SSBC TECHNICAL STANDARDS for Offices – 2014

Tenant Improvements

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SSBC TECHNICAL STANDARDS FOR OFFICES 2014

TENANT IMPROVEMENTS

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1 GENERAL REQUIREMENTS

1 a Introduction

1 a 1 SSBC Technical Standards for Offices Tenant Improvements

1 a 2 These technical requirements apply to office space. Requirements for other occupancies or building types are described in other documents.

1 a 3 These standards are intended to provide technical requirements for the design and construction of existing space that Shared Services BC (SSBC) leases or builds for its clients. The standards apply to all office spaces, any area.

1 a 4 SSBC requires design solutions that are to current industry standard and practice, that maximize economic potential over the projected life of the building, without prestige amenities.

1 a 5 In the absence of a specific edition of a standard being referred to for the BC Building Code, Vancouver Building Bylaw or the Technical Standards, the current edition including all addenda at the time of the building permit application shall apply.

1 a 6 The design and construction of office space shall comply with the National Energy Code of Canada for Buildings 2011 (NECB-2011) except for office spaces in City of Vancouver, using the Prescriptive Path in lieu of ASHRAE 90.1-2010.

1 a 7 The completion of all commissioning Letters of Conformance, Section 12 Commissioning apply to all work undertaken and completed except for projects within the terms of reference for the Province of British Columbia Master Services Agreement (MSA) with WSI (Brookfield Johnson Controls).

1 a 8 The IPT (Integrated Project Team) will determine the applicability of these Technical Standards as per the defined roles and responsibilities used for all SSBC projects.

DEFINITIONS

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

Prescriptive requirements: This section specifies construction requirements according to particular materials and construction methods. Each of these sections is identified by colour green throughout the technical standards.

1 b Design Requirements

1 b 1 Performance requirements

- a The following Technical Standards summarize basic technical requirements of the tenant improvements in the building. Obtain approval from SSBC for any proposed deviations from the Technical Standards prior to implementation.
- b Gap analysis: Building System Review should be completed as part of the consultant's scope of work during schematic design.

1 b 2 Prescriptive requirements

- a On projects where LEED-CI certification is required, "Short-listed" Proponents shall include their initial LEED Checklist, indicating the strategies they intend to utilize to capture the various LEED credits. This LEED checklist will be updated and revised over the term of the project, and the initial checklist will serve as the starting point for future revision, requiring that alternate credits be attained by the proponent to replace any credits found to be unattainable during the course of the project.
- b Integrated Design Process (IDP)
  - 1 An Integrated Design Process shall be utilized for the project.
  - 2 The successful proponent shall invite the project stakeholders to participate in the initial visioning design workshop. The list of invitees shall be co-ordinated with SSBC.

1 c Project Documents

1 c 1 Prescriptive requirements

1 c 2 The following individual items in Paper copy and Digital files must be submitted to SSBC:

- a Conceptual/Schematic Design and Design Development.
- b Final Design and Construction Drawings
- c Project Specifications
- d LEED Documentation
- e Final Record of Construction Drawings
- f Operation & Maintenance Manuals
- g Construction Progress Photographs
- h Commissioning Records

For Glossary and Definitions refer to:

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

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

2 INTERIOR ARCHITECTURE

2 a Non-Permanent Interior Walls

2 a 1 Performance requirements

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

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

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

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

e Select materials and products that are compliant with LEED criteria.

2 a 2 Prescriptive requirements

a The base shall be coved rubber or vinyl 100 mm (4") high.

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

c 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.

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

e 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.

f 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.

g Acoustic performance of interior walls and partitions must be established in accordance with sub-section 2g "Acoustic Separation".

2 b Doors, Frames, Hardware and Interior Glazing

2 b 1 Performance requirements

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

1 Resistant to expected use and abuse

2 Easily maintainable and repairable

3 Fabricated complete with cut outs and reinforcing and drilled and tapped to receive the appropriate finish hardware required

4 Surfaces prepared to receive finishes as required

b Reference Standards for Doors:

1 Commercial Steel Doors and Frames: Canadian Steel Door Manufacturers Association (CSDMA), 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).

c New exterior doors, if required by specific project, will be identified in Section 12 "Project Specific Requirements"

2 b 2 Prescriptive requirements

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

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

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

by the Environmental Choice Program (e.g. EcoLogo) www.environmentalchoice.com or compliant with LEED criteria.

d All latch and locksets shall be standard/medium duty commercial ANSI A156.2 (latest edition), Series 4000 Grade 2 certified quality such as Schlage AL, Sargent 7 Line, Corbin Russwin CL3900 and Falcon B Series. Locksets are only provided for identified needs. Refer to Section 10 Electronic Security Systems. 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.

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

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

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

2 c Floor Finishes

2 c 1 Performance requirements

a Schedule of Floor Finishes:

b Table 2.1 - Schedule of Floor Finishes

SPACE	FINISH
Open office areas	Glue-down carpet/carpet tile
Private offices	Glue-down carpet/carpet tile
Conference, Interview rooms, Libraries and similar areas	Glue-down carpet/carpet tile
Circulation and Reception, Office Copiers	Glue-down carpet/carpet tile
Mailrooms, Copy Centres	Glue-down carpet/carpet tile/sheet vinyl
Break Areas	Glue-down carpet/carpet tile with a 914 mm (3'0") wide strip of sheet vinyl to floor in front of counter, full length.
Service Rooms (e.g., Mechanical/Electrical)	Sealed concrete
Telecommunication Closet	Sealed concrete or antistatic sheet vinyl
Washrooms (slope minimally to drains)	Sheet vinyl
First Aid Rooms	Sheet vinyl
Storage Rooms/Spaces	Sealed concrete to match adjoining area
Main Entrances, Foyers, and similar public areas	Sheet vinyl/stained and polished concrete
Janitor Rooms	Sheet vinyl/sealed concrete

c Materials and Installations

1 Carpets: Carpet shall meet the following minimum specifications:

BROADLOOM CARPET CONSTRUCTION SPECIFICATIONS	
Fibre	100% bulked continuous filament (BCF) nylon 6 or nylon 6,6 with built-in antistatic fibre
Style	Level loop
Pattern	Directional
Pile Weight	Minimum 949 g/m^2 (28 oz/yd^2)
Dyeing	Manufacturer's recommended method
Appearance Retention	Carpet and Rug Institute CRI TM101, minimum 4 ARR
Static Level	Not to exceed 3.5 kV - AATCC-134
Warranties	Ten year maximum 10% wear (by weight) Lifetime antistatic Ten year light fastness Ten year no edge ravel and no zippering Ten year no delamination – *chair pads not required*
Product Availability	Product available for no less than 10 years in regards to 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^2 / hr TVOC) after installation
Carpet Flammability	≥ 0.45 watts/cm^2, Class 1 (ASTM E648)
Smoke Density	≤ 450 Flaming Mode (ASTM E662)

CARPET TILE CONSTRUCTION SPECIFICATIONS	
Fibre	Nylon 6 or Nylon 6,6; Modification ratio of 2.5 or less
Style	Level loop, textured loop, or cut & 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 4.0 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) ≤0.1% change or ISO 2551 ≤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 in regards to 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^2 hr TVOC)
Carpet Flammability	≥ 0.45 watts/cm^2, Class 1 (ASTM E648)
Smoke Density	≤ 450 Flaming Mode (ASTM E662)

2 Sheet Vinyl

a To conform to CSA 126.3 (latest edition) Type II Grade 1 minimum gauge 2.0 mm (.079”). Obtain prior approval from SSBC for Linoleum type products. Linoleum shall be installed in accordance with manufacturer’s instructions and shall be sealed and waxed.

3 Carpet and Resilient Floor Installation

1. Carpet and resilient flooring installations shall be in accordance with the recommendations contained in the "Floor Covering Specification Manual” of the National Floor Covering Association, c/o BC Floor Covering Association, info@bcfca.com.
2. Concrete Floor Finishes
   a. Steel trowel finish: to CSA CAN3-A23.1 with final finish to suit covering or treatment.
   b. Sealed/hardened concrete: in accordance with manufacturer’s instructions.
3. Stained and Polished Concrete
   a. Produce a representative test section to SSBC for acceptance prior to application.
   b. Use no-VOC non-corrosive low pH organic salts concrete etching solution, neutralizing rinse, low VOC water based acrylic semi-transparent stain, overlaid for aesthetic effect, sealed with two coats of water based urethane and wax top coat, all applied as per manufacturer’s instructions (especially regarding concrete curing and moisture content).
4. Adhesives
   a. Flooring shall be laid with adhesives that are acrylic based, low TVOC, 0 TVOC (calculated) and approved by the Environmental Choice Program. Web site: www.environmentalchoice.com.
   b. All carpet and resilient flooring shall be laid with an adhesive approved by the carpet and/or resilient flooring manufacturer for the substrate to which it is to be applied.

2 d Wall Finishes

2 d 1 Performance requirements

a Wall Finishes

1 The most cost effective method of finishing wall surfaces shall be used. All gypsum board surfaces are to be painted. The joint compound for gypsum board should be as per CSA A82.31-M1980, 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.

2 Materials and Installations

a Painting

1. Painting shall be in accordance with the recommendations of the Master Painters Institute (MPI) Architectural Painting Specification Manual, current edition, including Standard [GPS-1-05]. Web site: www.paintinfo.com/mpi.
2. Paint to walls shall be acrylic latex with low sheen, eggshell or semi-gloss finish. Flat latex is not an acceptable finish. Use waterproof products such as alkyd flat or semi-gloss enamel in janitor rooms, kitchens, and other high condensation and wet areas.
3. All materials must be LEED compliant.
4. Where required, paints and coatings must meet the flame spread requirements of local authorities having jurisdiction.

b Wall Tiling

1. Tiling shall be in accordance with the Tile Installation Manual, and Ceramic Tile and Maintenance Guide produced by Terrazzo Tile and Marble Association of Canada (TTMAC).
2. Ceramic tile adhesive VOC limit: 65 g/L.
3. Grout colour shall be complementary to the tiles and easy to be maintained. Do not use white grout.

c Plastering

1. Plastering shall conform to the AWCC Specifications Standards Manual, available from the BC Wall & Ceiling Association, Web site: www.bcwca.org.

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

d Gypsum Board Substitutes

1. 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 other wall finish. Protect substrate with a 0.15 mm
(6 mil) thick sheet of polyethylene installed behind the backer board, and extending the full area of the backer board without joints.

2 e Ceilings

2 e 1 Performance requirements

a Ceiling Finishes

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

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

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

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

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

2 e 2 Prescriptive requirements

a Materials and Installation

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

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

b Acoustic Isolation

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

2 f Millwork

2 f 1 Performance requirements

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

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

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

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

3 "Premium" Grade shall be used in specific areas only, for example: Deputy Minister's office.

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

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

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

f Painting: Painting shall be in accordance with the recommendations of the current edition of the MPI Architectural Painting Specification Manual, including Standard [GPS-1-05]
Web site: www.paintinfo.com/mpi

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 SSBC.

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 SSBC.

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

2 g Acoustic Separation

2 g 1 Definitions

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

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

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

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

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

2 g 2 Performance requirements

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

1 Deputy Ministers’ (or similar) offices

2 Arbitration/Union or other negotiation facilities

3 Offices where matters of strict confidentiality must be discussed

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

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

6 Determine NIC required from the following table:

NIC required between different occupancies

A.	45							
B.	45	40						
C.	45	35	35					
D.	45	35	30					
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.**

Space Types:

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

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

2 g 3 Prescriptive Requirements

a Determine NIC in conformance to realistic needs of the user at the design stage.
b NIC shall be no less than NIC 35 between any occupied enclosed space and any adjoining space.
c Fire resistance rating requirements for closers (doors) take precedence over acoustic requirements.
d The following details indicate typical constructions that can be used to achieve various NIC separations, and STC and NRC ratings of partitions and ceilings in the areas. The STC and NRC ratings can also be used as a checklist for assessing proposed designs once the NIC level has been established.
e NIC Details

1 NIC 30

a walls - STC 33 minimum. Typical wall construction detail as per BC Building Code.
b ceilings - continuous suspended T-bar ceiling, CAC 35 minimum, ceiling NRC 0.7 minimum.
c floors - STC 52 minimum, (example.: 150 mm (6”) concrete or BC Building Code floor construction F1a - 90 mm reinforced concrete with 20 mm minimum cover over reinforcing steel). Alternative floor constructions (such as wood frame) meeting the required minimum STC rating must be verified by an acoustical expert/specialist.
d doors - solid core wood, no grilles or openings. Note that doors without perimeter seals limit NIC performance to NIC 20.
e windows - non-opening, 6 mm (1/4”) laminated minimum, perimeter gasket (neoprene tape or silicone sealant).
f ventilation - no special precautions except as required in “Noise and Vibration – HVAC” section.)
g mullion/convector details - minimize openings

2 NIC 35

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

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

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

d doors - solid core wood or insulated metal. Acoustically rated door is required, complete with perimeter seals and threshold. No grilles or openings. Note that solid core wood doors would achieve a maximum STC of 30 only when properly fitted with perimeter seals. Without seals they will limit assembly performance to NIC 20. NIC 35 could be achieved when the wall where the door is located has a large area (try to minimize glazing) and a better construction than what would be required for NIC 35.

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

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

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

h piping - caulk piping at partitions with high temperature caulking

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

3 NIC 45

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

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

c floors - STC 52 minimum, 152 mm (6") concrete. Alternative floor constructions (such as wood frame) meeting the required minimum STC rating must be verified by an acoustical expert/specialist.

d doors - STC 45 rated door and frame assembly supplied by one manufacturer, complete with all necessary seals and rated as an assembly. Consider double doors / vestibule for highly sensitive areas.

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

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

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

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

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

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

2 h Janitor Facilities

2 h 1 Performance requirements

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

2 h 2 Prescriptive requirements

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

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

c Detailed Requirements - Facilities with rentable area under 4645 m^2 (50,000 sf):

1 One floor sink size 610 x 610 x 152 mm (2’0” x 2’0” x 6”); if ceramic, provide stainless steel protection to lip. Waterproof backsplash to 1219 mm (4’0”) above floor behind floor style utility sink.

2 Wall mounted hangers, for mops and brooms (double units: project specific). Standard of acceptance: Geerpres/Gripit #5047 or Rubbermaid 1993 (34”) closet organizer. Install wet mop hangers 1524 mm (5’0”) above floor over floor sink so that mops will drip into sink.

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

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

d Detailed Requirements - Facilities with rentable area over 4645 m^2 (50,000 sf) - refer to Section12, Project Specific Requirements.

2 i Washroom Accessories

2 i 1 Performance requirements

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

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

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

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

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

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

1 Toilet paper dispensers - locking large double roll type [approximate dimensions: 533 mm w x 318 mm h x 127 mm d (21" x 12 ½" x 5")].
2 Towel dispensers - surface mounted (do not install recessed units), at all sink and basin units [approximate dimensions 483 mm w x 273 mm h x 229 mm d (19" x 10 ¾" x 9")].
3 Soap dispensers - surface mounted - do not install recessed units [approximate dimensions 133 mm w x 235 mm h x 127 mm d (5 ¼" x 9 ¼" x 5")].

2 j First Aid Room Fit-up

2 j 1 Prescriptive requirements

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

2 k Interior Signage

2 k 1 Prescriptive requirements

a All lettering is to be white Helvetica Medium, upper and lower case.
b Except where matching existing building signage scheme, room identification signs, directional signs at elevator/stair landings / in corridors, on-floor identification signs at the main access point to the office shall be plastic removable insert style, with:
1 a 3 mm (0.12") black ABS back
2 a 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 a continuous strip of 0.8 mm (0.032") double-sided tape at the edge of three sides and
4 a 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 sufficient 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 similar to directional signs, but without hanger tabs, and wall mounted where appropriate or to match existing directory as required.
f Washroom doors and doors to stairs shall be provided with internationally recognized symbols, engraved in 3-ply plastic laminate material, with bevelled edges to expose the white core.
g Provide only a room number to Telecommunication closets – no signage identifying the room as such.
h Required signage such as "warning signs" must conform to the BC Building Code and all other relevant codes and regulations. International symbols must be used where and as applicable.

2 l Commissioning

2 l 1 Prescriptive requirements

a Refer to Section 12 - Commissioning.

2 m Wood First Act

2 m 1 Performance requirements

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

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

3 HVAC

3 a HVAC General

3 a 1 Design & Review Process – HVAC

a Performance requirements:

1 Responsibilities

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

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

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

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

b Prescriptive requirements:

1 Concept Stage Submission

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

1. System type(s), descriptions and approximate sizes
2. Basic design parameters including:
   a. Design velocities through ducts, coils, AHUs and pipes
   b. Minimum supply rates for ventilation and for comfort

b Schematic sketch and preliminary equipment specification

1. Conceptual sketch schematics of air flow and hydronics systems
2. Conceptual sketch layouts and locations of equipment
3. Conceptual sketches of HVAC thermal zonings
4. Preliminary specification

c Calculations

1. Preliminary ventilation and load calculations
2. Threshold calculations to determine if special Technical Standards requirements are triggered

2 Design Development Stage Submission

a HVAC Concept Report reissue including any changes

b Preliminary equipment selections for major pieces of equipment.

3 95% Documentation Stage Submission

a 95% Drawings and Specifications

b Sequence of Operations:

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

c Ventilation Data Tables:

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

VENTILATION DATA for SYSTEM	System			
	Name	Name	Name	
System Design Occupant Density[1]				m^2/person
Minimum OA Fraction in Primary SA[2]				%
Minimum OA / Primary SA[3]				%
Minimum OA Intake[4]				L/s•m^2
VENTILATION DATA for each OCCUPIED SPACE TYPE	**Space Type[5]**			
	Name	**Name**	**Name**	
Design Maximum Occupant Density[6]				m^2/person
Design Minimum OA per person[7]				L/s/person
Minimum Primary SA / unit area[8]				L/s/m^2
Minimum Total SA / unit area[9] [10]				L/s/m^2
Note: The above minimum flows are for outdoor air ventilation purposes only. Systems and spaces may need more supply or outdoor air for other reasons such as comfort or makeup				

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

3 a 2 HVAC Operation and Maintenance Manual

a Prescriptive requirements:

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

2 Prior to recommending acceptance of the project, the HVAC RP shall verify that manuals meeting these requirements have been provided.

3 a 3 HVAC Capacity

a Performance requirements:

1 Capacity

a The HVAC system shall have sufficient capacity to maintain the required Space Conditions at the BC Building Code’s 1% January and 2½% July outdoor design conditions.

b It shall also have sufficient capacity to restore spaces from night setback temperature to occupied temperature efficiently and within 4 hours.

3 a 4 Balancing - HVAC

a Performance requirements:

1 Test, adjust and balance all air and hydronic systems in accordance with the requirements and procedures described in Associated Air Balance Council (AABC) and National Environmental Balancing Bureau (NEBB).

2 Balance to ±5% of design flows at central equipment and main distribution runs

3 Balance to ±10% of design flows elsewhere and at outdoor air intakes

4 Measurements shall be accurate to ±5% of actual values.

5 Adjust systems so that balancing is achieved with minimal pressure loss. Change fan or pump speeds or pump impeller diameters so that at least one fluid path in each system has all balancing devises almost wide open.

b Prescriptive requirements:

1 Smoke and Fire Damper verification

a Verify the presence of fire dampers in all new fire separations, and smoke dampers in all smoke separations, and test the function of both.

2 Balancing Report

a Document the results of the balancing process in a written balancing report, that clearly identifies any outstanding problems and submit it to SSBC after review and acceptance by the Responsible Professional (RP) and prior to substantial completion.

b Include signed pdfs in the balancing report showing:

1. All ductwork, fire separations and smoke separations and RA openings
2. All fire, smoke and balancing dampers circled and initialled to confirm accessibility, and functionality
3. The critical run for each air system and each hydronic system
4. Design and actual flow values at each balanced point

3 a 5 Commissioning - HVAC

a Performance requirements:

1 Refer to “Commissioning” section.

3 a 6 Maintenance Access - HVAC

a Performance requirements:

1 Provide practical and safe maintenance and service access to HVAC equipment and space to remove and replace equipment without having to disassemble it or remove other elements.

2 HVAC equipment requiring inspection, servicing, or repair annually or more frequently shall be:

a Indoors, or in a fully enclosed and well lit service space provided as part of custom rooftop equipment.

b Accessible from floor level without requiring a ladder

c Accessible through access routes that are completely clear of any pipes, conduits, sprinklers, lights, structure, equipment or any other obstruction from the floor surface to a height 2000 mm above it and at least 800 mm wide.

b Prescriptive requirements:

1 All catwalks, stairways, ladders, roof hatches and other means of access and egress shall comply with WorkSafeBC Regulations and the BC Building Code (Code equivalencies not permitted).

2 Locate equipment and services so that maintenance access points for HVAC or any other services are not blocked by ducts, pipes, conduits, other equipment, walls, structure, or other parts of the building.

3 The layout of HVAC equipment and distributions systems shall provide service access as required in order to measure and adjust air and water flows as part of the system balancing process.

4 Duct and Plenum Cleaning

a Provide access to all ducts and plenums for cleaning (Refer to “Ductwork”).

3 a 7 Spare Parts - HVAC

a Performance requirements:

1 Provide a basic starting stock of commonly used spare parts

b Prescriptive requirements

1 Provide spare parts as follows:

a One complete set of replacement media or filters for each filter and filter bank, installed and servicing the tenant improvement space only (including both pre and final filters).

3 b Space Requirements - HVAC

3 b 1 Space Conditions

a Performance requirements:

1 Temperature

a The indoor design temperature shall be 22° C in all occupies spaces.

b Indoor temperature setpoints shall be ±1°C adjustable by occupants from the zone temperature sensor.

c 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.

d The temperature of separate spaces within a single control zone may vary by up to ± 2°C from the zone setpointe.

e 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 22° 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

Refer to “Noise and Vibration- HVAC”.

3 b 2 Equipment Room HVAC

a Performance requirements

1 All equipment rooms
a Provide sufficient cooling to protect equipment function, reliability & lifespan.
b Prevent space temperature exceeding the ratings and warranty limits of wiring & equipment installed therein. This applies both in normal operation and in the event of failure of any one cooling related component.
c HVAC systems must not compromise security of room entry or equipment
2 Server and UPS Rooms
a Maintain space temperature at 22°C ±1°C at all times including the event of failure of any one cooling related component
3 Communication Rooms with cooling load =>1500 W
a Maintain space temperature at 22°C ±1°C in normal operation
b Maintain > 21°C and < 27° if any one cooling related component fails

b Prescriptive requirements:
1 Obtain Server, UPS and Communication equipment loads from SSBC
2 Air supplied or drawn into a Server, UPS or Communication room must be filtered to min. MERV 8 or be transferred from a clean indoor area
3 Cooling in normal operation must not require operation of central plant that could otherwise be shut down.
4 Mechanical cooling must be maintained in the event of failure of any one cooling related component for Server and UPS rooms.
5 Communication rooms
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 that draws from an adjacent space and discharges into the ceiling space

3 b 3 Noise and Vibration - HVAC

a Performance requirements
1 Provide HVAC systems that meet the following criteria for at least the projected average life of the equipment based on the ASHRAE Handbook.
2 Interior HVAC noise for each space
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

b Prescriptive requirements
1 Equipment on Metal Decks and/or OWSJ Structures
a Provide effective isolation.

b For equipment with motors larger than 10HP, provide a housekeeping pad at least double the equipment weight

c Prior to completing the design, provide an acoustical consultant's report demonstrating that the specified interior noise requirements will be met.

2 Ceiling mounted equipment above Lay-In Acoustic Tiles

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).

3 Noise and Vibration Verification

a Verify under the noisiest HVAC operating mode for each location

b Measure dBA and dBC levels and listen for tones in each space and each outdoor location. Problem spaces may be re-measured for compliance based on NC level and low octave band SPLs

c Take any measures needed to bring the installation into compliance

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

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

3 b 4 Zoning

a Performance requirements:

1 Provide sufficient thermal zoning to achieve reasonable occupant comfort and meet the requirements under "Space Conditions"

b Prescriptive requirements:

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

a Office spaces

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

b High Occupancy and high Occupant Density Rooms

1. Separate rooms >20 m^2 shall each be a separate zone
2. Smaller enclosed spaces shall each have a separate temperature sensor with temperature control based on averaged zone temperature.
3. See also ventilation requirements including ventilation control

3 b 5 Ventilation

a Performance requirements:

1 Ventilation systems, ventilation calculations and ventilation documentation shall be in accordance with ASHRAE Standard 62.1-2010 and the following.

b Prescriptive requirements:

1 Minimum Outdoor Air Calculations

a Calculations methods

1. Calculation minimum outdoor air ventilation for each space, and outdoor air intake, using the methods from ASHRAE Standard 62-2010 but applying the rates and occupant densities below.

b Outdoor Air Ventilation Rates

1. Provide sufficient outdoor air to each space to satisfy all of the following:
   a. The rates from Table 2 of ASHARE Standard 62-2001
   b. The rates from Table 6-1 of ASHRAE Standard 62.1-2010

c. For systems without outdoor air economizers (e.g. 100% OA):
1 Rates shall be 150% of the values prescribed above for at least 90% of operating hours.
2 If min. OA intake is greater than 500 L/s, automatically reduce rates from 150% to 100% in extreme hot and cold weather.

c Occupant Densities

1. Base calculations on the largest of the following:
   a. The programmed occupant density for the space
   b. The occupant density from Table 6-1, ASHRAE Std. 62.1-2001
   c. The occupant density from Table 6-1, ASHRAE Std. 62.1-2010
   d. Office Space
      1 Private offices – 15 people / 100 m^2
      2 Open plan office zones – 10 people / 100 m^2
   e. Office Area Systems with common recirculation serving >1000 m^2
      1 Diversified population– 5 people / 100 m^2

2 Recirculation, Transfer and Exhaust

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

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

c Space exhaust air rates shall not be less than the exhaust rates in Table 6-4 "Minimum Exhaust Rates" of ASHRAE 62.1-2010, unless noted otherwise.

3 High Occupancy Rooms

a For rooms designed to accommodate more than 20 people, (e.g. meeting rooms =>40 m^2), control minimum outdoor air ventilation as follows:

1. Use a single sensor to sense space and outdoor CO_2 concentration.
2. Control minimum ventilation so the CO_2 concentration rise doesn't exceed that corresponding to the OA ventilation requirements of this standard.
3. The first response to increasing demand shall be fan powered transfer of secondary supply air from other spaces. If this is insufficient then:
   a. If the space is served by a separate AHU, adjust its outdoor air intake.
   b. If it is served by a 100% OA system, increase flow to this space
   c. If the space is served by a central system that serves multiple spaces then adjust the supply air flow to the space to match the greater of the ventilation demand or the thermal demand.

4 High Occupancy Density Rooms

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

1. Local transfer air originating from other areas with surplus outdoor air.
   a. The required transfer air flow can be calculated from formulae in Appendix A of ASHRAE Standard 62.1. For office buildings, the total flow of primary air plus transferred air will typically be over 2 cfm/sq ft
   b. Direct transfer e.g.:
      1 A fan powered VAV box
      2 A fan injecting air into the supply downstream of a VAV box
      3 A fan injecting air into the room
   c. Indirect Transfer
      1 Combined exhaust, transfer and return flow from the room exceeds the air flow supplied to the room, and induces inflow air flow from the most readily available sources along the paths of least resistance.

3 c HVAC Elements - General

3 c 1 Air Diffusion

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

b Prescriptive requirements:
1 Refer to: “Noise and Vibration HVAC”, “Space Conditions – Draft”, “Ductwork” and “VAV Reheat Systems”.

3 c 2 Ductwork

a Prescriptive requirements:
1 Duct connections to fans shall be configured to minimize system effect losses.
2 Bends shall be full radius or have splitters placed so each air path is full radius.
3 Ductwork shall be airtight joint sealed spiral formed round or oval type except that joint and seam sealed rectangular duct may be used in mechanical rooms and immediately adjacent to mechanical rooms, crossovers shafts and rooftop equipment.
4 Diffusers and Supply grilles shall be connected using a straight rigid duct preceded by a rigid full radius bend. Other configurations may be used where performance is proven. Where practical, a single piece of flexible duct may be added to trap duct borne sound from the balancing damper and fan, to aid in alignment, and to eliminate sheet metal fittings.
5 Balancing Dampers shall be acoustically remote from diffusers and grilles. Subject to that constraint they shall be placed for convenience of access, preferably at the takeoff connection.
6 Duct Silencers shall be avoided where possible and their insertion resistance penalty shall not exceed 75pa.
7 Duct Liner: Face and exposed edges to be covered with a smooth durable film and to be accessible for inspection and repair.
8 Flexible Duct shall not be used in locations where it cannot be replaced. Its length shall be no greater than 10 duct diameters, the velocity of air within it is shall not exceed 1000 fpm and it shall be supported so that all bends are smooth and at least full radius.
9 Duct and Plenum Access
a Provide access to all ducts and plenums for cleaning. This includes providing access at potential blockage points such as multi-blade dampers and Security Barriers and coils.
b Access to plenums shall be through access doors. Where possible, the openings shall be at least 450 mm wide and 1500 mm high.
c Access to ducts shall be through sturdy panels or doors with hand fasteners

3 c 3 Filters - Air

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

3 c 4 Perimeter heating

a Prescriptive requirements:
1 Heating with Air from standard ceiling diffusers
a Typical perimeter spaces may be heated with supply air from standard ceiling mounted diffusers provided:
1. Perimeter heat loss =<750W in any 3 m run or 500W in any 1 m run.
2. .Supply air temperature =<8°C (15°F) above room temperature.
3. Ceiling height =<2700 mm above floor level
4. The supply air flow =>5 L/s/m^2 (1 cfm/sf) while heating

b Where any of these limiting conditions is not met, the permissible heat loss is adjusted proportionally for each criterion so:

1. If the supply air temperature is twice as far above room temperature, or the ceiling height is twice as high, or the supply air flow is half the above limit, then the permissible heat losses would halve to 375 W in any 3 meter run and 250 W in any one meter run
2. If all the above changes apply then permissible heat losses would reduce by ½ x ½ x ½ = 1/8 to 93W in any 3 meter run and 63 W in any 1 meter run

c Transient Occupancy (e.g. Corridors and Lobbies)

1 In spaces where occupancy is transient and the occupants are not sitting down, the permissible perimeter heat loss is twice that permitted in normally occupied spaces.

2. Supplementary Heating

a. Avoid supplementary perimeter heating where possible.
b. If the above conditions for heating with air can't be met, provide separate perimeter heating to meets facility's needs in the most economical manner.
c. Subject to the needs of the space, such heating may be overhead radiant panels, baseboard heaters, in-slab heating or directed warm air.
d. In secure areas, baseboard shall not be used and overhead radiant panels shall be avoided unless there is no viable alternative.
e. The output of this supplementary heating shall be scheduled with outdoor temperature. Radiant panels or baseboard may alternatively be modulated from a space temperature sensor in sequence with the space cooling.

3 c 5 Reheat

a Performance requirements:

1 Minimize direct and indirect reheat and eliminate it wherever possible.

b Prescriptive requirements:

1 Hot water Reheat

a Reheat coils shall have modulating 2 way valve control and be designed for low return water temperature to minimize heat losses and to optimize operation of condensing boilers.

b Supply water temperature shall be scheduled to reduce heat loss and improve controllability in mild weather.

2 Electric Reheat shall have modulating control (e.g. SCR).

3 c 6 Refrigeration - HVAC

a Perormance requirements:

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

3 c 7 Variable Speed Drives

a Performance requirements:

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

3 d HVAC Central Plant

3 d 1 Air Handling Units

a Performance requirements:

1 Air Filters.

b Prescriptive requirements:

1 Filter replacement

a Provide new filter replacement for AHU unit installed and servicing for the tenant space only.

3 d 2 Cooling & Hot Water Heating Plant

a Performance requirements:

1 Project Specific Requirements section must be consulted prior to starting design if new cooling & hot water heating plant is required.

3 e HVAC Systems - General

3 e 1 LEED - Energy (HVAC)

a Performance requirements

1 Design to meet the following mandatory LEED Credits for existing building with Tenant Improvements “LEED Gold” rating system:

a Credit 1.3 Optimize Energy Performance, HVAC:

1. If new HVAC systems are to be installed under the project, then 2 points are mandatory. The system must either perform 30% better than the ASHRAE/IESNA Standard 90.1 – 2004 OR meet the “Advanced Buildings: Energy Benchmark for High Performance Buildings (E-Benchmark)” prescriptive criteria and have Appropriate Zoning and Controls.
2. If new HVAC systems are not to be installed under the project, then 1 point for Appropriate Zoning and Controls is mandatory.

a. Indoor Environmental Quality

1 Credit 2 Increased Ventilation – 1 point

b Minimum Energy Performance

1. The building shall attain the above referenced minimum Energy Performance requirements.

b Prescriptive requirements:

1 Planning shall include consideration of feasibility, space requirements, any structural implications, access, fuel delivery and storage, future fuel availability, order of final cost and order of cost for initial provisions.

2 Electric resistance heating is not an acceptable measure.

3 f HVAC System Types

3 f 1 Dual Fan Dual Duct

a Prescriptive requirements:

1 Mixing boxes

a VAV boxes shall be pressure independent type with sensing and control of space temperature, zone supply airflow, and zone supply temperature.

2 Minimum flow

a Provide a minimum zone supply flow set point that is sufficient to:

1. Deliver the minimum zone outdoor air requirement based on the outdoor air fraction in the supply air and
2. Avoid air distribution and control problems from excessive turndown, and
3. Maintain space temperature in cold weather while limiting zone supply air temperature to 30°C max (reset function).

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

1. Use natural transfer air to meet the shortfall then increase the zone supply flow if transfer air is insufficient.

3 Dampers

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

3 f 2 Fan Coil

a Prescriptive requirements:

1 Fan coil unit selection and installation shall meet the following criteria:

a Fan coils shall only be located in accessible ceilings above readily accessible floor space rated for NC 35 or higher.

b Fan coils shall be selected to meet the required NC level in adjacent spaces allowing for any increase in noise over a 15 year lifespan.

c Maximum nominal cooling capacity for a single unit shall be 3 tons.

d They must be designed and located to permit easy access to replace filters, inspect and clean coils and drain pans, and service components.

e Fan coils must simultaneously meet Noise and Vibration requirements, supply air temperature limits and peak heating and cooling load.

f Fan motors shall be ECM type.

2 Outdoor air shall be filtered, heated or dehumidified as necessary, and ducted to discharge within 300 mm of, and directly toward, the air inlet of each fan coil.

3 Any new fan coil system shall be 4 - Pipe type with separate supply and return of both chilled and hot water and standby pumps for both and chilled hot water supply and be designed to meet peak heating loads with 52°C (125°F) water.

3 f 3 Naturally Cooled Buildings

a Performance requirements

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

3 f 4 Radiant Floor

a .Performance requirements

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

3 f 5 VAV Reheat

a Prescriptive requirements:

1 VAV boxes

a VAV boxes shall be pressure independent type with sensing and control of space temperature, supply airflow, and supply temperature.

2 Minimum flow

a Provide a minimum supply flow set point that is sufficient to:

1. Deliver the minimum zone outdoor air requirement based on the outdoor air fraction in the supply air and
2. Maintain a minimum supply flow rate to occupied spaces of at least 0.5 cfm/ft^2, and
3. Avoid air distribution and VAV box control problems from excessive turndown, and
4. Maintain space temperature in cold weather while limiting zone supply air temperature to 30°C max (reset function)

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

1. Where possible, use natural or fan powered transfer air to meet the shortfall rather than increasing the minimum primary flow.
2. If transfer air is insufficient then increase minimum supply flow setpoint.

3 Reheat

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

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

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

d Reduce flow to minimum before reheat coils activate.

e See additional requirements under Reheat in HVAC System Elements.

4 Dampers

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

3 f 6 Variable Refrigerant Flow (VRF)

a Prescriptive requirements

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

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

3 f 7 Variable Volume & Temperature (VVT)

a Prescriptive requirements:

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

3 f 8 Water Loop Heat Pump (WLHP)

a Performance requirements:

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

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

4 HVAC SYSTEM CONTROLS

4 a General Requirements – DDC

4 a 1 HVAC System Controls Alternatives

a A computerized DDC system is mandatory on all tenant improvement projects. An electro-mechanical system with programmable thermostats and setback capability is acceptable only if it meets the following conditions.

1 The tenant space is less than 300 square meter.

2 The Occupancy is less than five years.

3 The travel response time from closest property management contractor office is less than one (1.0) hr.

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

4 a 2 Design and Review Process – DDC

a Prescriptive requirements:

1 Concept Stage Submission

~~a~~ Confirm that all Technical Standards requirements will be met including those relating to the OPR (Owner's Project Requirements).

2 Design Development Stage

a Details on proposed equipment types

b Details on system architecture and operators workstation location and layout

3 95% Documentation Stage

a 95% Drawings and Specifications including complete points list

4 a 3 General DDC

a Prescriptive requirements:

1 General - DDC

a Provide a BACnet Direct Digital Control (DDC) system to control and monitor the HVAC systems and record mechanical system performance.

b DDC control shall be applied down to and including the terminal zone units. Local hardwired controls may be used for safety controls and local small exhaust fans.

c The DDC control system shall be a modular, flexible, and fully commissioned BACnet Testing Laboratories (BTL) certified and approved Direct Digital Control (DDC) System.

d The approved DDC system manufacturers are Delta Controls ORCA product line, both hardware and software, and Reliable Controls Mach-System product line and the current version of RC Studio software.

e DDC control shall not be monitored through BCSC system.

f DDC systems shall be engineered, installed, programmed, and commissioned by trained and qualified personnel who have ample experienced with the particular system and the task they perform and employed by companies that have demonstrated an acceptable quality of post construction service.

2 Alarms - DDC

a Relay selected alarms to remote locations as directed by SSBC.

3 Connectivity - DDC

a Provide Ethernet connections between buildings on the same site.

b Provide for secure offsite support access by including a modem or serial device server for telephone or secure internet connectivity. Ethernet connections shall be provided between buildings.

4 Monitoring

a The DDC systems shall be able to monitor the performance of the HVAC and lighting systems through system graphics, trend graphs and other monitoring features, and shall also be able to change zone set points remotely.

b To the extent possible with the DDC system type including all options:
1. Provide automatic data logging capability including all hard and soft points, unrestricted intervals and unrestricted number of data points.
2. Provide maximum ease and flexibility in setting up and displaying current and historical data both separately and together
3. Provide for easy data storage expansion without having to reload the DDC software.

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

6 Lighting Controls - DDC
a Provide Low Voltage lighting controls and controllers.
b The DDC system shall monitor relay status of Low Voltage lighting relays.

4 a 4 DDC System Type

a Performance requirements:
1 Provide a current model DDC system that has operational, maintenance and programming compatibility with those in existing facilities and has a well established and proven support network.

b Prescriptive requirements:
1 DDC Systems shall be the latest hardware and software version current at the time of DDC system design and shall be Delta Controls Orca or Reliable Controls

4 a 5 Spare Parts – DDC

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

4 b Programming – DDC

4 b 1 Graphics

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

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

4 b 2 DDC Control Sequences

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

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

4 c Components - DDC

4 c 1 Control Station

a e requirements:

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

b Prescriptive requirements:

1 Provide a central DDC control station complete with computer, trend and alarm printers.

2 The control station shall have at hard drive capacity of at least 1 Terabyte.

3 Locate the DDC control station in a quiet well lit space controlled by maintenance staff and with ample space to lay out plans, have small meetings, and store record drawings and other record documentation.

4 c 2 Field Devices

a Performance requirements:

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

b Prescriptive requirements:

1 Control Panels

a Provide at least 10% spare control points at each DDC controller for future expansion.

2 Durability:

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

3 Actuators:

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

4 Control Valves:

a Select and size control valves to match the application and achieve reasonably linear control characteristics.

b Provide a low-flow control valve in parallel where high pressure drop at low load prevent a single valve from achieving stable control and long life.

5 Dampers:

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

6 Terminal Controllers

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

4 d Completion – DDC

4 d 1 and Point Verification

a Performance requirements:

1 Provide a detailed check and record of the basic wiring connections and setup of the DDC system.

b Prescriptive requirements:

1 Verify every physical point.

2 Submit the following as part of the record documentation:

3 Point to point checksheets

4 Check sheets showing all calibration values.

5 Trend data showing that all control loops have been tuned.

6 Witness all start-up tests and perform point verifications.

4 d 2 Commissioning - DDC

a Performance requirements:

1 Refer to Commissioning Section.

2 DDC commissioning work includes controls changes, trends and charts to ensure and demonstrate that the Owner's Project Requirements (OPR) are fully met.

4 d 3 Training – DDC

a Performance requirements:

1 Provide adequate training for operating and maintenance personnel and to make provision for training of future personnel.

b Prescriptive requirements:

1 Initial On Site Training:

a Provide detailed initial training for the operations and maintenance personnel prior to substantial completion.

b Provide multiple sessions with multiple threads so that operation and maintenance personnel who cannot attend training at the same time can all receive full training.

c Provide a detailed schedule and syllabus for acceptance by SSBC at least one month before initial training is to occur.

1. This syllabus shall include complete explanation of the intended operating of each controlled system including:
   a. DDC control Sequences
   b. The role of any manual controls
   c. System optimization for minimum energy use
   d. System response in the event of problems
   e. Problems to watch for
   f. Elements to trend and what to watch for in the trend information
   g. Alarms, their significance and what to do about them

d Follow up Training and Support:

1. Provide operation and maintenance staff with remote email and phone training support at no additional cost as requested during the 1st year of operation.
2. Provide a follow up on-site training session at no additional cost during the first year of operation at a time acceptable to the person responsible for operation and maintenance.

e Training Documentation

1. Provide DVD copies of the training sessions as follows:
   a. One copy to be kept on site.
   b. One copy to be handed to SSBC as part of the project documentation.
   c. A master to be retained by the DDC contractor who will provide replacement copies at no charge if either of the above copies is lost.

4 e HVAC Controls – (Non-DDC)

4 e 1 General

a Performance requirements:

1 Provide fully automatic temperature controls for all HVAC Systems and equipment.

b Prescriptive requirements:

1 Controls shall have a set-back feature for unoccupied hours including a timer-operated manual override.

2 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 23°C and,

c minimum cooling setpoint 22°C

----- End HVAC System Controls Section -----

5 PLUMBING

5 a Plumbing – General

5 a 1 Plumbing System Type, Scope and Capacity:

a Performance requirements:

1 Cold Water Supply System:

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

b The cold water supply system shall be capable to withstand a pressure test at a maximum working pressure (minimum 200 psi).

2 Domestic Hot Water System:

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

b The domestic hot water supply system shall be capable to withstand a pressure test at a maximum working pressure (minimum 200 psi).

3 Sanitary Drainage System:

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

4 Drinking Water Treatment Systems:

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

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

b Prescriptive requirements:

1 Water and Sanitary Pipe sizing:

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

2 Plumbing Drawings:

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

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

5 a 2 Plumbing System Zoning:

a Performance requirements:

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

b Prescriptive requirements:

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

5 a 3 LEED – Plumbing:

a Performance requirements:

1 Design plumbing systems to conserve water and to minimize sanitary discharge.

b Prescriptive requirements:

1 Provide water conserving plumbing fixtures unless explicitly noted otherwise.

5 a 4 Maintenance Access – Plumbing:

a Performance requirements:

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

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

b Prescriptive requirements:

1 Major equipment and central valve stations:

a Provide unobstructed access routes that have at least 2m clear height and through which all new and/or relocated equipment can eventually be replaced without removing doors or demolishing parts of walls or roofs.

2 Locate pipes, equipment, valves and other serviceable components so that:

a Maintenance points are:

1. Not blocked by ducts, pipes, conduits, electrical boxes, other equipment, walls, columns, or other parts of the building or cabinetry.
2. Are fully visible and are readily accessible with both hands by service personnel, when comfortably standing or kneeling, without stretching, reaching behind obstructions, or having to remove obstructions.

b No part of the plumbing systems shall obstruct similar maintenance access to any other building system or its components.

3 Distribution Systems:

a No piping shall be located in concrete or concrete block walls.

b Vertical services shall be in accessible shafts with access provided to each floor. On floors where maintenance items are located, provide an access door. Elsewhere, provide either an access door or a permanently mounted steel ladder.

5 a 5 Acoustics – Plumbing:

a Performance requirements:

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

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

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

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

5 Maximum noise from plumbing equipment and components shall not exceed the following dBA levels:

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

b Prescriptive requirements:

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

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

5 a 6 Balancing – Plumbing:

a Performance requirements:

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

b Prescriptive requirements:

1 Domestic Hot Water Recirculation System Balancing:

a Provide domestic hot water recirculation systems with balancing valves at new tenant improvements recirculation branch lines.

b Balance the systems to maintain a minimum temperature drop of 6°C to the takeoff to the most hydraulically remote fixture on each branch.

c Design recirculation system to minimize the length and quantity of non-recirculated branch lines.

2 Tempered Water System Balancing:

a Set each tempering valve, pressure balanced valve and limit stop faucet so that the discharge temperature in each case is within the required tolerance.

b Central tempered water systems are not permitted.

5 b Drainage Systems

5 b 1 Sanitary Drainage:

a Performance requirements:

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

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

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

4 Provide cleanouts along the entire new piping system.

5 New sewer piping system shall be dye tested to verify the sewer is not interconnected with the storm piping system.

6 Fittings shall not be encased in concrete.

b Prescriptive requirements:

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

2 Provide cleanouts in accessible locations and, where possible.

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

4 Provide floor drains:

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

b Service and Equipment Spaces:

1. Adjacent to all new and/or relocated equipment that is likely to discharge water during operation or maintenance. (e.g. cooling coils, pumps, water heaters, boilers, backflow preventers, valve stations, test points).
2. Do not permit water discharge to drain across the floor.
3. Do not route drain piping across floors unless it is tight to walls or bases and does not create a tripping hazard.
4. If no floor drain is required for the reasons above, provide at least one floor drain for wash down purposes.

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

5 Cleanouts:

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

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

6 Slope drainage lines at a minimum of 2 %.

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

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

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

5 c Domestic Water Systems

5 c 1 Domestic Water – General:

a Performance requirements:

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

2 Provide zone isolation valves to each separate area.

b Prescriptive requirements:

1 Piping:

a Water distribution piping above slab shall be Type K copper for fire resistance and longevity.

b Limit the velocities of flow in the piping to 1.5 meters per second for cold water and 1.2 meters per second for hot water (including recirculation systems).

2 Isolation:

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

3 Provide sleeves for water piping penetrating through concrete.

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

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

5 c 2 Domestic Hot Water:

a Performance requirements:

1 Provide domestic hot water and tempered hot water at the required temperature to new and/or relocated plumbing fixtures and equipment that require it.

2 Domestic hot water temperatures shall be adjustable to suit the needs of the occupants. Initial setpoints including temperature limit stops on individual fixtures shall be as follows:

a Showers 40ºC ±1ºC

b Janitor sinks 60ºC ±2ºC

c Staff showers 43ºC ±2ºC

d Kitchen sinks 60ºC ±2ºC

b Prescriptive requirements:

1 Water Distribution and Temperatures:

a Generate, store and distribute domestic hot water at 60ºC to minimize Legionella risk.

b Recirculate domestic hot water from the distribution system back to the generating / storage equipment to maintain a minimum temperature of 55ºC at the most remote takeoff and a minimum temperature of 50ºC at the return point.

c Run outs from domestic hot water mains shall be recirculated where they exceed 5 meters in length.

d Minimum run outs from tempering valves shall not exceed 2 meters in length.

5 d Plumbing Fixtures

5 d 1 Plumbing Fixtures – General:

a Performance requirements:

1 Comply with the B.C. Building Code regarding water efficiency.

2 Where accessible fixtures are required, comply with BC Building Code, Building Access Handbook.

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

a Prescriptive requirements:

1 Bowl: Bowl: 780 mm x 520 mm x 175 mm O.D., Type 302 stainless steel self-rimming bowl double compartment with under coating, 90 mm crumb cup, holes drilled in ledgeback complete with under deck clamps.

2 Trim: Sink supply faucet, lever handle, 200 mm swing spout with aerator, 200 mm centres, polished chrome finish

5 d 3 Counter Sink (meeting rooms):

a Prescriptive requirements:

1 Bowl: Bowl: 510 mm x 520 mm x 175 mm O.D., Type 302 stainless steel self-rimming, single compartment with under coating, 90 mm crumb cup, holes drilled in ledge back complete with under deck clamps.

2 Trim: Sink supply faucet, lever handle, 200 mm swing spout with aerator, 200 mm centres, polished chrome finish.

5 d 4 Water closets:

a Performance requirements:

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

5 d 5 Urinals:

a Performance requirements:

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

5 d 6 Lavatories:

a Performance requirements:

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

---- End Plumbing Section -----

6 FIRE SUPRESSION

6 a Fire Suppression – General

6 a 1 Maintenance Access – Fire Suppression:

1 Performance requirements:

a Provide good access to all fire suppression services.

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

c Prescriptive requirements:

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

6 a 2 Maintenance Manuals – Fire Suppression

a Prescriptive Measures

1 Provide a copy of the relevant sections of NFPA-25 to SSBC.

6 b Fire Extinguishers

6 b 1 Fire Extinguishers - General

a Performance requirements:

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

b Prescriptive requirements:

1 Provide dry chemical fire extinguishers, rated in conformance with code.

2 In finished areas, provide semi-recessed cabinets suitable for required fire extinguisher, complete with plexiglass window, piano hinged door and latch. Provide wall mounted “Fire Extinguisher” signage that mounts perpendicular to the wall to which it is attached.

6 c Sprinkler Systems

6 c 1 Sprinklers – General:

a Performance requirements:

1 Provide an automatic sprinkler system in accordance with the B.C. Building Code, NFPA-13 and municipal requirements.

b Prescriptive requirements:

1 Provide wet sprinkler systems throughout all areas of the tenant improvement area unless noted otherwise below.

2 Provide a ULC listed manual supervised shut off valve and ULC listed flow switch for sprinkler zone. Locate these devices in mechanical rooms or service spaces.
3 Provide quick response sprinklers throughout.
4 Connect all manual shut off valves, solenoid shut off valves and flow switches to dedicated trouble signals in the fire alarm panel.
5 Provide hydrostatic tests conforming to NFPA-25 at not less than 200-psi..
6 Provide zone tags on all valves and piping.
7 Provide stock of spare sprinklers and wrench as per NFPA-25.

6 c 2 Pre-action and Dry Sprinklers:

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

b Sprinkler Zoning and Isolation:

c Performance requirements:
1 Provide sprinkler zones in conformance to NFPA requirements.

d Prescriptive requirements:
1 Sprinkler Zoning:
2 Each sprinkler zone shall be complete with flow test station and drain assembly

6 c 3 Fire Suppression Systems

a Performance requirements:
1 Provide fire suppression systems for major computer rooms and where required by SSBC.
2 System based on Halon as an extinguishing agent are NOT permitted.

b Prescriptive requirements:
1 Provide chemical based fire suppression systems in accordance with NFPA requirements.
2 Chemicals shall be non-damaging to the environment (FM200, Energen, or as reviewed with SSBC)
3 Provide double interlocked system complete with detectors, wiring, control panel, abort switches, emergency dump switches and local alarm indication. Panel shall be interlocked to main building fire alarm system with separate zone indicated at building enunciator.
4 Provide chemical storage tanks, distribution piping, discharge nozzles and all required components. Provide seismic restraint of all components.
5 Provide technical assistance to conduct a live dump test and chemical to recharge and reset the system.

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

7 ELECTRICAL

7 a Performance requirements

7 a 1 Provide one, CSA 5-20R, commercial specification grade, duplex receptacle as per Table 7.1 (density based on rentable area). Receptacle locations will be determined during detail design. Table 7.2 provides a guideline for receptacle locations.

Table 7.1 – RECPTACLE DENSITY	
Rentable Area	Receptacle Density (one receptacle per)
≤ 250 m^2	4 m^2
> 250 m^2	5 m^2

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

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

7 a 3 Installation shall be flexible and permit cost effective relocation of devices.

7 b Prescriptive Requirements

7 b 1 Where required provide weatherproof, intelligent controller for automobile block heaters. Confirm quantity of tenant parking stalls requiring a block heater receptacle with SSBC. Each intelligent controller shall service 2 parking stalls. Model: Intelligent Parking Lot Controller (IPLC) or equivalent.

7 b 2 Provide “all mode” Transient Voltage Surge Suppression (TVSS) on electrical service to tenant space.

7 b 3 Tenant space shall be supplied from a dedicated feeder. A means of disconnect shall be provided within the tenant space.

7 b 4 All rentable areas >465m^2 shall have dedicated information (non-revenue) metering installed to record total energy consumption and electrical demand of the space. Meter(s) shall be located within tenant space. Meter(s) in government owned buildings shall have a pulse output connected to DDC system.

7 b 5 In addition to the requirements of 7b4, rentable areas >2500m^2 shall have additional dedicated information (non-revenue) metering installed to record energy consumption and electrical demand of space for each of the following systems; interior lighting, HVAC and plug load. Meter(s) shall be located within tenant space. Meter(s) in government owned buildings shall have a pulse output connected to DDC system.

7 b 6 Locate all panelboards within tenant spaces but not on/in walls adjacent to staff work areas. Panelboards supplying work area receptacles shall not supply HVAC loads.

7 b 7 Each new panel shall have 25% spare space to add future bolt on circuit breakers.

7 b 8 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.

7 b 9 Complete electrical system shall comply with current codes and best industry practices.

7 b 10 Minimum wire size shall be #12 AWG. Each circuit supplying receptacles shall be provided with a dedicated neutral.

7 b 11 Where power poles are permitted coordinate location with furniture layout, ceiling tile configuration, and window mullions. Provide 3 meters of cable slack, neatly coiled, in ceiling space to permit relocation of power pole.

7 b 12 All branch circuit wiring shall be routed vertically in stud cavity, not horizontally.

7 b 13 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 JBs to minimize cable lengths.

7 b 14 Provide 2 spare 27 mm (1") conduit from each panelboard to accessible ceiling space.

7 b 15 Circuiting for receptacles shall be as per Table 7.2.

Table 7.2 – RECEPTACLE LOCATIONS AND CIRCUITING CRITERIA

Area Designation		Minimum Quantity of Receptacles per Space/Equipment	Minimum Quantity of Separate Circuits per Space/Equipment	Comments
Enclosed Space	Office	3	Maximum of 2 offices sharing 1 circuit	As defined in Schedule A & B of Planning Section [a] = includes one (1) receptacle in ceiling for multimedia projector controlled by wall mounted on/off switch. Label as "Overhead Projector Power". [b] = includes one (1) circuit connected to one receptacle for video conferencing equipment.
	Meeting	6 [a]	2 [b]	
	Telecom Closet	3	3	
	Telecom Enclosure	1	1	
Open Space	Workstation	1	Maximum of 4 receptacles sharing 1 circuit	
Equipment	Printer	1	1	
	Fax	1	1	
	Copier / MFD	1	1	
Other Areas	Break Area	4	5	Frig, microwave, coffee kettle, other
	Housekeeping	See comment	Maximum of 2 receptacles sharing 1 circuit	Install receptacles 10 meters o.c. along corridors and in stairwells

7 b 16 Commission Electrical system as per Section 12 – Commissioning.

----- End Electrical Section -----

8 LIGHTING

8 a Performance requirements

8 a 1 Select luminaires suitable for tasks being performed and installed environment.

8 a 2 Illuminance levels shall meet requirements of Table 8.1

Table 8.1 - INTERIOR SPACE ILLUMINANCE

Space Type	Requirements	Lux (Footcandles)	Height
General Office	• Range of average maintained illuminance with dimmable fluorescent lighting control. • Illuminance uniformity ratios not to exceed 3:1 (Average to Minimum). • Minimum average vertical Illuminance on walls other than projection surfaces.	320-540 lux (30-50 fc)	760 mm (30”)
Conference / Meeting Rooms	• Range of average maintained illuminance with dimmable fluorescent lighting control. • Illuminance uniformity ratios not to exceed 3:1 (Average to Minimum). • Minimum average vertical Illuminance on walls other than projection surfaces.	50-540 lux (10-50 fc) 110 lux (10 fc)	760 mm (30”) 760 -1675 mm (30”-66”)
Telecommunication Closet	• Minimum average maintained vertical illuminance on equipment.	320 lux (30 fc)	760 mm (30”)
Circulation / Corridors / Stairs	• Minimum average maintained illuminance:	110 lux (10 fc)	0 mm (0”)
Washrooms	• Minimum average maintained illuminance: • Vertical illuminance in front of vanity:	220 lux (20 fc) 110 lux (10 fc)	0 mm (0”) 1500 mm (60”)
Storage / Active Files	• Minimum average maintained illuminance:	320 lux (30 fc)	760 mm (30”)
Inactive / Dead Files	• Minimum average maintained illuminance:	110 lux (10 fc)	760 mm (30”)

8 b Prescriptive requirements

8 b 1 Interior Switching System:

a All open office areas shall be provided with two local manual switches controlling each luminaire with a 50% and 100% stepped dimming level. Each pair of switches shall control a maximum 90m^2 zone. No occupancy/vacancy sensors.

b Enclosed offices, training rooms, copy/print rooms, meeting/training rooms, and lunch/break rooms shall be equipped with wall box mounted dual technology, dual relay, vacancy sensors (manual on, automatic off after preselected delay if no motion detected). Delay shall be adjustable from 0-30 minutes and initially set at 15 minutes. Each luminaire shall have stepped dimming levels of 50% and 100%.

c Storage rooms, change rooms shall be equipped with wall box mounted, dual technology, single relay, vacancy sensors (manual on, automatic off after preselected delay if no motion detected). Delay shall be adjustable from 0-30 minutes and initially set at 15 minutes.

d Washrooms shall be equipped with a wall box mounted, dual technology occupancy sensor (automatic on, automatic off after preselected delay if no motion detected). Delay shall be adjustable from 0-30 minutes and initially set at 15 minutes.

e Meeting/trainings rooms 16.7 m^2 in size or greater shall have luminaires capable of full range dimming with automatic off control.

f As a minimum, provide dimmable photo-sensor control of the first row of perimeter lighting in open office areas exceeding 25 m^2 where side-lighting daylight is available.

g Provide automatic lighting shut-off controls to switch off lighting at two hour intervals during unoccupied hours. In buildings with a Direct Digital Control (DDC), this automatic switching of lights shall be controlled by the DDC. Provide a manual override switch located near each staff entrance to the space.

h For safety reasons, provide one unswitched night light per 90m^2 of office space. Night lights shall be strategically placed along circulation routes to permit staff to move safely to the afterhours lighting shutoff override switch. Where emergency lighting is supplied from a generator, the emergency lighting may also serve as the night lighting.

i Except for security, exit, emergency, and night lighting, circuit breakers shall not be used to switch lighting circuits.

8 b 2 Standard Interior Luminaire Types & Components:

a Lamps

1 Fluorescent T8 technology, 25 watt, 1220 mm (48”), minimum CRI ≥85, CCT = 3500K.

2 Extra long life (min. 40,000 hours based on 3 hour program-start switch cycle)

3 Mercury content shall be ≤4 mg per lamp.

4 Use of incandescent lamps is not permitted.

b Ballast

1 Program-start, step-dimming, high-frequency, electronic type for operation of two (2) T8 fluorescent lamps,

2 Input Watts ≤46, Power factor ≥0.95.

3 Ballast shall have parallel operation and striation reduction technology.

4 Ballast must be compatible with the fluorescent lamp being used.

c Standard luminaire for office spaces and meeting rooms shall have the following performance and components:

1 Nominal 2’x 4’ recessed fluorescent, volumetric style, 2-lamp operation, Minimum efficiency = 80%.

2 If nominal 2’x4’ will not fit, a 1’x4’ luminaire with minimum efficiency of 75% may be used.

d Standard luminaire for remaining finished spaces with T-bar ceilings:

1 Nominal 2’x4’, 2-lamp recessed fluorescent style with minimum luminaire efficiency of 80%. Prismatic K12 pattern, 3.2 mm thick, acrylic lens with swing-down frame for relamping.

2 If nominal 2’x4’ will not fit, a 1’x4’ luminaire may be used to match 2’x4’ specification.

e Surface Mounted Fluorescent Luminaires

1 Luminaires with wrap-around prismatic lenses may be used in washrooms, stairs, and service spaces provided they will not be in the way of equipment and door swing.

2 Fluorescent strips c/w wire guards shall be used in service rooms.

f Recessed Downlights (“Potlights”)

1 Where required, recessed downlights shall be high power factor compact fluorescent luminaires with program start, electronic ballasts. Minimum luminaire efficiency shall be 50%. Screw-in lamps are not acceptable. Clear alzac finish is standard.

8 b 3 EXIT Signs:

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

8 b 4 Emergency Lighting:

a Where unit equipment is utilized the batteries shall be centralized, with remote heads. No more than one battery unit for every 500 m^2 shall be provided on each floor.

b Lamps shall be 20 watt, high output MR16.

8 b 5 Installation:

a Provide for a relocation potential of 1.5 m (approximately 5 ft.) radius for each recessed luminaire and provide a 3 m lead on each luminaire.

b Commission Lighting system as per Section 12 – Commissioning.

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

9 STRUCTURED CABLING

9 a Performance requirements

9 a 1 A complete structured cabling system shall be installed as outlined below for data, voice, wireless access points and video services including installation of data patch cords.

9 a 2 Provide a separate structured cabling system for the Building Utility Service (BUS) to allow interfacing building systems (i.e. security, DDC, lighting control, etc).

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

9 a 4 All Category 5e products that are installed, when combined, shall meet Category 5e channel performance as per TIA/EIA-568.

9 a 5 The quantity of telecommunication outlets to be installed shall be based on the following Table 9.1. Exact locations will be determined during detailed design.

Table 9.1 - TELECOMMUNICATION OUTLET QUANTITY

Rentable Area	Telecommunication outlets (one jack per)
≤200 m^2	5 m^2
>200 m^2	6 m^2

9 a 6 In addition to requirements of Table 9.1 install 2 outlets at each monitored building system as part of the Building Utility Service.

9 b Prescriptive requirements

9 b 1 Cable

a All horizontal cabling shall be 4 pair Category 5e and shall terminate on the same patch panel(s).

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

c Voice backbone cable shall be a minimum of 25 pair, Category 3. The voice backbone shall be sized by allocating one pair for 50 percent of the horizontal cables originating from that telecommunication closet. The pair count shall be rounded to the next 25 pair multiple.

d For Centrex sites, voice backbone cables shall be installed between the Main Entrance Facility and each tenant telecommunication room on each floor. For PBX sites, voice backbone cables shall be installed between the Main Entrance Facility and the tenant PBX switch, and from the PBX switch to each tenant telecommunication room. The voice backbone cables shall be installed in a star wired configuration from the demarc.

e Copper data backbone shall be two (2), 4 pair, Category 5e cables.

f Fiber data backbone shall be 24 strand OM3 fiber optic cable assembly. Cable assembly shall have straight through polarity with 12 strand, factory installed 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 closet.

g Copper and fiber data backbone cables shall be distributed in a star configuration, to each tenant telecommunication closet from a tenant telecommunication closet determined by SSBC.

h Data backbone for the telecommunication enclosure shall be copper only and shall be terminated in the telecommunication enclosure and in a telecommunication closet as determined by SSBC.

9 b 2 Termination Hardware

a Copper

1 All horizontal and data backbone cable terminations shall use TIA/EIA 568A pin configuration.

2 All cables shall terminate on 483 mm (19”) rack mounted, Category 5e, RJ45 patch panels in the telecommunication closets. The maximum density of the rack mounted patch panels is 48 port, and the minimum is 24 port.

3 All voice backbone cables shall terminate on BIX1A/110 blocks adjacent to the telephone demarcation and on rack mounted, RJ45 patch panels (1 pair per RJ45 jack using TIA/EIA 568A pin configuration) at the telecommunication closets. The supply and installation of the jumper wire between the demarcation and the backbone cables will be supplied and installed by the service provider. In buildings that have a PBX the riser/tie cables shall all terminate adjacent to PBX on BIX1A and on rack mounted RJ45 patch panels as per above. This includes the tie cable(s) from BIX1A (adjacent to PBX) and rack mounted RJ45 patch panels within this space. Confirm if the tenant will be utilizing a Centrex or PBX style system prior to commencing design.

4 Separate patch panels shall be used to terminate horizontal cables, data riser and voice riser cables in each telecommunication closet. Refer to Figure 3: Typical Relay Frame Layout.

5 Data riser cables from telecommunication closet to telecommunication enclosure, shall use last 2 ports on data riser patch panel in telecommunication closet and last two ports on patch panel in telecommunication enclosure.

6 All patch panels shall be front and back accessible.

7 All wall jacks shall be same color, Category 5e, RJ45 jacks.

b Fiber

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

2 MPO to LC (with straight through polarity) fiber optic cassettes shall be used to terminate the cable assembly at each end.

9 b 3 Patch Cords

a The quantity of copper patch cords supplied for telecommunication closets shall equal the total quantity of horizontal cables installed. These patch cords shall be Category 5e, have snag less boots, and be the same color. Provide 50% of the patch cords at a length of 1.2 m (4’0”) and 50 % of the patch cords at 1.8 m (6’0”).

b The quantity of patch cords supplied for work areas shall equal the total quantity of horizontal cables installed. These patch cords shall be Category 5e and the same color. Each end of the patch cord shall have an RJ45 plug. Provide 75% of the patch cords at a length of 3 m (10’0”), and 25 % of the patch cords at a length of 4.6 m (15’0”).

9 b 4 Telecommunication Enclosure

a Enclosure shall be tamper resistant as per Telecordia GR-487-CORE.

b Enclosure shall be lockable with unique key. Key to be given to SSBC Facility Manager.

c Enclosure shall have a door mounted tamper switch connected into the building security system as a separate intrusion alarm zone. Sites that do not have a building security system shall have tamper switch connected to local audible alarm.

d Install 5-15R receptacle in enclosure. Receptacle shall be connected to dedicated circuit.

e Minimum enclosure dimensions shall be 1067mmH x 615mmW x 254mmD.

f Enclosure shall be equivalent to Hubbell ‘Re-Box’ Remote Equipment Cabinet.

g Enclosure shall have a lamacoid label permanently affixed to the front cover stating:

GOVERNMENT OF BC

BUILDING UTILITY SERVICE

UNAUTHORIZED ACCESS STRICTLY PROHIBITED

9 b 5 Racks

a All patch panels shall be installed on floor mounted 483 mm (19") relay frame style racks. Overall height of rack shall be 2134 mm (7') high with 45 rack units. The rack shall have the EIA universal hole spacing.

b Install power bar, with minimum 10 receptacles, to rack using tie wraps. Power bar shall connect to adjacent wall mounted receptacle with minimum 1.8 meter (6') cord. Receptacles on power bar shall be 5-20R configuration (input plug to be 5-20P).

9 b 6 Cable Management

a Racks

1 Cable troughs shall be provided on 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. The cable troughs shall be installed on both sides of the relay frames from top to bottom.

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

3 Each patch panel shall have a horizontal cable manager located above and below.

4 Provide one additional horizontal cable manager for every patch panel installed. This will be used for the owner supplied switches.

b Telecommunication Enclosure

1 Install separate 25 mm (1") Velcro straps to bundle/manage patch cords and cables within enclosure.

9 b 7 CATV System

a Each CATV outlet shall be cabled with a standard RG6 cable (with foil shield) terminated on an 'F' series connector. The coverplate shall have an 'F' series bulkhead for the termination of the cable. Each cable shall be a home run to the CATV service entrance room.

9 b 8 Wireless Access Points

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

b Wireless access points shall be spaced a maximum of 15 m (50') o.c. and provide complete coverage of space. Reduce spacing if type of construction (example concrete) requires reduced spacing to provide complete coverage.

c Wireless access points will use Power Over Ethernet (POE) technology.

9 b 9 Monitored Building Systems

a Each outlet for the monitored building system shall be Category 5e and shall be installed from the telecommunication enclosure to the building system front end equipment.

b The following building systems shall be connected to the telecommunication enclosure; fire alarm, DDC, lighting control, intrusion alarm, digital metering. Confirm connection requirements with SSBC during the design phase.

9 b 10 Multimedia System

a In each meeting room greater than 16.6 square meters install a 41 mm (1 ½") conduit, complete with pull string, from ceiling mounted multi-media location to a wall mounted outlet box (location to be determined during design). Multimedia cable shall be provided by others.

9 b 11 Wide Area Network

a Provide one 53 mm (2") continuous conduit, c/w pull string from demarcation for the building to telecommunication closet (determined by SSBC) for WAN riser cable.

b Provide two (2) Category 5e WAN riser cables in conduit between the demarcation for the building to the telecommunication closet.

9 b 12 Fire Stopping

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

b Where acceptable to Authority Having Jurisdiction (AHJ) use EZ-Path by Specified Technologies Inc.

9 b 13 Design

a Telecommunication Closet

1 At least one telecommunication closet shall be provided in each building on each floor as per Table 9.2. The telecommunication closet shall be located on the floor that it serves and shall be the termination point for all horizontal cabling on that floor. Telecommunication closet shall be vertically aligned and centrally located within the area it serves to limit horizontal cable length to 90 m (295') maximum.

Table 9.2 - TELECOMMUNICATION CLOSET SIZE

Quantity of Telecom Closets	Telecom Closet Type	Size of Telecom Closet	Comments
Minimum of 1 per floor. Maximum floor area served from one closet is 1000 m^2	Figure 1: Typical Telecom Closet Layout	1219 x 1524 mm (4'0" x 5'0")	Follow layout as per Figure 3: Typical Relay Frame Layout
One per Building when building area >500 m^2	Figure 2: Typical Telecom Closet Layout with PBX	2134 x 1219 mm (7'-0" x 4'-0")	Follow layout as per Figure 3: Typical Relay Frame Layout

2 Only equipment associated with data and voice services shall be located in telecommunication closets. (no pipes or ducts shall pass through telecommunication closet)
3 Telecommunication rooms/closet shall have 19 mm (¾") G1S plywood backboard installed as indicated in Figure 1 and Figure 2. If permitted by AHJ doors shall swing out. If the door must swing in then the telecommunication closet shall be redesigned to accommodate this.
4 Environmental control of Telecommunication closets shall comply with requirements of Section 4.
5 The room will have its own switched lighting as per Section 6.
6 Provide receptacles in Telecommunication closets as per Section 5.

b Telecommunication Enclosure

1 Telecommunication enclosure shall be centrally located within the area it serves, to limit horizontal cable length to 90 meters (295') maximum, and be located in a secure (locked) service space common to the building (not in telecommunication closet).
2 Telecommunication enclosure shall be installed in common Landlord space. The implementer shall obtain Landlord approval prior to installation.
3 Tamper resistant enclosure shall be securely anchored to wall.
4 Only one telecommunication enclosure shall be installed in a building.
5 All monitored building systems shall be cabled to telecommunication enclosure.

9 b 14 Documentation

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

Table 9.3 - LABLE FORMAT		
Label	Format	Example
Horizontal Cable/Jack	fs-m	1A-054 1st floor, closet A, port 54 on patch panels
Data Riser	fs_1/fs_2-Dn	1A/2A-D2 Data riser cable #2 from 1st floor closet A to 2nd floor closet A
Data Riser Termination	fs_1/fs_2-Dn.d	1A/2A-D2.2 Connector #2 of data riser cable #2 from 1st floor closet A to 2nd floor closet A
Voice Riser Cable	fs_1/fs_2-Vn	1A/2A-V3 Voice riser cable #3 from 1st floor closet A to 2nd floor closet A
Voice Riser Termination	fs_1/fs_2-Vn.d	1A/2A-V3.1 Pair #1 of Voice riser cable #3 from 1st floor closet A to 2nd floor closet A

Identifier	Descriptor of Identifier
f	Floor number telecommunication closet/enclosure is located (as per drawings)
s	Sequential telecommunication closet/enclosure identifier (starting at A)
m	Sequential patch panel(s) port number
fs_1	Source telecommunication closet/enclosure with floor number and closet identifier
fs_2	Destination telecommunication closet/enclosure with floor number and closet identifier
n	Sequential cable number
d	Pair number in voice riser cable, 1 for Cat 5e data riser, fiber connector number for fiber data riser
D	Designates data riser cable
V	Designates voice riser cable

b The BIX1A/110 blocks at the demarcation and the PABX output shall be labelled as per above for voice riser terminations.

c All horizontal cables, and copper data riser cables shall be tested to ensure compliance with Category 5e permanent link performance as defined by TIA/EIA 568B. Test results indicating “fail” and test results indicating “warning” (i.e. test results that do not pass within the accuracy of the tester) are not acceptable.

d The voice riser cables shall be tested for continuity and polarity. Contractor must sign off the test results indicating the testing has been completed and everything is acceptable.

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

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

g “As Built” drawings shall be provided in hardcopy and in electronic form. A copy of the “As Built” drawing, showing the jacks associated with that specific telecommunication closet shall be mounted on the door of that telecommunication closet/enclosure. The “As Built” drawings shall show all jacks and the associated label for each jack. The drawings shall clearly indicate the location of the telecommunication closets, telecommunication enclosure, voice riser, and data riser diagrams. The drawing legend shall be shown on each page. Handwritten copy of As-Builts shall be provided at substantial completion.

9 b 15 Installation

a The installation shall meet the requirements of industry practices as recommended by the manufacturer whose products are being installed, and the TIA/EIA Standards (except where this Technical Standard differs). The Installation shall also meet the BiCSi Telecommunication Cabling Installation Manual.

b Walls shall have102 mm x 102 mm (4”x 4”) outlet boxes installed with a single gang mud ring. A 27 mm (1”) conduit shall be installed from the outlet box to the ceiling space. The conduit shall have a grounding bushing installed in the ceiling space and be installed such that the minimum bend radius of the cable is not exceeded. If the wall is an internal partition with no insulation then a low voltage mounting bracket with open wiring is acceptable.

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

d Where power poles are used leave 3 meters of spare cable coiled in ceiling space above power pole to permit relocation of power pole. Properly support cable coil to structure. Power poles with surface mounted jacks are not acceptable.

e All cable 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 5e cable). Spacing of the J hooks shall be a maximum of 1524 mm (5’) and maximum cable sag permitted is 305 mm (12”). J hooks shall be installed in locations to group cables where possible. All cables shall be installed parallel to building grid lines.

f All cables installed in service spaces or outside the tenant space shall be installed in conduit.

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

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

i Install a complete grounding system to each telecommunication closet and telecommunication enclosure, and bond all equipment.

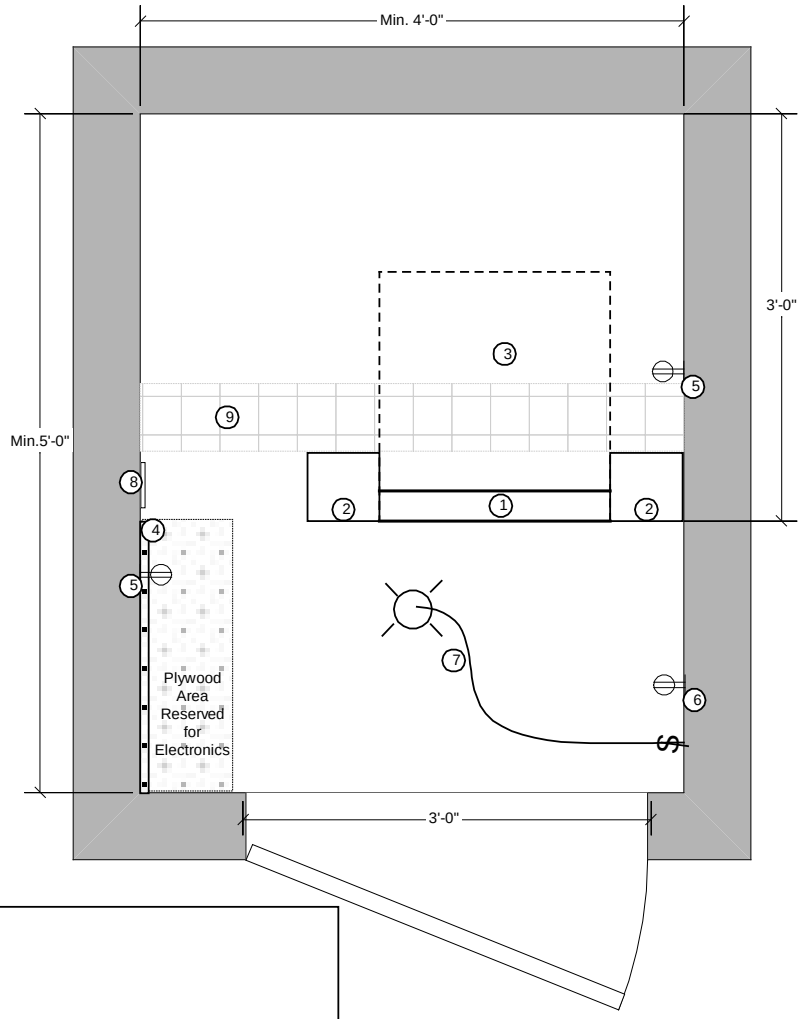
j Install patch cords from patch panels to government supplied Ethernet switches (switches installed by others). All patch cords to be installed in a neat and orderly fashion; dressed in the same direction, with surplus lengths tucked neatly into wire management.

k The patch panel jack, corresponding to the individual work area jack label with the highest number, shall be patched to the Ethernet switch(es). The work area jack label with the lowest number will be used for voice services and the patching will be completed by others. Obtain clarification from Program Facilities Manager if work area has more than 2 outlets or non work area spaces.

l Warranty on the complete system shall be one year.

m Commission Structured Cabling system as per Section 12 – Commissioning.

Figure 1: Typical Telecommunication Closet Layout



Notes:

1. 7'-0" Relay frame
2. Vertical cable management trough (patch cords only)
3. Electronics (supplied by others)
4. 3/4" G1S plywood backboard (2'x8')
5. Receptacle to be duplex 5-20RA (each on dedicated circuit)
6. General purpose duplex 5-15R receptacle
7. Luminaire with light switch
8. Copper ground bus, connected to ground bus in panel board supplying receptacles
9. 12" cable tray

General Note: Install intrusion alarm system in Telecommunication closet as per Section 9.2

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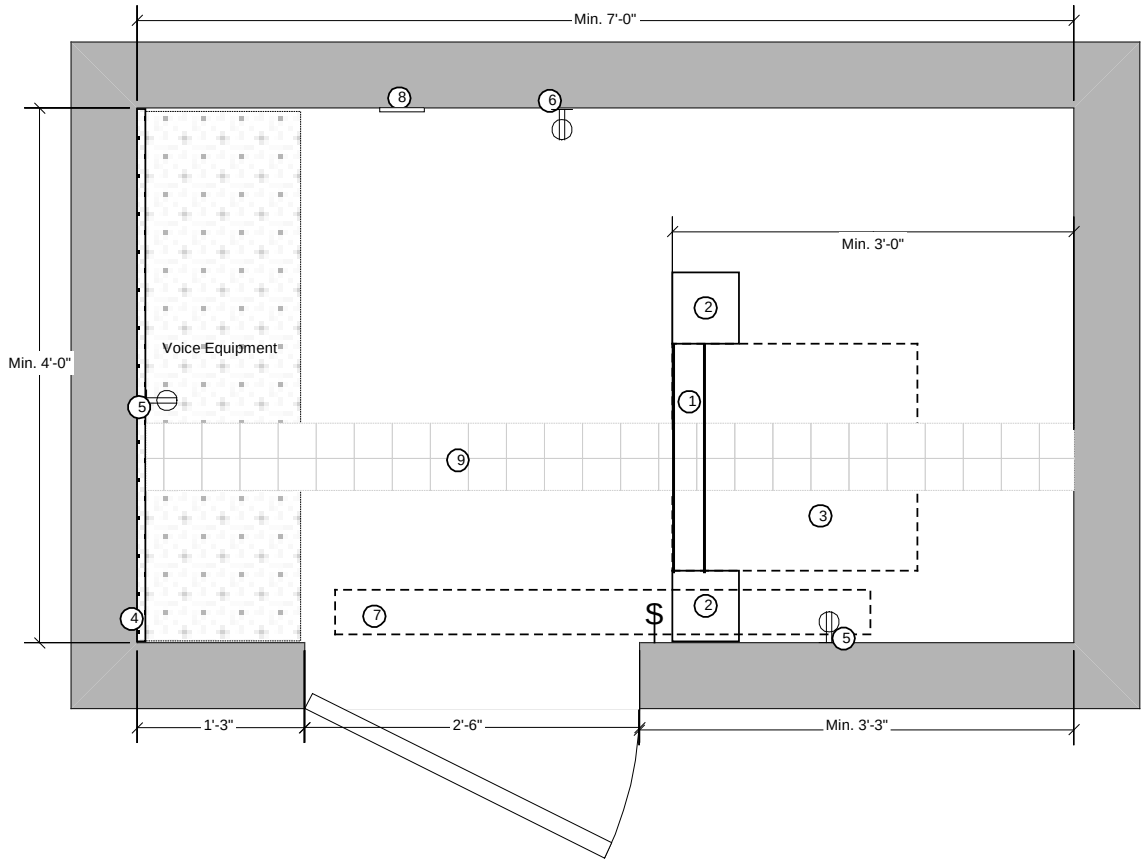
Figure 2: Typical Telecommunication Closet Layout With PBX



Notes:

1. 7'-0" Relay frame
2. Vertical cable management trough (patch cords only)
3. Electronics (supplied by others)
4. 3/4" G1S plywood backboard (4'x8')
5. Receptacle to be duplex 5-20RA (each on dedicated circuit)
6. General purpose duplex 5-15R receptacle
7. Wall-mounted luminaire with light switch
8. Copper ground bus, connected to ground bus in panel board supplying receptacles
9. 12" cable tray

General Note: Install intrusion alarm system in Telecommunication closet as per Section 9.2

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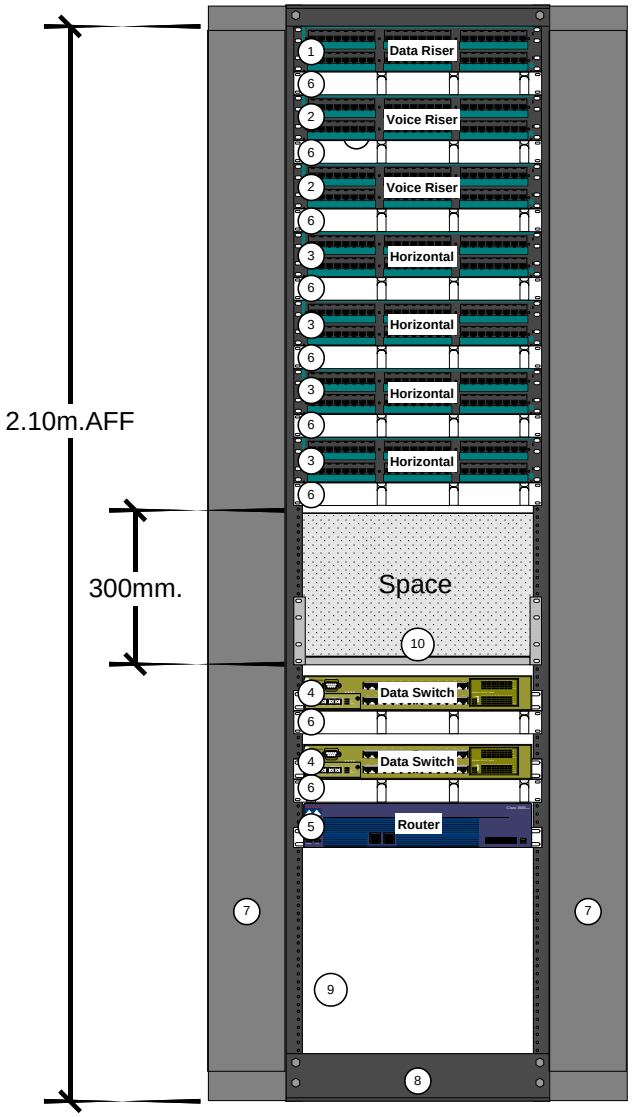
Last Updated by:TCARLSTR
EDIT DATE: 02/22/06

Figure 3: Typical Relay Frame Layout



Notes:

1. CAT5e patch panel for Data Riser (c/w hinged bracket)
2. Voice grade patch panel for Voice Riser (c/w hinged bracket)
3. CAT5e patch panel for Horizontal cable terminations (c/w hinged bracket)
4. Network switch (by others)
5. Network router (by others)
6. 1 E.U. horizontal cable manager
7. Verticle cable management trough
8. 7' high (45 E.U.) relay frame
9. Power bar tie wrapped to relay frame
10. Front-mount (flush) equipment shelf

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Last Updated by:TCARLSTR
EDIT DATE: 03/31/05

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

10 BUILDING FABRIC SECURITY UPGRADES

10 a General

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

Table 10.1- Building fabric security upgrades

Security Upgrades to Basic Technical Standards for Offices											
			Room/Space								
	Comments	Upgrade:	General	Telecom Closet							
10.b.1 Exterior Building Fabric Upgrades		10.b.1.a.1 Exterior Doors and Frames									
		10.b.1.a.2 Locksets and Keyways									
		10.b.1.a.3 Exterior Door Glazing									
		10.b.1.b.1 Exterior Walls									
		10.b.1.b.2 Floors and Roofs									
		10.b.1.b.3 Windows and Glazing									
		10.b.1.b.4 Compounds and Parking Areas									
10.b.2 Interior Building Fabric Upgrades		10.b.2.a 1 Interior Doors & Frames 1st Upgrade									
		10.b.2.a 1Interior Doors & Frames 2nd Upgrade		X							
		10.b.2.a 1Interior Door Glazing									
		10.b.2.b Locksets									
		10.b.2.c.1 Keyways 1st upgrade									
		10.b.2.c.2 Keyways 2nd upgrade									
		10.b.2.d.1 Interior Walls 1st upgrade									
		10.b.2.d.2 Interior Walls 2nd upgrade									
		10.b.2.d.3 Interior Walls 3rd upgrade		X							
		10.b.2.e.1 Reception Counters 1st upgrade									
		10.b.2.e.2 Reception Counters 2nd upgrade									

10 b Performance Requirements

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

a Exterior Shell of Building - Fabric Upgrades

1 Exterior Doors, Frames, Hardware and Glazing

a Exterior Doors and Frames Upgrade

1. Provide heavy duty 1.6 mm (16 ga.) solid core steel door (with steel stiffeners). All entry doors to be fitted with a full length steel astragal.Standard of Acceptance: Fleming H16 or Steelcraft B 16 series doors.

b Locksets and Keyways Upgrade

1. Highest Level of Security: Keyways shall comply with UL 437 and be restricted from duplication of key blanks as provided by copyright law in Canada and shall be registered to provide absolute key control. Standard of Acceptance: Medeco or Mul-T_lock

c Exterior Door Glazing Upgrade

1. Door and sidelight glazing shall be a minimum of heavy duty laminated glass or an approved equivalent.

b Exterior Building Fabric (other than Doors)

1 Exterior Walls Upgrade

a Use normal commercial construction, but provide 3.5 mm (10 ga.) expanded metal mesh under exterior wall sheathing.

2 Floors and Roofs Upgrade

a Roofs shall be constructed with 3.5 mm (10 ga.) expanded metal mesh under the roof sheathing.

3 Windows and Glazing Upgrade

a Exterior windows within 3 meters (10ft.) of the grade shall be protected with laminated glass or protective film. All protective films shall be factory installed as per the manufacturer's specifications or be field installed "edge to edge" under the window stops. Standard of Acceptance: Glass-gard GGL 800 or Ace Security Films SF9.

4 Compounds and Parking Areas

a Compound is to be enclosed with a 2134 mm high (7'0") secure galvanized chain-link fence topped with three (3) strands of barbed wire strung between steel posts making a total height of 2438 mm (8'0"); fence to have top and bottom rails, and to be fully secure at grade. 3048 mm (10'0") wide lockable gate is required for main access to compound.

10 b 2 Interior of Building - Fabric Upgrades

a Interior Doors and Frames Upgrade

1 **1st Upgrade:** Provide heavy duty 1.6 mm (16 ga.) solid core steel door (with steel stiffeners). Standard of Acceptance: Fleming H16 or Steelcraft B 16 series doors.

2 **2nd Upgrade:** All doors to be heavy duty 1.6 mm (16 ga.) hollow steel door (with steel stiffeners). Additionally:

a All entry doors to be fitted with a full length steel astragal.

b All doors to be equipped with NRP (non-removable pin) hinges.

c All telecommunication closet doors, accessible from public space, to be equipped with a door-closer.

d No "elephant foot" is to be installed.

e No signage to identify the room as a telecommunication closet - room number only.

b Locksets Upgrade

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

c Keyways Upgrade

1 **1st Upgrade:** Keyways shall be restricted to approved types such as Schlage D, G or T series or Falcon G series.

a All keys to be engraved "DO NOT COPY".

b ARES/WSI to maintain a list of all keys distributed.

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

d. Interior Perimeter Walls Upgrade

1. **1st Upgrade:** All interior demising walls to be full height (slab to slab).
2. **2nd Upgrade:** The interior perimeter walls shall be full-height, slab to slab, and constructed to resist penetration using a material such as 13 mm (1/2") plywood or particle board as a backing to the outer layer of gypsum board wall finish.
3. **3rd Upgrade:** Partitions are to be full height, floor to underside of structure, with no openings. Interior walls to be of the following composite construction (from outside face inward):
   a. 16 mm (5/8") gypsum wall board (or as per AHJ requirements)
   b. 3.5 mm (10 ga.) expanded metal mesh
   c. 19 mm Plywood or OSB
   d. Framing
   e. 16 mm (5/8") gypsum wall board
   f. Where openings cannot be avoided at ceiling plenum area, then the area must be completely enclosed with 3.5 mm (10 ga.) expanded metal mesh.

e. Reception Counters Upgrade

1. **1st Upgrade:** Reception counters with increased depth, front to back, to discourage physical attack and/or protective barriers over counter *(provide Millwork details).*
2. **2nd Upgrade:** 1067 mm (42") high multi-level counter, to be secured on with glazed partition between counter and minimum 2438 mm (8') above floor.

----- End Building Fabric Security Upgrades Section -----

11 ELECTRONIC SECURITY

Security System Selection Matrix												
			Room/Space									
	Comments	Upgrade	General	Telecom Closet								
Electronic Security Systems		Intrusion Alarm System	X	X								
		Cellemetry Communication										
		IP Communication										
		Panic Alarm System - Local										
		Panic Alarm System - Monitored										
		Panic Alarm Annunciator										
		Remote Door Control										
		Remote Door Release										
		Access Control System										
		Intercom										
		Closed Circuit TV System										
		Exterior Alarm System										
		Other										

11 a Performance requirements

11 a 1 General

a Shared Services BC (SSBC) electronic security systems include intrusion alarm, panic duress alarm, card access, intercom, CCTV and Perimeter Alarm systems, as applicable.

b Intrusion detection systems are mandatory for all government buildings and offices.

c Panic duress systems are used to initiate emergency assistance calls that annunciate and display at designated security/staff locations.

d Remote door control designated door(s) may have a selector switch/pushbutton assembly to remotely lock/unlock or momentarily release the door.

e An access control system may be installed based on client requirements.

f An intercom system may be installed at designated entry point(s) to allow staff to communicate with public/visitors prior to allowing entry into the facility.

g CCTV cameras may be installed for viewing, monitoring, assessing and recording movement and activities within the facility.

h Exterior alarm systems are most suited to locations where a full-time overnight security patrol can immediately investigate an activated alarm signal to determine its cause, either directly or with the aid of CCTV cameras.

11 b Prescriptive requirements

11 b 1 General

a All security system installations shall conform to the requirements detailed in the most current version of Shared Services BC (SSBC) Security System Specifications. Copies of the specifications are available at the Internet web site: http://www.accommodationandrealestate.gov.bc.ca/Doing_Business_With_Us/Technical_Manuals

b All materials, workmanship and/or installation practices shall comply with:

1 Canadian Electrical Code (CEC) Part 1 C22.1. BC Amendments to the CEC & associated bulletins

2 BC Electrical Safety Act

3 British Columbia Building Code

4 British Columbia Fire Code Regulation

5 Applicable Federal, Provincial and Municipal laws, regulations and bylaws

c Companies contracted to install electronic security systems must hold current valid Security Business License registered with the Ministry of Public Safety and Solicitor General.. (SSA - 2007)

d Electronic security systems shall be installed and commissioned by qualified alarm service technicians who hold valid security license issued by the Security Programs Division of the Ministry of the Solicitor General. (SSA - 2007).

e SSBC (or it's appointed representatives) will have complete control of the operation of the system(s) while the building is occupied by SSBC or its tenants.

f All equipment shall remain the sole property of SSBC and the installing company will not retain ownership or control of the system, in any manner whatsoever.

g Documentation which includes Operating & Maintenance manuals, as-built drawings and interconnection, programming schedules must be provided at completion of the work.

h Operator and maintenance training is to be provided for each installation.

11 b 2 Operational Requirements

a Electronic security systems installed in Shared Services BC (SSBC) facilities shall operate on a 24-hour basis throughout the year.

b All hardware and software (including the Windows operating system) required to make programming changes to the system(s) shall be included with the system. Hard copies of all software licenses shall be provided.

c Security systems do not require conduit, except where cable is exposed (to prevent from physical abuse or tampering) or exterior locations where wiring and cable is to be protected from environmental damage.

11 b 3 Products

a Products shall conform to Canadian Standards Association or CSA recognized approved equivalent.

b Reference manufacturer's products that have been approved as standard equipment for installation at SSBC facilities shall not be substituted or replaced with unapproved alternates without written approval from SSBC. Refer to Shared Services BC (SSBC) Security System Specifications.

11 b 4 Intrusion Alarm Systems

a Intrusion protection shall be provided by way of door contact switches, motion sensors and glass-break detectors (glass-breaks used only in consultation with SSBC).

b All security control panels must be located in a secure location within the protected space.

c Intrusion system(s) shall have:

1 Sufficient number of zone inputs so that each device shall be connected to a single zone

2 Partitioning capability, such that each area will be programmable and operate independently from each other. Each partitioned area shall incorporate a keypad to arm and disarm the intrusion detection devices associated with the area.

d Where cellemetry back-up unit is installed, panel must be placed in location that is physically and visually separated from the main alarm panel (so that intruders cannot readily find the cellemetry panel to disable it).

e Where an IP communication module is installed the IP module must be connected to an approved port of the Building Utility Services (BUS) Switch. IP modules CANNOT be directly connected to the SPANBC network. Approval must be granted before connection is made. Refer to TS Section 09 - Structured Cabling for the BUS technical requirements.

f Telecommunication Equipment Spaces

g Telecommunication rooms shall be protected by intrusion alarm door contacts and dual technology motion detector which will be connected to the main intrusion alarm system.

11 b 5 Panic Alarms

a Panic alarm systems include the following:

b Local response only

c Monitored response

d Client to identify type of panic system required and the desired operation.

e Panic alarm system shall be a separate, standalone system and will not be monitored unless specified otherwise. Local panic systems will not be integrated into the main intrusion alarm panel.

11 b 6 Remote Door Control

a Client to identify door(s) to be remotely controlled and the desired operation.

b Door release selector switch/pushbutton assembly shall be wall or desk (in suitable enclosure) mounted.

c Door control unit to be interfaced and operate in conjunction with card access system and/or intrusion alarm system, where applicable.

11 b 7 Access Control Systems

a Card readers and electric locking devices shall be installed at all designated entry doors to the protected space, including stairwell doors at points of public access. If an elevator is used to directly access the protected space, the card access system shall also be used to control the movement of the elevator on a floor by floor basis.

b System and all associated equipment rated for and capable of 24 hours per day, seven days per week continuous operation.

c Electric strikes (12/24vdc) are the only acceptable electric locking devices and provide fail secure operation, unless specified otherwise.

d All electric and associated mechanical locking devices must meet building, fire and electrical code requirements of all AHJ.

11 b 8 Intercoms

a Intercom system (audio or audio & video - color) to include the following components:

1 Intercom master stations

2 Door sub- stations w/remote door unlock capability

3 Remote release relays and associated interface hardware

b Stations to be rugged construction, highly resistant to physical attack, tampering, liquids, etc.

c Where required, intercom sub-station will be installed at designated entry door(s). The master station will be mounted in a location of the client's choosing. The intercom will either be a regular audio or a video intercom, based on client requirements.

d Interface intercom system with card access and intrusion systems as required.

11 b 9 Closed Circuit Television Systems

a Closed circuit television systems shall not violate the rights of privacy and other legal rights of persons under observation. In particular, signs shall be provided where routine surveillance is conducted, advising that the space is under electronic surveillance. Signage should be in the languages spoken in the area. Cameras shall not be installed where there is a reasonable expectation of privacy; i.e. washrooms, change-rooms or other similar spaces. Voice recording is not permitted generally by law. Refer to the following web site: http://www.cio.gov.bc.ca/cio/priv_leg/manual/sec01_09/sec1.page

b Closed circuit television (CCTV) systems shall be designed in conjunction with the client and installed by certified personnel.

c The following locations and areas will be considered for monitoring the facility and surrounding building perimeter:

1 Public access entry & egress points to facility and/or building entrances

2 Entry & egress points where only authorized access is permitted.

3 Controlled doorways and pathways in highly sensitive areas and high security rooms (file storage, high value materials, etc)
4 Entry and egress points for mission critical facilities, such as server rooms, computer rooms, etc.
5 Areas surrounding buildings and facilities

d Closed circuit television systems shall be designed to take into account:
1 Field of view of the camera(s)
2 Definition (resolution) of image being viewed;
3 Continuous screen viewing of area(s) under surveillance;
4 Video recording of the area(s) under surveillance;
5 Capability to interface with alarm and/or access control system;
6 Lighting requirements in the area under surveillance (both day and night);
7 Types of luminaires used (inside and outside).
8 Resistance to vandalism and tampering

e Dummy cameras are not permitted.

f Cameras shall be high resolution colour, suitable for day/night operation in extreme low light conditions. All models shall include vari-focal auto iris lens.

g All IP cameras shall be H.264 compliant, with capability to fully integrate with Genetec systems.

h Unless otherwise specified a Digital Video Recorder (DVR) will be used to record video information. The DVR to be mounted in a secure location.

11 b 10 Exterior Alarm Systems

a The installation of exterior alarm system(s) is to be based on client request or determined by completing a threat and risk assessment for site conditions.

b Equipment for exterior alarm systems may consist of one or more of the following:

c Perimeter IR beam systems;

d Fence vibration systems;

e Ground vibration (seismic) systems;

f Electromagnetic field systems;

g Closed Circuit Television Systems

----- End Electronic Security Systems Section -----

12 COMMISSIONING

12 a Commissioning Scope of Work

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

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

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

12 b Letter of Conformance - Architectural

Project Name: _____

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

Section A:

A1.	YES / NO _____	All architectural systems have been designed in compliance with SSBC Technical Standards for Offices and any deviations have been identified, recorded and approved by SSBC. Identify all deviations in Section B.
A2.	YES / NO _____	All architectural systems have been installed in compliance with SSBC Technical Standards for Offices and any deviations have been identified, recorded and approved by SSBC. Identify all deviations in Section B.
A3.	YES / NO _____	Acoustics separations (NIC 45) have been tested and all test results have been reviewed with no deficiencies noted.
A4.	YES / NO _____	Record drawings have been received, reviewed and are complete.
A5.	YES / NO _____	Interdisciplinary coordination has occurred, been recorded and indicates that TI space is in compliance with Work Safe BC and SSBC Technical Standards for Offices.
A6.	YES / NO _____	All fire separations and fire stops have been designed and installed as per BC Building Code.
A7.	YES / NO _____	Architectural products and installation are in general conformance with contract documents and shop drawings.

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

B1. _____

B2. _____

B3. _____

Architect of Record:

Name: *(print)* _____

Company: _____

Date: _____ **, 20**_____

AIBC Seal

12 c OPR Checksheet – Architectural

Item #	System	Commissioning and Acceptance Testing Standard	Submission	Initial	Date Received
1	Interior Architecture Design	SSBC Technical Standards for Offices -TI	AR submit sealed Letter of Conformance indicating all architectural systems and components have been designed in compliance with SSBC 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 Conformance sealed by AR indicating all architectural products and installation are in general conformance with contract documents and shop drawings. Also attach a copy of final Declaration of Compliance. Letter also refers to design and installation of the interfaces, in addition to materials, components and systems themselves.		
3	Acoustic Separation	BC Building Code, Vancouver Building Bylaw, and Technical Standards for Offices	Sealed 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 sealed by AR with no exclusions.		
5	Seismic restraint	Seismic Engineer Inspection Report	Copies of Building Code Schedule B-1, B-2, and C sealed by ER with no exclusions.		
6	Exit Signs	BC Fire Code and AHJ	Copies of applicable Building Code Schedules sealed by AR with no exclusions.		
7	Proposed penetration and opening details	BC Building Code and installation methods	Verification report with summary letter sealed 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 sealed by registered architect with review letter sealed by AR.		
9	Record Drawings	SSBC Technical Standards for Offices TI	Letter of Conformance sealed by AR advising record drawings reflect changes to contract.		
10	Contractor Quality Assurance & Control	See General Note “g”	Letter of Conformance sealed by AR indicating each interior space meets Work Safe BC requirements and SSBC Technical Standards		

General Notes

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

[1] AR to develop functional tests to demonstrate acoustics systems functions as per contract documents and owner requirements.

12 d Letter of Conformance – Mechanical

Project Name: _____

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

Section A:

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

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

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

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

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

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

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

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

B1. _____

B2. _____

B3. _____

Mechanical Engineer of Record:

Name: *(print)* _____

Company: _____

Date: _____ **, 20**_____

APEGBC Seal

12 e OPR Checksheet – Mechanical

Item #	System	Commissioning and Acceptance Testing Standard	Submission	Initial	Date Received
1	All Mechanical Systems	SSBC Technical Standards for Offices (Tenant Improvement)	MER submit sealed Letter of Conformance indicating all mechanical system have been designed in compliance with SSBC Technical Standards for Offices (owner's requirements) and deviations recorded.		
2	Fire Alarm Test Certificate	ULC - S537	Copies of Building Code Schedule B-1, B-2, and C sealed by MER with no exclusions.		
3	Plumbing System	BCBuilding 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 sealed by MER with no exclusions.		
6	Seismic restraint	Seismic Engineer Inspection Report	Copies of Building Code Schedule B-1, B-2, and C sealed by a professional engineer with no exclusions.		
7	O&M Manuals	SSBC Technical Standards for Offices	Letter of Conformance sealed by MER advising content of O&M manuals reviewed and is complete.		
8	Record Drawings	SSBC Technical Standards for Offices	Letter of Conformance sealed by MER advising record drawings reflect changes to contract.		
General Notes	a. MER = Mechanical Engineer of Record. b. If manufacturer has specific acceptance/commissioning testing requirements they will be in addition to standards listed above.				

12 f Letter of Conformance – 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 seal and sign this document indicating conformance.

Section A:

A1.	YES / NO _____	All electrical systems have been designed in compliance with SSBC Technical Standards for Offices and any deviations have been identified, recorded and approved by SSBC. 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 _____	Record drawings have been received, reviewed and are complete.
A5.	YES / NO _____	Interior lighting measurements have been recorded and illumination levels and uniformity is in compliance with Work Safe BC and SSBC Technical Standards for Offices.
A6.	YES / NO _____	All lighting controls have been witnessed and are operational as per SSBC Technical Standards for Office and design.
A7.	YES / NO _____	Electrical products and installation are in general conformance with contract documents and shop drawings.

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

B1. _____

B2. _____

B3. _____

Electrical Engineer of Record:

Name: *(print)* _____

Company: _____

Date: _____ **, 20**_____

APEGBC Seal

12 g OPR Checksheet – Electrical

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

[2] EER to develop functional tests to demonstrate lighting control system operates as per contract documents and owner requirements.

12 h Letter of Conformance – Security

Project Name: _____

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

Section A:

A.1	YES / NO _____	All security systems have been designed in compliance with SSBC's Security Specifications and any deviations have been identified, recorded and approved by SSBC. Identify all deviations in Section B.
A.2	YES / NO _____	Complete intrusion alarm system and/or panic duress system has been tested and signals sent from all devices to SAFELINK. Contractor has provided a verification number indicating that SAFELINK has received all required information and alarm signals.
A.3	YES / NO _____	Complete Digital Video Management System (DVMS) has been tested and all camera views have been verified and approved.
A.4	YES / NO _____	Complete Access Control System has been tested and functionality meets SSBC's Security Specifications, contract documents, and owner's requirements.
A.5	YES / NO _____	Record drawings have been received, reviewed and are complete
A.6	YES / NO _____	Training has been completed as per contract documents and owner's requirements.
A.7	YES / NO _____	All Security System products and installation are in general conformance with contract documents and shop drawings.

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

B1. _____

B2. _____

B3. _____

Security Engineer or Designer/Consultant of Record:

Name: *(print)* _____ **Company:** _____

Signature: _____ **Date:** _____**, 20**_____

12 i OPR Checksheet – Security

Item #	System	Commissioning and Acceptance Testing Standard	Submission	Initial	Date Received
1	Security Design	a) SSBC Technical Standards for TI b) SSBC Security Specifications	SER submit signed Letter of Conformance indicating all security system has been designed in compliance with SSBC Technical Standards for Tenant Improvements and SSBC Security Specifications and deviations recorded.		
2	Intrusion and Duress Systems	1. SSBC Security Specifications	SER submit signed letter of Conformance indicating complete intrusion alarm system and/or panic duress system have been tested and signals sent from all devices to SAFELINK. Contractor has provided a verification number indicating that SAFELINK has received all required information and alarm signals.		
3	Digital Video System	2. SSBC Security Specifications	SER submit signed letter of Conformance indicating complete Digital Video Management System (DVMS) has been tested and all camera views have been verified and approved.		
4	Access Control System	a) SSBC Security Specifications b) Contract Documents	SER submit signed letter of Conformance indicating complete Access Control System has been tested and functionality meets SSBC's Security Specifications, contract documents, and owner's requirements.		
5	Record Drawings	a) SSBC Security Specifications b) Contract Documents	SER submit signed letter of Conformance indicating record drawings have been received, reviewed and are complete		
7	O&M Manuals	a) SSBC Technical Standards for TI b) SSBC Security Specifications	SER submit signed letter of Conformance indicating O&M manuals have been received, reviewed and are complete.		
8	Training	a) SSBC Security Specifications b) Contract Documents	SER submit signed letter of Conformance indicating training has been completed as per contract documents and owner's requirements.		
9	Security Installation	a) SSBC Security Specifications b) Contract Documents and Shop Drawings	SER submit signed letter of Conformance indicating all Security System products and installation are in general conformance with contract documents and shop drawings.		
General Notes	a. SER = Security Engineer or Designer/Consultant of Record. 3. b. If manufacturer has specific acceptance/commissioning testing requirements they will be in addition to standards listed above.				

13 PROJECT SPECIFIC REQUIREMENTS