TECHNICAL STANDARDS - 2007

ACCOMMODATION AND REAL ESTATE SERVICES

26 September 2007

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TECHNICAL STANDARDS 2007

Date Updated	Sections Updated
2007-09-21	6.1 table
2007-09-23	4.1.6.2, 4.2.1.1, 4.2.2.1.4, 4.2.2.1.5, 4.2.2.2.6, 4.2.2.4.4.c, 4.2.3.1.5.e, 4.2.3.2.2, 4.2.12.5, 4.3.1.2.8
2007-09-24	3.5.1.6
2007-09-26	4.1.4.3, 4.1.5.3, 4.2.1.1.1, 4.2.1.1.2, 4.2.2.2.6,

In the electronic version, all hidden text is displayed in red.
*This includes instructions for editing choices to be made and the clause letters such as **A** or **B** that precede the clauses to be edited in or out.*

The clauses to be edited are displayed in blue text and have a double bar in the right margin (no double bar in the electronic version). The double bar in the margin will remain in the final printed version to alert proponents that these are clauses that will vary from project to project. This is a similar convention to that used in building code documents.

*Where the choices result in entire sub-sections being deleted, as in Section 2 and Section 8, the sub-section heading is replaced with **Not Applicable** in order to preserve clause numbering.*

The Table of Contents page numbers in the master are based on having the hidden text printable. The hidden text will need to be turned off and the TOC will need to be re-generated for the final printed version.

Table of Contents

1. GENERAL REQUIREMENTS

1.1. Introduction

1.1.1. These requirements apply to office buildings and office space. Requirements for other occupancies or building types are described in other documents.

1.1.2. These standards are intended to provide technical requirements for the design and construction of new premises/buildings and existing space that Accommodation and Real Estate Services (ARES) leases or builds for its clients.

1.1.3. For existing buildings, when requested, the landlord or consultant shall work with ARES to complete a gap analysis in order to identify where the existing building systems or the recommended design will not meet the requirements of the Technical Standards (i.e. identify non-compliance). The landlord or consultant shall also estimate the approximate cost implications of identified gaps (i.e. incremental costs) to bring them to the requirements of the Technical Standards, performance compromises, and any mitigating actions to be taken through the design. The project implementer(s) and the landlord or consultant shall review the gaps with the client to decide final direction. Only in this manner can informed decisions be made as to what to trade off for cost savings.

1.1.4. ARES 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.

1.1.5. Telecommunication closets are deemed to be a “Security Zone” as per Government’s Core Policy Manual (Office of the Chief Information Officer).

1.2. Technical Standards and LEED

*Use **B** if the building is to meet High Performance Building requirements.*

*Use **A** in all other cases.*

A

1.2.1. The following Technical Standards summarize basic technical requirements of the building and tenant improvements. It is anticipated that on LEED® (Leadership in Energy and Environmental Design) projects an integrated design approach will achieve systems integration and optimization which will result in departures from some of these specified requirements, while achieving or exceeding the intent of the requirements. Obtain approval from ARES for proposed deviations prior to implementation.

B

1.2.2. High Performance Building Requirements

1.2.2.1. The intent is to provide leased real estate facilities which incorporate High Performance Building strategies and processes to integrate products, components and systems to improve building performance by significantly reducing energy consumption, increasing facility flexibility and improving user comfort and satisfaction for ARES’s tenants.

1.2.2.2. A High Performance Building is explicitly designed for resource efficiency and cost effectiveness (both in construction and operation) with healthy and productive environments. It is a functional, adaptable, durable building that

makes the best use of natural light and fresh air, minimizes water and power consumption, and reduces site impacts, waste and emissions. Benefits of a High Performance Building:

.1 Lower operating costs.

.2 Improves the comfort and performance of their occupants:

a) Higher productivity.

b) Improved learning and health related outcomes.

.3 Is good for the community:

a) Increased local economic activity.

b) Minimized demands on local infrastructure.

.4 Is good for the environment:

a) Efficient use of resources.

b) Less waste and greenhouse gas emissions.

c) Low site impacts or even site enhancement.

.5 Is good for the bottom line:

a) Enhanced marketability.

b) Higher attraction and retention of staff or tenants.

c) Higher return on investment, improved asset value.

d) Enhanced community relations and reputation.

1.2.2.3. Proponent's High Performance Building Design Team, Strategies and LEED Checklist:

All Proponents shall identify their design teams, (Architectural, Mechanical Engineer, Electrical Engineer, Energy Modeling Consultant, Commissioning Authority, and Cost Consultant), state their design team qualifications, experience with LEED, and in delivering LEED Certified Projects.

"Short-listed" Proponents shall describe:

.1 What High Performance Building targets and strategies they will endeavour to implement.

.2 The process of how they intend to incorporate High Performance Building targets into the design.

.3 How they intend to verify achievement of High Performance Building targets incorporated into the design.

1.2.2.4. "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. As a minimum, the LEED Checklist must include sufficient credits to meet:

.1 New Building or Existing Building with Major Renovation: the "LEED Silver" Certification level under the Canada Green Building Council's LEED Canada- NC Version 1.0 (a minimum of 33 credits plus prerequisite requirements). The following credits are mandatory:

a) Water Efficiency

.a1. Credit 3.1 Water Use Reduction: 20% - 1 point minimum

b) Energy and Atmosphere

.b1. Credit 1 Optimize Energy Performance – 6 points minimum

.2 Existing Building with Tenant Improvements: the "LEED Silver" Certification level under the Canada Green Building Council's (CaGBC) LEED – CI (Commercial Interiors) (a minimum of 27 credits plus prerequisite requirements). The following credits are mandatory:

a) Energy and Atmosphere

.a1. Credit 1.1 Optimize Energy Perfomance, Lighting Power – 1 point minimum

.a2. Credit 1.3 Optimize Energy Performance, HVAC:

.a2.1. If new HVAC systems are to be installed under the project, then 2 points are mandatory.

.a2.2. If new HVAC systems are not to be installed under the project, then 1 point for Appropriate Zoning and Controls is mandatory.

b) Indoor Environmental Quality

.b1. Credit 2 Increased Ventilation – 1 point

1.2.2.5. Minimum Energy Performance

The building shall attain the above referenced minimum energy performance requirements.

Energy modelling is necessary under LEED and must be performed by an experienced professional, using an energy simulation tool acceptable to ARES, e.g. EE4 or DOE 2.1. The energy simulator must participate in the integrated design workshops, and provide interactive response to the integrated design team on proposed energy saving initiatives during the workshops.

The building shall be eligible for BC Hydro's High Performance Building

Program, which provides funding for half of the energy simulation costs, and certain incentive rates for energy-efficient design features.

1.2.2.6. An integrated design process (IDP) shall be utilized to achieve LEED and the building energy performance requirements for this project. IDP is characterized by the following main features:

.1 Commitment of the developer, designers and builder to stringent, measurable performance targets.

.2 Close collaboration by multi-disciplinary teams, including commissioning authority, from the beginning of conceptual design, throughout design and construction.

.3 Computer energy simulations, to assess energy conservation measures early and throughout the design process. The expanded design team collaborates early in conceptual design to generate alternative concepts for building orientation and form, envelope and landscaping, focusing on minimizing energy loads, demand and consumption. Computer energy simulation is used to assess their effectiveness in energy conservation, and their construction costs. Typically, heating and cooling load reductions from better glazing, insulation, efficient lighting, day-lighting and other measures allow smaller and less expensive HVAC equipment and systems, resulting in little or no increase in initial capital cost compared to conventional designs.

.4 Design alternatives are evaluated on the basis of minimizing life-cycle cost, as well as capital cost. Assessments include costs and environmental impacts of specified materials.

The successful proponent shall invite up to 4 Tenant representatives to participate in the initial visioning design workshop.

1.2.2.7. Verification
The successful proponent shall update their LEED checklist throughout the project, and in addition to their original LEED checklist, they shall submit a copy of the updated completed LEED checklist (LEED-NC if new building, LEED-CI if existing building) at completion of schematic design, design development and construction documents phases, for the Ministry's review.

End General Requirements Section

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2. BUILDING STRUCTURE AND ENVELOPE

2.1. Building Envelope Principles

Delete entire Section TS2.1 for buildings with a planned occupancy of less than 10 years.

2.1.1. Documentation of Building Envelope Design Intent

2.1.1.1. The continuity of the air barrier, vapour transmission retarder (vapour barrier) and weather-tight plane, plus drainage and ventilation of assembly voids, shall be clearly and graphically depicted in the working drawings and applicable shop drawings on all envelope sections drawn at a scale of 1:20 or larger. Pay particular attention to foundation/wall, roof/wall, window/wall, door/wall, roof/roof mounted mechanical equipment, skylight/roof and structure/wall connections. Show proposed flashings. Design and build building components and assemblies to minimize the accumulation of condensation, mould or infiltration of precipitations in the building envelope.

2.1.2. Air Barrier Requirements

2.1.2.1. It is critical that the building envelope air barrier is continuous and capable of being constructed.

2.1.2.2. All components of the air barrier system shall withstand imposed loads for the duration of the building service life, or shall be easily maintained. Pay particular attention to structural movement such as thermal expansion and contraction and/or live load deflections.

2.1.2.3. Locate the air barrier on the warm side of the insulation.

Use A for 10 to 30 year buildings *Use B for 30 year + buildings*

A

2.1.2.4. Do not use polyethylene sheet as a component of the envelope air barrier system.

B

2.1.2.5. Do not use polyethylene sheet or caulking as components of the envelope air barrier system.

2.1.3. Thermal Envelope Requirements

2.1.3.1. The building thermal envelope shall be continuous and capable of being constructed.

2.1.3.2. Insulation shall be in direct, continuous and permanent contact with the air barrier.

2.1.4. Weather-Tight Plane

*Use **C** for 10 to 30 year buildings.*

*Use **D** for 30 year + buildings and for buildings where the 1 in 10 Driving Rain Wind Pressure (DRWP) exceeds 260 Pa when calculated using the appropriate building height and tables UG-1 and UG-2 of CAN/CSA-A440-M90.* The DRWP will exceed 260 Pa for all locations on the west coast and northern half of Vancouver Island, the Queen Charlottes and the northern west coast of the mainland. The DRWP on the south east coast of the island and the south west coast of the mainland will exceed 260 Pa once building heights rise above 10 metres (i.e. 3 storeys).

C

2.1.4.1. All assemblies shall have a declared weather-tight plane beyond which moisture from exterior sources can not pass and from which such moisture is redirected to the exterior of the assembly. The weather-tight plane shall be the same as, or exterior to, the plane of the air barrier.

D

2.1.4.2. All assemblies shall have a declared weather-tight plane beyond which moisture from exterior sources can not pass and from which such moisture is redirected to the exterior of the assembly. The weather-tight plane shall be the same as the plane of the air barrier. Construct the assembly in accordance with rain screen principles.

2.1.4.3. All components of the assembly exterior to the weather-tight plane shall be resistant to the deteriorating effects of exposure to the elements, consistent with the service life of the building.

Use the following for 10 to 30 year buildings, otherwise delete the text:

2.1.4.4. Where sheathing paper constitutes the weather-tight plane, a minimum of two layers of 30 minute rated paper shall be employed. The two layers shall be applied in such a manner as to ensure any moisture that penetrates past the first layer is redirected back to the exterior at the next lower lap in the paper.

2.1.4.5. Where walls are designed as face sealed assemblies, other provisions for rain protection (such as overhangs, recesses, drip ledges) shall be provided.

Use the following for 10 to 30 year buildings if the Driving Rain Wind Pressure (DRWP) exceeds 200 Pa but is less than 260 Pa, as calculated above. (Rain screen assemblies must be used If the DRWP is greater than 260 Pa. Such assemblies substantially reduce the chance that the sheathing would be subjected to extensive wetting.)

2.1.5. Sheathing

2.1.5.1. Oriented strand board (OSB) and gypsum board shall not be used for sheathing in face sealed assemblies. Alternatives would include exterior grade plywood, cement board or glass fibre faced, silicone impregnated gypsum board.

2.1.6. Building Envelope Commissioning
The building envelope shall be commissioned to ensure that both energy performance and building integrity are achieved.

2.2. Substructure And Structure

Delete the entire substructure and Structure section for buildings with a planned occupancy of less than 10 years.

2.2.1. Basic Requirements

2.2.1.1. Roof Structure

.1 Roofs shall have a minimum 1:50 slope to drain built into the structure.

2.2.1.2. Structural Design Of Non-Structural Components

.1 Non-structural components, restraints, and anchorages for such elements as exterior wall assemblies, parapets, canopies, window glass and all other glazing, lay-in tile ceilings, partitions, all indoor and outdoor equipment, etc., shall be designed by a professional engineer to accommodate dead, live and seismic loads.

2.2.2. Materials And Installation

2.2.2.1. Concrete

.1 Cast-in inserts, water bars, etc., shall be resistant to corrosion, ultra-violet degradation and other factors.

.2 Foundation slabs shall be protected against water and damp penetration. As a minimum, provide a damp-proof membrane of 0.15 mm thick polyethylene sheet, Polycrepe VPA or equivalent.

.3 Type 4 polystyrene insulation shall be provided at perimeter of foundation slabs to 600 mm below grade or 300 mm below maximum frost penetration, whichever is greater.

.4 Concrete slabs in covered car parks shall have drive aisle surfaces textured or otherwise treated to ensure good vehicular traction especially when wet.

2.2.2.2. Structural Steel

.1 Structural steel shall have all faces shop primed. Touch up any damaged areas using same primer.

2.2.2.3. Steel Decking

.1 Steel decking shall be galvanized except wiped coating is acceptable for dry interior applications.

2.2.2.4. Wood Construction

.1 Exterior grade tongue and groove plywood, glued and screwed in place, shall be used for subfloors.

.2 The exterior edge of stud walls may be located back from the slab edge only if appropriate falls, water bars and flashings are provided to prevent water penetration.

.3 All sill plates shall be installed over foam gaskets or be fully bedded in mastic.

.4 Plates in contact with concrete or masonry shall be pressure preservative treated.

2.3. Exterior Walls Above Grade

Delete the entire Exterior Walls Above Grade section for buildings with a planned occupancy of less than 10 years.

2.3.1. Structural Integrity

2.3.1.1. Exterior wall assemblies shall be designed by a Registered Professional Engineer.

2.3.2. Standards References and Requirements

2.3.2.1. Stucco and/or Steel Stud components of wall assemblies shall conform to the recommendations of the Association of Wall and Ceiling Contractors of British Columbia (AWCCBC) Specifications Standards Manual (http://www.awccbc.org/).

2.3.2.2. Joint design and sealant selection, specifications and installation shall follow the recommendations in "Sealants: The Professional Guide" published by the Sealant, Waterproofing & Restoration Institute (http://www.swrionline.org/)).

2.4. Glazing Systems

2.4.1. Basic Requirements

2.4.1.1. Glazing systems selection, specifications and installation shall follow the recommendations in the "Glazing Systems Specifications Manual" published by the Glazing Contractors Association of BC (http://www.gca-bc.org/).

2.4.1.2. Window performance ratings shall meet the requirements of CSA Standard CAN3-A440-M90 for the building height, location and exposure. The minimum allowable rating for windows shall be A3, B3, C3, I50.

2.4.1.3. The thermal conductivity of individual glazing units, calculated using the weighted U-factor for the entire fenestration assembly, shall conform to the values in Table 2.1.

Table 2.1 Maximum Permitted Fenestration Thermal Conductivity

Winter Design Temperature, °C	Maximum Fenestration Assembly Thermal Conductivity
Warmer than -25°C	USI = 2.75 (U = 0.48)
-25° ≥ WDT > -30°C	USI = 2.61 (U = 0.46)
-30° ≥ WDT > -35°C	USI = 2.27 (U = 0.40)
-35° ≥ WDT > -40°C	USI = 2.10 (U = 0.37)
-40°C or colder	USI = 1.93 (U = 0.34)

USI values shall be calculated in accordance with

CSA-A440.2-04, Energy Performance of Windows and Other Fenestration Systems.

2.4.1.4. Window/wall heat loss:

.1 Glazing shall meet the requirements in 2.4.1.3

.2 Except as noted below, the building shall be designed with a maximum window/wall heat loss of 50 W/m^2 of perimeter envelope area (i.e. everything between the structural floor slab and the structural floor/roof slab above), at 1% winter design temperature, and taking into account all thermal bridging that contributes to heat loss. Heat loss shall be averaged over each architectural bay width (i.e. between the center-lines of major structural columns), and the heat loss requirement applies to every such bay.

.3 Exception – Main entrance lobbies may be designed with a maximum window/wall heat loss of 80 W/m2 of perimeter envelope area, at 1% winter design temperature, and taking into account all thermal bridging that contributes to heat loss. Heat loss shall be averaged over each architectural bay width.

*Only include the following clause **B** for buildings with a planned occupancy of 10 years or greater.*

B

2.4.1.5. Windows are to be of similar quality to equivalent commercial buildings. Light weight, residential quality windows shall not be used.

2.4.1.6. Vertical window mullion locations shall respect the building planning grid.

2.4.1.7. Provision shall be made for cleaning windows above the height reached by window cleaners with extension tube brushes. Safety features such as roof-top anchors shall be provided where necessary.

2.4.2. Materials, Systems And Installation

Where the client desires and is prepared to pay for operable windows, include the following clause "Operable Windows", otherwise delete.

2.4.2.1. Operable Windows

.1 Where exterior perimeter operable windows are provided, such operable windows shall be fitted with switches, similar to intruder alarm switches. Switches shall be SPST (Single Pole Single Throw), installed such that the contact will be open when the window is open, and closed when it is closed. Install switches to be readily accessible for installation of field wiring connections to DDC (Direct Digital Control) system (refer to mechanical section). If switches are not readily accessible, extend wiring, and terminate in accessible junctions boxes.

.2 Provide "limiters" to opening distance on operable windows where required for security or safety reasons, as determined by ARES.

*Only include the following clause **C (.3 to 2.4.3 inclusive)** for buildings with a planned occupancy of 10 years or greater. . The glazing requirement is for the longer term plan occupancy of 10 years or more.*

C

.3 Operable windows shall have top hung outward opening lights, the size of opening to be the width between vertical mullions and the height a minimum of 400 mm.

2.4.2.2. Glass and Glazing

.1 The minimum requirement for exterior glazing shall be factory sealed double glazing with minimum 12.7 mm (1/2") air space and a U-factor as indicated in Table 2.1 "Maximum Permitted Fenestration Thermal Conductivity".

.2 The glazing system shall meet the requirements of IGMAC (Insulating Glass Manufacturers Association of Canada) and:

a) where glazing tape is employed it shall be pre-formed, pre-shimmed butyl such as TREMCO Polyshim II, corners sealed with acrylic-based sealant. Non-shimmed tape shall not be used.

b) where glazing gaskets are employed they shall be neoprene or EPDM (ethylene-propylene-diene monomer). Vinyl or vinyl composites shall not be used.

2.4.2.3. Weather-stripping

.1 Operable windows shall be fully weather-stripped, using heavy duty EPDM or neoprene material. Vinyl or vinyl composite weather-stripping shall not to be used.

2.4.2.4. Window / Wall Interface

.1 The perimeter of the window rough opening shall be completely sealed with a rubberized asphalt peel and stick membrane. Ensure that the membrane enhances rather than impedes the integrity and drainage of the weather-tight plane of the wall assembly.

.2 Flashings must be of a suitable corrosion resistant material and where exposed shall be of pre-finished metal.

.3 Exterior window sills shall be flashed and sloped away from the window and shall have a projecting drip. Where possible the backs and ends of sills shall be turned up to form a three sided pan. Ends, laps and intersections of sill flashings shall be made watertight.

.4 Provide flashing at window heads.

2.4.3. Guarantees

2.4.3.1. Sealed, glazing units shall be guaranteed for a minimum of 5 years.

2.5. Exterior Doors

2.5.1. Basic Requirements

2.5.1.1. Doors shall be commercial exterior-grade hollow insulated metal, or commercial style heavy-duty aluminum.

2.5.1.2. Doors shall be minimum 900 mm wide and 2030 mm high.

2.5.1.3. Doors must be hung in well anchored frames suited to the type of door. Frames must have a minimum available width and depth of 45 mm to accommodate an electric strike lock for a Card Access system should one be required at a later date.

2.5.2. Materials, Systems And Installation

2.5.2.1. *Aluminum Doors and Frames*

.1 Door finishes are to be to the latest edition of the "Designated System for Aluminum Finishes" issued by the Aluminum Association.

.2 Newly developed coating systems not included in the Aluminum Association's requirements will be considered provided they are guaranteed by a reputable manufacturer.

2.5.2.2. *Hollow Steel Doors and Frames*

.1 The quality of hollow steel doors and frames to be to the recommendations of the Canadian Steel Door and Frame Manufacturers' Association, and all hinge and lock locations are to meet this Association's standards.

.2 Door frames to be galvanized and to have mitred and welded corner joints, ground, filled and dressed smooth.

2.5.2.3. *Thresholds:* Exterior doors shall have a minimum 150 mm wide aluminum threshold.

2.5.2.4. *Weather-stripping:* Doors shall be fully weather-stripped, using a heavy duty EPDM or neoprene weather-strip. PVC is not to be used.

2.5.2.5. *Glass and Glazing:* Glazing in wood or hollow steel doors and sidelights shall be with pre-formed pre-shimmed butyl bedding tape.

2.5.2.6. *Finishing Hardware*

.1 Locksets to external doors shall be either:

a) Heavy duty commercial grade such as Schlage 'D', or similar locks to ANSI (American National Standards Institute) Series 4000 Grade 1, from the ranges of Best, Sargent, Yale, or approved equal, with full return lever handles. The latch shall be protected by a guard plate or other intrusion shielding device; or

b) Light duty lockset plus a heavy duty dead bolt with a solid free turning crush proof guard ring and 25 mm throw.

Falcon D4000 Series or Schlage B460 Series are typical examples of this type of lock. Full return lever handles shall be used where applicable; or:

c) Laminated flip-up style bolts are acceptable for glazed doors as are dead latches with protected latches such as Adams Rite 4500 Series.

.2 The following lock types are not approved for outside doors - magnetic pin, padlock, non-supervised code operated, combination lock, and disc tumbler.

.3 Doors shall be equipped with 1 1/2 pairs, 115 mm, ball bearing butt hinges, minimum. Where butt hinges are located to the exterior they shall be equipped with non-removable pins.

.4 A hardware schedule shall be prepared. The schedule shall be fully itemized, each item giving the name of manufacturer, size, code number and finish. A copy of the hardware schedule shall be submitted to and approved by ARES. Door thickness has to be confirmed before hardware is ordered.

Include the following clause for buildings with a planned occupancy greater than 10 years.

.5 A master keyed system and, if necessary, a grand master keyed system shall be provided. Consult ARES.

2.5.2.7. *Flashing*

.1 Provide flashing over door heads.

.2 Flashings must be of a suitable corrosion resistant material.

2.5.2.8. *Painting:* To Master Painter and Decorators Association recommendations and standards, for appropriate grade and quality, and to Canadian General Standards Board (CGSB) CAN/CGSB 85 series.

2.6. Roofing Systems

2.6.1. General

*Use **E only** for planned occupancies of less than 10 years.*

*Use **F (the remainder of the roofing systems section)** for occupancies of 10 years or greater.*

E

2.6.1.1. All roofing systems shall be constructed to good trade practices.

F

2.6.1.2. All roofing systems shall conform to the requirements of the Roofing Contractor's Association of British Columbia (RCABC) Roofing Practices Manual and come complete with an RCABC 5 year guarantee.

2.6.1.3. All roofs shall have at least 1:50 slope to roof drains with valleys having a minimum slope of 1:100. Slopes shall be incorporated in the structure, tapered insulation shall be used only where slopes in the structure are impractical such as at backslopes and crickets.

2.6.2. Materials, Systems and Installation

2.6.2.1. Membrane Roofing Systems

.1 Choice of membrane roofing systems are limited to the following generic types:

a) 2 ply Flexible Membrane Roofing Systems
S.B.S. {Styrene/Butadiene/Styrene Modified Bitumen}

b) Single ply Thermoplastic Systems
P.V.C. {Polyvinyl chloride}
EP {Ethylene Propylene}

.2 membranes shall have a minimum of 180 gm/m^2 polyester reinforcement or equivalent. Base sheets shall have a minimum thickness of 2.2 mm. Cap sheets shall have a minimum thickness of 3.0 mm exclusive of granules.

.3 and E.P. membranes shall have a minimum thickness of 1.2 mm and shall be mechanically fastened.

.4 Protected membrane assemblies (PMA or IRMA (Insulated (or Inverted) Roof Membrane Assembly)) shall not be used in wooded areas or other locations where large quantities of organic material may accumulate on the roof surface.

2.6.2.2. Roof Drains, Gutters, Scuppers and Downspouts

.1 Water from all roof areas shall be directed away from the property by roof drains, gutters, scuppers and downspouts connected to a municipal or site drainage system.

.2 Balconies and isolated roof areas such as canopies shall have positive water run-off with drip ledges where appropriate.

Add the following clause (2.6.2.2.3) with respect to snow shedding for buildings where the ground snow load (S_s) is greater than 2.5 kPa per the BC Building Code Appendix C. Otherwise delete.

.3 Special consideration shall be given to snow shedding and removal of snow from roofs. Provide protection against injury and property damage due to sliding ice and snow. Adequate structural support shall be provided for roof projections such as vents, chimneys and canopies so as to resist the shear forces resulting from sliding snow.

2.6.2.3. Shakes and Shingles

.1 Shake or shingle roofs shall have zinc anti-moss strips in accordance with industry practice.

Delete the following clause if the building is leased.

2.6.2.4. Appointment of a Roofing Inspection Company

.1 ARES will appoint and pay the fees for the services of a roofing inspection company to satisfy the requirements of the R.C.A.B.C. 5 year roofing guarantee.

------ End Building Structure and Envelope Section ------

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3. INTERIOR ARCHITECTURE

3.1. Non-Permanent Interior Walls

3.1.1. Requirements

3.1.1.1. 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 3.6, Acoustic Separation.

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

3.1.1.3. 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.

3.1.1.4. 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.

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

3.1.1.6. Provide wood blocking behind wallboard as required to support and fasten surface mounted fixtures/fittings such as shelving and equipment.

3.1.2. Doors, Frames, Hardware and Interior Glazing

3.1.2.1. 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. Door thickness has to be confirmed before hardware is ordered.

3.1.2.2. 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) c/o TerraChoice Environmental Marketing, 1280 Old Innes Road, Suite #801, Ottawa, Ontario K1B 5M7. Phone: 1- (800) 478-0399 or www.environmentalchoice.com .

3.1.2.3. 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 8 Building Fabric Security Upgrades. All latch and locksets shall have full return lever handles.

3.1.2.4. Where interior glazing is provided, it 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. Provide a minimum 152 mm (6”) between door and glazing

to allow space for light switch. Width of glazing, to a maximum of 1829 mm (6'0"), is to be determined by Planner, considering space and office configuration, distance from daylight source, number of offices, safety, acoustical and visual privacy and budget.

3.1.2.5. 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.

3.1.3. Acoustic Isolation

3.1.3.1. Partitions around enclosed offices shall meet the Noise Isolation Class (N.I.C.) ratings required for the type of space enclosed. Refer to 3.6, Acoustic Separation.

3.2. Floor Finishes

3.2.1. Schedule of Floor Finishes:

Table 3.1 - 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 anti-static sheet vinyl
Washrooms (slope minimally to drains)	Sheet vinyl
First Aid Rooms	Sheet vinyl
Storage Rooms/Spaces	Sealed concrete or to match adjoining area
Main Entrances, Foyers and similar public areas	Sheet vinyl/stained and polished concrete
Janitor Rooms	Sheet vinyl/sealed concrete

3.2.2. Materials and Installations

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

Choose Broadloom or Carpet Tile

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/cm2, 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 / $m^2 \cdot$ hr TVOC).
Carpet Flammability	≥ 0.45 watts/cm2, Class 1 (ASTM E648)
Smoke Density	≤ 450 Flaming Mode (ASTM E662)

3.2.2.2. Sheet Vinyl

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

3.2.2.3. 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, 2160 Springer Avenue, Suite 210, Burnaby, BC V5B 3M7. Phone: (604) 689-9928, info@bcfca.com .

3.2.2.4. Concrete Floor Finishes

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

.2 Sealed/hardened concrete: in accordance with manufacturer's instructions.

3.2.2.5. Stained and Polished Concrete

.1 Produce a representative test section for acceptance prior to application.

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

3.2.2.6. Adhesives

.1 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

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

3.3. Wall Finishes

3.3.1. Wall Finishes

3.3.1.1. 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 required by Building Code or to avoid vandalism.

3.3.2. Materials and Installations

3.3.2.1. Painting

.1 Painting shall be in accordance with the recommendations of the current edition of the MPI Architectural Painting Specification Manual, including MPI Green Performance™ Standard [GPS-1-05] for Paints & Coatings of the Master Painters Institute, 2800 Ingelton Avenue, Burnaby, BC. V5C 6G7. Phone: (888)674-8937, E-mail: info@paintinfo.com. 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, showers and other high condensation and wet areas.

3.3.2.2. Wall Tiling

.1 Tiling shall be in accordance with the Ceramic Tile Institute's Tile Manual available through the Tile & Stone Association of BC, 108 - 3650 Bonneville Place, Burnaby, BC V3N 4T7. Phone: (604) 294-6885.

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

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

3.3.2.3. Plastering

.1 Plastering shall conform to the AWCC Specifications Standards Manual, available from the BC Wall & Ceiling Association, #112 - 8484 162nd Street, Surrey, BC V4N 1B4. Phone: (604) 597-7180. E-mail: info@bcwca.org Web site: www.bcwca.org

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

3.3.2.4. Gypsum Board Substitutes

.1 To prevent decay, use cement-fibreglass backer board instead of gypsum board over studs in wet areas such as showers etc. 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.

3.4. Ceilings

3.4.1. Ceiling Finishes

3.4.1.1. 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.

3.4.2. Materials and Installation

3.4.2.1. 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 – see section 3.6.1) of .55 and minimum STC 35 (Sound Transmission Class – see section 3.6.1) except as noted in 3.6, 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.

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

3.4.2.3. Acoustic Isolation

.1 Ceilings around the perimeters of enclosed offices shall meet the Noise Isolation Class (N.I.C.) ratings required for the type of space enclosed. Refer to 3.6, Acoustic Separation.

3.5. Millwork

3.5.1. Requirements

3.5.1.1. 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, however, be allowed to take precedence over any special size necessary to the client.

3.5.1.2. 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, 160 - 4664 Lougheed Hwy., Burnaby, BC V5C 5T5. Phone: 604-298-3555. Website: www.awma-bc.ca The AWMAC Manual shall be applied as follows:

If the Planned Occupancy is:	*Then choose:*
less than 10 years	***A**, "Custom" Grade*
10 years to 29 years	***B**, "Custom" Grade with P-Lam on outer face*
30 years and greater	***C**, "Custom" Grade with AWMAC 2 year warranty*
High Profile Areas:	***D**, "Premium" Grade in specific areas only*

(consult with ARES for a decision.)

*In the following text, either **A** or **B** or **C** shall remain and the other shall be deleted. **D** shall be included for specific areas only.*

A

.1 "Custom" Grade shall be used; however, 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.

B

.2 "Custom" Grade shall be used; however, 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.

C

.3 "Custom" Grade shall be used and an AWMAC 2 year guarantee obtained.

D

.4 "Premium" Grade shall be used in some areas, for example: conference room, Deputy's office, etc.

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

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

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

3.5.1.6. *Painting:* Painting shall be in accordance with the recommendations of the current edition of the MPI Architectural Painting Specification Manual, including MPI Green Performance™ Standard [GPS-1-05] for Paints & Coatings of the Master Painters Institute, 2800 Ingelton Avenue, Burnaby, BC. V5C 6G7. Phone: (888)674-8937, E-mail: info@paintinfo.com . Web site: www.paintinfo.com/mpi

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 the Development Manager and/or Project Services Manager.

3.5.1.7. Architectural Woodwork

.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 ARES.

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

.3 All such work shall be of hardwood.

.4 As far as possible, only simple mouldings shall be used, unless required to match existing work, or for work of a monumental nature. The use of heavily ornamented pediments, turned and carved wood shall be avoided.

3.6. Acoustic Separation

3.6.1. Definitions

3.6.1.1. The NRC (Noise Reduction Coefficient) is a single number rating indicating the sound absorbing properties of a material. A 0.1 rating indicates very low sound absorption while 0.99 indicates very high sound absorption.

3.6.1.2. The STC (Sound Transmission Class) is a single number rating which 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.

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

3.6.1.4. 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, unlike the STC which refers to a specific element in the room (e.g. the partition, etc.).

3.6.2. Requirements

3.6.2.1. Determine realistic needs of the user. 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 4.1.6).

3.6.2.2. Determine NIC required from the following table:

NIC required between different occupancies

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

Space Types:

A. Areas requiring very high level of confidentiality (e.g. 3.6.2.1 .1-.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.

3.6.2.3. The following clauses 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.

3.6.3. NIC Details

3.6.3.1. NIC 30

.1 walls - STC 33 minimum. Typical wall construction detail: 12.7 mm (½") gypsum board on each side of 64 mm (2 ½") steel studs (or 38 mm x 89 mm (1½" x 3½") wood studs) or regular demountable partitions.

.2 ceilings - continuous suspended T-bar ceiling, CAC 35 to 39 minimum, ceiling NRC 0.55 to 0.65 minimum.

.3 floors - STC 47 minimum, 152 mm (6") concrete. Alternative floor constructions (such as wood frame) meeting the required minimum STC rating must be verified by an acoustical engineer.

.4 doors - solid core wood, no grilles or openings

.5 windows - non-opening, 6 mm (1/4") plate minimum, perimeter gasket (Insil 650 tape or equivalent or silicone sealant).

.6 ventilation - no special precautions except as required in 4.1.6.

.7 mullion/convector details - minimize openings

3.6.3.2. NIC 35

.1 walls - STC 35 minimum. Typical wall construction detail: 12.7 mm (½") gypsum board on each side of 64 mm (2 ½") steel studs (or 38 mm x 89 mm (1½" x 3½") wood studs) 610 mm (2'0") on centre, R8 batt insulation in cavity. Seal top and bottom of partition with Insil 650 tape or equivalent. Back to back power and telecommunication outlets are not acceptable. Separate service penetrations by at least two stud centre widths.

.2 ceilings - continuous suspended T-bar ceiling, CAC 40 to 44 minimum. Use 2 layers of tile - see illustration at end of section. Ceiling NRC 0.55 to 0.65 minimum. No light fixtures straddling partitions. Clip T-bar to top of partition on 6 mm x 12 mm (¼" x ½") Insil 400 tape or equivalent.

.3 floors - STC 47 minimum, 152 mm (6") concrete. Alternative floor constructions (such as wood frame) meeting the required minimum STC rating must be verified by an acoustical engineer.

.4 doors - solid core wood or insulated metal, hung within 3 mm (1/8") of carpet, no grilles or openings.

.5 windows - non-opening, in corridor partitions (not in partitions between adjacent offices), 6 mm (¼") plate minimum, perimeter gasket (Insil 650 tape or equivalent or silicone sealant).

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

.7 mullion details - partitions abutting exterior glazing are to line up with or return to mullions. Fill gap between inner face of exterior 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 Insil 650 tape.

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

Include the following clause only if NIC 45 is required according to Table 3.6.2.2:

3.6.3.3. NIC 45

.1 walls - STC 48 minimum. Partitions installed from floor slab to underside of structure. Typical wall construction detail: 2 layers of 15.9 mm (5/8") gypsum board on one side, 1 layer of 15.9 mm (5/8") gypsum board on other side, 92 mm (3 5/8") 25 ga. (maximum) steel studs, R8 batt insulation in cavity. Heavier gauge steel or wood studs not acceptable. Do not use demountable partitions. Gasket top of partition with Insil 650 tape or equivalent or seal with acoustical sealant. Remove carpet under partitions and gasket with Insil 650 tape or seal with acoustical sealant. Back to back power and telecommunication outlets are not acceptable. Separate service penetrations by at least two stud centre widths.

.2 ceilings - suspended T-bar ceiling, ceiling NRC 0.55 to 0.66 minimum.

.3 floors - STC 47 minimum, 152 mm (6") concrete. Alternative floor constructions (such as wood frame) meeting the required minimum STC rating must be verified by an acoustical engineer.

.4 doors - solid core STC 36 (minimum) wood or insulated metal, hung within 3 mm (1/8") of carpet, no grilles or openings, gasket with Insil 650 tape or Pemko 285 AN seals. Install surface mount drop seal - Pemko 43 AS or equivalent.

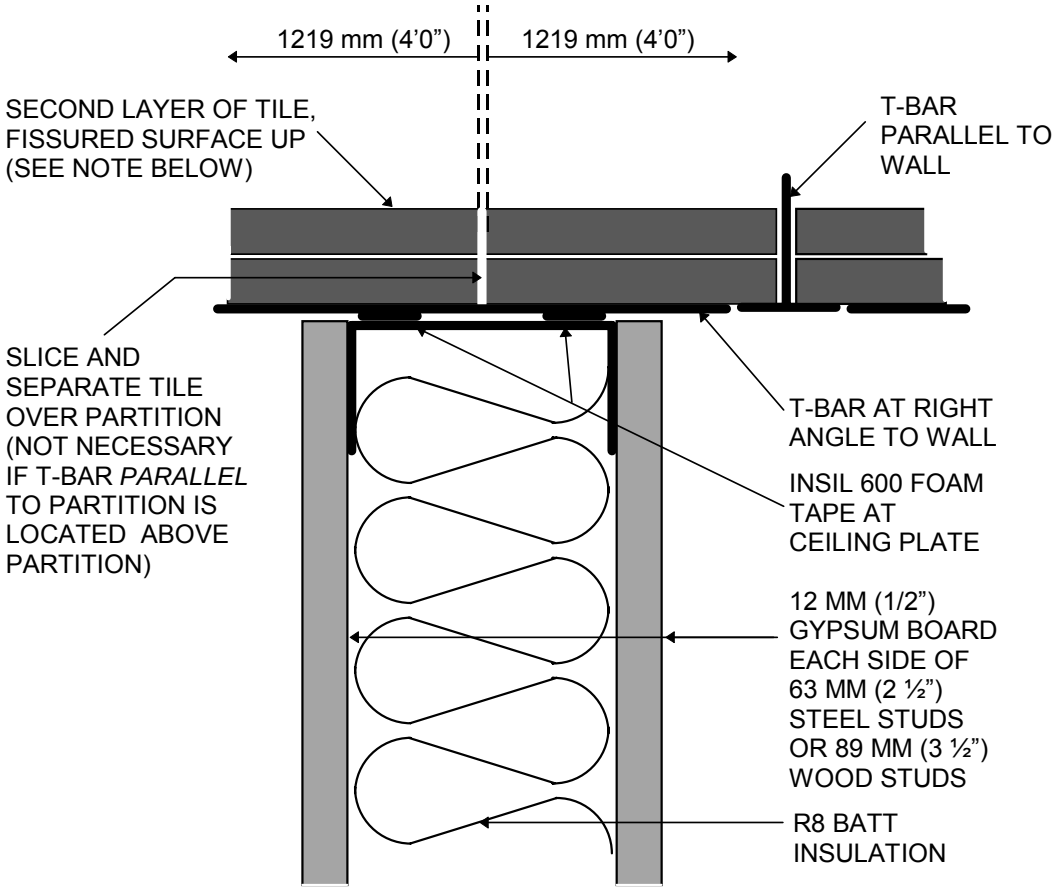
.5 windows - non-opening, in corridor partitions (not in partitions between adjacent offices), laminated acoustic glass STC 40 (6 mm (¼") plate, 0.76 mm (0.030") polyvinyl butyral interlayer, 6 mm (¼") plate), perimeter gasket (Insil 650 tape or equivalent or silicone sealant) OR one 6 mm (¼") lite separated from one 4.7 mm (3/16") lite by 63 mm (2 ½") airspace, install glass in neoprene gasket.

.6 ventilation - return and supply air shall be through an acoustically lined elbow designed to prevent line-of-sight condition through the elbow. Install elbows through least critical wall, not in party walls.

.7 mullion details - partitions abutting exterior glazing are to line up with or return to mullions. Fill gap between inner face of exterior 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 Insil 650 tape.

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

TYPICAL PARTITION/CEILING ACOUSTIC DETAIL
FOR ENCLOSED SPACES - NIC 35



NOTE: PLACE A SECOND LAYER OF CEILING TILE (MINIMUM CAC 40-44) FOR A WIDTH OF 1219 MM (4'0") ON BOTH SIDES OF PARTITIONS AROUND ENCLOSED SPACE. THE FISSURED SURFACE OF THE UPPER LAYER OF TILE MUST FACE UP (TOWARD UNDERSIDE OF STRUCTURE ABOVE). IF AVAILABLE, SOILED (UNBROKEN) TILES MAY BE USED FOR THE UPPER LAYER.

GLUE TILES TOGETHER USING MAPEI ULTRABOND 550 HIGH PERFORMANCE BASEBOARD ADHESIVE, TO ENSURE PROPER REPLACEMENT AFTER CEILING TILES HAVE BEEN REMOVED FOR MAINTENANCE.

3.7. Janitor Facilities

3.7.1. General Requirements

3.7.1.1. Janitor facilities shall be provided in accordance with this Standard in Provincially owned buildings, and in leased buildings (if facilities are not available or if leased space is in a multi-tenant building) if ARES's Property Management provider will be arranging for janitorial services.

3.7.1.2. 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").

3.7.1.3. 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.

3.7.1.4. Facilities shall be provided for new buildings as follows:

Select the appropriate clause depending on the size and number of floors of the rentable area.

Rentable Area	*Floors*	*Choose:*
up to 929 m^2 (10,000 sf)	*Single floor*	***A***
929 m^2 (10,000 sf) - 2787 m2 (30,000 sf)	*Single floor*	***B***
up to 2787 m^2 (30,000 sf)	*Multi-floor*	***C***
2787 m^2(30,000 sf) - 4645 m2 (50,000 sf)	*Multi-floor*	***D***
over 4645 m^2 (50,000 sf)	*Multi-floor*	***E***

A

Type 1 or Type 2

B

Type 2 and Type 1 (or additional Type 2) where distance from Type 2 exceeds 45.7 m (150')

C

Type 2 on 1st floor or basement and Type 1 (or additional Type 2) on each floor above

D

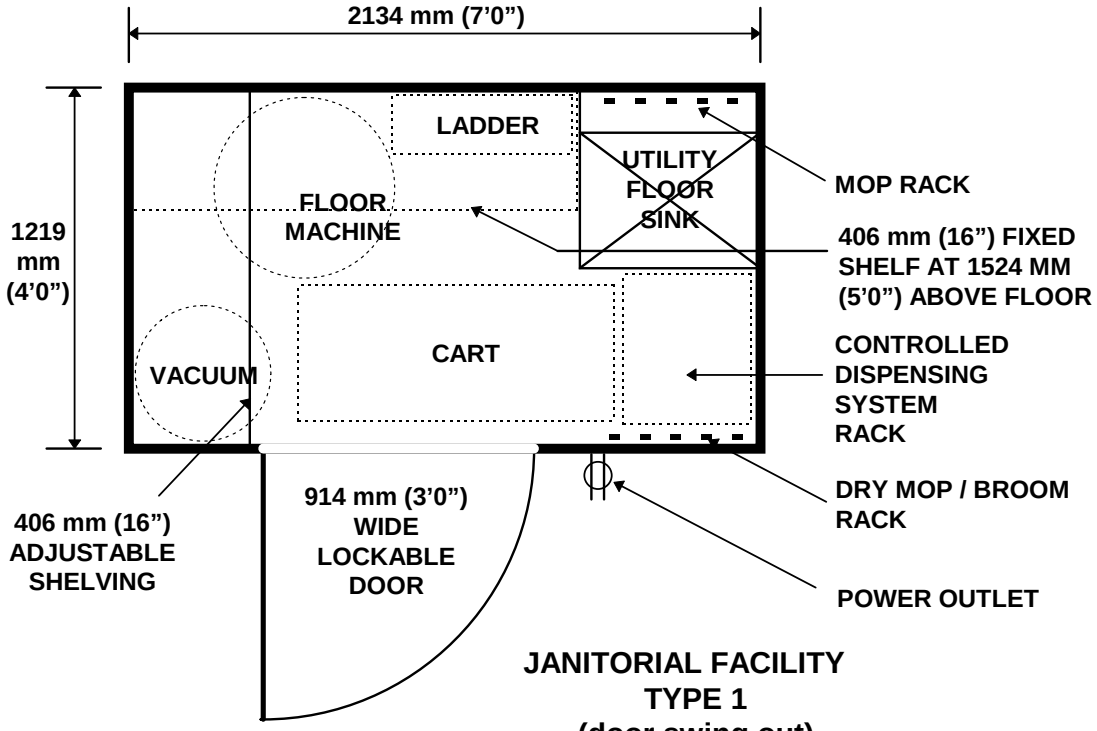
Type 2 on 1st floor or basement and Type 2 each floor above plus a Type 1 (or additional Type 2) if distance from Type 2 exceeds 45.7 m (150')

E

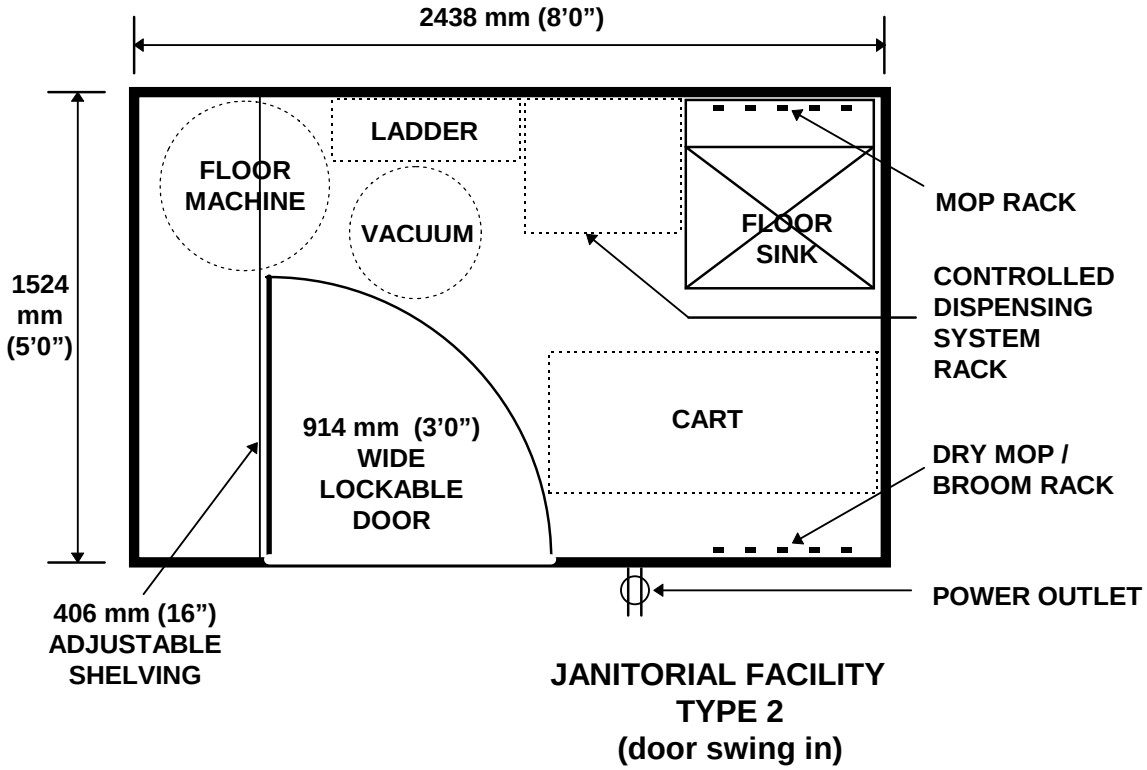
Type 3 on 1st floor or basement and Type 2 each floor above plus a Type 1 (or additional Type 2) if distance from Type 2 exceeds 45.7 m (150')

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

3.7.1.6. Facility types are illustrated on the following drawings. Room dimensions are minimum clear inside dimensions.

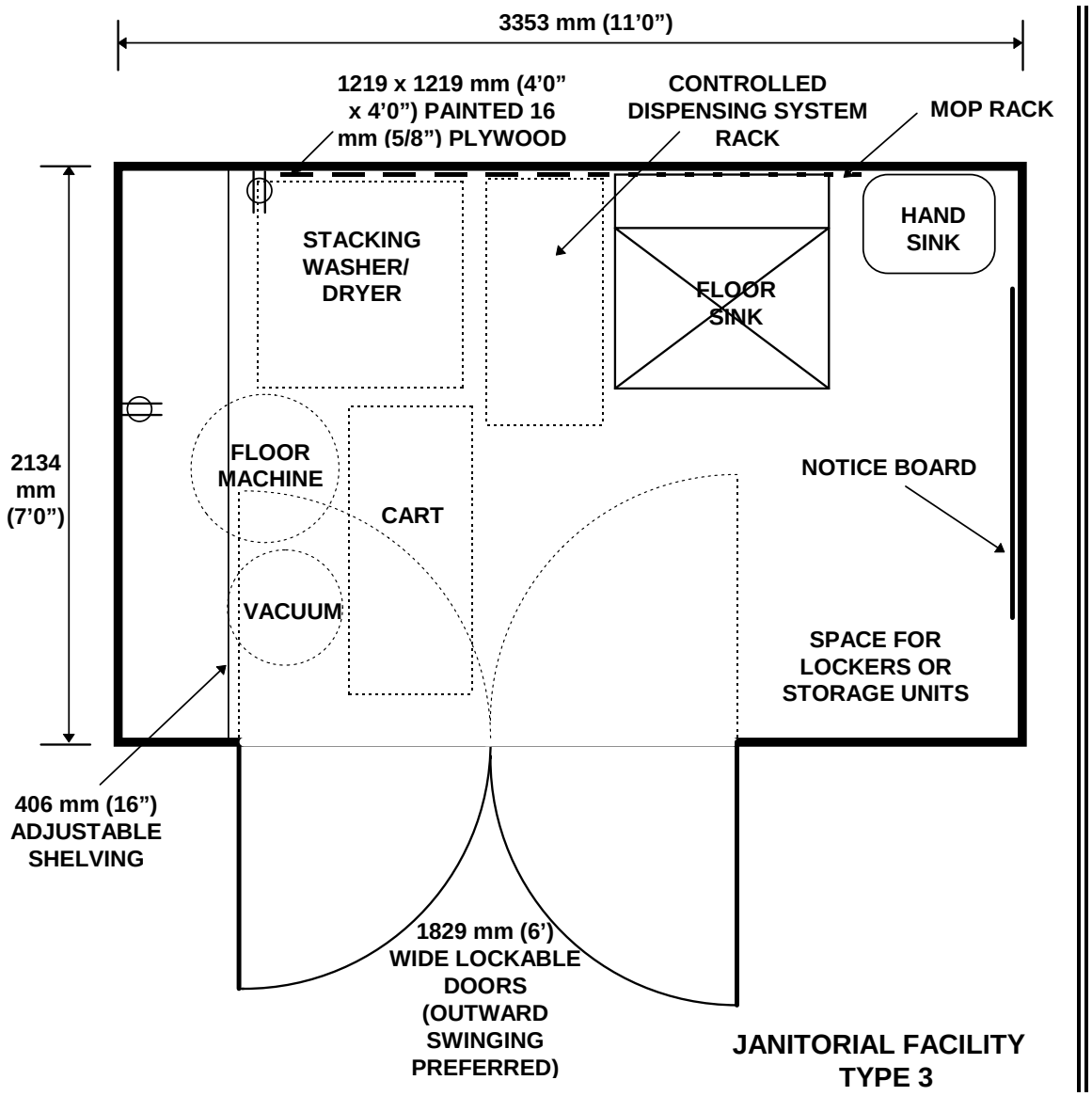


JANITORIAL FACILITY
TYPE 1
(door swing out)



JANITORIAL FACILITY
TYPE 2
(door swing in)

Include the following drawing if the rentable area is over 4645 m2 (50,000) sf:


3353 mm (11'0")
1219 x 1219 mm (4'0" x 4'0") PAINTED 16 mm (5/8") PLYWOOD
CONTROLLED DISPENSING SYSTEM RACK
MOP RACK
HAND SINK
STACKING WASHER/ DRYER
FLOOR SINK
2134 mm (7'0")
FLOOR MACHINE
CART
NOTICE BOARD
VACUUM
SPACE FOR LOCKERS OR STORAGE UNITS
406 mm (16") ADJUSTABLE SHELVING
1829 mm (6') WIDE LOCKABLE DOORS (OUTWARD SWINGING PREFERRED)
JANITORIAL FACILITY TYPE 3

3.7.2. Detailed Requirements - Type 1 & 2 Facilities

3.7.2.1. 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. Sink is to be complete with hot and cold water supply by a bib type faucet with brace, siphon breaker (back flow preventer) and removable trap insert to catch mop strings etc. Faucet is to be mounted at 914 mm (3'0") clear above floor.

3.7.2.2. Waterproof backsplash to 1219 mm (4'0") above floor behind floor style utility sink.

3.7.2.3. Wall mounted hangers, where indicated on preceding plan drawings, for mops and brooms (double units for Type 3 rooms). 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.

3.7.2.4. 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.

3.7.2.5. One fixed wood shelf 406 mm (1'4") deep, 1524 (5'0") long, wall-mounted at 1524 mm (5'0") above floor (to accommodate box of fluorescent lamps).

3.7.2.6. Power outlet on corridor wall outside room, on latch side of door.

Include the following clause 3.7.3 if the rentable area is over 4645 m^2 (50,000 sf):

3.7.3. Detailed Requirements - Type 3 Facilities

3.7.3.1. Type 3 facilities are to be provided with the fixtures and fittings required for Types 1 and 2, with the following additional requirements.

3.7.3.2. Increase floor sink size to 813 x 813 x 150 mm (2'8" x 2'8" x 6") and recess into the floor so that the lip of the sink curb is 20-25 mm (3/4-1") above adjacent floor level (this will enable rear dumping of automatic scrubbers and carpet equipment).

3.7.3.3. Hand wash sink.

3.7.3.4. Power outlet.

3.7.3.5. 1219 mm x 1219 mm (4'0" x 4'0") painted 16 mm (5/8") plywood, secured to the wall with wood blocking behind the gypsum board.

3.7.3.6. Standard 1219 x 914 mm (4'0" x 3'0") corkboard with painted softwood trim.

3.7.3.7. Double doors 1829 mm (6'0") wide with flush bolts, lockset and full height security astragal.9 mm (6'0") wide with flush bolts, lockset and full height security astragal.

Where the requirement is identified by the District Office (such as where significant floor areas have flooring other than carpet), provide cleaning equipment battery charging room close to the main janitor facility. Consult ARES Building Technology Advisor for details.

3.8. Washroom Accessories

3.8.1. General Requirements

3.8.1.1. The following accessories are to be supplied and installed by the Landlord in leased buildings or included in the construction of Provincially owned buildings.

3.8.1.2. 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.

3.8.1.3. 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.

3.8.1.4. 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.

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

3.8.2. Accessories Supplied by WSI

3.8.2.1. The following accessories are to be supplied by WSI 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.

3.8.2.2. 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")).

3.8.2.3. 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")).

3.8.2.4. 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")).

3.9. First Aid Room Fit-up

3.9.1. General Requirements

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

3.10. Interior Signage

3.10.1. Requirements

3.10.1.1. All lettering is to be white Helvetica Medium, upper and lower case, regardless of method of application or type of sign.

3.10.1.2. Except where matching existing building signage scheme, room identification signs, directional signs at elevator/stair landings and in corridors and 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.

3.10.1.3. 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).

3.10.1.4. 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.

3.10.1.5. 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.

3.10.1.6. 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.

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

3.10.1.8. Indicate clearly the location of Exits.

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

4. MECHANICAL SYSTEMS

4.1. Performance Criteria

Include the following clause if this is a lease project.

The following performance criteria are critical to the comfort of the building occupants. ARES reserves the right to measure the performance of the building at Substantial Performance to ascertain if the performance criteria have been met. If performance is not met in any of the requirements noted below, the costs incurred to measure the performance of the deficient item as well as the cost of rectification will be borne by the Landlord/General Contractor.
If climatic conditions do not allow for testing of both heating and cooling performance at the time of Substantial Performance, the testing will be done when directed by ARES, within 12 months.

4.1.1. Outdoor Design Temperatures

4.1.1.1. Use 1% January and 2 1/2% July design temperatures as listed in Appendix C of the BC Building Code.

4.1.2. Interior Temperatures

4.1.2.1. The HVAC systems shall be capable of maintaining the indoor space temperatures at the values in Table 1 when the outdoor temperature is at the relevant design value as listed in 4.1.1.1. In addition the systems shall have the capacity to restore the building from the unoccupied temperature to the occupied temperature prior to the occupied hour start time.

Table 4.1.2.1 Interior Temperatures

	Occupied Hours:	**Unoccupied Hours:**
Heating	22°C	15°C
Cooling	23°C DB	not to exceed 27° C

4.1.2.2. Consultation with, and approval by, ARES is required before a naturally cooled building may be designed. A naturally cooled building that meets the criteria in 4.1.2.2.1 is not required to meet the indoor temperatures for cooling listed in Table 4.1.2.1.

.1 At a minimum, the design of a naturally cooled building and its intended occupancy must include the following characteristics:

a) The building's design incorporates features that will minimize space cooling loads during occupied hours. Such features include, but are not limited to, use of thermal mass, minimizing solar and all lighting and other internal heat gains, maximizing the effectiveness of natural ventilation, and considering use of "night flushing" to pre-cool space.

b) No mechanical cooling, except for process spaces (e.g. telecom closets, computer rooms); however, mechanical ventilation with unconditioned air would be permitted.

c) Building is designed so occupants are located in reasonable proximity to windows or other deliberate sources of outside air for ventilation.

d) Operable windows that open to the outdoors and can be easily opened and adjusted by the building occupants.

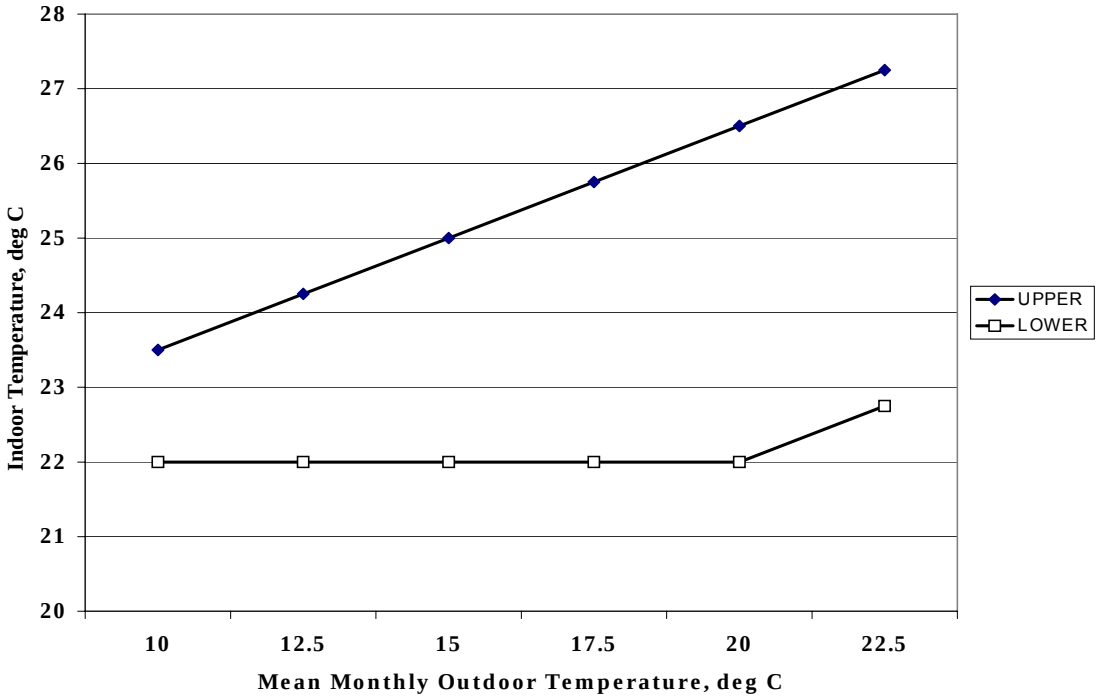
e) Building occupants are engaged in near sedentary physical activities (e.g. office work).

f) Building occupants are free to adapt their clothing to the indoor and/or outdoor thermal conditions, within reasonable limits.

.2 In a naturally cooled building, the heating systems shall be capable of meeting the heating requirements listed in 4.1.2.1 and Table 4.1.2.1.

.3 In a naturally cooled building, the building shall be designed to maintain indoor space temperatures within the upper and lower limits shown in Table 4.1.2.2. Mean monthly outdoor air temperature is the arithmetic average of the mean daily minimum and mean daily maximum for the month in question. This means that different indoor temperature limits will apply in different months.

Table 4.1.2.2, Indoor Temperature Limits for Naturally Cooled Buildings



.4 The Technical Standards permit a building where portions of the building are mechanically cooled and other portions are naturally cooled, subject to the following conditions:

a) The mechanically cooled and naturally cooled portions of the building are physically separated from each other and are served by entirely independent space conditioning systems.

b) The naturally cooled portion complies with all requirements of this 4.1.2.2 plus all other applicable requirements in the Technical Standards.

c) The mechanically cooled portion complies with all applicable requirements in the Technical Standards.

4.1.3. Interior Relative Humidity

4.1.3.1. The HVAC systems serving the occupied space shall be capable of maintaining the indoor relative humidity at the values in Tables 4.1.3.1A and 4.1.3.1B when the outdoor temperature is at the relevant design value as listed in 4.1.1.1.

Table 4.1.3.1A - Indoor Relative Humidity - Heating

WINTER DESIGN TEMPERATURES	**HUMIDIFICATION REQUIREMENT**
warmer than - 20°C:	No humidification required
equal to or colder than -20°C:	Humidify to maintain the space at or above 20% RH at 22°C indoor temperature

Table 4.1.3.1B - Indoor Relative Humidity - Cooling

SUMMER DESIGN CONDITION	**DEHUMIDIFICATION REQUIREMENT**
All Climates	Dehumidification to maintain space at or below 60% RH

4.1.4. Thermal Variations During Occupied Hours:

4.1.4.1. The temperature fluctuation shall not exceed ±1°C from setpoint.

4.1.4.2. The vertical temperature gradient between 200 mm and 1700 mm above the floor at any point more than 300 mm from the exterior wall shall not exceed 3°C.

4.1.4.3. The air velocity shall not exceed 0.15 m/s (30 ft./min.) when heating and 0.25 m/s (50 ft./min.) when cooling.

4.1.5. Ventilation

4.1.5.1. The requirements herein are minimum requirements and shall not be taken to reduce the requirements of applicable codes, authorities having jurisdiction, or the functional needs of the facility.

4.1.5.2. Ventilation system design and documentation shall be in accordance with ASHRAE Standard 62.1-2004 except as noted herein.

4.1.5.3. Minimum Outdoor Air Ventilation Rates

.1 For central air handling units with economizers, provide outdoor air ventilation in the breathing zone of all occupied spaces of no less than the supply ventilation rates in Table 2 of ASHRAE Standard 62-89. For central air handling units without economizers (with fixed minimum air intakes) and for 100% outdoor air supply units, provide outdoor air ventilation in the breathing zone of all occupied spaces of no less than 150% the supply ventilation rates in Table 2 of ASHRAE Standard 62-89. This outdoor air may be comprised of any combination of: outdoor air delivered directly to the space from a dedicated 100% outdoor air system, outdoor air that is mixed with air recirculated from the building before delivery to the space, and unvitiated outdoor air that is contained in recirculated or transferred air.

.2 Ventilation for toilets, janitor rooms, kitchens and kitchenettes may be provided by transfer of air from ventilated spaces to meet the exhaust requirements.

4.1.5.4. Minimum Exhaust Air Rates

.1 Provide exhaust air ventilation of no less than the exhaust ventilation rates in Table 6-4 of ASHRAE Standard 62.1 – 2004.

4.1.5.5. Outdoor Air Ventilation Calculations

.1 Calculate the outdoor air intake requirements for systems that serve and recirculate air from multiple spaces using the method in ASHRAE Standard 62.1-2004, Appendix A (but using the rates from 62-89 as required in 4.1.5.3.1). The Technical Standards Ventilation Manual (available at www.accommodationandrealestate.gov.bc.ca) provides additional information on requirements for these calculations. In addition, the ASHRAE Standard 62.1-2004 User's Manual provides guidance on how to design systems to meet the requirements of ASHRAE Std. 62.1-2004.

.2 For each air-handling system, including unitary systems, document the results of these calculations in the form of Table 4.1.5.5, and include it on each floor plan showing areas served by the system. Multiple systems, each serving the same space types whose characteristics in the lower portion of Table 4.1.5.5 are identical, may be documented in one table.

Table 4.1.5.5, Ventilation Data Table

System Name	**Insert Name**	**Insert Name**	**Insert Name**	**Insert Name**	
System Design Occupant Density	Note 1	Note 1	Note 1	Note 1	m2/person
Min. OA fraction in primary SA	Note 2	Note 2	Note 2	Note 2	%
Min. OA intake fraction in primary SA	Note 3	Note 3	Note 3	Note 3	%
Min. OA intake	Note 4	Note 4	Note 4	Note 4	L/s/m2
Space Type	**Open Plan**	**Perim. Office**	**Int. Office**	**Mtg. / Conf.**	
Design maximum occupant density	Note 5	Note 5	Note 5	Note 5	m2/person
Design minimum OA/person	Note 6	Note 6	Note 6	Note 6	L/s/pers
Min. primary SA / Unit Area	Note 7	Note 7	Note 7	Note 7	L/s/m2
Min. total SA / unit area	Note 8	Note 8	Note 8	Note 8	L/s/m2

NOTES to Table 4.1.5.5

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 recirculated from spaces where the OA supplied 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 primary air to each zone.
4. This is the system's airflow through the outdoor air intake expressed in flow/unit of floor area.
5. Design peak occupant density for a typical space or room of the type listed.
6. From Table 2 in ASHRAE Std. 62-1989
7. Minimum SA delivered to the space from the primary supply air system per unit of floor area in the space. Applies at design occupancy of the space.
8. The minimum total SA delivered to the space, equal to the sum of primary SA and separately recirculated secondary supply air, per unit of floor area in the space. Applies at design occupancy of the space. If this value is the same as the minimum SA from the primary supply air system, then a secondary air supply is not required.

4.1.5.6. Outdoor Air Ventilation Intakes

.1 Particular attention shall be paid to position outside air intakes away from all sources of noxious odours and fumes.

.2 Design the air handling system so that the required minimum outdoor air flow at intakes is provided under all operating conditions. Refer also to section 4.2.2.1.

4.1.5.7. Secondary Supply Air

.1 Secondary supply air is defined as air that is recirculated locally, but from outside the subject space, and not recirculated through a central air-handling unit. Examples of secondary supply air are: air recirculated through a fan-powered zone air terminal unit, or air recirculated through a local transfer fan.

.2 Secondary supply air may be delivered to a space through the local primary supply air duct, for example using fan-powered zone air terminal units, or using a local transfer fan that delivers air into the local primary supply air duct downstream of any terminal unit.

.3 Secondary supply air may be delivered to a space independently of the primary supply air, for example by means of a local transfer fan delivering air through an independent duct directly into the space. If delivered through ceiling diffusers, airflow distribution must be coordinated with primary supply air diffusers. If delivered at floor level, use low velocity supply grilles located to avoid uncomfortable draft conditions.

4.1.5.8. Demand Control Ventilation (DCV)

.1 For rooms designed to accommodate more than 20 people (e.g. a meeting room of 40 m^2 or larger), control the minimum outdoor air supply to the space based on space CO_2 concentration.

.2 Control of outdoor ventilation based upon occupancy, referred to here as DCV, is not required by the Technical Standards, except as provided in 4.1.5.8.1. However, if an HVAC system uses DCV, its design shall be based upon the requirements in the Technical Standards Ventilation Manual (available at www.accommodationandrealestate.gov.bc.ca).

4.1.6. Acoustic Criteria

4.1.6.1. Background noise in the occupied space from any component of the HVAC systems shall not exceed the values in Table 4.1.6.1:

Table 4.1.6.1 - Allowable Background Noise Levels, HVAC System

SPACE	MAX. SOUND POWER LEVEL, RC MARK II METHOD, DB
Open office/reception areas	RC 40(N)
Private offices	RC 35(N)
Conference, interview & meeting rooms	RC 30(N)
Circulation and lobbies	RC 45(N)
Washrooms, service and storage areas	RC 50(N)
NOTE: (N) refers to a neutral sound spectrum	

4.1.6.2. Design documentation proving acoustical compliance shall be produced upon request.

4.1.6.3. Mechanical system penetrations of acoustic separations shall not degrade their specified ratings.

4.2. Prescriptive Requirements

4.2.1. Perimeter Heating Systems

4.2.1.1. Allowable perimeter heating systems are defined as follows:

.1 **Type A**: Heating from ceiling mounted diffusers that may also supply ventilation and cooling. Maximum supply air temperature shall be 40°C[1]. Water-loop heat pumps shall meet the 40°C supply air temperature limit at the low fan speed. If a selection cannot be made at low speed, then medium speed is acceptable on an exceptional basis (i.e. no more than 10% of the total units shall be medium speed). The design for each heat pump shall incorporate low pressure drop distribution to help meet this requirement. The supply air temperature for each heat pump shall be reviewed and documented as part of the commissioning process. Heat pumps which fail to meet this requirement shall be corrected before project acceptance.

.2 **Type B**: Heating from ceiling mounted diffusers that may also supply ventilation and cooling. Maximum supply air temperature shall be 30°C. Modulating control of heating output is mandatory.

.3 **Type C**: Heating from modular radiant ceiling panels. Modulating control of heating output is mandatory. If the heating medium is water, controls shall schedule the water supply temperature with outdoor air temperature.

[1] At 21°C entering air temperature and 21°C entering water temperature for water-loop heat pumps.

.4 **Type D**: Heating from convectors/radiators installed at floor level under the windows. Modulating control, either from a local sensor/ thermostat or scheduled from outdoor air temperature is mandatory.

4.2.1.2. Building envelope design requirements related to perimeter heating systems:

.1 The Architectural part of the Technical Standards imposes maximum window/wall heat loss limits. Refer to section 2.4.1.

.2 Glazing shall be selected to meet the minimum requirements of architectural section 2.4.1.

4.2.1.3. The perimeter heating system type(s) permitted depends on the inside glazing surface temperature, which shall be calculated for each window type using the weighted U-factor for the entire fenestration assembly in accordance with CSA-A440.2-04, Energy Performance of Windows and Other Fenestration Systems. Thus perimeter heating system type and glazing U-factor must both be coordinated for optimum design, and in this process the designer may choose to select glazing with a lower U-factor than section 2.4.1 mandates as the maximum permitted. Table 4.2.1.3 provides perimeter heating system selection criteria.

Table 4.2.1.3 - Perimeter Heating System Type Selection

Inside Glazing Surface Temp., at 1% WDT	Allowable Perimeter Heating System Types
IGST < +8°C	D
+8°C ≤ IGST ≤ +10°C	B, C, D
IGST > +10°C	A, B, C, D
WDT = winter design temperature IGST = inside glazing surface temperature	

4.2.2. Conditioned Air Supply Systems

4.2.2.1. Central Air Handling Units

.1 Includes all air-handling units that mix outside and return air, filter it and condition it by heating and/or cooling before delivery to the space. Scope includes packaged rooftop units, packaged and built-up indoor air-handling units, and furnaces. It includes AHUs serving both single-zone or multiple-zone conditioned air supply systems.

.2 Units may be constant or variable air volume type. Variable volume units shall incorporate adjustable speed drives (ASDs) to vary the speed of the supply fan, and, if applicable and required, the speed of a return/relief fan. Motors and ASDs shall meet the requirements of 4.2.8 and 4.2.9 respectively.

.3 Minimum supply airflow delivered to conditioned spaces during occupied hours shall provide at least 3 air changes per hour. Recirculated air delivered through series fan-powered zone terminals shall be included; but

air delivered through the fan in a parallel fan-powered zone terminal or by local transfer fans that are independent of the primary conditioned air system shall not be included.

.4 All units equal to or larger than 6 tons shall have a full outside air economizer and the system design shall:

a) Incorporate one of the outdoor air, return/relief air, and supply air configurations shown and described in ASHRAE Guideline 16-2003.[2]

b) Control dampers shall be selected and sized in accordance with ASHRAE Guideline 16-2003.

c) Where a single economizer outdoor air damper is used (as shown in ASHRAE Guideline 16, Figure 3), ensure there are provisions for measuring outdoor airflow rate and controlling the outdoor air damper to meet the requirements of 4.1.5.

d) Design the system and controls so the minimum outdoor air flow through the intake, and/or the outdoor air fraction in the system total primary supply air can be measured easily and accurately, set up during commissioning, and verified during the operating life of the system.

.5 All units smaller than 6 tons shall have a manual damper to adjust outdoor air intake rates, and an automatic shutoff damper to close when the unit is off.

.6 Air handling systems serving multiple zones shall be designed to provide:

a) simultaneous heating and cooling if, at any time the system is operating, some zones will require cooling while others require heating, and

b) the required ventilation air to every zone in accordance with the requirements in 4.1.5.

.7 Rooftop Units are permitted only:

a) where the 1% winter design temperature is equal to or warmer than -20°C,

Exception – Rooftop units with an enclosed walk-in service vestibules and minimum RSI = 1.40 (R = 8.0) cabinet insulation are permitted where the 1% winter design temperature is equal to or warmer than -30°C.

b) where maximum roof slope within 5 m of the unit is 10%, and

[2] ASHRAE Guideline 16-2003, Selecting Outdoor, Return, and Relief Dampers for Air-Side Economizer Systems.

c) when mechanical cooling (if provided) is supplied by a DX cooling coil.

.8 Indoor units are mandatory except as noted in item 7 above. Attic spaces are acceptable for locating indoor units subject to acoustic requirements (see 4.1.6) being met and adequate access for operations and maintenance being provided (see 4.2.5).

.9 Provision of heating in air-handling equipment (includes rooftop units, packaged and built-up air-handling units, furnaces, and unitary equipment) shall conform to the following:

a) For both rooftop and indoor units, where a fossil-fuel-fired burner provides heating, conform to Table 4.2.2.1 requirements.

b) For rooftop units where a hot water coil provides heating, use an industrial quality, inhibited anti-freeze solution that is rated for the winter design temperature.

c) For rooftop units located where the 1% winter design temperature is colder than -15°C, hot water (i.e. anti-freeze solution) coils to provide heat are not permitted.

d) For indoor units, where a hot water coil provides heating, use an industrial quality, inhibited, anti-freeze solution in the coil if there is a risk of coil freezing either when the unit is operating or when it is shut-off.

Table 4.2.2.1 - Fossil-Fuel-Fired Equipment Characteristics

1% WINTER DESIGN TEMP.	**MINIMUM FOSSIL-FUEL FIRED EQUIPMENT CHARACTERISTICS**
≥ -25°C	modulating burners (100% to 25% modulation) and stainless steel heat exchangers.
< -25°C	modulating burners +(100% to 10 % modulation) and stainless steel heat exchangers.

.10 Rooftop units in locations with a ground snow load (S_S) greater than 2.5 kPa (as listed in British Columbia Building Code design data) shall be mounted on a minimum 450 mm high roof curb.

4.2.2.2. 100% Outside Air Supply Units

.1 Includes all air-handling units that always supply 100% outdoor air to the conditioned space when they are operating. Scope includes packaged rooftop units and packaged or built-up indoor air-handling units.

.2 Typical applications of these units include:

a) Units providing make-up air to offset air exhausted from the building (e.g. kitchen or process exhaust).

b) Units providing outdoor ventilation air to spaces served by terminal unit systems (see 4.2.2.4

.3 Rooftop units are only permitted as described in 4.2.2.1.7. Indoor units are mandatory except as described in 4.2.2.1.7.

.4 Where heating is provided by a fossil-fuel-fired burner, the heating section shall have a stainless steel heat exchanger and a modulating burner (from 100% to 10% design output).

.5 Where a hot water coil provides heating, use an industrial quality, inhibited anti-freeze solution that is rated for the winter design temperature.

.6 Note that the distribution effectiveness factor in ASHRAE Shandard 62.1 2004 (table 6-2) may increase the size of a 100% outdoor air supply unit and the associated ventilation ductwork through-out the building (e.g. water-loop heat pump systems).

.7 Design the system and controls so the outdoor airflow through the intake can be measured easily and accurately, set up during commissioning, and verified during the operating life of the system.

.8 Exhaust air energy recovery to preheat (or pre-cool) air entering a 100% outdoor air supply unit shall be provided as required in Table 4.2.2.2.

Table 4.2.2.2 – Requirements for Exhaust Air Energy Recovery

Energy recovery shall be provided under the conditions listed in this table.		
Design Outdoor Airflow	Annual Operating Time	1% Winter Design Temperature
≥ 2,800 L/s	≥ 1,000 hours	< -15°C
≥ 700 L/s	≥ 2,000 hours	< -15°C
≥ 700 L/s	≥ 2,500 hours	any
≥ 350 L/s	≥ 2,500 hours	< -15°C
≥ 350 L/s	≥ 3,000 hours	any

4.2.2.3. Reheat In Conditioned Supply Air Systems

.1 Hot water distribution systems serving reheat coils shall meet the requirements in 4.2.12.3.

.2 Electric reheat circuits must achieve modulating control using SCR relays or some alternative approach. Electric heating coils with mechanical relays and contactors are not allowed.

4.2.2.4. Terminal Unit Systems

.1 Terminal unit systems comprise unitary heating/cooling units, each conditioning the air in a single thermostatic control zone. Inlet air will be

drawn from the indoor space at the unit's location. Common types of terminal unit systems include:

a) Fan-coil units using hot water and chilled water coils.

b) Water-loop heat pump systems, whose terminal units are water-to-air heat pumps.

c) Air-to-air split system heat pumps, whose terminal units are refrigerant-to-air fan-coil units.

.2 Terminal unit selection and installation shall meet the following criteria:

a) Units installed in ceiling plenums shall be located above corridors.

b) Acoustic requirements (see 4.1.6) shall be met, considering unit selection and mounting location.

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

.3 Outside air ventilation shall be supplied by an independent 100% outside air supply system, refer to 4.2.2.2.

a) Ventilation air shall be delivered directly into each space served or ducted to within 300 mm of the air inlets of zone terminal units and discharged directly towards the inlet of the terminal unit

.4 The design of water-loop heat pump systems shall include:

a) Freeze protection for the heat rejecter and its piping loop, effective in the case of a power failure.

b) A stand-by water-loop circulating pump

c) The compressor enclosure in water-loop heat pumps shall be a minimum thickness of 16 gauge sheet metal.

.5 The design of hot/chilled water fan-coil systems shall include:

a) Capability to provide heating and cooling simultaneously to different zones whenever, and to the extent, such demand will exist at any time during the year.[3] The use of three-pipe systems is prohibited.

b) Stand-by circulating pumps for both hot and chilled water distribution piping circuits.

4.2.3. Thermostatically Controlled Zones

[3] Various design approaches can meet these criteria including, but not necessarily limited to: (1) heating and cooling single-pipe systems with a zone pump serving each fan-coil unit, (2) a conventional 2-pipe system with electric resistance heating sized for shoulder season heating demand, (3) a single-pipe system with a zone pump serving each fan-coil unit and electric resistance heating sized for shoulder season heating demand, and (4) a conventional 4-pipe system.

4.2.3.1. Spaces shall be grouped into thermal control zones in accordance with the following criteria:

.1 Perimeter and interior spaces shall be in separate zones.

.2 Perimeter spaces having different exposures (>45° difference) shall be in separate zones.

.3 Spaces with substantially different, or unpredictable, occupancy schedules, shall be in separate zones, except as permitted in item 5 below.

.4 An enclosed, perimeter, corner room (office, interview room, meeting room, etc.) with windows on two exposures, shall be in a separate thermostatically controlled zone.

Exception[4] - An enclosed corner room that is smaller than 17.5 m^2 is permitted to be in the same thermal control zone as adjacent open or enclosed perimeter spaces, only if the designer clearly explains in writing, how the heating and cooling requirements of all spaces within the resulting zone will be accommodated in order to achieve occupant comfort under all weather and occupancy conditions, and ARES approves the exception.

.5 One or more adjacent enclosed offices, interview rooms, meeting rooms, etc. (each smaller than 17.5), may be in a single zone, or may be in the same zone as adjacent open office space, provided that all of the following criteria are met:

a) At any given time, all spaces in the zone require heating or require cooling.

b) The zone's thermostat (or temperature sensor) shall be located in the open office space if there is any in the zone.

c) The zone ventilation air supply shall be constant volume.[5]

d) Subject to items (e) and (f), each enclosed room in the zone is fitted with its own thermostatically controlled VAV diffuser (or comparable device) controlled from a wall-mounted thermostat, so that the delivery of heating or cooling may be modulated to maintain indoor temperatures within the required limits, refer to 4.1.2.

e) The operation of the VAV devices shall not reduce the total zone supply airflow across the terminal unit (e.g. consider by-pass type diffuser).

[4] The solar and occupancy loads in the corner room will almost always vary differently than those in adjacent rooms or spaces. Thus, accommodating them to achieve occupant comfort if the rooms/spaces are grouped into a single thermal control zone, even with some "sub-zone" control, will often be difficult. It is recommended that space planning avoid locating enclosed rooms smaller than 17.5 m2 in the corners of buildings if at all possible. If such corner rooms are unavoidable, it is further recommended that consideration be given to having glazing on only one exposure, with an opaque wall on the other.

[5] The central air-handling system may be VAV; but in that case the supply air to these zone must be through a constant volume terminal unit.

f) Outdoor air requirements (refer to section 4.1.5) for these enclosed spaces shall be determined for the minimum airflow of the VAV device.

g) If any enclosed space will require heating at some times and cooling at others, its thermostatically controlled VAV diffuser shall have "changeover" capability.

.6 Maximum zone floor areas shall be in accordance with Table 4.2.3.1:

Table 4.2.3.1 - Thermostatically Controlled Zone Sizes

ZONE TYPE	MAXIMUM FLOOR AREA
Perimeter zones:	100m2 for open space 50 m2 for enclosed spaces
Interior zones:	200 m2 for open space 50 m2 for enclosed spaces
NOTE: If a zone contains any enclosed space, the enclosed space floor area limit applies.	

4.2.3.2. Conference / meeting/training / break rooms and private offices larger than 17.5 m2 with variable occupancy rates:

.1 Each such room shall be a separate, thermostatically controlled zone.

.2 For outdoor air ventilation requirements refer to 4.1.5. Provide secondary air through a local transfer fan with local control, or through an alternative pathway as described in 4.1.5.

4.2.4. Telecommunication Closets

4.2.4.1. Required environmental conditions shall be maintained 24 hours/day, seven days/week, independent of the building system.

4.2.4.2. Maintain room dry bulb temperature within a range of 18°C to 26°C. Each room shall have a high temperature alarm that will be active 24 hours per day. These alarms shall be integrated into the tenant intrusion alarm system.

4.2.4.3. Individual vent openings shall be a maximum size of 4"x16". All vents shall be steel construction. Provide a sufficient number of vents for the required airflow.

4.2.4.4. All vents to be securely fastened from within the room (no bolts or screws protruding on the outside of the room).

4.2.4.5. Designer shall finalize the equipment loads with the user group and WTS during design. The following are approximate cooling loads for the telecommunication closets:

.1 Typical Telecommunication Closet with PBX – the sum of:

a) WTS Data Load, Btu/hr = (Quantity of FTE / 40) x 400 Btu/hr) + 400 Btu/hr (minimum 800 Btu/hr),

b) WTS Voice Load, Btu/hr = (Quantity of FTE / 100) x 5000 Btu/hr (minimum 2500 Btu/hr), and

c) Tenant equipment to be confirmed

.2 Typical Telecommunication Closets – the sum of:

a) WTS Data Load, Btu/hr = (Quantity of FTE / 40) x 400 Btu/hr) + 400 Btu/hr (minimum 800 Btu/hr), and

b) Tenant equipment to be confirmed

4.2.4.6. For cooling loads of less than 5000 Btu/hr, provide cooling for the telecommunication closet from the building conditioning system. For unoccupied hours, provide a thermostatically controlled exhaust fan drawing air in through a door grille and discharging into the ceiling space to cool the room.

4.2.4.7. For cooling loads in excess of 5000 Btu/hr, provide an independent cooling unit for the telecommunication room/closet that can operate 24 hours per day independently of the building systems. The independent cooling unit shall conform to the requirements of 4.2.11.

4.2.5. Maintenance Access

4.2.5.1. All catwalks, stairways, ladders, roof hatches and other means of access shall be designed, constructed and installed in compliance with the applicable WCB Regulation.

4.2.5.2. Locate equipment so that required maintenance access points are not blocked by ducts, pipes, conduits, other equipment, walls, columns, or other parts of the building.

4.2.5.3. The design layout of HVAC equipment and distribution systems shall provide for the access required in order to measure and adjust air and water flows as part of the system balancing process – refer to section 4.3.2.

4.2.5.4. Provide catwalks, located adjacent to maintenance points, at all refrigeration, combustion and supply/makeup air handling equipment located more than 3.0 m above a floor, a roof, or the ground.

the Building Area is:	*Then choose:*
greater than 1000 m^2:	***A** below*
less than 1000 m^2:	***B** below*

4.2.5.5. Provide access to mezzanine, attic or roof-mounted refrigeration, combustion or supply/make-up air handling equipment as follows:

A

.1 by means of a stairway or by “ships ladder” complete with handrails and a maximum slope of 60° above horizontal and a roof hatch (if required).

B

.2 by means of a stairway or by “ships ladder” complete with handrails and a maximum slope of 60° above horizontal and a roof hatch (if required) or by means of an indoor vertical ladder and a roof hatch (if required).

4.2.6. Exhaust Air Systems

4.2.6.1. Washrooms shall not use door grills for air entry. Use acoustically treated transfer ducts taking air from the ceiling plenum, or other acceptable means, for make-up air.

4.2.6.2. In all new buildings 3 storeys and higher, with a floorplate larger than 750 m2, provide one 400 mm diameter tenant exhaust riser duct from the ceiling of the lowest occupied floor through the roof. Provide a 300 mm capped duct connection at each floor level.

4.2.6.3. In all new buildings 3 storeys and higher, with a floorplate larger than 1,250 m2, provide one duct riser as described in 4.2.6.2 for each 750 m2, or portion, of floor plate area.

4.2.7. Air Filtration

4.2.7.1. Filter efficiencies shall be tested and rated in accordance with the procedure in ASHRAE Std. 52.2.

4.2.7.2. Filters for air handling equipment (including packaged and built-up air-handling units, rooftop units, furnaces, water-loop heat pumps, fan-coil units, and other unitary equipment) up to 1,000L/s design supply air flow shall be panel filters at least 50 mm deep, with high capacity pleated media and a minimum efficiency rating of MERV 8.

Exception – Unitary equipment that is not able to accommodate 50 mm deep panel filters may use filters as described but that are 25 mm deep.

4.2.7.3. Filters for air handling equipment, including rooftop units, larger than 1,000 L/s shall be panel filters at least 50 mm deep, with high capacity pleated media and a minimum efficiency rating of MERV 11. Where the air-handling equipment selected can accommodate filters that are 100 mm deep, such filters shall be used.

4.2.8. Electric Motor Requirements for Adjustable Speed Drive Application (ASD)

4.2.8.1. All motors connected to adjustable-speed drives (ASDs) shall be Definite-Purpose Inverter Fed Motors complying with NEMA MG-1 Part 31. If an existing motor does not meet these requirements, it shall be replaced with one that does.

4.2.8.2. Winding insulation shall be rated for a Class B temperature rise (80ºC by resistance) with a minimum of class F insulation.

4.2.8.3. Service factor shall be 1.0.

4.2.8.4. Motor insulation shall withstand repetitive voltage peaks at motor terminals equal to 3.1 times motor rated rms voltage with a rise time not less than 0.1 microseconds.

4.2.8.5. Motors shall be appropriately sized to optimize motor efficiency at normal load.

4.2.9. Adjustable Speed Drives (ASD's)

4.2.9.1. Provide adjustable speed drives for variable air volume fan systems. Do not employ variable speed drives for heating and cooling water pumps unless large capacity and extended hours of operation result in a payback of three years or less.

4.2.9.2. Variable speed drives shall be pulse width modulated IGBT.

4.2.9.3. Install 5% line reactor (manufacturer to confirm size for application).

4.2.9.4. Drives shall be selected and installed to ensure the equipment/installation complies with a Category 1 (as per NEMA Application Guide to AC Adjustable Speed Drives) installation as follows:

.1 Carrier frequency shall be selected to satisfy audible noise and temperature requirements of area where drive/motor are installed.

.2 Use a dedicated drive for each motor (no operation of motors in parallel from one drive)

.3 Minimize cable length.

.4 Limit rise time to .1 microseconds.

.5 Minimize time between pulses (> 3 times resonant period of cable).

.6 Single transition.

4.2.9.5. Ensure all drives have CE mark indicating compliance with EMC Radiated and Conducted Emissions. EMI Filters, or other acceptable solution, shall be installed to eliminate any interference caused by drives (and associated wiring) on other systems installed in the facility.

4.2.9.6. Each drive shall be solidly grounded to the main system ground supplying the drive. Use a dedicated, insulated ground wire installed in its conduit (daisy chaining ground wire is not acceptable). Also, install insulated ground wire, in same conduit as motor circuit, between the drive and motor (conduit shall be continuous).

4.2.10. Control Systems

There are two alternatives for HVAC system controls:

***A**: A computerized direct digital control system referred to as a DDC System – refer to 4.2.10.2.*

***B**: This alternative is referred to as "non-DDC" – refer to 4.2.10.3. A computerized DDC system, as in alternative A, is preferred. An electro-mechanical system, with programmable thermostats and setback capability, is acceptable.*

Only one alternative, A or B, shall be used on a project. *Use the following selection criteria to establish the alternative applicable to the project:*

Building Size	*Travel Response Time from closest property management contractor office*

	Up to 0.5 hrs	*0.5 hr up to 1.0 hr*	*more than 1.0 hr*
≥ 1000m²	***A***	***A***	***A***
< 1000m² and ≥ 300m²			
Occupancy < 5 years	***B***	***B***	***A***
Occupancy ≥ 5 to < 10 Years	***B***	***A***	***A***
Occupancy 10 ≥ Years	***A***	***A***	***A***
< 300m²	***B***	***B***	***A***

4.2.10.1. Regardless of the type of controls used, the construction documents shall include a comprehensive and logically consistent sequence of operations for all HVAC systems and equipment, detailing the designer's requirements for normal occupied hours operation, unoccupied 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.

4.2.10.2. Direct Digital Control (DDC) System

.1 Provide a DDC system to control HVAC and lighting systems and equipment. The DDC system shall apply down to and including the terminal zone units. Local hardwired controls may also be used for safety controls, local exhaust fans and unit heaters.

.2 The DDC system shall conform to the requirements of the documents "DDC Manual – Part 1, Conditions of Contract and Performance Specifications", "DDC Manual – Part 2, Point Naming Convention", and "DDC Manual – Part 3, Graphics Standards". Copies of these documents are available from ARES' web site on the Internet at: **www.accommodationandrealestate.gov.bc.ca**.

.3 DDC system manufacturers are permitted to bid in accordance with the following:

a) Government owned building – only the following ARES pre-approved manufacturers and product lines:

.a1. Delta Controls ORCA™ product line, both hardware and software.

.a2. Reliable Controls Mach-System™ product line and the current version of RC Studio software.

b) Leased building, operated by ARES or its property management contractor – only the following ARES pre-approved manufacturers and product lines:

.b1. Delta Controls ORCA™ product line, both hardware and software.

.b2. Reliable Controls Mach-System™ product line and the current version of RC Studio software.

c) All other buildings – any manufacturer whose DDC products conform to the Performance Specifications and are BTL tested and rated.

4.2.10.3. HVAC Controls, (non-DDC)

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

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

.3 Thermostats shall permit occupant adjustment within the following limits:

a) at any given time, cooling setpoint cannot be lower than heating setpoint

b) maximum heating setpoint 23ºC and,

c) minimum cooling setpoint 22ºC.

4.2.11. Refrigeration Equipment

4.2.11.1. Refrigeration equipment serving DX cooling coils in air-handling units shall be air-cooled. This applies to all types of air-handling units and cooling equipment, including: single-zone or multiple zone, packaged rooftop units, packaged or built-up indoor AHUs, split-system unitary cooling equipment, fan-coil units, and cooling units for tenant equipment. Water or evaporatively cooled refrigeration equipment is not permitted for DX units.

Exception – Water-source heat pumps.

4.2.11.2. Chillers in chilled water plants shall conform to the following.

.1 Plant capacity less than 200 tons: chillers shall be packaged air-cooled units. They may be located inside a chiller room, or outside the building, as determined by the designer.

.2 Plant capacity from 200 to 300 tons: chillers may be packaged air-cooled units or water-cooled units, as determined by the designer.

.3 Plant capacity above 300 tons: chillers shall be water-cooled units.

.4 Individual chillers shall conform to Table 4.2.11.2.

Table 4.2.11.2 Requirements for Individual Chillers

Chiller Capacity, tons	Compressor Type
Less than 100	Screw or scroll
100 to less than 200	Screw
200 to 300	Screw or centrifugal
Above 300	Centrifugal

4.2.11.3. For new building projects initiated after January 1, 2009 the selection of air-conditioning and refrigeration equipment using R22 shall be prohibited.

4.2.11.4. The use of once-through water-cooled refrigeration equipment, of any capacity and for any application, is not permitted.

4.2.12. Hot Water Boiler Plants

4.2.12.1. Hot water heating boiler plants serving any building that is larger than 3,000m2 and is in a location with a 1% winter design temperature colder than -25°C shall be designed with provision for N + 1 boiler capacity redundancy. "N + 1 redundancy" means the design heating capacity can be met by the boiler plant when the largest single boiler or module is out of service.

4.2.12.2. The primary hot water piping loop that provides circulation through the hot water boilers shall be designed to have a minimum system volume such that the burner may fire at minimum firing rate for at least 5 minutes without being shut down on operating high water temperature setting.[6]

4.2.12.3. Hot water distribution systems serving reheat coils shall meet the following design criteria:

.1 If non-condensing boiler(s) are used, the water temperature returning to the boiler shall be maintained at no less than 65°C during system operation.

.2 If condensing boilers are used, the water temperature returning to the boiler(s) shall be as low as is practical.

.3 The design shall provide fully modulating control of reheat coil output.

4.2.12.4. Hot water distribution systems serving perimeter heating elements (radiators, convectors, or baseboard units) must have water supply temperature scheduled with changing outside air temperature.

Exception: A one-pipe distribution system with individual zone pumps controlled by the zone thermostat may have a constant hot water supply temperature.

4.2.12.5. To facilitate energy-efficient heating plant, hot water heating systems shall have lower than conventional design supply water temperature (i.e. < 82˚C) and/or higher than conventional design delta-T (i.e. > 11˚C.

[6] For a 5°C (9°F) temperature rise from burner cut-in temperature to burner cut-out temperature, this translates into a minimum water volume of 3.5L (1 US gal) for each MJ/hr (1,000 Btuh) of output capacity at minimum boiler firing rate.

4.3. Other Requirements

4.3.1. Commissioning

4.3.1.1. Ensure and verify that all HVAC systems and/or components are designed, installed, calibrated, and functionally tested to operate as intended by undertaking a comprehensive commissioning process.

4.3.1.2. A commissioning authority who is independent of individuals directly responsible for design and/or construction management[7] shall be retained. The commissioning authority's scope of work shall be consistent with the fundamental commissioning requirements necessary to meet LEED certification. These commissioning requirements apply to all buildings covered by these technical standards, not just buildings intended for LEED certification. The commissioning scope of work shall include:

.1 Reviewing the owner's project requirements[8] and basis of design documentation on behalf of the owner.

.2 Reviewing the construction documents to ensure the owner's project requirements have been incorporated, and the contractor's responsibilities related to commissioning are included.

.3 Preparing a commissioning plan, and ensuring the commissioning process is carried out in accordance with it.

.4 Verifying that functional performance tests, which shall include every aspect of the specified sequence of operations, are carried out properly, and documented fully.

.5 Verifying that training for the owner's operating staff (or a designated maintenance contractor) is carried out properly, and that operations and maintenance documentation is provided to the owner.

.6 Verifying that all 7-day test requirements for DDC systems in the "DDC Manual – Part 1, Performance Specifications" (available online at: www.accommodationandrealestate.gov.bc.ca) have been carried out.

.7 Preparing and submitting a commissioning report documenting the results of the commissioning process.

.8 The commissioning report shall include DDC trend data proving the supply air temperature requirements for overhead heating as identified in 4.2.1.1. If no DDC system exists, the performance shall be documented based on field temperature readings.

4.3.1.3. The commissioning process shall be planned and carried out generally in accordance with ASHRAE Guideline 0, The Commissioning Process, and ASHRAE Guideline 1, The HVAC Commissioning Process.

[7] The commissioning authority may be employed by the design consultant or construction manager provided he/she has no association or responsibilities related to design on this project.
[8] These Technical Standards will normally be part of the owner's project requirements.

4.3.1.4. The Ministry's designated representatives must have the opportunity to observe any or all of the systems functional performance tests as an important element in the operator familiarization/inspection process.

4.3.1.5. If outside temperature, lack of full occupancy, or other factors prevent full performance testing of some functions, then testing, verifying and documenting the performance of these functions must be carried out at an appropriate and mutually agreed time during the 12 months after the Substantial Performance of the work.

4.3.2. Air and Hydronic System Balancing

4.3.2.1. The construction documents shall require that fluid flows in the HVAC systems be balanced in accordance with generally accepted engineering standards.

4.3.2.2. The construction documents shall require that the results of the balancing process be documented in a written balancing report, and be delivered to the building owner.

------ End Mechanical Section ------

5. ELECTRICAL

5.1. General

5.1.1. Based on rentable area, provide one 15 amp, commercial specification grade, duplex receptacle as per Table 5.1. Receptacle locations will be determined during detail design. Table 5.2 provides a guideline for receptacle locations.

Table 5.1

Rentable Area	Receptacle Density (one receptacle per)
≤ 250 m^2	4 m^2
> 250 m^2 and ≤ 600 m^2	5 m^2
> 600 m^2	6 m^2

5.1.2. Circuiting for receptacles shall be as per Table 5.2.

Table 5.2

Area Designation	Min. Quantity of Receptacles per Space/Equipment Guideline	Min. Quantity of Separate Circuits per Space/Equipment Requirement	Comment
Enclosed Space			
Office	3	.5	
Meeting	5 **	1	As defined in Schedule A & B of Planning Section * two (2) receptacles shall be 5-20RA configuration ** one (1) receptacle in ceiling for multi media projector
Telecom Closet	3 *	3	
Open Space			
Workstation	1	.25	
Equipment			
Printer	1	1	
Fax	1	1	
Copier	1	1	
Other Areas			
Break Area	4	5	Frig, microwave, coffee, kettle, other
Housekeeping	see comment	.5	Install 5-20RA receptacle, 10 meter o.c. along corridors and in stairwells

Include the following clause for Climatic Areas that have a January 1% design temperature <-25°C. Replace XX with quantity of receptacles required.

5.1.3. In addition to the above provide (XX) weatherproof, duplex, split receptacles for automobile heaters. Each duplex receptacle services 2 parking stalls. Use thermostat and time clock control to de-energize receptacles at night and when temperature greater than -9°C (set point shall be variable).

5.1.4. Complete electrical system shall comply with current code requirements.

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

5.1.6. Panelboards supplying work area receptacles shall not be used to supply mechanical loads.

5.1.7. Provide all “mode” Transient Voltage Surge Suppression (TVSS) on main electrical service for all buildings.

5.1.8. When transformers are required they shall be appropriately sized, be Energy Star labeled, and complete with tap changers.

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

5.1.10. Strategies shall be implemented to ensure the electrical system performs as follows (at the point where the space receives its electrical supply, prior to occupancy of the space):

5.1.10.1. Total Power Factor > .95

5.1.10.2. Voltage Unbalance < 1%

5.1.10.3. Phase Unbalance < 10%

5.1.10.4. Comply with IEEE 519 for Harmonic Distortion.

5.2. Documentation

5.2.1. Label each receptacle cover plate with type written label(s) indicating circuit identifier as follows; 2A10, where 2 is floor #, A unique panel descriptor, 10 is circuit number. Include same label in outlet box using permanent marker.

5.2.2. Provide/update panel board directory using type written descriptors.

5.2.3. Provide As Built drawing files in CAD format.

5.3. Installation

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

5.3.2. Panelboards shall be located in core building areas and not on/in walls located adjacent to staff work areas.

5.3.3. All branch circuit wiring shall be routed vertically in stud cavity (not horizontally through studs).

5.3.4. Final connections to receptacles, luminaries, and other electrical equipment, from adjacent JBs can be cable (as permitted by code) but home run conduit and wiring shall be used from panel to JBs. Provide spare 27 mm (1”) conduit from each panel to accessible ceiling space for future use.

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

6. LIGHTING

6.1. Illuminance

Table 6.1 - Illuminances shall be in accordance with the following table[9]:

Delete requirement for vertical illuminance in meeting rooms per client request.

Delete row with drafting if this is not a program requirement.

Interior Space Type	Requirements	Lux (Footcandles)[10]	Height
General Office	Provide a Maintained Illuminance ***range*** of: **Note:** Illuminance ratios not to exceed 3:1 (maximum:minimum), Average maintained Illuminance not to exceed 50 footcandles.	320-540 lux (30-50 fc)	760 mm (30")
Conference/ Meeting Rooms 16.7 m^2 or larger	Minimum Average maintained illuminance (primary system):	320 lux (30 fc)	760 mm (30")
	Low-level presentation illuminance on meeting table surfaces shall not exceed (separately controlled secondary system):	110 lux (10 fc)	760 mm (30")
	Minimum average VERTICAL Illuminance on walls other than projection surfaces:	110 lux (10 fc)	760-1675 mm (30"-66")
Meeting Rooms smaller than 16.7 m^2	Minimum Average maintained illuminance:	320 lux (30 fc)	760 mm (30")
Telecommunication Closet	Minimum average maintained VERTICAL illuminance on equipment:	320 lux (30 fc)	760 mm (30")
Manual Drafting/ Plan Reading	Provide a Maintained Illuminance ***range*** of: Average maintained Illuminance not to exceed 70 footcandles.	540-750 lux (50-70 fc)	760 mm (30")
Circulation/ Corridors/Stairs	Absolute minimum average maintained illuminance: Note: where circulation occurs within an open area, illuminance is not to fall below a ratio of 4:1 from average illuminance of adjacent area.	110 lux (10 fc)	0 mm (0")
Washrooms	Minimum average maintained illuminance:	220 lux[11] (20 fc)	0 mm (0")
	Vertical illuminance in front of vanity	110 lux[12] (10 fc)	1500 mm (60")

[9] Unless otherwise noted, illuminance values are based on those recommended by the Illuminating Engineering Society of North America (IESNA) 'Lighting Handbook Reference and Application' 9th edition.
[10] Unless otherwise noted, illuminance values are horizontal measurements.
[11] Illuminance based on WorkSafeBC 'Occupational Health and Safety Regulation Part 4 General Conditions'
[12] Not based on IESNA handbook.

Interior Space Type	Requirements	Lux (Footcandles)[10]	Height
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")

Exterior Space Type	Requirements	Lux (Foot-candles)[13]	Height
Exterior Exit Door (and frequently used walkways)	Minimum average maintained illuminance	50 lux (5 fc)	760 mm (30")
Covered Parkade	Minimum average maintained illuminance:	50 lux (5 fc)	0 mm (0")
	Absolute minimum illuminance:	10 lux (1 fc)	0 mm (0")
	Illuminance uniformity ratio to be: 10:1 (Maximum:Minimum)		
	Minimum Vertical maintained Illuminance (at point of lowest horizontal illuminance):	5 lux (0.5 fc) [14]	1500 mm (60")
Parking Lot	Minimum average maintained illuminance:	22 lux (2 fc)	0 mm (0")
	Absolute minimum illuminance Illuminance uniformity ratio to be: 10:1 (Maximum:Minimum)	5 lux (0.5 fc)	0 mm (0")
	Minimum Vertical maintained Illuminance (at point of lowest horizontal illuminance):	2.2 lux (0.22 fc)	1500 mm (60")

6.2. Interior Lighting Switching and Controls

6.2.1. Night/Security Lighting

6.2.1.1. One night light per 100 m^2 (approximately 1000 sf) of office space is required. This lighting system will run independent of the following switching requirements.

6.2.2. Switching System

6.2.2.1. Provide automatic central controls to switch off all lights during unoccupied hours, with manual override control for after hours use.

6.2.2.2. In buildings with a Direct Digital Control (DDC), automatic switching of lights shall be controlled by the DDC.

[13] Where municipal by-laws govern this topic, the higher value shall apply.
[14] THIS IS A MINIMUM VALUE MEASURED AT POINT OF LOWEST HORIZONTAL ILLUMINANCE

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

6.2.3. Areas to be Switched

6.2.3.1. All enclosed spaces with full height walls or partitions shall be provided with manual on/off control at the entrance(s) to space.

6.2.3.2. All open areas shall be provided with independent switching controls based on approximately one switch per 90 m^2.

6.2.3.3. Meeting rooms 16.7 square meters in size or greater shall have separately switched low-level presentation illuminance. Low-level presentation illuminance shall be dimmable.

6.2.3.4. Exact locations and quantity to be determined during the design stage.

6.3. Exterior Lighting Switching and Controls

6.3.1. Exterior luminaires which are required to be “on” all night for safety or security reasons shall be controlled with a photocell.

6.3.2. Exterior luminaires which are NOT required to be “on” all night for safety or security reasons shall be controlled with a photocell time clock combination.

6.3.3. In buildings with a Direct Digital Control (DDC), the timeclock function shall be provided by the DDC.

6.4. Standard Interior Luminaire Types & Components:

6.4.1. Standard lamp type for interiors shall have the following characteristics:

6.4.1.1. Fluorescent T8 technology

6.4.1.2. Nominal Length = 48”

6.4.1.3. Minimum Colour Rendering Index = 80

6.4.1.4. Correlated Colour Temperature = 3500K

6.4.1.5. Initial lamp lumens per watt >= 92

6.4.2. Use of incandescent lamps is not permitted.

6.4.3. Standard fluorescent ballast type for interiors shall have the following characteristics:

6.4.3.1. Instant start, high-frequency, electronic type for operation of two (2) F32T8 lamps,

6.4.3.2. Input Watts <= 60 W,

6.4.3.3. Ballast efficacy factor (BEF) >1.46.
(Ballast Efficacy Factor = Ballast Factor(%)/Input Watts)

6.4.3.4. Power factor > 0.90.

6.4.4. Standard luminaire for office spaces and meeting rooms shall have the following performance & components:

6.4.4.1. Nominal 2’x 4’ recessed fluorescent style

6.4.4.2. 2-lamp operation

6.4.4.3. Minimum luminaire efficiency shall be 65%

6.4.4.4. "Deep-cell" type with output within the "VDT Normal" intensity requirements for VDT downlights as stated in the American National Standard Institute /Illuminating Engineering Society document ANSI/IESNA RP-1-2004, American National Standard Practice for Office Lighting.

Degrees from Vertical	Maximum luminous intensity:
65°	300 cd
75°	185 cd
85°	60 cd

6.4.4.5. If nominal 2'x4' will not fit in the ceiling grid, a 1-lamp 1'x4' luminaire with minimum luminaire efficiency of 75% may be used.

6.4.5. Standard luminaire for remaining finished spaces with T-bar ceilings shall have the following performance & components:

6.4.5.1. Nominal 2'x 4' recessed fluorescent style

6.4.5.2. 2-lamp operation

6.4.5.3. Minimum luminaire efficiency shall be 80%.

6.4.5.4. Prismatic K12 pattern acrylic lens with swing-down frame for relamping.

6.4.5.5. If nominal 2'x4' will not fit in the ceiling grid, a 1-lamp 1'x4' luminaire with minimum luminaire efficiency of 75% may be used.

6.4.6. Surface Mounted Fluorescent Luminaires

6.4.6.1. 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.

6.4.6.2. Fluorescent strips shall be used in electrical, mechanical rooms and janitor closets, complete with wire guards.

6.4.7. EXIT Signs

6.4.7.1. Exit Signs shall be economy grade with an integral (not screw-in) LED source. Input power shall be no greater than 2 watts. Emergency illumination may be supplied by integral DC lamp(s).

6.4.8. Recessed Downlights ("Potlights")

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

6.4.9. Track Lighting

6.4.9.1. Where required, track lighting shall be high power factor compact fluorescent.

6.5. Standard Exterior Luminaire Types & Components

6.5.1. Incandescent, incandescent halogen, and mercury vapour lamps shall not be used for exterior lighting. Where compact fluorescent is used, lamps shall use amalgam technology.

6.5.2. Luminaires with greater than 3500 initial lamp lumens, shall be “full cutoff” classification per IESNA classification categories.

6.5.3. Exterior luminaires with greater than 1000 initial lamp lumens shall be have shielding such that luminaire is at a minimum “semicutoff” per IESNA classification categories.

6.6. Additional Wiring

6.6.1. 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.

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

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7. STRUCTURED CABLING (TELECOMMUNICATION OUTLETS)

7.1. General Requirements

7.1.1. A complete structured cabling system shall be installed as outlined below for data and voice services including installation of data patch cords.

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

7.1.3. The design and installation of the structured cabling system shall follow the TIA/EIA 568B, TIA/EIA 569B, TIA/EIA 606A, J-STD-607A standards and BiCSi TDM and TCIM manuals. The demarcation shall meet the requirements of the service provider.

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

Table 7.1

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

7.1.5. Provide one 53 mm (2”) from demarcation for the building to telecommunication closet (determined by ARES) for WAN connection (cable by others).

7.1.6. Install a 1200x1200x1200 mm (minimum size) hand hole at property line. Install two 103 mm (4”) ducts from hand hole to building demarcation for telecommunication service providers entrance cables.

7.2. Products

7.2.1. General

7.2.1.1. All products that are installed, when combined, shall meet Category 5e channel performance as per TIA/EIA 568B.

7.2.2. Cable

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

7.2.2.2. Voice riser cable shall be a minimum of 25 pair, Category 3. The voice riser 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. Install voice riser cable between the telephone service for the facility and each telecommunication closet on each floor. The voice riser cables shall be installed in a star wired configuration.

7.2.2.3. Data riser shall be six (6), 4 pair, Category 5e cables. Data riser cables shall be distributed in a star configuration, to each telecommunication closet, from a telecommunication closet determined by WTS.

7.2.2.4. If one data riser cable is longer than 90 meters all data risers shall be six (6) strand fiber cable. The fiber cable shall be a laser optimized 50/125 µm tight

buffered cable. The fiber shall have maximum attenuation of 3.5/1.0 db/km and minimum information transmission capacity of 2000 MHz km at 850 nm (laser optimized). The fiber cables shall be terminated in a rack mounted fiber interconnect box with simplex SC connectors at each end. Fiber patch cords shall be supplied by others.

7.2.3. Termination Hardware

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

7.2.3.2. 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.

7.2.3.3. All voice riser/tie 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 riser/tie 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.

7.2.3.4. 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.

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

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

7.2.4. Patch Cords

7.2.4.1. The quantity of copper patch cords supplied shall equal the total quantity of horizontal cables installed. 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").

7.2.4.2. The quantity of data equipment cords supplied shall be 50 percent of the quantity of horizontal cables installed. Data equipment cords shall be Category 5e and the same color. Each end of the equipment cord shall have an RJ45 plug. Provide 75% of the equipment cords at a length of 3 m (10'0"), and 25 % of the equipment cords at a length of 4.6 m (15'0").

7.2.5. Racks

7.2.5.1. 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.

7.2.5.2. Install power bar, with minimum 6 receptacles, to rack. Power bar shall connect to adjacent wall mounted receptacle with 1.8 meter (6') cord. Receptacles on power bar shall be 5-20RA configuration (plug to be 5-20P).

7.2.6. Cable Management in Telecommunication Closets

7.2.6.1. Hinged 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.

7.2.6.2. The horizontal cable managers shall consist of 4 D rings, each ring shall be 38mm 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.

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

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

7.2.7. CATV System

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

7.2.8. Multi Media Sytsem

7.2.8.1. 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 by others.

7.3. Design

7.3.1. At least one telecommunication closet shall be provided in each building on each floor as per the following Table. 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 7.2 – Size of Telecommunication Closets

Quantity of Telecom Closets	Telecom Closet Type	Size of Telecom Closet	Comments
Minimum of 1 per floor. Maximum floor area served from closet 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

7.3.2. Only equipment associated with data and voice services shall be located in telecommunication closets. (no pipes or ducts shall pass through telecommunication closet)

7.3.3. Each telecommunication closet shall be a secure zone as per Section 8.

7.3.4. The maximum area to be served from one telecommunication closet is 1000 m2 (10, 765 sf).

7.3.5. The telecommunication room/closet shall be accessible from a corridor with 914 mm (3'-0") working clearance.

7.3.6. Each telecommunication room/closet shall have 19 mm (¾") G1S plywood backboard installed as indicated in Figure 1 and Figure 2. If permitted by AHJ the doors shall swing out. If the door must swing in then the telecommunication closet shall be redesigned to accommodate this.

7.3.7. Environmental control of Telecommunication closets shall comply with requirements of Section 4.

7.3.8. The room will have its own switched lighting as per Section 6.

7.3.9. Provide receptacles in Telecommunication closets as per Section 5.

7.4. Documentation

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

Table 7.3 – Label Format

Label	Format	Example
Horizontal Cable/Jack	fs-m	**1A-054** ;1st floor, closet A, port 54 on patch panels
Data Riser/Jack	fs_1/fs_2-n	**1A/2A-2** ;Riser cable #2 from 1st floor closet A to 2nd floor closet A
Voice Riser Cable	fs_1/fs_2-n	**1A/2A-3** **;**Riser cable #3 from 1st floor closet A to 2nd floor closet A
Voice Riser Termination	Fs_1/fs_2-n.d	**1A/2A-3.1** ;Pair #1 of riser cable #3 from 1st floor closet A to 2nd floor closet A

Identifier	Descriptor of Identifier
f	Floor number telecommunication closet is located (as per drawings)
s	Sequential telecommunication closet identifier (starting at A)
m	Sequential patch panel(s) port number
fs_1	Source telecommunication closet with floor number and closet identifier
fs_2	Destination telecommunication closet with floor number and closet identifier
n	Sequential cable number
d	Pair number in voice riser cable

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

7.4.3. All horizontal cables, and 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.

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

7.4.5. If fiber backbone is installed test each fiber strand using an optical power meter to ensure the actual power losses are less than the expected losses (calculated). Submit actual printed test results with calculated losses for review. For calculated losses use .3 db per splice, .5 db per connector pair, and the manufacturer’s published cable losses.

7.4.6. All test results shall be provided in electronic format only. Provide manufacturer’s viewing software on disk with test results.

7.4.7. “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. 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, 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.

7.5. Installation

7.5.1. 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.

7.5.2. Cable shall be continuous from wall outlet to telecommunication closet.

7.5.3. 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.

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

7.5.5. Where power poles are used leave 3 m (9’-10”) of spare cable coiled in the ceiling space above the power pole to permit relocation of the power pole. Properly support cable coil to the structure. Power poles with surface mounted jacks are not acceptable.

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

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

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

7.5.9. Install a complete grounding system to each telecommunication closet and bond all equipment.

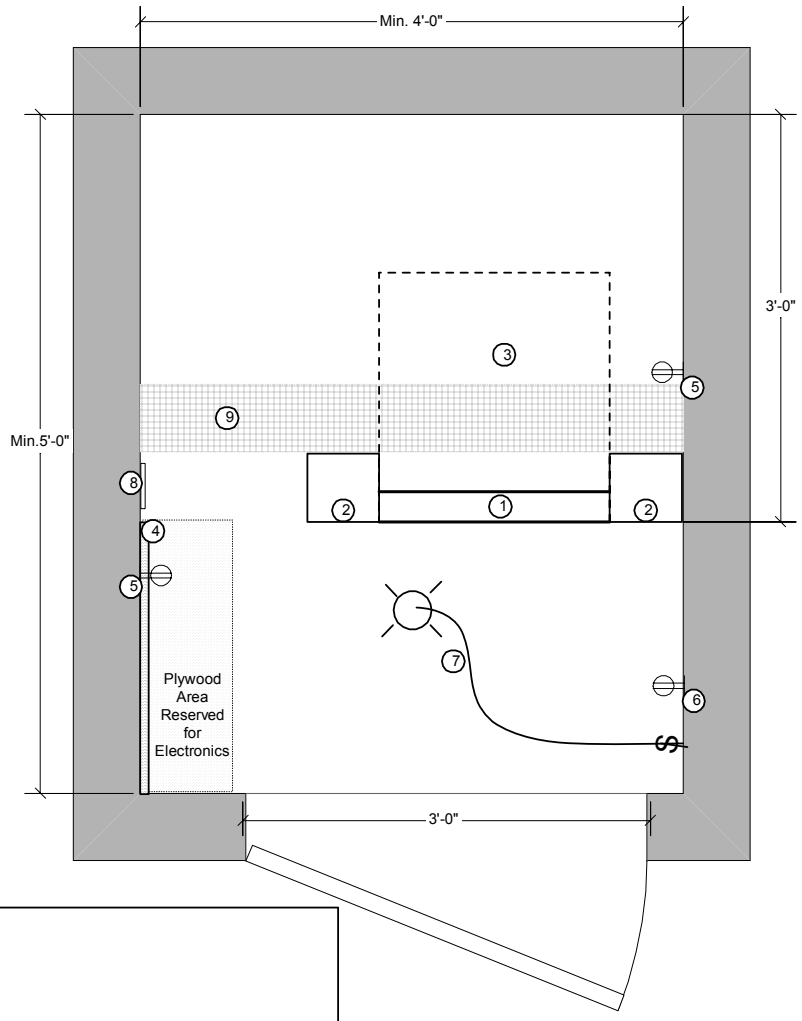
7.5.10. Install patch cords from patch panels to government supplied Ethernet switches (switches installed by others). All patch cords to be installed in a neat and orderly fashion; dressed in the same direction, with surplus lengths tucked neatly into wire management.

7.5.11. 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.

7.5.12. Complete “Patch Panel Cross Reference Form” as shown in Figure 4 for each telecommunication closet. Mount one copy on the back of the telecommunication closet door, and send a copy to WTS Network Implementation (250-387-5900).

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

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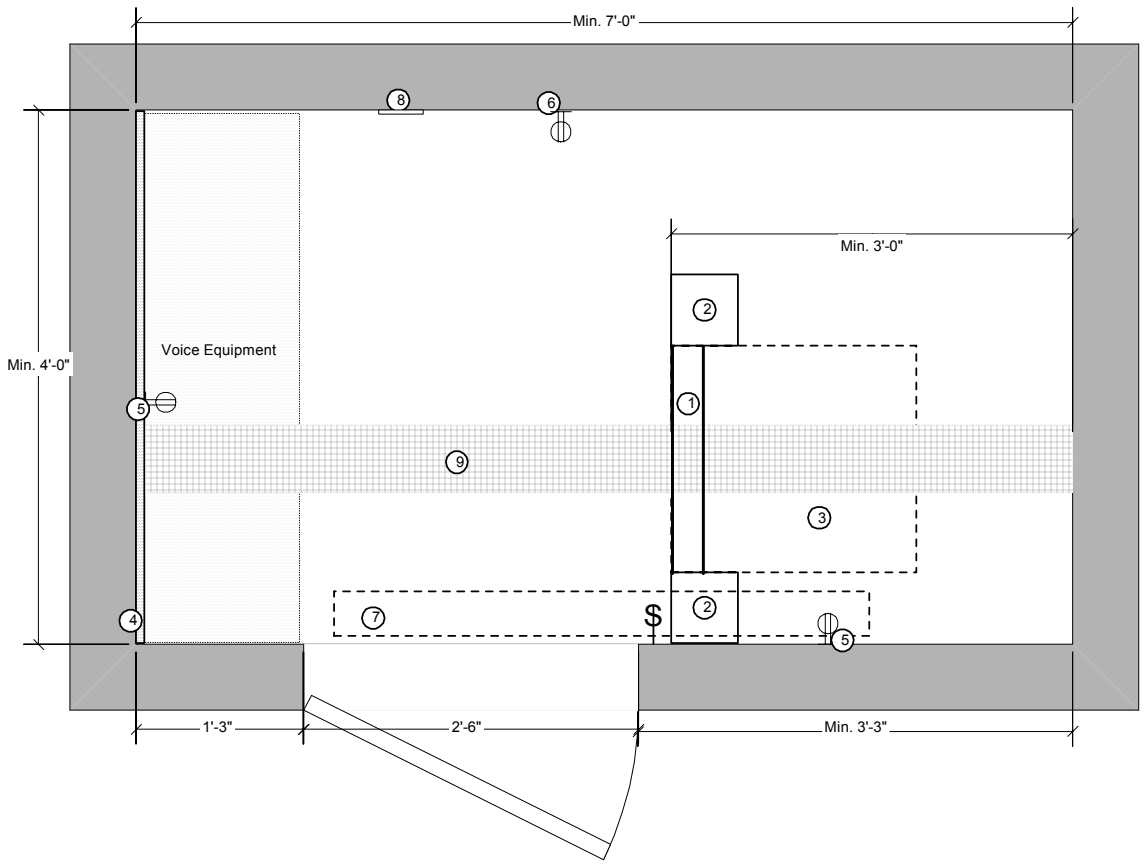
Last Updated by:TCARLSTR
EDIT DATE: 02/22/06

Figure 2: Typical Telecommunication Closet Layout With PBX



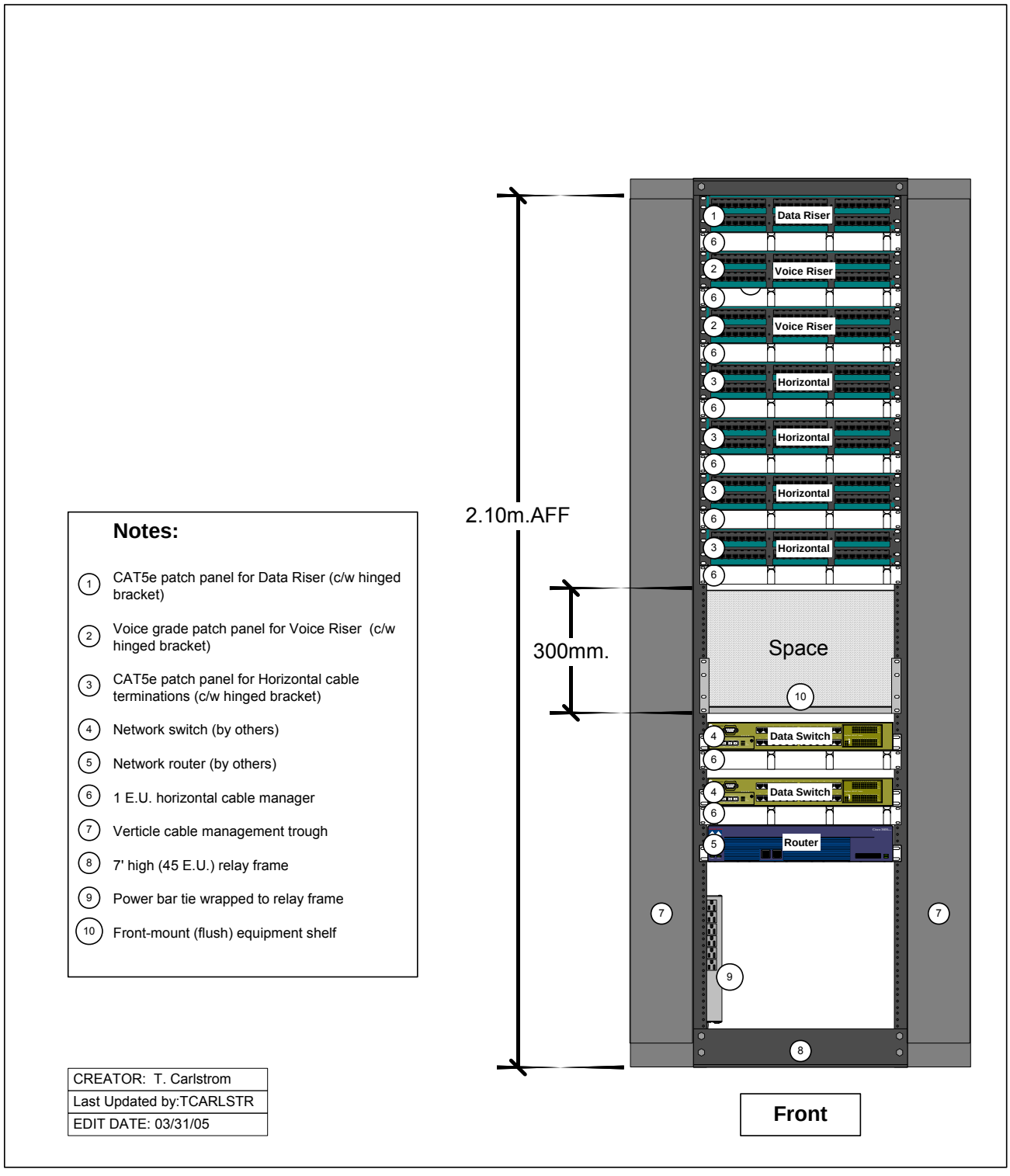
Notes:

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

CREATOR: T. Carlstrom
Last Updated by:TCARLSTR
EDIT DATE: 02/22/06

Figure 3: Typical Relay Frame Layout



Patch Panel Cross Reference

Client:
Address:
City:
Date:
Closet Name:
Floor Number:

Switch Name	port	Jack #	date	done by		new Jack#	date	done by		new Jack #	date	done by

Photocopy this page for larger installations, or contact WTS 250-387-5900

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

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8. BUILDING FABRIC SECURITY UPGRADES

Instructions to Planners For RFP Projects

Security upgrades may vary from one area of a building to another, particularly interior areas.

8.1. General

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

Exterior Shell of Building

*If a clause by clause review of requirements for security measures on the shell of the building results in no requirement beyond that provided in the basic Technical Standards, then no boxes under **8.2** on the Schedule would be 'ticked'.*

*If a clause by clause review of requirements for security measures on the shell of the building results in upgraded requirements, 'tick' the boxes under **8.2 Exterior Upgrades** on the Schedule for **all** of the upgrades to shell/exterior as it is not known before the successful proposal is selected whether individual elements can be downgraded.*

Interior of Building

*For interior of building, the intention is to show the upgrades on an area by area (or room by room) basis. In some cases there will be no requirements beyond those included in the basic Technical Standards, while other areas may require upgrades to all or part of the systems. On the Security Upgrade Schedule, enter a brief description of each room/space and 'tick' appropriate boxes under **8.3** as applicable.*

Table 8.1 - Building fabric security upgrades:

Security Upgrades to Basic Technical Standards for Offices											
			Room/Space								
	Comments	Upgrade:	General	Telecom Closet							
8.2 Exterior Building Fabric Upgrades		8.2.1.1 Exterior Doors and Frames									
		8.2.1.2 Locksets and Keyways									
		8.2.1.3 Exterior Door Glazing									
		8.2.2.1 Exterior Walls									
		8.2.2.2 Floors and Roofs									
		8.2.2.3 Windows and Glazing									
		8.2.3 Compounds and Parking Areas									
8.3 Interior Building Fabric Upgrades		8.3.1(a) Interior Doors & Frames 1st Upgrade									
		8.3.1(b) Interior Doors & Frames 2nd Upgrade		X							
		8.3.2 Locksets									
		8.3.3 (a) Keyways 1st upgrade									
		8.3.3 (b) Keyways 2nd upgrade									
		8.3.4 (a) Interior Walls 1st upgrade									
		8.3.4 (b) Interior Walls 2nd upgrade									
		8.3.4 (c) Interior Walls 3rd upgrade		X							
		8.3.5 (a) Reception Counters 1st upgrade									
		8.3.5 (b) Reception Counters 2nd upgrade									

8.1.2. The following requirements are security upgrades to the basic Technical Standards:

8.2. Exterior Shell of Building - Fabric Upgrades

8.2.1. Exterior Doors, Frames, Hardware and Glazing

8.2.1.1. Exterior Doors and Frames Upgrade

The basic Technical Standard is commercial exterior-grade hollow insulated metal or commercial style heavy-duty aluminum.

.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.

8.2.1.2. Locksets and Keyways Upgrade

The basic Technical Standard is heavy duty commercial grade such as Schlage 'D', and normal keyways

.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

8.2.1.3. Exterior Door Glazing Upgrade

The basic Technical Standard is normal unprotected glass and sidelights located so that, if glass is broken, it will not be possible to insert an arm to open the door lock.

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

8.2.2. Exterior Building Fabric (other than Doors)

8.2.2.1. Exterior Walls Upgrade

The basic Technical Standard is normal commercial construction

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

8.2.2.2. Floors and Roofs Upgrade

The basic Technical Standard is normal commercial roof construction

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

8.2.2.3. Windows and Glazing Upgrade

The basic Technical Standard is normal commercial windows with unprotected glass.

.1 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.

8.2.3. Compounds and Parking Areas

8.2.3.1. 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.

8.3. Interior Of Building - Fabric Upgrades

8.3.1. Interior Doors and Frames Upgrade

(a) 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.

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

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

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

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

.4 No “elephant foot” is to be installed.

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

If additional security is required, specify under “Comments” column in Security Upgrade Schedule “doors faced with 1.2 mm thick steel.”

8.3.2. Locksets Upgrade

8.3.2.1. 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.)

8.3.3. Keyways Upgrade

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

.1 All keys to be engraved “DO NOT COPY”.

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

(b) 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.

8.3.4. Interior Perimeter Walls Upgrade

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

(b) 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.

(c) 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):

.1 16 mm (5/8”) gypsum wall board (or as per AHJ requirements)

.2 3.5 mm (10 ga.) expanded metal mesh

.3 19 mm Plywood or OSB

.4 Framing

.5 16 mm (5/8”) gypsum wall board

.6 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.

8.3.5. Reception Counters Upgrade

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

(b) 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. Partition to be Lexan – 10 mm (3/8”) thick.

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

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9. ELECTRONIC SECURITY SYSTEMS

Electronic Security

Enter a brief description of each room/space, and 'Tick' boxes on the following Schedule as applicable for required electronic security systems.

Security System Selection Matrix											
			Room/Space								
	Comments	Upgrade:	General	Telecom Closet							
9.0 Electronic Security Systems		9.2 Intrusion Alarm System	X	X							
		9.3 Telecommunications Closets		X							
		9.4 Panic Alarm System									
		9.5 Remote Door Control									
		9.6 Access Control System									
		9.7 Intercom									
		9.8 Closed Circuit TV System									
		9.9 Exterior Alarm System									
		Other									

9.1. General

9.1.1. The contractor must be provincially licensed by the Ministry of Public Safety and Solicitor General to install alarms (PISA Act - ASR1).

9.1.2. The contractor shall be responsible for all permits, licenses, inspections and all related fees.

9.1.3. The installation and commissioning of electronic security systems shall be by qualified alarm service technicians who shall be licensed by the Security Programs Division of the Ministry of the Solicitor General.

9.1.4. The contractor shall not sub-contract any portion of the installation without prior approval of ARES.

9.1.5. The contractor shall be fully trained and certified on all security systems as required by this standard.

9.1.6. ARES will have complete control of the operation of the system(s) while the building is occupied by ARES or its tenants.

9.1.7. All equipment shall remain the sole property of ARES and the installing company will not retain ownership or control of the system.

9.1.8. 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.

9.1.9. Each system shall have sufficient power supply to operate as per manufacturers' specifications.

9.1.10. All systems shall include sufficient back up power supply to operate all devices simultaneously without drawing more than 80% of the capacity of the power supply. The back up power system shall have sufficient capacity to operate the entire system for a minimum of 24 hours under normal operating conditions. (All batteries to be minimum 7 amp hour)

9.1.11. All systems shall be locally managed with the ability to be remotely controlled and configured.

9.1.12. All exceptions to these standards and specifications (including the determination of equivalencies) shall be at the sole discretion of ARES.

9.1.13. All systems to be on separate, standalone network and will not be connected to the government network.

9.1.14. All security panels shall be located in a secure location within the protected space as directed by ARES (i.e. equipment shall not be mounted in electrical or data rooms that are not within the protected space).

9.1.15. All cable and equipment supplied, and all installation methods used, shall be as specified by the equipment manufacturer.

9.1.16. Unless otherwise specified, ARES security systems do not require conduit, except in exposed or exterior locations.

9.1.17. ARES may or may not choose to have the system(s) monitored, and retains the right to monitor the system(s) with a company of its own choosing.

9.1.18. All systems shall conform to the requirements of the document "ARES 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/

9.2. Intrusion Alarm Systems

9.2.1. The protected space shall be provided with a complete intrusion alarm system. Intrusion protection shall be provided by way of door contact switches, glass break detectors and motion sensors as required. The intrusion alarm system is designed to detect unauthorized entry into protected spaces. The system shall conform to the requirements of this document.

9.2.2. The intrusion alarm system may be broken into separate partitions (areas).

9.2.3. The intrusion alarm control panel shall have a sufficient number of zone inputs so that each device shall be connected to a single zone (double doors may be grouped as a single zone).

9.2.4. Home-run all devices to the alarm panel - do not gang or group devices unless otherwise authorized by ARES.

9.2.5. The system shall have the capacity to provide one access code per person for the full occupancy of the protected space.

9.2.6. Where partitioned, each partition of the intrusion alarm system will have as a minimum the following devices:

.1 a) Individual LCD keypad

.2 b) Door contact

.3 c) Motion Detector

9.2.7. The panel make and model shall be approved in advance by ARES. The panel shall be non-proprietary (i.e. – available to all alarm contractors.)

9.3. Telecommunication Closets

9.3.1. Telecommunication closets shall be protected by the intrusion alarm system and shall be a partition of the overall main office intrusion alarm system. The telecommunications closet partition requires separate keypad codes.

9.3.2. Telecommunication closet(s) to have its own keypad. Keypad to be LCD type and are to be mounted inside the room.

9.3.3. Each telecommunication closet to have the following equipment:

9.3.3.1. All doors to be equipped with door contacts.

9.3.3.2. Allow for one motion detector to be installed in each space.

9.3.3.3. A digital High-Low temp alarm (WINUTA- 1 - DIG HI/LO MIC TEMP- ALERT #1201).

9.3.3.4. A photoelectric smoke detector (DSCMN-140C).

9.3.4. All equipment listed above shall be installed, connected, calibrated and tested as per the manufacturer's specifications.

9.3.5. Each user or user group to have an individual user code.

9.3.6. All environmental alarms to be 24-hour zones.

9.3.7. This partition shall be set to auto-arm at 23:00.

9.4. Panic Alarms

9.4.1. Panic alarms shall be activated by hardwired recessed push buttons which have to be manually reset after activation.

9.4.2. The panic alarm system may be one of the following:

.1 a. Local response only

.2 b. Monitored

.3 c. Wireless

9.4.3. Client to identify which type of panic system is required and the desired operation. For further definition and details see the ARES Security System Specifications.

9.5. Remote Door Control

9.5.1. Designated door(s) will have controls that will either remotely lock/unlock or release the door. Client to identify the door(s) and the desired operation.

9.6. Access Control Systems

9.6.1. The protected space shall be provided with an access control system. 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.

9.6.2. The system shall be expandable to allow for a minimum of 20% additional card readers.

9.6.3. The system shall have the capacity of either: one access card for every $10m^2$ of the protected space, or the number of cards immediately required by the tenant plus 20%.

9.6.4. Proximity cards or Fob's (or card formats of ARES' choice) shall be provided.

9.6.5. The access system may be interfaced with the intrusion alarm system, so that access cards can disarm the intrusion alarm system.

9.6.6. The card system shall be programmable to restrict each card as to which doors it can access and the times and days when the card will function.

9.6.7. Every door that has a card reader and electric locking device shall also have a door contact and request to exit sensor (not a push button) in order to provide door held open/door forced open functions.

9.6.8. The access system shall record all door held open/forced open events and shall be capable of providing an audible alarm and a voltage or dry contact output for these conditions.

9.6.9. The system shall include all computer hardware, peripherals and software necessary to operate and record all system event history on the computer's hard drive. The system shall be capable of generating a variety of historical reports which can be outputted to the computer screen and to a printer. The system shall allow the user to make changes to all system parameters including access card and schedule changes. New computer hardware and peripherals shall be supplied as part of the system and shall meet or exceed the manufacturer's requirements.

9.6.10. The access system shall not be dependent on the computer for its operation. That is, the access control panels shall be able to continue to operate 24 hours a day, 7 days a week without any degradation in the operation of the system even if the computer hardware and software are completely disconnected from the access control panels.

9.6.11. This system shall include a minimum of three (3) workstation licenses.

9.7. Intercoms

9.7.1. An intercom will be installed at the designated entry door. The base station will be mounted in a location of the client's choosing. The intercom will either be a regular audio or a video intercom (client to choose).

9.7.2. The intercom will be installed adjacent to the designated entry door at 1.525 m (5 ft). The base station will be mounted in a location of the client's choosing.

9.7.3. The client may elect to have the intercom interfaced with the entry door controls so that they can remotely release the door. The contractor is responsible for all interfacing between the various systems.

9.8. Closed Circuit Television Systems

The decision to install a closed circuit television system shall be based on client request or determined by completing a threat and risk assessment.

9.8.1. The protected space shall be provided with a closed circuit television system. Closed circuit television systems shall be designed to take into account the following:

9.8.2. The required field(s) of view of the camera(s);

9.8.3. The required definition of picture;

9.8.4. The facilities for continuous screen viewing of area(s) under surveillance;

9.8.5. The need for a video record of the area(s) under surveillance;

9.8.6. Linking of CCTV system to an alarm system;

9.8.7. Lighting requirements in the area under surveillance (both day and night);

9.8.8. Types of luminaires used (inside and outside).

9.8.9. 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.mser.gov.bc.ca/foi_pop/main/video_security.htm

9.8.10. Cameras shall be monitored either by an operator or recorded locally. Output must be available for viewing by authorized persons. Unconnected (dummy) cameras are not permitted.

9.8.11. Video recording devices must be a digital video recorder (DVR). The DVR shall include all necessary hardware and software (including an operating system) and have a time/date generator and emergency and alarm recording features. The DVR shall have the ability to output to a CD/R and shall be complete with all programs required to view images on PC screen.

9.8.12. Recordings used for evidence must include a procedure for continuity of evidence. Typical procedures include removal of the CD, labeling and signing the CD and placing it in a sealed bag in a secured area.

9.9. Exterior Alarm Systems

The decision to install an exterior alarm system shall be based on the client request or determined by completing a threat and risk assessment. Equipment for exterior alarm systems may consist of one or more of the following: Light beam systems; Fence vibration systems; Ground vibration (seismic) systems; Electromagnetic field systems; Closed circuit television systems.

9.9.1. Exterior alarm systems shall only be used in locations where a full perimeter fence is erected to keep animals out and reduce the incidence of blowing debris.

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

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10. LANDSCAPING

10.1. Principles

10.1.1. Exterior landscape designs shall be simple and practical to maintain. Design landscapes to minimize the effect they will have on the surrounding environment by giving preference to regionally native plant species and the use of water conserving landscaping techniques such as xeriscaping.

10.1.2. Drainage And Grading

10.1.2.1. All areas shall be well drained and shall not flood onto adjacent properties. Grading shall direct surface water away from the building and outdoor use areas.

.1 Where the grading will result in the collection of surface water, provide catch basins and suitable drain pipes to carry such water away from the site.

.2 Avoid steep grades where possible. To prevent erosion, any slope greater than 25% shall receive special treatment appropriate for the grade such as terracing or retaining walls.

Add the following clause for buildings where the ground snow load (S_s) is greater than 2.5 kPa per the BC Building Code Appendix C. Otherwise delete:

10.1.3. Provide areas for storage or removal of snow and provide for protection of fences and plant material during snow removal.

10.2. Design Guidelines

10.2.1. Retain natural features, such as healthy trees, rock outcrops, streams etc., as far as is practical.

10.2.2. Design landscapes to minimize on-going maintenance costs. Choose options from the following list, prioritized in order of cost of maintenance:

10.2.2.1. Various types of concrete paving finished and drained for easy hose cleaning.

10.2.2.2. River rock or similar paving stone set in concrete.

10.2.2.3. Native species of grasses and trees.

10.2.2.4. Native species of groundcovers, (e.g.: kinnikinnick)

10.2.2.5. Plants in raised tubs and planters. Tubs and planters shall not be placed over occupied spaces.

10.2.3. Avoid the following: large open grassed areas, plantings of seasonal ornamental flowers, and small grassed areas that cannot easily be cut by gang mowers.

10.3. Additional Requirements

10.3.1. Where plants are planted under or close to deciduous trees, properly space them to facilitate the removal of leaves and litter.

10.3.2. Groundcover plants shall be planted close enough together to completely cover the ground in one year.

10.3.3. Locate trees so as to avoid maintenance problems from falling leaves.

10.3.4. Plants in raised tubs and planters shall be sized so as not to provide a means of cover for potential assailants.

10.3.5. Do not select hedges and trees with growth patterns that are incompatible with the building (i.e. block window accesses or views) and ensure that plantings adjacent to entrances do not provide cover for potential assailants.

10.3.6. A minimum of six inches of screened topsoil shall be placed above the subgrade of all areas designated for planting grass. All areas designated for shrubs, trees and groundcovers shall have soil depths matching those in the BC Landscape & Nursery Association (BCLNA) BC Landscape Standards (6th Ed) (www.bclna.com).

10.4. Irrigation Guidelines

10.4.1. Consult with an arborist or suitably trained professional to determine whether an irrigation system is required.

10.4.2. Irrigation system operation shall be automated with Direct Digital Control (DDC), where DDC systems are installed for other reasons.

10.4.3. Sub-surface drip irrigation systems shall not be utilized.

10.4.4. Ensure that water lines and controls are labeled appropriately, e.g. interior and exterior.

10.5. Plant And Tree Selection

10.5.1. Select only low maintenance plants and trees that are established as suitable to the area of British Columbia where they are to be located.

10.5.2. Landscapes containing trees and shrubs shall utilize native plants of mixed genus and species to ensure diversity and long-term stability.

10.5.3. Plants known to cause toxic or allergic reactions such as laburnam or broom shall not be utilized.

If outdoor furniture is to be utilized on this project then include the following clauses:

10.6. Outdoor Furniture

10.6.1. The furniture shall, as far as possible, be vandalproof.

10.6.2. The furniture shall have low maintenance costs.

10.6.3. The location of the furniture shall be such that it will not interfere with grass mowing runs.

10.6.4. Outdoor furniture shall be specified from existing market sources, and not purpose designed and made unless authorized by ARES

10.6.5. Consideration shall be given to matching outdoor furniture, such as benches and waste/recycling bins, with those provided by the local municipality or the client.

10.6.6. One coat of wood preservative shall be applied to all rough carpentry wood items stored outdoors.

------ End Landscaping Section ------

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11. ENERGY STANDARD FOR NEW BUILDINGS

11.1. Definition of Energy Standard for New Buildings

11.1.1. The design of new buildings, both leased from the private sector and owned by the Government, shall meet the requirements of ASHRAE Standard 90.1-2004.

11.1.2. For the purpose of complying with ASHRAE Std. 90.1, ASHRAE climate zones applicable to British Columbia shall be defined as follows:

Climate zone 5:	HDD 18°C less than 4000
Climate zone 6:	HDD 18°C greater than or equal to 4000 and less than 5000
Climate zone 7:	HDD 18°C greater than or equal to 5000 and less than 7000
Climate zone 8:	HDD 18°C greater than or equal to 7000

11.2. Documentation of Compliance

11.2.1. The Coordinating Registered Professional shall ensure that documentation confirming the design complies with the energy standard in 11.1.1.1 is prepared, filed with the project records, and provided to ARES upon request. The documentation shall conform to one of the following forms:

.1 If compliance is achieved using the prescriptive compliance path, the compliance forms from the ASHRAE Std. 90.1 User's Manual for sections 5 (building envelope), 6 (HVAC systems), 7 (service water heating), and 9 (lighting) shall be completed.

.2 If compliance is achieved using the energy cost budget compliance path, the compliance forms from the ASHRAE Std. 90.1 User's Manual for section 11 (energy cost budget) plus the compliance forms covering mandatory provisions only for sections 5 (building envelope), 6 (HVAC systems), 7 (service water heating), and 9 (lighting) shall be completed.

.3 As an alternate to .1 and .2, the compliance documentation shall be prepared in any format of the consultant's choosing provided that all the information included in .1 or .2 is included in the selected format.

------ End Energy Standard ------

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12. PROJECT SPECIFIC REQUIREMENTS

12.1. General Requirements *– not applicable*

12.2. Building Structure and Envelope *– not applicable*

12.3. Interior Architecture *– not applicable*

12.4. Mechanical Systems *– not applicable*

12.5. Electrical *– not applicable*

12.6. Lighting *– not applicable*

12.7. Structured Cabling (Telecommunication Outlets) *– not applicable*

12.8. Building Fabric Security Upgrades *– not applicable*

12.9. Electronic Security Systems *– not applicable*

12.10. Landscaping *– not applicable*

12.11. Energy Standard for New Buildings *– not applicable*