



REAL PROPERTY  
DIVISION

# **RPD Technical Standards for Offices 2019 Tenant Improvements (Revision 2)**

Date of Update	Revision	Sections Updated
August 19, 2020	Rev. 1	General update to align with new Master Service Agreement
April 25, 2023	Rev. 2	General updates

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## **1. GENERAL REQUIREMENTS**

### **1.1 INTRODUCTION**

- .A 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.
- .B Where Municipal and/or Provincial regulations differ from the RPD Technical Standards, the Consultant shall notify the Project Manager and complete a Design Deviation Request Form (DDRF).
- .C Design solutions must adhere to current industry standard and practice, that maximize economic potential over the projected life of the building, without prestige amenities.
- .D 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.
- .E The design and construction of office space shall comply with American Society of Heating, Refrigeration, & Air Conditioning Engineers' Energy Standard for Buildings Except Low-Rise Residential Buildings (in lieu of National Energy Code of Canada for Buildings)
- .F Provide an Energy Statement on all design review drawing submissions.
- .G The completion of all Letters of Compliance and Owner's Project Requirements (OPR) Check Sheets of Section 11 shall apply to all work undertaken and completed.
- .H The IPT (Integrated Project Team) will determine the applicability of these Technical Standards for all RPD and its client's projects.
- .I For accessibility requirements refer to section 2.12.
- .J For Universal Multi-Stall Washrooms (Gender Inclusive) washrooms refer to section 2.13.
- .K It is expected the various project disciplines will coordinate and be familiar with the entire Technical Standards document so that an adequate interdisciplinary coordination occurs.

### **1.2 DESIGN 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 final requirements prior to implementation.
- .B Gap analysis: Building System Review should be completed as part of the consultant's scope of work during schematic design.

- .C On projects where LEED certification is required, RPD will determine the level of certification.
- .D Integrated Design Process (IDP)
  - .1 An Integrated Design Process should be utilized for the multidisciplinary projects.

### 1.3 CLIENT SPECIFIC REQUIREMENTS

- .A These technical requirements apply to commercial office spaces. Requirements for other occupancies or building types are described in other documents.
- .B Certain clients have specific requirements that only apply to their spaces. To detail these specific requirements, a series of supplemental Technical Standards have been developed. These supplemental standards are intended to be used in conjunction with the RPD Technical Standards for Offices which serve as the base standard.
- .C A Confidentiality Agreement will need to be completed and signed by anyone who will have access to the Client Specific Technical Standards.
- .D The list of Client Specific Technical Standards are as follows:
  - .1 **Community Corrections Office Design Standards for Service Delivery Locations**  
Contact: Earl Strueby [earl.strueby@gov.bc.ca](mailto:earl.strueby@gov.bc.ca)
  - .2 **Ministry of Children and Family Development (MCFD) Technical Design Standards for Offices**  
Contact: Sarah Patterson [sarah.patterson@gov.bc.ca](mailto:sarah.patterson@gov.bc.ca)
  - .3 **Ministry of Social Development and Poverty Reduction (MSDPR) Standards for Public Facing Locations**  
Contact: Joel Crocker [SDSIHQFacilities@gov.bc.ca](mailto:SDSIHQFacilities@gov.bc.ca)
  - .4 **Service BC Technical Standards** (Under development)

----- End General Requirements Section -----

## **2. INTERIOR ARCHITECTURE**

### **2.1 INTERIOR WALLS**

- .A Partitions may be either wood or steel studs finished with painted drywall, depending on the required acoustical separation - refer to Acoustic Separation sub-section.
- .B Select materials and products that are compliant with LEED criteria.
- .C The base should 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 negatively impact 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 sub-section "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.

### **2.2 DOORS, FRAMES, HARDWARE, AND INTERIOR GLAZING**

- .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:

- .1 Commercial Steel Doors and Frames: Canadian Steel Door and Frame Manufacturers' Association (CSDFMA) Manufacturing Specifications for Steel Doors and Frames.
- .2 Wood Doors: Architectural Woodwork Quality Standards as published by the Architectural Woodwork Manufacturers' Association of Canada (AWMAC).
- .3 New exterior doors, if required by specific project, will be identified in Section "Project Specific Requirements":
- .4 Doors must comply with fire resistance requirements when used in a rated wall assembly.
- .5 All solid core wood doors to be painted, paint grade high density hardboard face. Door size to 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.
- .6 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 LEED criteria compliant.
- .7 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.
- .8 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.
- .9 Window coverings for exterior windows and interior glazing to 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) or equal. Exception: leased spaces: exterior window coverings to be agreed upon with Landlords to ensure uniformity of exterior aesthetic look. To avoid glare on computer screens, do not select highly reflective finishes for exterior window application.



.10 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.

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

## 2.3 FLOOR FINISHES

.A Materials and Installations:

<b>SCHEDULE OF FLOOR FINISHES</b>	
<b>SPACE</b>	<b>FINISH</b>
Open office areas	Carpet tile
Private offices	Carpet tile
Conference, Interview rooms, Libraries and similar areas	Carpet tile
Circulation and Reception, Office Copiers	Carpet tile/ resilient flooring
Mailrooms, Copy Centres	Carpet tile/resilient flooring
Break Areas	Resilient flooring
Service Rooms (e.g., Mechanical/Electrical)	Sealed concrete
Telecommunication Closet	Sealed concrete or antistatic sheet vinyl
Washrooms (slope minimally to drains)	Resilient flooring or Methyl Methacrylate (MMA)
First Aid Rooms	Resilient flooring
Storage Rooms/Spaces	Sealed concrete
Main Entrances, Foyers, and similar public areas	Resilient flooring/stained and polished concrete
Janitor Rooms	Resilient flooring/sealed concrete

.B Carpets: Carpet to meet the following minimum specifications:

<b>CARPET TILE CONSTRUCTION SPECIFICATIONS</b>	
Fibre	Nylon 6 or Nylon 6,6; Modification ratio of 2.7 or less
Style	Level loop, textured loop, or cut & 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 & 3, 90% reduction, 0% growth
Static Level	Not to exceed 3.5 kV - AATCC-134
Warranties	Ten-year dimensional stability (Aachen Method DIN 54318) $\leq 0.1\%$ change or ISO 2551 $\leq 0.2\%$ change
	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 / m <sup>2</sup> hr TVOC)
Carpet Flammability	$\geq 0.45$ watts/cm <sup>2</sup> , Class 1 (ASTM E648)
Smoke Density	$\leq 450$ Flaming Mode (ASTM E662)

.C Sheet Vinyl

- .1 To conform to CSA 126.3 (latest edition) Type II Grade 1 minimum gauge 2.0 mm (.079").

.D Carpet and Resilient Floor Installation

- .1 Carpet and resilient flooring installations shall be in accordance with the recommendations contained in the BC Floor Covering Association, [info@bcfca.com](mailto:info@bcfca.com).

.E Concrete Floor Finishes

- .1 Steel trowel finish: to CSA CAN3-A23.1 with final finish to suit covering or treatment as per manufacturer's instructions.
- .2 Sealed/hardened concrete: in accordance with manufacturer's instructions.

- .F Stained and Polished Concrete
  - .1 Produce a representative test section to project manager-for acceptance prior to application.
  - .2 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).
- .G Adhesives
  - .1 Flooring shall be laid with adhesives that are acrylic based, low TVOC, 0 TVOC (calculated).
  - .2 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.

## **2.4 WALL FINISHES**

- .A Wall Finishes
  - .1 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 to be sealer/primer, top two coats to be project specific finish.
    - .B Paint to walls to 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 compliant.
  - .2 Wall Tiling
    - .A Tiling to 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 to be complementary to the tiles and easy to be maintained. Do not use white grout.

.3 Plastering

- .A Plastering to conform to the AWCC Specifications Standards Manual, available from the BC Wall & Ceiling Association, Web site: [www.bcwca.org](http://www.bcwca.org).
- .B Plaster finish to 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.

## 2.5 CEILINGS

.A Ceiling Finishes

- .1 All ceilings to be lay-in panels except for washrooms, which to be painted drywall. Mechanical, electrical and similar service rooms to 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 Where suspended ceilings are permitted, seismic resistance capabilities must conform to the requirements of the BC Building Code or Vancouver Building Bylaw, depending on project location.

.B Materials and Installation

- .1 Ceiling heights in office areas shall be consistent throughout and not less than 2591 mm (8' 6").
- .2 No light fixtures straddling partitions.

.C 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.

## 2.6 MILLWORK

- .A Wherever possible use standard size pre-manufactured and prefinished base cabinets and wall cabinets. Freestanding units are preferred. 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 to 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 to 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 could be used in specific areas only, for example: Deputy Minister’s office.
- .C Finishing Hardware: Finishing hardware should be to CGSB 69-GP-8M.
- .D Drawer Slides: Commercial grade drawer slides, suitable for the use and load requirements, to be installed on all drawers.
- .E Glass and Glazing: Glass to 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 the Client.
  - .2 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 2.12.

## **2.7 ACOUSTIC SEPARATION**

- .A Definitions
  - .1 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.

- .2 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.
  - .3 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.
  - .4 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.
  - .5 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.
  - .6 Impact Insulation Class (IIC) is an acoustical rating used to quantify impact sound absorption.
- .B General
- .1 Absolute acoustic separation is rarely required. Special attention is to be given in the following locations:
    - .A Deputy Ministers’ (or similar) offices
    - .B Arbitration/Union or other negotiation facilities
    - .C Offices where matters of strict confidentiality will be discussed
    - .D Separations between adjacent quiet areas (e.g. office to office or office to conference/meeting room).
    - .E 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).

.F Determine NIC required from the following table:

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

.G On projects requiring acoustics qualities an Acoustics consultant to be part of consultant's team.

.C Space Types:

- .1 Areas requiring very high level of confidentiality (e.g. 2.7.B.1.A to 2.7.B.1.C noted above).
- .2 Libraries, meeting rooms and other enclosed areas (including enclosed offices) requiring normal confidentiality.
- .3 Enclosed areas requiring lower level of confidentiality (e.g. people in adjacent enclosed area would be able to hear conversation indistinctly).
- .4 Open office areas.
- .5 Public areas (busy or noisy).
- .6 Utility/maintenance areas (noisy).
- .7 Storage areas, janitor facility and other quiet areas.
- .8 Mechanical equipment rooms.

.D 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.

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

.F 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.
- .G 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 on whether it is a 10 STC point increase or decrease.
- .1 On multidisciplinary projects determine acoustic requirements, including NIC, in compliance to realistic needs of the user at the design stage.
  - .2 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.
  - .3 “Mock-up” testing within select offices to be conducted during construction, to ascertain that project goals of acoustic separation can be achieved.
  - .4 Cables or conduits that penetrate through the seals are not permitted.
  - .5 Install an acoustical door bottom and threshold on the corridor doors.
  - .6 NIC shall be no less than NIC 35 between any occupied enclosed space and any adjoining space.
  - .7 Fire resistance rating requirements for closers (doors) take precedence over acoustic requirements.
  - .8 For NIC 40, demountable partition that extends to underside of suspended ceiling, should 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.
  - .9 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.
  - .10 Acoustically rated doors, hinged, swinging, with door stops at the jamb and head with manufacturer recommended hardware can achieve STC33 – 42.
  - .11 Doors must apply pressure evenly along the seals.



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

## **2.8 JANITOR FACILITIES**

- .A Locate janitorial facilities in lockable, separate room as close as practical to entrances, elevators, and washrooms, in spaces with a minimum clear height of 2438 mm (8'0").
- .B 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.
- .C Janitor facilities located in a basement must have elevator access to upper floors.

## **2.9 WASHROOM ACCESSORIES**

- .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.
  - .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 or approved equal. Provide 2 copies of keys to project manager.
  - .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 ¾" x 9")]. Or use electric hand dryers.

- .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")].

## **2.10 INTERIOR SIGNAGE**

- .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 to be plastic removable insert style, with:
  - .1 3 mm (0.12") black ABS back
  - .2 1.5 mm (0.06") non-glare acrylic face with a vinyl or paint colour accent border on inside surface, fastened to the back with
  - .3 Continuous strip of 0.8 mm (0.032") double-sided tape at the edge of three sides and
  - .4 Changeable insert of 0.5 mm (0.02") styrene base/intermediate vinyl surface with lettering reversed out or intermediate vinyl lettering showing styrene as background.
- .C 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.
- .E 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 to 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” to conform to the BC Building Code and all other relevant codes and regulations. International symbols must be used where and as applicable.

## **2.11 WOOD FIRST ACT**

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

## 2.12 ACCESSIBILITY

- .A Section 8.1 of the BC Human Rights Code protects an individual's access to accommodation, service, or facility.
- .B 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.
- .C The BC Public Service acts to meet this legal obligation through several mandates:
  - .1 The Public Service Act
  - .2 The 'Where Ideas Work' Corporate HR plan (2016)
  - .3 The Diversity and Inclusion Action Plan (2017)
  - .4 Accessibility 2024 (2014) / and the Building a Better B.C. for People with Disabilities
  - .5 Universal single-user washrooms (accessible washrooms)
    - .A 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 Inclusive washroom, people with chronic illness, or individuals with mobility impairments who use wheelchairs or scooters. Provide automatic door openers with push plates for accessibility for new Universal Single-User Washrooms/Shower Rooms.
- .D 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 B651 requires larger clear spaces for each accessible washroom.

- .E 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, except for projects where VBBL (Vancouver Building Bylaw) applies.
- .F 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 should 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., should 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.
- .G General:
  - .1 The space must be wheelchair accessible. Persons using wheelchairs, scooters or with other mobility impairments should 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.
  - .2 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.
  - .3 Accessibility entryway signage should be provided. Automatic door controls should be clearly visible with clear signage.
  - .4 Pathway from street to a main entrance should 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.
  - .5 Access from the main entrance to at least one accessible washroom.
  - .6 Access to the elevator or lift, where a publicly accessible elevator or lift exits. Provide signage for elevator / elevating device. Braille and tactile characters should be installed adjacent to control panel buttons.
  - .7 Contrasting colour should be used between wall and floor, with no glare.
  - .8 Doors should contrast visually with adjacent walls. Level threshold to be provided where required at change in floor finishes. 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. Kick plates should be provided on doors.

.9 Washrooms:

- .A 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 to be provided, one for the public and one for staff. Access to building common washrooms is acceptable for staff.
- .B 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.
- .C Other accessibility features should be provided in the washrooms, such as clear space under washbasin, graspable/reachable door handles and faucets, grab bars, and other accessories.
- .D In millwork provide a recessed removable panel below sinks to conceal plumbing below. The panel must provide access as needed for servicing, and knee space for accessibility while protecting users against contact with exposed pipes/surfaces.
- .E Fixtures should 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 mounted on the side wall rather than the door.
- .F Soap dispensers should 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 should be surface mounted.
- .G Surface mounted accessories: toilet tissue dispenser with stainless steel utility shelf, paper towel dispenser, sanitary napkin disposal.
- .H Provide new directional sign to accessible and universal washrooms.
- .I Provide automatic door openers with push plates for accessibility for new Universal Single-User Washrooms/Shower Rooms.

.10 Break rooms:

- .A 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.

- .B Millwork: create a space on the front cabinetry to accommodate a front mounted receptacle to be used mainly by people with accessibility challenges.
- .C In millwork provide a recessed removable panel below sinks to conceal plumbing below. The panel must provide access as needed for servicing, and knee space for accessibility while protecting users against contact with exposed pipes/surfaces.
- .D Cabinets corners to be rounded to avoid potential injury.
- .E A valance is required under the upper cabinet to shield any under-cabinet lighting provided for food preparation. This will help people with accessibility challenges.
- .F 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.
- .G Base cabinets to have toe space as per accessibility requirements.
- .H Cabinets / drawer hardware should support use with closed fist.
- .I Water supply pipes and P-trap drainage pipes should offset to rear of the accessible use sink.
- .J Sink: one lever handle or sensor-controlled faucet.
- .K Provide clear space in front of sink in breakrooms, for easy access to the sink by a person in wheelchair.

## 2.13 UNIVERSAL MULTI-STALL WASHROOMS

(also called **Gender Inclusive multi-user** washrooms)

- .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 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, gender-inclusive designated facilities with individual enclosed toilet stalls (full-height enclosures), that can share a common sink area. Accessible / universal cubicles should be provided in addition to these.
- .D Universal / accessible cubicles can be installed either alone or alongside universal multi-stall or 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 but refers to them as gender-inclusive washrooms with individual toilet stalls. Their requirements include full height stall doors and walls, locks that indicate vacancy, and entrances with no doors.
- .G It is the responsibility of the design team to identify the functional requirements specific to each project, depending on the existing building condition.
- .H In all cases, washroom design must either conform to all current jurisdiction 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 Compliance to all regulatory requirements including health and safety.
  - .2 Provides required capacity based on occupancy type and occupant load.
  - .3 Universal Multi-Stall Washrooms should include provision of an integrated environment (lighting, finishes, fixture selection, acoustics) which holistically responds to the needs of the user, owner, and other stakeholders.
- .I Universal Multi-Stall Washrooms shall provide full-height enclosures for toilets, creating individual 'toilet rooms' as opposed to stalls separated by partial dividers. They should be clearly marked as universal with appropriate signage.

- .J Universal Multi-Stall Washroom includes multi-user/common sink area.
- .K Use of swing door or vestibule to provide visual screening to main washroom area.
- .L If common washroom area is not provided with doors, then it must be visually screened from public corridor.
- .M 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. Insulate walls for maximum privacy.
- .N 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 openers c/w pushbutton for wheelchair access for accessible stalls. Provide push plates for accessibility for new Universal Multi-Stall Washrooms/Shower Rooms.
  - .4 Doors should be full height of the enclosure, from floor to ceiling.
- .O Floor finishes: Methyl Methacrylate (MMA) Acrylic Resin System. Apply coving for base.
- .P Ceilings: painted GWB
- .Q Provide waste receptacles in each toilet stall to ensure privacy around personal health and hygiene.
- .R Provide hooks in each toilet stall.
- .S Way finding & Signage Design
  - .1 Provide new signage, including Braille, on all new doors.
  - .2 Signage should 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.
- .T Wall mounted toilets should be used for easy floor cleaning in the compartment.

## **2.14 CHANGE ROOMS AND SHOWERS:**

- .A Included on in projects with specific requirements.



**2.15 TV MONITORS:**

- .A TV monitor sizes and locations shall be co-ordinated with the client and RPD.
- .B LED flat screen, 3840 x 2160-pixel, TV monitor (no curved screens).
- .C TV monitor shall be wall mounted, using fixed mount bracket, and sized to suit room/function where it is being installed.
- .D All TV monitors shall be by the same manufacturer with a standardized remote control for each unit.
- .E In addition to a remote control each TV monitor shall have integrated controls mounted on side or bottom.
- .F Provide a minimum of 2 Type A, HDMI 2.1 ports, one port on back for permanent connection and one side mounted.
- .G Minimum 10-watt speakers, integrated in TV monitor, for each of two channels.
- .H Provide Ethernet connectivity through integrated RJ45 jack.
- .I TV monitor will have automatic sleep/standby mode and consume < .5 watts of power in that mode.

**---- End Interior Architecture Section ----**

### **3. HVAC**

#### **3.1 GENERAL**

- .A Design process shall minimize risks of poor value, non-compliance with standards, delays, re-work, and compromised installations.
- .B Nothing in these Technical Standards or in questions asked, responses made, suggestions made, or assistance given by others shall transfer any responsibilities for the design and construction away from the Engineer of Record or the Contractor, to any other party.
- .C Greenhouse Gas (GHG) Emissions:
  - .1 Existing Buildings with major renovations shall meet maximum GHG emissions level of 5.0 kgCO<sub>2e</sub> / m<sup>2</sup>/year, if feasible.
  - .2 New Buildings shall meet maximum GHG emission level of 3.0 kgCO<sub>2e</sub> / m<sup>2</sup>/year, if feasible.
- .D Energy Performance Requirements:
  - .1 New Buildings and Existing Buildings with major renovations shall have improved Maximum Total Energy Use Intensity from Equipment and Systems to satisfy the following:
    - .A 110 kWh/(m<sup>2</sup>x year) from equipment and systems.
    - .B 20% Improvement from the original performance targets of 2018 BC Building Code.
  - .2 Net-Zero Energy Requirements for New Buildings and Existing Buildings with major renovations must be consulted with RPD prior to design.
- .E HVAC Operation and Maintenance Manual:
  - .1 The manual shall be in accordance with ASHRAE Guideline 4, “Preparation of Operating and Maintenance Documentation for HVAC&R Systems” and as-built record drawings certified by the Engineer of Record.
- .F HVAC Capacity
  - .1 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.
  - .2 It shall also have enough capacity to restore spaces from night setback temperature to occupied temperature efficiently and within 4 hours.
- .G Balancing - HVAC
  - .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  $\pm 5\%$  of design flows at central equipment and main distribution runs
- .3 Balance to  $\pm 10\%$  of design flows elsewhere and at outdoor air intakes
- .4 Measurements shall be accurate to  $\pm 5\%$  of actual values.
- .5 Adjust systems so that balancing is achieved with minimal pressure loss.
- .6 Smoke and Fire Damper verification:
  - .A Verify the presence of fire dampers in all fire separations, and smoke dampers in all smoke separations, and test the function of both.
- .7 Air and Hydronic System Balancing Report in PDF format certified by balancing contractor.
- .H Commissioning - HVAC
  - .1 ASHRAE Commissioning Guideline 0 and Guideline 1 latest version shall be used as guidelines.
  - .2 Refer to “Project Compliance Checklist” section for additional checklist requirements.
- .I Maintenance Access – Mechanical rooms / HVAC systems
  - .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.
    - .D All catwalks, stairways, ladders, roof hatches and other means of access and egress shall comply with WorkSafe BC regulations and BC Building Code.
- .J Spare Parts - HVAC
  - .1 Provide a basic starting stock of commonly used spare parts including followings:
    - .A One mechanical seal and casing joint gasket for each pump size and model.
    - .B One gasket set for each heat exchanger.

- .C One glass for each size and model of gauge glass installed.
- .D One set of belts for each piece of belt-driven equipment.
- .E One complete set of replacement media or filters for each filter and filter bank, installed (including both pre and final filters).
- .K Prior to the detailed design stage, consult with the Electrical discipline to confirm if adequate electrical capacity is available to accommodate the anticipated incremental electrical loads and if not, obtain direction from RPD Project Manager.

### **3.2 SPACE REQUIREMENTS -HVAC**

- .A Space Conditions
  - .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  $\pm 1^{\circ}\text{C}$  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  $\pm 2^{\circ}\text{C}$  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”.
- .B Equipment Room HVAC
  - .1 All equipment rooms
    - .A Provide enough cooling to protect equipment function, reliability & lifespan. Equipment may include network switches, servers, phone switches, and UPS’s.
    - .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 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  $22^{\circ}\text{C} \pm 1^{\circ}\text{C}$  including the event of failure of any cooling related component.
  - .3 Communication Rooms with cooling load  $\Rightarrow 1500\text{ W}$ 
    - .A Maintain space temperature at  $22^{\circ}\text{C} \pm 1^{\circ}\text{C}$  in normal operation.
    - .B Maintain  $> 21^{\circ}\text{C}$  and  $< 27^{\circ}$  if any cooling related component fails.
  - .4 Air supplied or drawn into a Server, UPS or Communication room must be free of dust.
  - .5 Cooling in normal operation must not require operation of central plant that could otherwise be shut down.
  - .6 Mechanical cooling must be maintained in the event of failure of any cooling related component for Server and UPS rooms.
  - .7 Communication rooms
    - .A During normal hours provide cooling from the building conditioning system
    - .B For cooling when the building conditioning system is not operational, provide a thermostatically controlled fan powered transfer air for ventilation.

.8 Dedicated Cooling Units

- .A For cooling capacities equal to or exceeding 3 tons, provide Air-Conditioning unit designed and manufactured specifically for electronic equipment environment.
- .B Floor-mounted units are preferable for maintenance and safety reasons.
- .C Units shall be complete with control panel for full digital temperature control, humidity control, and air-filter monitoring control. Units shall be compatible for monitoring by Base-Building DDC system.

.C Noise and Vibration

- .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
  - .A Sound level shall comply with either the NC or dBA level listed below.
  - .B 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.
  - .C Any discrete tone shall be at least 5dB lower than the listed Max NC.

SPACE TYPES MOST LIKE	MAX. NC	MAX DB	
		DBA	DBC
Teleconference, Videoconference	25	30	60
Conference, Interview, Meeting, Training,	30	35	60
Office	35	40	65
Lobby, Corridor, Change, Washrooms	40	45	70

.3 Vibration Isolation

- .A Isolate mechanical equipment such that any structure borne noise transmitted to occupied space is less than airborne noise transmission and that any discrete tones transmitted to occupied space via any path are 5 decibels less than the specified noise criteria.

.4 Noise and Vibration Verification

- .A Provide a report verifying that all noise and vibration criteria have been met.
- .B Prior to the end of the warranty period, provide equipment adjustment and verification at any locations where noise levels may have become non-compliant.

- .5 Ceiling mounted equipment above Lay-In Acoustic Tiles
  - .A Back loading of ceiling tiles to meet HVAC noise criteria is not permitted.
  - .B Motor driven equipment selections shall allow for noise increase over their lifespan. The allowance shall not be less than 3dB (6dB for compressors).
- .6 Ceiling mounted equipment in exposed ceiling or without drop ceiling.
  - .A Transmitted noise level from the HVAC equipment to the space at occupant level shall not exceed the maximum allowable NC levels listed in the above table of this section.
  - .B Provide additional acoustic insulation/enclosures as necessary to not exceed the NC levels listed in the above table of this section.
  - .C Provide acoustic lining at the take-off of supply and return air ducts.
- .D Zoning
  - .1 Provide enough thermal zoning to achieve reasonable occupant comfort and meet the requirements under “Space Conditions.”
  - .2 Each thermostatic control zone shall include only spaces with similar thermal load profiles and occupancy schedules.
  - .3 Office spaces
    - .A Perimeter and interior spaces in separate zones.
    - .B Perimeter spaces zoned by exposure and limited to 100 m<sup>2</sup> max.
    - .C Corner spaces with windows on two exposures shall be separate zones.
    - .D Interior zones 200 m<sup>2</sup> max for open space & 100 m<sup>2</sup> for enclosed space.
    - .E Open and private office areas on the same zone shall be no larger than 100 m<sup>2</sup> and be controlled by the average from a sensor in each space.
  - .4 High Occupancy Rooms
    - .A Separate rooms >20 m<sup>2</sup> shall each be a separate zone.
    - .B Smaller enclosed spaces shall each have a separate temperature sensor with temperature control based on averaged zone temperature.
- .E Ventilation
  - .1 Provide enough outdoor air to each space to satisfy all the following:
    - .A The rates from Table 2 of ASHRAE Standard 62-2001 referenced in BC Building Code

- .B The rates from Table 6.2.2.1 of ASHRAE Standard 62.1-2016
- .2 Ventilation systems, occupant density, calculations and ventilation documentation shall be in accordance with ASHRAE Standard 62.1-2016, and 62-2001 (except Addendum N). The programmed occupant density shall also be used for cross-reference if available.
- .3 For systems without outdoor air economizers
  - .A Rates shall be 150% of the values prescribed above for at least 90% of operating hours.
  - .B If min. OA intake is greater than 500 L/s, automatically reduce rates from 150% to 100% in extreme hot and cold weather.
- .4 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.
- .5 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.
- .6 High Occupancy Rooms
  - .A For rooms designed to accommodate more than 20 people, (e.g. meeting rooms =>40 m<sup>2</sup>), control minimum outdoor air ventilation as follows:
    - .1 Control minimum ventilation so the CO<sub>2</sub> concentration rise doesn’t exceed that corresponding to the OA ventilation requirements of this standard.
    - .2 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.
    - .3 For meeting room, less than 40 m<sup>2</sup>, that do not have their own dedicated variable control of outdoor air supply, provide secondary circulation of air from areas with surplus outdoor air.



### 3.3 HVAC ELEMENTS - GENERAL

- .A Air Diffusion
  - .1 Achieve good room air distribution without unacceptable noise, drafts, stagnation, stratification, or temperature gradients under all operating conditions.
  - .2 Side wall air registers in small offices are not permitted.
  - .3 Supply-air diffusers downstream of VAV outlets shall be selected to be within the manufacturers' range of VAV airflows.
- .B Ductwork
  - .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 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.
  - .4 Flexible Duct shall not be used in locations where it cannot be replaced. Its length shall be no greater than 5 feet in length, 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.
  - .5 Maintenance Access
    - .A Access to plenums shall be through access doors.
    - .B Access to ducts shall be through sturdy panels or doors with hand fasteners.
- .C Filters - Air
  - .1 Filter installation shall be in accordance with latest ASHRAE Standards.
  - .2 All supply systems, and all exhaust systems with heat recovery, shall have high-capacity pleated media panel filters.
  - .3 Replace existing air filter with new in all new and existing equipment servicing the tenant space only.
- .D Perimeter heating
  - .1 Heating with Air from standard ceiling diffusers
  - .2 Typical perimeter spaces may be heated with supply air from standard ceiling mounted diffusers provided:
    - .A Perimeter heat loss  $\leq$  750W in any 3 m run or 500W in any 1 m run.
    - .B Supply air temperature  $\leq$  8°C (15°F) above room temperature.
    - .C Ceiling height  $\leq$  2700 mm above floor level

- .D The supply air flow  $\Rightarrow 5 \text{ L/s/m}^2$  (1 cfm/sf) while heating
- .3 Where any of these limiting conditions is not met, the permissible heat loss above shall be reduced proportionally.
- .E 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.
- .F Reheat
  - .1 Minimize direct and indirect reheat.
  - .2 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.
  - .3 Electric Reheat shall have modulating control (e.g. SCR).
- .G Variable Speed Drives
  - .1 A strategy must be in place to maintain service in the event of drive failure.
  - .2 VSD's must not electronically interfere with data, video, or communication systems.
  - .3 VSDs
    - .A VSDs shall be factory CSA certified and shall operate within IEEE 519 harmonic distortions guidelines.
    - .B Locate variable speed drives within 10m cable run of controlled motors.
  - .4 Motors fed from VSDs
    - .A Shall be specifically designed and warranted for VSD operation.
    - .B Shall have an operating current not exceeding 75% of full load current.
  - .5 Warranty
    - .A VSDs and the motors they serve shall have a full warranty for at least 3 years.
- .H Air Intake
  - .1 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.

- .2 Where necessary and possible, new air intakes shall be located away from the ground level to minimize air contamination/pollution from smoke, vehicle exhaust, etc.

### **3.4 HVAC CENTRAL PLANT**

#### **.A Air Handling Units**

##### **.1 Outdoor Air, Recirculation and Relief Dampers**

- .A Select control dampers and their sizes to achieve good controllability and good mixing yet minimize unnecessary pressure loss.

##### **.2 Coils**

###### **.A Freeze Protection**

- .1 Protect coils from freezing. Depending upon the application, this may require pumped coils, glycol, or special air mixing provisions.

###### **.B Cleaning Access**

- .1 Provide at least 450 mm of clear access space before and after each coil for cleaning access.

###### **.C Plenums**

- .1 Construct and reinforce plenum and AHU walls so that there is no detectable vibration.
- .2 Provide air plenums with hinged, sealed access doors and lighting for inspection of each chamber.
- .3 Do not use mechanical rooms as air plenums.

###### **.D Locations**

- .1 Attic spaces may be used for mechanical rooms subject to all requirements being met. Refer to “Noise and Vibration” and “Maintenance Access-HVAC”.
- .2 Locations of Air-Handling Units at underground or ground level are not permitted for new buildings.

###### **.E DX Coils**

- .1 DX coils in Air-Handling Units shall be multiple stages to provide precise temperature control.
- .2 DX coils shall meet all applicable codes and standards, including all safety and operational requirements.

###### **.F Electric Heating Coils**

- .1 Electric heating coils in Air-Handling Units shall be multiple heating stages to provide precise heating temperature control.

- .2 Electrical coils shall meet all applicable codes and standards, including all safety and operational requirements.
- .G Gas furnaces
  - .1 Gas furnaces in Air Handling Units shall have:
    - .A A stainless-steel heat exchanger.
    - .B A modulating burner with a 16:1 turndown ratio for good discharge temperature control.
    - .C Over 80% efficiency across the whole operating range.
    - .D For VAV applications, the ability to operate at low flows.
    - .E A proven track record of at least 10 years and an extended warranty of at least 3 years, all under the above conditions.
  - .H Outdoor Units
    - .1 Rooftop units and/or outdoor grade mounted units in location with a ground snow load (SS) greater than 2.5 kPa shall be mounted on a minimum 450mm high equipment curb.
  - .I Plenum Access Doors
    - .1 Doors shall swing so that they close with pressure.
    - .2 Latches shall be heavy duty frame mounted type.
  - .J Filter provisions
    - .1 Provide a universal filter frame and sufficient space to accommodate future filters up to 600mm deep.
    - .2 For AHU's 5000 L/s and larger, provide for front access and service from a plenum at least 2 m high and 600 wide.
    - .3 Filter shall be capable of minimizing smoke infiltration and air particles, within local health and work safety guidelines/standards.
- .B Hot Water Heating Plant
  - .1 HVAC Boilers
    - .A Boiler Efficiency and Types
      - .1 Gas Boilers
        - .A Boilers shall be condensing boilers that are over 90% efficient at a return temperature of 40°C.
      - .2 Electric Boilers
        - .A Boilers shall be 100% efficient at a return temperature of 40°C.
        - .B Provide multiple heating elements for stage control.

- .B Support
  - .1 All boilers must have technical and maintenance support that has been well established within BC for that manufacturer for at least 5 years.
  - .2 Heat Pump Technology
    - .A Heat pump technology is preferred where applicable.
  - .3 HW Distribution Pump Pressure Control
    - .A If parallel pumps have motors > 2 hp, at least one shall have VSD control.
    - .B Systems with no VSD Control shall have a differential pressure relief valve.
  - .4 Heating Water Distribution
    - .A Distribution systems shall have supply  $\leq 52^{\circ}\text{C}$  (125°F), return  $\leq 40^{\circ}\text{C}$  (104°F) and no direct bypass of supply to return.
- .C Cooling Water Plant
  - .1 Security of Service
    - .A All cooling plant shall be arranged so that if one compressor fails, at least 50% cooling capacity remains available.
    - .B At least the same redundancy shall apply to air cooled condensers, pumps and cooling towers.
  - .2 Turndown
    - .A All cooling plant shall be able to turn down to 50% or lower.
  - .3 DX
    - .A DX plant may be used up to 30 tons per AHU and up to 80 Tons total
    - .B It shall be able to turn down to 25% capacity or lower.
  - .4 Screw
    - .A Rotary screw chillers may be used with air cooled condensers if total building load is less than 200 Tons.
  - .5 Centrifugal
    - .A Centrifugal chillers may be used when the individual chiller capacity is over 200 Tons.

### **3.5 HVAC SYSTEM TYPES**

- .A Dual Fan Dual Duct
  - .1 Dual Fan Dual Duct system is not permissible in new buildings.

.B Fan Coil

- .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.

.C Naturally Cooled Buildings

- .1 Project Specific Requirements must be consulted prior to design a naturally cooled space.

.D Radiant Floor

- .1 Project Specific Requirements must be consulted prior to starting design if new or repair of existing radiant flooring systems is considered.

.E VAV Reheat

- .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/ft<sup>2</sup>.

- .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
- .4 Dampers
  - .A Do not provide balancing dampers between the AHU and VAV Terminals.
- .F Variable Refrigerant Flow (VRF)
  - .1 New VRF systems shall not be installed in either new or existing buildings.
  - .2 New VRF systems are acceptable for central supply system only where refrigerant piping is retained inside mechanical room. Provide refrigerant leak detection system and emergency ventilation exhaust system for safety measure to refrigerant safety code/ASHRAE Standard requirements if existing VRF system is retained or adapted.
  - .3 Existing VRF systems may be retained and may be adapted to new tenancy requirements if no better option is available. Provide early local alarm signal/DDC system to detect if VRF system operation is failing.
- .G Water Loop Heat Pump (WLHP)
  - .1 New WLHP systems are acceptable only in the new buildings or major retrofits if the following conditions are applied with design:
    - .A Model with acoustic insulation package shall meet the acoustic level listed in Section 3.2.C Noise and Vibration.
    - .B The design layout in accordance to acoustic report recommendations.

- .C Maximum nominal cooling capacity for a single WLHP shall be 3 tons.
- .2 Existing WLHP may be retained and upgraded similar to new WLHP system requirements.

**----- End HVAC Section -----**



## **4. HVAC SYSTEM CONTROLS**

### **4.1 REQUIREMENTS – DDC**

- .A HVAC System Controls Alternatives
  - .1 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.
    - .A The tenant space is less than 300 square meters.
    - .B The Occupancy is less than five years.
    - .C The travel response time from closest property management contractor office is less than one (1.0) hr.
    - .D New DDC system is not required in the leased tenant space if the updated DDC system to control HVAC system is already in service. Existing DDC system shall have similar control features as per the Technical Standards.
  - .2 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.
  - .3 Energy Analytic Software for enhanced Energy Management and Faulty Detection & Diagnostics must be consulted and pre-approved prior to starting design.
- .B Design Process – DDC
  - .1 Confirm that all Technical Standards requirements will be met.
  - .2 Details on proposed equipment types
  - .3 Details on system architecture and operator’s workstation location and layout
  - .4 Complete digital and analog control points list
- .C General - DDC
  - .1 Provide a BACnet Direct Digital Control (DDC) system to control and monitor the HVAC systems and record mechanical system performance.
  - .2 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.

- .3 The DDC control system shall be a modular, flexible, and fully commissioned BACnet Testing Laboratories (BTL) certified and approved Direct Digital Control (DDC) System.
- .4 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.
- .5 DDC control shall not be monitored through BCSC system.
- .6 DDC systems shall be engineered, installed, programmed, and commissioned by trained and qualified personnel who have ample experienced with the system and the task they perform and employed by companies that have demonstrated an acceptable quality of post construction service.
- .7 Alarms - DDC
  - .A Relay selected alarms to remote locations as directed.
- .8 Connectivity - DDC
  - .A Provide Ethernet connections between buildings on the same site.
  - .B Provide for secure offsite support access by a connection to the Government of BC Building Utility Services network (HSBC). No other new external network connectivity shall be installed. HSBC connectivity requires an IT order created by the ministry client group. Contractor shall contact OCIO Network Implementation via email [OCIONetworkImpl@gov.bc.ca](mailto:OCIONetworkImpl@gov.bc.ca) to schedule an installation appointment. At time of appointment, technician shall be onsite and call into OCIO Network Implementation to provide MAC address of connected device and confirm connectivity.
- .9 Monitoring
  - .A The DDC systems shall be able to monitor the performance of the HVAC 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.
  - .C Shop Drawings – DDC
    - .1 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.
  - .D Lighting Controls - DDC
    - .1 Lighting Controls is an independent system and is not controlled from DDC system.
- .10 Installation
  - .A The installation shall conform both to manufacturer’s recommended procedures and all applicable codes and regulations to the approval of authorities having jurisdiction.
  - .B Equipment shall be installed so as to allow for easy maintenance access. Equipment shall be installed such that it does not interfere in any way with access to adjacent equipment and personnel traffic in the surrounding space.
- .11 Object Naming Convention
  - .A Provide a consistent DDC object naming convention in all new DDC-installation equipment/devices. The new naming convention shall be consistent with the Ministry’s building portfolio. Refer to RPD/CBRE DDC Installation/Manual for details.
- .D DDC System Type
  - .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.
  - .2 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
- .E Spare Parts – DDC
  - .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.

## **4.2 PROGRAMMING – DDC**

- .A Graphics
  - .1 Provide system graphics to facilitate operation and maintenance.
  - .2 Create dynamic graphics in the central control unit (CCU) for all mechanical systems.
  - .3 Provide a graphics of each floor showing smoke control zones. Include all DDC controlled space temperatures and smoke dampers.
- .B DDC Control Sequences
  - .1 Meet all Owners project requirements including the control tolerances in the HVAC section of this technical standard.
  - .2 Provide custom control sequences and programs where necessary.
  - .3 Optimize all performance including comfort, IAQ, lifespan and energy use.
  - .4 Refer to RPD/CBRE DDC Installation Guideline/Manual (if available) for details.

## **4.3 COMPONENTS - DDC**

- .A Control Station
  - .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.
  - .2 Provide a central DDC control station complete with computer, trend, and alarm printers.
- .B Field Devices
  - .1 Control Panels
    - .A Provide at least 10% spare control points at each DDC controller for future expansion.
  - .2 Actuators:
    - .A Provide electrically powered proportional actuators to drive all valves, dampers, and other control devices.
  - .3 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.

- .4 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.
- .5 Terminal Controllers
  - .A Terminal controllers shall not be used for control of major equipment, i.e. boilers, air handling units, etc.

#### **4.4 COMPLETION – DDC**

- .A End Point Verification
  - .1 Provide a detailed check and record of the basic wiring connections and setup of the DDC system.
- .B Commissioning - DDC
  - .1 Refer to section 3.1.F Commissioning section.
- .C Training – DDC
  - .1 Training & Documentation:
    - .A Provide detailed training for the operations and maintenance personnel prior to substantial completion.
    - .B Provide a follow up on-site training session at no additional cost during the first year of operation.
    - .C Provide digital copies of the training sessions.

#### **4.5 NON-DDC HVAC CONTROLS**

(Programmable Thermostats with setback capacity and Smart Technology IoT Thermostats)

- .A General
  - .1 Provide fully automatic temperature controls for all HVAC Systems and equipment.
  - .2 Smart Thermostats IoT application shall be limited to specific tenant space local use only unless it is pre-approved for an access to external Internet Web network (on further application such as the off-site remote-control 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.
- .3 Programmable Thermostats shall have a set-back feature for unoccupied hours including a timer-operated manual override.
- .4 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**

### **5.1 GENERAL**

- .A Plumbing System Type, Scope, and Capacity:
  - .1 American Society Plumbing Engineers (ASPE) Handbooks and American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) Handbooks should be used for general reference as applicable.
  - .2 Domestic Water Supply System:
    - .A The domestic water supply system and existing Building Water Service shall be capable of providing domestic water to all new and/or relocated plumbing fixtures and equipment.
  - .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.
  - .5 Drinking Fountains & Water Bottling Stations:
    - .A Drinking fountains or water bottling stations are not recommended due to the additional maintenance of the equipment and its associated components, such as water filter replacement and backflow device maintenance/testing.
  - .6 Piping system in new building only shall be capable of providing 10% spare capacities beyond BC Building Code and ASPE Handbooks.
- .B Plumbing System Zoning:
  - .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.
  - .2 Provide domestic hot water and/or tempered water to designated areas for specific functions.

.C Maintenance Access – Plumbing:

- .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.
- .3 Major equipment and central valve stations:
  - .A Locate major equipment, valves, and other serviceable components no higher than 2m above floor.
- .4 Distribution Systems:
  - .A 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.

.D Acoustics – Plumbing:

- .1 Continuous noise from plumbing fixtures and systems shall meet the same NC levels as HVAC systems.
- .2 Maximum noise from new plumbing equipment and components shall not exceed the following dBA levels:

SPACE TYPE	MAX NC	MAX SPL DB	
		32 HZ	16 HZ
Conference, Meeting, Interview Rooms	30	50	55
Offices, Reception Areas	35	55	60
Other Occupied Areas	40	60	65

.E Balancing – Plumbing:

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

**5.2 DRAINAGE SYSTEMS**

.A Sanitary Drainage:

- .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 Provide floor drains:
  - .A Where backflow preventers with drainage ports are installed, the sizes of the floor drains selected must be adequate 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.
    - .5 In other locations as required to meet Code and the functional needs of the facility.
- .4 Cleanouts:
  - .A Provide minimum a readily accessible cleanout in the sanitary connection to each washroom.
  - .B Provide a cleanout on the vertical riser at the bottom of each pipe chase.
- .5 If possible, slope drainage lines at a minimum of 2 %.

### **5.3 DOMESTIC WATER SYSTEMS**

- .A Domestic Water – General:
  - .1 Water distribution piping smaller than 3” in size above slab in new buildings or major renovation shall only be Type K copper for fire resistance and longevity. For piping of 3” or larger, stainless steel/ductile iron piping and fittings are acceptable.
  - .2 Stainless steel/ductile iron pipe shall be sized as per copper pipe sizing, except 6” or larger.
  - .3 Location of piping installation shall not cause water damage to areas with water-sensitive equipment due to unexpected burst of water-piping.
  - .4 Installation of Backflow Preventers shall be as per applicable codes and standards.

.B Domestic Hot Water:

- .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 40°C ±1°C
  - .B Janitor sinks 60°C ±2°C
  - .C Staff showers 43°C ±2°C
  - .D Kitchen sinks 60°C ±2°C
- .3 Generate, store, and distribute domestic hot water at 60°C to minimize Legionella risk.
- .4 For capacities up to 12kW, the domestic hot water tank heater, shall be electric type.
- .5 Gas-fired domestic hot water tank heaters shall be high-efficient, condensing type.
- .6 Hot water heat pump technology is encouraged to be utilized in mild climate regions.

**5.4 PLUMBING FIXTURES**

.A Plumbing Fixtures – General:

- .1 Comply with the B.C. Building Code regarding water efficiency.
- .2 Where accessible fixtures are required, comply with Building Codes, Client Requirements and Building Access Handbooks.
- .3 Water Closets shall be vitreous china, commercial duty, floor mounted, elongated bowl, open front seat, battery-operated/hardwired hands-free infrared valve with fully mechanical override flush button.
- .4 Hand basins shall be vitreous china, wall mounted, commercial grade, concealed arm carrier. Faucet shall be battery-operated hand-free technology, with low battery indicator. Tempered water shall be set with separate or built-in water mixing valve, as necessary.

---- End Plumbing Section ----

## **6. FIRE SUPPRESSION**

### **6.1 GENERAL**

#### **.A Maintenance Access – Fire Suppression:**

- .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.
- .3 Locate major equipment, valves, and other serviceable components no more than 2 meter above floor.
- .4 Heat Tracing:
  - .A Provide an electronic heat trace controller to monitor and control the system where risk of freezing is presented. 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.

#### **.B Maintenance Manuals – Fire Suppression**

- .1 Provide a copy of the relevant sections of NFPA-25 as part of close-out documents.
- .2 Provide an electronic copy of complete project documents including as-built drawings, hydraulic calculations and equipment shop drawings.

### **6.2 FIRE EXTINGUISHERS**

#### **.A General**

- .1 Provide dry chemical fire extinguishers, rated in compliance with applicable codes and standards.
- .2 In finished office 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.

### **6.3 SPRINKLER SYSTEMS**

#### **.A General:**

- .1 Provide an automatic sprinkler system in accordance with the B.C. Building Code, B.C Fire Code, NFPA-13, NFPA-25 and municipal requirements.
- .2 Provide a ULC listed manual supervised shut off valve and ULC listed flow switch for sprinkler zone in mechanical rooms or service spaces only.

- .B Pre-action and Dry Sprinklers:
  - .1 Project Specific Requirements must be consulted prior to starting design if new or replacement of existing pre-action and / or dry sprinklers is considered.
- .C Sprinkler Zoning and Isolation:
  - .1 Each sprinkler zone shall be complete with flow test station and drain assembly.
- .D Fire Suppression Systems
  - .1 Provide double-interlocked fire suppression systems in accordance with NFPA requirements for major computer rooms and where required by RPD.
  - .2 Chemicals shall be non-damaging to the environment. System based on Halon as an extinguishing agent are NOT permitted.

**----- End Fire Suppression System Section -----**

## **7. POWER**

### **7.1 GENERAL**

- .A 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.
- .B 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:
  - .1 Total Power Factor > 0.95
  - .2 Voltage Unbalance < 1%
  - .3 Current Unbalance < 10%
  - .4 Comply with IEEE 519 for Harmonic Distortion.
- .C Distribution and Branch Wiring
  - .1 Provide CSA 5-20R duplex receptacles and circuiting as per Table 7.1.
  - .2 Unless noted otherwise, receptacles shall be mounted at 480mm (19") AFF in alignment with accessibility standards.
  - .3 Tenant space shall be supplied from a dedicated feeder. A means of disconnect shall be provided within the tenant space.
  - .4 Panelboard shall be lockable and have 25% spare space to add future bolt-on circuit breakers.
  - .5 Where more than 12 branch circuits are provided for ebike chargers, provide a panelboard located within bike storage room. Size feeder and panel for 50% additional ebike chargers.
  - .6 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.
  - .7 Provide a handle lock on circuit breakers feeding tenant security equipment, exit signs, and emergency lighting.
  - .8 No switched receptacles shall be provided.
  - .9 Provide one power bar mounted to underside of each desk as identified in Table 7.1 and coordinate location with Project Manager. Power bars shall come complete with 6 receptacles and embedded overload protection with reset button. This power bar will be used to supply stationary equipment at workpoint (monitors, height adjustable desk, task lighting, etc.) This power bar is in addition to any power bar that is supplied with the system furniture.

.D Metering

- .1 Provide a digital information metering system to measure and report total energy, power factor, demand, and peak demand.
- .2 Metering system (meters + CTs) accuracy shall be better than or equal to 1%.
- .3 Each meter shall have an integral alpha/numeric display.
- .4 Metering requirements shall be as follows:
  - .A Tenant spaces > 930m<sup>2</sup> (10,000ft<sup>2</sup>) - Segregate tenant plug, lighting, and HVAC loads (dedicated to this tenant) on separate panels and install meters to separately measure each load type.
  - .B Tenant spaces between 465m<sup>2</sup> (5000ft<sup>2</sup>) and 930m<sup>2</sup> (10,000ft<sup>2</sup>) – Install a single meter to measure 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 a separate panel and metered.
  - .C Tenant spaces < 465m<sup>2</sup> (5000ft<sup>2</sup>) - Install a single meter to measure combined plug, lighting, and HVAC loads (dedicated to this tenant).
- .5 Metering system shall include a BACnet IP interface which is certified by BACnet Testing Laboratories (BTL). Connect each meter to the Building Utility Service (BUS) patch panel (as described in the Structured Cabling Section).
- .6 Metering system, including software requirements and device system hardening shall be secure to prevent unauthorized access. Co-ordinate with OCIO Integrated Project Lead.
- .7 Metering system shall be capable of connecting to an enterprise system (without a custom interface) to permit consolidation of information centrally for reporting. This software is not required as part of the tenant's metering system.

.E Fire Alarm

- .1 In addition to code requirements, provide fire alarm strobe lights in all washrooms, corridors, and any enclosed space where a corridor strobe light is not visible (e.g., enclosed space with no sidelight such as a file room, storage room, etc.). Strobe lights are only required in buildings with a fire alarm system.
- .2 In Province owned buildings with a fire alarm system, and no sprinkler system, provide smoke detectors in corridors and service rooms (includes telecom room) within the tenant suite. If there is no existing fire alarm system in a government owned building, and it is not required by code, confirm with Project Manager if one is to be added.

- .3 Within tenant suite, provide a tamperproof cover over each fire alarm pull station. Tamperproof cover shall consist of a clear, acrylic, hinged cover c/w integral, battery-operated buzzer that shall generate an audible alarm when the cover is lifted. Confirm with local AHJ this cover can be utilized in this jurisdiction.

.F Installation

- .1 In support of climate resiliency, locate all new power distribution equipment, fire alarm control panels, Telecommunication rooms, service entrance rooms, etc. above grade to avoid spaces prone to future flooding.
- .2 Locate all panelboards within tenant space, but not on/in walls adjacent to workpoints.
- .3 Provide 2 spare 27 mm (1”) conduit from each panelboard to accessible ceiling space.
- .4 Provide complete project documentation at completion including following:
  - .A Current panelboard directory using type written descriptors.
  - .B 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.
- .5 Minimum wire size shall be #12 AWG. Each branch circuit shall be provided with a dedicated neutral.
- .6 All branch circuit wiring shall be routed vertically in stud cavity, not horizontally.
- .7 Final connections to receptacles, luminaries, and other electrical equipment, from adjacent junction boxes (JBs) can be cable (as permitted by code) but home run conduit and wiring shall be used from panelboards to JB's to minimize cable lengths.
- .8 Provide fully recessed floor box to deliver power and communications to tables in Meeting Rooms, Training Rooms, Boardrooms and Workpoint islands.
- .9 Power cords and patch cords running under height adjustable desks shall be properly supported to ensure they travel freely and do not become crushed/jammed by the moving parts.

**TABLE 7.1 – POWER, DATA AND HDMI LOCATIONS, AND CIRCUITING CRITERIA**

SPACE <sup>(2)</sup>	CSA 5-20R DUPLEX RECEPTACLES			POWER BAR	DATA JACKS <sup>(1)</sup>		HDMI <sup>(3)</sup>	
	QNTY	CIRCUITING	COMMENTS	QNTY	QNTY	COMMENT	QNTY	COMMENT
Dedicated Office	2	2 offices per circuit	Receptacle on wall adjacent to desk. Receptacle on wall opposite desk.	1	2	Data jack on wall adjacent to desk. Data jack on wall opposite desk.	0	
Shared Office	3	1 Office per circuit	Receptacle on each wall (excluding wall with door)	2	2	Data jack adjacent to each desk.	0	
Drop-In Office	2	2 Offices per circuit	Receptacle on wall adjacent to desk. Receptacle on wall opposite desk.	1	2	Data jack on wall adjacent to desk. Data jack on wall opposite desk	0	
Small Meeting Room	4	1	Receptacle on wall behind TV. Receptacle on wall opposite TV. Receptacle on wall below TV. Receptacle in floor box under table.	0	4	Data jack on wall behind TV. Data jack on wall below TV. Two data jacks in floor box.	1	HDMI connection in floor box. Provide yellow MTR patch cord as per Section 9-Multimedia.
Large Meeting Room	7	2	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 at each end (connected to a dedicated circuit).	0	6	Data jack on wall behind TV. Data jack on wall below TV. Two data jacks in each floor box.	1	HDMI connection in floor box closest to TV. Provide yellow MTR patch cord as per Section 9-Multimedia.



<b>TABLE 7.1 – POWER, DATA AND HDMI LOCATIONS, AND CIRCUITING CRITERIA</b>								
<b>SPACE <sup>(2)</sup></b>	<b>CSA 5-20R DUPLEX RECEPTACLES</b>			<b>POWER BAR</b>	<b>DATA JACKS <sup>(1)</sup></b>		<b>HDMI <sup>(3)</sup></b>	
	<b>QNTY</b>	<b>CIRCUITING</b>	<b>COMMENTS</b>	<b>QNTY</b>	<b>QNTY</b>	<b>COMMENT</b>	<b>QNTY</b>	<b>COMMENT</b>
Team Room	5	1	Receptacle on wall behind TV. Receptacle on wall opposite TV. 4-plex receptacle on wall between TV and table. Receptacle on wall below table.	0	3	Data jack on wall behind TV. Two data jacks on wall between TV and table.	1	HDMI cable to tabletop surface.
Copy / Print Room	6*	2*	* 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.	0	3**	** Two data jacks adjacent to each MFD (one for fax & one for print) Data jack on wall above counter.	0	
Break Room	6*	7*	* 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	0	0	WIFI only.	0	

<b>TABLE 7.1 – POWER, DATA AND HDMI LOCATIONS, AND CIRCUITING CRITERIA</b>								
<b>SPACE <sup>(2)</sup></b>	<b>CSA 5-20R DUPLEX RECEPTACLES</b>			<b>POWER BAR</b>	<b>DATA JACKS <sup>(1)</sup></b>		<b>HDMI <sup>(3)</sup></b>	
	<b>QNTY</b>	<b>CIRCUITING</b>	<b>COMMENTS</b>	<b>QNTY</b>	<b>QNTY</b>	<b>COMMENT</b>	<b>QNTY</b>	<b>COMMENT</b>
			for each dishwasher. Confirm quantity based on actual tenant requirements. Provide housekeeping receptacle in room (refer to Corridor for circuiting)					
Privacy Room	1	4 Privacy rooms per circuit	Receptacle on wall below desk.	1	1	Data jack on wall below desk.	0	
Quiet Room / Interview Room	4	1	Receptacle on wall behind TV. Receptacle on wall opposite TV. Receptacle on wall between TV and table. Receptacle on wall below table.	0	3	Data jack on wall behind TV. Two data jacks on wall between TV and table.	1	HDMI cable to tabletop surface.
Cubicle	1	4 Cubicles per circuit	Receptacle adjacent to desk. (Confirm if receptacle will be provided as part of system furniture)	1	1	Data jack adjacent to desk.	0	
Mobile Workpoint	1	6 Mobile Workpoints per circuit	Receptacle adjacent to each desk. (Confirm if receptacle will be provided as part of system furniture)	1	1	Data jack adjacent to desk.	0	
Touch-down	1	6 Touch-down Stations per circuit	Receptacle adjacent to each desk. (Confirm if receptacle will be provided as part of system furniture)	0	0	WIFI only	0	

<b>TABLE 7.1 – POWER, DATA AND HDMI LOCATIONS, AND CIRCUITING CRITERIA</b>								
<b>SPACE <sup>(2)</sup></b>	<b>CSA 5-20R DUPLEX RECEPTACLES</b>			<b>POWER BAR</b>	<b>DATA JACKS <sup>(1)</sup></b>		<b>HDMI <sup>(3)</sup></b>	
	<b>QNTY</b>	<b>CIRCUITING</b>	<b>COMMENTS</b>	<b>QNTY</b>	<b>QNTY</b>	<b>COMMENT</b>	<b>QNTY</b>	<b>COMMENT</b>
Corridor	10 m o.c	3 receptacles per circuit	Circuit to be used for housekeeping receptacles only.	0	0	WIFI only	0	
Network Counter	2 seats per receptacle	1	Every seat shall have access to duplex receptacle. Install below counter	0	2 seats per data jack	Every seat shall have access to a data jack. Install below counter.	0	
Huddle Space	3	1	Receptacle on wall behind TV. Receptacle on wall between TV and table. Receptacle in end of millwork.	0	2	Data jack on wall behind TV. Data jack on wall between TV and table.	1	HDMI cable to tabletop surface.
Chat point	0	N/A	N/A	0	0	WIFI only.	0	
Soft Seating	1	*	Receptacle adjacent to seats. * Connect to housekeeping circuit (see Corridor).	0	0	WIFI only.	0	
Meeting Booth	2	4 Meeting Booths per circuit	Receptacle on wall behind TV. Receptacle on wall between TV and table.	0	2	Data jack on wall behind TV. Data jacks on wall between TV and table.	1	HDMI cable to tabletop surface.
Library / Resource Room	2	1	Location to suit layout.	0	0	WiFi only.	0	
Reception	3	1	Incorporate 2 receptacles in millwork. Receptacle on wall within space.	0	2	Incorporate 2 data jacks in millwork.	0	
Waiting Room	3	1	2 receptacles adjacent to seats. Receptacle on wall behind TV.	0	1	WiFi only. Data jack on wall behind TV.	0	
Washroom / Shower /	1*	1	GFCI receptacle on wall above	0	0	N/A	0	

<b>TABLE 7.1 – POWER, DATA AND HDMI LOCATIONS, AND CIRCUITING CRITERIA</b>								
<b>SPACE <sup>(2)</sup></b>	<b>CSA 5-20R DUPLEX RECEPTACLES</b>			<b>POWER BAR</b>	<b>DATA JACKS <sup>(1)</sup></b>		<b>HDMI <sup>(3)</sup></b>	
	<b>QNTY</b>	<b>CIRCUITING</b>	<b>COMMENTS</b>	<b>QNTY</b>	<b>QNTY</b>	<b>COMMENT</b>	<b>QNTY</b>	<b>COMMENT</b>
Locker Rooms			counter (if within tenant space). *GFCI receptacle adjacent to each accessible toilet for accommodate adaptive devices (as per RHF).					
Janitor Closet	1	1	GFCI receptacle adjacent to door	0	0	N/A	0	
Storage / File / Recycle Room	1	2 Storage / File rooms per circuit	Receptacle adjacent to door	0	0	WIFI only.	0	
Bike Storage Room	1*	*Dedicated circuit to each GFCI receptacle to charge 2 ebikes.	*50% of long term and 10% short term bike storage spaces shall have connection for ebike charger	0	0	N/A	0	
Telecom Room	4*	4*	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 circuit and one 5-20R receptacles for each 48 port PoE switch (Quantity	0	0	WIFI only.	0	

<b>TABLE 7.1 – POWER, DATA AND HDMI LOCATIONS, AND CIRCUITING CRITERIA</b>								
<b>SPACE <sup>(2)</sup></b>	<b>CSA 5-20R DUPLEX RECEPTACLES</b>			<b>POWER BAR</b>	<b>DATA JACKS <sup>(1)</sup></b>		<b>HDMI <sup>(3)</sup></b>	
	<b>QNTY</b>	<b>CIRCUITING</b>	<b>COMMENTS</b>	<b>QNTY</b>	<b>QNTY</b>	<b>COMMENT</b>	<b>QNTY</b>	<b>COMMENT</b>
			to be confirmed during design).					
Elect / Mech Room	1	1	Receptacle adjacent to door	0	1*	* Provide 1 data jack for each BUS interface.	0	

(1) Where powered system furniture is provided, the horizontal data cabling shall be run inside the partition communication channel with the data jack mounted on the partition at the workpoint.

(2) Rooms may not necessarily be enclosed spaces (e.g., may be an open space with no door) but requirements described in the table are still applicable. For example, if a ‘room’ is required to have a receptacle but it has been designed as an open space, then the receptacle shall be installed in a suitable location within the space.

(3) Quantity of HDMI cables shown in table is for each monitor.

**----- End Power Section -----**

## **8. LIGHTING**

### **8.1 GENERAL**

- .A Provide quality lighting throughout the tenant space which is suitable for tasks being performed.
- .B 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.
- .C Minimize energy consumption by selecting suitable luminaires with high efficacy and implementing advanced lighting control strategies.
- .D Lighting design and associated controls shall comply with the latest ASHRAE 90.1 standard except where this standard indicates otherwise.
- .E Provide emergency lighting in staff washrooms and public washrooms located within tenant suite.
- .F Refer to Table 8.1 for illumination levels, luminaire type and control requirements for each type of space.
- .G Luminaires
  - .1 General
    - .A All luminaires shall be LED.
    - .B Luminaires shall “fail on” to 100% output upon loss of control signal.
    - .C Input to LED dimming driver shall utilize a 0-10 Volt.
    - .D Colour temperature shall be 3500°K
    - .E CRI shall be minimum 80
    - .F Maximum THD shall be <20%
  - .2 Primary Luminaires
    - .A Luminaires shall be complete with an embedded wireless control module and occupancy/daylight sensor mounted within each luminaire housing. Embedded sensors shall not have any external wires to luminaire (sensor not tethered to luminaire).
    - .B Each luminaire with an embedded sensor shall be capable of individual or group control of multiple luminaires.
    - .C Luminaires shall be recessed 610mm x 610mm (2' x 2') volumetric or direct/indirect luminaires. No flat lens troffers.
    - .D Minimum efficacy of luminaires shall be 125 lumens per watt (LPW).
    - .E Minimum rated lumen maintenance life L80/50,000 hours.

- .F All luminaires shall have a minimum dimming range from 1% to 100% with no adverse impact on power quality, cause flicker or colour inconsistencies.
- .G 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.
- .3 Specialty Luminaires
  - .A Includes downlights, pendants, and linear lighting as selected by design team.
  - .B Downlights shall have fully integrated LED array and driver (no screw in lamps) with a minimum efficacy of 95 LPW.
  - .C Linear lighting shall have fully integrated LED array and driver with a minimum efficacy of 120 LPW.
  - .D LED strip lights shall be provided on the underside of Breakroom upper cupboards to provide supplemental illumination for food preparation.
  - .E Dimmable luminaires shall have a minimum dimming range from 1% to 100% with no adverse impact on power quality, cause flicker or colour inconsistencies.
- .H Wireless Lighting Control System
  - .1 General
    - .A Provide a fully functional wireless lighting control system throughout the space.
    - .B Lighting control system shall be compatible with the LED luminaires.
    - .C Lighting control system, including software requirements and device system hardening shall be secure to prevent unauthorized access. Co-ordinate with OCIO Integrated Project Lead.
    - .D The lighting control network shall not cause interference on other wireless networks operating within the space.
    - .E System shall provide complete coverage throughout tenant space with no loss of communication signals to/from devices.
    - .F 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.
    - .G Provide daylight harvesting in all spaces with fenestration.

.2 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 typical usage in an office environment.
- .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, or over existing switch box (CSA approved) as required. Mounting height maximum 1066mm (42") AFF.
- .2 Switches shall be selected based on functionality required:
  - .A Non-dimming switch: on/off
  - .B Dimming switch: on/off/raise/lower
- .3 All spaces shall have switches installed at each entrance to space. Enclosed spaces shall have switches installed on latch side of door within space.

.C Occupancy/Daylight Sensors

- .1 All primary luminaires to have embedded occupancy/daylight sensor.
- .2 Where embedded luminaire sensors do not provide full coverage of the space, supplemental wireless sensors shall be added.
- .3 Utilize PIR style occupancy sensors, except in washrooms where dual technology sensors shall be utilized.
- .4 Embedded 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 dimming control to luminaire.



- .3 Where multiple specialty 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(s) being controlled.
- .3 Software
- .A 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 installed in a wall mounted holster in the Telecom Room.
  - .B All passwords shall be provided for system access.
  - .C Software shall not require licensing fees.
  - .D Lighting control system shall include a BACnet IP interface which is certified by BACnet Testing Laboratories (BTL) and shall have a single point data connection to the Building Utility Service (BUS) patch panel (as described in the Structured Cabling Section).
  - .E System shall be capable of connecting to an enterprise system (without a custom interface) to permit consolidation of information centrally for reporting. This software is not required as part of the tenant's lighting control system.

**TABLE 8.1 - LUMINAIRE TYPE, LIGHTING CONTROL, AND ILLUMINACE LEVELS**

Space <sup>(2)</sup>	Task Illuminance Level <sup>(1)</sup> (average maintained)	Primary Lighting	Specialty Lighting	Vacancy Control (manual on/off, auto off)	Occupancy Control (auto on/off)	Primary Dimming Switch	Specialty Dimming Switch	Low Trim	High Trim	First On	Comments
Dedicated Office	540 lux	Yes	No	Yes	No	Yes	N/A	No	540 lux	Last dimming level	
Shared Office	540 lux	Yes	No	Yes	No	Yes	N/A	No	540 lux	Last dimming level	
Drop-In Office	540 lux	Yes	No	Yes	No	Yes	N/A	No	540 lux	Last dimming level	
Small Meeting Room	540 lux (horizontal)	Yes	Optional	Yes	No	Yes	yes (when provided)	No	540 lux	270 lux	
Large Meeting Room	540 lux (horizontal) 110 lux (vertical on walls)	Yes	Optional	Yes	No	Yes	Yes (when provided)	No	540 lux	270 lux	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

**TABLE 8.1 - LUMINAIRE TYPE, LIGHTING CONTROL, AND ILLUMINACE LEVELS**

Space <sup>(2)</sup>	Task Illuminance Level <sup>(1)</sup> (average maintained)	Primary Lighting	Specialty Lighting	Vacancy Control (manual on/off, auto off)	Occupancy Control (auto on/off)	Primary Dimming Switch	Specialty Dimming Switch	Low Trim	High Trim	First On	Comments
Team Room	540 lux	Yes	No	Yes	No	Yes	N/A	No	540 lux	Last dimming level	
Copy/Print Room	320 lux	Yes	No	Yes	No	No	N/A	N/A	N/A	Setpoint 320 lux	Dimming setpoint set by software.
Break Room	320 lux	Yes	Optional	Yes	No	Yes	Yes (when provided)	54 lux	320 lux	320 lux	Specialty lighting shall be on a separate vacancy control zone.
Privacy Room	540 lux	Yes	Yes (Pendant)	Yes	No	Yes	No	No	540 lux	Primary: 270 lux Specialty: N/A	Specialty lighting shall be on a separate, non-dimming, vacancy control zone.
Quiet Room / Interview Room	540 lux	Yes	Yes (Pendant)	Yes	No	Yes	No	No	540 lux	Primary: 270 lux Specialty: N/A	Specialty lighting shall be on a separate, non-dimming, vacancy control zone.
Cubicle <sup>(3)</sup> (Open Office)	540 lux	Yes	No	Yes	No	Yes	N/A	320 lux	540 lux	Last dimming level	
Mobile Workpoint	540 lux	Yes	No	Yes	No	Yes	N/A	320 lux	540 lux	Last dimming level	
Touchdown	540 lux	Yes	No	Yes	No	Yes	N/A	320 lux	540 lux	Last dimming level	

**TABLE 8.1 - LUMINAIRE TYPE, LIGHTING CONTROL, AND ILLUMINACE LEVELS**

Space <sup>(2)</sup>	Task Illuminance Level <sup>(1)</sup> (average maintained)	Primary Lighting	Specialty Lighting	Vacancy Control (manual on/off, auto off)	Occupancy Control (auto on/off)	Primary Dimming Switch	Specialty Dimming Switch	Low Trim	High Trim	First On	Comments
Corridor/Circulation <sup>(4)</sup>	110 lux	Yes	No	No	Yes #	No	N/A	N/A	N/A	High Setpoint 110 Lux	# High and low setpoints set by software. When corridor/circulation zone unoccupied for 15 minutes lighting dims to low set point (54 lux). Provide master switch at each staff entry point <sup>(5)</sup>
Network Counter	220 lux	No	Yes	No	No	N/A	No	N/A	N/A	N/A	On/off control (without dimming) as part of local corridor/circulation zone.
Huddle Space	540 lux	No	Yes	Yes	No	N/A	Yes	No	540 lux	270 lux	
Chat point	220 lux	No	Yes	No	No	N/A	No	N/A	N/A	N/A	On/off control (without dimming) as part of local corridor/circulation zone.
Soft Seating	220 lux	No	Yes	Yes	No	N/A	Yes	No	220 lux	110 lux	
Meeting Booth	220 lux	No	Yes	Yes	No	N/A	No	N/A	N/A	N/A	
Library/Resource Room	540 lux	Yes	No	Yes	No	Yes	No	No	540 lux	270 lux	

**TABLE 8.1 - LUMINAIRE TYPE, LIGHTING CONTROL, AND ILLUMINACE LEVELS**

Space <sup>(2)</sup>	Task Illuminance Level <sup>(1)</sup> (average maintained)	Primary Lighting	Specialty Lighting	Vacancy Control (manual on/off, auto off)	Occupancy Control (auto on/off)	Primary Dimming Switch	Specialty Dimming Switch	Low Trim	High Trim	First On	Comments
Reception	540 lux	Yes	Optional	Yes	No	Yes	Yes (when provided)	320 lux	540 lux	Last dimming level	
Waiting Room	220 lux	No	Yes	No	No	No	N/A	N/A	N/A	High setpoint 220 lux	High and low setpoints set by software. When master switch at Reception de-energized lighting dims to low set point (54 lux). Provide master switch at Reception <sup>(5)</sup>
Washroom/ Shower/Locker Room	220 lux 110 lux (vertical for vanity)	No	Yes	No	Yes	No	N/A	N/A	N/A	Setpoint 220 lux	Each shower room shall have one 7x24 light for safety Dimming set point set by software. Luminaires in Shower Room shall be suitable for the environment.
Janitor Closet	320 lux	No	Yes	Yes	No	No	N/A	N/A	N/A	Setpoint 320 lux	Dimming set point set by software.
Storage Room	220 lux	Yes	No	Yes	No	No	N/A	N/A	N/A	Setpoint 220 lux	Dimming set point set by software.

**TABLE 8.1 - LUMINAIRE TYPE, LIGHTING CONTROL, AND ILLUMINACE LEVELS**

Space <sup>(2)</sup>	Task Illuminance Level <sup>(1)</sup> (average maintained)	Primary Lighting	Specialty Lighting	Vacancy Control (manual on/off, auto off)	Occupancy Control (auto on/off)	Primary Dimming Switch	Specialty Dimming Switch	Low Trim	High Trim	First On	Comments
File / Recycle Room	320 lux	Yes	No	Yes	No	No	N/A	N/A	N/A	Setpoint 320 lux	Dimming set point set by software.
Bike Storage	320 lux	No	Yes	Yes	No	No	N/A	N/A	N/A	Setpoint 320 lux	Dimming set point set by software.
Service Room (Elect/Mech /Telecom)	320 lux	No	Yes	No	No	No	N/A	N/A	N/A	320 lux	Line voltage switching is acceptable. No automatic shut-off.

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

(2) Spaces identified in this table as “rooms” may not necessarily be enclosed spaces (eg; may be an open space with no door). Even if a room is not enclosed, the requirements described in the table will still be applicable. For example, if a ‘room’ is required to have a light switch but it has been designed as an open space, then the light switch shall be installed in a suitable location within the space.

(3) 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.

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

(5) For safety and security reasons, the corridor/circulation and waiting room lighting must always provide low level illumination 24 hours (does not switch 100% off). Master switches located at staff entrances (entrance to corridor/circulation) shall have manual control to switch corridor/circulation and waiting room lighting from low level (54 lux) to high level (110 lux and 220 lux respectively) and vice versa. No manual or automatic 100% off. Occupancy control will be provided to change illumination levels from low to high when motion is detected in each corridor/circulation zone. All corridor/circulation/waiting room zones shall be grouped as one zone for manual control and occupancy control for each individually controlled corridor/circulation. AHJ approval may be required.

.I Installation

- .1 Ensure lighting system is properly installed, programmed, calibrated to meet manufacturer's requirements and this standard.
- .2 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.
- .3 Provide separate training and demonstration sessions to occupants and maintenance staff on lighting system.

**----- End Lighting Section -----**

## **9. STRUCTURED CABLING**

### **9.1 GENERAL**

- .A 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, maintainable, and meets the tenant needs.
- .B A complete structured cabling system shall be installed and tested as outlined below for data, voice, multimedia, and Building Utility Service (BUS).
- .C 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.
- .D All products in the horizontal cabling system, when combined, shall meet channel performance as per TIA/EIA-568 for the cabling system installed.
- .E 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.
- .F Cable
  - .1 Cables and patch cord insulation shall contain no lead or other heavy metals.
  - .2 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.
  - .3 Category 3 voice backbone cables shall be installed between the Main Entrance Facility (MEF) and each tenant telecommunication room in a star wired configuration.
  - .4 For Unified Communication (UC) sites, provide one (1) 25 pair voice backbone cable to each telecommunication room.
  - .5 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.
  - .6 Data backbone cables shall be installed between the government's main telecommunication room and each tenant's telecommunication room in a star wired configuration, coordinate with project manager.
  - .7 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.

.G Termination Hardware

.1 Copper

.A All horizontal cable terminations shall use TIA/EIA 568A pin configuration.

.B All cables shall terminate on 483mm (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).

.C 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.

.D All voice backbone cables shall terminate on BIX1A/110 blocks adjacent to the Main Entrance Facility (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.

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

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

.2 Fiber

.A 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.

.B 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.

.H 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 1200mm (4') and 50 % of the patch cords at 1800mm (6') or lengths as required to suit final layout.

- .2 The quantity of patch cords supplied for workpoint 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. Patch cord lengths shall be as required to suit the layout with a minimum length of 3000mm (10').
- .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).

#### .I Racks

- .1 All patch panels shall be installed on floor mounted 483mm (19") two-post, relay frame style racks. Rack shall be 2134mm (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 (12") 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 38mmx102mm (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 483mm (19") rack.
- .6 Each data network switch shall have a horizontal cable manager located above and below.

#### .J 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 cover plate 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.

.K Multimedia

.1 General

- .A Provide a recessed multi-gang outlet box behind monitor(s) to allow monitor(s) to sit flat against wall when power and low voltage cords are plugged in.
- .B Provide a Category 3 HDMI cable (minimum 18 Gbps) for each monitor, complete with male connectors, to the tabletop (when table abuts wall) or floor box.

.2 Tabletop Installation

- .A Conceal the HDMI cable vertical drop(s) inside wall by using the recessed multi-gang outlet box behind the TV monitor and a second pass through cover plate between the TV monitor(s) and tabletop. Provide 1500mm (5') slack cable coiled up on the tabletop surface when monitor connected.

.3 Floor Box Installation

- .A Conceal the HDMI cable vertical drop(s) inside wall by using the recessed multi-gang outlet box behind the TV monitor and install in conduit (minimum size conduit 41mm (1 ½")) to floor box. Terminate HDMI cable(s) on HDMI female/female bulkhead(s) in floor box. Leave 1500mm (5') spare cable length neatly coiled behind TV monitor(s) when monitor connected.
- .B Provide a "yellow" Category 6 patch cord from TV monitor to floor box using same pathway as HDMI cable, leave 3000mm (10') of spare cable length neatly coiled behind TV monitor and apply label on each end identifying as "MTR Link".
- .C Supply one 3000mm (10') Category 3 HDMI patch cord, for each TV monitor, from floor box to tabletop.

.4 Co-ordinate the multi-media requirements with OCIO Integrated Project Lead.

.L Wireless Access Points (WAP)

- .1 Provide 2 telecommunication outlets at each POE wireless access point. WAP outlets shall be mounted to the building structure above the suspended ceiling with a patch cord dropped down to the WAP device through a grommeted hole in the ceiling tile.
- .2 Wireless Access Points shall be located as per the OCIO heat map. If heat map is not provided, install WAP outlets in a grid pattern, with maximum spacing of 15 meters (50') o.c., and provide complete coverage throughout the entire space.

.M Wide Area Network (WAN)

- .1 If OCIO does not have connectivity in the building provide one 53mm (2") continuous conduit, c/w pull rope, from Service Providers Point of Presence to the government's main telecommunication room (determined by project manager). WAN cable shall be installed by Service Provider (NIC).
- .2 If OCIO already has connectivity in the building install a new fiber data backbone cable, in conduit, from the existing government main telecommunication room to each new telecommunication room. Consultant to advise project manager if length exceeds 300 meters.

.N Building Utility Service (BUS)

- .1 BUS provides remote access to building systems, that service the tenant space, through the government WAN.
- .2 Data outlets shall be installed for the following building systems: intrusion alarm, access control, lighting control, metering, and other systems identified during design.
- .3 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.

.O Fire Stopping

- .1 Product installed shall be reusable and not require firestop materials to be removed or reinstalled when cables are added or removed (e.g. STI EZ Path, etc.).

.P Telecommunication Room

- .1 Minimum of one telecommunication room per floor, maximum floor area served from one room is 1000m<sup>2</sup> (10,765ft<sup>2</sup>).
- .2 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 meters (295') maximum.
- .3 Minimum telecommunication room size shall be 1372mmx1829mm (4'-6" x 6'-0").
- .4 Only equipment associated with data, voice, and security services shall be located in Telecommunication rooms. No pipes or ducts shall pass through Telecommunication Rooms unless required to service the room.

- .5 Telecommunication rooms shall have 19mm (¾") G1S painted plywood backboard installed as indicated in Figure 1: Typical Telecom Room Layout.
  - .6 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.
  - .7 Unless required by code, a suspended ceiling is not required in the telecommunication room.
  - .8 Layout of telecommunication room equipment shall follow Figure 1: Typical Telecom Room Layout.
  - .9 Layout of relay frame equipment shall follow Figure 2: Typical Relay Frame Layout.
- .Q Installation
- .1 Walls shall have 102mmx102mm (4"x 4") outlet boxes installed with a single gang mud ring. A 27mm (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.
  - .2 Provide grommets to protect bare cables where they pass through metal framing.
  - .3 Leave 300mm (12") of cable coiled in outlet box (or coiled behind wall if a low voltage mounting bracket is used) at wall jack location.
  - .4 Where service poles or system furniture connections are implemented, leave 3 meters (10') of spare cable coiled in ceiling space above to permit relocation of service pole and system furniture. Properly support cable coil to structure.
  - .5 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 1500mm (5') and maximum cable sag permitted is 300mm (12"). J hooks shall be installed in locations to group cables where possible. All cables shall be installed parallel to building grid lines.
  - .6 Use 25mm (1") Velcro straps to support/bundle cables. Provide 100% spare cable capacity in Velcro straps. Tie wraps are not acceptable.
  - .7 All cables installed in service spaces or outside the tenant space shall be installed in conduit. Where data backbone fiber is installed between

vertically stacked core telecom rooms, innerduct raceway may be used in lieu of conduit within that room.

- .8 Install 103mm (4") sleeves in floor to interconnect telecommunication rooms. These sleeves shall be used to distribute riser cables. Provide 50% spare capacity in sleeves for future cables.
  - .9 Install a complete grounding system to each telecommunication room and bond all equipment as per J-STD-607 standard.
  - .10 All patch cords supplied for the telecommunication room and the workstation area shall be turned over to project manager.
- .R Documentation
- .1 Every wall jack/patch panel jack shall be labelled with a unique label, 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.9.1.

**TABLE 9.1 - LABEL FORMAT**

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

Identifier	Descriptor of Identifier
f	Floor number telecommunication room is located (as per drawings)
s	Sequential telecommunication room identifier (starting at A)
p	Sequential patch panel(s) port number

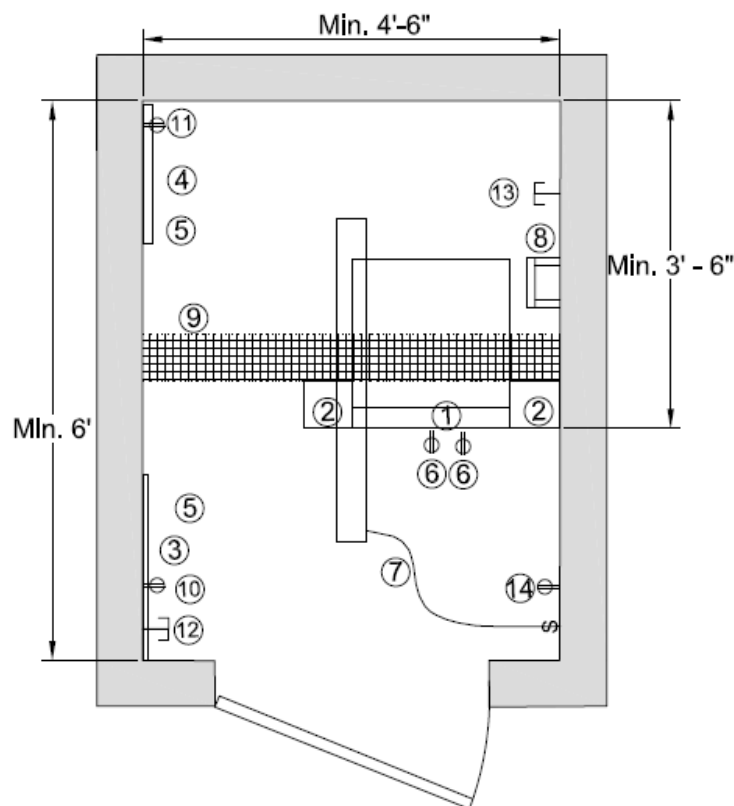
m	Specialty port identifier for MFD Fax line
wb	Specialty Patch Panel Identifier: BUS = Building Utility Service WAP = Wireless Access Point
fs <sub>1</sub>	Source telecommunication room with floor number and telecommunication room identifier (main telecommunication room)
fs <sub>2</sub>	Destination telecommunication room with floor number and telecommunication room identifier
n	Sequential cable number
d	Pair number in voice backbone cable, fiber connector number for fiber data backbone
D	Designates data backbone cable
V	Designates voice backbone cable

- .2 The BIX1A/110 blocks at the demarcation shall be labelled as per above for voice backbone terminations.
- .3 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 the latest TIA/EIA 568 standard. 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.
- .4 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.
- .5 Each fiber strand shall be tested to ensure compliance with 10GB Performance requirements using Tier 1 testing with “single test cord reference” as defined by TIA 526-14. Submit actual test results with calculated losses.
- .6 All test results shall be provided in electronic format only c/w manufacturer’s viewing software on disk with test results.
- .7 Record drawings shall be provided in hardcopy and in electronic form. A copy of the record drawing, showing the jacks associated with that specific telecommunication room shall be mounted on the door of that telecommunication room. The record 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.

**Figure 1: Telecommunications Room Layout**

Notes:

1. 7' 0" Replay frame.
2. Vertical cable management trough (patch cords only).
3. Service provider equipment (by others).
4. Security equipment (by others).
5. ¾" G1S plywood backboard (36" W x 48" H).
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 or service provider WAN riser cable.
13. Conduit stub-in location for fiber backbone cable (between tenant telecom rooms).
14. General purpose duplex 5-20R receptacle.

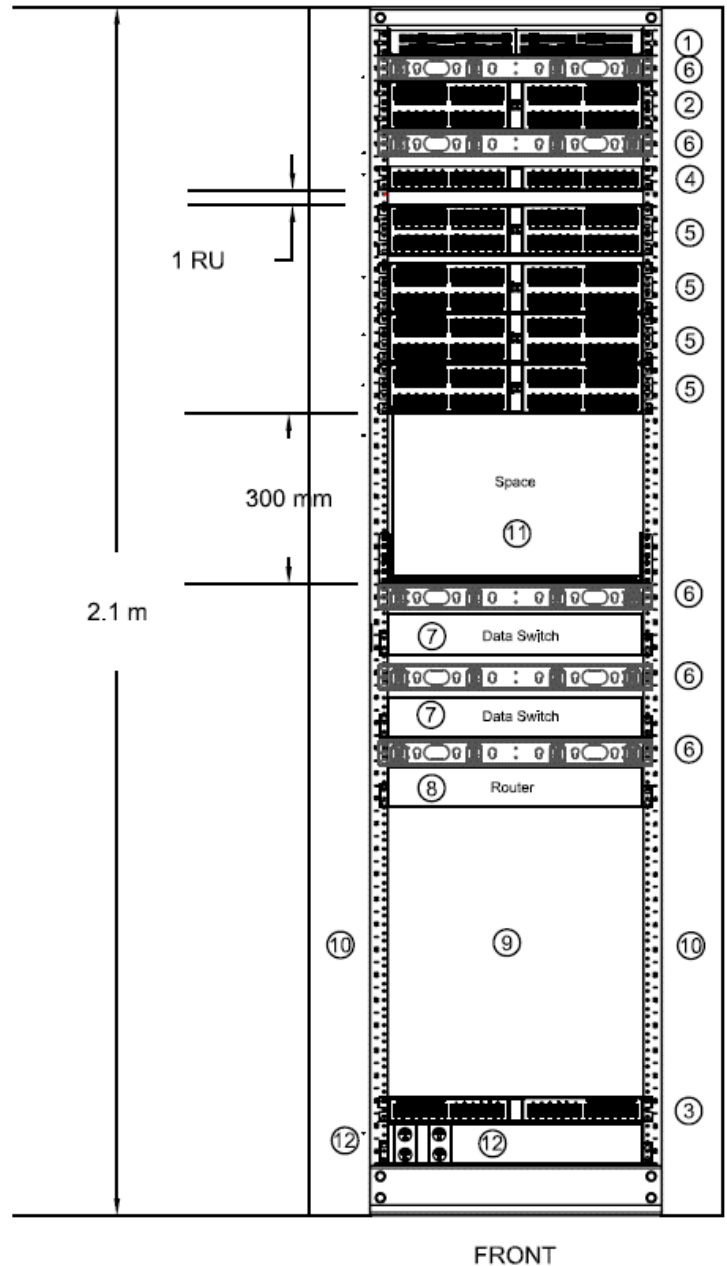




**Figure 2: Equipment Rack Layout**

Notes:

1. Fiber optic patch panel c/w fiber optic cassettes for network backbone running between tenant telecom rooms. Label = BCGN BACKBONE PATCH PANEL.
2. Minimum Cat 3, preloaded, angled patch panel for Voice riser. Label = VOICE RISER PATCH PANEL.
3. Cat 6, 24 port, modular, angled patch panel for Building Utility Service (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/12V circuit. Mount receptacle(s) to rigid, rack mounted panel.



----- End Structured Cabling Section -----

## **10. PHYSICAL SECURITY SYSTEMS**

### **10.1 GENERAL**

- .A All security systems shall comply with the requirements detailed in the most current version of the RPD 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\\_for\\_government\\_of\\_bc\\_facilities.pdf](https://www2.gov.bc.ca/assets/gov/british-columbians-our-governments/services-policies-for-government/real-estate-space/physical_security_standards_for_government_of_bc_facilities.pdf)

**----- End Physical Security Section -----**

## **11. PROJECT COMPLIANCE CHECKLIST**

The Architect-of-Record (or coordinating registered professional) and Engineers-of-Record shall complete the Letters of Compliance and submit them to the Service Provider Project Manager. Upon receipt of the completed Letters of Compliance, the Service Provider Project Manager shall complete the Owner's Project Requirements (OPR) Check Sheets and submit them to the RPD Project Manager.

## 11.1 LETTER OF COMPLIANCE - ARCHITECTURAL

**Project Name:** \_\_\_\_\_

**Instructions:** Architect of Record (or coordinating registered professional) circles the corresponding answer and initializes each clause below to confirm general compliance with each clause for the above project. Architect of Record (or coordinating registered professional) shall sign this document indicating compliance.

### Section A:

	Select	Initial	
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. Results of compliant results have been submitted to RPD Oversight Project Officer or Development Manager.
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 compliance with contract documents and shop drawings.

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

**B1.** \_\_\_\_\_

**B2.** \_\_\_\_\_

**B3.** \_\_\_\_\_

**Architect of Record** (or coordinating registered professional):

**Name:** (*print*) \_\_\_\_\_

**Company:** \_\_\_\_\_

**Date:** \_\_\_\_\_, 20\_\_\_\_

**11.2 OPR CHECK SHEET - ARCHITECTURAL**

Item #	System	Commissioning and Acceptance Testing Standard	Submission	Initial	Date Received
1	Interior Architecture Design	RPD Technical Standards for Offices -TI	AR submit signed Letter of Compliance 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.		
2	Architectural Installation	BC Building Code, Contract Documents and Shop Drawings	Letter of Compliance signed by AR indicating all architectural products and installation are in general compliance 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.		
3	Acoustic Separation	BC Building Code, Vancouver Building Bylaw, and Technical Standards for Offices	Signed letter by AR indicating acoustics meets Technical Standards for Offices – TI - requirements. Also, see footnote 1		
4	Fire Stops	Manufacturer approved installation methods	Copies of applicable BC Building Code Schedules signed by AR with no exclusions.		
5	Seismic restraint	Seismic Engineer Inspection Report	Copies of Building Code Schedule B-1, B-2, and C signed by ER with no exclusions.		
6	Exit Signs	BC Fire Code and AHJ	Copies of applicable Building Code Schedules signed by AR with no exclusions.		
7	Proposed penetration and opening details	BC Building Code and installation methods	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).		
8	Coordination Study	General Note “h”.	Copy of complete coordination study signed by registered architect with review letter signed by AR.		
9	Record Drawings	RPD Technical Standards for Offices TI	Letter of Compliance signed by AR advising record drawings reflect changes to contract.		

Item #	System	Commissioning and Acceptance Testing Standard	Submission	Initial	Date Received
10	Contract or Quality Assurance & Control	See General Note "g"	Letter of Compliance signed by AR indicating each interior space meets Work Safe BC requirements and RPD Technical Standards		
<p><b>General Notes</b></p>	<p>a. AR = Architect of Record or coordinating registered professional.</p> <p>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.</p> <p>c. If manufacturer has specific acceptance/commissioning testing requirements they will be in addition to standards listed above.</p> <p>d. Commissioning and Acceptance Testing Standard is minimum requirements, AR to determine any additional requirements.</p> <p>e. AR to develop appropriate procedures in addition to all items shown above, to demonstrate compliance with the CaGBC LEED rating system, as per contract documents and owner project requirements.</p> <p>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.</p> <p>g. AR review and confirm all systems, products and assemblies installed meet required standards and ratings.</p> <p>h. AR review coordination study and confirm all interior architectural building systems are selectively coordinated.</p> <p>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.</p>				

Footnote: AR to develop functional tests to demonstrate acoustics systems functions as per contract documents and owner requirements.

**11.3 LETTER OF COMPLIANCE – 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 compliance.

**Section A:**

	Select	Initial	
A1.	YES / NO		All mechanical 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 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 compliance with contract documents, shop drawings, and building code requirement.
A5.	YES / NO		Seismic restraint products and installation are in general compliance 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\_\_\_\_

**11.4 OPR CHECK SHEET - MECHANICAL**

Item #	System	Commissioning and Acceptance Testing Standard	Submission	Initial	Date Received
1	All Mechanical Systems	RPD Technical Standards for Offices (Tenant Improvement), ASHRAE Commissioning Guideline 0 and 1	<p>MER shall submit signed Letter of Compliance indicating all mechanical system have been designed in compliance with RPD Technical Standards for Offices (owner’s requirements) and deviations recorded.</p> <p>MER has acknowledged the use of ASHRAE Commissioning Guidelines for this project as applicable.</p>		
2	Fire Alarm Test Certificate	ULC - S537	Copies of Building Code Schedule B-1, B-2, and C signed by MER with no exclusions.		
3	Plumbing System	BC Building Code, AHJ (Local Plumbing Inspector), CSA B64.10 (Backflow annual testing)	Final Plumbing Inspection Certificate and Backflow Test Certificate from AHJ.		
4	Sprinkler System	NFPA 13 and AHJ	Sprinkler Contractors Engineer of record inspection, testing, and Schedule C “Letter of Assurance”.		
5	Fire Stops	Manufacturer approved installation methods	Copies of BC Building Code Schedule B-1, B-2, and C signed by MER with no exclusions.		
6	Seismic restraint	Seismic Engineer Inspection Report	Copies of Building Code Schedule B-1, B-2, and C signed by a professional engineer with no exclusions.		
7	O&M Manuals	RPD Technical Standards for Offices	Letter of Compliance signed by MER advising content of O&M manuals reviewed and is complete.		
8	Record Drawings	RPD Technical Standards for Offices	Letter of Compliance signed by MER advising record drawings reflect changes to contract.		
<b>General Notes</b>	<p>a. MER = Mechanical Engineer of Record.</p> <p>b. If manufacturer has specific acceptance/commissioning testing requirements they will be in addition to standards listed above.</p>				



**11.5 LETTER OF COMPLIANCE – ELECTRICAL**

**Project Name:** \_\_\_\_\_

**Instructions:**

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

**Section A:**

	Select	Initial	
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.
A6.	YES / NO		Interior lighting measurements have been recorded and illumination levels and uniformity are following Work Safe BC and RPD Technical Standards for Offices.
A7.	YES / NO		All lighting controls have been witnessed and are operational as per RPD Technical Standards for Office and design.
A8.	YES / NO		Electrical products and installation are in general compliance 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\_\_\_\_

**11.6 OPR CHECK SHEET - ELECTRICAL**

<b>Item #</b>	<b>System</b>	<b>Commissioning and Acceptance Testing Standard</b>	<b>Submission</b>	<b>Initial</b>	<b>Date Received</b>
1	Electrical Design	RPD Technical Standards for	EER submit signed Letter of Compliance indicating all electrical system have been designed in compliance		
2	Fire Alarm	ULC - S537	Copies of Building Code Schedule B-1, B-2, and C signed by EER with no exclusions		
3	Structured Cabling	EIA/TIA 568	All individual test reports with Letter of Compliance signed by EER.		
4	Fire Stops	Manufacturer approved	Copies of BC Building Code Schedule B-1, B-2, and C signed by EER with no exclusions.		
5	Seismic Restraint	Seismic Engineer Inspection Report	Copies of Building Code Schedule B-1, B-2, and C signed by EER with no exclusions.		
7	Exit Signs	BC Fire Code and AHJ	Copies of Building Code Schedule B-1, B-2, and C signed by EER with no exclusions.		
8	Emergency Lighting	BC Fire Code and AHJ	Copies of Building Code Schedule B-1, B-2, and C signed by EER with no exclusions.		
9	O&M Manuals	RPD Technical Standards for Offices	Letter of Compliance signed by EER advising content of O&M manuals reviewed and is complete.		
10	Record Drawings	RPD Technical Standards for Offices	Letter of Compliance signed by EER advising record drawings reflect changes to contract.		
11	Electrical Installation	Contract Documents and Shop Drawings	Letter of Compliance signed by EER indicating all electrical products and installation are in general compliance with contract documents and shop drawings. Also, attach a copy of final Electrical		
12	Interior Lighting	IESNA Lighting Handbook, 9 <sup>th</sup> Edition	Letter of Compliance signed by EER indicating min, max, average, uniformity ratio for each interior space meets Work Safe BC requirements and RPD Technical Standards.		
13	Lighting Control System	See footnote	EER submit signed Letter of Compliance indicating lighting control has been witness tested and operates as intended by contract document and owner's		

Item #	System	Commissioning and Acceptance Testing Standard	Submission	Initial	Date Received
<b>General Notes</b>	<p>a. EER = Electrical Engineer of Record.</p> <p>b. If manufacturer has specific acceptance/commissioning testing requirements they will be in addition to standards listed above.</p>				

Foot note: EER to develop functional tests to demonstrate lighting control system operates as per contract documents and owner requirements.

### 11.7 DESIGN DEVIATION REQUEST FORM (DDRF)

A sample of the Design Deviation Request Form (DDRF) is shown in this section. The consultant may obtain a copy of the DDRF from the Project Manager.

<h2 style="margin: 0;">RPD Technical Standards</h2> <h3 style="margin: 0;">Design Deviation Request Form</h3>			
<p>It is RPD's expectation that when projects are being designed and implemented, the relevant technical standards shall be followed. However, it is understood that on some projects there may be justifiable reasons to deviate from a standard (e.g.: site constraints, landlord building standards, client requirements, etc.).</p> <p>Under such circumstances and in conjunction with the Project Charter, the Design Deviation Request Form (DDRF) must be completed by the consulting team and submitted by the Prime Consultant to the RPD's Oversight Project Officer (OPO) or Development Manager (DM) assigned to the project. Submit a separate DDRF for each deviation request.</p> <p>Upon receipt, the completed DDRF will be reviewed by RPD for acceptance, and signed off by the RPD OPO or DM.</p> <p>It is RPD's expectation that any design deviations would be identified during the project schematic design phase however, it is understood that there may be exceptions (primarily security items) that may require deviations during other phases including construction.</p>			
Project Number:		Date:	*DDRF Number:
Project Name:		Project Address:	
Deviation Subject Title:			
Disciplines Affected: <i>(check off all applicable):</i> <input type="checkbox"/> Architectural <input type="checkbox"/> Mechanical <input type="checkbox"/> Electrical <input type="checkbox"/> Security			
Reference Clause Number(s) from Technical Standard: <i>(list all clauses affected and version of Technical Standard used)</i>			
Deviation Description: <i>(include any proposed options and supporting documentation)</i>			
Rationale for Deviation:			
Schedule Impact:			
Budget Impact:			
Applicant Name and Company:		Applicant Signature:	
		Date Signed:	

\* The DDRF Number nomenclature shall comprise of the project number, followed by the discipline initial (e.g., Architectural = A, Mechanical = M, Electrical = E, Security = S, etc.), followed by the sequential number (e.g., 01, 02, 03).

Review Comments: *(include BTA technical review comments and Consultant responses)*

Deviation Approval (RPD Use only):

APPROVED     NOT APPROVED

RPD Oversight Project Officer / Development Manager Name:

Justification:

Date:

*The completed form shall be attached to the Project Charter and added to the WDS Project Folder*

**----- End Deviation Request Form Section -----**

## 12. GLOSSARY

### 12.1 GENERAL

- .A Glossary List defines the meaning of words and phrases used in this Technical Standards.
- .B Some terms in the Technical Standards are not defined in the Glossary but have a generally accepted meaning in the industry and in the Province of British Columbia.
- .C Green as in “green building” or “green infrastructure” is defined as the efficient use of resources – land, water, energy and materials – that reduces developments’ impact on the environment and human health for the duration of the development’s lifecycle.

Accessible	Access is required to install and maintain building components, services or systems including Mechanical, Electrical or Building Security and Communication systems. Where access is required to service a building component, access must be such that a person can reach the building component through a route that is unobstructed. The minimum headroom clearance is 2100 mm clear (floor to underside of beams). The minimum space for a person in plan is 1000 mm x 1000 mm at the service location.
Accessible for persons with disabilities	Comply with requirements prescribed in the British Columbia Building Code, current version.
Acoustic Noise	Noise in relation to sound is meaningless or unwanted sound of a greater than usual volume, such that sound disrupts that activities of the staff both within or surrounding the facility.
Alternative Solutions	Denotes alternative design approach, alternative systems, materials and products that are not described in these Technical Standards or the BC Building Code.
Background Noise	Noise the receiver would experience in the absence of the intruding noise.
Basis of Design	A stand-alone document that records the design concepts, criteria, calculations (as necessary) and performance metrics used to meet the Owner’s Project Requirements, and to satisfy applicable regulatory requirements, standards and guidelines. The document includes both narrative descriptions and lists of individual items that support the design process.
Commissioning	A systematic, coordinated process of design review, construction checks, functional performance tests, and comprehensive documentation that verifies that RPD’s Project Requirements are achieved in the complete building. Commissioning starts during pre-design, and continue through all stages of the design, construction and post-construction stages of a project. It provides documentation, testing and training to facilitate successful operation and maintenance of the completed building.
Contractor	A person or entity being a member of the Project Design Team
Energy	Energy refers to any energy source or fuel, including electricity, natural gas, propane, etc.

Energy Statement	A statement indicates the energy criteria, referenced standards and adopted compliance path for the disciplines of Architectural, Electrical and Mechanical.
Gap Analysis	Analysis among Technical Standards, project specific requirements/constraints and site conditions.
IDP	Integrated Design Process (IDP) is a method that seeks to produce high performance sustainable building criteria while staying within budgetary and scheduling constraints.
IPT	Integrated Project Team (IPT) is a team that consists of stakeholders from ministry clients, assets management, technical advisory, project management and project consulting team.
Owner's Project Requirements.	Project requirements including those requirements related to use of the space, and all requirements of Technical Standards.
RPD Project Manager	RPD's Oversight Project Officer (OPO) or Development Manager (DM)
Proponent	Denotes a qualified bidder proposing to submit an offer to RPD for obtaining the Work.
Provide	Wherever the word "provide" is used in any form, it shall mean that the Work concerned shall include both supply, installation and commissioning of the products or systems required for the completion of that part of the Work.
RPD	Ministry of Citizens' Services, Real Property Division
Service Space	A space provided in a building to facilitate or conceal the installation of building service such as chutes, ducts, pipes, conduits, electrical trays or shafts.
Work	Means the provision of all professional, technical, skilled and unskilled labour, services, material, equipment including without limitation, all design and construction and any action as necessary for the Project Design Team to complete and perform its obligations arising from and in accordance with the terms and conditions of the Contract.

----- End of Glossary Section -----