Conformance – Electrical

**Project Name:** ______________________________________________________________

**Instructions:** Electrical Engineer of Record circles corresponding answer and initializes each clause below to confirm general conformance with each clause for the above project. Electrical Engineer of Record shall sign this document indicating conformance.

**Section A:**

**A1.** YES / NO _______ All electrical systems have been designed in compliance with RPD Technical Standards for Offices and any deviations have been identified, recorded and approved by RPD. Identify all deviations in Section B.

**A2.** YES / NO _______ Complete structured cabling system has been tested and all test results have been reviewed with no deficiencies noted.

**A3.** YES / NO _______ O&M manuals have been received, reviewed and are complete.

**A4.** YES / NO _______ Training and Demonstration

**A5.** YES / NO _______ Record drawings have been received, reviewed and are complete.

**A5.** YES / NO _______ Interior lighting measurements have been recorded and illumination levels and uniformity is following Work Safe BC and RPD Technical Standards for Offices.

**A6.** YES / NO _______ All lighting controls have been witnessed and are operational as per RPD Technical Standards for Office and design.

**A7.** YES / NO _______ Electrical products and installation are in general conformance with contract documents and shop drawings.

**Section B:** Deviations as per A1 above (attach additional sheet if required)

**B1.**

**B2.**

**B3.**

**Electrical Engineer of Record:**

**Name:** (print) ____________________________________________________________

**Company:** ____________________________________________________________

**Date:** ___________________ , 20____

March 29th, 2019
### OPR Check Sheet - Electrical

<table>
<thead>
<tr>
<th>Item #</th>
<th>System</th>
<th>Commissioning and Acceptance Testing Standard</th>
<th>Submission</th>
<th>Initial</th>
<th>Date Received</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Electrical Design</td>
<td>RPD Technical Standards for Offices</td>
<td>EER submit signed Letter of Conformance indicating all electrical system have been designed in compliance with RPD Technical Standards for Offices (owner’s requirements) and deviations recorded.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Fire Alarm</td>
<td>ULC - S537</td>
<td>Copies of Building Code Schedule B-1, B-2, and C signed by EER with no exclusions.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Structured Cabling System</td>
<td>EIA/TIA 568</td>
<td>All individual test reports with Letter of Conformance signed by EER.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Fire Stops</td>
<td>Manufacturer approved installation methods</td>
<td>Copies of BC Building Code Schedule B-1, B-2, and C signed by EER with no exclusions.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Seismic Restraint</td>
<td>Seismic Engineer Inspection Report</td>
<td>Copies of Building Code Schedule B-1, B-2, and C signed by EER with no exclusions.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Exit Signs</td>
<td>BC Fire Code and AHJ</td>
<td>Copies of Building Code Schedule B-1, B-2, and C signed by EER with no exclusions.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Emergency Lighting</td>
<td>BC Fire Code and AHJ</td>
<td>Copies of Building Code Schedule B-1, B-2, and C signed by EER with no exclusions.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>O&amp;M Manuals</td>
<td>RPD Technical Standards for Offices</td>
<td>Letter of Conformance signed by EER advising content of O&amp;M manuals reviewed and is complete.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Record Drawings</td>
<td>RPD Technical Standards for Offices</td>
<td>Letter of Conformance signed by EER advising record drawings reflect changes to contract.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Electrical Installation</td>
<td>Contract Documents and Shop Drawings</td>
<td>Letter of Conformance signed by EER indicating all electrical products and installation are in general conformance with contract documents and shop drawings. Also, attach a copy of final Electrical Contractor Authorization and Declaration of Compliance.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Lighting Control System</td>
<td>See footnote ²</td>
<td>EER submit signed Letter of Conformance indicating lighting control has been witness tested and operates as intended by contract document and owner’s requirements.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### General Notes

- EER = Electrical Engineer of Record.
- If manufacturer has specific acceptance/commissioning testing requirements they will be in addition to standards listed above.

---

² EER to develop functional tests to demonstrate lighting control system operates as per contract documents and owner requirements.
13 PROJECT SPECIFIC