

PROJECT MANUAL  
Including Specifications for  
PWGSC  
P/N R. 063761.003  
Parole Office Fit-Up CSC  
J.R. Smallwood Bldg.  
Corner Brook, NL

"Issued for Tender"

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INCLUDING SPECIFICATIONS FOR  
PWGSC  
P/N R. 063761.003  
Parole Office Fit-Up CSC  
J.R. Smallwood Bldg.  
Corner Brook, NL

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OWNER: Public Works & Government Services Canada

PRIME CONSULTANT: Architecture49 Inc.  
Architectural:

MECHANICAL/ELECTRICAL CONSULTANT: Stantec Consulting Ltd.

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A49 Project No.: 14-152  
PWGSC Project No.: R. 063761.003  
Date: December 10, 2014  
"Issued for Tender"

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P/N R. 063761.003  
Parole Office Fit-Up CSC  
J.R. Smallwood Bldg.  
Corner Brook, NL

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REAL PROPERTY SERVICES  
PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

DISCIPLINE                      SIGNATURE                      DATE

Architectural  
Specifications:

\_\_\_\_\_ approved \_\_\_\_\_

Mechanical  
Specifications:

\_\_\_\_\_ approved \_\_\_\_\_

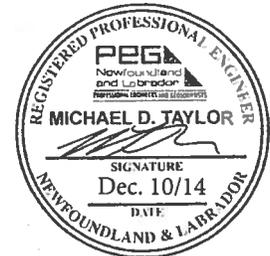
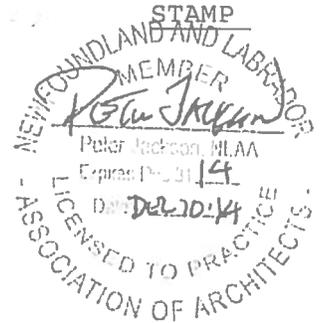
Electrical  
Specifications:

\_\_\_\_\_ approved \_\_\_\_\_

Tender  
PWGSC Project Mgr:

\_\_\_\_\_ approved \_\_\_\_\_

*Hein Yang*



1.1 DESCRIPTION  
OF WORK

- .1 In general work of this contract consists of interior demolition and new construction of a portion of the third floor of the J.R. Smallwood Building. Demolition generally includes interior finishes, walls, partitions, ceilings, doors and frames and mechanical and electrical.
- .2 Re-construction generally encompasses new partitions, doors, frames, hardware, finishes, and ceilings, mechanical and electrical systems.
- .3 The overall facility is occupied, however the work areas will be vacant during the work. Certain restrictions apply to work hours provision of noise, vibration and dirt generating activities. Removal of demolished materials from the building may have to be carried out outside of business hours, at night and on weekends.
- .4 The site of work is located in the 3<sup>rd</sup> floor of the J.R. Smallwood Building in Corner Brook, NL.

1.2 SITE  
FAMILIARIZATION

- .1 Before submitting a bid, it is recommended that bidders visit the site to review and verify the form, nature and extent of the work, materials needed, the means of access and temporary facilities required to perform the work.
- .2 Contact and obtain permission from the Departmental Representative before carrying out such site visit.

1.3 WORK SCHEDULE

- .1 Submit within 7 calendar days after contract award, a construction schedule showing commencement and completion of all work within the time stated in the accepted bid.
- .2 Provide sufficient details in Schedule to clearly illustrate the entire implementation plan to achieve completion of the work on time and to monitor efficient use of resources and the progress of work in relation to established milestones.
- .3 Work Schedule shall include:
  - .1 Bar (Gantt) Chart indicating all work

activities, their anticipated duration and planned dates for achieving major milestones and;  
.2 Written narrative for key elements of work providing sufficient information to demonstrate a reasonable implementation plan.

.4 Schedule work in cooperation with and to the approval of the Departmental Representative.

.5 Submit updates when requested by Departmental Representative.

1.4 WORK  
RESTRICTIONS

.1 Mobilization to project site is to commence immediately after acceptance of bid and submission of Site Specific Safety Plan, unless otherwise agreed in writing by Departmental Representative.

.2 Project work on site is to commence as soon as possible, with a continuous reasonable work force, unless otherwise agreed in writing by Departmental Representative.

.3 Facility operations shall continue during the work. Schedule and sequence work in cooperation with operators. Provide temporary security barriers to maintain existing level of security. After hours and weekend work may be necessary. All costs to be included in the tender price.

1.5 CODES AND  
STANDARDS

.1 Perform work in accordance with the National Building Code of Canada (of latest edition as adopted by the province and municipality of the work location) and any other code of provincial or local application, including all amendments up to the bid closing date, provided that in any case of conflict or discrepancy the more stringent requirement shall apply.

.2 Perform electrical work in accordance with CSA C22.1-2006. Use only licensed electricians to carry out such work.

.3 Materials and workmanship must meet or exceed requirements of specified standards, codes and referenced documents.

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- 1.6 INTERPRETATION OF DOCUMENTS .1 Supplementary to the General Conditions of the Contract, the Division 01 sections take precedence over the technical specification sections in other Divisions of the Specification Manual.
- 1.7 TERM ENGINEER .1 Unless specifically stated otherwise, the term Engineer where used in the Specifications and on the Drawings shall mean the Departmental Representative and vice versa as defined in the General Conditions of the Contract.
- 1.8 DOCUMENTS REQUIRED .1 Maintain at job site, one copy each of the following:  
.1 Contract Drawings, Specifications, addenda and reviewed shop drawings.  
.2 Work Schedule  
.3 Health and Safety Plan and other safety documents related to the Work.  
.4 Shop Drawings.  
.5 Change Orders  
.6 Field test reports.  
.7 Reports received from various inspection authorities.  
.8 Permits and regulatory approvals and requirements.  
.9 Other documents as stipulated in the contract documents.
- 1.9 PERMITS and AUTHORITIES INSPECTIONS .1 Obtain and pay for building permit, authorities inspections, compliance certificates, licenses and other applicable permits as required by municipal, provincial and federal authorities to perform the Work.  
.2 Provide appropriate notifications of project to provincial and other authorities having jurisdiction.  
.3 Upon request, submit copy of applications made and permits received to Departmental Representative.

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- 1.10 PROJECT MEETINGS .1 Project meeting will be held during the course of the work at least monthly.
- .2 Arrange project meetings and assume responsibility for setting times and recording minutes. Distribute minutes within five (5) days of meeting.
- .3 Have Superintendent and subcontractors in attendance.
- 1.11 SETTING OUT WORK .1 Assume full responsibility for and execute complete layout of work.
- 1.12 ALTERATIONS TO EXISTING BUILDING .1 Execute work with least possible interference or disturbance to Facility operations, occupants and the Public.
- .2 Provide barricades, temporary security partitions and doors, barriers and warning signs around work areas and adjacent to areas in use by Facility occupants and the Public.
- .1 Signage to be professionally made with bilingual message or use internationally recognized graphic symbols.
- .3 Separate work areas from other interior areas of the building. In addition to the specified security partitions, provide dust barriers as specified in clause 1.15 below.
- .4 Do not block fire exits and emergency escape routes. Ensure free egress from buildings at all times during the work.
- .5 Follow Departmental Representative's directives in meeting above requirements.
- 1.13 WORK ACCESS .1 Use only designated roads, walkways, entrance doors and corridors designated by Departmental Representative to gain access to work areas.
- .2 Restrict movement of workers to immediate work areas. Plan work to minimize need for workers to circulate inside buildings of the Facility.

1.14 BUILDING  
SECURITY

- .1 Keys, door security access cards building security access codes security passes may be issued to the Contractor, at the discretion of the Departmental Representative, to open locked doors and access secure areas at the site for work purposes.
- .2 Follow all instructions in regards to use, care and disposition of all keys and security cards issued.
- .3 Unless indicated otherwise, keys and security access devices given to Contractor's Superintendent shall be for his/her sole possession shall not under any circumstances be shared with any worker or subcontractor.
- .4 Do not, under any circumstances, make or allow workers to make duplicates of keys issued.
- .5 Immediately report to Departmental Representative any lost, stolen or destroyed keys and access cards.
- .6 At end of project, return all security devices to Departmental Representative.
- .7 Ensure building and other facilities of site are kept secure at all times. Lock all doors, activate building security system at end of each workday.
- .8 Cost incurred from police and security surveillance company resulting from falsely setting off security alarm system will be charged to the Contractor in the form of a financial assessment against the Contract.

1.15 TEMPORARY  
FACILITIES

- .1 Existing water and power supply may be used for construction at no cost. Departmental Representative will advise of the supply location.
  - .1 Be responsible for transporting such services to work areas.
- .2 Store materials on site only in location(s) within

the work area and on site as directed by Departmental Representative.

- .3 Enclose work areas with full height floor to ceiling metal stud walls with 13 mm painted gypsum board. Provide 914 x 2134 hollow metal doors steel frames with hardware and heavy metal dead bolt lock. Provide bilingual construction warning signs at prominent locations. All signage to be professionally made. Walls are also intended to maintain existing level of building security during the work period.
- .4 Dust Barriers:
  - .1 In addition to temporary walls and doors, erect full height dust tight partitions to separate works areas from others areas of the building.
  - .2 Provide additional dust covers as required for major dust generating work to stop propagation of dust beyond work areas.
  - .3 Obtain Departmental Representative's approval beforehand on the proposed dust barrier assembly and location.
- .5 Sanitary facilities are available on site.

1.16 HEATING AND VENTILATION

- .1 Maintain existing heating, ventilation and air conditioning system operational within Occupied Areas during the entire course of work.
- .2 Existing heating system may be used for construction purposes.
- .3 Shut-down air distribution system in work areas from remainder of building. Seal ductwork, exhaust diffusers and grilles in work areas to stop spread of dust and fumes to Occupied areas of Facility.
- .4 Provide suitable equipment and ventilate work areas as required to:
  - .1 Facilitate progress of work.
  - .2 Provide adequate ventilation to meet health regulations for safe working environment.
  - .3 Prevent accumulations of dust, fumes, mists, vapours or gases within building.
  - .4 Prevent harmful accumulation of hazardous

substances into atmosphere.

.5 Dispose of exhaust materials in manner that will not result in harmful exposure to persons.

.5 Continue operation of ventilation and exhaust system for time after cessation of work process to assure removal of harmful contaminants.

.6 Maintain strict supervision of operation of temporary ventilating equipment to:

.1 Conform with applicable codes and standards.

.2 Enforce safe practices.

.3 Prevent abuse of existing services provided by Departmental Representative.

1.17 CUTTING,  
FITTING AND  
PATCHING

.1 Execute cutting fitting and patching required to make work fit properly.

.2 Where new work connects with existing and where existing work is altered, cut, patch and make good to match existing work.

.3 Do not cut, bore, or sleeve load-bearing members.

.4 Make cuts with clean, true, smooth edges. Make patches inconspicuous in final assembly.

.5 Fit work airtight to pipes, sleeves, ducts, conduits and other services penetrating new or existing condition.

.6 Openings made in existing fire rated walls, floors and ceilings shall be filled with purpose made, ULC approved, fire stopping materials and smoke seals.

1.18 EXISTING  
SERVICES

.1 Before commencing work, investigate and establish location and extent of concealed and buried service lines in area of work. Notify Departmental Representative of findings.

.2 Where work involves breaking into, connecting or shutting down of existing services, obtain approval beforehand from Departmental Representative. Schedule and carryout work at time as directed by Departmental Representative with minimum of disturbance to Facility and site

operations. Adhere to approved schedule and provide notice to affected parties.

- .3 Comply with electrical safety requirements specified in Section 01 35 25.
- .4 Protect, relocate or maintain existing active services as required. Where inactive services are encountered, cap off in manner approved by authority having jurisdiction over service. Record location of maintained, rerouted and abandoned service lines.

1.19 MATERIALS

- .1 Use new material and equipment unless otherwise specified.
- .2 Select and use products, adhesives and sealants which have:
  - .1 No or very low off-gassing levels.
  - .2 No or very little VOC content.
  - .3 Are the least noxious and emit smallest amount of fumes, gases and strong odors during their cure period.
  - .4 Minimal chemical, physical or biological elements or agents in their composition which adversely affect human health and welfare or which degrades the environment.
- .3 Provide material and equipment of specified design and quality, performing to published ratings and for which replacement parts are readily available.
- .4 Use products of one manufacturer for equipment or material of same type or classification unless otherwise specified.
- .5 Within 7 days of written request by Departmental Representative, submit following information for any materials and products proposed for supply:
  - .1 Name and Address of manufacturer.
  - .2 Trade Name, model and catalogue number.
  - .3 Performance, descriptive and test data indicating compliance with specified requirements.
  - .4 Manufacturer's installation or application instructions.

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- .5 Evidence of arrangements to procure.
  - .6 Evidence of manufacturer delivery problems or unforeseen delays.
  - .6 Obtain manufacturer's printed installation instructions and comply by such directives for installation of materials.
  - .7 Notify Departmental Representative in writing of any conflict between Specifications and manufacturer's instructions, so that Departmental Representative will designate which document is to be followed.
  - .8 Deliver, store and protect materials on site against theft, vandalism, soiling and climatic damage. Provide additional suitable cover beyond manufacturer's packaging where required.
  - .9 Touch-up factory finishes damaged by the Work. Use touch-up materials to match original. Do not paint over name plates.
- 1.20 FASTENERS
- .1 Provide metal fastenings and accessories in same texture, colour and finish as base metal in which they occur unless indicated otherwise. Prevent electrolytic action between dissimilar metals.
  - .2 Use non-corrosive heavy duty fasteners, anchors and spacers for all fastening conditions. Space fasteners within limits of load bearing or shear capacity. Ensure positive permanent anchorage.
- 1.21 HAZARDOUS MATERIALS
- .1 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling and storage, and disposal of hazardous materials.
  - .2 Do not leave and store flammable and hazardous materials on site. Remove of site at end of each work shift.
  - .3 Keep MSDS data sheets for all products brought on site. Provide copy to Departmental Representative.
  - .4 Asbestos Discovery: Demolition of spray or

trowel-applied asbestos can be hazardous to health. Should material resembling spray or trowel-applied asbestos be encountered in course of work, immediately stop work and notify Departmental Representative. Do not proceed with relevant work until written instructions have been received from Departmental Representative.

1.22 ENVIRONMENTAL  
PROTECTION

- .1 Have appropriate emergency spill response equipment and rapid clean-up kit on site. Provide personal protective equipment required for clean-up.
- .2 Report all spills of petroleum, hazardous materials and accidents having potential of polluting the environment to Federal and Provincial Department of the Environment and to the Departmental Representative.
- .3 Do not pump water containing suspended materials into sewer or drainage systems. Control disposal or runoff of water containing suspended materials or other harmful substances in accordance with governing regulations and requirements.
- .4 Do not dump hazardous materials and polluted water containing suspended hazardous products into sewers and drainage systems. Dispose in accordance with federal and provincial environmental regulations and recommended procedures.
- .5 Fires and burning of waste and rubbish on site is prohibited.

1.23 INSPECTION  
AND TESTING

- .1 Give timely notice requesting inspection of work designated for inspections, special tests or approvals by Departmental Representative or by inspection authorities having jurisdiction.
- .2 In accordance with the General Conditions, Departmental Representative may order any part of work to be examined if work is suspected to be not in accordance with Contract Documents.
- .3 Rejected Work: removal and replace defective work, whether result of poor workmanship, use of

defective or damaged products and whether incorporated in work or not, which has been identified by Departmental Representative as failing to conform to Contract Documents.

- .4 Tests on materials and equipment, is the responsibility of the Contractor except where specified otherwise.
  - .1 Provide all necessary instruments, equipment and qualified personnel to perform tests.
  - .2 At completion of tests, turn over two sets of fully documented tests reports to the Departmental Representative.
- .5 Unspecified tests may also be made by Departmental Representative. The costs of these tests will be paid for by the Departmental Representative.
- .6 Where tests or inspection reveal work not in accordance with the Contract, the Contractor shall bear the cost of additional tests and inspections incurred by Departmental Representative as required to verify the acceptability of corrected work.
- .7 If Contractor covers or permits to be covered work designated for special tests, inspections or approvals before such is made, uncover work until particular inspections or tests have been fully and satisfactorily completed and until such time as Departmental Representative gives permission to proceed. Pay costs to uncover and make good such work.

1.24 CLEANING

- .1 As work progresses, maintain work areas and site in a tidy, clean and dust free condition at all times.
- .2 Provide on-site containers for placement of waste and debris. Loose and scattered waste, debris and materials will not be allowed on site.
- .3 Remove and dispose of waste and debris off site at end of each workday.
- .4 Clean interior of building used by workers and dirtied by work.

- .1 Wash walls, floors and other surfaces as needed.
- .2 Vacuum carpets.
- .3 Dust all furnishings.
  
- .5 At project completion, conduct final cleaning of areas affected by work.
  - .1 Remove dust and dirt from all surfaces with recommended cleaning agents.
  - .2 Wash and polish finish surfaces.
  - .3 Wash clean pavements, rake clean grassed areas used.
  
- .6 Use competent persons experienced in commercial cleaning operations.
  
- .7 Meager attempt at controlling dust and ineffective cleaning will not be tolerated.
  - .1 Failure to provide effective dust control and/or perform proper cleaning by the Contractor will result in the Departmental Representative to proceed and obtain an independent commercial cleaning agency to perform all required cleaning to the satisfaction of the Facility tenant for which the costs will be charged to the Contractor in the form of a financial assessment against the Contract.
  
- 1.25 WASTE MANAGEMENT
  - .1 Dispose of waste, debris and product packaging in accordance with municipal and provincial laws and regulations.
  
  - .2 Plan work to minimize waste, maximize reuse and recycling of materials and to divert the greatest amount of waste from being disposed into landfill sites.
  
  - .3 Separate waste, debris, leftover material, redundant equipment and product packaging at source, place into pre-planned waste categories during the course of the work and send to recycling facilities to maximum extent possible.
  
  - .4 Store, handle and dispose of hazardous waste in covered, locked steel dumpsters in accordance with applicable federal, provincial and municipal laws, regulations, codes and guidelines.

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- .5 Upon request, submit written list of items salvaged and sent to recycling facility
- 1.26 COST BREAKDOWN
- .1 Before submitting first progress claim, submit a breakdown of the contract price in format and detail as directed by Departmental Representative.
- 1.27 ACCEPTANCE
- .1 Notify Departmental Representative in writing when work is complete and ready for final inspection.  
.1 Make a check of all work and correct all discrepancies, defects and outstanding work before sending notification.
- .2 Accompany Departmental Representative during final inspection.
- .3 Rectify all defects, faults and outstanding items identified by Departmental Representative during inspection.

1.1 SUBMITTALS

- .1 Upon acceptance of bid and prior to commencement of work, submit to Departmental Representative the following work management documents:
  - .1 Work Schedule as specified herein.
  - .2 Shop Drawing Submittal Schedule specified in section 01 33 00
  - .3 Waste Management Plan specified in section 01 74 21
  - .4 Environmental Plan specified in section 01 35 43
  - .5 Health and Safety Plan specified in section 01 35 29.
  - .6 Hot Work Procedures specified in section 01 35 24
  - .7 Dust Control Plan specified in section 01 50 00.
  - .8 List of workers requiring security clearance and those to be placed on Site Security Control list as specified in section 01 35 54.

1.2 WORK SCHEDULE

- .1 Upon acceptance of bid submit:
  - .1 Work schedule within 7 calendar days of contract award.
- .2 Schedule to indicate all calendar dates from commencement to completion of all work within the time stated in the accepted bid.
- .3 Provide sufficient details in schedule to clearly illustrate entire implementation plan, depicting efficient coordination of tasks and resources, to achieve completion of work on time and permit effective monitoring of work progress in relation to established milestones.
- .4 Work schedule content to include as a minimum the following:
  - .1 Bar (GANTT) Charts, indicating all work activities, tasks and other project elements, their anticipated durations, planned dates for achieving key activities and major project milestones supported with;
  - .2 Written narrative on key elements of work illustrated in bar chart, providing sufficient details to demonstrate a reasonable implementation plan for completion of project

within designated time.

.3 Generally Bar Charts derived from commercially available computerized project management system are preferred but not mandatory.

.6 Schedule work in cooperation with the Departmental Representative. Incorporate within Work Schedule, items identified by Departmental Representative during review of schedule.

.7 Completed schedule shall be approved by Departmental Representative. When approved, take necessary measures to complete work within scheduled time. Do not change schedule without Departmental Representative's approval.

.8 Ensure that all subtrades and subcontractors are made aware of the work restraints and operational restrictions specified.

.9 Schedule Updates:

.1 Submit on a monthly basis.

.2 Provide information and pertinent details explaining reasons for necessary changes to implementation plan.

.3 Identify problem areas, anticipated delays, impact on schedule and proposed corrective measures to be taken.

.10 Departmental Representative will make interim reviews and evaluate progress of work based on approved schedule. Frequency of such reviews will be as decided by Departmental Representative. Address and take corrective measures on items identified by reviews and as directed by Departmental Representative. Update schedule accordingly.

.11 In every instance, change or deviation from the Work Schedule, no matter how minimal the risk or impact on safety or inconvenience to tenant or public might appear, will be subject to prior review and approval by the Departmental Representative.

1.3 OPERATIONAL  
RESTRICTIONS

.1 The Contractor must recognize that building

occupants will be affected by implementation of this contract. The Contractor must perform the work with utmost regard to the safety, security and convenience of building occupants and users. All work activities must be planned and scheduled with this in mind. The Contractor will not be permitted to disturb any portion of the building without providing temporary facilities as necessary to ensure safe and direct passage through disturbed or otherwise affected areas.

- .2 Contractor to meet with the Departmental Representative on a weekly basis to identify intended work areas, activities and scheduling for the coming week.
- .3 To assure that construction work may proceed productively without risk to safety of building occupants and the public, and due to the nature of the tenant's operation be aware that certain work of this contract must be carried out during "Off-Hours".
- .4 Off Hours: means a period of time which is outside the daily operational hours of the tenants of the Facility. For the purposes of this contract, Off-Hours are defined as follows:
  - .1 Weeknight Off-Hours: between the hours of 18:00 and 07:00 for each weekday Monday to Thursday inclusive.
  - .2 Weekend Off-Hours: between the hours of 18:00 Friday evening to 07:00 Monday morning.
  - .3 Dependent on the nature and location of the construction activity and due to an unanticipated operational requirement of the Tenant, certain off-hour periods may be redefined by adjusting the start and end time periods or cancellation of a specific off-hour workshift during the course of the Work.
- .5 The following work shall be performed during Off-Hours:
  - .1 Erection and dismantling of dust barriers, hoarding or other protective devices to separate areas of Facility occupied and under use by public and tenants from work areas;
  - .2 Asbestos abatement;
  - .3 Demolition of any masonry or concrete inside building;

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- .4 All work involving saw cutting or boring of openings through masonry and concrete walls, floors, ceilings or roof;
  - .5 Work which requires the use of products controlled by WHMIS and for which MSDS sheets indicate toxic or hazardous materials requiring special handling and application procedures;
  - .6 Use of materials having high solvent content or other content emitting strong noxious fumes or odours;
  - .7 Painting;
  - .8 Removal of demolition debris from the building including cleaning of premises;
  - .9 Cleaning and preparing of occupied areas for daytime use by tenants immediately following an off-hour workshift;
  - .10 Work within a tenant occupied area including corridors, stairwells and other circulation routes under use;
  - .11 Work which requires the temporary disconnection of power and communication services to occupied areas;
  - .12 Testing of fire alarms and other emergency annunciating system;
  - .13 Delivery of materials and equipment from exterior to the interior of building when access routes are located in tenant occupied spaces.
  - .14 Work which creates excessive noise or vibration creating interference with tenant operations.
- 
- .6 Departmental Representative reserves the right to stop certain daytime work activities, if the nature of that activity generates excessive noise or dust and have Contractor re-schedule that particular work to be performed during the Off-Hour period.
  - .7 Ensure that all trades are aware of the "Off-Hour" requirements of this contract and ensure that any extra costs incurred as a result is included in the Contractor's bid price for the work. No extra cost will be paid due to failure by General Contractor or his sub-contractors to recognize the off-hour requirements and other restrictions specified herein and to include all necessary allowances within their bids.
  - .8 See section 01 35 54 in regards to:

- 
- .1 Special security requirements which must be observed in the course of work.
  - .2 Provision of security personnel by Contractor as part of the Work.
- .9 Facility circulation maintained:
- .1 Ensure that entrances, corridors, stairwells, fire exits and other circulation routes are maintained free and clear providing safe and uninterrupted passage for Facility users and public at all times during the entire work.
  - .2 Maintain those areas clean and free of construction materials and equipment. Provide temporary dust barriers and other suitable enclosures to ensure users are not exposed to construction activities and are protected from exposure to dust, noise and hazardous conditions.
  - .3 Provide temporary corridors, walkways, passageways, access to offices, etc... when required due to nature of work. Such circulation routes must be constructed to barrier free requirements unless approved otherwise by Departmental Representative.
  - .4 Maintain fire escape routes accessible and firefighting access open all times for the duration of the project.
  - .5 Do not under any circumstances block fire exit doors. Do not leave construction materials or debris in corridors, stairwells building entrances and exits.
- .11 Safety Signage:
- .1 Provide on site, and erect as required during progress of work, proper bilingual signage, mounted on self-supporting stands, warning the public and building occupants of construction activities in progress and alerting need to exercise caution in proceeding through disturbed areas of the facility, and directing building occupants through any detours which may be required.
  - .2 Signage to be professionally printed and mounted on wooden backing, coloured and to express messages as directed by the Departmental Representative.
  - .3 Generally maximum size of sign should be in the order of 1.0 square meters. Number of signs required will be dependent on number of areas in facility under renovation at any one time.

.4 Include costs for the supply and installation of these signs in the bid price.

.12 Dust and Dirt Control:

.1 See section 01 50 00 and 01 74 11 for dust control and cleaning requirements.

.2 Effectively plan and implement dust control measures and cleaning activities as an integral part of all construction activities. Review all measures with the Departmental Representative before undertaking work, especially for major dust generating activities.

.3 Do not allow demolition debris and construction waste to accumulate on site and contribute to the propagation of dust.

.4 As work progresses, maintain construction areas in a tidy condition at all times. Remove gross dust accumulations by cleaning and vacuuming immediately following the completion of any major dust generating activity.

.5 Immediately remove all debris and dust from within occupied areas as generated by work therein during a given workshift.

.6 Disconnect and seal-off ductwork of HVAC servicing the construction area to stop spread of dust into other areas of Facility.

.7 Avoid situations and practices which results in dust and dirt being brought from the construction areas or from the exterior and tracked inside the building into occupied areas used by tenants and the public.

.8 Stop workers with soiled footwear from entering building. This includes roofing mechanics and heavy civil workers.

.9 Inform workers and make them sensitive to the need for dust and dirt control. Stringently enforce rules and regulations, immediately address non-compliance.

.10 Keep access doors to work areas closed at all times. Use only designated doors for entry or egress.

.13 Work in Occupied Areas:

.1 Where work must be carried out in an occupied area beyond the boundaries of the enclosed construction site, perform such work during the non-operational off-hour periods of the Facility.

.2 Ensure that all dust, dirt, debris, construction waste, materials, tools and

equipment are completely removed at the end of each "off-hour" workshift. Clean and reinstate area ready for daytime use by tenant.

.3 Provide temporary dust barriers around immediate work areas and place fabric drop sheets over workstations, equipment and other furnishings located immediately adjacent to such work.

.4 Conduct work in such a way as to minimize the creation of dust and to avoid contaminating areas beyond the immediate location.

.5 Discuss and obtain Departmental Representative's approval beforehand on the type and extent of dust barriers, protective devices and measures needed.

.6 Be responsible for temporarily moving office furnishings, workstations, computer equipment and other objects as needed to gain access and conduct work. Reinstall all dislocated items at end of each workshift making the area operational again.

.7 Disconnect and reconnect any power and communications systems feeding workstations as required.

.8 Clean such areas as well as those corridors and routes used to gain entry and access.

.14 Cleaning of tenant occupied areas used by Contractor:

.1 Clean lobbies, corridors, stairs and other circulation routes used by workers to gain access to work by conducting cleaning, vacuuming and washing of floors, walls and other soiled surfaces.

.2 Obtain and pay for the services of a professional cleaning company to perform this cleaning. Cleaning staff shall remain on site one hour beyond the end of each off-hour workshifts to address any Tenant complaints or concerns and carryout additional cleaning functions as directed by Departmental Representative or by a pre-designated person(s) representing the tenant(s).

.3 Meager attempts at controlling dust and ineffective unprofessional cleaning procedures will not be tolerated.

.4 Failure to provide effective dust control, allowing construction dust and dirt to escape beyond construction areas and contaminate

occupied areas and building circulation areas will result in Contractor being ordered to immediately provide professional cleaning services without delay to remedy the situation and conduct all cleaning to the extent as determined by Departmental Representative. Alternatively, Departmental Representative may, at certain times and at own discretion; obtain the services of an independent building cleaning agency when cleaning being provided by Contractor is ineffective or tardy in response. Costs of such services will be charged against Contractor in the form of financial penalties or holdback assessments against the Contract.

- .15 Ensure that all sub-trades are made aware of and abide by the contents of this section and in particular the work restrictions specified herein due to tenant operational requirements.

1.4 PROJECT MEETINGS

- .1 Schedule and administer project meetings, held on a minimum-monthly basis, for entire duration of work and more often when directed by Departmental Representative as deemed necessary due to progress of work or particular situation.
- .2 Prepare agenda for meetings.
- .3 Notify participants in writing 4 days in advance of meeting date.
  - .1 Ensure attendance of all subcontractors.
  - .2 Departmental Representative will provide list of other attendees to be notified.
- .4 Hold meetings at project site or where approved by Departmental Representative.
- .5 Preside at meetings and record minutes.
  - .1 Indicate significant proceedings and decisions. Identify action items by parties.
  - .2 Distribute to participants by mail or by facsimile within 5 calendar days after each meeting.
  - .3 Make revisions as directed by Departmental Representative.
  - .4 Departmental Representative will advise whether submission of minutes by Email is acceptable. Decision will be based on

compatibility of software among participants.

1.5 WORK  
COORDINATION

- .1 The General Contractor is responsible for coordinating the work of the various trades and predetermining where the work of such trades interfaces with each other.
  - .1 Designate one person from own employ having overall responsibility to review contract documents and shop drawings, plan and manage such coordination.
  - .2 Coordinate relocation and reinstallation of owner's existing security equipment with owner so as to permit airport operations and security procedures to continue.
- .2 The General Contractor shall convene meetings between trades whose work interfaces and ensure that they are fully aware of the areas and the extent of where interfacing is required.
  - .1 Provide each trade with the plans and specs of the interfacing trade, as required, to assist them in planning and carrying out their respective work.
  - .2 Develop coordination drawings when deemed required illustrating potential interference between work of various trades and distribute to all affected parties including structural trade.
    - .1 Pay particularly close attention to overhead work above ceilings and within or near to building structural elements.
    - .2 Coordination drawings to identify all building elements, services lines, rough-in points and indicate from where various services are coming.
  - .3 Review coordination drawings at purposely called meetings. Have subcontractors sign-off on drawings and publish minutes of each meeting.
  - .4 Plan and coordinate work in such a way to minimize quantity of service line offsets.
  - .5 Submit copy of coordination drawings and meeting minutes to Departmental Representative for information purposes.
- .3 Submission of shop drawings and ordering of prefabricated equipment or prebuilt components shall only occur once coordination meeting for such items has taken place between trades and all conditions affecting the work of the interfacing

trades has been made known and accounted for.

.4 Work Cooperation:

.1 Ensure cooperation between trades in order to facilitate the general progress of the work and avoid situations of spatial interference.

.2 Ensure that each trade provides all other trades reasonable opportunity for the completion of the work and in such a way as to prevent unnecessary delays, cutting, patching and the need to remove and replace completed work.

.5 No extra costs to the Contract will be considered by the Departmental Representative as a result of Contractor's failure to effectively coordinate all portions of the Work. Disputes between the various trades as a result of their not being informed of the areas and extent of interface work shall be the sole responsibility of the General Contractor to be resolved at own cost.

1.6 OTHER CONTRACTS

.1 Further contracts may be let during the period that this contract is in progress.

.2 Cooperate with other Contractors in carrying out their respective works and carry out all instructions from the Departmental Representative in this regard.

.3 Connect properly and coordinate work with that of other Contractors. If any part of the work under this Contract depends for its proper execution or result upon the work of another Contractor, report promptly to the Departmental Representative, in writing, any defects in the work of such other Contractors as may interfere with the proper execution of this work.

1.1 SUBMITTAL  
GENERAL REQUIREMENTS

- .1 Submit shop drawings, product data, samples and other items specified for review by Departmental Representative.
- .2 Submit sufficient copies for own use plus 3 copies which will be kept by Departmental Representative.
  - .1 Include additional copies for insertion into the O & M manuals specified in section 01 78 00.
- .3 Accompany data with transmittal letter identifying project name, project number, Contractor's name and address, supplier name, description of items and quantity of drawings/data being submitted.
- .4 Allow 14 calendar days for review of shop drawings by Departmental Representative. Note that colours can only be selected after all shop drawings and samples of products requiring colour selections are received by the Departmental Representative.
- .5 Do not proceed with work applicable to shop drawing item until relevant submission has been reviewed by Departmental Representative.
- .6 Submit with reasonable promptness and in orderly sequence so as to allow for Departmental Representative's review and not cause delay in Work. Failure to submit in ample time will not be considered sufficient reason for an extension of Contract time and no claim for extension by reason of such default will be allowed.
- .7 Present data, dimensions and engineering values in SI Metric units.
- .8 Review submittals prior to submission. Ensure that all requirements have been addressed, field dimensions and data have been taken and submittal has been checked and coordinated with work of contract documents.
- .9 Stamp and sign each item of submittal certifying

contractor's review and verification of submitted data.

- .10 Submittals not stamped and signed will be returned unexamined by Departmental Representative and considered rejected.

1.2 SHOP DRAWINGS

- .1 The term "shop drawings" means drawings, diagrams, illustrations, schedules, performance charts, technical product data, brochures and other data which are to be provided by Contractor to illustrate details of a portion of work.

- .2 Shop Drawings Content:

- .1 Indicate materials, methods of construction, attachment, connections, explanatory notes and other information necessary for completion of work. Where items attach or connect to other items, confirm that all interrelated work has been coordinated, regardless of section or trade from which the adjacent work is being supplied and installed.

- .2 Supplement manufacturer's standard drawings and literature with additional information to provide details applicable to project.

- .3 Shop Drawings Format:

- .1 Opaque white prints or photocopies of original drawings or standard drawings modified to clearly illustrate work specific to project requirements. Maximum sheet size to be 1000 x 707 mm.

- .2 Product data from manufacturer's standard catalogue sheets, brochures, literature, performance charts and diagrams, used to illustrate standard manufactured products, to be original full colour brochures, clearly marked indicating applicable data and deleting information not applicable to project.

- .3 Non or poorly legible drawings, photocopies or facsimiles will not be accepted and returned not reviewed.

- .4 Delete information not applicable to project on all submittals.

- .5 Adjustments or corrections made on shop drawings by Departmental Representative are not intended to change contract price. If adjustments affect value of work, advise Departmental Representative in writing prior to proceeding with work.
- .6 After Departmental Representative's review, distribute copies.
- .7 The review of shop drawings by Departmental Representative or by a Consultant or designated person so authorized by the Departmental Representative, is for sole purpose of ascertaining conformance with general concept. This review shall not mean that Canada approves the detail design inherent in the shop drawings, responsibility for which shall remain with Contractor submitting same, and such review shall not relieve Contractor of responsibility for errors or omissions in shop drawings or of responsibility for meeting all requirements of the construction and Contract Documents. Without restricting generality of foregoing, Contractor is responsible for dimensions to be confirmed and correlated at job site, for information that pertains solely to fabrication processes or to techniques of construction and installation and for co-ordination of Work of all sub-trades.

1.3 SAMPLES

- .1 Submit samples for items specified in trade sections. Label with origin and intended use.
- .2 Deliver samples to Departmental Representative's office. Do not drop off samples at construction site except for special circumstances pre-approved by Departmental Representative.
- .3 Notify Departmental Representative in writing, at time of submission of deviations in samples from requirements of Contract Documents.

- 1.1 SECTION INCLUDES
- .1 Fire Safety Requirements
  - .2 Hot Work Permit
  - .3 Existing Fire Protection and Alarm Systems
- 1.2 RELATED WORK
- .1 Section 01 35 29 Health and Safety Requirements
- 1.3 REFERENCES
- .1 Fire Protection Standards issued by Fire Protection Services, Labour Program Division of Service Canada:
    - .1 FCC No. 301-June 1982 Standard for Construction Operations.
    - .2 FCC No. 302-June 1982 Standard for Welding and Cutting.
  - .2 FCC standards may be viewed at:
    - .1 <http://www.hrsdc.gc.ca/en/lp/lo/fp/standards/commissioner.shtml>
    - .2 Fire Protection Services - Atlantic Region office, Halifax, N.S, Tel. (902) 426-6053.
- 1.4 DEFINITIONS
- .1 Hot Work defined as:
    - .1 Welding work
    - .2 Cutting of materials by use of torch or other open flame devices
    - .3 Grinding with equipment which produces sparks.
    - .4 Use of open flame torches.
- 1.5 SUBMITTALS
- .1 Submit copy of Hot Work Procedures and sample of Hot Work permit to Departmental Representative for review, within 14 calendar days of acceptance of bid.
  - .2 Submit in accordance with section 01 33 00.
- 1.6 FIRE SAFETY REQUIREMENTS
- .1 Implement and follow fire safety measures during Work. Comply with following:
    - .1 National Fire Code.
    - .2 Fire Protection Standards FCC 301 and FCC 302.

.3 Federal and Provincial Occupational Health and Safety Acts and Regulations.

.2 In event of conflict between any provisions of above authorities the most stringent provision will apply. Should a dispute arise in determining the most stringent requirement, Departmental Representative will advise on the course of action to be followed.

1.7 HOT WORK  
AUTHORIZATION

.1 Obtain Departmental Representative's written "Authorization to Proceed" before conducting any form of Hot Work on site.

.2 To obtain authorization submit to Departmental Representative:

.1 Contractor's typewritten Hot Work Procedures to be followed on site as specified below.

.2 Description of the type and frequency of Hot Work required.

.3 Sample Hot Work Permit to be used.

.3 Upon review and confirmation that effective fire safety measures will be implemented and followed during performance of hot work, Departmental Representative will give authorization to proceed as follows:

.1 Issue one written "Authorization to Proceed" covering the entire project for duration of work or;

.2 Subdivide the work into pre-determined, individual activities, each activity requiring a separately written authorization to proceed.

.4 Requirement for individual authorization will be based on:

.1 Nature or phasing of work;

.2 Risk to Facility operations;

.3 Quantity of various trades needing to perform hot work on project or;

.4 Other situation deemed necessary by Departmental Representative to ensure fire safety on premises.

.5 Do not perform any Hot Work until receipt of Departmental Representative's written "Authorization to Proceed" for that portion of

work.

- .6 In tenant occupied Facility, coordinate performance of Hot Work with Facility Manager through the Departmental Representative. When directed, perform Hot Work only during non-operative hours of the Facility. Follow Departmental Representative's directives in this regard.

1.8 HOT WORK PROCEDURES

- .1 Develop and implement safety procedures and work practices to be followed during the performance of Hot Work.
- .2 Hot Work Procedures to include:
  - .1 Requirement to perform hazard assessment of site and immediate work area beforehand for each hot work event in accordance with Safety Plan specified in section 01 35 29.
  - .2 Use of a Hot Work Permit system with individually written permit issued by Contractor's Superintendent to specific worker or subcontractor granting permission to proceed with Hot Work.
  - .3 Permit required for each Hot Work event.
  - .4 Designation of a person on site as a Fire Safety Watcher responsible to conduct a fire safety watch for a minimum duration of 60 minutes immediately following the completion of the Hot Work.
  - .5 Compliance with fire safety codes, standards and occupational health and safety regulations specified.
  - .6 Site specific rules and procedures in force at the site as provided by the Facility Manager.
- .3 Generic procedures, if used, must be edited and supplemented with pertinent information tailored to reflect specific project conditions. Label document as being the Hot Work Procedures for this contract.
- .4 Procedures shall clearly establish responsibilities of:
  - .1 Worker performing hot work,
  - .2 Person issuing the Hot Work Permit,
  - .3 Fire Safety Watcher,

.4 Subcontractor(s) and Contractor.

.5 Brief all workers and subcontractors on Hot Work Procedures and of Permit system. Stringently enforce compliance.

.6 Failure to comply with fire safety procedures may result in the issue of a Non-Compliance notification as specified in Section 01 35 29.

1.9 HOT WORK PERMIT

.1 Hot Work Permit to include the following:

- .1 Project name and project number;
- .2 Building name and specific room or area where hot work will be performed;
- .3 Date of issue;
- .4 Description of hot work type needed;
- .5 Special precautions to be followed, including type of fire extinguisher needed;
- .6 Name and signature of permit issuer.
- .7 Name of worker to which the permit is issued.
- .8 Permit validity period not to exceed 8 hours. Indicate start time/date and termination time/date.
- .9 Worker's signature with time/date of hot work completion.
- .10 Stipulated time period of safety watch.
- .11 Fire Safety Watcher's signature with time/date.

.2 Permit to be typewritten form. Industry Standard forms shall only be used if all data specified above is included on form.

.3 Each Hot Work Permit to be completed in full, signed and returned to Contractor's Superintendent for safe keeping on site.

1.10 FIRE PROTECTION AND ALARM SYSTEMS

.1 Fire protection and alarm systems shall not be:

- .1 Obstructed.
- .2 Shut-off, unless approved by Departmental Representative.
- .3 Left inactive at the end of a working day or shift.

.2 Do not use fire hydrants, standpipes and hose systems for purposes other than fire fighting.

- .3 Costs incurred, from the fire department, Facility owner and tenants, resulting from negligently setting off false alarms will be charged to the Contractor in the form of financial progress payment reductions and holdback assessments against the Contract.

1.11 DOCUMENTS  
ON SITE

- .1 Keep Hot Work Permits and Hazard assessment documentation on site for duration of Work.
- .2 Upon request, make available to Departmental Representative or to authorized safety Representative for inspection.

- 1.1 SECTION INCLUDES .1 Procedures to isolate and lockout electrical facility and other equipment from energy sources.
- 1.2 RELATED WORK .1 Section 01 35 28: Health and Safety
- 1.3 REFERENCES .1 CSA C22.1-06 - Canadian Electrical Code, Part 1, Safety Standard for Electrical Installations.  
.2 CAN/CSA C22.3 No.1-06 - Overhead Systems.  
.3 CSA C22.3 No.7-06 - Underground Systems.  
.4 COSH: Canada Occupational Health and Safety Regulations made under Part II of the Canada Labour Code.
- 1.4 DEFINITIONS .1 Electrical Facility: means any system, equipment, device, apparatus, wiring, conductor, assembly or part thereof that is used for the generation, transformation, transmission, distribution, storage, control, measurement or utilization of electrical energy, and that has an amperage and voltage that is dangerous to persons.  
.2 Guarantee of Isolation: means a guarantee by a competent person in control or in charge that a particular facility or equipment has been isolated.  
.3 De-energize: in the electrical sense, that a piece of equipment is isolated and grounded, e.g. if the equipment is not grounded, it cannot be considered de-energized (DEAD).  
.4 Guarded: means that an equipment or facility is covered, shielded, fenced, enclosed, inaccessible by location, or otherwise protected in a manner that, to the extent that is reasonably practicable, will prevent or reduce danger to any person who might touch or go near such item.  
.5 Isolate: means that an electrical facility, mechanical equipment or machinery is separated or disconnected from every source of electrical, mechanical, hydraulic, pneumatic or other kind of energy that is capable of making it dangerous.

- .6 Live/alive: means that an electrical facility produces, contains, stores or is electrically connected to a source of alternating or direct current of an amperage and voltage that is dangerous or contains any hydraulic, pneumatic or other kind of energy that is capable of making the facility dangerous to persons.

1.5 COMPLIANCE REQUIREMENTS

- .1 Comply with the following in regards to isolation and lockout of electrical facilities and equipment:
  - .1 Canadian Electrical Code
  - .2 Federal and Provincial Occupational Health and Safety Acts and Regulations.
  - .3 Regulations and code of practice as applicable to mechanical equipment or other machinery being de-energized.
  - .4 Procedures specified herein.
- .2 In event of conflict between any provisions of above authorities the most stringent provision will apply. Should a dispute arise in determining the most stringent requirement, Departmental Representative will advise on the course of action to be followed.

1.6 SUBMITTALS

- .1 Submit copy of proposed lockout procedures and sample of lockout permit or lockout tags to Departmental Representative for review, within 14 calendar days of acceptance of bid.
- .2 Submit in accordance with section 01 33 00.

1.7 ISOLATION OF EXISTING SERVICES

- .1 Obtain Departmental Representative's written authorization prior to working on existing live or active electrical facilities and equipment and before proceeding with isolation of such item.
- .2 To obtain authorization, submit to Departmental Representative the following documentation:
  - .1 Written request to isolate the particular service or facility and;
  - .2 Copy of Contractor's Lockout Procedures.
- .3 Make a Request for Isolation for each event, unless directed otherwise by Departmental

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Representative, as follows:

- .1 Fill-out standard form in current use at the Facility as provided by Departmental Representative or;
  - .2 Where no form exist, make written request indicating:
    - .1 The equipment, system or service to be isolated and its location;
    - .2 Duration of isolation period (ie: start time & date and completion time & date).
    - .3 Voltage of service feed to system or equipment being isolated.
    - .4 Name of person making the request.
  - .4 Do not proceed with isolation until receipt of written notification from Departmental Representative granting the Isolation Request and authorization to proceed with the work.
    - .1 Note that Departmental Representative may designate another person at the Facility being authorized to grant the Isolation Request.
  - .5 Conduct safe, orderly shutdown of equipment or facility. De-energize, isolate and lockout power and other sources of energy feeding the equipment or facility.
  - .6 Determine in advance, as much as possible, in cooperation with the Departmental Representative, the type and frequency of situations which will require isolation of existing services.
  - .7 Plan and schedule shut down of existing services in consultation with the Departmental Representative and the Facility Manager. Minimize impact and downtime of Facility operations. Follow Departmental Representative's directives in this regard.
  - .8 Conduct hazard assessment as part of the process in accordance with health and safety requirements specified Section 01 35 28.
- 1.8 LOCKOUTS
- .1 De-energize, isolate and lockout electrical facility, mechanical equipment and machinery from all potential sources of energy prior to working on such items.

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- .2 Develop and implement clear and specific lockout procedures to be followed as part of the Work.
  - .3 Prepare typed written Lockout Procedures describing safe work practices, procedures, worker responsibilities and sequence of activities to be followed on site by workforce to safely isolate an active piece of equipment or electrical facility and effectively lockout and tag out it's sources of energy.
  - .4 Include as part of the Lockout Procedures a system of lockout permits managed by Contractor's Superintendent or other qualified person designated by him/her as being "in-charge" at the site.
    - .1 A lockout permit shall be issued to specific worker providing a Guarantee of Isolation before each event when work must be performed on a live equipment or electrical facility.
    - .2 Duties of person managing the permit system to include:
      - .1 Issuance of permits and lockout tags to workers.
      - .2 Determining permit duration.
      - .3 Maintaining record of permits and tags issued.
      - .4 Making a Request for Isolation to Departmental Representative when required as specified above.
      - .5 Designating a Safety Watcher, when one is required based on type of work.
      - .6 Ensuring equipment or facility has been properly isolated.
      - .7 Collecting and safekeeping lockout tags returned by workers as a record of the event.
  - .5 Clearly establish, describe and allocate responsibilities of:
    - .1 Workers.
    - .2 Person managing the lockout permit system.
    - .3 Safety Watcher.
    - .4 Subcontractor(s) and General Contractor.
  - .6 Generic procedures, if used, must be edited and supplemented with pertinent information to reflect specific project requirements.
    - .1 Incorporate site specific rules and procedures in force at site as provided by Facility Manager through the Departmental

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Representative.

.2 Clearly label the document as being the Lockout procedures applicable to work of this contract.

.7 Use energy isolation lockout devices specifically designed and appropriate for type of facility or equipment being locked out.

.8 Use industry standard lockout tags.

.9 Provide appropriate safety grounding and guards as required.

1.9 CONFORMANCE

.1 Brief all workers and subcontractors on requirements of this section. Stringently enforce use and compliance.

.2 Failure to follow lockouts procedures specified herein may result in the issuance of a Non-Compliance notification as specified in section 01 35 28.

1.10 DOCUMENTS  
ON SITE

.1 Post Lockout Procedures on site in common location for viewing by workers.

.2 Keep copies of Request for Isolation forms and lockout permits and tags issued to workers on site for full duration of Work.

.3 Upon request, make available to Departmental Representative or to authorized safety Representative for inspection.

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- 1.1 RELATED WORK .1 Section 01 35 24: Special Procedures on Fire Safety Requirements.
- .2 Section 01 35 25: Special Procedures on Lockout Requirements.
- 1.2 SUBMITTALS .1 Submit to Departmental Representative copies of the following documents, including updates:
- .1 Site Specific Health and Safety Plan.
  - .2 Building Permit, compliance certificates and other permits obtained.
  - .3 Reports or directions issued by Federal, Provincial or other authority having jurisdiction.
  - .4 Accident or Incident Reports.
  - .5 MSDS data sheets.
  - .6 Name of Contractor's Representative designated to perform full time health and safety supervision on site.
- .2 Upon request by Departmental Representative, submit reports and other documentation as stipulated to be produced and maintained by Federal and Provincial Occupational Health and Safety Regulations and as specified herein.
- .3 Submit above documents in accordance with the submittal procedures specified in Section 01 33 00.
- 1.3 COMPLIANCE REQUIREMENTS .1 Comply with the Occupational Health and Safety Act for the Province of Newfoundland and Labrador, and the Occupational Health & Safety Regulations made pursuant to the Act.
- .2 Comply with Canada Labour Code Part II, and the Canada Occupational Safety and Health Regulations made under Part II of the Canada Labour Code.
- .3 Observe and enforce construction safety measures required by:
- .1 National Building Code of Canada;
  - .2 Provincial Worker's Compensation Board;
  - .3 Municipal statutes and ordinances.

- .4 In event of conflict between any provisions of above authorities the most stringent provision will apply. Should a dispute arise in determining the most stringent requirement, Departmental Representative will advise on the course of action to be followed.
- .5 A copy of the Canada Labour Code Part II may be obtained by contacting:

Canadian Government Publishing  
Public Works & Government Services Canada  
Ottawa, Ontario, K1A 0S9  
Tel: (819) 956-4800 (1-800-635-7943)  
Publication No. L31-85/2000 E or F)

- .9 Maintain Workers Compensation Coverage for duration of Contract. Submit Letter of Good Standing to Departmental Representative upon request.

#### 1.4 RESPONSIBILITY

- .1 Be responsible for health and safety of persons on site, of property and for protection of persons and public circulating adjacent to work operations to extent that they may be affected by conduct of the Work.
- .2 Enforce compliance by all workers, sub-contractors and other persons granted access to work site with safety requirements of Contract Documents, applicable Federal, Provincial, and local statutes, regulations, and ordinances, and with site-specific Health and Safety Plan.

#### 1.5 SITE CONTROL AND ACCESS

- .1 Control work site and entry points to construction areas.
  - .1 Delineate and isolate construction areas from other areas of Facility by use of appropriate means.
  - .2 Post notices and signage at entry points and at other strategic locations identifying entrance onto site to be restricted to authorized persons only.
  - .3 Signage must be professionally made, bilingual in both official languages or display internationally understood graphic symbols.
- .2 Approve and grant access to site only to workers

and authorized persons.

.1 Immediately stop non-authorized persons from circulating in construction areas and remove from site.

.2 Provide site safety orientation to all persons before granting access. Advise of site conditions, hazards and mandatory safety rules to be observed on site.

.3 Secure site at night time to extent required to protect against unauthorized entry.

.4 Ensure persons granted access to site wear appropriate personal protective equipment (PPE) suitable to work and site conditions.

.1 Provide such PPE to authorized persons who require access to perform inspections or other approved purposes.

#### 1.6 PROTECTION

.1 Carry out work placing emphasis on health and safety of the Public, Facility personnel, construction workers and protection of the environment.

.2 Erect safety barricades, lights and signage on site to effectively delineate work areas, protect pedestrian traffic around and adjacent to work and to create a safe working environment.

.1 Erect, hoarding and temporary lighting as required. See Section 01 50 00 for minimum acceptable barricades.

.3 Should unforeseen or peculiar safety related hazard or condition become evident during performance of work, immediately take measures to rectify the situation and prevent damage or harm. Advise Departmental Representative verbally and in writing.

#### 1.7 PERMITS

.1 Post on site permits, licenses, compliance certificates specified in section 01 10 10.

.2 Where particular permit or compliance certificate cannot be obtained at the required stage of work, notify Departmental Representative in writing and obtain his/her approval to proceed before carrying out that portion of work.

1.8 HAZARD  
ASSESSMENTS

- .1 Conduct site specific health and safety hazard assessment before commencing project and during course of the work. Identify risks and hazards resulting from site conditions, weather conditions and work operations.
  - .1 Perform on-going assessments addressing new risks and hazards as work progresses including when new subtrade or subcontractor arrives on site.
  - .2 Also, conduct assessment when the scope of work has been changed by Change Order and when potential hazard or weakness in current health and safety practices are identified by Departmental Representative or by an authorized safety Representative.
- .2 Record results in writing and address in Health and Safety Plan.
- .3 Keep copy of all assessments on site.

1.9 PROJECT/SITE  
CONDITIONS

- .1 The following are known or potential project related health, environmental and safety hazards at site which must be properly managed if encountered during course of work:
  - .1 Environmental hazards lead, mould, MSDS, spills, ventilation required, heat stress, cold.
  - .2 Access to site scaffolding, slips, hoarding, safe access to other tenants.
  - .3 Communication plan.
  - .4 Lock out procedures, hot work, fire watch, traffic control, HVAC contamination from construction activity, emergency response, maintaining sprinkler system.
  - .5 Personal limitation of workers.
  - .6 PPE, working at heights.
  - .7 Activity hazards, electrical cord and equipment, airborne particles, energized equipment, burn/heat source/torching.
  - .8 Working at heights, barricades, holes, protection from falling items.
- .2 Above list shall not be construed as being complete and inclusive of potential health, and safety hazards encountered during work. Include above items into hazard assessment process.
- .3 Obtain from Departmental Representative, copy of MSDS Data sheets for existing hazardous products stored on site or used by Facility personnel.

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- 1.10 HEALTH AND SAFETY MEETINGS
- .1 Attend pre-construction health and safety meeting conducted by Departmental Representative. Have following persons in attendance:
    - .1 Site Superintendent.
    - .2 Contractor's designated Health and Safety Site Supervisor.
    - .3 Departmental Representative will advise of date, time and location.
  - .2 Conduct health and safety meetings and tool box briefings on site. Hold on a regular and pre-scheduled basis during entire work in accordance with requirements and frequency as stipulated in provincial occupational health and safety regulations.
    - .1 Keep workers informed of potential hazards and provide safe work practices and procedures to be followed.
    - .2 Take written minutes and post on site.
- 1.11 HEALTH AND SAFETY PLAN
- .1 Develop written site-specific Project Health and Safety Plan, based on hazard assessments, prior to commencement of work.
    - .1 Submit copy to Departmental Representative within 21 calendar days of acceptance of bid.
    - .2 Submit updates as work progresses.
  - .2 Health and Safety Plan shall contain three (3) parts with following information:
    - .1 Part 1 - Hazards: List of individual health risks and safety hazards identified by hazard assessment process.
    - .2 Part 2 - Safety Measures: engineering controls, personal protective equipment and safe work practices used to mitigate hazards and risks listed in Part 1 of Plan.
    - .3 Part 3a: Emergency Response: standard operating procedures, evacuation measures and emergency response in the occurrence of an accident, incident or emergency.
      - .1 Include response to all hazards listed in Part 1 of Plan.
      - .2 Evacuation measures to complement the Facility's existing Emergency Response and Evacuation Plan. Obtain pertinent information from Departmental Representative.
      - .3 List names and telephone numbers of officials to contact including:
        - .1 General Contractor and all

Subcontractors.

.2 Federal and Provincial Departments as stipulated by laws and regulations and local emergency resource organizations, as needed based on nature of emergency or accident.

.3 Officials from PWGSC and site Facility management. Departmental Representative will provide list.

.4 Part 3b - Site Communications:

.1 Procedures used on site to share work related safety issues between workers, subcontractors, and General Contractor.

.2 List of critical tasks and work activities, to be communicated with the Facility Manager, which has risk of affecting tenant operations, or endangering health and safety of Facility personnel and the general public. Develop list in consultation with the Departmental Representative.

.3 Prepare Health and Safety Plan in a three column format, addressing the three parts specified above, as follows:

Column 1	Column 2	Column 3
Part 1 Identified Hazards	Part 2 Safety Measures	Part 3a/3b Emergency Response & Site Communications

.4 Develop Plan in collaboration with subcontractors. Address work activities of all trades. Revise and update Plan as Sub-contractors arrive on site.

.5 Implement and enforce compliance with requirements of Plan for full duration of work to final completion and demobilization from site.

.6 As work progresses, review and update Plan. Address additional health risks and safety hazards identified by on-going hazard assessments.

.7 Post copy of Plan, and updates, on site.

- .8 Submission of the Health and Safety Plan, and updates, to the Departmental Representative is for review and information purposes only. Departmental Representative's receipt, review and any comments made of the Plan shall not be construed to imply approval in part or in whole of such Plan by Departmental Representative and shall not be interpreted as a warranty of being complete and accurate or as a confirmation that all health and safety requirements of the Work have been addressed and that it is legislative compliant. Furthermore, Departmental Representative's review of the Plan shall not relieve the Contractor of any of his legal obligations for Occupational Health and Safety provisions specified as part of the Work and those required by provincial legislation.

1.12 SAFETY  
SUPERVISION AND  
INSPECTIONS

- .1 Designate one person to be present on site at all times, responsible for supervising health and safety of the Work.  
.1 Person to be competent in Occupational Health and Construction Safety as defined in the Provincial Occupational Health and Safety Act.
- .2 Assign responsibility, obligation and authority to such designated person to stop work as deemed necessary for reasons of health and safety.
- .3 Conduct regularly scheduled informal safety inspections of work site on a minimum bi-weekly basis.  
.1 Note deficiencies and remedial action taken in a log book or diary.
- .4 Conduct Formal Inspections on a minimum monthly basis.  
.1 Use standardized safety checklist forms.  
.2 Prepare written report of each inspection. Document deficiencies, remedial action needed and assign responsibility for rectification to appropriate subcontractor or worker.  
.3 Distribute monthly reports to subcontractors for their pursuance.  
.4 Follow-up and ensure appropriate action and corrective measures are taken.
- .5 Cooperate with Facility's Health and Safety Site Coordinator responsible for the entire site,

should one be designated by Departmental Representative.

.6 Keep inspection reports on site.

1.13 TRAINING

.1 Ensure that all workers and other persons granted access to site are competently trained and knowledgeable on:

.1 Safe use of tools and equipment.

.2 How to wear and use personal protective equipment (PPE).

.3 Safe work practices and procedures to be followed in carrying out work.

.4 Site conditions and minimum safety rules to be observed on site, as given at site orientation session.

1.14 MINIMUM  
SITE SAFETY RULES

.1 Notwithstanding the requirement to abide by federal and provincial health and safety regulations, the following safety rules shall be considered minimum requirements to be obeyed by all persons granted site access:

.1 Wear personnel protective equipment (PPE) appropriate to function and task on site; the minimum requirements being hard hat, safety footwear and eye protection.

.2 Immediately report unsafe activity or condition at site, near-miss accident, injury and damage.

.3 Maintain site in tidy condition.

.4 Obey warning signs and safety tags.

.2 Brief workers on site safety rules and on disciplinary measures to be taken by Departmental Representative for violation or non compliance of such rules. Post rules on site.

.3 The following actions or conduct by Contractor, workers and subcontractors will be considered as non conformance with the health and safety requirements of the contract for which a Non-Compliance Notification will be issued to the General Contractor by the Departmental Representative:

.1 Failure to follow the minimum site safety rules specified above.

.2 Negligence resulting in serious injury or major property damage.

.3 Deliberate non-compliance with Federal and

Provincial Acts and Regulations.

.4 Falsification of information in Workers Compensation Reports, safety reports and other health and safety related documents submitted to Departmental Representative or to Authority having jurisdiction.

.5 Possession of firearms on site.

.6 Possession of non-prescriptive illegal drugs or alcohol.

.7 Action, or lack thereof, resulting in the issuance of Warnings, Fines or Stop Work Orders from a Provincial Authority having jurisdiction.

.8 Violation of other specified health and safety rules and requirements as determined by Departmental Representative.

.4 See elsewhere in this section for details on Non-Compliance Notifications and resulting disciplinary measures.

1.15 ACCIDENT  
REPORTING

.1 Investigate and report the following incidents and accidents:

.1 Those as required by Provincial Occupational Safety and Health Act and Regulations.

.2 Injury requiring medical aid as defined in the Canadian Dictionary of Safety Terms-1987, published by the Canadian Society of Safety Engineers (C.S.S.E) as follows:

.1 Medical Aid Injury: any minor injury for which medical treatment was provided and the cost of which is covered by Workers' Compensation Board of the province in which the injury was incurred.

.3 Property damage in excess of \$5000.00,

.4 Interruption to Facility operations with potential loss to a Federal Dept. in excess of \$5000.00,

.5 Those which require notification to Workers Compensation Board or other regulatory agencies as stipulated by applicable law or regulations.

.2 Send written report to Departmental Representative for all above cases.

1.16 TOOLS AND  
EQUIPMENT SAFETY

.1 Routinely check and maintain tools, equipment and machinery for safe operation.

- .2 Conduct checks as part of site safety inspections. When requested, submit proof that checks and maintenance have been carried out.
- .3 Tag and immediately remove from site items found faulty or defective.

1.17 HAZARDOUS PRODUCTS

- .1 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS).
- .2 Keep MSDS data sheets for all products delivered to site. Post on site. Submit copy to Departmental Representative upon receipt.
- .3 On building renovation projects where work is within or immediately adjacent to occupied areas, also post copy of data sheets in a public location accessible to Facility personnel.

1.18 POWDER ACTUATED DEVICES

- .1 Use powder actuated fastening devices only after receipt of written permission from Departmental Representative.

1.19 CONFINED SPACES

- .1 Carry out work in confined spaces in compliance with:
  - .1 Provincial Occupational Safety and Health Regulations and;
  - .2 Canada Occupational Safety and Health Regulations (COSH) made under the Canada Labour Code - Part II.
- .2 Conduct hazard assessment and address in Safety Plan before entering confined space.
- .3 Obtain "Entry Permit" from Facility management before entering a Facility's known confined space in accordance with Part XI, Section 11.3, of COSH Regulations. Keep copy of permits received.
- .4 Provide and maintain equipment and PPE as required for the safety and emergency evacuation of persons entering confined spaces.
- .5 Provide training to persons who will be entering and to those persons who will be assisting in the confined space entry process. Training to be specialized instructions beyond (basic confined

space entry information) as required to suit type and conditions of confined space.

- 1.20 POSTING OF DOCUMENTS
- .1 Post on site safety documentation as stipulated by Authorities having jurisdiction and as specified herein. Place in a common visible location.
- 1.21 SITE RECORDS
- .1 Maintain on site a copy of all health and safety documentation and reports specified to be produced as part of the work and received from authorities having jurisdiction.
- .2 Upon request, make available to Departmental Representative and to other authorized safety representative for review. Provide copy when directed by Departmental Representative.
- 1.22 NON COMPLIANCE AND DISCIPLINARY MEASURES
- .1 Immediately address and correct health and safety violations and non-compliance issues.
- .2 Negligence or failure to follow occupational health and safety provisions specified in the Contract Documents and of those of applicable federal and provincial laws and regulations could result in disciplinary measures taken by the Departmental Representative against the General Contractor.
- .3 PWGSC uses a system of Non-Compliance Notifications and Disciplinary Measures on projects as follows:
- .1 A non-compliance notification will be issued to the General Contractor, by the Departmental Representative, whenever there is a violation or failure to follow any of the project's occupational health and safety requirements by a worker, subcontractor or any other person to whom the Contractor has granted access to the work site.
- .2 Non-Compliance notifications are progressive in nature resulting in increased disciplinary measures imposed depending on the frequency, nature and severity of the infraction.
- .3 Disciplinary measures could include:
- .1 Removal of the offending person or party from site;
- .2 Financial penalties in the form of

progress payment reduction or holdback assessments made against the Contract and;  
.3 Taking the Work Out of Contractor's Hands in accordance with the General Conditions.

- .4 Departmental Representative will make final decision as to what constitutes a violation and when to issue a Non-Compliance Notification.
- .5 Non-compliance Notifications issued by Departmental Representative shall not be construed as to overrule or disregard warnings, orders and fines levied against Contractor by a regulatory agency having jurisdiction.
- .6 Details of the Non-Compliance Notification and Disciplinary Measures system will be provided by Departmental Representative upon acceptance of bid and prior to commencement of work.
- .7 Each non-compliance notification issued is given a numerical rating based on a three level numbering system. Each level is progressive in nature to reflect:
  - .1 The seriousness of the infraction as viewed by the Departmental Representative.
  - .2 The degree of disciplinary action which will be taken by the Departmental Representative.
- .8 Numerical ratings are as follows:
  - .1 Non-Compliance Notification-Level No.1 Rating:
    - .1 Situation: occurrence of a first time infraction by a person or party on site.
    - .2 Action: verbal warning to General Contractor, documented in Departmental files and copy sent to the General Contractor.
  - .2 Non-Compliance Notification-Level No.2 Rating:
    - .1 Situation:
      - .1 The second occurrence of a previous infraction by the same person or party on site or;
      - .2 Accumulation of several level-1 notifications for different infractions by the same person or party on site or;

.3 Non-action on the part of the Contractor or subcontractor to rectify non-compliance infractions previously identified in one or several level-1 notifications or;

.4 Violation or non-observance of a Federal or Provincial safety Law or Regulation by subcontractor or Contractor or;

.5 Negligence by a person or party resulting in injury or major property damage.

.2 Action: written notice to General Contractor complete with an order for immediate remedial action to be taken. Depending on the severity of the offence, the order may include request for the immediate removal of the offending person or party from site.

.3 Non-Compliance Notification-Level No.3  
Rating:

.1 Situation:

.1 Continued and repeated non-compliance with health and safety requirements by the General Contractor or by subcontractor(s) or;

.2 The occurrence of a serious accident on site resulting in serious bodily injury or death.

.2 Action:

.1 Formal letter issued to General Contractor with an order to immediately stop the work until so notified to proceed.

.2 Review of all infractions and incident/accident occurrences with possible investigation by the Department of Public Works & Government Services Canada.

.3 Based on outcome of the review/investigation, Work could be suspended or taken out of the Contractor's hands in accordance with the General Conditions.

.3 The term "serious accident" used herein shall have the same meaning as defined in the Canadian Dictionary of Safety Terms - 1987 issue from the Canadian Society of Safety Engineers (C.S.S.E).

- .9 Decision on which rating level to be placed on any given Non-Compliance Notification will be determined solely by Departmental Representative.
- .10 Further details on the disciplinary system will be provided at the pre-construction Health and Safety meeting.
- .11 Be responsible to fully brief workers and subcontractors on the operation and importance of this system.

<u>Project Name</u> <u>&amp; Description</u>	<u>Start</u> <u>Dates or Months</u>	<u>Completion</u> <u>Duration</u>
.1	_____	_____
.2	_____	_____
.3	_____	_____

- .6 Departmental Representative will provide full description of Contracts listed above, complete with drawings and specifications, and name of each General Contractor prior to commencement of Work or immediately upon award of future contracts.

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- 1.1 RELATED WORK .1 Waste Management and Disposal: Section 01 74 21.
- 1.2 DEFINITIONS .1 Hazardous Material: Product, substance, or organism that is used for its original purpose; and that is either dangerous goods or a material that may cause adverse impact to the environment or adversely affect health of persons, animals, or plant life when released into the environment.
- 1.3 FIRES .1 Fires and burning of rubbish on site not permitted.
- 1.4 HAZARDOUS MATERIAL HANDLING .1 Store and handle hazardous materials in accordance with applicable federal and provincial laws, regulations, codes and guidelines. Store in location that will prevent spillage into the environment
- .2 Label containers to WHMIS requirements and keep MSDS data sheets on site for all hazardous materials.
- .3 Maintain inventory of hazardous materials and hazardous waste stored on site. List items by product name, quantity and date when storage began.
- .4 Store and handle flammable and combustible materials in accordance with National Fire Code.
- .5 Transport hazardous materials in accordance with federal Transportation of Dangerous Goods Regulations and applicable Provincial regulations.
- 1.5 DISPOSAL OF WASTES .1 Do not bury rubbish and waste materials on site. Dispose in accordance with project waste management requirements specified.
- .2 Do not dispose of hazardous waste or volatile materials, such as mineral spirits, paints, thinners, oil or fuel into waterways, storm or sanitary sewers or waste landfill sites.

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.3 Dispose of hazardous waste in accordance with applicable federal and provincial laws, regulations, codes and guidelines.

1.6 POLLUTION CONTROL

.1 Maintain temporary erosion and pollution control features during this contract.

.2 Control emissions from equipment and plant to local authorities' emission requirements.

.3 Prevent sandblasting and other extraneous materials from contaminating air beyond application area, by providing temporary enclosures.

.4 Cover or wet down dry materials and rubbish to prevent blowing dust and debris.

.5 Have appropriate emergency spill response equipment and rapid clean-up kit on site located adjacent to hazardous materials storage area. Provide personal protective equipment required for clean-up.

1.1 GENERAL

- .1 Due to nature of this Facility, and client operations therein, security regulations pertaining to site will be in place during the work resulting in need for:
  - .1 Control and limit movement of construction workers inside building;
  - .2 Specific rules and regulations as specified in this section and as directed by the Departmental Representative to be stringently followed.
- .2 It is the Contractor's responsibility to:
  - .1 Submit necessary documentation required for all workers;
  - .2 Become familiar with and abide by security rules and regulations;
  - .3 Brief all workers and subcontractors in respect of the security regulations and ensure that they abide by all rules and directives.
- .3 The Departmental Representative will coordinate a pre-construction meeting between Contractor, Facility Management and Security Personnel who will provide details and directives on control and movement on site.
- .4 Any infraction of site security regulations on the part of the Contractor, members of work force or any Subcontractor in his employ, could result in:
  - .1 Financial penalties in the form of progress payment reduction or holdback assessments being levied against the Contractor and;
  - .2 Demand immediate removal of offending party from the site.

1.2 SECURITY PERSONNEL

- .1 Pay costs of facility security staff during all after hours and weekend work. Building security must be present while contractor is on site. Hourly cost may be obtained from PWGSC representative.

1.3 SECURITY CLEARANCE REQ'TS

- .1 Security Passes:
  - .1 Visitor or worker ID Tags are required for all personnel requiring access inside the

building.

.2 ID Tags will be provided by the Facility Security, issued to Contractor for distribution to authorized workers which shall also be placed on the Security Control List specified below.

.3 All persons while on site, must wear the ID Tag issued to him regardless of daytime or nighttime work.

.4 Be responsible to obtain ID Tags before work commences, including those required by subcontractors, and continually control their distribution and use by workers. Submit request for tags as early as possible prior to commencement of work.

.5 For the duration of this contract, anyone not in possession of the ID Tag will not be allowed access on site.

.6 At end of project, return to Departmental Representative all tags issued to workers and to subcontractors.

.1 The Departmental Representative will levy a financial penalty in the form of a holdback assessment against the Contract for each pass not returned regardless of the reason the pass is not returned.

.7 Immediately report any lost, stolen or destroyed ID Tags to the Departmental Representative.

1.4 SECURITY CONTROL LIST

- .1 Provide a list of employee names from workforce and from subcontractors who will be present at site during the course of work.
- .2 List to include each person's name, address and telephone number.
- .3 Submit copy of list to Departmental Representative and to Security Commissionaire for control of workers.
- .4 Update list as work progresses.
- .5 Ensure that each worker can provide proof of identity upon demand, when requested by

Facility's Security Personnel, Departmental Representative or by Facility Management.

1.5 BUILDING ACCESS

- .1 Keys and door security access cards necessary for access to restricted areas may be issued at the discretion of the Building Manager and the Departmental Representative. Follow all instructions in regards to use, care and disposition of all keys and access cards so issued.
- .2 Keys and security access cards given to the Commissionaire for his sole possession, as determined by Departmental Representative, shall not under any circumstances be given to any worker or subcontractor.
- .3 Do not, under any circumstances, make or allow workers to make duplicates of keys issued.
- .4 At end of project, return to Departmental Representative all keys and access cards issued. Departmental Representative will deduct from final contract payment, \$25.00 for each item not returned, regardless of the reason.
- .5 Immediately report to Departmental Representative any lost, stolen or destroyed keys and door security access cards.

1.6 SITE SECURITY

- .1 Where work of this contract requires use of a permanently locked door, it is Contractor's responsibility to ensure that door is unlocked and locked after each use or provide a competent security guard, posted at door, when door must remain open for an elongated period of time during a particular workshift.
  - .1 Notify Building Security when security doors will be used and stringently follow all directives to ensure building security is effectively maintained.
- .2 Where work of this contract results in removal of doors or walls (providing security to the exterior or between spaces and suites), erect temporary security hoarding over openings constructed in such a way to provide the same degree of security as doors/walls removed.

- .3 When work must be carried out during Off Hours or beyond the work hours previously agreed upon at start of work; provide notice within 48 hours beforehand to minimize impact on Facility's security and tenant operations.
- .4 Off Hours are defined in section 01 14 10.

1.1 INSPECTION

- .1 Give timely notice requesting inspection of Work designated for special tests, inspections or approvals by Departmental Representative or by inspection authorities having jurisdiction.
- .2 In accordance with the General Conditions, Departmental Representative may order any part of Work to be examined if Work is suspected to be not in accordance with Contract Documents.
- .3 If Contractor covers or permits to be covered Work designated for special tests, inspections or approvals before such is made, uncover Work until particular inspections or tests have been fully and satisfactorily completed and until such time as Departmental Representative gives permission to proceed.
- .4 Pay costs to uncover and make good work disturbed by inspections and tests.

1.2 TESTING

- .1 Tests on materials, equipment and building systems as specified in various sections of the Specifications is the responsibility of the Contractor except where stipulated otherwise.
  - .1 Provide all necessary instruments, equipment and qualified personnel to perform tests.
- .2 At completion of tests, turn over 2 sets of fully documented tests reports to the Departmental Representative. Submit in accordance with Section 01 33 00.
  - .1 Obtain additional copies for inclusion of a complete set in each of the maintenance manuals specified in Section 01 78 00.
- .3 Unspecified tests may also be made by Departmental Representative, at the discretion of the Departmental Representative. The costs of these tests will be paid for by the Departmental Representative.
- .4 Where tests or inspections reveal work not in accordance with contract requirements, Contractor shall pay costs for additional tests and inspections incurred by Departmental Representative as required to verify acceptability of corrected work.

1.3 INDEPENDENT  
INSPECTION AGENCIES

- .1 Departmental Representative may engage and pay for service of Independent Inspection and Testing Agencies for purpose of inspecting and testing portions of Work except for the following which remain part of Contractor's responsibilities:
  - .1 Inspection and testing required by laws, ordinances, rules, regulations or orders of public authorities.
  - .2 Inspection and testing performed exclusively for Contractor's convenience.
  - .3 Testing, adjustment and balancing of mechanical and electrical equipment and other building systems.
  - .4 Performance verification tests before building commissioning procedures commences.
  - .5 Mill tests and certificates of compliance.
  - .6 Tests as specified within various sections designated to be carried out by Contractor under the supervision of Departmental Representative.
  - .7 Air quality monitoring and testing during hazardous materials abatement.
  - .8 Additional tests as specified in Clause 1.3.4 above.
- .2 Provide sufficient advance notice to Departmental Representative of time when the Work will be ready for testing by designated Testing Agency in order for Departmental Representative to make attendance arrangements with such Agency. When directed by Departmental Representative notify the Agency directly.
- .3 When specified or directed, submit Representative samples of materials, in required quantities, to Testing Agency for testing purposes. Submit with reasonable promptness and in an orderly sequence so as not to cause delay in Work.
- .4 Provide labour and facilities to obtain, handle and deliver samples.
- .5 Provide sufficient space on site for Testing Agency's exclusive use to store equipment and cure test samples.
- .6 Employment of Independent Inspection and Testing Agencies by Departmental Representative does not

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relax responsibility to perform Work in accordance with Contract Documents.

1.4 ACCESS TO WORK

- .1 Facilitate Departmental Representative's access to Work. If part of Work is being fabricated at locations other than construction site, make preparations to allow access to such Work whenever it is in progress.
- .2 Furnish labour and facility to provide access to the work being inspected and tested.
- .3 Co-operate to facilitate such inspections and tests.

1.5 REJECTED WORK

- .1 Remove and replace defective Work, whether result of poor workmanship, use of defective or damaged products and whether incorporated in Work or not, which has been identified by Departmental Representative as failing to conform to Contract Documents.
- .2 Make good damages to new and existing construction and finishes resulting from removal or replacement of defective work.

1.6 MOCK-UPS

- .1 Prepare mock-ups of certain work as specified in various sections of the Specifications. Include in each mock-up all related work components representative of final assembly.
- .2 Construct in locations acceptable to Departmental Representative.
- .3 Prepare mock-ups for Departmental Representative's review with reasonable promptness and in an orderly sequence, so as not to cause any delay in Work.
- .4 Failure to prepare mock-ups in ample time is not considered sufficient reason for an extension of Contract Time and no claim for extension by reason of such default will be allowed.
- .5 If requested, Departmental Representative will assist in preparing a schedule fixing dates for preparation.

- .6 Dismantle and remove mock-up when directed by Departmental Representative, unless approval is given for mock-up to remain as part of the Work.

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- 1.1 SITE ACCESS AND PARKING
- .1 The Departmental Representative will designate Contractor's access to project site as well as parking facilities for equipment and workers.
  - .2 The Contractor is advised that while parking facilities for his workers and subcontractors MAY be on property, such parking facilities may be remote from the actual site of the work. In any case, follow all instructions from the Departmental Representative in regards to parking facilities. Availability of on-site parking is not, however guaranteed.
- 1.2 BUILDING ACCESS
- .1 Use only access doors, and circulation routes within building as designated by Departmental Representative to access interior work.
- 1.3 MATERIAL STORAGE
- .1 Locate site storage trailers where directed by Departmental Representative. Place in location of least interference with existing Facility operations.
  - .2 Material storage space on site is limited. Coordinate delivery to minimize storage period on site before being needed for incorporation into work. Storage within the building is not available.
- 1.4 INTERIOR HOARDING
- .1 Erect hoarding inside building to isolate construction areas, protect occupants and public and maintain security for duration of work.
  - .2 Construct hoarding as follows:
    - .1 Height: to underside of ceiling above.
    - .2 Framing type: 89 mm metal stud spaced at 400 mm oc
    - .3 Covering: 12 mm thick painted gypsum board, finished and painted: .
    - .4 Sealed to abutting surfaces.
    - .5 Access Doors: 1 quantity steel pedestrian door dust tight lockable.
    - .6 Scribed to underside and profile of ceiling above.

1.5 INTERIOR DUST  
CONTROL AND  
DUST BARRIERS

- .1 Control creation and spread of dust and dirt to building interior and in particular to areas within premises still under use by occupants.
- .2 Develop and implement a dust control plan, addressing effective measures to carry out work with least amount of dust being created and propagated.
  - .1 Carefully evaluate the type of work to be undertaken and the physical layout of each work area on site.
  - .2 Provide specifically tailored strategy for each work area.
  - .3 Pre-determine location and placement of dust barriers to confine resulting dust to immediate work area.
  - .4 Inform Departmental Representative of the proposed dust control measures to be followed at each work area and for each major dust generating activities. Obtain Departmental Representative's approval before proceeding with work.
- .3 Dust control plan to incorporate as a minimum the following dust protection and cleaning requirements:
  - .1 Erect dustproof partitions in addition to construction hoarding specified in 1.4 above completely around work area to fully isolate construction from other parts of the building.
    - .1 Erect from floor to underside of ceiling above, sheathing applied to occupied side of partition.
    - .2 Scribe, cut and fit sheathing tight to shape of structural steel, deck profile and to other obstructions in ceiling space and abutting walls.
    - .3 Use compressible neoprene gaskets around perimeter of partition and at all protrusions to achieve airtight construction.
    - .4 Where partition is exposed to public view, tape and finish drywall joints and paint surface to color approved by the Departmental Representative.
  - .3 Provide a "dust tight" and lockable access door(s) within dust partition or between rooms for worker entry into work area. This is of particular importance for situations where

excessive dust will be generated.

.4 Provide additional dust barriers, placed tightly to underside of the floor/roof deck above, in locations where existing walls are used as part of the dust barrier system but simply terminate at the finished ceiling level resulting in an open space above, or other similar condition, permitting dust to migrate beyond the construction areas.

.5 Make all dust barriers airtight, effectively blocking and stopping all dust migration.

.6 Inspect dust barriers at various intervals during each work shift. Immediately fix tears, unsealed edges and maintain barriers effectively sealed for the entire work duration.

.7 Shut down existing ventilation system feeding construction space, or disconnect and seal-off supply and return air ducts to stop dust from contaminating other areas.

.8 Immediately clean areas in use by occupants and public contaminated by work.

.1 Vacuum carpets, wash floors and walls. Remove accumulated dust from all surfaces. Clean and remove smears, scuffs and marks.

.4 Meager attempts at controlling dust will not be tolerated. Failure to provide effective dust control during work and to perform satisfactory cleaning thereafter will result in Departmental Representative to proceed and obtain a separate cleaning service agency to perform cleaning to tenant's satisfaction with cost for such services being charged against this Contract in the form of financial holdbacks.

.5 Obtain Departmental Representative's approval before erecting any dust partitions simply to underside of finish ceiling.

.6 Construction of dust barriers, enclosures and placement of temporary protective devices to be performed during Facility non-operational off-hour periods.

1.6 SANITARY  
FACILITIES

.1 Sanitary facilities are available at the site and may be used by Contractor's work force. Make arrangements for the use of such facilities through the Departmental Representative.

1.7 POWER

- .1 Power supply is available and will be provided for construction usage at no cost.
  - .1 Make arrangements for the use of such services through the Departmental Representative.
  - .2 Departmental Representative will designate and approve each location of existing power source to which connections can be made to obtain temporary power service.
  - .3 Connect to existing power supply in accordance with Canadian Electrical Code.
- .2 Provide and pay all costs to supply and install temporary cabling, panel boards, switching devices and other equipment as required to connect into power source, provide adequate ground fault protection and extend power supply from existing source to work areas. Perform work and make all connections in accordance with the Canadian Electrical Code, in compliance with the federal and provincial Occupational Health and Safety Regulations as specified in section 01 35 29 and to lockout requirements specified in section 01 35 25.
- .3 Provide and maintain temporary lighting to conduct work. Ensure illumination level is not less than 162lx in all locations.
- .4 Electrical power and lighting systems installed under this Contract can be used for construction requirements provided that guarantees are not affected thereby. Make good damage. Replace lamps which have been used over period of 3 months.

1.8 WATER SUPPLY

- .1 Water supply is available in existing building and will be provided for construction usage at no cost. Make arrangements for the use and transportation of such services to work area through the Departmental Representative.
- .2 Permanent water supply system installed under this Contract can be used for construction requirements provided that guarantees are not affected thereby. Make good damage.

1.9 SCAFFOLDING

- .1 Design, construct and maintain scaffolding in rigid, secure and safe manner in accordance with CAN/CSA-S269.2-M87(R2003).

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- .2 Erect scaffolding independent of walls. Remove when no longer required.
- 1.10 HEATING AND VENTILATING
- .1 Provide temporary ventilation in enclosed areas as required to:
    - .1 Facilitate progress of work.
    - .2 Provide adequate ventilation to meet health regulations for safe working environment.
  - .2 Ventilating:
    - .1 Prevent accumulations of dust, fumes, mists, vapours or gases in areas occupied during construction.
    - .2 Provide local exhaust ventilation to prevent harmful accumulation of hazardous substances into atmosphere of occupied areas.
    - .3 Dispose of exhaust materials in manner that will not result in harmful exposure to persons.
    - .4 Ventilate storage spaces containing hazardous or volatile materials.
    - .5 Ventilate temporary sanitary facilities.
    - .6 Continue operation of ventilation and exhaust system for time after cessation of work process to assure removal of harmful contaminants.
  - .3 Maintain strict supervision of operation of temporary ventilating equipment to:
    - .1 Conform with applicable codes and standards.
    - .2 Enforce safe practices.
    - .3 Prevent abuse of services.
    - .4 Prevent damage to finishes.
  - .4 Submit bid assuming existing or new equipment and systems will be used for temporary heating.
  - .5 Upon acceptance of bid, Departmental Representative may permit use of permanent system providing agreement can be reached on:
    - .1 Conditions of use, special equipment, protection and maintenance.
    - .2 Saving on Contract price.
    - .3 Provisions relating to warranties on equipment.
- 1.11 CONSTRUCTION SIGN AND NOTICES
- .1 Safety and Instruction Signs and Notices:
    - .1 Signs and notices for safety and instruction

shall be in both official languages or commonly understood graphic symbols conforming to CAN3-Z321-96(R2006).

- .2 Maintenance and Disposal of Site Signs:
  - .1 Maintain approved signs and notices in good condition for duration of project and dispose of off site on completion of project or earlier if directed by Departmental Representative.

1.12 REMOVAL OF  
TEMPORARY  
FACILITIES

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- .1 Remove temporary facilities from site when directed by Departmental Representative.

1.1 GENERAL

- .1 Use new material and equipment unless otherwise specified.
- .2 Within 7 days of written request by Departmental Representative, submit following information for any materials and products proposed for supply:
  - .1 Name and address of manufacturer.
  - .2 Trade name, model and catalogue number.
  - .3 Performance, descriptive and test data.
  - .4 Compliance to specified standards.
  - .5 Manufacturer's installation or application instructions.
  - .6 Evidence of arrangements to procure.
  - .7 Evidence of manufacturer delivery problems or unforeseen delays.
- .3 Provide material and equipment of specified design and quality, performing to published ratings and for which replacement parts are readily available.
- .4 Use products of one manufacturer for equipment or material of same type or classification unless otherwise specified.
- .5 Permanent labels, trademarks and nameplates on products are not acceptable in prominent locations, except where required for operating instructions, or when located in mechanical or electrical rooms.

1.2 PRODUCT QUALITY

- .1 Contractor shall be solely responsible for submitting relevant technical data and independent test reports to confirm whether a product or system proposed for use meets contract requirements and specified standards.
- .2 Final decision as to whether a product or system meets contract requirements rest solely with the Departmental Representative in accordance with the General Conditions of the Contract.

1.3 ACCEPTABLE MATERIALS AND ALTERNATIVES

- .1 Acceptable Materials: When materials specified include trade names or trademarks or manufacturers or supplier's name as part of the material description, select and only use one of

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the names listed for incorporation into the Work.

- .2 Alternative Materials: Submission of alternative materials to trade names or manufacturer's names specified must be done during the bidding period following procedures indicated in the Instructions to Bidders.
- .3 Substitutions: After contract award, substitution of a specified material will be dealt with as a change to the Work in accordance with the General Conditions of the Contract.

1.4 MANUFACTURERS  
INSTRUCTIONS

- .1 Unless otherwise specified, comply with manufacturer's latest printed instructions for materials and installation methods to be used. Do not rely on labels or enclosure provided with products. Obtain written instructions directly from manufacturers.
- .2 Notify Departmental Representative in writing of any conflict between these specifications and manufacturer's instructions, so that Departmental Representative will designate which document is to be followed.

1.5 AVAILABILITY

- .1 Immediately notify Departmental Representative in writing of unforeseen or unanticipated material delivery problems by manufacturer. Provide support documentation as per clause 1.1.2 above.

1.6 WORKMANSHIP

- .1 Ensure quality of work is of highest standard, executed by workers experienced and skilled in respective duties for which they are employed.
- .2 Remove unsuitable or incompetent workers from site as stipulated in the General Conditions of the Contract.
- .3 Ensure cooperation of workers in laying out work. Maintain efficient and continuous supervision on site at all times.
- .4 Coordinate work between trades and subcontractors. See section 01 14 10 in this regard.

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- .5 Coordinate placement of openings, sleeves and accessories.
- 1.7 FASTENINGS - GENERAL
- .1 Provide metal fastenings and accessories in same texture, colour and finish as base metal in which they occur. Prevent electrolytic action between dissimilar metals. Use non-corrosive fasteners, anchors and spacers for securing exterior work and in humid areas.
- .2 Space anchors within limits of load bearing or shear capacity and ensure that they provide positive permanent anchorage. Wood or organic material plugs not acceptable.
- .3 Keep exposed fastenings to minimum, space evenly and lay out neatly.
- .4 Fastenings which cause spalling or cracking of material, to which anchorage is made are not acceptable.
- .5 Do not use explosive actuated fastening devices unless approved by Departmental Representative. See section on Health and Safety Requirements in this regard.
- 1.8 FASTENINGS - EQUIPMENT
- .1 Use fastenings of standard commercial sizes and patterns with material and finish suitable for service.
- .2 Use heavy hexagon heads, semi-finished unless otherwise specified.
- .3 Bolts may not project more than one diameter beyond nuts.
- .4 Use plain type washers on equipment, sheet metal and soft gasket lock type washers where vibrations occur and, use resilient washers with stainless steel.
- 1.9 STORAGE, HANDLING AND PROTECTION
- .1 Deliver, handle and store materials in manner to prevent deterioration and soiling and in accordance with manufacturer's instructions when applicable. Provide same degree of protection to materials supplied by Departmental Representative.

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- .2 Store packaged or bundled materials in original and undamaged condition with manufacturer's seal and labels intact. Do not remove from packaging or bundling until required in Work. Provide additional cover where manufacturer's packaging is insufficient to provide adequate protection.
  - .3 Store products subject to damage from weather in weatherproof enclosures.
  - .4 Store cementitious products clear of earth or concrete floors, and away from walls.
  - .5 Keep sand, when used for grout or mortar materials, clean and dry. Store sand on wooden platforms and cover with waterproof tarpaulins during inclement weather.
  - .6 Store sheet materials and lumber on flat, solid supports and keep clear of ground. Slope to shed moisture.
  - .7 Store and mix paints in heated and ventilated room. Remove oily rags and other combustible debris from site daily. Take every precaution necessary to prevent spontaneous combustion.
  - .8 Immediately remove damaged or rejected materials from site.
  - .9 Touch-up damaged factory finished surfaces to Departmental Representative's satisfaction. Use touch-up materials to match original. Do not paint over name plates.

1.10 CONSTRUCTION  
EQUIPMENT AND PLANT

- .1 On request, prove to the satisfaction of Departmental Representative that the construction equipment and plant are adequate to manufacture, transport, place and finish work to quality and production rates specified. If inadequate, replace or provide additional equipment or plant as directed.
- .2 Maintain construction equipment and plant in good operating order.

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- 1.1 GENERAL .1 Conduct cleaning and disposal operations to comply with local ordinances and anti-pollution laws.
- .2 Store volatile waste in covered locked metal containers, and remove from premises at end of each working day.
- .3 Provide adequate ventilation during use of volatile or noxious substances. Use of building ventilation systems is not permitted for this purpose.
- 1.2 MATERIALS .1 Use only cleaning materials recommended by manufacturer of surface to be cleaned, and as recommended by cleaning material manufacturer.
- 1.3 CLEANING DURING CONSTRUCTION .1 Maintain work areas and occupied area in a clean, tidy condition, free from accumulations of waste material dust, dirt and debris. Clean areas on a daily basis.
- .2 Keep building entrances, corridors, stairwells and tenant occupied areas of building in a clean dust free condition at all times. Conduct thorough cleaning of these areas at end of each workshift when used by workers or affected by the Work.
- .3 Provide on-site covered, locked steel containers for collection of waste materials and debris.
- .4 Use separate collection bins, clearly marked as to purpose, for source separation and recycling of waste and debris in accordance with waste management requirements specified.
- .5 Remove waste materials, and debris from site on a daily basis.
- .6 Schedule cleaning operations so that resulting dust, debris and other contaminants will not fall on wet, newly painted surfaces nor contaminate building systems.
- .7 Provide dust barriers, dividers, seals on doors and employ other dust control measures as required

to ensure that dust and dirt, generated by work, are not transmitted to other existing areas of building. Should dust migrate into tenant occupied and public areas of building, employ such means as may be necessary to immediately clean all contaminated surfaces to the satisfaction of the Departmental Representative.

.1 See Section 01 50 00 for requirements on dust control and for erection of dust partitions.

.8 Immediately clean all dust, dirt, smears, scuffs and soiled surfaces in lobbies, corridors, and within tenant occupied areas resulting from the Work.

.1 Perform cleaning, dusting and washing operations, carpet vacuuming (including shampooing if deemed required by Departmental Representative) and floor washing as necessary to thoroughly clean all soiled surfaces.

1.4 FINAL CLEANING

.1 In preparation for acceptance of the completed work perform final cleaning.

.2 Remove grease, dust, dirt, stains, labels, fingerprints, marks and other foreign materials, from interior and exterior finished surfaces. Clean and polish surfaces including glass, mirrors, hardware, wall tile, stainless steel, chrome, baked enamel, plastic laminate, mechanical and electrical fixtures.

.3 Replace items with broken pieces, scratches or disfigured.

.4 Clean lighting reflectors, lenses, and other lighting surfaces.

.5 Vacuum clean and dust building interiors, behind grilles, louvres and screens.

.6 Wax, seal, shampoo or prepare floor finishes as recommended by manufacturer.

.7 Inspect finishes, fitments and equipment. Ensure specified workmanship and operation.

.8 Clean equipment, washroom fixtures to a sanitary condition. Replace filters of mechanical equipment.

- 1.1 RELATED WORK .1 Environment Procedures: Section 01 35 43.
  
- 1.2 GENERAL .1 Carry out work placing maximum emphasis on the areas of:
  - .1 Waste reduction;
  - .2 Diversion of waste from landfill and;
  - .3 Material Recycling.
  
- 1.3 WASTE MANAGEMENT PLAN .1 Prior to commencement of work, prepare waste Management Workplan.
  - .2 Workplan to include:
    - .1 Waste audit.
    - .2 Waste reduction practices.
    - .3 Material source separation process.
    - .4 Procedures for sending recyclables to recycling facilities.
    - .5 Procedures for sending non-salvageable items and waste to approved waste processing facility or landfill site.
    - .6 Training and supervising workforce on waste management at site.
  - .3 Workplan to incorporate waste management requirements specified herein and in other sections of the Specifications.
  - .4 Develop Workplan in collaboration with all subcontractors to ensure all waste management issues and opportunities are addressed.
  - .5 Submit copy of Workplan to Departmental Representative for review and approval.
    - .1 Make revisions to Plan as directed by Departmental Representative.
  - .6 Implement and manage all aspects of Waste Management Workplan for duration of work.
  - .7 Revise Plan as work progresses addressing new opportunities for diversion of waste from landfill.
- 1.4 WASTE AUDIT .1 At project start-up, conduct waste audit of:
  - .1 Site conditions identifying salvageable and non-salvageable items and waste resulting from

demolition and removal work.

.2 Projected waste resulting from product packaging and from material leftover after installation work.

.2 Develop written list. Record type, composition and quantity of various salvageable items and waste anticipated, reasons for waste generation and operational factors which contribute to waste.

1.5 WASTE REDUCTION

.1 Based on waste audit, develop waste reduction program.

.2 Structure program to prioritize actions, with waste reduction as first priority, followed by salvage and recycling effort, then disposal as solid waste.

.3 Identify materials and equipment to be:  
.1 Protected and turned over to Departmental Representative when indicated.  
.2 Salvaged for resale by Contractor.  
.3 Sent to recycling facility.  
.4 Sent to waste processing/landfill site for their recycling effort  
.5 Disposed of in approved landfill site.

.4 Reduce construction waste during installation work. Undertake practices which will minimize waste and optimize full use of new materials on site, such as:  
.1 Use of a central cutting area to allow for easy access to off-cuts;  
.2 Use of off-cuts for blocking and bridging elsewhere.  
.3 Use of effective and strategically placed facilities on site for storage and staging of left-over or partially cut materials (such as gypsum board, plywood, ceiling tiles, insulation etc...) to allow for easy incorporation into work whenever possible avoiding unnecessary waste.

.5 Develop other strategies and innovative procedures to reduce waste such as minimizing the extent of packaging used for delivery of materials to site etc.

1.6 MATERIAL SOURCE  
SEPARATION PROCESS

- .1 Develop and implement material source separation process at commencement of work as part of mobilization and waste management at site.
- .2 Provide on-site facilities to collect, handle and store anticipated quantities of reusable, salvageable and recyclable materials.
  - .1 Use suitable containers for individual collection of items based on intended purpose.
  - .2 Locate to facilitate deposit but without hindering daily operations of existing building tenants.
  - .3 Clearly mark containers and stockpiles as to purpose and use.
- .3 Perform demolition and removal of existing building components and equipment following a systematic deconstruction process.
  - .1 Separate materials and equipment at source, carefully dismantling, labelling and stockpiling alike items for the following purposes:
    - .1 Reinstallation into the work where indicated.
    - .2 Salvaging reusable items not needed in project which Contractor may sell to other parties. Sale of such items not permitted on site.
    - .3 Sending as many items as possible to locally available recycling facility.
    - .4 Segregating remaining waste and debris into various individual waste categories for disposal in a "non-mixed state" as recommended by waste processing/landfill sites.
- .4 Isolate product packaging and delivery containers from general waste stream. Send to recycling facility or return to supplier/manufacturer.
- .5 Send leftover material resulting from installation work for recycling whenever possible.
- .6 Establish methods whereby hazardous and toxic waste materials, and their containers, encountered or used in the course work are properly isolated, stored on site and disposed in accordance with applicable laws and regulations from authorities having

jurisdiction.

- .7 Isolate and store existing materials and equipment identified for re-incorporation into the Work. Protect against damage.

1.7 WORKER TRAINING  
AND SUPERVISION

- .1 Provide adequate training to workforce, through meetings and demonstrations, to emphasize purpose and worker responsibilities in carrying out the Waste Management Plan.
- .2 Waste Management Coordinator: designate full-time person on site, experienced in waste management and having knowledge of the purpose and content of Waste Management Plan to:
  - .1 Oversee and supervise waste management during work.
  - .2 Provide instructions and directions to all workers and subcontractors on waste reduction, source separation and disposal practices.
- .3 Post a copy of Plan in a prominent location on site for review by workers.

1.8 CERTIFICATION OF  
MATERIAL DIVERSION

- .1 Submit to Departmental Representative, copies of certified weigh bills from authorized waste processing sites and sale receipts from recycling/reuse facilities confirming receipt of building materials and quantity of waste diverted from landfill.
- .2 Submit data at pre-determined project milestones as determined by Departmental Representative.
- .3 Compare actual quantities diverted from landfill with projections made during waste audit.

1.9 DISPOSAL  
REQUIREMENTS

- .1 Burying or burning of rubbish and waste materials is prohibited.
- .2 Disposal of waste, volatile materials, mineral spirits, oil, or paint thinner into waterways, storm, or sanitary sewers is prohibited.

- .3      Dispose of waste only at approved waste processing facility or landfill sites approved by authority having jurisdiction.
  
- .4      Contact the authority having jurisdiction prior to commencement of work, to determine what, if any, demolition and construction waste materials have been banned from disposal in landfills and at transfer stations. Take appropriate action to isolate such banned materials at site of work and dispose in strict accordance with provincial and municipal regulations.
  
- .5      Transport waste intended for landfill in separated condition, following rules and recommendations of Landfill Operator in support of their effort to divert, recycle and reduce amount of solid waste placed in landfill.
  
- .6      Collect, bundle and transport salvaged materials to be recycled in separated categories and condition as directed by recycling facility. Ship materials only to approved recycling facilities.
  
- .7      Sale of salvaged items by Contractor to other parties not permitted on site.

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- 1.1 SECTION INCLUDES .1 Administrative procedures preceding inspection and acceptance of Work by Departmental Representative.
- 1.2 RELATED SECTIONS .1 Section 01 78 00 - Closeout Submittals.
- 1.3 INSPECTION AND DECLARATION .1 Contractor's Inspection: Coordinate and perform, in concert with subcontractors, an inspection and check of all Work. Identify and correct deficiencies, defects, repairs and perform outstanding items as required to complete work in conformance with Contract Documents.  
.1 Notify Departmental Representative in writing when deficiencies from Contractor's inspection have been rectified and that Work is deemed to be complete and ready for Departmental Representative's inspection of the completed work.
- .2 Departmental Representative's Inspection: Accompany Departmental Representative during all substantial and final inspections of the Work.  
.1 Address defects, faults and outstanding items of work identified by such inspections.  
.2 Advise Departmental Representative when all deficiencies identified have been rectified.
- .3 Note that Departmental Representative will not issue a Certificate of Substantial Performance of the work until such time that Contractor performs following work and turns over the specified documents:  
.1 Project record as-built documents;  
.2 Final Operations and Maintenance manuals;  
.3 Maintenance materials, parts and tools;  
.4 Compliance certificates from applicable authorities;  
.5 Reports resulting from designated tests;  
.6 Demonstration and training complete with user manuals;  
.7 Manufacturer's Guarantee certificates.  
.8 Testing, adjusting and balancing of equipment and systems complete with submission of test reports.

- .9 Commissioning of equipment and systems specified.
  
- .4 Correct all discrepancies before Departmental Representative will issue the Certificate of Completion.

1.1 GENERAL

- .1 Submit closeout documents specified in this section prior to application for Certificate of Substantial Performance of the Work.
- .2 Submit data in sufficient lead time to allow adequate review by Departmental Representative.
- .3 Make revisions to data as directed by Departmental Representative based on review.

1.2 PROJECT RECORD DOCUMENTS

- .1 Departmental Representative will provide 2 white print copies of contract drawings specifically to record "as-built" conditions.
- .2 Maintain 1 set at site and record actual built conditions.
- .3 Mark each drawing with up-to-date, real time as-built conditions as work progresses.
- .4 Maintain drawings in good condition and make available for inspection by the Departmental Representative whenever requested.
- .5 Record changes in red ink on the prints. Mark only on 1 set of drawings and transfer data to other set at completion of project.
  - .1 Neatly transfer notations to second set also by use of red ink.
  - .2 Stamp all drawings of both sets with the notation "As-Built Drawings". Also sign and date drawings.
  - .3 Indicate all modifications, substitutions and deviations from that shown on the Contract Drawings or in Specifications.
- .6 Record following information:
  - .1 Field changes to dimensions and details;
  - .2 Any additional details produced in the course of the contract by the Departmental Representative to supplement or to change existing design drawings;
  - .3 All Change Orders issued, documenting accurately and consistently the changed condition as it applies to all affected drawing details.

- .7 Maintain As-built documents current as the contract progresses.
- .8 Submit both sets of as-builts drawings.

1.3 OPERATIONS & MAINTENANCE DATA

- .1 Submit 2 copies of Operations and Maintenance (O&M) manual(s).
- .2 O&M manuals to be hard cover three ring binder for 215 x 280 mm size paper. Each copy shall contain:
  - .1 Technical data for installation, operations and maintenance of products and systems supplied in project.
  - .2 Nameplate information for mechanical and electrical equipment.
  - .3 List of spare parts and tools.
  - .4 Original or certified copy of warranties and manufacturer's product guarantees.
  - .5 Reports of any field test.
  - .6 Complete set of reviewed shop drawings.
- .3 Provide cover sheet in each manual with:
  - .1 Project name and number
  - .2 Name and address of Contractor and subcontractors
  - .3 Date of submission
  - .4 Table of contents
- .4 Manuals to be in English language.

1.4 TOOLS AND PARTS

- .1 Supply special tools, wrenches and spare parts as supplied by manufacturer to disassemble, remove and reinstall components as needed for maintenance purposes.
- .2 Tag all items with name of associated equipment and function.
- .3 Turn items over to Departmental Representative immediately upon completion of work.
- .4 Where required, provide manufacturer's written instructions on intent and method of use.
- .5 Provide name, address and telephone number of nearest supplier.

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PWGSC

CLOSEOUT SUBMITTALS

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Parole Office Fit-Up CSC

12/10/2014

J.R. Smallwood Bldg.

Corner Brook, NL

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- .6 Prepare and include complete inventory list of items supplied into the maintenance manuals.

1.1 RELATED SECTIONS

- .1 Operations and Maintenance Manual: Section 01 78 00.

1.2 DESCRIPTION

- .1 Demonstrate scheduled operation and maintenance of equipment and systems to Owner's personnel prior to date of final inspection.
- .2 Departmental Representative will provide a list of Owner's personnel to receive instructions.
- .3 Cooperate with Departmental Representative in coordinating time and attendance of Owner's personnel with manufacturer's training Representative(s).

1.3 QUALITY CONTROL

- .1 Ensure that only personnel from own forces, Subcontractors or Suppliers competent and fully knowledgeable in the particular material component, equipment or system installation are used to provide training and demonstrations.
- .2 When specified in individual Sections, obtain the manufacturers authorized Representative to demonstrate operation of equipment and systems, instruct Owner's personnel, and provide written report that demonstration and instructions have been completed.
- .3 Upon request, provide evidence to Departmental Representative of individual Trainer's knowledge and qualifications.

1.4 SUBMITTALS

- .1 Submit schedule of time, date and complete list of equipment and systems for which demonstration and training sessions will be provided. Submit schedule a minimum of 2 weeks prior to designated dates, for Departmental Representative's approval.
- .2 Submit report within 1 week after completion of demonstration, that demonstration and instructions have been satisfactorily completed. Provide time and date of when each demonstration was actually given, with list of persons present.

1.5 CONDITIONS FOR  
DEMONSTRATIONS

- .1 Prior to carrying out demonstration and training, ensure that equipment has been inspected and tested, is fully operational, has been performance verified and TAB has been carried out.
- .2 Provide copies of completed operation and maintenance manuals for use in demonstrations and instructions.

1.6 PREPARATION

- .1 Verify that conditions for demonstration and instructions comply with requirements.
- .2 Verify that designated personnel are present.

1.7 DEMONSTRATION  
AND INSTRUCTIONS

- .1 Include the following items within the demonstration and training:
  - .1 Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, and maintenance of each of equipment.
  - .2 Instruct personnel in all phases of operation and maintenance using operation and maintenance manuals as the basis of instruction.
  - .3 Review contents of manual in detail to explain all aspects of operation and maintenance.
  - .4 Prepare and insert additional data in operations and maintenance manuals when the need for additional data becomes apparent during instructions.
  - .5 Provide other specific training and instructions as specified in trade sections.

1.8 TIME ALLOCATED  
FOR INSTRUCTIONS

- .1 Observe the allocated time period specified in trade sections. Provide additional time when required to ensure all personnel fully understand all aspects of the information and instructions being provided. Allow for questions by participants.

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- 1.1 SECTION INCLUDES
- .1 This section deals with commissioning activities to occur during the construction stage and the early period of facility occupancy stage.
  - .2 Section includes:
    - .1 Commissioning activities to be performed by the Contractor who is assigned membership on a Commissioning Team as part of the contract requirements.
    - .2 Commissioning activities to be performed by other members of the Commissioning Team.
  - .3 In general, Contractor's commissioning activities consists of performing specified tasks and functions to assist the Commissioning Agent, along with other members of the commissioning team who will commission various components and systems of the Facility.
- 1.2 RELATED SECTIONS
- .1 Operations and Maintenance Manuals: Section 01 78 00.
  - .2 Demonstration and Training: Section 01 79 00
- 1.3 BACKGROUND INFORMATION
- .1 Historically in the past, the term commissioning has been used in reference to the process used to conduct testing, adjusting and balancing of the heating, ventilation and air conditioning (HVAC) systems of a building.
  - .2 Commissioning (or the commissioning process), as understood by PWGSC, is a planned program of activities conducted in concert with other activities performed during each stage of project delivery.
    - .1 The commissioning process identifies issues during the Planning and Design stages which are addressed during the Construction and Occupancy Stages of a Facility to ensure that the built facility is constructed and proven to operate satisfactorily under all weather, environmental and occupancy conditions to meet operational and user requirements.
    - .2 Commissioning activities during the Construction stage incorporates a third party verification process and a transfer of critical operational knowledge to Facility personnel.

1.4 COMMISSIONING  
OBJECTIVES

- .1 A Commissioning Plan has been prepared by the Design Consultant, on behalf of PWGSC, which identifies, among other issues, specific commissioning activities to be carried out by the commissioning team during the Construction and Occupancy Stages of the project.
- .2 The commissioning activities have the following objectives:
  - .1 Collect data on equipment and systems being supplied and document their installation;
  - .2 Conduct checks and tests on fully installed building components, equipment, systems and integrated systems to:
    - .1 Verify whether they operate in accordance with requirements of Contract Documents;
    - .2 Verify performance against design criteria and user requirements and measure peak capacities;
    - .3 Prepare a Building Management Manual (BMM) which contains operations and maintenance data, as-built record documents, commissioning reports, training data and other critical information for future use by Facility operational staff;
    - .4 Ensure transfer of knowledge on the operations, maintenance and management of the Facility to Tenant and Operational personnel by means of appropriate training.
- .3 Work to achieve the above objectives requires a collaborative effort from all members of the commissioning team.
  - .1 Contractor's commissioning activities and responsibilities are described in Clause 1.8 below.
- .4 Commissioning activities performed by the Commissioning Agent and the Design Consultant does not replace checks, tests, adjustments, balancing and other performance verification procedures to be carried out by the Contractor as an integral part of performing the Work of this contract as specified in other sections of the Specifications.

1.5 SYSTEMS TO BE  
COMMISSIONED

- .1 The following systems and controls, complete with associated equipment and components, will be commissioned by the Commissioning Agent and requires related commissioning activities to be performed by Contractor as specified herein and in section(s):
  - .1 Mechanical
  - .2 Electrical
  - .3 Doors and Hardware
  - .4 Finishes

1.6 DEFINITIONS

- .1 For the purpose of this contract, the various terms listed below, as they relate directly or indirectly to the commissioning process, shall be deemed to have the following meaning.
- .2 Commissioning Process: a planned program of tasks, activities and procedures carried out systematically during the Construction and Occupancy Stages in accordance with the commissioning objectives, specified in clause 1.4.2 above, to:
  - .1 Verify whether the fully installed equipment, systems and integrated systems operate in accordance with contract documents and design criteria and;
  - .2 Ensure that appropriate documentation is compiled to effectively train O& M staff and prepare a comprehensive Building Management Manual (BMM).
- .3 Commission (ie: to commission a building component or system): tests and checks conducted by Commissioning Agent on all systems and integrated systems of Facility; carried out only after they are fully installed, functional and Contractor's Performance Verification responsibilities have been completed and approved.
  - .1 Contractor provides assistance during this process by operating equipment and systems, by troubleshooting and making adjustments as may be required.
  - .2 Systems are run under their full operation

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and under various modes to determine if they function correctly, consistently, at peak efficiency and interactively with each other as intended in accordance with Contract Documents and design criteria.

.3 During these checks, adjustments may be made enhancing performance to meet environmental or user requirements.

.4 Commissioning Agent: a specifically appointed person, representing the Departmental Representative, responsible for the development of a Commissioning Plan and managing its implementation by overseeing and coordinating various activities and responsibilities to be performed by members of the Commissioning Team.

.1 In this project, the Commissioning Agent is part of the engineering consultant firm engaged by PWGSC to prepare the final design and contract documents for this Work. His name is: .

.2 Commissioning Agent plays a lead role in support to the Departmental Representative to ensure that the commissioning objectives are achieved.

.5 Commissioning Manager: a PWGSC departmental employee providing advice and guidance on commissioning requirements to the Commissioning Agent in support to the Departmental Representative.

.6 Commissioning Plan: The document which describes the organization, scheduling, allocation of resources, required documentation, target dates, and team roles and responsibilities for verification that the built works meet Contract Document and design criteria requirements.

.7 Contractor: means the General Contractor, however it also refers to any personnel from subcontractors, including the controls and TAB specialists, suppliers and manufacturer's technical persons which Contractor employs to carry out his/her designated commissioning duties and activities.

.8 Design Consultant: persons from the, architectural, mechanical and electrical design disciplines of the engineering firm(s) which have been engaged by the Departmental Representative

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to prepare the final design and produce the contract documents. Design Consultant also has specifically identified commissioning activities for this project.

- .9 Design Criteria: All those factors included in the design of a Facility prescribed by the tenant needs or as determined by Designer as necessary in order to meet all Facility functional and user operational requirements
- .10 Installation/Start-up Checks:(sometimes referred to as pre-functional checks) A written compilation of checks and inspections to be performed by Contractor during the pre-start-up and start-up of a particular equipment or system component.
  - .1 Checklist sheets are produced which include the following data:
    - .1 Product manufacturer's installation instructions and recommended checks and;
    - .2 Special procedures as specified in relevant sections of Specifications;
    - .3 Other items considered good installation and engineering industry practices deemed appropriate for proper and efficient operation.
  - .2 Standard Installation/Start-up Checklist sheets prepared by equipment manufacturer are acceptable for use. However, supplement with additional data representative of specific project conditions as deemed required by Commissioning Agent.
  - .3 Use Checklist sheets for all equipment installation. Document in writing on checklist the various checks made, deficiencies noted and corrective action taken.
  - .4 Installer to sign Checklist sheets upon completion, certifying that stated checks and inspections have been performed.
  - .5 Use of Installation/Start-up Checklists shall not be considered part of the commissioning process but shall be stringently used for all equipment pre-start and start-up procedures.
  - .6 Return completed Installation/Start-up Checklist sheets after use to Commissioning Agent for retention. Checklists are required by Commissioning Agent when Facility is commissioned and will be included in the BMM manual at completion of project.

- .11 Performance Verification: (sometimes referred to Functional Testing) checks, running dynamic tests and adjustments carried out by Contractor on equipment and systems, upon their installation, to ensure they operate correctly, efficiently and function independently and interactively with other systems as intended in accordance with contract documents and manufacturer's recommendations.

.1 Performance Verification shall not be considered part of the commissioning process. It is however considered an essential and integral part of Contractor's responsibilities in the equipment installation process which must be stringently conducted, successfully completed and approved by Departmental Representative before a piece of equipment or system is considered fully installed and functional.

.2 Facility components and systems will not be commissioned by Commissioning Agent until performance verification has been completed and approved.

- .12 Performance Verification Report Sheets (PV sheets): forms developed by Commissioning Agent for Contractor's use to record measured data and readings taken during functional testing and Performance Verification procedures.

- .13 Product Information (PI Data): a compilation of data gathered on a particular piece of equipment, typically produced by manufacturer, which includes nameplate information, installation/startup instructions, parts list, operating instructions, maintenance guidelines and other pertinent technical data and recommended checks that is necessary to prepare for start-up and functional testing and used during operation and maintenance of such equipment. This documentation is included in the Building Management Manual (BMM) at completion of work.

1.7 COMMISSIONING  
TEAM

- .1 A commissioning team will be assembled to carryout various functions needed to effectively commission the Facility. Contractor shall be part of this team with duties and responsibilities as specified in this section and in other sections

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of the Specifications.

- .2 Members of the Commissioning Team are as follows:
  - .1 Commissioning Agent
  - .2 Design Consultant
  - .3 Contractor
  - .4 Construction Commissioning Supervisor
  - .5 Departmental Representative
  - .6 PWGSC Commissioning Manager
  - .7 PWGSC departmental personnel providing advice and project quality control to Departmental representative when required.
  - .8 Facility's operation and maintenance personnel staff as identified by Departmental Representative.
  
- .3 Effective commissioning requires coordination between members of the commissioning team. Cooperate with other team members in fulfilling assigned duties and as follows:
  - .1 Communicate commissioning objectives, to subcontractors, suppliers and manufacturers.
  - .2 Coordinate activities between subcontractors and trades as needed to carryout Contractor's assigned commissioning activities.
  - .3 Ensure attendance of subcontractors and required specialist at commissioning meetings and during the commissioning process.
  
- .4 Construction Commissioning Supervisor:
  - .1 Assign a person, under Contractor's employ, to be the Construction Commissioning Supervisor.
  - .2 Person to be knowledgeable and have past experience in commissioning of mechanical and electrical systems. Submit affidavit confirmation person's qualifications for Departmental Representative's review and approval.
  - .3 Construction Commissioning Supervisor to coordinate and oversee all work activities and input required from subcontractors and applicable trades as required to make equipment, subsystems and system ready for commissioning and to conduct commissioning duties assigned to the Contractor.
  - .4 Construction Commissioning Supervisor shall:
    - .1 Be the main point of contact, representing the Contractor, with whom the Commissioning Agent and Departmental Representative will to deal with in matters

relating to commissioning.

.2 Attend all commissioning meetings and ensure that appropriate persons from subcontractors, trades, suppliers and manufacturers attend meetings when deemed required by Commissioning Agent or Departmental Representative.

1.8 CONTRACTOR'S  
COMMISSIONING  
ACTIVITIES

.1 General:

.1 Organize and arrange for the services of subcontractors, their specialists and manufacturer's technical representatives to perform Contractor's commissioning activities

.2 Ensure that personnel forming part of the Commissioning Team are qualified and knowledgeable of installed equipment and systems and with design intent.

.3 Develop in conjunction with the Commissioning Agent a commissioning schedule as specified in clause 1.11.

.4 Notify Departmental Representative in writing when Facility is ready for be commissioned. Give 14 calendar day notice.

.5 Commissioning will only commence once that full documentation has been received and installed equipment and systems have undergone successful performance verification.

.6 Note that Certificate of Substantial Completion will only be issued when:

.1 All commissioning documentation has been received and found suitable by Departmental Representative;

.2 Designated equipment and systems have been commissioned and;

.3 Training has been completed.

.7 Performance faults:

.1 Equipment and systems found not operating correctly or not performing as intended during commissioning shall be re-verified by checking 100% of all equipment and components of the unfunctional system, including related controls as required to rectify the deficiencies and ensure correct performance.

.2 Costs to conduct additional tests and inspections, as deemed required by Departmental Representative, to determine acceptability and proper performance of

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such item to be paid for by Contractor.

- .2 Prior to Facility being Commissioned:
  - .1 Submit commissioning documentation as specified in clause 1.13 below.
  - .2 Submit the Installation/Start-up Checklist sheets to Commissioning Agent for review prior to conducting the pre-start and start-up of any piece of equipment. Incorporate additional start-up instructions onto checklist as determined by the Commissioning Agent's review.
  - .3 Conduct the pre-start and start-up of all equipment by following and filling out the approved Installation/Start-up Checklists.
  - .4 Conduct Performance Verification on all installed equipment and systems. Use and fill out the PV Report Sheets provided.
  - .5 Upon completion of start-up and performance verification process, submit signed copy of Checklist and PV sheets to Commissioning Agent as affidavit that required checks and tests were successfully conducted.
  - .6 Record performance measurements and data reading on PV sheets and return to Commissioning Agent for compilation.
  - .7 Give Departmental Representative and Commissioning Agent a minimum of 5 days' notice for start-up and performance verification of equipment and systems which must be witnessed by Commissioning Agent as determined by Commissioning Agent beforehand on PV sheets.
  - .8 Provide missing information and data as identified by Commissioning Agent and Departmental Representative during documentation review.
  - .9 Submit above noted documentation before Commissioning will proceed.
  - .10 Address deficiencies in Work identified during performance verification of equipment and systems. Conduct additional performance verification thereafter.
  - .11 Arrange for special tools and devices, identified at commissioning meeting(s), as deemed required to assist with commissioning.
  - .12 Provide access ladders, two way radios and other equipment required by Team when facility will be commissioned.
- .3 When Facility is being Commissioned:
  - .1 Provide qualified tradespersons to be

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present at site to assist Commissioning Agent for the time period and commissioning activity specified.

.2 Assist in commissioning architectural building component, mechanical and electrical systems specified and as follows:

.1 Operate designated building component, mechanical/electrical equipment and system under all modes of operation and conduct checks and tests as directed by Commissioning Agent.

.2 Check and verify that building component, equipment, systems and integrated systems, including their controls, are functioning and responding correctly and interactively with each other.

.3 Test systems independently and then in unison with other related systems.

.4 Conduct all Commissioning checks and tests in presence of and witnessed by Commissioning Agent and Departmental Representative.

.5 Assist Design Consultant and other members of the commissioning team who will also be present to commission Facility.

.3 Specific procedures used to commission Facility will be provided by Commissioning Agent which includes:

.1 Sequential order of building component and system to be tested.

.2 Running systems under various anticipated modes and demands (example: high and low cooling or heating loads, duplicating outside temperature conditions, fire alarm and power failure conditions etc.).

.3 Running building controls through all sequences of operation to verify and confirm that equipment and systems are responding as designed and intended.

.4 Operating designated equipment at peak capacities, recording output data against design criteria.

.4 Run component or systems as long as necessary to effectively commission all items as deemed required by Commissioning Agent and Departmental Representative.

.5 Monitor equipment and system responses.

.6 Record test results, measurements and other

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data on commissioning forms provided by Commissioning Agent.

.7 Assist in analyzing results. Identify system deficiencies and components not responding as intended.

.8 Correct deficiencies and system non-conformance issues. Adjust, calibrate or fine tune system components as required. Debug system software as may be required.

.9 Retest systems when directed to confirm compliance.

.4 Upon completion of Facility Commissioning:

.1 Provide training to maintenance & operational personnel as specified in clause 1.12 below.

.2 Turn over any filled-in checks sheets or reports resulting from commissioning.

.5 During Warranty period at Occupancy Stage:

.1 After 10 months has elapsed from the commencement of the warranty period, conduct commissioning checks on the building components and systems.

.2 Fine tune components, systems and integrated systems and continue system debugging to optimize Facility performance.

.3 Rectify warranty issues.

.4 Submit written report to Commissioning Agent and Departmental Representative.

.1 Indicate results noted and corrective action taken.

.2 Note improvements made to operating parameters and control settings.

.3 Recommend modifications deemed advisable to improve performance, environmental conditions, energy consumptions and other issues.

.5 Commissioning Agent and other team members as determined by Departmental Representative to be present during such work.

1.9 COMMISSIONING  
ACTIVITIES OF  
OTHER TEAM MEMBERS

.1 Commissioning Agent:

.1 Represents the Departmental Representative during the commissioning process.

.2 Coordinates activities of the commissioning team members to ensure that commissioning activities are carried out properly and in a timely manner.

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- .3 Prepares commissioning schedule in concert with Contractor.
  - .4 Chairs commissioning meetings.
  - .5 Works with Contractor, subcontractors, equipment suppliers, Design Consultant resources, PWGSC and Tenant Representatives to resolve technical problems which may arise during the process.
  - .6 Witnesses Contractor's pre-start, start-up and performance verification procedures for certain equipment and systems specified when deemed required due to their critical nature and function in the Facility.
  - .7 Verifies that Installation/Start-up Checklists and Performance Verification checks and tests are used and stringently followed by Contractor.
  - .8 Assists Contractor in coordination of training activities for facility staff.
  - .9 Submits final commissioning report to Departmental Representative.
- .2 Design Consultant:
- .1 Prepares in concert with Commissioning Agent the Commissioning Plan.
  - .2 Reviews Contractor's Installation/Start-up Checklists for completeness, incorporating supplement data not addressed on checklist. Provides to Contractor checklist for products which manufacturer does not provide installation and start-up instructions.
  - .3 Develops performance verifications report sheets for use by Contractor to record actual data and measurements against design data criteria.
  - .4 Includes, on performance verification report sheets, design data and anticipated performance values for equipment and systems to undergo verification.
  - .5 Compiles commissioning documentation submitted by Contractor. Prepares final Building Management Manuals.
  - .6 Assists Commissioning Agent in witnessing pre-start, start-up and performance verification activities.
  - .7 Approves type and method of calibration for instruments used by Contractor to conduct performance verification and commissioning tests.
  - .8 Assists Commissioning Agent in reviewing and analyzing tests results.

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- .9 Participate in the training sessions provided by Contractor to tenant O&M staff by giving introductory information on design philosophy, design intent and systems designs,
  - .10 Assist in the resolution of issues relating to commissioning.
- .3 Tenant Representative:
    - .1 Participates with other team members to ensure that systems as installed meet the operational and functional requirements.
    - .2 Periodically attends commissioning meetings as required.
    - .3 Attends final commissioning activities.
    - .4 Assists in resolving technical problems by providing additional details on operational requirements.
  - .4 Facility Operations and Maintenance Staff:
    - .1 Participates in the commissioning process to obtain early introduction to the facility systems and to provide early operator feedback.
    - .2 Prime interest is in the familiarization and training of appropriate maintenance staff.
    - .3 Staff may attend certain critical equipment start-up and performance verification activities and provide comments and practical suggestions on issues which may arise during actual operation, maintenance and repair of the equipment and systems.
    - .4 Attends commissioning meetings periodically, depending on issues being discussed.
    - .5 Identifies the appropriate staff which must receive the O & M training.
- 1.10 COMMISSIONING MEETINGS
- .1 General briefing on commissioning will be conducted at first project construction meeting at commencement of work.
    - .1 Issues discussed will include scope and extent of commissioning and clarify responsibilities of commissioning team members.
    - .2 All team members must attend, including subcontractors of equipment and systems to be commissioned.
  - .2 Include commissioning as one agenda item at each construction meeting held and chaired by Contractor during construction. Give subject due

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consideration for each material and equipment supplied and for all matters of Work.

- .3 At the 60% construction completion stage, as determined by Departmental Representative, a separate commissioning scope meeting will be called by Departmental Representative to review progress of work, discuss schedule of equipment start-up activities and prepare for upcoming commissioning. Issues at meeting will include:
  - .1 Review duties and responsibilities of Contractor and subcontractors, addressing delays and potential problems.
  - .2 Determine the degree of involvement of each trade and manufacturer's representatives in the commissioning process.
- .4 Separate commissioning meetings will be held from the 60% construction stage to project completion. Meetings are tentatively scheduled to be held on a bi-monthly basis but may be more frequent during the equipment start-up and functional testing period.
- .5 Whenever possible meetings will be held immediately following the construction meetings.
- .6 Meeting will be chaired by Departmental Representative, who will record and distribute minutes.
- .7 Ensure that all subcontractors and relevant manufacturer representatives are present at the 60% commissioning scope meeting and at other meetings as deemed required.

1.11 COMMISSIONING SCHEDULE

- .1 Address commissioning activities within the construction work schedule. Clearly identify allocated time period for commissioning and training activities.
- .2 Provide a separate independent commissioning schedule at the 60% construction stage in order that specific issues and individual details of commissioning can be reviewed, discussed and dealt with from that period onward to project completion. Submit monthly updates thereafter,
- .3 Develop commissioning schedule in conjunction with Commissioning Agent. Indicate allocated time

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period and anticipated dates for:

- .1 Submission of commissioning documentation, including O&M Manuals.
  - .2 Equipment and system start-up and performance verification, making them ready to be commissioned.
  - .3 Allocated period to commission designated building components and systems.
  - .4 Training period.
  - .5 Work during Warranty period.
- .4 Submit schedule to Departmental Representative for review.

1.12 TRAINING

- .1 Commence process of familiarizing Tenant and O&M personnel in the early stages of work on purpose and operation of various equipment and systems. Continue process throughout the entire construction duration.
  - .1 Provide informal briefings during occasional site visits, at planned commissioning meetings and during the final commissioning site activities.
- .2 Conduct formal demonstration and training sessions' only after all identified systems have been commissioned by Commissioning Agent and Departmental Representative has given approval to proceed with the training process.
- .3 Provide training and demonstration on equipment, sub-systems, systems and integrated systems as specified.
- .4 Carryout training in accordance with requirements of section 01 79 00.
- .5 Submit written agenda of training session(s) 4 weeks beforehand for review by Commissioning Agent and Departmental Representative.
- .6 Coordinate content with Commissioning Agent. Design Consultant will provide introductory presentation giving general outline of each system design and intended function.
- .7 Submit training manuals for review 2 weeks prior to actual training.

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- .8 Ensure required tools and O&M Manuals are on site for training and system demonstration.
  - .9 As a minimum, the training sessions to cover the following information:
    - .1 Introduction.
    - .2 Description of the system with factory personnel being involved at appropriate times.
    - .3 Instructions on start-up procedures including seasonal procedures, system check-lists and emergency procedures.
    - .4 Operational procedures, including occupancy considerations, seasonal change-over, manual and automatic operations and emergency modes.
    - .5 Instruction on system shutdowns, including checklists.
    - .6 Instructions on all aspects of system maintenance, including routine servicing, lubrication, overhaul and factory servicing.
    - .7 Information concerning the scope of warranties and their use.
    - .8 A description of spare parts in stock and their service.
    - .9 A description of normal tools required for servicing the systems/equipment.
  - .10 Submit typewritten record of training sessions given and list of attendees. Use forms of format approved by Departmental Representative.

1.13 COMMISSIONING  
DOCUMENTATION

- .1 Submit the following documentation for use during commissioning and for incorporation thereafter into a Building Management Manual (BMM):
  - .1 Operations and Maintenance Manuals, Project Record Documents and other data as specified in Section 01 78 00. Data to include:
    - .1 Equipment Product Information (PI Data) complete with:
      - .1 Nameplate info,
      - .2 Installation instructions,
      - .3 Operating procedures and
      - .4 Maintenance guidelines.
    - .2 Reviewed shop drawings,
    - .3 As-built record drawings and Specifications.
  - .2 Completed Installation/Start-up Checklist sheets used.
  - .3 Performance Verifications checks and tests

- procedures and completed report sheets used.
- .4 Copy of any static and dynamic test and reports conducted.
  - .5 TAB report and other reports as specified in various trade sections.
  - .2 Above documentation is required by Commissioning Agent to commission Facility. Submit data minimum 3 weeks before commencement of commissioning.
  - .3 Documentation to include detailed information and number of copies as specified for maintenance manuals of section 01 78 00.
  - .4 Commissioning Agent and Design Consultant will compile above documentation and produce a BMM manuals for operation/maintenance staff and tenant use.



1.4 SITE  
CONDITIONS

- .1 Review designated substance report and take precautions to protect environment.
- .2 Should material resembling spray or trowel-applied asbestos or other designated substance listed as hazardous be encountered, stop work, take preventative measures, and notify Departmental Representative immediately.
  - .1 Do not proceed until written instructions have been received from Departmental Representative.
- .3 Notify Departmental Representative before disrupting building access or services.

PART 2 PRODUCTS

2.1 EQUIPMENT

- .1 Demonstrate that tools and machinery are being used in manner which allows for salvage of materials in best condition possible.

PART 3 EXECUTION

3.1 PREPARATION

- .1 Do Work in accordance with Section 01 35 29 - Health and Safety Requirements.
- .2 Protection:
  - .1 Prevent movement, settlement, or damage to adjacent structures, utilities, and parts of building to remain in place. Provide bracing and shoring required.
  - .2 Keep noise, dust, and inconvenience to occupants to minimum.
  - .3 Protect building systems, services and equipment.
  - .4 Provide temporary dust screens, covers, railings, supports and other protection as required.
- .3 Disconnect and re-route electrical, telephone and communication service lines. Post warning signs on electrical lines and equipment which must remain energized to serve other products during period of

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demolition.

- .4 Locate and protect utility lines. Do not disrupt active or energized utilities traversing premises designated to remain undisturbed.
- .5 Disconnect and cap designated mechanical services.

3.2 DEMOLITION  
SALVAGE AND  
DISPOSAL

- .1 Remove parts of existing building to permit new construction. Sort materials into appropriate piles for recycling.
- .2 Trim edges of partially demolished building elements to tolerances as defined by Departmental Representative to suit future use.
- .3 Dispose of removed materials, to appropriate recycling facilities except where specified otherwise, in accordance with authority having jurisdiction.

3.3 PARTIAL  
DEMOLITION OF  
STRUCTURES

- .1 Refer to drawings.

3.4 STOCKPILING

- .1 Stockpile off site.

3.5 REMOVAL FROM  
SITE

- .1 Transport material designated for alternate disposal by approved haulers and facilities listed in waste reduction workplan and in accordance with applicable regulations. Do not deviate from haulers and facilities receiving organizations listed in waste reduction workplan without prior written authorization from Departmental Representative.
- .2 Dispose of materials not designated for alternate disposal in accordance with applicable regulations. Disposal facilities must be approved of and listed in waste reduction workplan. Do not deviate from disposal facilities listed in waste reduction workplan without prior written authorization from Departmental Representative.

PART 1 GENERAL

1.1 REFERENCES

- .1 ASTM International
  - .1 ASTM A53/A53M-07, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.
  - .2 ASTM A269-08, Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service.
  - .3 ASTM A307-07b, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
- .2 CSA International
  - .1 CSA G40.20/G40.21-04(R2009), General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
  - .2 CAN/CSA G164-M92(R2003), Hot Dip Galvanizing of Irregularly Shaped Articles.
  - .3 CSA S16-09, Design of Steel Structures.
  - .4 CSA W48-06, Filler Metals and Allied Materials for Metal Arc Welding (Developed in co-operation with the Canadian Welding Bureau).
  - .5 CSA W59-M03(R2008), Welded Steel Construction (Metal Arc Welding) Metric.
- .3 Environmental Choice Program
  - .1 CCD-047-98(R2005), Architectural Surface Coatings.
  - .2 CCD-048-98(R2006), Surface Coatings - Recycled Water-borne.
- .4 Green Seal Environmental Standards (GS)
  - .1 GS-11-2008, 2nd Edition, Paints and Coatings.
- .5 Health Canada / Workplace Hazardous Materials Information System (WHMIS)
  - .1 Material Safety Data Sheets (MSDS).
- .6 The Master Painters Institute (MPI)
  - .1 Architectural Painting Specification Manual - current edition.

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- 1.2 ACTION AND INFORMATIONAL SUBMITTALS
- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
  - .2 Product Data:
    - .1 Submit manufacturer's instructions, printed product literature and data sheets for sections plates pipe tubing bolts and include product characteristics, performance criteria, physical size, finish and limitations.
    - .2 Submit two copies of WHMIS MSDS in accordance with Section 01 35 29.06 - Health and Safety Requirements 01 35 43 - Environmental Procedures.
      - .1 For finishes, coatings, primers, and paints applied on site: indicate VOC concentration in g/L.
    - .3 Shop Drawings:
      - .1 Indicate materials, core thicknesses, finishes, connections, joints, method of anchorage, number of anchors, supports, reinforcement, details, and accessories.
- 1.3 QUALITY ASSURANCE
- .1 Test Reports: submit certified test reports showing compliance with specified performance characteristics and physical properties.
  - .2 Certifications: submit product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.
- 1.4 DELIVERY, STORAGE AND HANDLING
- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.
  - .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
  - .3 Storage and Handling Requirements:
    - .1 Store materials off ground indoors in dry location and in accordance with manufacturer's recommendations in clean,

dry, well-ventilated area.

- .2 Replace defective or damaged materials with new.
- .4 Develop Construction Waste Management Plan Waste Reduction Workplan related to Work of this Section.
- .5 Packaging Waste Management: remove for reuse and return by manufacturer of pallets, crates, padding, and packaging materials as specified in Construction Waste Management Plan Waste Reduction Workplan in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

PART 2 PRODUCTS

2.1 MATERIALS

- .1 Steel sections and plates: to CSA G40.20/G40.21, Grade 350W.
- .2 Steel pipe: to ASTM A53/A53M standard weight.
- .3 Welding materials: to CSA W59.
- .4 Welding electrodes: to CSA W48 Series.
- .5 Bolts and anchor bolts: to ASTM A307.
- .6 Aluminum sheet: proprietary utility sheet plain, 1.0 mm minimum thickness, finish, colour clear.
- .7 Grout: non-shrink, non-metallic, flowable, 15 MPa at 24 hours.

2.2 FABRICATION

- .1 Fabricate work square, true, straight and accurate to required size, with joints closely fitted and properly secured.
- .2 Use self-tapping shake-proof flat headed screws on items requiring assembly by screws or as indicated.
- .3 Where possible, fit and shop assemble work, ready for erection.
- .4 Ensure exposed welds are continuous for length of each joint. File or grind exposed

welds smooth and flush.

- 2.3 FINISHES .1 Shop coat primer: MPI-INT EXT 5.1A MPI-INT EXT 5.1B in accordance with chemical component limits and restrictions requirements and VOC limits of CCD-047a CCD-048 GS-11.
- .2 Zinc primer: zinc rich, ready mix to MPI-INT EXT 5.2C in accordance with chemical component limits and restrictions requirements and VOC limits of CCD-047a CCD-048 GS-11.
- 2.4 ISOLATION COATING .1 Isolate aluminum from following components, by means of bituminous paint:
- .1 Dissimilar metals except stainless steel, zinc, or white bronze of small area.
- .2 Concrete, mortar and masonry.
- .3 Wood.
- 2.5 SHOP PAINTING .1 Primer: VOC limit 250 g/L maximum to GS-11 CCD-047a CCD-048.
- .2 Apply one shop coat of primer to metal items, with exception of galvanized or concrete encased items.
- .3 Use primer unadulterated, as prepared by manufacturer. Paint on dry surfaces, free from rust, scale, grease. Do not paint when temperature is lower than 7 degrees C.
- .4 Clean surfaces to be field welded; do not paint.

PART 3 EXECUTION

- 3.1 EXAMINATION .1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for metal fabrications installation in accordance with manufacturer's written instructions.
- .1 Visually inspect substrate in presence of Departmental Representative.

- .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
- .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 ERECTION

- .1 Do welding work in accordance with CSA W59 unless specified otherwise.
- .2 Erect metalwork square, plumb, straight, and true, accurately fitted, with tight joints and intersections.
- .3 Provide suitable means of anchorage acceptable to Departmental Representative such as dowels, anchor clips, bar anchors, expansion bolts and shields, and toggles.
- .4 Exposed fastening devices to match finish and be compatible with material through which they pass.
- .5 Supply components for work by other trades in accordance with shop drawings and schedule.
- .6 Make field connections with bolts to CSA S16 or Weld field connection.
- .7 Deliver items over for casting into concrete and building into masonry together with setting templates to appropriate location and construction personnel.
- .8 Touch-up rivets, field welds, bolts and burnt or scratched surfaces with primer after completion of:
  - .1 Primer: maximum VOC limit 250 g/L to GS-11.
- .9 Touch-up galvanized surfaces with zinc rich primer where burned by field welding.
  - .1 Primer: maximum VOC limit 250 g/L to GS-11.

3.3 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
  - .1 Leave Work area clean at end of each

day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

.3 Waste Management: separate waste materials for recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

.1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.4 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by metal fabrications installation.



Accreditation Board.

- .2 Plywood identification: by grade mark in accordance with applicable CSA standards.
- .3 Plywood, OSB and wood based composite panel construction sheathing identification: by grademark in accordance with applicable CSA standards.

1.4 DELIVERY,  
STORAGE, AND  
HANDLING

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- .1 Waste Management and Disposal:
  - .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

PART 2 PRODUCTS

2.1 LUMBER  
MATERIAL

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- .1 Lumber: unless specified otherwise, softwood, S4S, moisture content 19% or less in accordance with following standards:
  - .1 CAN/CSA-0141.
  - .2 NLGA Standard Grading Rules for Canadian Lumber.
- .2 Furring, blocking, nailing strips, grounds, rough bucks, cants, curbs, :
  - .1 S2S is acceptable for all work.
  - .2 Board sizes: "Standard" or better grade.
  - .3 Dimension sizes: "Standard" light framing or better grade.
  - .4 Post and timbers sizes: "Standard" or better grade.

2.2 PANEL  
MATERIALS

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- .1 Douglas fir plywood: to CSA 0121, standard construction.
  - .1 Urea-formaldehyde free.
- .2 Canadian softwood plywood (CSP): to CSA 0151, standard construction.
  - .1 Urea-formaldehyde free.
- .3 Poplar Plywood: to CSA 0153, standard construction, urea-formaldehyde free.
  - .1 Urea-formaldehyde free.
- .4 Plywood, OSB and wood based composite panels:

to CAN/CSA-0325.

.1 Urea-formaldehyde free.

- 2.3 ACCESSORIES
- .1 Nails, spikes and staples: to CSA B111.
  - .2 Bolts: 12.5 mm diameter unless indicated otherwise, complete with nuts and washers.
  - .3 Proprietary fasteners: toggle bolts, expansion shields and lag bolts, screws and lead or inorganic fibre plugs, explosive actuated fastening devices, recommended for purpose by manufacturer.

### PART 3 EXECUTION

- 3.1 INSTALLATION
- .1 Comply with requirements of NBC, supplemented by the following paragraphs.
  - .2 Install furring and blocking as required to space-out and support casework, cabinets, wall and ceiling finishes, facings, and other work as required.
  - .3 Align and plumb faces of furring and blocking to tolerance of 1:600.
  - .4 Install rough bucks, nailers and linings to rough openings as required to provide backing for frames and other work.
  - .5 Install wood cants, backing, nailers, curbs and other wood supports as required and secure using galvanized steel fasteners.
  - .6 Use caution when working with particle board. Use dust collectors and high quality respirator masks.
- 3.2 ERECTION
- .1 Frame, anchor, fasten, tie and brace members to provide necessary strength and rigidity.
  - .2 Countersink bolts where necessary to provide clearance for other work.



PART 1 GENERAL

1.1 REFERENCES

- .1 American National Standards Institute (ANSI)
  - .1 ANSI/NPA A208.1-09, Particleboard.
  - .2 ANSI/HPVA HP-1-04, Standard for Hardwood and Decorative Plywood.
- .2 ASTM International
  - .1 ASTM E1333-96(2002), Standard Test Method for Determining Formaldehyde Concentrations in Air and Emission Rates From Wood Products Using a Large Chamber.
  - .2 ASTM D2832-92(R2005), Standard Guide for Determining Volatile and Nonvolatile Content of Paint and Related Coatings.
  - .3 ASTM D5116-06, Standard Guide For Small-Scale Environmental Chamber Determinations of Organic Emissions From Indoor Materials/Products.
- .3 Architectural Woodwork Manufacturers Association of Canada (AWMAC) and Architectural Woodwork Institute (AWI)
  - .1 Architectural Woodwork Quality Standards Illustrated, 8th edition, Version 1.0 (2009).
- .4 Canadian General Standards Board (CGSB)
  - .1 CAN/CGSB-71.20-M88, Adhesive, Contact, Brushable.
- .5 CSA International
  - .1 CSA B111-74(R2003), Wire Nails, Spikes and Staples.
  - .2 CSA O112.4 SERIES-M1977(R2006), Standards for Wood Adhesives.
  - .3 CSA O121-08, Douglas Fir Plywood.
  - .4 CSA O141-05, Softwood Lumber.
  - .5 CSA O151-09, Canadian Softwood Plywood.
  - .6 CSA O153-M1980(R2008), Poplar Plywood.
- .6 Health Canada / Workplace Hazardous Materials Information System (WHMIS)
  - .1 Material Safety Data Sheets (MSDS).
- .7 National Hardwood Lumber Association (NHLA)
  - .1 Rules for the Measurement and Inspection

of Hardwood and Cypress 1998.

- .8 National Lumber Grades Authority (NLGA)
  - .1 Standard Grading Rules for Canadian Lumber 2003(R2007).
- .9 South Coast Air Quality Management District (SCAQMD), California State, Regulation XI. Source Specific Standards
  - .1 SCAQMD Rule 1113-A2007, Architectural Coatings.
  - .2 SCAQMD Rule 1168-A2005, Adhesives and Sealants Applications.

1.2 ACTION AND  
INFORMATIONAL  
SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
  - .1 Submit manufacturer's instructions, printed product literature and data sheets for architectural woodwork and include product characteristics, performance criteria, physical size, finish and limitations.
  - .2 Submit two copies of WHMIS MSDS in accordance with Section 01 33 00 - Submittal Procedures and 01 35 43 - Environmental Procedures.
- .3 Shop Drawings:
  - .1 Indicate details of construction, profiles, jointing, fastening and other related details.
    - .1 Scales: profiles full size, details half full size.
  - .2 Indicate materials, thicknesses, finishes and hardware.
  - .3 Indicate locations of service outlets in casework, typical and special installation conditions, and connections, attachments, anchorage and location of exposed fastenings.

1.3 QUALITY  
ASSURANCE

- .1 Lumber by grade stamp of an agency certified by Canadian Lumber Standards Accreditation Board.
- .2 Plywood, particleboard based composite panels to CSA and ANSI standards.

1.4 DELIVERY,  
STORAGE AND  
HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
  - .1 Protect millwork against dampness and damage during and after delivery.
  - .2 Store millwork in ventilated areas, protected from extreme changes of temperature or humidity.
- .3 Storage and Handling Requirements:
  - .1 Store materials off ground indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
  - .2 Store and protect architectural woodwork from nicks, scratches, and blemishes.
  - .3 Replace defective or damaged materials with new.

PART 2 PRODUCTS

2.1 MATERIALS

- .1 Softwood lumber: unless specified otherwise, S4S, moisture content 15 19 % or less in accordance with following standards:
  - .1 CSA 0141.
  - .2 NLGA Standard Grading Rules for Canadian Lumber.
  - .3 AWMAC premium grade, moisture content as specified.
- .2 Machine stress-rated lumber is acceptable for all purposes.
- .3 Hardwood lumber: moisture content 8 % or less in accordance with following standards:
  - .1 National Hardwood Lumber Association (NHLA).
  - .2 AWMAC premium grade, moisture content as specified.

2.2 MANUFACTURED  
UNITS

- .4 Interior mat-formed wood particleboard: to ANSI/NPA A208.1.
  - .1 Particleboard resin to contain no added urea-formaldehyde.
- .5 Nails and staples: to CSA B111.
- .6 Wood screws: type and size to suit application.
- .7 Splines: plastic.
- .8 Sealant: in accordance with Section 07 92 00 - Joint Sealants.
  - .1 Sealants: VOC limit 250 g/L maximum to SCAQMD Rule 1168.
- .1 Casework:
  - .1 Fabricate caseworks to AWMAC custom quality grade.
  - .2 Furring, blocking, nailing strips, grounds and rough bucks and sleepers.
    - .1 Board sizes: "standard" or better grade.
    - .2 Dimension sizes: "standard" light framing or better grade.
    - .3 Urea-formaldehyde free.
  - .3 Framing birch or maple species, NHLA premium grade.
  - .4 Case Bodies (ends, divisions and bottoms)
    - .1 Premanufactured plastic laminate covered Particle board custom grade, 19 mm thick.
  - .5 Backs.
    - .1 Premanufactured plastic laminate covered particle board, custom grade, 12 mm thick.
  - .6 Shelving.
    - .1 Premanufactured plastic laminate covered particle board, custom grade 19 mm thick.
  - .7 Edge banding.
    - .1 Provide 10 mm thick solid matching wood strip on plywood edges 12 mm or thicker, exposed in final assembly. Strips same width as

- 
- plywood.
  - .2 Provide matching colour PVC edge on all plastic laminate covered particleboard edges. Same width as particle board.
  - .2 Wood Drawers
    - .1 Fabricate drawers to AWMAC premium grade supplemented as follows:
      - .2 Sides and backs.
        - .1 Hardwood plywood: Birch species face veneers.
          - .1 Thickness 12 mm.
      - .3 Bottoms:
        - .1 Preformed plastic laminate covered particle board, grade custom 12 mm thick.
      - .4 Fronts.
        - .1 Hardwood plywood: birch species face veneers.
          - .1 Thickness: 12 mm.
        - .2 Preformed plastic laminate covered particleboard, grade premium 19 mm thick.
  - .3 Casework Doors.
    - .1 Fabricated doors to AWMAC premium grade supplemented as follows:
      - .2 Preformed plastic laminate covered particleboard, grade premium 19 mm thick.
- 2.3 FABRICATION
- .1 Set nails and countersink screws apply stained wood filler to indentations, sand smooth and leave ready to receive finish.
  - .2 Shop install cabinet hardware for doors, shelves and drawers. Recess shelf standards unless noted otherwise.
  - .3 Shelving to cabinetwork to be adjustable unless otherwise noted.
  - .4 Provide cutouts for plumbing fixtures, inserts, appliances, outlet boxes and other fixtures.
  - .5 Shop assemble work for delivery to site in size easily handled and to ensure passage

through building openings.

- .6 Obtain governing dimensions before fabricating items which are to accommodate or abut appliances, equipment and other materials.
- .7 Ensure adjacent parts of continuous laminate work match in colour and pattern.
- .8 Veneer laminated plastic to core material in accordance with adhesive manufacturer's instructions. Ensure core and laminate profiles coincide to provide continuous support and bond over entire surface. Use continuous lengths up to 2400 mm. Keep joints 600 mm from sink cutouts.
- .9 Use straight self-edging laminate strip for flatwork to cover exposed edge of core material. Chamfer exposed edges uniformly at approximately 20 degrees. Do not mitre laminate edges.
- .10 Apply laminate backing sheet to reverse side of core of plastic laminate work.
- .11 Apply laminated plastic liner sheet.

PART 3 EXECUTION

3.1 EXAMINATION .1

Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for architectural woodwork installation in accordance with manufacturer's instructions.

- .1 Visually inspect substrate in presence of Departmental Representative.
- .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
- .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 INSTALLATION .1

Do architectural woodwork to Quality Standards of AWMAC.

3.3 CLEANING

- .2 Install prefinished millwork at locations shown on drawings.
  - .1 Position accurately, level, plumb straight.
- .3 Fasten and anchor millwork securely.
  - .1 Supply and install heavy duty fixture attachments for wall mounted cabinets.
- .4 Use draw bolts in countertop joints.
- .5 Scribe and cut as required to fit abutting walls and to fit properly into recesses and to accommodate piping, columns, fixtures, outlets or other projecting, intersecting or penetrating objects.
- .6 At junction of plastic laminate counter back splash and adjacent wall finish, apply small bead of sealant in accordance with Section 07 92 00 - Joint Sealants.
- .7 Apply bituminous coating over wood framing members in contact with masonry or cementitious construction.
- .8 Fit hardware accurately and securely in accordance with manufacturer's written instructions.
- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
  - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.
  - .1 Clean cabinet work.
  - .2 Remove excess glue from surfaces.
- .3 Waste Management: separate waste materials for recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
  - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

- 
- 3.4 PROTECTION .1 Protect cabinet work from damage until final inspection.
- .2 Protect installed products and components from damage during construction.
- .3 Repair damage to adjacent materials caused by architectural woodwork installation.

PART 1 GENERAL

- 1.1 RELATED REQUIREMENTS .1 Section 06 40 00 - Architectural Woodwork.
- 1.2 REFERENCES .1 American National Standards Institute (ANSI)
- .1 ANSI 208.1-09, Particleboard.
  - .2 ANSI/NEMA LD3-05, High Pressure Decorative Laminates.
- .2 ASTM International
- .1 ASTM D2832-92(R2005), Standard Guide for Determining Volatile and Nonvolatile Content of Paint and Related Coatings.
  - .2 ASTM D2369-07, Standard Test Method for Volatile Content of Coatings.
- .3 Canadian General Standards Board (CGSB)
- .1 CAN/CGSB-71.20-M88, Adhesive, Contact, Brushable.
- .4 CSA International
- .1 CSA O112-SERIES M1977(R2006), Standards for Wood Adhesives.
  - .2 CSA O121-08, Douglas Fir Plywood.
  - .3 CSA O151-09, Canadian Softwood Plywood.
  - .4 CSA O153-M1980(R2008), Poplar Plywood.
- .5 Environmental Choice Program (ECP)
- .1 CCD-045-95, Sealants and Caulking Compounds.
  - .2 CCD-046-95, Adhesives.
- .6 Green Seal Environmental Standards (GS)
- .1 GS-36-00, Commercial Adhesives.
- .7 Health Canada / Workplace Hazardous Materials Information System (WHMIS)
- .1 Material Safety Data Sheets (MSDS).
- .8 South Coast Air Quality Management District (SCAQMD), California State, Regulation XI. Source Specific Standards
- .1 SCAQMD Rule 1113-A2007, Architectural Coatings.
  - .2 SCAQMD Rule 1168-A2005, Adhesives and Sealants Applications.

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- 1.3 ACTION AND INFORMATIONAL SUBMITTALS
- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
  - .2 Product Data:
    - .1 Submit manufacturer's instructions, printed product literature and data sheets for laminate, adhesive, and core materials and include product characteristics, performance criteria, physical size, finish and limitations.
    - .2 Submit two copies of WHMIS MSDS in accordance with Section 01 35 43 - Environmental Procedures. Indicate VOC=s for adhesives in g/L.
  - .3 Samples:
    - .1 Submit for review and acceptance of each unit.
    - .2 Samples will be returned for inclusion into work.
    - .3 Submit duplicate samples of joints, edging, cutouts and postformed profiles.
  - .4 Certifications: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
- 1.4 CLOSEOUT SUBMITTALS
- .1 Provide maintenance data for laminate work for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.
- 1.5 QUALITY ASSURANCE
- .1 Test Reports: certified test reports showing compliance with specified performance characteristics and physical properties.
  - .2 Certificates: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.
- 1.6 DELIVERY, STORAGE AND HANDLING
- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.
  - .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name

and address.

- .3 Storage and Handling Requirements:
  - .1 Store materials off ground indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
  - .2 Store and protect laminate, adhesive, and core materials from nicks, scratches, and blemishes.
  - .3 Replace defective or damaged materials with new.
- .4 Develop Construction Waste Management Plan Waste Reduction Workplan related to Work of this Section and in accordance with Section 01 74 21 Construction/Demolition Waste Management and Disposal.
- .5 Packaging Waste Management: remove for reuse and return by manufacturer of pallets, crates, padding, and packaging materials as specified in Construction Waste Management Plan Waste Reduction Workplan in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

PART 2 PRODUCTS

2.1 MATERIALS

- .1 Laminated plastic for flatwork: to ANSI/NEMA LD3.
  - .1 Type: General purpose.
  - .2 Grade: HGS.
  - .3 Size: 1.27 mm thick.
  - .4 Colour: multilayered.
  - .5 Pattern: solid.
  - .6 Finish: satin.
  - .7 Colours: to be selected by Departmental Representative from a minimum palette of 60 varied colours and patterns.
- .2 Laminated plastic for backing sheet: to ANSI/NEMA LD3.
  - .1 Type: backer.
  - .2 Grade: BKH.
  - .3 Size: not less than 0.5 mm thick or same thickness as face laminate.

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- .4 Colour: same colour as face laminate.
  - .3 Laminated plastic for liner: to ANSI/NEMA LD3.
    - .1 Type: cabinet liner.
    - .2 Grade: CLS.
    - .3 Size: 50 mm thick
    - .4 Colour: white.
  - .4 Particleboard core: to ANSI 208.1, Grade One, sanded faces, of thickness indicated.
    - .1 Ensure particleboard core is urea-formaldehyde free.
  - .5 Laminated plastic adhesive: contact adhesive to CAN/CGSB-71.20.
    - .1 Test for acceptable VOC emissions in accordance with ASTM D2369 and ASTM D2832.
    - .2 VOC limit 80 g/L 5% by weight maximum to SCAQMD Rule 1168 GS-36 CCD-046.
    - .3 Chemical restrictions to CCD-046.
  - .6 Sealer: water resistant sealer or glue acceptable to laminate manufacturer.
    - .1 Test for acceptable VOC emissions to ASTM D2369 and ASTM D2832.
    - .2 VOC limit: 200 250 g/L. maximum to SCAQMD Rule 1113.
    - .3 Chemical restrictions to SCAQMD Rule 1113.
  - .7 Sealants:
    - .1 Test for acceptable VOC emissions to ASTM D2369 and ASTM D2832.
    - .2 VOC limit: 5% by weight maximum to CCD-045.
      - .1 Chemical restrictions to SCAQMD Rule 1113.
    - .3 Draw bolts and splines: as recommended by fabricator.
- 2.2 FABRICATION
- .1 Comply with ANSI/NEMA LD3, Annex A.
  - .2 Obtain governing dimensions before fabricating items which are to accommodate or abut appliances, equipment and other materials.

- .3 Ensure adjacent parts of continuous laminate work match in colour and pattern.
- .4 Veneer laminated plastic to core material in accordance with adhesive manufacturer's instructions. Ensure core and laminate profiles coincide to provide continuous support and bond over entire surface. Use continuous lengths up to 2400 mm. Keep joints 600 mm from sink cutouts.
- .5 Form shaped profiles and bends as indicated, using postforming grade laminate to laminate manufacturer's instructions.
- .6 Use straight self-edging laminate strip for flatwork to cover exposed edge of core material. Chamfer exposed edges uniformly at approximately 20 degrees. Do not mitre laminate edges.
- .7 Apply laminate backing sheet to reverse side of core of plastic laminate work.
- .8 Apply laminated plastic liner sheet to interior of cabinetry where indicated.

PART 3 EXECUTION

3.1 EXAMINATION .1

Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for laminate, adhesive, and core materials installation in accordance with manufacturer's written instructions.

- .1 Visually inspect substrate in presence of Departmental Representative.
- .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
- .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 MANUFACTURER'S INSTRUCTIONS .1

Compliance: comply with manufacturer's written recommendations, including product technical bulletins, product catalogue

installation instructions, product carton  
installation instructions, and data sheets.

3.3 INSTALLATION

- .1 Install work plumb, true and square, neatly scribed to adjoining surfaces.
- .2 Make allowances around perimeter where fixed objects pass through or project into laminated plastic work to permit normal movement without restriction.
- .3 Use draw bolts and splines in countertop joints. Maximum spacing 450 mm on centre, 75 mm from edge. Make flush hairline joints.
- .4 Provide cutouts for inserts, grilles, appliances, outlet boxes and other penetrations. Round internal corners, chamfer edges and seal exposed core.
- .5 At junction of laminated plastic counter back splash and adjacent wall finish, apply small bead of sealant.
- .6 Site apply laminated plastic to units as indicated. Adhere laminated plastic over entire surface. Make corners with hairline joints. Use full sized laminate sheets. Make joints only where approved. Slightly bevel arises.
- .7 For site application, offset joints in plastic laminate facing from joints in core.

3.4 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
  - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.
  - .1 Clean to ANSI/NEMA LD3, Annex B.
  - .2 Remove traces of primer, caulking, epoxy and filler materials and clean doors and frames.
- .3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition

Waste Management and Disposal.

- .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.5 PROTECTION

- .1 Cover finished laminated plastic veneered surfaces with heavy kraft paper or put in cartons during shipment.
- .2 Protect installed laminated surfaces in accordance with manufacturer's written recommendations.
  - .1 Remove protection only immediately before final inspection.
- .3 Protect installed products and components from damage during construction.
- .4 Repair damage to adjacent materials caused by laminate, adhesive, and core materials installation.

PART 1 GENERAL

- 1.1 REFERENCES .1 American Society for Testing and Materials International (ASTM)
- .1 ASTM C553-02, Specification for Mineral Fibre Blanket Thermal Insulation for Commercial and Industrial Applications.
  - .2 ASTM C665-01e1, Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.
  - .3 ASTM C1320-05, Standard Practice for Installation of Mineral Fiber Batt and Blanket Thermal Insulation for Light Frame Construction.
- .2 Canadian Standards Association (CSA International)
- .1 CSA B111-1974(R2003), Wire Nails, Spikes and Staples.
- .3 Underwriters Laboratories of Canada (ULC)
- .1 CAN/ULC-S702-1997, Standard for Mineral Fibre Insulation.
- 1.2 SUBMITTALS .1 Product Data:
- .1 Submit manufacturer's printed product literature, specifications and data sheet in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Manufacturer's Instructions:
- .1 Submit manufacturer's installation instructions.
- 1.3 QUALITY ASSURANCE .1 Test Reports: certified test reports showing compliance with specified performance characteristics and physical properties.
- .2 Certificates: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.
- 1.4 WASTE MANAGEMENT AND DISPOSAL .1 Separate waste materials for recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management And

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Disposal.

- .2 Remove from site and dispose of packaging materials at appropriate recycling facilities.
- .3 Collect and separate for disposal paper plastic polystyrene corrugated cardboard packaging material in appropriate on-site for recycling in accordance with Waste Management Plan.

PART 2 PRODUCTS

- 2.1 INSULATION .1 Batt and blanket mineral fibre: to ASTM C553 ASTM C665 CAN/ULC S702. Acoustic insulation 89 mm tick in locations as indicated.

PART 3 EXECUTION

- 3.1 MANUFACTURER'S INSTRUCTIONS .1 Compliance: comply with manufacturer's written data, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and data sheets.
- 3.2 INSULATION INSTALLATION .1 Install insulation to maintain continuity of thermal and acoustical protection to building elements and spaces and to ASTM C1320.
- .2 Fit insulation closely around electrical boxes, pipes, ducts, frames and other objects in or passing through insulation.
  - .3 Do not compress insulation to fit into spaces.
  - .4 Keep insulation minimum 75 mm from heat emitting devices such as recessed light fixtures, and minimum 50 mm from sidewalls of CAN/ULC-S604 Type A chimneys and CAN/CGA-B149.1 and CAN/CGA-B149.2 Type B and L vents.
  - .5 Do not enclose insulation until it has been inspected and approved by Departmental Representative Engineer Consultant.

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PWGSC  
P/N R. 063761.003  
Parole Office Fit-Up CSC  
J.R. Smallwood Bldg.  
Corner Brook, NL

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BLANKET INSULATION

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3.3 CLEANING .1 Upon completion of installation, remove surplus materials, rubbish, tools and equipment barriers.

PART 1 GENERAL

- 1.1 REFERENCES
- .1 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
    - .1 Material Safety Data Sheets (MSDS).
  - .2 Underwriter's Laboratories of Canada (ULC)
    - .1 ULC-S115-1995, Fire Tests of Fire stop Systems.
- 1.2 DEFINITIONS
- .1 Fire Stop Material: device intended to close off opening or penetration during fire or materials that fill openings in wall or floor assembly where penetration is by cables, cable trays, conduits, ducts and pipes and poke-through termination devices, including electrical outlet boxes along with their means of support through wall or floor openings.
  - .2 Single Component Fire Stop System: fire stop material that has Listed Systems Design and is used individually without use of high temperature insulation or other materials to create fire stop system.
  - .3 Multiple Component Fire Stop System: exact group of fire stop materials that are identified within Listed Systems Design to create on site fire stop system.
  - .4 Tightly Fitted; (ref: NBC Part 3.1.9.1.1 and 9.10.9.6.1): penetrating items that are cast in place in buildings of noncombustible construction or have "0" annular space in buildings of combustible construction.
    - .1 Words "tightly fitted" should ensure that integrity of fire separation is such that it prevents passage of smoke and hot gases to unexposed side of fire separation.
- 1.3 SUBMITTALS
- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
  - .2 Product Data:
    - .1 Submit manufacturer's printed product literature, specifications and datasheet and include product characteristics,

- performance criteria, physical size, finish and limitations.
- .2 Submit two copies of WHMIS MSDS - Material Safety Data.
- .3 Shop Drawings:
  - .1 Submit shop drawings to show location, proposed material, reinforcement, anchorage, fastenings and method of installation.
  - .2 Construction details should accurately reflect actual job conditions.
- .4 Samples:
  - .1 Submit duplicate 300 x 300 mm samples showing actual fire stop material proposed for project.
- .5 Quality assurance submittals: submit following in accordance with Section 01 45 00 - Testing and Quality Control.
  - .1 Test reports: in accordance with CAN-ULC-S101 for fire endurance and CAN-ULC-S102 for surface burning characteristics.
    - .1 Submit certified test reports from approved independent testing laboratories, indicating compliance of applied fire stopping with specifications for specified performance characteristics and physical properties.
  - .2 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
  - .3 Manufacturer's Instructions: submit manufacturer's installation instructions and special handling criteria, installation sequence, cleaning procedures.
  - .4 Manufacturer's Field Reports: submit to manufacturer's written reports within 3 days of review, verifying compliance of Work, as described in PART 3 - FIELD QUALITY CONTROL.

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- .1 Installer: company and person specializing in fire stopping installations with 5 years documented experience approved by manufacturer.
- 1.5 DELIVERY, STORAGE AND HANDLING
- .1 Packing, shipping, handling and unloading:
    - .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.
    - .2 Deliver, store and handle materials in accordance with manufacturer's written instructions.
    - .3 Deliver materials to the site in undamaged condition and in original unopened containers, marked to indicate brand name, manufacturer, ULC markings.
  - .2 Storage and Protection:
    - .1 Store materials indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
    - .2 Replace defective or damaged materials with new.
  - .3 Waste Management and Disposal:
    - .1 Separate waste materials for recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

PART 2 PRODUCTS

- 2.1 MATERIALS
- .1 Fire stopping and smoke seal systems: in accordance with CAN-ULC-S115.
    - .1 Asbestos-free materials and systems capable of maintaining effective barrier against flame, smoke and gases in compliance with requirements of CAN-ULC-S115 and not to exceed opening sizes for which they are intended and conforming to specified special requirements described in PART 3 .
    - .2 Fire stop system rating: 60 minutes.
  - .2 Service penetration assemblies: systems tested to CAN-ULC-S115.
  - .3 Service penetration fire stop components:

certified by test laboratory to CAN-ULC-S115.

- .4 Fire-resistance rating of installed fire stopping assembly in accordance with NBC.
- .5 Fire stopping and smoke seals at openings intended for ease of re-entry such as cables: elastomeric seal.
- .6 Fire stopping and smoke seals at openings around penetrations for pipes, ductwork and other mechanical items requiring sound and vibration control: elastomeric seal.
- .7 Primers: to manufacturer's recommendation for specific material, substrate, and end use.
- .8 Water (if applicable): potable, clean and free from injurious amounts of deleterious substances.
- .9 Damming and backup materials, supports and anchoring devices: to manufacturer's recommendations, and in accordance with tested assembly being installed as acceptable to authorities having jurisdiction.
- .10 Sealants for vertical joints: non-sagging.

PART 3 EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS .1

Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheets.

3.2 PREPARATION .1

Examine sizes and conditions of voids to be filled to establish correct thicknesses and installation of materials.

.1 Ensure that substrates and surfaces are clean, dry and frost free.

.2 Prepare surfaces in contact with fire stopping materials and smoke seals to manufacturer's instructions.

.3 Maintain insulation around pipes and ducts penetrating fire separation.

- .4 Mask where necessary to avoid spillage and over coating onto adjoining surfaces; remove stains on adjacent surfaces.

3.3 INSTALLATION

- .1 Install fire stopping and smoke seal material and components in accordance with manufacturer's certified tested system listing.
- .2 Seal holes or voids made by through penetrations, poke-through termination devices, and unpenetrated openings or joints to ensure continuity and integrity of fire separation are maintained.
- .3 Provide temporary forming as required and remove forming only after materials have gained sufficient strength and after initial curing.
- .4 Tool or trowel exposed surfaces to neat finish.
- .5 Remove excess compound promptly as work progresses and upon completion.

3.4 SEQUENCES OF OPERATION

- .1 Proceed with installation only when submittals have been reviewed by Departmental Representative.
- .2 Install floor fire stopping before interior partition erections.
- .3 Metal deck bonding: fire stopping to precede spray applied fireproofing to ensure required bonding.
- .4 Mechanical pipe insulation: certified fire stop system component.
  - .1 Ensure pipe insulation installation precedes fire stopping.

3.5 FIELD QUALITY CONTROL

- .1 Inspections: notify Departmental Representative when ready for inspection and prior to concealing or enclosing fire stopping materials and service penetration assemblies.

.2 Manufacturer's Field Services:

- .1 Obtain written report from manufacturer verifying compliance of Work, in handling, installing, applying, protecting and cleaning of product and submit Manufacturer's Field Reports as described in PART 1 - SUBMITTALS.
- .2 Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.
- .3 Schedule site visits, to review Work, as directed in PART 1 - QUALITY ASSURANCE.

3.6 CLEANING

- .1 Proceed in accordance with Section 01 74 11 - Cleaning.
- .2 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.
- .3 Remove temporary dams after initial set of fire stopping and smoke seal materials.

3.7 SCHEDULE

- .1 Fire stop and smoke seal at:
  - .1 Penetrations through fire-resistance rated masonry, concrete, and gypsum board partitions and walls.
  - .2 Edge of floor slabs.
  - .3 Top of fire-resistance rated masonry and gypsum board partitions.
  - .4 Intersection of fire-resistance rated masonry and gypsum board partitions.
  - .5 Control and sway joints in fire-resistance rated masonry and gypsum board partitions and walls.
  - .6 Penetrations through fire-resistance rated floor slabs, ceilings.
  - .7 Openings and sleeves installed for future use through fire separations.  
Around mechanical and electrical assemblies penetrating fire separations.

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- .8 Rigid ducts: greater than 129 cm<sup>2</sup>: fire stopping to consist of bead of fire stopping material between retaining angle and fire separation and between retaining angle and duct, on each side of fire separation.

PART 1 GENERAL

- 1.1 SECTION INCLUDES .1 Materials, preparation and application for caulking and sealants.
- 1.2 RELATED SECTIONS .1 Section 01 33 00 - Submittal Procedures.  
.2 Section 01 74 21 - Construction/Demolition Waste Management And Disposal.  
.3 Section 01 45 00 - Testing and Quality Control.  
.4 Section 01 61 00 - Common Product Requirements.
- 1.3 REFERENCES .1 American Society for Testing and Materials International, (ASTM)  
.1 ASTM C919-02, Standard Practice for Use of Sealants in Acoustical Applications.  
.2 Canadian General Standards Board (CGSB)  
.1 CGSB 19-GP-5M-1984, Sealing Compound, One Component, Acrylic Base, Solvent Curing (Issue of 1976 reaffirmed, incorporating Amendment No. 1).  
.2 CAN/CGSB-19.13-M87, Sealing Compound, One-component, Elastomeric, Chemical Curing.  
.3 CGSB 19-GP-14M-1984, Sealing Compound, One Component, Butyl-Polyisobutylene Polymer Base, Solvent Curing (Reaffirmation of April 1976).  
.4 CAN/CGSB-19.17-M90, One-Component Acrylic Emulsion Base Sealing Compound.  
.5 CAN/CGSB-19.24-M90, Multi-component, Chemical Curing Sealing Compound.  
.3 Department of Justice Canada (Jus)  
.1 Canadian Environmental Protection Act, 1999 (CEPA).  
.4 General Services Administration (GSA) - Federal Specifications (FS)  
.1 FS-SS-S-200-E(2)1993, Sealants, Joint, Two-Component, Jet-Blast-Resistant, Cold Applied, for Portland Cement Concrete Pavement.

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- .5 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
    - .1 Material Safety Data Sheets (MSDS).
  - .6 Transport Canada (TC)
    - .1 Transportation of Dangerous Goods Act, 1992 (TDGA).
- 1.4 SUBMITTALS
- .1 Submit product data in accordance with Section 01 33 00 - Submittal Procedures.
  - .2 Manufacturer's product to describe.
    - .1 Caulking compound.
    - .2 Primers.
    - .3 Sealing compound, each type, including compatibility when different sealants are in contact with each other.
  - .3 Submit samples in accordance with Section 01 33 00 - Submittal Procedures.
  - .4 Submit duplicate samples of each type of material and colour.
  - .5 Cured samples of exposed sealants for each color where required to match adjacent material.
  - .6 Submit manufacturer's instructions in accordance with Section 01 33 00 - Submittal Procedures.
    - .1 Instructions to include installation instructions for each product used.
- 1.5 DELIVERY, STORAGE, AND HANDLING
- .1 Deliver, handle, store and protect materials in accordance with Section 01 61 00 - Common Product Requirements.
  - .2 Deliver and store materials in original wrappings and containers with manufacturer's seals and labels, intact. Protect from freezing, moisture, water and contact with ground or floor.
- 1.6 WASTE MANAGEMENT AND DISPOSAL
- .1 Separate waste materials for recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management And Disposal.

1.7 PROJECT  
CONDITIONS

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- .2 Remove from site and dispose of packaging materials at appropriate recycling facilities.
- .3 Collect and separate for disposal paper plastic polystyrene corrugated cardboard packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.
- .4 Place materials defined as hazardous or toxic in designated containers.
- .5 Handle and dispose of hazardous materials in accordance with the CEPA, TDGA, Regional and Municipal regulations.
- .6 Unused sealant material must not be disposed of into sewer system, into streams, lakes, onto ground or in other location where it will pose health or environmental hazard.
- .7 Divert unused joint sealing material from landfill to official hazardous material collections site approved by Owner's Representative.
- .8 Empty plastic joint sealer containers are not recyclable. Do not dispose of empty containers with plastic materials destined for recycling.
- .9 Fold up metal banding, flatten, and place in designated area for recycling.
- .1 Environmental Limitations:
  - .1 Do not proceed with installation of joint sealants under following conditions:
    - .1 When ambient and substrate temperature conditions are outside limits permitted by joint sealant manufacturer or are below 4.4 degrees C.
    - .2 When joint substrates are wet.
  - .2 Joint-Width Conditions:
    - .1 Do not proceed with installation of joint sealants where joint widths are less than those allowed by joint sealant manufacturer for applications indicated.

.3 Joint-Substrate Conditions:

- .1 Do not proceed with installation of joint sealants until contaminants capable of interfering with adhesion are removed from joint substrates.

1.8 ENVIRONMENTAL REQUIREMENTS

- .1 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of hazardous materials; and regarding labelling and provision of Material Safety Data Sheets (MSDS) acceptable to Labour Canada.
- .2 Conform to manufacturer's recommended temperatures, relative humidity, and substrate moisture content for application and curing of sealants including special conditions governing use.
- .3 Ventilate area of work as directed by Departmental Representative by use of approved portable supply and exhaust fans.

PART 2 PRODUCTS

2.1 SEALANT MATERIALS

- .1 Do not use caulking that emits strong odours, contains toxic chemicals or is not certified as mould resistant in air handling units.
- .2 When low toxicity caulks are not possible, confine usage to areas which offgas to exterior, are contained behind air barriers, or are applied several months before occupancy to maximize offgas time.
- .3 Where sealants are qualified with primers use only these primers.

2.2 SEALANT MATERIAL DESIGNATIONS

- .1 Urethanes One Part.  
.1 Non-Sag to CAN/CGSB-19.13, Type 2, MCG-2-25 MCG-2-40.  
.2 Windows not relevant.
- .2 Acrylics One Part.  
.1 To CGSB 19-GP-5M.
- .3 Acoustical Sealant.

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- .1 To ASTM C919.
  - .4 Butyl.
    - .1 To CGSB 19-GP-14M.
  - .5 Preformed Compressible and Non-Compressible back-up materials.
    - .1 Polyethylene, Urethane, Neoprene or Vinyl Foam.
      - .1 Extruded closed cell foam backer rod.
      - .2 Size: oversize 30 to 50 %.
    - .2 Neoprene or Butyl Rubber.
      - .1 Round solid rod, Shore A hardness 70.
    - .3 High Density Foam.
      - .1 Extruded closed cell polyvinyl chloride (PVC), extruded polyethylene, closed cell, Shore A hardness 20, tensile strength 140 to 200 kPa, extruded polyolefin foam, 32 kg/m<sup>3</sup> density, or neoprene foam backer, size as recommended by manufacturer.
    - .4 Bond Breaker Tape.
      - .1 Polyethylene bond breaker tape which will not bond to sealant.
- 2.3 SEALANT SELECTION
- .1 Perimeter of bath fixtures (e.g. sinks, tubs, urinals, stools, waterclosets, basins, vanities): Sealant type: CAN/CGSB-19.13.
  - .2 Exposed interior control joints in drywall: Sealant type: CAN/CGSB-19.13.
- 2.4 JOINT CLEANER
- .1 Non-corrosive and non-staining type, compatible with joint forming materials and sealant recommended by sealant manufacturer.
  - .2 Primer: as recommended by manufacturer.
- PART 3 EXECUTION
- 3.1 PROTECTION
- .1 Protect installed Work of other trades from staining or contamination.

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- 3.2 SURFACE PREPARATION
- .1 Examine joint sizes and conditions to establish correct depth to width relationship for installation of backup materials and sealants.
  - .2 Clean bonding joint surfaces of harmful matter substances including dust, rust, oil grease, and other matter which may impair Work.
  - .3 Do not apply sealants to joint surfaces treated with sealer, curing compound, water repellent, or other coatings unless tests have been performed to ensure compatibility of materials. Remove coatings as required.
  - .4 Ensure joint surfaces are dry and frost free.
  - .5 Prepare surfaces in accordance with manufacturer's directions.
- 3.3 PRIMING
- .1 Where necessary to prevent staining, mask adjacent surfaces prior to priming and caulking.
  - .2 Prime sides of joints in accordance with sealant manufacturer's instructions immediately prior to caulking.
- 3.4 BACKUP MATERIAL
- .1 Apply bond breaker tape where required to manufacturer's instructions.
  - .2 Install joint filler to achieve correct joint depth and shape, with approximately 30% compression.
- 3.5 MIXING
- .1 Mix materials in strict accordance with sealant manufacturer's instructions.
- 3.6 APPLICATION
- .1 Sealant.
    - .1 Apply sealant in accordance with manufacturer's written instructions.
    - .2 Mask edges of joint where irregular surface or sensitive joint border exists to provide neat joint.

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- .3 Apply sealant in continuous beads.
  - .4 Apply sealant using gun with proper size nozzle.
  - .5 Use sufficient pressure to fill voids and joints solid.
  - .6 Form surface of sealant with full bead, smooth, free from ridges, wrinkles, sags, air pockets, embedded impurities.
  - .7 Tool exposed surfaces before skinning begins to give slightly concave shape.
  - .8 Remove excess compound promptly as work progresses and upon completion.
  - .9 Curing.
    - .1 Cure sealants in accordance with sealant manufacturer's instructions.
    - .2 Do not cover up sealants until proper curing has taken place.
  - .2 Cleanup.
    - .1 Clean adjacent surfaces immediately and leave Work neat and clean.
    - .2 Remove excess and droppings, using recommended cleaners as work progresses.
    - .3 Remove masking tape after initial set of sealant.

PART 1 GENERAL

1.1 RELATED SECTIONS

- .1 Section 08 14 16 - Flush Wood Doors.
- .2 Section 08 71 00 - Door Hardware.
- .3 Section 09 91 23 - Interior Painting/Re-Painting.

1.2 REFERENCES

- .1 American Society for Testing and Materials International (ASTM)
  - .1 ASTM A653/A653M-06a, Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- .2 Canadian General Standards Board (CGSB)
  - .1 CAN/CGSB-1.181-99, Ready-Mixed Organic Zinc-Rich Coating.
  - .2 CGSB 41-GP-19Ma-84, Rigid Vinyl Extrusions for Windows and Doors.
- .3 Canadian Standards Association (CSA International)
  - .1 CSA-G40.20-04/G40.21-04, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
  - .2 CSA W59-03, Welded Steel Construction (Metal Arc Welding).
- .4 Canadian Steel Door Manufacturers' Association (CSDMA)
  - .1 CSDMA, Recommended Specifications for Commercial Steel Doors and Frames, 2000.
  - .2 CSDMA, Selection and Usage Guide for Commercial Steel Doors, 1990.
- .5 South Coast Air Quality Management District (SCAQMD), California State
  - .1 SCAQMD Rule 1113-04, Architectural Coatings.
  - .2 SCAQMD Rule 1168-05, Adhesives and Sealants Applications.

1.3 SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Provide product data: in accordance with

Section 01 33 00 - Submittal Procedures.

- .3 Provide shop drawings: in accordance with Section 01 33 00 - Submittal Procedures.
  - .1 Indicate each type frame material, core thickness, reinforcements, location of anchors and exposed fastenings and reinforcing finishes.
  - .2 Include schedule identifying each unit, with door marks and numbers relating to numbering on drawings and door schedule.
  - .3 Submit test and engineering data, and installation instructions.
- .4 Provide samples in accordance with Section 01 33 00 - Submittal Procedures.

1.4 DELIVERY,  
STORAGE AND  
HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.
- .2 Waste Management and Disposal:
  - .1 Separate waste materials for recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

PART 2 PRODUCTS

2.1 MATERIALS

- .1 Hot dipped galvanized steel sheet: to ASTM A653M, ZF75 1.2, minimum base steel thickness in accordance with CSDMA Table 1 - Thickness for Component Parts.
- .2 Reinforcement channel: to CSA G40.20/G40.21, Type 44W, coating designation to ASTM A653M, ZF75.

2.2 PRIMER

- .1 Touch-up prime CAN/CGSB-1.181.
  - .1 Maximum VOC limit 50 g/L to GC-03.

2.3 PAINT

- .1 Field paint steel frames in accordance with Sections 09 91 23 - Interior Painting,. Protect weatherstrips from paint. Provide final finish free of scratches or other blemishes.
  - .1 Maximum VOC emission level 50 g/L to GS-

11 to SCAQMD Rule 1113.

2.4 FRAMES  
FABRICATION  
GENERAL

- .1 Fabricate frames in accordance with CSDMA specifications.
- .2 Fabricate frames to profiles and maximum face sizes as indicated.
- .3 Interior frames: 1.2 mm welded type construction.
- .4 Blank, reinforce, drill and tap frames for mortised, templated hardware, using templates provided by finish hardware supplier. Reinforce frames for surface mounted hardware.
- .5 Protect mortised cutouts with steel guard boxes.
- .6 Prepare frame for door silencers, 3 for single door.
- .7 Manufacturer's nameplates on frames and screens are not permitted.
- .8 Conceal fastenings except where exposed fastenings are indicated.
- .9 Provide factory-applied touch up primer at areas where zinc coating has been removed during fabrication.
- .10 Insulate exterior frame components with polyurethane insulation.

2.5 FRAME  
ANCHORAGE

- .1 Provide appropriate anchorage to floor and wall construction.
- .2 Locate each wall anchor immediately above or below each hinge reinforcement on hinge jamb and directly opposite on strike jamb.
- .3 Provide 2 anchors for rebate opening heights up to 1520 mm and 1 additional anchor for each additional 760 mm of height or fraction thereof.
- .4 Locate anchors for frames in existing openings not more than 150 mm from top and bottom of each jambs and intermediate at 660 mm on centre maximum.

- 2.6 FRAMES:  
WELDED TYPE
- .1 Welding in accordance with CSA W59.
  - .2 Accurately mitre or mechanically joint frame product and securely weld on inside of profile.
  - .3 Grind welded joints and corners to a flat plane, fill with metallic paste and sand to uniform smooth finish.
  - .4 Securely attach floor anchors to inside of each jamb profile.
  - .5 Weld in 2 temporary jamb spreaders per frame to maintain proper alignment during shipment.

PART 3 EXECUTION

- 3.1 MANUFACTURER'S  
INSTRUCTIONS
- .1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheets.
- 3.2 FRAME  
INSTALLATION
- .1 Set frames plumb, square, level and at correct elevation.
  - .2 Secure anchorages and connections to adjacent construction.
  - .3 Brace frames rigidly in position while building-in. Install temporary horizontal wood spreader at third points of door opening to maintain frame width. Provide vertical support at centre of head for openings over 1200 mm wide. Remove temporary spreaders after frames are built-in.
  - .4 Make allowances for deflection of structure to ensure structural loads are not transmitted to frames.
  - .5 Caulk perimeter of frames between frame and adjacent material.
- 3.3 FINISH  
REPAIRS
- .1 Touch up with primer finishes damaged during installation.

- .2 Fill exposed frame anchors and surfaces with imperfections with metallic paste filler and sand to a uniform smooth finish.

PART 1 GENERAL

- 1.1 RELATED SECTIONS
- .1 Section 01 33 00 - Submittal Procedures.
  - .2 Section 01 74 21 - Construction/Demolition Waste Management And Disposal.
  - .3 Section 08 11 00 - Metal Doors and Frames.
  - .4 Section 08 71 00 - Door Hardware.
- 1.2 REFERENCES
- .1 Architectural Woodwork Manufacturers Association of Canada (AWMAC).
    - .1 Quality Standards for Architectural Woodwork 1998.
  - .2 Canadian General Standards Board (CGSB).
    - .1 CAN/CGSB-71.19-M88, Adhesive, Contact, Sprayable.
    - .2 CAN/CGSB-71.20-M88, Adhesive, Contact, Brushable.
  - .3 Canadian Standards Association (CSA International).
    - .1 CSA A440.2-98, Energy Performance of Windows and Other Fenestration Systems.
    - .2 CSA O115-M1982(R2001), Hardwood and Decorative Plywood.
    - .3 CAN/CSA O132.2 Series-90(R1998), Wood Flush Doors.
    - .4 CAN/CSA-O132.5-M1992(R1998), Stile and Rail Wood Doors.
    - .5 CSA Certification Program for Windows and Doors 00.
  - .4 Environmental Choice Program (ECP).
    - .1 CCD-045-92, Sealants and Caulking Compounds.
    - .2 CCD-046-92, Adhesives.
- 1.3 SUBMITTALS
- .1 Product Data:
    - .1 Submit manufacturer's printed product literature, specifications and data sheet in accordance with Section 01 33 00 - Submittal Procedures.
    - .2 Submit two copies of WHMIS MSDS -

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- Material Safety Data Sheets in accordance with Section 01 33 00 - Submittal Procedures. Indicate VOC's:
- .1 For caulking materials during application and curing.
  - .2 For door materials and adhesives.
- .2 Shop Drawings:
- .1 Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.
- 1.4 SAMPLES
- .1 Submit samples in accordance with Section 01 33 00 - Submittal Procedures.
  - .2 Submit one 300 x 300 mm corner sample of each type wood door.
  - .3 Show door construction, core, and faces.
  - .4 Manufacturer's Instructions:
    - .1 Submit manufacturer's installation instructions.
- 1.5 DELIVERY, STORAGE, AND HANDLING
- .1 Storage and Protection:
    - .1 Protect doors from dampness. Arrange for delivery after work causing abnormal humidity has been completed.
    - .2 Store doors in well ventilated room, off floor, in accordance with manufacturer's recommendations.
    - .3 Protect doors from scratches, handling marks and other damage. Wrap doors.
    - .4 Store doors away from direct sunlight.
- 1.6 WASTE MANAGEMENT AND DISPOSAL
- .1 Remove from site and dispose of packaging materials at appropriate recycling facilities.
  - .2 Dispose of corrugated cardboard polystyrene plastic packaging material in appropriate on-site bin for recycling in accordance with site waste management program.
  - .3 Divert unused adhesive material from landfill to official hazardous material collections site approved by Departmental Representative.
  - .4 Do not dispose of unused paint materials into

sewer systems, into lakes, streams, onto ground or in locations where it will pose health or environmental hazard.

PART 2 PRODUCTS

2.1 WOOD FLUSH DOORS .1

Solid core: to CAN/CSA-0132.2.1.

.1 Construction:

.1 Solid particleboard core: stile and rail frame bonded to particleboard core with wood lock blocks 7-ply construction.

.2 Face Panels:

.1 Hardwood; veneer grades: Grade I (Premium), birch species.

.3 Adhesive: Type II (water resistant) for interior doors.

2.2 FABRICATION .1

Vertical edge strips to match face veneer.

.2 Bevel vertical edges of single acting doors 3 mm in 50 mm on lock side and 1.5 mm in 50 mm on hinge side.

.3 Radius vertical edges of double acting doors to 60 mm radius.

.4 Provide waterproof non-staining membrane at cutouts on exterior doors to exclude moisture from core.

PART 3 EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS .1

Compliance: comply with manufacturer's written data, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and data sheets.

3.2 INSTALLATION .1

Unwrap and protect doors in accordance with CAN/CSA-0132.2 Series, Appendix A.

.2 Install doors and hardware in accordance with manufacturer's printed instructions and CAN/CSA-0132.2 Series, Appendix A.

.3 Adjust hardware for correct function.

3.3 ADJUSTMENT

.1 Re-adjust doors and hardware just prior to completion of building to function freely and properly.

3.4 CLEANING

.1 Perform cleaning as soon as possible after installation to remove construction and accumulated environmental dirt.

.2 Remove traces of primer, caulking; clean doors and frames.

.3 On completion of installation, remove surplus materials, rubbish, tools and equipment barriers.

PART 1 GENERAL

- 1.1 RELATED REQUIREMENTS .1 06 40 00 - Architectural Woodwork.
- 1.2 REFERENCES .1 American National Standards Institute (ANSI)  
/ Builders Hardware Manufacturers Association (BHMA)
- .1 ANSI/BHMA A156.9-2003, Cabinet Hardware.  
.2 ANSI/BHMA A156.11- 2004, Cabinet Locks.  
.3 ANSI/BHMA A156.16-2008, Auxiliary Hardware.  
.4 ANSI/BHMA A156.18-2006, Materials and Finishes.
- 1.3 ACTION AND INFORMATIONAL SUBMITTALS .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
- .1 Submit manufacturer's instructions, printed product literature and data sheets for cabinet hardware and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Samples:
- .1 Submit samples of all hardware.
- .4 Hardware List:
- .1 Submit contract hardware list.  
.2 Indicate specified hardware, including make, model, material, function, finish and other pertinent information.
- .5 Test Reports: certified test reports showing compliance with specified performance characteristics and physical properties.
- .6 Manufacturer's Instructions: submit manufacturer's installation instructions.
- 1.4 CLOSEOUT SUBMITTALS .1 Submit in accordance with Section 01 78 00 - Closeout Submittals.
- .2 Operation and Maintenance Data: submit operation and maintenance data for cabinet hardware for incorporation into manual.

- 1.5 QUALITY ASSURANCE
- .1 Certificates: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.
- 1.6 DELIVERY, STORAGE AND HANDLING
- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Package items of hardware including fastenings, separately or in like groups of hardware, label each package as to item definition and location.
- .4 Storage and Handling Requirements:
- .1 Store materials off ground indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
- .2 Store and protect cabinet hardware from nicks, scratches, and blemishes.
- .3 Protect prefinished surfaces with wrapping strippable coating.
- .4 Replace defective or damaged materials with new.
- .5 Develop Construction Waste Management Plan Waste Reduction Workplan related to Work of this Section.
- .6 Packaging Waste Management: remove for reuse and return by manufacturer of pallets, crates, padding, and packaging materials as specified in Construction Waste Management Plan Waste Reduction Workplan in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

PART 2 PRODUCTS

- 2.1 HARDWARE ITEMS .1 Use one manufacturer's product for all similar items.
- 2.2 CABINET HARDWARE .1 Cabinet hardware: to ANSI/BHMA A156.9, as listed below.
- .1 Hinges: concealed self-closing hinge, type European, finish to C26D.
  - .2 Pulls: surface mounted pull, type Rod 'U', 100 mm length, type B02191, finished to C26D.
  - .3 Shelf rests and standards: shelf rest installed in holes drilled, type B04013 adjustable shelf standards, with open shelf rests, finished to C26D.
  - .4 Drawer slides: side mounted drawer slides.
- .2 Cabinet locks: to ANSI/BHMA A156.11, designated by letter E and numeral identifiers listed in Hardware Schedule as listed below.
- .1 Door or drawer locks: half mortised into back of door or drawer.
  - .2 Cylinders: key into keying system.
  - .3 Finished to C26D.
- 2.3 MISCELLANEOUS HARDWARE .1 Auxiliary hardware: to ANSI/BHMA A156.16, designated by letter and numeral identifiers listed in Hardware Schedule as listed below, finished to C26D.
- .1 Garment rods and shelf brackets: 32 mm diameter tubular stainless steel with end and centre brackets.
  - .2 Closet shelf supports: heavy duty adjustable support with brace for shelf and closet rod, stainless steel zinc plated.
- 2.4 FASTENINGS .1 Supply screws, bolts, expansion shields and other fastening devices required for satisfactory installation and operation of hardware.
- .2 Exposed fastening devices to match finish of hardware.

Use fasteners compatible with material through which they pass.

- 2.5 KEYING
- .1 Cabinet locks to be keyed alike. Submit keying schedule for approval.
  - .2 Supply keys in duplicate for every lock in this Contract.
  - .3 Supply 3 master keys for each master key or grand master key group.
  - .4 Stamp keying code numbers on keys and cylinders.

PART 3 EXECUTION

- 3.1 INSTALLATION
- .1 Manufacturer's Instructions: comply with manufacturer's written recommendations, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and data sheets.
  - .2 Install hardware to standard hardware location dimensions in accordance with manufacturer's recommendations and to project design requirements.
  - .3 Install key control cabinet and establish key control set-up.
- 3.2 ADJUSTING
- .1 Adjust cabinet hardware for optimum, smooth operating condition.
  - .2 Lubricate hardware and other moving parts.
  - .3 Adjust cabinet door hardware to ensure tight fit at contact points with frames.
- 3.3 CLEANING
- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
    - .1 Leave Work area clean at end of each day.
    - .2 Clean hardware with damp rag and approved non-abrasive cleaner, and polish hardware in accordance with

manufacturer's instructions.

.3 Remove protective material from hardware items where present.

.4 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

.2 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

.1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.4 PROTECTION .1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by cabinet and miscellaneous hardware installation.

3.5 SCHEDULE .1 Cabinet drawers:

.1 1 set drawer slides B05052.

.2 1 lock kd E07212.

.3 1 handle pull B02011 626.

.2 Cabinet swinging doors:

.1 1 pair hinges B01262 626.

.2 1 pull B02131 626.

.3 1 lock kd E07212.

PART 1 GENERAL

- 1.1 RELATED SECTIONS
- .1 Section 01 33 00 - Submittal Procedures.
  - .2 Section 01 61 00 - Common Product Requirements.
  - .3 Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
  - .4 Section 01 78 00 - Closeout Submittals.
  - .5 Section 08 11 14- Metal Doors & Frames.
  - .6 Section 08 14 16 - Flush Wood Doors.
  - .7 Division 26 - Electrical wiring for magnetic strikes, electric releases, electric locks.
- 1.2 REFERENCES
- .1 Canadian Steel Door and Frame Manufacturers' Association (CSDFMA).
    - .1 CSDFMA Canadian Metric Guide for Steel Doors and Frames (Modular Construction).
  - .2 Canadian General Standards Board (CGSB).
    - .1 CAN/CGSB-69.17, Bored and Preassembled Locks and Latches.
    - .2 CAN/CGSB-69.18 /ANSI/BHMA A156.1, Butts and Hinges.
    - .3 CAN/CGSB-69.19/ANSI/BHMA A156.3, Exit Devices.
    - .4 CAN/CGSB-69.20/ANSI/BHMA A156.4, Door Controls (Closers).
    - .5 CAN/CGSB-69.22/ANSI/BHMA A156.6, Architectural Door Trim.
    - .6 CAN/CGSB-69.29/ANSI/BHMA A156.13, Mortise Locks and Latches.
    - .7 CAN/CGSB-69.30/ANSI/BHMA A156.14, Sliding and Folding Door Hardware.
    - .8 CAN/CGSB-69.34/ANSI/BHMA A156.18, Materials and Finishes.
    - .9 CAN/CGSB-69.35/ANSI/BHMA A156.19, Power Assist and Low Energy Power Operated Doors.
- 1.3 SUBMITTALS
- .1 Product Data:

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- .1 Submit manufacturer's printed product literature, specifications and data sheet.
  - .2 Samples:
    - .1 Identify each sample by label indicating applicable specification paragraph number, brand name and number, finish and hardware package number.
    - .2 After approval samples will be returned for incorporation in the Work.
  - .3 Hardware List:
    - .1 Submit contract hardware list.
    - .2 Indicate specified hardware, including make, model, material, function, size, finish and other pertinent information.
  - .4 Manufacturer's Instructions:
    - .1 Submit manufacturer's installation instructions.
  - .5 Closeout Submittals
    - .1 Provide operation and maintenance data for door closers, locksets, door holders electrified hardware and fire exit hardware for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.
- 1.4 MAINTENANCE MATERIALS
- .1 Provide maintenance materials in accordance with Section 01 78 00 - Closeout Submittals.
  - .2 Supply two sets of wrenches for door closers, locksets and fire exit hardware.
- 1.5 WARRANTY
- .1 Provide a written manufacturer's warranty for work of this Section for failure due to defective materials for ten (10) years, dated from substantial completion certificate.
  - .2 Provide a written Contractor's warranty for work of this Section for failure due to defective installation workmanship for one (1) year, dated from submittal completion certificate.
- 1.6 QUALITY ASSURANCE
- .1 Regulatory Requirements:
    - .1 Hardware for doors in fire separations

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and exit doors certified by a Canadian Certification Organization accredited by Standards Council of Canada.

- .2 Only products meeting ANSI/BHMA standards are acceptable. Items that are equal in design, function and quality will be accepted upon approval of the Owner's Representative.
- .3 Only recognized contract hardware distributors will be considered for the work of this section. The distributor shall have on staff locally a qualified Architectural Hardware Consultant (AHC) in good standing, recognized by the Door and Hardware Institute to assist installers and direct detailing, processing and delivery of material, and certify installation acceptance.

1.7 DELIVERY,  
STORAGE, AND  
HANDLING

- .1 Deliver, store, handle and protect materials in accordance with Section 01 61 00 - Common Product Requirements.
- .2 Store finishing hardware in locked, clean and dry area.
- .3 Package each item of hardware including fastenings, separately or in like groups of hardware, label each package as to item definition and location.

1.8 MAINTENANCE  
SERVICE

- .1 Provide maintenance service for one year during warranty period to maintain all barrier free entrance automatic operators as follows:
  - .1 Qualified service personal approved by manufacturer of operators.
  - .2 Site inspection every three months will make all necessary adjustment made during this visit. Separate warranty service calls, if required, will only qualify as an inspection if time of call is close to the three month intervals.
  - .3 Make detailed reports of each visit and copy to Owner and Engineer.
  - .4 Cost of this service will be included as part of this Section and is not covered by any allowance amount.

PART 2 PRODUCTS

2.1 HARDWARE  
ITEMS

- .1 Only door locksets and latches listed on ANSI/BHMA Standards list are acceptable for use on this project.
- .2 Use one manufacturer's products only for similar items.

2.2 DOOR  
HARDWARE

- .1 Locks and latches:
  - .1 Bored and preassembled locks and latches: to CAN/CGSB-69.17, 4000 bored lock, grade 1, designed for function and keyed as stated in Hardware Schedule.
  - .2 Mortise locks and latches: to CAN/CGSB-69.29, series 1000 mortise lock, designed for function and keyed as stated in Hardware Schedule.
  - .3 Knobs Lever handles : plain design.
  - .4 Roses: round.
  - .5 Normal strikes: box type, lip projection not beyond jamb.
  - .6 Cylinders: key into keying system as directed.
  - .7 All corresponding cylinders to be removable.
  - .8 Finished to BHMA 626.
- .2 Butts and hinges:
  - .1 Butts and hinges: to CAN/CGSB-69.18, designated by letter A and numeral identifiers, followed by size and finish, listed in Hardware Groups.
- .3 Door Closers and Accessories:
  - .1 Door controls (closers): to CAN/CGSB-69.20, designated by letter C and numeral identifiers listed in Hardware Groups.
- .4 Door Operators:
  - .1 Power-operated pedestrian doors: to CAN/CGSB-69.26.
- .5 Auxiliary locks and associated products: to CAN/CGSB-69.21, designated by letter E and numeral identifiers listed in Hardware Groups.

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- .1 Key into keying system as noted.
- .6 Architectural door trim: to CAN/CGSB-69.22, designated by letter J and numeral identifiers listed in Hardware Groups.
- .1 Door protection plates: 1.27 mm thick stainless steel, finished to BMHA 630.
- .7 Door bottom seal: heavy duty, door seal of extruded aluminum frame and hollow closed cell neoprene weather seal, surface mounted with drip cap closed ends, clear anodized finish.
- 2.3 KEY CABINET .1 Provide one wall mounted steel key cabinet with capacity for 1.5 times the number of keys with an indexed key control system to CAN/CGSB-69-21.
- 2.4 FASTENINGS .1 Use only fasteners provided by manufacturer. Failure to comply may void warranties and applicable licensed labels.
- .2 Supply screws, bolts, expansion shields and other fastening devices required for satisfactory installation and operation of hardware.
- .3 Exposed fastening devices to match finish of hardware.
- .4 Where pull is scheduled on one side of door and push plate on other side, supply fastening devices, and install so pull can be secured through door from reverse side. Install push plate to cover fasteners.
- .5 Use fasteners compatible with material through which they pass.
- 2.5 KEYING .1 Door locks to be master keyed as directed. Prepare detailed keying schedule in conjunction with Owner's Representative and owner.
- .2 Provide keys in triplicate for every lock in this Contract.
- .3 Provide six master keys for each MK or GMK group. Allow for six (6) levels of sub master

keying.

- .4 Stamp keying code numbers on keys and cylinders.
- .5 Provide construction cores.
- .6 Provide all permanent cores and keys to Owner's Representative.
- .7 Supply fifty (50) blanks for each sub master group used.

2.6 FINISHES

- .1 Following finishes are indicated in hardware groups.

	BHMA	CAN MATERIAL	FINISH
Chrome	626	C26D Brass/Bronze	Satin
Alum, Anodized	628	C28 Aluminum	Satin
Stainless Steel	630	C32D Stainless Steel	Satin
Chrome	652	C26D Steel	Plated Satin
Aluminum	689	Al All	Painted

2.7 ABBREVIATIONS

BE	Best
CDH	Custom Door Hardware
Cyl	Cylinder (of a lock)
CMK	Construction Master Key
DEL	Delayed Action
DX	Detex
FBB or BB	Ball bearing hinge
NGP	National Guard Products
SDC	Security Door Controls
ST	Stanley
TR	Trine

PART 3 EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

- .1 Compliance: comply with manufacturer's written data, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and data sheets.
- .2 Furnish metal door and frame manufacturers with complete instructions and templates for preparation of their work to receive

hardware.

- .3 Furnish manufacturers' instructions for proper installation of each hardware component.

3.2 INSTALLATION

- .1 Install hardware to standard hardware location dimensions in accordance with Canadian Metric Guide for Steel Doors and Frames (Modular Construction) prepared by Canadian Steel Door and Frame Manufacturers' Association.
- .2 Where door stop contacts door pulls, mount stop to strike bottom of pull.
- .3 Install key control cabinet.
- .4 Use of "quick" type fasteners, unless specifically supplied by manufacturer, is unacceptable.
- .5 Remove construction when directed by Owner's Representative; install permanent cores and check operation of locks.
- .6 Wiring Diagrams:
  - .1 Provide any special information, voltage requirements and wiring diagrams to other trades requiring such information.
- .7 Electronic hardware connection are to be made by a certified, factory trained technician to meet the "operation" stated in each hardware group.

3.3 EXAMINATION

- .1 Visit site prior to start of installation of hardware.
- .2 Visit will include examination of openings, site conditions and materials for conditions that prevent proper application of finish hardware.
- .3 Installation will imply conditions for installation acceptable hardware contractor to accept responsibility.

3.4 FIELD  
QUALITY CONTROL

- .1 Hardware contractor to have a qualified AHC representative from the manufacturer/supplier on site at Substantial Completion Inspection

and at commissioning of the finished hardware. Cost of the visits to be included in contract.

- 3.5 ADJUSTING
- .1 Adjust door hardware, operators, closures and controls for optimum, smooth operating condition, safety and for weather tight closure.
  - .2 Lubricate hardware, operating equipment and other moving parts.
  - .3 Adjust door hardware to provide tight fit at contact points with frames.
  - .4 Where hardware is found defective, repair or replace or correct as desired by inspection reports.

- 3.6 CLEANING
- .1 Perform cleaning after installation to remove construction and accumulated environmental dirt.
  - .2 Clean hardware with damp rag and approved non-abrasive cleaner, and polish hardware in accordance with manufacture's instructions.
  - .3 Remove protective material from hardware items where present.
  - .4 Upon completion of installation, remove surplus materials, rubbish, tools and equipment barriers.

- 3.7 PROTECTION
- .1 All hardware shall be protected against damage from paint, plaster or other defacing materials. Whenever possible manufacturers protective covering when applied, shall not be removed until final project cleaning takes place. Material not protected by manufacture shall be covered or removed from door during painting or any other adjustments that can cause damage to hardware.

- 3.8 HARDWARE GROUPS
- .1 HG1 For meeting room & office doors 3000, 3001, 3002, 3003 & 3004;
    - Hinges 3- CB179 114 X  
101mm 26D ST
    - Passage Set 9K 3 O N 15C
    - Auto. Bottom 220WH 914mm

- 
- |  |  |               |        |        |
|--|--|---------------|--------|--------|
|  |  | Gasket, sound | 5050   | 5184mm |
|  |  | Stop, wall    | CDH253 |        |
- .2 HG2 For interview 3005 & program room 3012 door;
- |                    |          |            |
|--------------------|----------|------------|
| Hinges             | 3- CB179 | 114 X      |
| 101mm              | 26D      | ST         |
| Lockset, classroom | 9K 3 7 R | 15C        |
| Gasket, sound      | 5050     | x 518cm    |
| Bottom, automatic  | 335N     | x end caps |
| Stop, wall / floor | CDH253 / | 221        |
- .3 HG3 For fire rated telecom room door 3006;
- |                         |          |             |
|-------------------------|----------|-------------|
| Hinges                  | 3- CB179 | 114 X 101mm |
| Lockset, hotel special  |          |             |
| Closer, push side mount |          |             |
| Kick Plate              | CDH92A   | 254 x 38mm  |
| LDW                     | 630      | CDH         |
| Gasket, smoke           | 5050     | x 518cm     |
| Stop, floor             | CDH221   |             |
- .4 HG4 For fire rated file room door 3007;
- |                             |                   |            |
|-----------------------------|-------------------|------------|
| Hinges                      | 2- CB179          |            |
| Hinge, power transfer       | 1- CE-CB179-      |            |
| 12C 114 x 101mm             | 26D               | ST         |
| Lockset, electric unlocking |                   |            |
| Card Reader                 | By access control |            |
| provider.                   |                   |            |
| Power Supply                | 8W599             |            |
| Closer, standard mount      |                   |            |
| Kick Plate                  | CDH92A            | 254 x 38mm |
| LDW                         | 630               | CDH        |
| Gasket, smoke               | 5050              | x 518cm    |
| Stop, wall                  | CDH253            |            |
- Operation;
- Door is closed and monitored, the lock deadbolt is thrown by outside key or inside thumb turn, entry with a card will unlock the lever, turning the lever will simultaneously retract the deadbolt and the latchbolt.
  - Door is closed, latched and the deadbolt is not thrown, entry with a card will unlock the outside lever. Turning the lever will retract the latchbolt.
  - Turning the inside lever will retract the deadbolt, latchbolt and shunt the monitoring.

- .5 HG5 For urinalysis room door 3009;
- |             |              |       |  |
|-------------|--------------|-------|--|
| Hinges      | 3-           | CB179 |  |
| Passage Set | 9K 3 0 N 15C |       |  |
| Stop, wall  | CDH253       |       |  |
- .6 HG6 For monitored, doors with electric unlocking 3011, 3014 & 3017;
- |                             |                 |                             |        |
|-----------------------------|-----------------|-----------------------------|--------|
| Hinges                      | 2-              | CB179                       |        |
| Hinge, power transfer       | 1-              | CE-CB179-12C 114 x 101mm    | 26D ST |
| Lockset, electric unlocking |                 |                             |        |
| Card Reader                 |                 | By access control provider. |        |
| Power Supply                | 8W599           |                             |        |
| Closer, standard mount      |                 |                             |        |
| Kick Plate                  | CDH92A          | 254 x 38mm                  |        |
| LDW                         | 630             | CDH                         |        |
| Gasket, sound               | 5050            | x 518cm (for 3011 only)     |        |
| Bottom, automatic           | T               | NGP                         |        |
| Bottom, automatic           | 335N x end caps | (for door 3011 only)        |        |
| Viewer, 180*                | 511             | Peek-O                      |        |
| Stop, wall or floor         | CDH253 / 221    |                             |        |
- Operation;
- Open hours; The outside lever is unlocked and the monitoring is inhibited by the access control system. The door is free to enter and always free to exit.
  - Closed hours; The outside lever is secure and the monitoring is active through the access control system. Entry with a card will unlock the outside lever and inhibit the monitoring.
  - Turning the inside lever will retract the latchbolt and shunt the monitoring.
- .7 HG7 For monitored, door 3010 with electric strike and remote release;
- |                             |         |                            |    |
|-----------------------------|---------|----------------------------|----|
| Hinges                      | 3-      | CB168                      |    |
|                             |         | 114 X 114mm                |    |
|                             | NRP     | 26D                        | ST |
| Power Transfer              | EPT-12C | 26D                        |    |
| Lockset, electric unlocking |         |                            |    |
| Power Supply                | 8W599   |                            |    |
| Remote Release              |         | by access control provider |    |
| Card Reader                 |         | by access control provider |    |
| Closer, push side mount     |         |                            |    |

Kick Plate CDH92A 254 x 38mm  
LDW 630 CDH  
Stop, wall CDH253  
Operation;

- Door is always closed, locked and monitored through the security system. Entry with a card or remote release at the reception desk will shunt the monitoring and unlock the outside lever.
- Always free to exit, turning the inside lever will retract the latchbolt and shunt the monitoring.

.8 HG8 For emergency exit door 3013;

Hinges 3- CB179 114 X  
101mm 26D ST  
Lockset, storeroom 45H 7 D 15H less  
outside lever 626  
Alarm EAX-2500FK1-KS-IC7  
Closer, push side mount  
Kick Plate CDH92A 254 x 38mm  
LDW 630 CDH  
Gasket, smoke 5050 x 518cm  
Bottom, automatic 335N x end caps  
Stop, wall CDH253  
Operation;

- Door is always closed, locked on the pull side and monitored through the security system. Exiting or forced entry will sound a local alarm and send a signal to the access control station.

.9 HG9 For urinalysis corridor door 3016;

Hinges 3- FBB179 114 X  
101mm 26D ST  
Lockset, storeroom 9K 3 7 D 15C  
Electric Strike EN400 12vdc LC  
Power Supply 522  
Remote Release by access control  
provider ( @ reception)  
Stop, wall CDH253

.10 HG10 For closet door 3018;

Hinges 6- FBB179 114 x 101  
Flush Bolt, top CDH 413B  
Lockset, entrance 9K 3 7 AB 15D  
Stop, floor CDH 221

- 3.9 DEMONSTRATION .1 Keying System Setup and Cabinet:
- .1 Set up key control system with file key tags, duplicate key tags, numerical index, alphabetical index and key change index, label shields, control book and key receipt cards.
  - .2 Place file keys and duplicate keys in key cabinet on their respective hooks.
  - .3 Lock key cabinet and turn over key to Owner's Representative.
- .2 Designated Staff Briefing:
- .1 Brief designated staff regarding:
    - .1 Proper care, cleaning, and general maintenance of projects complete hardware.
    - .2 Description, use, handling, and storage of keys.
    - .3 Use, application and storage of wrenches for door closers, locksets, and fire exit hardware.
  - .3 Demonstrate operation, operating components, adjustment features, and lubrication requirements.
- 3.10 COMMISSIONING .1 Site inspection or visit at Substantial Completion and training follow up and inspection at commissioning as directed by Owner's Representative.
- .2 Provide 10 month warranty service.

**END OF SECTION**

PART 1 GENERAL

1.1 RELATED  
REQUIREMENTS

- .1 Section 01 33 00 - Submittal Procedures.
- .2 Section 01 45 00 - Quality Control.
- .3 Section 01 78 00 - Closeout Submittals.
- .4 Section 07 92 00 - Joint Sealants.
- .5 Section 08 11 00 - Metal Doors and Frames.
- .6 Section 08 14 16 - Flush Wood Doors.
- .7 Section 08 71 00 Door Hardware.
- .8 Section 08 87 53 - Security Films.

1.2 REFERENCES

- .1 ASTM International
  - .1 ASTM C542-05, Standard Specification for Lock-Strip Gaskets.
  - .2 ASTM D790-07e1, Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.
  - .3 ASTM D1003-07e1, Standard Test Method for Haze and Luminous Transmittance of Plastics.
  - .4 ASTM D1929-96(R2001)e1, Standard Test Method for Determining Ignition Temperature of Plastics.
  - .5 ASTM D2240-05, Standard Test Method for Rubber Property - Durometer Hardness.
  - .6 ASTM E84-10, Standard Test Method for Surface Burning Characteristics of Building Materials.
  - .7 ASTM E330-02, Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference.
  - .8 ASTM F1233-08, Standard Test Method for Security Glazing Materials and Systems.
- .2 Canadian General Standards Board (CGSB)
  - .1 CAN/CGSB-12.1-M90, Tempered or Laminated Safety Glass.

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- .3 Environmental Choice Program (ECP)
    - .1 CCD-045-95(R2005), Sealants and Caulking Compounds.
  - .4 Glass Association of North American (GANA)
    - .1 GANA Glazing Manual - 2008.
    - .2 GANA Laminated Glazing Reference Manual - 2009.
  - .5 South Coast Air Quality Management District (SCAQMD), California State, Regulation XI. Source Specific Standards
    - .1 SCAQMD Rule 1168-A2005, Adhesives and Sealants Applications.
- 1.3 ACTION AND INFORMATIONAL SUBMITTALS
- 
- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
  - .2 Product Data:
    - .1 Submit manufacturer's instructions, printed product literature and data sheets for glass, sealants, and glazing accessories and include product characteristics, performance criteria, physical size, finish and limitations.
  - .3 Samples:
    - .1 Submit for review and acceptance of each unit.
    - .2 Samples will be returned for inclusion into work.
    - .3 Submit duplicate mm size samples of and sealant material.
  - .4 Certificates: submit product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.
  - .5 Test Reports: certified test reports showing compliance with specified performance characteristics and physical properties.
    - .1 Submit testing and analysis of glass under provisions of Section 01 45 00 - Quality Control.
    - .2 Submit shop inspection and testing for glass.

- 
- 1.4 CLOSEOUT SUBMITTALS
- .1 Submit in accordance with Section 01 78 00 - Closeout Submittals.
  - .2 Operation and Maintenance Data: submit operation and maintenance data for glazing for incorporation into manual.
- 1.5 QUALITY ASSURANCE
- .1 Certificates: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.
- 1.6 DELIVERY, STORAGE AND HANDLING
- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.
  - .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
  - .3 Storage and Handling Requirements:
    - .1 Store materials off ground indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
    - .2 Store and protect glazing and frames from nicks, scratches, and blemishes.
    - .3 Protect prefinished aluminum surfaces with wrapping strippable coating.
    - .4 Replace defective or damaged materials with new.
  - .4 Develop Construction Waste Management Plan Waste Reduction Workplan related to Work of this Section.
  - .5 Packaging Waste Management: remove for reuse and return by manufacturer of pallets, crates, padding, and packaging materials as specified in Construction Waste Management Plan Waste Reduction Workplan in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
- 1.7 AMBIENT CONDITIONS
- .1 Ambient Requirements:

- .1 Install glazing when ambient temperature is 10 degrees C minimum. Maintain ventilated environment for 24 hours after application.
- .2 Maintain minimum ambient temperature before, during and 24 hours after installation of glazing compounds.

PART 2 PRODUCTS

2.1 MATERIALS

- .1 Design Criteria:
  - .1 Size glass to withstand dead loads and positive and negative live loads acting normal to plane of glass to design pressure of kPa to ASTM E330.
  - .2 Limit glass deflection to 1/200 flexural limit of glass with full recovery of glazing materials.
  - .3 Safety glass: to CAN/CGSB-12.1, translucent, minimum 6 mm thick.
    - .1 Type 2-tempered.
    - .2 Class B-float.
- .2 Sealant: in accordance with Section 07 92 00 - Joint Sealants.
  - .1 VOC limit 250 g/L maximum to SCAQMD Rule 1168.
    - .1 VOC limit: 5 % maximum by weight to CCD-045.
    - .2 Ensure sealant does not contain chemical restrictions to CCD-045.

2.2 ACCESSORIES

- .1 Setting blocks: neoprene, 80-90 Shore A durometer hardness to ASTM D2240, length of 25 mm for each square meter of glazing minimum 100 mm x width of glazing rabbet space minus 1.5 mm x height to suit glazing method, glass light weight and area.
- .2 Spacer shims: neoprene, 50-60 Shore A durometer hardness to ASTM D2240, 75 mm long x one half height of glazing stop x thickness to suit application. Self-adhesive on one face.
- .3 Glazing tape:
  - .1 Preformed butyl compound with integral resilient tube spacing device, 10-15

- Shore A durometer hardness to ASTM D2240; coiled on release paper; black colour.
- .2 Closed cell polyvinyl chloride foam, coiled on release paper over adhesive on two sides, maximum water absorption by volume 2 %, designed for compression of 25 %, to effect an air and vapour seal.
  - .4 Glazing splines: resilient polyvinyl chloride silicone, extruded shape to suit glazing channel retaining slot, colour as selected.
  - .5 Lock-strip gaskets: to ASTM C542.

PART 3 EXECUTION

- 3.1 EXAMINATION .1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for glazing installation in accordance with manufacturer's written instructions.
- .1 Verify that openings for glazing are correctly sized and within tolerance.
  - .2 Verify that surfaces of glazing channels or recesses are clean, free of obstructions, and ready to receive glazing.
  - .3 Visually inspect substrate.
  - .4 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
  - .5 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.
- 3.2 PREPARATION .1 Clean contact surfaces with solvent and wipe dry.
- .2 Seal porous glazing channels or recesses with substrate compatible primer or sealer.
  - .3 Prime surfaces scheduled to receive sealant.

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- 3.3 INSTALLATION: INTERIOR WET/DRY METHOD (TAPE AND SEALANT)
- .1 Perform work in accordance with GANA Glazing Manual and GANA Laminated Glazing Reference Manual for glazing installation methods.
  - .2 Cut glazing tape to length and install against permanent stops, projecting 1.6 mm above sight line.
  - .3 Place setting blocks at 1/4 points, with edge block maximum 150 mm from corners.
  - .4 Rest glazing on setting blocks and push against tape to ensure full contact at perimeter of light or unit.
  - .5 Install removable stops, with spacer shims inserted between glazing and applied stops at 600 mm intervals, 6 mm below sight line.
  - .6 Fill gaps between light and applied stop with sealant to depth equal to bite on glazing, to uniform and level line.
  - .7 Trim protruding tape edge.
- 3.4 CLEANING
- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
    - .1 Leave Work area clean at end of each day.
      - .1 Remove traces of primer, caulking.
      - .2 Remove glazing materials from finish surfaces.
      - .3 Remove labels.
      - .4 Clean glass and mirrors using approved non-abrasive cleaner in accordance with manufacturer's instructions.
    - .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.
  - .2 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
    - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

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- 3.5 PROTECTION
- .1 Protect installed products and components from damage during construction.
  - .2 After installation, mark each light with an "X" by using removable plastic tape or paste.
    - .1 Do not mark heat absorbing or reflective glass units.
  - .3 Repair damage to adjacent materials caused by glazing installation.

PART 1 GENERAL

1.1 SUMMARY

- .1 Section Includes:
  - .1 Security and safety film placed on glass surfaces for increased security protection, and to improve resistance to glass breakage.
  - .2 Related Requirements
    - .1 Section 01 33 00 - Submittal Procedures.
    - .2 Section 01 61 00 - Common Product Requirements.
    - .3 Section 01 78 00 - Closeout Submittals.

1.2 REFERENCES

- .1 American National Standards Institute (ANSI)
  - .1 ANSI Z97.1-1984(R1994), Glazing Materials Used in Buildings, Safety Performance Specifications and Methods of Test.
  - .2 International Window Film Association (IWFA)
    - .1 IWFA Visual Quality Standard for Applied Window Film 1999.
  - .3 Consumer Product Safety Commission Publications (CPSC)/Code of Federal Regulations (CFR)
    - .1 CPSC, 16 CFR 1201 CAT I.
    - .2 CPSC, 16 CFR 1201 CAT II.
  - .4 General Services Administration (GSA)
    - .1 GSA-TS01-2003, Test Method for Glazing and Window Systems Subject to Dynamic Overpressure Loadings.
  - .5 Government of Canada
    - .1 Canada Labour Code, WHMIS datasheets.
  - .6 Underwriters laboratories of Canada (ULC)
    - .1 ULC-S332-93, Standard for Burglary Resisting Material.
    - .2 UL-972-02, Burglary resisting Glazing Material.
  - .7 Royal Canadian Mounted Police

- .1 Royal Canadian Mounted Police Guide  
G1003 Glazing, section 6.1.

1.3 DEFINITIONS

- .1 Safety: reduction of risk of injury, loss or death of persons due to accidental, natural or unintentional causes.
- .2 Security: reduction of risk of injury, loss or death of persons due to intentional actions of others.
- .3 Security and Safety Film Types:
  - .1 Type 2 Safety / Security / low end smash.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit shop drawings and product data in accordance with Section 01 33 00 - Submittal Procedures.
- .3 Submit samples in accordance with Section 01 33 00 - Submittal Procedures.
  - .1 Submit one 500 x 500 mm sample of film installed on 7 mm thick clear plate glass.
- .4 Submit test reports in accordance with Section 01 33 00 - Submittal Procedures.
  - .1 Submit test reports from approved independent testing laboratory, certifying film's compliance with specified requirements.
- .5 Submit Closeout Submittals in accordance with Section 01 78 00 - Closeout Submittals.
  - .1 Provide operation and maintenance data for window film for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.
  - .2 Follow manufacturers written instructions for care and maintenance of security and safety film.
  - .3 Use only cleaning solution recommended by manufacturer for regularly scheduled cleaning of security film.

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- 1.5 QUALITY ASSURANCE .1 Health and Safety:
- .1 Comply with requirements of WHMIS regarding use, handling, storage, and disposal of hazardous materials; and regarding labelling and provision of material safety data sheets acceptable to Canada Labour Code.
- 1.6 DELIVERY, STORAGE AND HANDLING .1 Deliver, store and handle materials in accordance with section 01 61 00 - Common Product Requirements.
- .2 Provide and maintain dry, off-ground weatherproof storage.
- .3 Store rolls of film flat on cross supports. Do not stand rolls of film on end.
- .4 Remove from storage, in quantities required for same day use.
- .5 Store materials in accordance with manufacturers written instructions.
- 1.7 WARRANTY .1 Work of this Section 08 87 53 - Security Films 12 months warranty period prescribed in subsection GC 32.1 of General Conditions "C" is extended to 10 years.
- .2 Contractor hereby warrants that Security and Safety Film will stay in place without delaminating, peeling or blistering, but for 10 years.
- .3 Ensure warranty includes items as follows:
- .1 Maintaining adhesion properties without blistering, bubbling or delaminating from glass surface.
- .2 Maintaining appearance without discolouration.
- .3 Removing, replace and reapply defective materials.
- .4 In event of product failure under warranty terms, remove and re-apply film without glass replacement at no cost to Departmental Representative.

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1.8 MAINTENANCE .1 Provide operation and maintenance data for  
DATA window film for incorporation into manual  
specified in Section 01 78 00 - Closeout  
Submittals.

PART 2 PRODUCTS

2.1 MATERIALS .1 Security Film - General: optically clear  
polyester film, abrasion resistant coating  
and release liner.

.1 Type 2 Safety / Security / Film:  
.1 Testing in accordance with ANSI  
Z97.1, CPSC 16 CFR 1201 CAT II ,  
and ULC - S332 UL 972.

2.2 FABRICATION .1 Shop installation of security film to glass  
panels:

.1 Ensure dust, grease, and chemical  
residue are removed from surface of  
glass before installation of film.

.2 Examine glass under natural daylight and  
identify cracks, blisters, bubbles,  
discolouration, edge defects or other  
anomalies that may cause film to  
delaminate, or cause vision transparency  
or distortion problems.

.3 View glass from 2.0 m minimum. Report  
findings to Departmental Representative.

.4 Proceed with Work only after receipt of  
written approval from Departmental  
Representative.

.1 Install security film to glass  
panels ensuring no blisters,  
bubbles, scratches, edge defects  
or distortions.

.2 Cut film edges straight and square  
to within 3 mm of edge of panel.

.3 Deliver glass panels complete with  
security film installed and labels  
intact and legible to site in  
accordance with section 01 61 00 -  
Basic Product Requirements.

PART 3 EXECUTION

- 3.1 PREPARATION .1 Clean glass before beginning installation using neutral cleaning solution.
- .2 Ensure no deleterious material adheres to glass by scraping surface of glass using industrial razors.
- .3 Ensure dust, grease, and chemical residue are removed from surface of glass before installation of film.
- .4 Examine glass under natural daylight and identify cracks, blisters, bubbles, discolouration, edge defects or other anomalies that may cause film to delaminate or cause vision transparency or distortion problems. Report findings to Departmental Representative.
- .5 Proceed with Work only after receipt of written approval from Departmental Representative.
- .6 Before beginning Work, place absorbent material at frame to absorb moisture accumulation generated by film application.
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- 3.2 INSTALLATION .1 Field Installation of Security Film to Glass Windows:
- .1 Install film in the same manner as tested.
- .2 Remove any window stops and window sealing device.
- .3 Ensure no deleterious material adheres to glass by scraping surface of glass using industrial razors.
- .4 Ensure dust, grease, and chemical residue are removed from surface of glass before installation of film.
- .5 Examine glass under natural daylight and identify cracks, blisters, bubbles, discolouration, edge defects or other anomalies that may cause film to delaminate, or cause vision transparency or distortion problems. Report findings

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- to Departmental Representative before starting Work.
- .6 Proceed with Work only after receipt of written approval from Departmental Representative.
  - .7 Install security film to glass windows ensuring no blisters, bubbles, scratches or distortions.
- .2 Cut film edges straight and square.
  - .3 Ensure film is installed behind window stops.
  - .4 Cut edges 3 mm maximum from edge of glass sealing device in accordance with manufacturers written instructions.
  - .5 Apply and attach film to glass in accordance with manufacturer's written instructions.
  - .6 Splicing:
    - .1 Splice film only when glass is greater in width than film.
    - .2 Splice film only after receipt of written approval from Departmental Representative.
    - .3 Use butt factory edges only.
    - .4 Ensure maximum overlap of 3 mm.
  - .7 Use only water and film slip solution on glass to facilitate positioning of film.
  - .8 Ensure removal of excess water from between film and glass.
  - .9 Remove left over material form work area and return work area to original condition.
- 3.3 INSTALLER'S INSPECTION
- .1 Visual Inspection: in accordance with IWFA - Visual Quality Standard for Applied Window Film.
  - .2 Remove and replace film that continues to show blisters, bubbles, tears, scratches, edge defects or vision distortion in film when viewed under natural daylight from 2.0 m minimum after 30 day period.
  - .3 Remove and replace without glass replacement, film that continues to show blisters, bubbles, tears, scratches, edge defects or

vision distortion in film when viewed under natural daylight from 2.0 m minimum after 30day period.

3.4 FINAL  
CLEANING

- .1 Wash interior and exterior of each window and film using cleaning solution recommended by film manufacturer.

**END OF SECTION**

PART 1 GENERAL

- 1.1 RELATED REQUIREMENTS .1 Section 09 22 16 - Non Structural Metal Framing.
- 1.2 REFERENCES .1 Aluminum Association (AA)
- .1 AA DAF 45-03(R2009), Designation System for Aluminum Finishes.
- .2 ASTM International
- .1 ASTM C475-02(2007), Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board.
- .2 ASTM C514-04(2009e1), Standard Specification for Nails for the Application of Gypsum Board.
- .3 ASTM C557-03(2009)e1, Standard Specification for Adhesives for Fastening Gypsum Wallboard to Wood Framing.
- .4 ASTM C840-08, Standard Specification for Application and Finishing of Gypsum Board.
- .5 ASTM C954-07, Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs From 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness.
- .6 ASTM C1002-07, Standard Specification for Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs.
- .7 ASTM C1047-09, Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base.
- .8 ASTM C1178/C1178M-08, Standard Specification for Glass Mat Water-Resistant Gypsum Backing Board.
- .9 ASTM C1396/C1396M-09a, Standard Specification for Gypsum Wallboard.
- .3 Association of the Wall and Ceilings Industries International (AWCI)
- .1 AWCI Levels of Gypsum Board Finish-97.
- .4 Canadian General Standards Board (CGSB)
- .1 CAN/CGSB-51.34-M86(R1988), Vapour

- Barrier, Polyethylene Sheet for Use in Building Construction.
- .2 CAN/CGSB-71.25-M88, Adhesive, for Bonding Drywall to Wood Framing and Metal Studs.
- .5 Green Seal Environmental Standards (GS)
  - .1 GS-11-2008, 2nd Edition, Paints and Coatings.
- .6 South Coast Air Quality Management District (SCAQMD), California State, Regulation XI. Source Specific Standards
  - .1 SCAQMD Rule 1113-A2007, Architectural Coatings.
  - .2 SCAQMD Rule 1168-A2005, Adhesives and Sealants Applications.
- .7 Underwriters' Laboratories of Canada (ULC)
  - .1 CAN/ULC-S102-07, Standard Method of Test of Surface Burning Characteristics of Building Materials and Assemblies.
- 1.3 ACTION AND INFORMATIONAL SUBMITTALS

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  - .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
  - .2 Product Data:
    - .1 Submit manufacturer's instructions, printed product literature and data sheets for gypsum board assemblies and include product characteristics, performance criteria, physical size, finish and limitations.
  - .3 Samples:
    - .1 Submit for review and acceptance of each unit.
    - .2 Samples will be returned for inclusion into work.
    - .3 Submit duplicate 300 mm long samples of corner and casing beads shadow mould cornice cap textured finishes insulating strip.
- 1.4 DELIVERY, STORAGE AND HANDLING

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  - .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.
  - .2 Delivery and Acceptance Requirements: deliver

materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:

- .1 Store gypsum board assemblies materials level off ground indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
- .2 Store and protect gypsum board assemblies from nicks, scratches, and blemishes.
- .3 Protect from weather, elements and damage from construction operations.
- .4 Handle gypsum boards to prevent damage to edges, ends or surfaces.
- .5 Protect prefinished aluminum surfaces with wrapping strippable coating. Do not use adhesive papers or sprayed coatings which bond when exposed to sunlight or weather.
- .6 Replace defective or damaged materials with new.

.4 Develop Construction Waste Management Plan related to Work of this Section.

.5 Packaging Waste Management: remove for reuse and return by manufacturer of pallets, crates, padding, and packaging materials as specified in Construction Waste Management Plan Waste Reduction Workplan in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

1.5 AMBIENT  
CONDITIONS

- .1 Maintain temperature 10 degrees C minimum, 21 degrees C maximum for 48 hours prior to and during application of gypsum boards and joint treatment, and for 48 hours minimum after completion of joint treatment.
- .2 Apply board and joint treatment to dry, frost free surfaces.
- .3 Ventilation: ventilate building spaces as required to remove excess moisture that would prevent drying of joint treatment material immediately after its application.

PART 2 PRODUCTS

2.1 MATERIALS

- .1 Standard board: to ASTM C1396/C1396M Type X, 16 mm thick, 1200 mm wide x maximum practical length, ends square cut, edges rounded squared bevelled.
- .2 Water-resistant board: to ASTM C1396/C1396M Type X, 16 mm thick, 1200mm wide x maximum practical length.
- .3 Metal furring runners, hangers, tie wires, inserts, anchors.
- .4 Drywall furring channels: 0.5 mm core thickness galvanized steel channels for screw attachment of gypsum board.
- .5 Resilient clips drywall furring: 0.5 mm base steel thickness galvanized steel for resilient attachment of gypsum board.
- .6 Nails: to ASTM C514.
- .7 Steel drill screws: to ASTM C1002.
- .8 Stud adhesive: to CAN/CGSB-71.25 ASTM C557.
- .9 Laminating compound: as recommended by manufacturer, asbestos-free.
- .10 Casing beads, corner beads, control joints and edge trim: to ASTM C1047, zinc-coated by electrolytic process, 0.5 mm base thickness, perforated flanges, one piece length per location.
- .11 Sealants: in accordance with Section 07 92 00 - Joint Sealants.
  - .1 VOC limit 250 g/L maximum to SCAQMD Rule 1168.
  - .2 Acoustic sealant: in accordance with Section 07 92 00 - Joint Sealants.
- .12 Polyethylene: to CAN/CGSB-51.34, Type 2.
- .13 Insulating strip: rubberized, moisture resistant, 3 mm thick closed cell neoprene strip, 12 mm wide, with self sticking

permanent adhesive on one face, lengths as required.

.14 Joint compound: to ASTM C475, asbestos-free.

2.2 FINISHES

.1 Texture finish: asbestos-free standard white texture coating and primer-sealer, recommended by gypsum board manufacturer.

.1 Primer: VOC limit 50 g/L maximum to GS-11 SCAQMD Rule 1113.

PART 3 EXECUTION

3.1 EXAMINATION

.1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for gypsum board assemblies installation in accordance with manufacturer's written instructions.

- .1 Visually inspect substrate in presence of Departmental Representative.
- .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
- .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 ERECTION

.1 Do application and finishing of gypsum board to ASTM C840 except where specified otherwise.

.2 Do application of gypsum sheathing to ASTM C1280.

.3 Install work level to tolerance of 1:1200.

.4 Frame with furring channels, perimeter of openings for access panels, light fixtures, diffusers, grilles.

.5 Install 19 x 64 mm furring channels parallel to, and at exact locations of steel stud partition header track.

.6 Furr for gypsum board faced vertical bulkheads within and at termination of

ceilings.

- .7 Install wall furring for gypsum board wall finishes to ASTM C840, except where specified otherwise.
- .8 Furr openings and around built-in equipment, cabinets, access panels, on four sides. Extend furring into reveals. Check clearances with equipment suppliers.
- .9 Furr duct shafts, beams, columns, pipes and exposed services where indicated.
- .10 Erect drywall resilient furring transversely across studs joists between the layers of gypsum board, spaced maximum 600 mm on centre and not more than 150 mm from ceiling/wall juncture. Secure to each support with 38 mm common nail 25 mm drywall screw.
- .11 Install 150 mm continuous strip of 12.7 mm gypsum board along base of partitions where resilient furring installed.

### 3.3 APPLICATION

- .1 Apply gypsum board after bucks, anchors, blocking, sound attenuation, electrical and mechanical work have been approved.
- .2 Apply single layer gypsum board to wood and metal furring or framing using screw fasteners. Maximum spacing of screws 300 mm on centre.
  - .1 Single-Layer Application:
    - .1 Apply gypsum board on ceilings prior to application of walls to ASTM C840.
    - .2 Apply gypsum board vertically or horizontally, providing sheet lengths that will minimize end joints.
- .3 Apply water-resistant Type X gypsum board in washroom. Apply water-resistant sealant to edges, ends, cut-outs which expose gypsum core and to fastener heads.
- .4 Apply 12 mm diameter bead of acoustic sealant continuously around periphery of each face of partitioning to seal gypsum board/structure junction where partitions abut fixed building components. Seal full perimeter of cut-outs

around electrical boxes, ducts, in partitions where perimeter sealed with acoustic sealant.

- .5 Apply board using stud adhesive on furring or framing laminating adhesive on base layer of gypsum board.
- .6 Install gypsum board on walls vertically to avoid end-butt joints. Install gypsum board with face side out.
- .7 Do not install damaged or damp boards.
- .8 Locate edge or end joints over supports. Stagger vertical joints over different studs on opposite sides of wall.

#### 3.4 INSTALLATION

- .1 Erect accessories straight, plumb or level, rigid and at proper plane. Use full length pieces where practical. Make joints tight, accurately aligned and rigidly secured. Mitre and fit corners accurately, free from rough edges. Secure at 150 mm on centre.
- .2 Install casing beads around perimeter of suspended ceilings.
- .3 Install casing beads where gypsum board butts against surfaces having no trim concealing junction and where indicated. Seal joints with sealant.
- .4 Install insulating strips continuously at edges of gypsum board and casing beads abutting metal window and exterior door frames, to provide thermal break.
- .5 Install shadow mould at gypsum board/ceiling juncture. Minimize joints; use corner pieces and splicers.
- .6 Construct control joints of two back-to-back casing beads set in gypsum board facing and supported independently on both sides of joint.
- .7 Provide continuous polyethylene dust barrier behind and across control joints.
- .8 Locate control joints at changes in substrate construction at approximate 10 m spacing on long corridor runs.

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- .9 Install control joints straight and true.
  - .10 Install cornice cap where gypsum board partitions do not extend to ceiling.
  - .11 Fit cornice cap over partition, secure to partition track with two rows of sheet metal screws staggered at 300 mm on centre.
  - .12 Splice corners and intersections together and secure to each member with 3 screws.
  - .13 Install access doors to electrical and mechanical fixtures specified in respective sections.
    - .1 Rigidly secure frames to furring or framing systems.
  - .14 Finish face panel joints and internal angles with joint system consisting of joint compound, joint tape and taping compound installed according to manufacturer's directions and feathered out onto panel faces.
  - .15 Gypsum Board Finish: finish gypsum board walls and ceilings to following levels in accordance with AWCI Levels of Gypsum Board Finish:
    - .1 Levels of finish:
      - .1 Level 5: embed tape for joints and interior angles in joint compound and apply three separate coats of joint compound over joints, angles, fastener heads and accessories; apply a thin skim coat of joint compound to entire surface; surfaces smooth and free of tool marks and ridges.
  - .16 Finish corner beads, control joints and trim as required with two coats of joint compound and one coat of taping compound, feathered out onto panel faces.
  - .17 Fill screw head depressions with joint and taping compounds to bring flush with adjacent surface of gypsum board so as to be invisible after surface finish is completed.
  - .18 Sand lightly to remove burred edges and other imperfections. Avoid sanding adjacent surface

of board.

- .19 Completed installation to be smooth, level or plumb, free from waves and other defects and ready for surface finish.
- .20 Apply one coat of white primer sealer over surface to be textured. When dry apply textured finish in accordance with manufacturer's instructions.
- .21 Mix joint compound slightly thinner than for joint taping.
- .22 Apply thin coat to entire surface using trowel or drywall broad knife to fill surface texture differences, variations or tool marks.
- .23 Allow skim coat to dry completely.
- .24 Remove ridges by light sanding or wiping with damp cloth.

3.5 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
  - .1 Leave Work area clean at end of each day.
  - .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.
- .2 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
  - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.6 PROTECTION

- .1 Protect installed products and components from damage during construction.
- .2 Repair damage to adjacent materials caused by gypsum board assemblies installation.

PART 1 GENERAL

- 1.1 RELATED SECTIONS
- .1 Section 01 74 21 - Construction/Demolition Waste Management And Disposal.
  - .2 Section 07 92 00 - Joint Sealants.
  - .3 Section 09 21 16 - Gypsum Board Assemblies.
- 1.2 REFERENCES
- .1 American Society for Testing and Materials International, (ASTM).
    - .1 ASTM C645-00, Specification for Nonstructural Steel Framing Members.
    - .2 ASTM C754-00, Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products.
  - .2 Canadian General Standards Board (CGSB).
    - .1 CAN/CGSB-1.40-97, Primer, Structural Steel, Oil Alkyd Type.
  - .3 Environmental Choice Program (ECP).
    - .1 CCD-047a -98, Paints - Surface Coatings.
    - .2 CCD-048-98, Surface Coatings - Recycled Water-borne.
- 1.3 QUALITY ASSURANCE
- .1 Test Reports: certified test reports showing compliance with specified performance characteristics and physical properties.
  - .2 Certificates: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.
- 1.4 WASTE MANAGEMENT AND DISPOSAL
- .1 Separate and recycle waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management And Disposal.
  - .2 Remove from site and dispose of packaging materials at appropriate recycling facilities.
  - .3 Collect and separate for disposal paper plastic polystyrene corrugated cardboard packaging material in appropriate on-site for

recycling in accordance with Waste Management Plan.

- .4 Divert unused metal materials from landfill to metal recycling facility approved by Departmental Representative.
- .5 Divert unused gypsum materials from landfill to recycling facility approved by Departmental Representative.

PART 2 PRODUCTS

2.1 MATERIALS

- .1 Non-load bearing channel stud framing: to ASTM C645, stud sizes indicated, roll formed from 0.91 mm thickness hot dipped galvanized steel sheet, for screw attachment of gypsum board lath. Knock-out service holes at 460 mm centres.
- .2 Floor and ceiling tracks: to ASTM C645, in widths to suit stud sizes, 32 mm flange height.
- .3 Metal channel stiffener:, 1.4 mm thick cold rolled steel, coated with rust inhibitive coating.
- .4 Acoustical sealant: to 07 92 00 - Joint Sealants.
- .5 Insulating strip: rubberized, moisture resistant 3 mm thick foam strip, 12 mm wide, with self sticking adhesive on one face, lengths as required.

PART 3 EXECUTION

3.1 ERECTION

- .1 Align partition tracks at floor and ceiling and secure at 600 mm on centre maximum.
- .2 Install damp proof course under stud shoe tracks of partitions on slabs on grade.
- .3 Place studs vertically at 400 mm on centre and not more than 50 mm from abutting walls, and at each side of openings and corners. Position studs in tracks at floor and ceiling. Cross brace steel studs as required to provide rigid installation to

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- manufacturer's instructions.
- .4 Erect metal studding to tolerance of 1:1000.
  - .5 Attach studs to bottom and ceiling track using screws.
  - .6 Co-ordinate simultaneous erection of studs with installation of service lines. When erecting studs ensure web openings are aligned.
  - .7 Co-ordinate erection of studs with installation of door/window frames and special supports or anchorage for work specified in other Sections.
  - .8 Provide two studs extending from floor to ceiling at each side of openings wider than stud centres specified. Secure studs together, 50 mm apart using column clips or other approved means of fastening placed alongside frame anchor clips.
  - .9 Install heavy gauge single jamb studs at openings and elsewhere as indicated.
  - .10 Erect track at head of door/window openings and sills of sidelight/window openings to accommodate intermediate studs. Secure track to studs at each end, in accordance with manufacturer's instructions. Install intermediate studs above and below openings in same manner and spacing as wall studs.
  - .11 Frame openings and around built-in equipment, cabinets, access panels, on four sides. Extend framing into reveals. Check clearances with equipment suppliers.
  - .12 Provide 40 mm stud or furring channel secured between studs for attachment of fixtures behind lavatory basins, toilet and bathroom accessories, and other fixtures including grab bars and towel rails, attached to steel stud partitions.
  - .13 Install steel studs or furring channel between studs for attaching electrical and other boxes.
  - .14 Extend partitions to ceiling height except where noted otherwise on drawings.

- .15 Maintain clearance under beams and structural slabs to avoid transmission of structural loads to studs. Use 50 mm leg ceiling tracks. Use double track slip joint as indicated.
  - .16 Install continuous insulating strips to isolate studs from uninsulated surfaces.
  - .17 Install two continuous beads of acoustical sealant insulating strip under studs and tracks around perimeter of sound control partitions.
- 3.2 CLEANING
- .1 Upon completion of installation, remove surplus materials, rubbish, tools and equipment barriers.

PART 1 GENERAL

1.1 SUMMARY

- .1 Section Includes:
  - .1 Materials and application of acoustical units for direct application or for application and installation within a suspended ceiling.
- .2 Related Sections:
  - .1 Section 01 33 00 - Submittal Procedures.
  - .2 Section 01 35 29 - Health and Safety Requirements.
  - .3 Section 01 35 43 - Environmental Procedures.
  - .4 Section 01 45 00 - Testing and Quality Control.
  - .5 Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
  - .6 Section 01 78 00 - Closeout Submittals.
  - .7 Section 09 53 00 - Acoustical Suspension: Suspension system.

1.2 REFERENCES

- .1 American Society for Testing and Materials International (ASTM)
  - .1 ASTM C423-02a, Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method
  - .2 ASTM E1264-98, Standard Classification for Acoustical Ceiling Products.
  - .3 ASTM E1477-98a(2003), Standard Test Method for Luminous Reflectance Factor of Acoustical Materials by Use of Integrating-Sphere Reflectometers.
- .2 Canadian General Standards Board (CGSB)
  - .1 CAN/CGSB-51.34-M86, Vapour Barrier, Polyethylene Sheet, for Use in Building Construction and Amendment No. 1 1988.
  - .2 CAN/CGSB-92.1-M89, Sound Absorptive Prefabricated Acoustical Units.
- .3 Canadian Standards Association (CSA International)
  - .1 CSA B111-1974(R2003), Wire Nails, Spikes and Staples.

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- .4 Department of Justice Canada (Jus)
    - .1 Canadian Environmental Protection Act (CEPA), 1999, c. 33.
    - .2 Transportation of Dangerous Goods Act (TDGA), 1992, c. 34.
  - .5 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
    - .1 Material Safety Data Sheets (MSDS).
  - .6 Underwriter's Laboratories of Canada (ULC)
    - .1 CAN/ULC-S102-2003, Surface Burning Characteristics of Building Materials and Assemblies.
- 1.3 SUBMITTALS
- .1 Submit samples in accordance with Section 01 33 00 - Submittal Procedures.
  - .2 Submit duplicate half size samples of each type acoustical units.
- 1.4 QUALITY ASSURANCE
- .1 Health and Safety:
    - .1 Do construction occupational health and safety in accordance with Section 01 35 29 - Health and Safety Requirements.
- 1.5 DELIVERY, STORAGE AND HANDLING
- .1 Protect on site stored or installed absorptive material from moisture damage.
  - .2 Store extra materials required for maintenance, where directed by Departmental Representative.
  - .3 Waste Management and Disposal:
    - .1 Separate waste materials for recycling in accordance with Section 01 74 21 - Construction /Demolition Waste Management and Disposal .
    - .2 Remove from site and dispose of packaging materials at appropriate recycling facilities.
    - .3 Collect and separate for disposal paper, plastic, polystyrene, corrugated cardboard packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan (WMP).

- .4 Separate for recycling and place in designated containers Steel Metal Plastic waste in accordance with Waste Management Plan.
- .5 Place materials defined as hazardous or toxic in designated containers in accordance with Section 01 35 43 - Environmental Procedures.
- .6 Handle and dispose of hazardous materials in accordance with CEPA, TDGA, Regional and Municipal, regulations.
- .7 Ensure emptied containers are sealed and stored safely in accordance with Section 01 35 43 - Environmental Procedures.
- .8 Fold up metal and plastic banding, flatten and place in designated area for recycling.

1.6 ENVIRONMENTAL REQUIREMENTS

- .1 Permit wet work to dry before beginning to install.
- .2 Maintain uniform minimum temperature of 15 degrees C and humidity of 20 -40 % before and during installation.
- .3 Store materials in work area 48 hours prior to installation.

1.7 EXTRA MATERIALS

- .1 Provide extra materials of acoustic units in accordance with Section 01 78 00 - Closeout Submittals.
- .2 Provide acoustical units amounting to 2 % of gross ceiling area for each pattern and type required for project.
- .3 Ensure extra materials are from same production run as installed materials.
- .4 Clearly identify each type of acoustic unit, including colour and texture.
- .5 Deliver to Departmental Representative, upon completion of the work of this section.

PART 2 PRODUCTS

2.1 MATERIALS

- .1 Acoustic units for suspended ceiling system:

to CAN/CGSB-92.1 ASTM E1264.

- .1 Type 1.
  - .2 Class A.
  - .3 Ecolabel certified Cellulose fibre with minimum 75 % recycled content.
  - .4 Pattern fissured, Class A.
  - .5 Textures: to match existing.
  - .6 Flame spread rating of 25 or less in accordance with CAN/ULC-S102.
  - .7 Smoke developed 50 or less in accordance with CAN/ULC-S102.
  - .8 Noise Reduction Coefficient (NRC) designation of 70. Sound Absorption Average (SAA) of 0.9 to ASTM C423.
  - .9 Edge type square edge.
  - .10 Colour white, to match existing.
  - .11 Size to suit existing grid.
  - .12 Shape flat.
- .2 Staples, nails and screws: to CSA B111 non-corrosive finish as recommended by acoustic unit manufacturer.
  - .3 Polyethylene: to CAN/CGSB-51.34, 0.15 mm thick.

PART 3 EXECUTION

- 3.1 EXAMINATION .1 Do not install acoustical panels and tiles until work above ceiling has been inspected by Departmental Representative.
  
- 3.2 INSTALLATION .1 Install acoustical panels and tiles in ceiling suspension system.  
.2 Install fibrous acoustical media above suspended tiles where indicated.
  
- 3.3 APPLICATION .1 Scribe acoustic units to fit adjacent work. Butt joints tight, terminate edges with moulding.
  
- 3.4 INTERFACE WITH OTHER WORK .1 Co-ordinate with Section 09 53 00- Acoustical Suspension.  
.2 Co-ordinate ceiling work to accommodate components of other sections, such as light fixtures, diffusers, speakers, sprinkler

heads, to be built into acoustical ceiling components.

- .3 Co-ordinate with existing acoustical ceiling suspension system.

PART 1 GENERAL

- 1.1 RELATED REQUIREMENTS .1 Section 09 51 13 - Acoustical Panel Ceilings.
- 1.2 REFERENCES .1 ASTM International
- .1 ASTM C635/C635M-07, Standard Specifications for the Manufacture, Performance and Testing of Metal Suspension Systems for Acoustical Tile and Lay-In Panel Ceilings.
  - .2 ASTM C636/C636M-08, Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels.
- .2 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
- .1 Material Safety Data Sheets (MSDS).
- 1.3 ACTION AND INFORMATIONAL SUBMITTALS .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
- .1 Submit manufacturer's instructions, printed product literature and data sheets for acoustical suspension and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Shop Drawings:
- .1 Submit reflected ceiling plans for special grid patterns as indicated.
  - .2 Indicate lay-out, insert and hanger spacing and fastening details, splicing method for main and cross runners, location of access splines change in level details, access door dimensions, and locations and acoustical unit support at ceiling fixture lateral bracing and accessories.
- .4 Samples:
- .1 Submit for review and acceptance of each unit.
  - .2 Samples will be returned for inclusion

into work.

- .3 Submit one representative model of each type ceiling suspension system.
- .4 Ceiling system to show basic construction and assembly, treatment at walls, recessed fixtures, splicing, interlocking, finishes, acoustical unit installation.

1.4 CLOSEOUT  
SUBMITTALS

- .1 Submit in accordance with Section 01 78 00 - Closeout Submittals.
- .2 Operation and Maintenance Data: submit operation and maintenance data for acoustical suspension for incorporation into manual.

1.5 QUALITY  
ASSURANCE

- .1 Certifications: submit product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

1.6 DELIVERY,  
STORAGE AND  
HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
  - .1 Store materials off ground indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
  - .2 Store and protect acoustical ceiling tiles and tracks from nicks, scratches, and blemishes.
  - .3 Replace defective or damaged materials with new.
- .4 Develop Construction Waste Management Plan to Work of this Section.
- .5 Packaging Waste Management: remove for reuse and return by manufacturer of pallets, crates, padding, and packaging materials as

specified in Construction Waste Management Plan Waste Reduction Workplan in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

PART 2 PRODUCTS

- 2.1 DESIGN CRITERIA .1 Design Requirements: maximum deflection: 1/360th of span to ASTM C635/ASTM C635M deflection test.
- 2.2 MATERIALS .1 Intermediate duty system to ASTM C635/ASTM C635M.
- .2 Basic materials for suspension system: commercial quality cold rolled steel zinc coated aluminum sheet mill finished.
- .3 Suspension system: to match existing.
- .4 Hanger wire: galvanized soft annealed steel wire:
- .1 3.6 mm diameter for access tile ceilings.
- .2 2.6 mm diameter for other ceilings.
- .5 Hanger inserts: purpose made.
- .6 Carrying channels: 38 mm channel, of galvanized steel.
- .7 Accessories: splices, clips, wire ties, retainers and wall moulding flush reveal, to complement suspension system components, as recommended by system manufacturer.

PART 3 EXECUTION

- 3.1 EXAMINATION .1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for acoustical ceiling tile and track installation in accordance with manufacturer's written instructions.
- .1 Visually inspect substrate.
- .2 Inform Departmental Representative of

unacceptable conditions immediately upon discovery.

- .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 INSTALLATION

- .1 Manufacturer's Instructions: comply with manufacturer's written recommendations, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and data sheets.
- .2 Installation: to ASTM C636/C636M except where specified otherwise.
- .3 Install suspension system to manufacturer's instructions and Certification Organizations tested design requirements.
- .4 Do not erect ceiling suspension system until work above ceiling has been inspected and approved by Departmental Representative.
- .5 Secure hangers to overhead structure using attachment methods as indicated acceptable to Departmental Representative.
- .6 Install hangers spaced at maximum 1200 mm centres and within 150 mm from ends of main tees.
- .7 Lay out centre line of ceiling both ways, to provide balanced borders at room perimeter with border units not less than 50% of standard unit width system according to reflected ceiling plan.
- .8 Ensure suspension system is co-ordinated with location of related components.
- .9 Install wall moulding to provide correct ceiling height.
- .10 Completed suspension system to support super-imposed loads, such as lighting fixtures diffusers grilles and speakers.
- .11 Support at light fixtures diffusers with additional ceiling suspension hangers within 150 mm of each corner and at maximum 600 mm around perimeter of fixture.

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- .12 Interlock cross member to main runner to provide rigid assembly.
  - .13 Frame at openings for light fixtures, air diffusers, speakers and at changes in ceiling heights.
  - .14 Install access splines to provide 10% ceiling access.
  - .15 Finished ceiling system to be square with adjoining walls and level within 1:1000.
- 3.3 CLEANING
- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
    - .1 Leave Work area clean at end of each day.
  - .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.
    - .1 Touch up scratches, abrasions, voids and other defects in painted surfaces.
  - .3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
    - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.
- 3.4 PROTECTION
- .1 Protect installed products and components from damage during construction.
  - .2 Repair damage to adjacent materials caused by acoustical suspension installation.

PART 1 GENERAL

- 1.1 REFERENCES .1 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
- .1 Material Safety Data Sheets (MSDS).
- 1.2 SUBMITTALS .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Provide product data in accordance with Section 01 33 00 - Submittal Procedures.
- .3 Provide samples in accordance with Section 01 33 00 - Submittal Procedures.
- .1 Submit duplicate 300 x 300 mm sample pieces of sheet material, 300 mm long base, nosing, feature strips, edge strips.
- .4 Closeout Submittals:
- .1 Provide maintenance data for resilient flooring for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.
- 1.3 DELIVERY, STORAGE AND HANDLING .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.
- .2 Waste Management and Disposal:
- .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
- 1.4 AMBIENT CONDITIONS .1 Maintain air temperature and structural base temperature at flooring installation area above 20 degrees for 48 hours before, during and 48 hours after installation.
- 1.5 MAINTENANCE .1 Extra Materials:
- .1 Provide extra materials of resilient sheet flooring and adhesives in accordance with Section 01 78 00 - Closeout Submittals.
- .2 Provide 2 m2 of each colour, pattern and

- type flooring material required for project for maintenance use.
- .3 Extra materials one piece and from same production run as installed materials.
- .4 Identify each roll of sheet flooring and each container of adhesive.
- .5 Deliver to Departmental Representative, upon completion of the work of this section.
- .6 Store where directed by Departmental Representative.

PART 2 PRODUCTS

2.1 MATERIALS

- .1 Linoleum sheet flooring: composed of natural ingredients which are mixed and calendared onto a jute backing:
  - .1 Pattern: marbled.
  - .2 Thickness: 2.5mm.
  - .3 Colours: selected by Departmental Representative from a minimum palette of 24 varied colours.
  - .4 Backing: jute fabric.
  - .5 Wear Surface: polyurethane-coated homogeneous mixture of linoleum cement (linseed oil, natural tree resins, drying oil catalysts), wood flour, cork flour, colour pigments and filler.
  - .6 Colours and pattern: shall be dispersed throughout the thickness of the wear layer.
  - .7 Provide solid colour linoleum weld rod intended for heat welding of linoleum seams. Colour shall be compatible with field colour of flooring or as selected by Departmental Representative to contrast with field colour of flooring.
  - .8 Flooring shall be supplied in rolls of 2.0m wide.
- .2 Resilient base: continuous, top set, complete with premoulded end stops and external corners:
  - .1 Type: rubber.
  - .2 Style: cove (straight where flooring is carpet tile).
  - .3 Thickness: 3.17 mm.
  - .4 Height: 101.6 mm.

- .5 Lengths: cut lengths minimum 2400 mm.
- .6 Colours: selected by Departmental Representative from a minimum palette of 60 varied colours.
- .3 Primers and adhesives: of types recommended by resilient flooring manufacturer for specific material on applicable substrate, above, on or below grade.
  - .1 Rubber floor adhesives:
    - .1 Adhesive: maximum VOC limit 60 g/L to SCAQMD Rule 1168.
    - .2 Cove base adhesives:
      - .1 Adhesive: maximum VOC limit 50 g/L to SCAQMD Rule 1168.
  - .4 Sub-floor filler and leveller: white premix latex requiring water only to produce cementitious paste as recommended by flooring manufacturer for use with their product.
  - .5 Metal edge strips:
    - .1 Aluminum extruded, smooth, mill finish with lip to extend under floor finish, shoulder flush with top of adjacent floor finish.
  - .6 Edging to floor penetrations: aluminum, type recommended by flooring manufacturer.
  - .7 Sealer and wax: type recommended by resilient flooring material manufacturer for material type and location.

PART 3 EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

- .1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheets.

3.2 SITE VERIFICATION OF CONDITIONS

- .1 Ensure concrete floors are clean and dry by using test methods recommended by flooring manufacturer.

3.3 PREPARATION

- .1 Remove existing flooring, bases, setting beds, adhesives and provide floor leveller, fill, level, grind and prepare floors to

accept new finishes.

- .2 Clean floor and apply filler; trowel and float to leave smooth, flat hard surface. Prohibit traffic until filler cured and dry.
- .3 Remove sub-floor ridges and bumps. Fill low spots, cracks, joints, holes and other defects with sub-floor filler.
- .4 Prime and seal concrete slab to resilient flooring manufacturer's printed instructions.

3.4 APPLICATION:  
FLOORING

- .1 Provide high ventilation rate, with maximum outside air, during installation, and for 48 to 72 hours after installation. If possible, vent directly to outside. Do not let contaminated air recirculate through district or whole building air distribution system. Maintain extra ventilation for at least one month following building occupation.
- .2 Apply adhesive uniformly using recommended trowel. Do not spread more adhesive than can be covered by flooring before initial set takes place.
- .3 Lay flooring with seams parallel to building lines to produce a minimum number of seams. Border widths minimum 1/3 width of full material.
- .4 Run sheets in direction of traffic. Double cut sheet joints and continuously seal heat weld according to manufacturer's printed instructions.
- .5 Heat weld seams of linoleum sheet flooring with colour matched PVC rods in accordance with manufacturer's printed instructions.
- .6 As installation progresses, and after installation, roll flooring with 45 kg minimum roller to ensure full adhesion.
- .7 Cut flooring around fixed objects.
- .8 Install flooring in pan type floor access covers. Maintain floor pattern.
- .9 Continue flooring over areas which will be under built-in furniture.

- .10 Continue flooring through areas to receive movable type partitions without interrupting floor pattern.
- .11 Terminate flooring at centreline of door in openings where adjacent floor finish or colour is dissimilar.
- .12 Install metal edge strips at unprotected or exposed edges where flooring terminates.

3.5 APPLICATION:  
BASE

- .1 Lay out base to keep number of joints at minimum.
- .2 Clean substrate and prime with one coat of adhesive.
- .3 Apply adhesive to back of base.
- .4 Set base against wall and floor surfaces tightly by using 3 kg hand roller.
- .5 Install straight and level to variation of 1:1000.
- .6 Scribe and fit to door frames and other obstructions. Use premoulded end pieces at flush door frames.
- .7 Cope internal corners. Use premoulded corner units for right angle external corners. Use formed straight base material for external corners of other angles.
- .8 Use toeless type base where floor finish will be carpet, coved type elsewhere.
- .9 Heat weld base in accordance with manufacturer's printed instructions.

3.6 CLEANING

- .1 Proceed in accordance with Section 01 74 11 - Cleaning.
- .2 Remove excess adhesive from floor, base and wall surfaces without damage.
- .3 Clean, seal and wax floor and base surface to flooring manufacturer's printed instructions.

3.7 PROTECTION

- .1 Protect new floors from time of final set of

adhesive after initial waxing until final waxing.

- .2 Prohibit traffic on floor for 48 hours after installation.
- .3 Use only water-based coating for linoleum.

PART 1 GENERAL

- 1.1 RELATED SECTIONS
- .1 Section 01 33 00 - Submittal Procedures.
  - .2 Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
  - .3 Section 01 78 00 - Closeout Submittals.
  - .4 Section 09 65 16 - Resilient Sheet Flooring.
- 1.2 REFERENCES
- .1 American Association of Textile Chemists and Colourists (AATCC)
    - .1 AATCC 118, Oil Repellency: Hydrocarbon Resistance Test.
    - .2 AATCC 134, Electrostatic Propensity of Carpet.
    - .3 AATCC 174, Antimicrobial Activity Assessment of Carpets.
    - .4 AATCC 175, Stain Resistance: Pile Floor Coverings.
  - .2 American Society for Testing and Materials (ASTM)
    - .1 ASTM E84, Test Method for Surface Burning Characteristics of Building Materials.
  - .3 Canadian General Standards Board (CGSB)
    - .1 CAN/CGSB-4.2 No.27.6, Textile Test Methods - Flame Resistance - Methemine Tablet Test for Textile Floor Coverings.
    - .2 CAN/CGSB-4.2 No.77.1/ISO 4919, Textile Test Methods - Carpets - Determination of Tuft Withdrawal Force.
    - .3 CGSB 4-GP-36M, Carpet Underlay, Fibre Type.
    - .4 CAN/CGSB-4.129, Carpets for Commercial Use.
    - .5 CAN/CGSB-25.20, Surface Sealer Floors.
  - .4 Carpet and Rug Institute (CRI)
    - .1 CRI-104, Standard Installation of Commercial Carpet.
    - .2 IAQ Carpet Testing Program, Green Label

Plus.

- .5 National Floor Covering Association (NFCA)
  - .1 Floor Covering Specification Manual.
- .6 Underwriters' Laboratories of Canada (ULC)
  - .1 CAN/ULC-S102, Surface Burning Characteristics of Building Materials and Assemblies.
  - .2 CAN/ULC-S102.2, Surface Burning Characteristics of Flooring, Floor Covering and Miscellaneous Materials and Assemblies.

1.3 SUBMITTALS

- .1 Submit verification to demonstrate compliance with CAN/ULCS102 and CAN/ULCS102.2.
- .2 Submit proof that carpet has been tested and passed the Indoor Air Quality (IAQ) Carpet Testing Program requirements of the Carpet and Rug Institute.
- .3 Submit report verifying that tuft bind meets requirements of CAN/CGSB-4.129 when tested to CAN/CGSB-4.2 No.77.1.
- .4 Submit report outlining proposed dust control measures.
- .5 Submit carpet schedule using same room designations indicated on drawings.
- .6 Submit carpet manufacturer's installation instructions: Indicate special procedures and perimeter conditions requiring special attention.
- .7 Submit product data sheet for each carpet, underlay, adhesive, carpet protection and subfloor filler.
- .8 Submit WHMIS MSDS - Material Safety Data Sheets acceptable to Labour Canada and Health Canada for carpet adhesive and seam adhesive. Indicate VOC content.
- .9 Submit data on specified products, describing physical and performance characteristics, sizes, patterns, colours, and methods of

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installation.

- .10 Indicate locations and lengths of seams for carpeted areas.
- .11 Indicate nap, direction, open edges, special patterns, and other details required by Departmental Representative to clarify work.
- .12 Submit drawings showing columns, doorways, enclosing walls or partitions, built-in cabinets, and locations where cutouts are required as well as direction of carpet pile and pattern, location of edge moldings and edge bindings to Departmental Representative for review prior to installation of carpet.
- .13 Submit duplicate 675 x 900 mm pieces of each type carpet specified, duplicate 225 x 225 mm pieces for each colour selected, 300 mm square pieces of under cushion, 150 mm lengths of carpet gripper and binder bars, base, divider strips.

1.4 CLOSEOUT  
SUBMITTALS

- .1 Submit operation and maintenance data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.
- .2 Submit maintenance data: include maintenance procedures, recommendations for maintenance materials and equipment, and suggested schedule for cleaning.
- .3 Include information on recycling of carpet including manufacturer's reprocessing program. Indicate which portions of material are recyclable.

1.5 QUALIFICATIONS

- .1 Installer Qualifications:
  - .1 Flooring contractor requirements.
    - .1 Specialty contractor normally engaged in this type of work, with not less than 5 years' experience in installation of these types of materials.
    - .2 Certified by carpet manufacturer prior to tender submission.

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- .3 Must not sub-contract labour without written approval of Departmental Representative.
  - .2 Be responsible for proper product installation, including floor testing and preparation as specified and in accordance with carpet manufacturers written instructions.
- 1.6 REGULATORY REQUIREMENTS
- .1 Prequalification: compliance with Department of Consumers and Corporate Affairs regulations under "Hazardous Products Act", Part II of the Schedule, tested to CAN/CGSB-4.2-No.27.6.
  - .2 Indoor Air Quality: compliance with CRI/CCI Green Label Indoor Air Quality Program, CRI/CCI-IAQ requirements for maximum total volatile chemicals released into air. Label each carpet product with CRI/CCI-IAQ label.
- 1.7 DELIVERY, STORAGE AND HANDLING
- .1 Deliver, store handle and protect materials in accordance with Section 01 61 00-Common Product Requirements.
  - .2 Label packaged materials. For carpet tile products indicate nominal dimensions of tile and indicate installation direction.
  - .3 Store packaged materials in original containers or wrapping with manufacturer's seals and labels intact.
  - .4 Store carpeting and accessories in location as directed by Departmental Representative. Store carpet and adhesive at minimum temperature of 18°C and relative humidity of maximum 60% for minimum of 48 hours before installation.
  - .5 Prevent damage to materials during handling and storage. Keep materials under cover and free from dampness.
  - .6 Store materials in area of installation for minimum period of 48 hours prior to installation.

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- 1.8 ENVIRONMENTAL REQUIREMENTS
- .1 Moisture: Ensure substrate is within moisture limits and alkalinity limits prescribed by manufacturer. Prepare moisture testing and provide report to Departmental Representative.
  - .2 Temperature: Maintain ambient temperature of not less than 18°C from 48 hours before installation to at least 48 hours after completion of work.
  - .3 Relative humidity: Maintain relative humidity not greater than 60% RH for 48 hours before, during and 48 hours after installation.
  - .4 Safety: Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of hazardous materials.
  - .5 Ventilation:
    - .1 Ventilate area of work as directed by Departmental Representative by use of approved portable supply and exhaust fans.
    - .2 Ventilate enclosed spaces in accordance with Section 01 51 00 - Temporary Utilities.
    - .3 Provide continuous ventilation during and after carpet application. Run ventilation system 24 hours per day during installation; provide continuous ventilation for 3 days after completion of carpet installation.
  - .6 Do not install carpet until space is enclosed and weatherproof, wet-work in space is completed and nominally dry, work above ceilings is complete.
- 1.9 EXTRA MATERIALS
- .1 Provide extra materials of carpet, carpet base, and adhesives in accordance with Section 01 78 00 - Closeout Submittals.
  - .2 Provide 5m<sup>2</sup> of each colour, pattern and type of carpeting.

- .3 Extra materials to be from same production run as installed materials.
- .4 Identify each package of carpet and each container of adhesive.
- .5 Deliver to Departmental Representative and store where directed by Departmental Representative.

1.10 QUALITY ASSURANCE

- .1 Provide certificate of quality compliance from carpet manufacturer.
- .2 Provide certificate of quality compliance from tile installer upon satisfactory completion of installation.

1.11 WARRANTY

- .1 Provide one year warranty against defects in material and workmanship.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- .1 Acceptable materials: Only carpeting listed in Qualification Program List (QPL) 4.129, Carpets for Commercial Use are acceptable for use on this project.
- .2 Certified to Carpet and Rug Institute's IAQ requirements.

2.2 MODULAR CARPET

- .1 Carpet: to CAN/CGSB-4.129 and as follows.
  - .1 Certified for flammability to Health Canada regulations under "Hazardous Products (Carpet) Regulations", Part II of the Schedule.
  - .2 Maximum flame spread rating 300, maximum smoke developed classification 500.
  - .3 Certified to Carpet and Rug Institute's and the Canadian Carpet Institute's IAQ requirements.
- .2 Carpet Tile Dimensions: minimum 600 x 600 mm unless otherwise indicated.

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- .3 Pattern and colours from manufacturers standard range of a minimum palette of 24 varied colours.
  - .4 Performance rating: to ASTM D5252 or ASTM D5417.
  - .5 Construction: tufted.
  - .6 Pile Surface Appearance:
    - .1 Level loop: pattern loop.
  - .7 Pile Fibre: to CAN/CGSB-4.129.
    - .1 100% Nylon.
  - .8 Yarn Ply: 2 ply.
  - .9 Colourfastness to light: CAN/CGSB-4.2 No. 18.3.
  - .10 Yarn weight: minimum 678 g/m<sup>2</sup> unless otherwise indicated.
  - .11 Pile height: 4.7 mm.
  - .12 Pile thickness: 2.4
  - .13 Green Label Plus Certified.
- 2.3 SPECIAL REQUIREMENTS
- .1 Soil Resistance: Drop oil and soil resistance to AATCC 118.
  - .2 Permanent static control: to AATCC 134, 3000V maximum at 20%RH and 22°C.
  - .3 Anti-microbial: to AATCC 174, 99% reduction, 0% growth.
  - .4 Stain resistance: to AATCC 175, 8.
- 2.4 ACCESSORIES
- .1 Base:
    - .1 Resilient base: to Section 09 65 16 - Resilient Sheet Flooring.
  - .2 Edge strips: metal, designed for carpet being installed.
  - .3 Seaming tape: types recommended by carpet manufacturer for purpose intended.
  - .4 Transition moldings: carpet edge/reducer strip, designed for purpose intended.
  - .5 Carpet protection: non-staining heavy duty

kraft paper.

- .6 Concrete floor sealer: to CAN/CGSB-25-20, Type 1.
- .7 Subfloor patching compound: Portland cement base filler, mix with water to form a cementations paste and leveling

PART 3 EXECUTION

3.1 SUB-FLOOR TREATMENT

- .1 Concrete shall be inspected to determine special care required to make it a suitable foundation for carpet. Cracks 3.0 mm wide or protrusions over 0.8 mm will be filled and leveled with appropriate and compatible patching compound.
- .2 Do not exceed manufacturer's recommendations for patch thickness.
- .3 Large patch areas are to be primed with a compatible primer.
- .4 Concrete substrates shall be cured, level, smooth, clean and dry.
- .5 Concrete substrates shall be free of paint, dirt, grease, oil, curing or parting agents, and other contaminates, including sealers, that may interfere with the bonding of the adhesive.
- .6 Wherever a powdery or porous concrete surface is encountered, a primer compatible with the adhesive shall be used to provide a suitable surface for glue-down installation.

3.2 PREPARATION

- .1 Prepare floor surfaces in accordance with CRI 104 Standard for Installation of Commercial Carpet.
- .2 Pre-condition carpeting following manufacturer's printed instructions.

3.3 INSTALLATION

- .1 Install in accordance with manufacturer's printed instructions and in accordance with

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Carpet and Rug Institute Standard for  
Installation of Commercial Carpet, CRI 104.

- .2 Install carpet after finishing work is completed but before demountable office partitions and telephone and electrical pedestal outlets are installed.
- .3 Finish installation to present smooth wearing surface free from conspicuous seams, burring and other faults.
- .4 Use material from same dye lot. Ensure colour, pattern and texture match within any one visual area. Maintain constant pile direction.
- .5 Apply thin film of pressure - sensitive adhesive according to manufacturer's recommendation.
- .6 Fit neatly around architectural, mechanical, electrical and telephone outlets, and furniture fitments, around perimeter of rooms into recesses, and around projections.
- .7 Install carpeting in pan type floor access covers.
- .8 Extend carpet into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.
- .9 Install carpet smooth and free of bubbles, puckers, and other defects.

3.4 BASE  
INSTALLATION

- .1 Install resilient base in accordance with Section 09 65 16 - Resilient Sheet Flooring.

3.5 PROTECTION  
OF FINISHED WORK

- .1 Vacuum carpets clean immediately after completion of installation. Protect traffic areas.
- .2 Prohibit traffic on carpet for a period of 24 hours until adhesive is cured.
- .3 Install carpet protection to satisfaction of

Departmental Representative.

- 3.6 COMMISSIONING .1 Train user staff in the care and cleaning of carpet.
- .2 Acceptance of maintenance material turned over to owner.

PART 1 GENERAL

1.1 SUMMARY

- .1 Section Includes:
  - .1 Material and installation of site applied paint finishes to new interior surfaces, including site painting of shop primed surfaces.
  - .2 Sustainable requirements for construction and verification:
- .2 Related Sections:
  - .1 Section 01 33 00 - Submittal Procedures.
  - .2 Section 01 35 29 - Health and Safety Requirements.
  - .3 Section 01 45 00 - Testing and Quality Control.
  - .4 Section 01 61 00 - Common Product Requirements.
  - .5 Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
  - .6 Section 01 78 00 - Closeout Submittals.

1.2 REFERENCES

- .1 Department of Justice Canada (Jus)
  - .1 Canadian Environmental Protection Act (CEPA), 1999, c. 33
- .2 Environmental Protection Agency (EPA)
  - .1 EPA Test Method for Measuring Total Volatile Organic Compound Content of Consumer Products, Method 24 - 1995, (for Surface Coatings).
- .3 Health Canada / Workplace Hazardous Materials Information System (WHMIS)
  - .1 Material Safety Data Sheets (MSDS).
- .4 Master Painters Institute (MPI)
  - .1 MPI Architectural Painting Specifications Manual, 2004.
- .5 National Fire Code of Canada - 1995
- .6 Society for Protective Coatings (SSPC)

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- .1 SSPC Painting Manual, Volume Two, 8th Edition, Systems and Specifications Manual.
  - .7 Transport Canada (TC)
    - .1 Transportation of Dangerous Goods Act (TDGA), 1992, c. 34.
- 1.3 QUALITY ASSURANCE
- .1 Qualifications:
    - .1 Contractor: minimum of five years proven satisfactory experience. Provide list of last three comparable jobs including, job name and location, specifying authority, and project manager.
    - .2 Journeymen: qualified journeymen who have "Tradesman Qualification Certificate of Proficiency" engaged in painting work.
    - .3 Apprentices: working under direct supervision of qualified trades person in accordance with trade regulations.
  - .2 Health and Safety:
    - .1 Do construction occupational health and safety in accordance with Section 01 35 29 - Health and Safety Requirements.
- 1.4 SCHEDULING
- .1 Submit work schedule for various stages of painting to Departmental Representative for review. Submit schedule minimum of 48 hours in advance of proposed operations.
  - .2 Obtain written authorization from Departmental Representative for changes in work schedule.
  - .3 Schedule painting operations to prevent disruption of occupants.
- 1.5 SUBMITTALS
- .1 Submittals in accordance with Section 01 33 00 - Submittal Procedures.
  - .2 Product Data:
    - .1 Submit product data and instructions for each paint and

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- coating product to be used.
- .2 Submit product data for the use and application of paint thinner.
  - .3 Submit two copies of Workplace Hazardous Materials Information System (WHMIS) Material Safety Data Sheets (MSDS) in accordance with Section 01 33 00 - Submittal Procedures. Indicate VOCs during application and curing.
- .3 Samples:
- .1 Submit full range colour sample chips to indicate where colour availability is restricted.
  - .2 Submit duplicate 200 x 300 mm sample panels of each paint stain clear coating special finish with specified paint or coating in colours, gloss/sheen and textures required to MPI Architectural Painting Specification Manual standards submitted on following substrate materials:
    - .1 3 mm plate steel for finishes over metal surfaces.
    - .2 13 mm birch plywood for finishes over wood surfaces.
    - .3 50 mm concrete block for finishes over concrete or concrete masonry surfaces.
    - .4 13 mm gypsum board for finishes over gypsum board and other smooth surfaces.
  - .3 Retain reviewed samples on-site to demonstrate acceptable standard of quality for appropriate on-site surface.
  - .4 Test reports: submit certified test reports for paint from approved independent testing laboratories, indicating compliance with specifications for specified performance characteristics and physical properties.
    - .1 Lead, cadmium and chromium: presence of and amounts.
    - .2 Mercury: presence of and amounts.
    - .3 Organochlorines and PCBs:

presence of and amounts.

- .5 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
- .6 Manufacturer's Instructions:
  - .1 Submit manufacturer's installation and application instructions.
- .7 Closeout Submittals: submit maintenance data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals include following:
  - .1 Product name, type and use.
  - .2 Manufacturer's product number.
  - .3 Colour numbers.
  - .4 MPI Environmentally Friendly classification system rating.

1.6 MAINTENANCE

- .1 Extra Materials:
  - .1 Deliver to extra materials from same production run as products installed. Package products with protective covering and identify with descriptive labels. Comply with Section 01 78 00 - Closeout Submittals.
  - .2 Quantity: provide - one four litre can of each type and colour of primer stain finish coating. Identify colour and paint type in relation to established colour schedule and finish system.
  - .3 Delivery, storage and protection: comply with Departmental Representative requirements for delivery and storage of extra materials.

1.7 DELIVERY,  
STORAGE AND  
HANDLING

- .1 Packing, Shipping, Handling and Unloading:
  - .1 Pack, ship, handle and unload materials in accordance with Section 01 61 00 - Common Product Requirements and manufacturer's

written instructions.

- .2 Acceptance at Site:
  - .1 Identify products and materials with labels indicating:
    - .1 Manufacturer's name and address.
    - .2 Type of paint or coating.
    - .3 Compliance with applicable standard.
    - .4 Colour number in accordance with established colour schedule.
  - .3 Remove damaged, opened and rejected materials from site.
  - .4 Storage and Protection:
    - .1 Provide and maintain dry, temperature controlled, secure storage.
    - .2 Store materials and supplies away from heat generating devices.
    - .3 Store materials and equipment in well ventilated area with temperature range 7 degrees C to 30 degrees C.
  - .5 Store temperature sensitive products above minimum temperature as recommended by manufacturer.
  - .6 Keep areas used for storage, cleaning and preparation clean and orderly. After completion of operations, return areas to clean condition.
  - .7 Remove paint materials from storage only in quantities required for same day use.
  - .8 Fire Safety Requirements:
    - .1 Provide one 9 kg Type ABC dry chemical fire extinguisher adjacent to storage area.
    - .2 Store oily rags, waste products, empty containers and materials subject to spontaneous combustion in ULC approved, sealed containers and remove from site on a daily basis.
    - .3 Handle, store, use and dispose of

flammable and combustible materials in accordance with National Fire Code of Canada requirements.

.9 Waste Management and Disposal:

- .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal .
- .2 Remove from site and dispose of packaging materials at appropriate recycling facilities.
- .3 Collect and separate for disposal paper, plastic, polystyrene, corrugated cardboard packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan (WMP).
- .4 Separate for recycling and place in designated containers Steel Metal Plastic waste in accordance with Waste Management Plan (WMP).
- .5 Place materials defined as hazardous or toxic in designated containers.
- .6 Handle and dispose of hazardous materials in accordance with CEPA, TDGA, Regional and Municipal regulations.
- .7 Ensure emptied containers are sealed and stored safely.
- .8 Unused paint coating materials must be disposed of at official hazardous material collections site as approved by Departmental Representative.
- .9 Paint, stain and wood preservative finishes and related materials (thinners, and solvents) are regarded as hazardous products and are subject to regulations for disposal. Information on these controls can be obtained from Provincial Ministries of Environment and Regional levels of Government.
- .10 Material which cannot be reused must be treated as hazardous waste and disposed of in an appropriate

manner.

- .11 Place materials defined as hazardous or toxic waste, including used sealant and adhesive tubes and containers, in containers or areas designated for hazardous waste.
- .12 To reduce the amount of contaminants entering waterways, sanitary/storm drain systems or into ground follow these procedures:
  - .1 Retain cleaning water for water-based materials to allow sediments to be filtered out.
  - .2 Retain cleaners, thinners, solvents and excess paint and place in designated containers and ensure proper disposal.
  - .3 Return solvent and oil soaked rags used during painting operations for contaminant recovery, proper disposal, or appropriate cleaning and laundering.
  - .4 Dispose of contaminants in approved legal manner in accordance with hazardous waste regulations.
  - .5 Empty paint cans are to be dry prior to disposal or recycling (where available).
- .13 Where paint recycling is available, collect waste paint by type and provide for delivery to recycling or collection facility.
- .14 Set aside and protect surplus and uncontaminated finish materials: Deliver to or arrange collection by organizations for verifiable re-use or re-manufacturing.

1.8 SITE  
CONDITIONS

- .1 Heating, Ventilation and Lighting:
  - .1 Ventilate enclosed spaces.
  - .2 Provide heating facilities to maintain ambient air and substrate temperatures above 10 degrees C for 24 hours before, during and

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- after paint application until paint has cured sufficiently.
- .3 Provide continuous ventilation for seven days after completion of application of paint.
  - .4 Coordinate use of existing ventilation system with Departmental Representative and ensure its operation during and after application of paint as required.
  - .5 Provide temporary ventilating and heating equipment where permanent facilities are not available or supplemental ventilating and heating equipment if ventilation and heating from existing system is inadequate to meet minimum requirements.
  - .6 Provide minimum lighting level of 323 Lux on surfaces to be painted.
- .2 Temperature, Humidity and Substrate Moisture Content Levels:
- .1 Unless pre-approved written approval by specifying body and product manufacturer, perform no painting when:
    - .1 Ambient air and substrate temperatures are below 10 degrees C.
    - .2 Substrate temperature is above 32 degrees C unless paint is specifically formulated for application at high temperatures.
    - .3 Substrate and ambient air temperatures are not expected to fall within MPI or paint manufacturer's prescribed limits.
    - .4 The relative humidity is under 85 % or when the dew point is more than 3 degrees C variance between the air/surface temperature. Paint should not be applied if the dew point is less than 3 degrees C below the ambient or surface temperature. Use sling psychrometer to establish the relative

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- humidity before beginning paint work.
  - .5 Ensure that conditions are within specified limits during drying or curing process, until newly applied coating can itself withstand 'normal' adverse environmental factors.
  - .2 Perform painting work when maximum moisture content of the substrate is below:
    - .1 15 % for wood.
    - .2 12 % for plaster and gypsum board.
  - .3 Test for moisture using calibrated electronic Moisture Meter. Test concrete floors for moisture using "cover patch test".
  - .4 Test concrete, masonry and plaster surfaces for alkalinity as required.
  - .3 Surface and Environmental Conditions:
    - .1 Apply paint finish in areas where dust is no longer being generated by related construction operations or when wind or ventilation conditions are such that airborne particles will not affect quality of finished surface.
    - .2 Apply paint to adequately prepared surfaces and to surfaces within moisture limits.
    - .3 Apply paint when previous coat of paint is dry or adequately cured.
  - .4 Additional interior application requirements:
    - .1 Apply paint finishes when temperature at location of installation can be satisfactorily maintained within manufacturer's recommendations.
    - .2 Apply paint in occupied facilities during silent hours only. Schedule operations to approval of Departmental Representative such that painted surfaces will have dried and cured sufficiently before occupants are affected.

PART 2 PRODUCTS

2.1 MATERIALS

- .1 Paint materials listed in the MPI Approved Products List (APL) are acceptable for use on this project.
- .2 Provide paint materials for paint systems from single manufacturer.
- .3 Conform to latest MPI requirements for interior painting work including preparation and priming.
- .4 Materials (primers, paints, coatings, varnishes, stains, lacquers, fillers, thinners, solvents, etc.) in accordance with MPI Architectural Painting Specification Manual "Approved Product" listing.
- .5 Linseed oil, shellac, and turpentine: highest quality product from approved manufacturer listed in MPI Architectural Painting Specification Manual, compatible with other coating materials as required.
- .6 Provide paint products meeting MPI "Environmentally Friendly", E2 ratings based on VOC (EPA Method 24) content levels.
- .7 Use MPI listed materials having minimum E2 rating where indoor air quality (odour) requirements exist.
- .8 Paints, coatings, adhesives, solvents, cleaners, lubricants, and other fluids:
  - .1 Water-based Water soluble Water clean-up.
  - .2 Non-flammable biodegradable.
  - .3 Manufactured without compounds which contribute to ozone depletion in the upper atmosphere.
  - .4 Manufactured without compounds which contribute to smog in the lower atmosphere.

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- .5 Do not contain methylene chloride, chlorinated hydrocarbons, toxic metal pigments.
  
  - .9 Formulate and manufacture water-borne surface coatings with no aromatic solvents, formaldehyde, halogenated solvents, mercury, lead, cadmium, hexavalent chromium or their compounds.
  
  - .10 Flash point: 61.0 degrees C or greater for water-borne surface coatings and recycled water-borne surface coatings.
  
  - .11 Ensure manufacture and process of both water-borne surface coatings and recycled water-borne surface coatings does not release:
    - .1 Matter in undiluted production plant effluent generating 'Biochemical Oxygen Demand' (BOD) in excess of 15 mg/L to natural watercourse or sewage treatment facility lacking secondary treatment.
    - .2 Total Suspended Solids (TSS) in undiluted production plant effluent in excess of 15 mg/L to natural watercourse or a sewage treatment facility lacking secondary treatment.
  
  - .12 Water-borne paints and stains, recycled water-borne surface coatings and water borne varnishes to meet minimum "Environmentally Friendly" E2 rating.
  
  - .13 Recycled water-borne surface coatings to contain 50 % post-consumer material by volume.
  
  - .14 Recycled water-borne surface coatings must not contain:
    - .1 Lead in excess of 600.0 ppm weight/weight total solids.
    - .2 Mercury in excess of 50.0 ppm weight/weight total product.
    - .3 Cadmium in excess of 1.0 ppm weight/weight total product.
    - .4 Hexavalent chromium in excess of 3.0 ppm weight/weight total

product.

- .5 Organochlorines or polychlorinated biphenyls (PCBS) in excess of 1.0 ppm weight/weight total product.

## 2.2 COLOURS

- .1 Departmental Representative will provide Colour Schedule after Contract award.
- .2 Colour schedule will be based upon selection of three base colours and three accent colours. No more than six colours will be selected for entire project and no more than three colours will be selected in each area.
- .3 Selection of colours from manufacturer's full range of colours.
- .4 Where specific products are available in restricted range of colours, selection based on limited range.
- .5 Second coat in three coat system to be tinted slightly lighter colour than top coat to show visible difference between coats.

## 2.3 MIXING AND TINTING

- .1 Perform colour tinting operations prior to delivery of paint to site. Obtain written approval from Departmental Representative for tinting of painting materials.
- .2 Mix paste, powder or catalyzed paint mixes in accordance with manufacturer's written instructions.
- .3 Use and add thinner in accordance with paint manufacturer's recommendations. Do not use kerosene or similar organic solvents to thin water-based paints.
- .4 Thin paint for spraying in accordance with paint manufacturer's instructions.
- .5 Re-mix paint in containers prior to and during application to ensure break-up of lumps, complete dispersion of settled pigment, and colour and gloss uniformity.

2.4 GLOSS/SHEEN RATINGS

.1 Paint gloss is defined as sheen rating of applied paint, in accordance with following values:

	Gloss @ 60 degrees	Sheen @ 85 degrees
Gloss Level 1 - Matte Finish (flat)	Max. 5	Max. 10
Gloss Level 2 - Velvet-Like Finish	Max.10	10 to 35
Gloss Level 3 - Eggshell Finish	10 to 25	10 to 35
Gloss Level 4 - Satin-Like Finish	20 to 35	min. 35
Gloss Level 5 - Traditional Semi-Gloss Finish	35 to 70	
Gloss Level 6 - Traditional Gloss	70 to 85	
Gloss Level 7 - High Gloss Finish	More than 85	

.2 Gloss level ratings of painted surfaces as indicated and as noted on Finish Schedule.

2.5 INTERIOR PAINTING SYSTEMS

.1 Concrete vertical surfaces: including horizontal soffits:

.1 INT 3.1A - Latex insert gloss level 6-5 finish (over sealer).

.2 Concrete horizontal surfaces: floors:

.1 INT 3.2B - Alkyd floor enamel gloss low gloss finish.

.3 Concrete masonry units:

.1 INT 4.2A - Latex insert gloss level 6-5 finish.

.4 Structural steel and metal fabrications: columns, beams, joists:

.1 INT 5.1A - Quick dry enamel semi-gloss finish.

.5 Galvanized metal: doors, frames, railings, misc. steel, pipes, overhead decking, and ducts.

.1 INT 5.3A - Latex insert gloss level 65 finish.

.6 Dimension lumber: columns, beams, exposed joists, underside of decking:

.1 INT 6.2A - Latex insert gloss level 65 finish (over alkyd primer).

.7 Dressed lumber: including doors, door and window frames, casings, mouldings:

.1 INT 6.3A - High performance

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- architectural latex insert gloss  
level 65 finish.
- .8 Plaster and gypsum board: gypsum wallboard, drywall, "sheet rock type material", and textured finishes:
- .1 INT 9.2A - Latex insert gloss level 64 finish (over latex sealer).
- 2.6 SOURCE QUALITY CONTROL
- .1 Perform following tests on each batch of consolidated post-consumer material before surface coating is reformulated and canned. Testing by laboratory or facility which has been accredited by Standards Council of Canada.
- .1 Lead, cadmium and chromium are to be determined using ICP-AES (Inductively Coupled Plasma - Atomic Emission Spectroscopy) technique no. 6010 as defined in EPA SW-846.
- .2 Mercury is to be determined by Cold Vapour Atomic Absorption Spectroscopy using Technique no. 7471 as defined in EPA SW-846.
- .3 Organochlorines and PCBs are to be determined by Gas Chromatography using Technique no. 8081 as defined in EPA SW-846.
- PART 3 EXECUTION
- 3.1 MANUFACTURER'S INSTRUCTIONS
- .1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and data sheet.
- 3.2 GENERAL
- .1 Perform preparation and operations for interior painting in accordance with MPI Architectural Painting Specifications Manual except where specified otherwise.
- .2 Apply paint materials in accordance with paint manufacturer's written application instructions.

3.3 EXAMINATION

- .1 Investigate existing substrates for problems related to proper and complete preparation of surfaces to be painted. Report to Departmental Representative damages, defects, unsatisfactory or unfavourable conditions before proceeding with work.
- .2 Conduct moisture testing of surfaces to be painted using properly calibrated electronic moisture meter, except test concrete floors for moisture using simple "cover patch test". Do not proceed with work until conditions fall within acceptable range as recommended by manufacturer.
- .3 Maximum moisture content as follows:
  - .1 Stucco, plaster and gypsum board: 12%.
  - .2 Concrete: 12%.
  - .3 Clay and Concrete Block/Brick: 12%.
  - .4 Wood: 15%.

3.4 PREPARATION

- .1 Protection:
  - .1 Protect existing building surfaces and adjacent structures from paint spatters, markings and other damage by suitable non-staining covers or masking. If damaged, clean and restore surfaces as directed by Departmental Representative.
  - .2 Protect items that are permanently attached such as Fire Labels on doors and frames.
  - .3 Protect factory finished products and equipment.
  - .4 Protect passing pedestrians, building occupants and general public in and about the building.
- .2 Surface Preparation:
  - .1 Remove electrical cover plates, light fixtures, surface hardware on doors, bath accessories and other surface mounted equipment, fittings and fastenings prior to undertaking painting operations.

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- Identify and store items in secure location and re-installed after painting is completed.
- .2 Move and cover furniture and portable equipment as necessary to carry out painting operations. Replace as painting operations progress.
  - .3 Place "WET PAINT" signs in occupied areas as painting operations progress. Signs to approval of Departmental Representative.
- .3 Clean and prepare surfaces in accordance with MPI Architectural Painting Specification Manual requirements. Refer to MPI Manual in regard to specific requirements and as follows:
- .1 Remove dust, dirt, and other surface debris by vacuuming, wiping with dry, clean cloths or compressed air.
  - .2 Wash surfaces with a biodegradable detergent and bleach where applicable and clean warm water using a stiff bristle brush to remove dirt, oil and other surface contaminants.
  - .3 Rinse scrubbed surfaces with clean water until foreign matter is flushed from surface.
  - .4 Allow surfaces to drain completely and allow to dry thoroughly.
  - .5 Prepare surfaces for water-based painting, water-based cleaners should be used in place of organic solvents.
  - .6 Use trigger operated spray nozzles for water hoses.
  - .7 Many water-based paints cannot be removed with water once dried. Minimize use of mineral spirits or organic solvents to clean up water-based paints.
- .4 Clean following surfaces with high pressure water washing.
- .5 Prevent contamination of cleaned surfaces by salts, acids, alkalis, other corrosive chemicals, grease, oil and

solvents before prime coat is applied and between applications of remaining coats. Apply primer, paint, or pretreatment as soon as possible after cleaning and before deterioration occurs.

- .6 Where possible, prime non-exposed surfaces of new wood surfaces before installation. Use same primers as specified for exposed surfaces.
  - .1 Apply vinyl sealer to MPI #36 over knots, pitch, sap and resinous areas.
  - .2 Apply wood filler to nail holes and cracks.
  - .3 Tint filler to match stains for stained woodwork.
- .7 Sand and dust between coats as required to provide adequate adhesion for next coat and to remove defects visible from a distance up to 1000 mm.
- .8 Clean metal surfaces to be painted by removing rust, loose mill scale, welding slag, dirt, oil, grease and other foreign substances in accordance with MPI requirements. Remove traces of blast products from surfaces, pockets and corners to be painted by brushing with clean brushes blowing with clean dry compressed air or vacuum cleaning.
- .9 Touch up of shop primers with primer as specified.
- .10 Do not apply paint until prepared surfaces have been accepted by Departmental Representative.
- .11 Prime existing oil painted surfaces prior to application of latex finishes.

### 3.5 APPLICATION

- .1 Method of application to be as approved by Departmental Representative. Apply paint by brush roller airless sprayer. Conform to manufacturer's application instructions unless specified otherwise.
- .2 Brush and Roller Application:

- .1 Apply paint in uniform layer using brush and/or roller type suitable for application.
- .2 Work paint into cracks, crevices and corners.
- .3 Paint surfaces and corners not accessible to brush using spray, daubers and/or sheepskins. Paint surfaces and corners not accessible to roller using brush, daubers or sheepskins.
- .4 Brush and/or roll out runs and sags, and over-lap marks. Rolled surfaces free of roller tracking and heavy stipple.
- .5 Remove runs, sags and brush marks from finished work and repaint.
- .3 Spray application:
  - .1 Provide and maintain equipment that is suitable for intended purpose, capable of atomizing paint to be applied, and equipped with suitable pressure regulators and gauges.
  - .2 Keep paint ingredients properly mixed in containers during paint application either by continuous mechanical agitation or by intermittent agitation as frequently as necessary.
  - .3 Apply paint in uniform layer, with overlapping at edges of spray pattern. Back roll first coat application.
  - .4 Brush out immediately all runs and sags.
  - .5 Use brushes and rollers to work paint into cracks, crevices and places which are not adequately painted by spray.
- .4 Use dipping, sheepskins or daubers only when no other method is practical in places of difficult access.
- .5 Apply coats of paint continuous film of uniform thickness. Repaint thin spots or bare areas before next coat of paint is applied.
- .6 Allow surfaces to dry and properly cure

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after cleaning and between subsequent coats for minimum time period as recommended by manufacturer.

- .7 Sand and dust between coats to remove visible defects.
- .8 Finish surfaces both above and below sight lines as specified for surrounding surfaces, including such surfaces as tops of interior cupboards and cabinets and projecting ledges.
- .9 Finish inside of cupboards and cabinets as specified for outside surfaces.
- .10 Finish closets and alcoves as specified for adjoining rooms.
- .11 Finish top, bottom, edges and cutouts of doors after fitting as specified for door surfaces.

3.6 MECHANICAL/  
ELECTRICAL  
EQUIPMENT

- .1 Paint finished area exposed conduits, piping, hangers, ductwork and other mechanical and electrical equipment with colour and finish to match adjacent surfaces, except as indicated.
- .2 Boiler room, mechanical and electrical rooms: paint exposed conduits, piping, hangers, ductwork and other mechanical and electrical equipment.
- .3 Other unfinished areas: leave exposed conduits, piping, hangers, ductwork and other mechanical and electrical equipment in original finish and touch up scratches and marks.
- .4 Touch up scratches and marks on factory painted finishes and equipment with paint as supplied by manufacturer of equipment.
- .5 Do not paint over nameplates.
- .6 Keep sprinkler heads free of paint.
- .7 Paint inside of ductwork where visible behind grilles, registers and diffusers with primer and one coat of matt black

paint.

- .8 Paint fire protection piping red.
- .9 Paint disconnect switches for fire alarm system and exit light systems in red enamel.
- .10 Paint both sides and edges of backboards for telephone and electrical equipment before installation. Leave equipment in original finish except for touch-up as required, and paint conduits, mounting accessories and other unfinished items.
- .11 Do not paint interior transformers and substation equipment.

3.7 SITE  
TOLERANCES

- .1 Walls: no defects visible from a distance of 1000 mm at 90 degrees to surface.
- .2 Ceilings: no defects visible from floor at 45 degrees to surface when viewed using final lighting source.
- .3 Final coat to exhibit uniformity of colour and uniformity of sheen across full surface area.

3.8 FIELD  
QUALITY CONTROL

- .1 Interior painting and decorating work shall be inspected by a Paint Inspection Agency (inspector) acceptable to the specifying authority and local Painting Contractor's Association. Painting contractor shall notify Paint Inspection Agency a minimum of one week prior to commencement of work and provide a copy of project painting specification, plans and elevation drawings (including pertinent details) as well as a Finish Schedule.
- .2 Interior surfaces requiring painting shall be inspected by Paint Inspection Agency who shall notify Departmental Representative in writing of defects or problems, prior to commencing painting work, or after prime coat shows defects in substrate.
- .3 Where "special" painting, coating or

decorating system applications (i.e. elastomeric coatings) or non-MPI listed products or systems are to be used, paint or coating manufacturer shall provide as part of this work, certification of surfaces and conditions for specific paint or coating system application as well as on site supervision, inspection and approval of their paint or coating system application as required at no additional cost to Departmental Representative.

- .4 Standard of Acceptance:
    - .1 Walls: no defects visible from a distance of 1000 mm at 90 degrees to surface.
    - .2 Ceilings: no defects visible from floor at 45 degrees to surface when viewed using final lighting source.
    - .3 Final coat to exhibit uniformity of colour and uniformity of sheen across full surface area.
  - .5 Field inspection of painting operations to be carried out by independent inspection firm as designated by Departmental Representative.
  - .6 Advise Departmental Representative when surfaces and applied coating is ready for inspection. Do not proceed with subsequent coats until previous coat has been approved.
  - .7 Cooperate with inspection firm and provide access to areas of work.
  - .8 Retain purchase orders, invoices and other documents to prove conformance with noted MPI requirements when requested by Departmental Representative.
- 3.9 RESTORATION
- .1 Clean and re install hardware items removed before undertaken painting operations.
  - .2 Remove protective coverings and warning signs as soon as practical after

operations cease.

- .3 Remove paint splashings on exposed surfaces that were not painted. Remove smears and spatter immediately as operations progress, using compatible solvent.
- .4 Protect freshly completed surfaces from paint droppings and dust to approval of Departmental Representative. Avoid scuffing newly applied paint.
- .5 Restore areas used for storage, cleaning, mixing and handling of paint to clean condition as approved by Departmental Representative.

PART 1 - GENERAL

1.1 SUBMITTALS

- .1 Submittals: in accordance with Section 01 33 00-Submittal Procedures.
- .2 Shop drawings; submit drawings stamped and signed by professional engineer registered or licensed in Provinces of Canada.
- .3 Shop drawings to show:
  - .1 Mounting arrangements.
  - .2 Operating and maintenance clearances.
- .4 In addition to transmittal letter referred to in Section 01 33 00 - Submittal Procedures: use MCAC "Shop Drawing Submittal Title Sheet". Identify section and paragraph number.
- .5 Closeout Submittals:
  - .1 Provide operation and maintenance data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.
  - .2 Operation and maintenance manual approved by, and final copies deposited with, Departmental Representative before final inspection.
  - .3 Operation data to include:
    - .1 Control schematics for systems including environmental controls.
    - .2 Description of systems and their controls.
    - .3 Description of operation of systems at various loads together with reset schedules and seasonal variances.
    - .4 Operation instruction for systems and component.
    - .5 Description of actions to be taken in event of equipment failure.
  - .4 Maintenance data to include:
    - .1 Servicing, maintenance, operation and trouble-shooting instructions for each item of equipment.
    - .2 Data to include schedules of tasks, frequency, tools required and task time.
  - .5 Performance data to include:
    - .1 Equipment manufacturer's performance datasheets with point of operation as left

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- after commissioning is complete.
- .2 Equipment performance verification test results.
  - .3 Special performance data as specified.
  - .4 Testing, adjusting and balancing reports as specified in Section 23 05 93 - Testing, Adjusting and Balancing for HVAC.
- .6 Approvals:
- .1 Submit 2 copies of draft Operation and Maintenance Manual to Departmental Representative for approval. Submission of individual data will not be accepted unless directed by Departmental Representative.
  - .2 Make changes as required and re-submit as directed by Departmental Representative.
- .7 Additional data:
- .1 Prepare and insert into operation and maintenance manual additional data when need for it becomes apparent during specified demonstrations and instructions.
- .8 Site records:
- .1 Departmental Representative will provide 1 set of reproducible mechanical drawings. Provide sets of white prints as required for each phase of work. Mark changes as work progresses and as changes occur. Include changes to existing mechanical systems, control systems and low voltage control wiring.
  - .2 Transfer information to reproducibles, revising reproducibles to show work as actually installed.
  - .3 Use different colour waterproof ink or CAD line work for each service.
  - .4 Make available for reference purposes and inspection.
- .9 As-built drawings:
- .1 Prior to start of Testing, Adjusting and Balancing for HVAC, finalize production of as-built drawings.
  - .2 Identify each drawing in lower right hand corner in letters at least 12 mm high as follows: - "AS BUILT DRAWINGS: THIS DRAWING HAS BEEN REVISED TO SHOW MECHANICAL SYSTEMS AS INSTALLED" (Signature of Contractor) (Date).
  - .3 Submit to Departmental Representative

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		for approval and make corrections as directed.
		.4 Perform testing, adjusting and balancing for HVAC using as-built drawings.
		.5 Submit completed reproducible as-built drawings with Operating and Maintenance Manuals.
	.10	Submit copies of as-built drawings for inclusion in final TAB report.
<u>1.2 QUALITY ASSURANCE</u>	.1	Health and Safety Requirements: do construction occupational health and safety in accordance with Section 01 35 29 - Health and Safety Requirements.
<u>1.3 MAINTENANCE</u>	.1	Provide one set of special tools required to service equipment as recommended by manufacturers and in accordance with Section 01 78 00 - Closeout Submittals.
<u>1.4 DELIVERY, STORAGE, AND HANDLING</u>	.1	Waste Management and Disposal: .1 Construction/Demolition Waste Management and Disposal: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
<u>PART 2 - PRODUCTS</u>	N/A	
<u>PART 3 - EXECUTION</u>		
<u>3.1 PAINTING REPAIRS AND RESTORATION</u>	.1	Prime and touch up marred finished paintwork to match original.
	.2	Restore to new condition, finishes which have been damaged.

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- 3.2 CLEANING .1 Clean interior and exterior of all systems including strainers. Vacuum interior of ductwork.
- 3.3 FIELD QUALITY CONTROL .1 Site Tests: conduct following tests in accordance with Section 01 45 00 - Quality Control and submit report as described in PART 1 - SUBMITTALS.
- 3.4 DEMONSTRATION .1 Departmental Representative will use equipment and systems for test purposes prior to acceptance. Supply labour, material, and instruments required for testing.
- .2 Supply tools, equipment and personnel to demonstrate and instruct operating and maintenance personnel in operating, controlling, adjusting, trouble-shooting and servicing of all systems and equipment during regular work hours, prior to acceptance.
- .3 Use operation and maintenance manual, as-built drawings, and audio visual aids as part of instruction materials.
- .4 Departmental Representative may record these demonstrations on video tape for future reference.
- 3.5 PROTECTION .1 Protect equipment and systems openings from dirt, dust, and other foreign materials with materials appropriate to system.

PART 1 - GENERAL

1.1 REFERENCES

- .1 National Fire Prevention Association (NFPA)
  - .1 NFPA 13, Standard for the Installation of Sprinkler Systems.
  - .2 NFPA 25, Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
  - .1 Provide manufacturer's printed product literature and data sheets, and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Shop Drawings:
  - .1 Submit drawings stamped and signed by professional engineer registered or licensed in Province of Newfoundland and Labrador, Canada.
  - .2 Indicate:
    - .1 Materials.
    - .2 Finishes.
    - .3 Method of anchorage
    - .4 Number of anchors.
    - .5 Supports.
    - .6 Reinforcement.
    - .7 Assembly details.
    - .8 Accessories.
- .4 Certificates:
  - .1 Submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
- .5 Field Quality Control Submittals:
  - .1 Manufacturer's Field Reports: manufacturer's field reports specified.

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1.3 CLOSEOUT  
SUBMITTALS

- .1 Provide operation, maintenance and engineering data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals] in accordance with ANSI/NFPA 20.
- .2 Manufacturer's Catalog Data, including specific model, type, and size for:
  - .1 Pipe and fittings.
  - .2 Sprinkler heads.
  - .3 Pipe hangers and supports.
  - .4 Mechanical couplings.
- .3 Drawings:
  - .1 Sprinkler heads and piping system layout.
    - .1 Prepare 760 mm by 1050 mm detail working drawings of system layout in accordance with NFPA 13, "Working Drawings (Plans)".
    - .2 Show data essential for proper installation of each system.
    - .3 Show details, plan view, elevations, and sections of systems supply and piping.
    - .4 Show piping schematic of systems supply, devices, valves, pipe, and fittings. Show point to point electrical wiring diagrams.
  - .2 Electrical wiring diagrams.
- .4 Design Data:
  - .1 Calculations of sprinkler system design where required.
- .5 Field Test Reports:
  - .1 Preliminary tests on piping system.
- .6 Records:
  - .1 As-built drawings of each system.
    - .1 After completion, but before final acceptance, submit complete set of as-built drawings of each system for record purposes.
    - .2 Submit 760 mm by 1050 mm drawings on reproducible Mylar film with title block similar to full size contract drawings.
- .7 Operation and Maintenance Manuals:
  - .1 Provide Material and Test Certificate for piping and other documentation for incorporation into manual in accordance with NFPA 13.

1.4 QUALITY  
ASSURANCE

- .1 Qualifications:
  - .1 Installer: company or person specializing in wet sprinkler systems with documented experience.
- .2 Supply grooved joint couplings, fittings, valves, grooving tools and specialties from a single manufacturer. Use date stamped castings for coupling housings and fittings, for quality assurance and traceability.

1.5 MAINTENANCE  
MATERIAL SUBMITTALS

- .1 Extra Materials:
  - .1 Provide maintenance materials in accordance with Section 01 78 00 - Closeout Submittals.

1.6 DELIVERY,  
STORAGE AND  
HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements:
  - .1 Deliver materials to site in original factory packaging, labelled with manufacturer's name, address.
- .3 Storage and Protection:
  - .1 Store materials indoors in dry location
  - .2 Store and protect materials from exposure to harmful weather conditions and at temperature and humidity conditions recommended by manufacturer.
- .4 Packaging Waste Management: remove packaging in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

PART 2 - PRODUCTS

2.1 DESIGN  
REQUIREMENTS

- .1 Design automatic wet pipe fire suppression sprinkler systems modifications in accordance with required and advisory provisions of NFPA 13, by pipe schedules for ordinary hazard occupancy or hydraulic calculations for uniform

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distribution of water over design area.

- .2 Include with each system materials, accessories, and equipment inside and outside building to provide each system complete and ready for use.
- .3 Design and provide each system to give full consideration to blind spaces, piping, electrical equipment, ducts, and other construction and equipment in accordance with detailed shop drawings.
- .4 Locate sprinkler heads in consistent pattern with ceiling grid, lights, and air supply diffusers.
- .5 Devices and equipment for fire protection service: ULC approved for use in wet pipe sprinkler systems.
- .6 Location of Sprinkler Heads:
  - .1 Locate heads in relation to ceiling and spacing of sprinkler heads not to exceed [that permitted by NFPA 13 for light hazard occupancy.
  - .2 Uniformly space sprinklers on branch.
- .7 Water Distribution:
  - .1 Make distribution uniform throughout the area in which sprinkler heads will open.
  - .2 Discharge from individual heads in hydraulically most remote area to be [100] % of specified density.
- .8 Friction Losses:
  - .1 Calculate losses in piping in accordance with Hazen-Williams formula with 'C' value of 120 for steel piping, 150 for copper tubing, and 140 for cement-lined ductile-iron piping.

2.2 ABOVE GROUND  
PIPING SYSTEMS

- .1 Provide fittings for changes in direction of piping and for connections.
  - .1 Make changes in piping sizes through tapered reducing pipe fittings, bushings will be permitted.
- .2 Perform welding in shop; field welding will be permitted.
- .3 Conceal piping in areas with suspended ceiling.

2.3 PIPE, FITTINGS  
AND VALVES

- .1 Pipe:
  - .1 Ferrous: to NFPA 13.
  - .2 Copper tube: to NFPA 13.
- .2 Fittings and joints to NFPA 13:
  - .1 Ferrous: screwed, welded, flanged or roll grooved.
    - .1 Grooved joints designed with two ductile iron housing segments, pressure responsive gasket, and zinc-electroplated steel bolts and nuts. Cast with offsetting angle-pattern bolt pads for rigidity and visual pad-to-pad offset contact.
  - .2 Copper tube: screwed, soldered, brazed, grooved.
  - .3 Provide welded, threaded, grooved-end type fittings into which sprinkler heads, sprinkler head riser nipples, or drop nipples are threaded.
  - .4 Plain-end fittings with mechanical couplings and fittings which use steel gripping devices to bite into pipe when pressure is applied will not be permitted.
  - .5 Rubber gasketed grooved-end pipe and fittings with mechanical couplings are permitted in pipe sizes 32 mm and larger.
  - .6 Fittings: ULC approved for use in wet pipe sprinkler systems.
  - .7 Ensure fittings, mechanical couplings, and rubber gaskets are supplied by same manufacturer.
  - .8 Side outlet tees using rubber gasketed fittings are permitted.
  - .9 Sprinkler pipe and fittings: metal.
- .3 Pipe hangers:
  - .1 ULC listed for fire protection services in accordance with NFPA.

2.4 SPRINKLER HEADS

- .1 General: to NFPA 13 and ULC listed for fire services.
- .2 Sprinkler Head Type:
  - .1 Type B: pendant chrome link and lever type.
  - .2 Type C: pendant chrome glass bulb type.
  - .3 Type D: recessed polished chrome glass

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- bulb type with ring and cup.
- .4 Type E: flush polished chrome link and lever type.
- .5 Type F: side wall chrome link and lever type.

- .3 Provide nominal [1.2] cm orifice sprinkler heads.
  - .1 Release element of each head to be of intermediate temperature rating or higher as suitable for specific application.
  - .2 Provide polished chromium-plated finish on copper alloy ceiling plates, and chromium-plated pendent sprinklers below suspended ceilings.
  - .3 Provide corrosion-resistant sprinkler heads and sprinkler head guards in accordance with NFPA 13.
  - .4 Provide sprinkler heads as required.
  - .5 Deflector: not more than 75 mm below suspended ceilings.
  - .6 Ceiling plates: not more than 25 mm deep.
  - .7 Ceiling cups: not permitted.

## 2.5 PIPE SLEEVES

- .1 Provide pipe sleeves where piping passes through walls, floors, and roofs.
- .2 Secure sleeves in position and location during construction.
- .3 Provide sleeves of sufficient length to pass through entire thickness of walls, floors, and roofs.
- .4 Provide 2.5 cm minimum clearance between exterior of piping and interior of sleeve or core-drilled hole.
  - .1 Firmly pack space with mineral wool insulation.
  - .2 Seal space at both ends of sleeve or core-drilled hole with plastic waterproof cement which will dry to firm but pliable mass, provide mechanically adjustable segmented elastomeric seal.
  - .3 In fire walls and fire floors, seal both ends of pipe sleeves or core-drilled holes with ULC listed fill, void, or cavity material.
- .5 Sleeves in Masonry and Concrete Walls, Floors, and Roofs:
  - .1 Provide hot-dip galvanized steel.

.2 Core drilling of masonry and concrete may be provided in lieu of pipe sleeves when cavities in core-drilled hole are completely grouted smooth.

.6 Sleeves in Other Than Masonry and Concrete Walls, Floors, and Roofs:

.1 Provide 0.61 mm thick galvanized steel sheet.

2.6 ESCUTCHEON  
PLATES

.1 Provide one piece type metal plates for piping passing through walls, floors, and ceilings in exposed spaces.

.2 Provide polished chromium-plated finish on copper alloy plates in finished spaces.

.3 Provide paint finish on metal plates in unfinished spaces.

PART 3 - EXECUTION

3.1 MANUFACTURER'S  
INSTRUCTIONS

.1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheet.

3.2 INSTALLATION

.1 Install, inspect and test to acceptance in accordance with NFPA 13 and NFPA 25.

3.3 PIPE  
INSTALLATION

.1 Install piping straight and true to bear evenly on hangers and supports. Do not hang piping from plaster ceilings.

.2 Keep interior and ends of new piping and existing piping thoroughly cleaned of water and foreign matter.

.3 Keep piping systems clean during installation by means of plugs or other approved methods. When work is not in progress, securely close open ends of piping to prevent entry of water and foreign matter.

.4 Inspect piping before placing into position.

3.4 ELECTRICAL  
CONNECTIONS

.1 Provide electrical work associated with this section under Section 26 05 01 - Common Work Results for Electrical

.2 Provide wiring in rigid metal conduit or intermediate metal conduit.

3.5 DISINFECTION

.1 Disinfect new piping.

.2 Fill piping systems with solution containing minimum of 50 parts per million of chlorine and allow solution to stand for minimum of 24 hours.

.3 Flush solution from systems with clean water until maximum residual chlorine content is not greater than 0.2 part per million or residual chlorine content of domestic water supply.

3.6 CONNECTIONS TO  
EXISTING WATER  
SUPPLY SYSTEMS

.1 Notify Contracting Officer in writing at least 15 days prior to connection date.

.2 Use tapping or drilling machine valve and mechanical joint type sleeves for connections to be made under pressure.

.3 Bolt sleeves around main piping.

.4 Furnish materials required to make connections into existing water supply systems, and perform excavating, backfilling, and other incidental labour as required.

3.7 FIELD QUALITY  
CONTROL

.1 Site Test, Inspection:

.1 Perform test to determine compliance with specified requirements in presence of Departmental Representative.

.2 Test, inspect, and approve piping before covering or concealing.

.3 Preliminary Tests:

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- .1 Hydrostatically test each system at [200] psig for a [2] hour period with no leakage or reduction in pressure.
  - .2 Flush piping with potable water in accordance with NFPA 13.
  - .3 Piping above suspended ceilings: tested, inspected, and approved before installation of ceilings.
  - .4 Formal Tests and Inspections:
    - .1 Do not submit request for formal test and inspection until preliminary test and corrections are completed and approved.
    - .2 Submit written request for formal inspection at least 15 days prior to inspection date.
    - .3 Repeat required tests as directed.
    - .4 Correct defects and make additional tests until systems comply with contract requirements.
    - .5 Furnish appliances, equipment, instruments, connecting devices, and personnel for tests.
    - .6 Authority of Jurisdiction, will witness formal tests and approve systems before they are accepted.
  - .3 Site Tests:
    - .1 Testing to be witnessed by authority having jurisdiction.
- 3.8 CLEANING
- .1 Clean in accordance with Section 01 74 11 - Cleaning.
    - .1 Remove surplus materials, excess materials, rubbish, tools and equipment.

PART 1 - GENERAL

1.1 REFERENCES

- .1 American National Standards Institute (ANSI)/American Society of Mechanical DCC Representatives International (ASME).
  - .1 ANSI/ASME B16.15, Cast Bronze Threaded Fittings, Classes 125 and 250.
  - .2 ANSI/ASME B16.18, Cast Copper Alloy Solder Joint Pressure Fittings.
  - .3 ANSI/ASME B16.22, Wrought Copper and Copper Alloy Solder Joint Pressure Fittings.
  - .4 ANSI/ASME B16.24, Cast Copper Alloy Pipe Flanges and Flanged Fittings, Class 150, 300, 400, 600, 900, 1500 and 2500.

PART 2 - PRODUCTS

2.1 PIPING

- .1 Domestic hot, cold and recirculation systems, within building.
  - .1 Above ground: copper tube, hard drawn, type L: to ASTM B 88M.
  - .2 Buried or embedded: copper tube, soft annealed, type K or L: to ASTM B 88M, in long lengths and with no buried joints.

2.2 FITTINGS

- .1 Bronze pipe flanges and flanged fittings, Class 150: to ANSI/ASME B16.24.
- .2 Cast bronze threaded fittings, Class 125 : to ANSI/ASME B16.15.
- .3 Cast copper, solder type: to ANSI/ASME B16.18.
- .4 Wrought copper and copper alloy, solder type: to ANSI/ASME B16.22.
- .5 NPS 2 and larger: roll grooved to CSA B242.

2.3 JOINTS

- .1 Rubber gaskets, 1.6 mm thick: to AWWA C111.
- .2 Bolts, nuts, hex head and washers: to ASTM A 307,

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heavy series.

- .3 Solder: 95/5 tin copper alloy.
- .4 Teflon tape: for threaded joints.
- .5 Grooved couplings: designed with angle bolt pads to provide rigid joint, complete with EPDM flush seal gasket.
- .6 Dielectric connections between dissimilar metals: dielectric fitting to ASTM F 492, complete with thermoplastic liner.

#### 2.4 BALL VALVES

- .1 NPS 2 and under, screwed:
  - .1 Class 150.
  - .2 Bronze body stainless steel ball, PTFE adjustable packing, brass gland and BunaN seat, steel lever handle.
- .2 NPS 2 and under, soldered:
  - .1 To ANSI/ASME B16.18, Class 150.
  - .2 Bronze body, stainless steel ball, PTFE adjustable packing, brass gland and BunaN seat, steel lever handle, with NPT to copper adaptors.

### PART 3 - EXECUTION

#### 3.1 INSTALLATION

- .1 Install in accordance with Plumbing Code and local authority having jurisdiction.
- .2 Assemble piping using fittings manufactured to ANSI standards.
- .3 Connect to fixtures and equipment in accordance with manufacturer's written instructions unless otherwise indicated.

#### 3.2 VALVES

- .1 Isolate equipment, fixtures and branches with ball valves.

- 3.3 PRESSURE TESTS .1 Test pressure: greater of 1 times maximum system operating pressure or 860 kPa.
- 3.4 PRE START-UP INSPECTIONS .1 Systems to be complete, prior to flushing, testing and start-up.
- .2 Verify that system can be completely drained.
- .3 Ensure that air chambers, expansion compensators are installed properly.
- 3.5 DISINFECTION .1 Flush out, disinfect and rinse system to requirements of authority having jurisdiction.

PART 1 - GENERAL

- 1.1 SUMMARY .1 Section Includes:  
.1 The installation of drainage waste and vent piping.

PART 2 - PRODUCTS

- 2.1 COPPER TUBE AND FITTINGS .1 Above ground sanitary storm and vent Type DWV to: ASTM B306.  
.1 Fittings.  
.1 Cast brass: to CAN/CSA-B125.  
.2 Wrought copper: to CAN/CSA-B125.  
.2 Solder: tin-lead, 50:50, type 50A.

- 2.2 CAST IRON PIPING AND FITTINGS .1 Above ground sanitary storm and vent: to CAN/CSA-B70.  
.1 Joints.  
.1 Mechanical joints.  
.1 Neoprene or butyl rubber compression gaskets with stainless steel clamps.

PART 3 - EXECUTION

- 3.1 INSTALLATION .1 Install in accordance with Canadian Plumbing Code.
- 3.2 TESTING .1 Hydraulically test to 3 m head.

PART 1 - GENERAL

1.1 REFERENCES

- .1 CSA International
  - .1 CSA-B64 Series, Backflow Preventers and Vacuum Breakers.
  - .2 CSA B79, Commercial and Residential Drains and Cleanouts.
  - .3 CAN/CSA-B356, Water Pressure Reducing Valves for Domestic Water Supply Systems.

1.2 ACTION AND  
INFORMAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
  - .1 Submit manufacturer's instructions, printed product literature and data sheets for plumbing products and include product characteristics, performance criteria, physical size, finish and limitations.
  - .2 Submit 2 copies of WHMIS MSDS in accordance with Section 01 35 29.06 - Health and Safety Requirements 01 35 43 - Environmental Procedures. Indicate VOC's:
- .3 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
- .4 Instructions: submit manufacturer's installation instructions.

1.3 CLOSEOUT SUBMITTALS

- .1 Submit in accordance with Section 01 78 00 - Closeout Submittals.
- .2 Operation and Maintenance Data: submit operation and maintenance data for plumbing specialties and accessories for incorporation into manual.
  - .1 Description of plumbing specialties and accessories, giving manufacturers name, type, model, year and capacity.
  - .2 Details of operation, servicing and maintenance.
  - .3 Recommended spare parts list.

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- 1.4 DELIVERY, STORAGE  
AND HANDLING
- .1 Deliver, storage and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.
  - .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
  - .3 Storage and Handling Requirements:
    - .1 Store materials off ground indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
    - .2 Store and protect plumbing materials from nicks, scratches, and blemishes.
    - .3 Replace defective or damaged materials with new.

PART 2 - PRODUCTS

- 2.1 WATER HAMMER  
ARRESTORS
- .1 Stainless steel copper construction, bellows piston type: to PDI-WH201.
- 2.2 BACK FLOW  
PREVENTERS
- .1 Preventers: to CSA-B64 Series, application as indicated, reduced pressure principle type double check valve assembly back flow preventer with intermediate atmospheric vent or vacuum breaker.
- 2.3 VACUUM BREAKERS
- .1 Breakers: to CSA-B64 Series, vacuum breaker atmospheric hose connection laboratory faucet intermediate.

PART 3 - EXECUTION

- 3.1 EXAMINATION  
INSTRUCTIONS
- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for plumbing specialties and accessories installation in accordance with manufacturer's

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- written instructions.
- .1 Visually inspect substrate in presence of Departmental Representative.
  - .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
  - .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.
- 3.2 MANUFACTURER'S INSTRUCTIONS
- .1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions and data sheet.
- 3.3 INSTALLATION
- .1 Install in accordance with National Plumbing Code of Canada, Provincial Codes and local authority having jurisdiction.
  - .2 Install in accordance with manufacturer's instructions and as specified.
- 3.4 WATER HAMMER ARRESTORS
- .1 Install on branch supplies to fixtures or group of fixtures where indicated.
- 3.5 START-UP
- .1 Timing: start-up only after:
    - .1 Pressure tests have been completed.
    - .2 Disinfection procedures have been completed.
    - .3 Certificate of static completion has been issued.
    - .4 Water treatment systems operational.
  - .2 Provide continuous supervision during start-up.
- 3.6 TESTING AND ADJUSTING
- .1 General:
    - .1 Test and adjust plumbing specialties and accessories in accordance with Manufacturer's Instructions.

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- .2 Timing:
  - .1 After start-up deficiencies rectified.
  - .2 After certificate of completion has been issued by authority having jurisdiction.

3.7 CLEANING

- .1 Progress Cleaning:
  - .1 Leave Work area clean at end of each day.
  - .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment.

3.8 PROTECTION

- .1 Protect installed products and components from damage during construction.
- .2 Repair damage to adjacent materials caused by plumbing specialties and accessories installation.

PART 1 - GENERAL

- 1.1 REFERENCES .1 Canadian Standards Association (CSA International)  
.1 CAN/CSA-B45 Series-[2(R2008), Plumbing Fixtures.  
.2 CAN/CSA-B125.3-05, Plumbing Fittings.  
.3 CAN/CSA-B651-04, Accessible Design for the Built Environment.
- 1.2 ACTION AND INFORMATIONAL SUBMITTALS .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.  
.2 Product Data:  
.1 Provide manufacturer's printed product literature and datasheets for washroom fixtures, and include product characteristics, performance criteria, physical size, finish and limitations.  
.3 Indicate fixtures and trim:  
.1 Dimensions, construction details, roughing-in dimensions.  
.2 Factory-set water consumption per flush at recommended pressure.  
.3 (For water closets, urinals): minimum pressure required for flushing.
- 1.3 CLOSEOUT SUBMITTALS .1 Provide operation and maintenance data for washroom fixtures, for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.  
.2 Include:  
.1 Description of fixtures and trim, giving manufacturer's name, type, model, year, capacity.  
.2 Details of operation, servicing, maintenance.  
.3 List of recommended spare parts.
- 1.4 DELIVERY, STORAGE AND HANDLING .1 Deliver, store and handle in accordance with Section 01 61 00 - Common Product Requirements.

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- .2 Deliver materials to site in original factory packaging, labelled with manufacturer's name, address.

PART 2 - PRODUCTS

2.1 MANUFACTURED  
UNITS

- .1 Fixtures: manufacture in accordance with CAN/CSA-B45 series.
- .2 Trim, fittings: manufacture in accordance with CAN/CSA-B125.3.
- .3 Exposed plumbing brass to be chrome plated.
- .4 Number, locations: as indicated.
- .5 Water closets:
  - .1 Floor-mounted, flush valve, for handicapped.
    - .1 Top of seat to be between 400 mm and 460 mm for finished floor.
    - .2 Bowl: vitreous china, floor mounted, syphon jet, elongated rim, close-coupled, bolt caps.
    - .3 Closet tank: vitreous china with tank liner, flapper type flush valve assembly for ultra flow flush cycle: adjustable from 3.8 - 17 litres/flush, factory set to 5.7 litres/flush.
- .6 Water Closet Flush Valves:
  - .1 No used.
- .7 Water Closet Seats.
  - .1 Seat: white, elongated, open front, moulded solid plastic, less cover, stainless steel check hinges, stainless steel insert post.
- .8 Washroom Lavatories:
  - .1 L-1: counter-top:
    - .1 Porcelain-on-steel, self-rimming, with front overflow, soap depressions, gasket, swivel clamps, semi-oval or rectangular bowl, supply openings on 200 mm centres. Sizes: 475 x 400 mm outside, 400 x 250 mm nominal inside.

- .9 Washroom Lavatory Trim:
  - .1 Wheelchair supply fitting with gooseneck spout, aerator, 150 mm blade handles with indexed buttons, bent tailpiece.
    - .1 Provide accessories to limit maximum flow rate to 8.35 l/minute at 413 kPa.
    - .2 Waste fittings.
- .10 Fixture piping:
  - .1 Hot and cold water supplies to fixtures:
    - .1 Chrome plated flexible supply pipes with quarter-turn stop, reducers, escutcheon.
  - .2 Waste:
    - .1 Brass P trap with clean out on fixtures not having integral trap.
    - .2 Chrome plated in exposed places.
- .11 Chair carriers:
  - .1 Factory manufactured floor-mounted carrier systems for wall-mounted fixtures.

### PART 3 - EXECUTION

- 3.1 APPLICATION
  - .1 Manufacturer's Instructions: comply with manufacturer's written recommendations, including product technical bulletins, handling, storage and installation instructions, and datasheets.
- 3.2 INSTALLATION
  - .1 Mounting heights:
    - .1 Standard: to manufacturer's recommendations, measured from finished floor.
    - .2 Wall-hung fixtures: as indicated, measured from finished floor.
    - .3 Barrier free: to most stringent of NBCC, CAN/CSA B651 and NL Buildings Accessibility Act and Regulations.
- 3.3 ADJUSTING
  - .1 Conform to water conservation requirements specified this section.

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- .2 Adjustments:
  - .1 Adjust water flow rate to design flow rates.
  - .2 Adjust pressure to fixtures to ensure no splashing at maximum pressures.
  - .3 Adjust flush valves to suit actual site conditions.
  - .4 Adjust urinal flush timing mechanisms.
  - .5 Set controls of automatic flush valves for WCs and urinals to prevent unnecessary flush cycles.
- .3 Checks:
  - .1 Water closets, urinals: flushing action.
  - .2 Aerators: operation, cleanliness.
  - .3 Vacuum breakers, backflow preventers: operation under all conditions.
- .4 Thermostatic controls:
  - .1 Verify temperature settings, operation of control, limit and safety controls.

3.4 CLEANING

- .1 Clean in accordance with Section 01 74 11 - Cleaning.
  - .1 Remove surplus materials, excess materials, rubbish, tools and equipment.

PART 1 - GENERAL

- 1.1 REFERENCES .1 Canadian Standards Association (CSA International)  
.1 CAN/CSA-B45 Series-02(R2008), Plumbing Fixtures.  
.2 CAN/CSA-B125.3-05, Plumbing Fittings.  
.3 CAN/CSA-B651-04, Accessible Design for the Built Environment.
- 1.2 ACTION AND INFORMATIONAL SUBMITTALS .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.  
.2 Product Data:  
.1 Provide manufacturer's printed product literature and datasheets for fixtures, and include product characteristics, performance criteria, physical size, finish and limitations.
- 1.3 CLOSEOUT SUBMITTALS .1 Provide maintenance data in accordance with Section 01 78 00 - Closeout Submittals.  
.2 Include:  
.1 Description of fixtures and trim, giving manufacturer's name, type, model, year, capacity.  
.2 Details of operation, servicing, maintenance.  
.3 List of recommended spare parts.
- 1.4 DELIVERY, STORAGE AND HANDLING .1 Deliver, store and handle in accordance with Section 01 61 00 - Common Product Requirements.  
.2 Deliver materials to site in original factory packaging, labelled with manufacturer's name, address.

PART 2 - PRODUCTS

- 2.1 MANUFACTURED UNITS .1 Fixtures: manufacture in accordance with CAN/CSA-B45 series.

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- .2 Trim, fittings: manufacture in accordance with CAN/CSA-B125.
- .3 Exposed plumbing brass to be chrome plated.
- .4 Number, locations: architectural drawings to govern.
- .5 Fixtures to be product of one manufacturer.
- .6 Trim to be product of one manufacturer.
- .7 Stainless steel counter-top sinks.
  - .1 SC-1: single compartment, non-ledge back.
    - .1 From 1.0 mm thick type 302 stainless steel, self-rimming, undercoated, clamps. Inside sizes: 508 x 508 x 203 mm.
    - .2 Trim: chrome plated brass, with swing spout, aerator, single lever handle, washerless controls, accessories to limit maximum flow rate to 8.35 litres/minute at 413 kPa, with spray fitting.
  - .8 Fixture piping:
    - .1 Hot and cold water supplies to each fixture:
      - .1 Chrome plated flexible supply pipes each with quarter-turn stop, reducers, escutcheon.
    - .2 Waste:
      - .1 Brass P trap with clean out on each fixture not having integral trap.
      - .2 Chrome plated in all exposed places.

### PART 3 - EXECUTION

#### 3.1 APPLICATION

- .1 Manufacturer's Instructions: comply with manufacturer's written recommendations, including product technical bulletins, handling, storage and installation instructions, and datasheets.

#### 3.2 INSTALLATION

- .1 Mounting heights:
  - .1 Standard: to comply with manufacturer's recommendations unless otherwise indicated or specified.

3.3 ADJUSTING

- .1 Conform to water conservation requirements specified this section.
- .2 Adjustments:
  - .1 Adjust water flow rate to design flow rates.
  - .2 Adjust pressure to fixtures to ensure no splashing at maximum pressures.
- .3 Checks:
  - .1 Aerators: operation, cleanliness.
- .4 Thermostatic controls:
  - .1 Verify temperature settings, operation of control, limit and safety controls.

3.4 CLEANING

- .1 Clean in accordance with Section 01 74 11 - Cleaning.
  - .1 Remove surplus materials, excess materials, rubbish, tools and equipment.

PART 1 - GENERAL

1.1 SUMMARY

- .1 Section Includes:
  - .1 Use of mechanical systems during construction.

1.2 USE OF SYSTEMS

- .1 Use of new and existing permanent heating and ventilating systems for supplying temporary heat or ventilation is permitted only under following conditions:
  - .1 There is no possibility of damage.
  - .2 Supply ventilation systems are protected by 60% filters, inspected daily, changed every week or more frequently as required.
  - .3 Return systems have approved filters over openings, inlets, outlets.
  - .4 Systems will be:
    - .1 Operated as per manufacturer's recommendations and instructions.
    - .2 Monitored continuously by Contractor.
  - .5 Warranties and guarantees are not relaxed.
  - .6 Regular preventive and other manufacturers recommended maintenance routines are performed by Contractor at own expense and under supervision of Departmental Representative.
  - .7 Refurbish entire system before static completion; clean internally and externally, restore to "as- new" condition, replace filters in air systems.
- .2 Filters specified in this Section are over and above those specified in other Sections of this project.
- .3 Exhaust systems are not included in approvals for temporary heating ventilation.

PART 2 - PRODUCTS

2.1 NOT USED

- .1 Not Used.

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Parole Office Fit-Up CSC		
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PART 3 - EXECUTION

3.1 NOT USED .1 Not Used.

PART 1 - GENERAL

1.1 SUMMARY

- .1 Section Includes:
  - .1 Hangers and supports for mechanical piping, ducting and equipment.

1.2 REFERENCES

- .1 American National Standards Institute/American Society of Mechanical Engineers (ANSI/ASME)
  - .1 ANSI/ASME B31.1, Power Piping.
- .2 American Society for Testing and Materials International (ASTM)
  - .1 ASTM A 125, Specification for Steel Springs, Helical, Heat-Treated.
  - .2 ASTM A 307, Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
  - .3 ASTM A 563, Specification for Carbon and Alloy Steel Nuts.
- .3 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
  - .1 Material Safety Data Sheets (MSDS).
- .4 Manufacturer's Standardization Society of the Valves and Fittings Industry (MSS)
  - .1 MSS SP58, Pipe Hangers and Supports - Materials, Design and Manufacture.
  - .2 ANSI/MSS SP69, Pipe Hangers and Supports - Selection and Application.
  - .3 MSS SP89, Pipe Hangers and Supports - Fabrication and Installation Practices.

- .5 Underwriter's Laboratories of Canada (ULC)

1.3 SYSTEM DESCRIPTION

- .1 Design Requirements:
  - .1 Construct pipe hanger and support to manufacturer's recommendations utilizing manufacturer's regular production components, parts and assemblies.
  - .2 Base maximum load ratings on allowable stresses prescribed by MSS SP58 or ASME B31.1.
  - .3 Ensure that supports, guides, anchors do not transmit excessive quantities of heat to building structure.
  - .4 Design hangers and supports to support systems under conditions of operation, allow free expansion and contraction, prevent excessive

stresses from being introduced into pipework or connected equipment.

.5 Provide for vertical adjustments after erection and during commissioning. Amount of adjustment in accordance with MSS SP58.

## PART 2 - PRODUCTS

### 2.1 GENERAL

- .1 Fabricate hangers, supports and sway braces in accordance with ANSI B31.1 and MSS SP58.
- .2 Use components for intended design purpose only. Do not use for rigging or erection purposes.

### 2.2 PIPE HANGERS

- .1 Finishes:
  - .1 Pipe hangers and supports: painted with zinc-rich paint after manufacture.
  - .2 Use electro-plating galvanizing process hot dipped galvanizing process.
  - .3 Ensure steel hangers in contact with copper piping are epoxy coated.
- .2 Upper attachment structural: suspension from lower flange of I-Beam:
  - .1 Cold piping NPS 2 maximum: malleable iron C-clamp with hardened steel cup point setscrew, locknut and carbon steel retaining clip.
    - .1 Rod: 9 mm UL listed.
  - .2 Cold piping NPS 2 1/2 or greater, hot piping: malleable iron beam clamp, eye rod, jaws and extension with carbon steel retaining clip, tie rod, nuts and washers.
- .3 Upper attachment structural: suspension from upper flange of I-Beam:
  - .1 Cold piping NPS 2 maximum: ductile iron top-of-beam C-clamp with hardened steel cup point setscrew, locknut and carbon steel retaining clip.
  - .2 Cold piping NPS 2 1/2 or greater, hot piping: malleable iron top-of-beam jaw-clamp with hooked rod, spring washer, plain washer and nut.
- .4 Upper attachment to concrete:
  - .1 Ceiling: carbon steel welded eye rod, clevis plate, clevis pin and cotters with weldless forged steel eye nut. Ensure eye 6 mm minimum greater than rod diameter.
  - .2 Concrete inserts: wedge shaped body with

knockout protector plate UL listed FM approved to MSS SP69.

- .5 Hanger rods: threaded rod material to MSS SP58:
  - .1 Ensure that hanger rods are subject to tensile loading only.
  - .2 Provide linkages where lateral or axial movement of pipework is anticipated.
- .6 Pipe attachments: material to MSS SP58:
  - .1 Attachments for steel piping: carbon steel black.
  - .2 Attachments for copper piping: copper plated black steel.
  - .3 Use insulation shields for hot pipework.
  - .4 Oversize pipe hangers and supports.
- .7 U-bolts: carbon steel to MSS SP69 with 2 nuts at each end to ASTM A 563.
  - .1 Finishes for steel pipework: black.
  - .2 Finishes for copper, glass, brass or aluminum pipework: black, with formed portion plastic coated epoxy coated.

### 2.3 RISER CLAMPS

- .1 Copper pipe: carbon steel copper plated to MSS SP58, type 42.
- .2 Bolts: to ASTM A 307.
- .3 Nuts: to ASTM A 563.

### 2.4 INSULATION PROTECTION SHIELDS

- .1 Insulated cold piping:
  - .1 64 kg/m<sup>3</sup> density insulation plus insulation protection shield to: MSS SP69, galvanized sheet carbon steel. Length designed for maximum 3 m span.
- .2 Insulated hot piping:
  - .1 Curved plate 300 mm long, with edges turned up, welded-in centre plate for pipe sizes NPS 12 and over, carbon steel to comply with MSS SP69.

### 2.5 EQUIPMENT SUPPORTS

- .1 Fabricate equipment supports not provided by equipment manufacturer from structural grade steel.

2.6 EQUIPMENT ANCHOR BOLTS AND TEMPLATES .1 Provide templates to ensure accurate location of anchor bolts.

2.7 OTHER EQUIPMENT SUPPORTS .1 Fabricate equipment supports from structural grade steel.

PART 3 - EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS .1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheet.

3.2 INSTALLATION .1 Install in accordance with:  
.1 manufacturer's instructions and recommendations.  
.2 Clamps on riser piping:  
.1 Support independent of connected horizontal pipework using riser clamps and riser clamp lugs welded to riser.  
.2 Bolt-tightening torques to industry standards.

3.3 HANGER SPACING .1 Plumbing piping: to Canadian Plumbing Code.  
.2 Copper piping: up to NPS 1/2: every 1.5 m.  
.3 Within 300 mm of each elbow.

<u>Maximum Pipe Size : NPS</u>	<u>Maximum Spacing Steel</u>	<u>Maximum Spacing Copper</u>
up to 1-1/4	2.1 m	1.8 m
1-1/2	2.7 m	2.4 m
2	3.0 m	2.7 m
2-1/2	3.6 m	3.0 m
3	3.6 m	3.0 m
3-1/2	3.9 m	3.3 m
4	4.2 m	3.6 m

3.4 HANGER INSTALLATION .1 Install hanger so that rod is vertical under operating conditions.

- .2 Adjust hangers to equalize load.
- .3 Support from structural members. Where structural bearing does not exist or inserts are not in suitable locations, provide supplementary structural steel members.

3.5 HORIZONTAL  
MOVEMENT

- .1 Angularity of rod hanger resulting from horizontal movement of pipework from cold to hot position not to exceed 4 degrees from vertical.
- .2 Where horizontal pipe movement is less than 13 mm, offset pipe hanger and support so that rod hanger is vertical in the hot position.

3.6 FINAL  
ADJUSTMENT

- .1 Adjust hangers and supports:
  - .1 Ensure that rod is vertical under operating conditions.
  - .2 Equalize loads.
- .2 Adjustable clevis:
  - .1 Tighten hanger load nut securely to ensure proper hanger performance.
  - .2 Tighten upper nut after adjustment.
- .3 C-clamps:
  - .1 Follow manufacturer's recommended written instructions and torque values when tightening C-clamps to bottom flange of beam.
- .4 Beam clamps:
  - .1 Hammer jaw firmly against underside of beam.

PART 1 - GENERAL

- 1.1 SUMMARY .1 Section Includes:  
.1 Materials and requirements for the identification of piping systems, duct work, valves and controllers, including the installation and location of identification systems.
- 1.2 QUALITY ASSURANCE .1 Quality assurance submittals: submit following in accordance with Section 01 33 00 - Submittal Procedures.  
.2 Health and Safety:  
.1 Do construction occupational health and safety in accordance with and Section 01 35 29 - Health and Safety Requirements.
- 1.3 DELIVERY, STORAGE, AND HANDLING .1 Packing, shipping, handling and unloading:  
.1 Deliver, store and handle in accordance with Section 01 61 00 - Common Product Requirements.  
.2 Deliver, store and handle materials in accordance with manufacturer's written instructions.

PART 2 - PRODUCTS

- 2.1 MANUFACTURER'S EQUIPMENT NAMEPLATES .1 Metal or plastic laminate nameplate mechanically fastened to each piece of equipment by manufacturer.  
.2 Lettering and numbers raised or recessed.  
.3 Information to include, as appropriate:  
.1 Equipment: manufacturer's name, model, size, serial number, capacity.  
.2 Motor: voltage, Hz, phase, power factor, duty, frame size.
- 2.2 SYSTEM NAMEPLATES .1 Colours:  
.1 Hazardous: red letters, white background.  
.2 Elsewhere: black letters, white background (except where required otherwise by applicable codes).  
.2 Construction:

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.1 3 mm thick laminated plastic, matte finish, with square corners, letters accurately aligned and machine engraved into core.

.3 Sizes:

.1 5 mm high letters.

.2 Size as appropriate.

2.3 EXISTING IDENTIFICATION SYSTEMS

.1 Existing identification system numbers, colors and coding to be used for new work.

.2 Apply identification to all new work.

2.4 IDENTIFICATION DUCTWORK SYSTEMS

.1 50 mm high stencilled letters and directional arrows 150 mm long x 50 mm high. Include system name, eg. A/C No. 1.

.2 Colours: black, or co-ordinated with base colour to ensure strong contrast.

2.5 LANGUAGE

.1 Identification in English.

PART 3 - EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

.1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheet.

3.2 INSTALLATION

.1 Perform work in accordance with CAN/CGSB-24.3 Identification of Piping Systems except as specified otherwise.

.2 Provide ULC and or CSA registration plates as required by respective agency.

3.3 NAMEPLATES

.1 Locations:

.1 In conspicuous location to facilitate easy reading and identification from operating floor.

.2 Standoffs:

.1 Provide for nameplates on hot and/or insulated surfaces.

.3 Protection:

.1 Do not paint, insulate or cover.

3.4 LOCATION OF IDENTIFICATION ON PIPING AND DUCTWORK SYSTEMS

- .1 Adjacent to each change in direction.
- .2 At least once in each small room through which piping or ductwork passes.
- .3 On both sides of visual obstruction or where run is difficult to follow.
- .4 On both sides of separations such as walls, floors, partitions.
- .5 Where system is installed in pipe chases, ceiling spaces, confined spaces, at entry and exit points, and at access openings.
- .6 At beginning and end points of each run and at each piece of equipment in run.
- .7 At point immediately upstream of major manually operated or automatically controlled valves, and dampers. Where this is not possible, place identification as close as possible, preferably on upstream side.
- .8 Identification easily and accurately readable from usual operating areas and from access points.
  - .1 Position of identification approximately at right angles to most convenient line of sight, considering operating positions, lighting conditions, risk of physical damage or injury and reduced visibility over time due to dust and dirt.

3.5 CLEANING

- .1 Proceed in accordance with Section 01 74 11 - Cleaning.
- .2 Upon completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

PART 1 - GENERAL

1.1 SUMMARY

- .1 TAB is used throughout this Section to describe the process, methods and requirements of testing, adjusting and balancing for HVAC.
- .2 TAB means to test, adjust and balance to perform in accordance with requirements of Contract Documents and to do other work as specified in this section.

1.2 QUALIFICATIONS  
OF TAB PERSONNEL

- .1 Submit names of personnel to perform TAB to Departmental Representative within 90 days of award of contract.
- .2 Provide documentation confirming qualifications, successful experience.
- .3 TAB: performed in accordance with the requirements of standard under which TAB Firm's qualifications are approved:
  - .1 Associated Air Balance Council, (AABC) National Standards for Total System Balance, MN-1.
  - .2 National Environmental Balancing Bureau (NEBB) TABES, Procedural Standards for Testing, Adjusting, Balancing of Environmental Systems.
  - .3 Sheet Metal and Air Conditioning Contractors' National Association (SMACNA), HVAC TAB HVAC Systems - Testing, Adjusting and Balancing.
  - .4 National Balancing Council (NBC).
- .4 Recommendations and suggested practices contained in the TAB Standard: mandatory.
- .5 Use TAB Standard provisions, including checklists, and report forms to satisfy Contract requirements.
- .6 Use TAB Standard for TAB, including qualifications for TAB Firm and Specialist and calibration of TAB instruments.
- .7 Where instrument manufacturer calibration recommendations are more stringent than those listed in TAB Standard, use manufacturer's recommendations.

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- .8 TAB Standard quality assurance provisions such as performance guarantees form part of this contract.
  - .1 For systems or system components not covered in TAB Standard, use TAB procedures developed by TAB Specialist.
  - .2 Where new procedures, and requirements, are applicable to Contract requirements have been published or adopted by body responsible for TAB Standard used (AABC, NEBB, TABB or NBC), requirements and recommendations contained in these procedures and requirements are mandatory.

1.3 PURPOSE OF TAB

- .1 Test to verify proper and safe operation, determine actual point of performance, evaluate qualitative and quantitative performance of equipment, systems and controls at design, average and low loads using actual or simulated loads
- .2 Adjust and regulate equipment and systems to meet specified performance requirements and to achieve specified interaction with other related systems under normal and emergency loads and operating conditions.
- .3 Balance systems and equipment to regulate flow rates to match load requirements over full operating ranges.

1.4 EXCEPTIONS

- .1 TAB of systems and equipment regulated by codes, standards to satisfaction of authority having jurisdiction.

1.5 CO-ORDINATION

- .1 Schedule time required for TAB (including repairs, re-testing) into project construction and completion schedule to ensure completion before acceptance of project.

1.6 START-UP

- .1 Follow start-up procedures as recommended by equipment manufacturer unless specified otherwise.
- .2 Follow special start-up procedures specified elsewhere in Division 23.

1.7 START OF TAB

- .1 Notify Departmental Representative seven (7) days prior to start of TAB.

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- .2 Start TAB when building is essentially completed, including:
    - .1 Installation of ceilings, doors, windows, other construction affecting TAB.
    - .2 Application of weatherstripping, sealing, and caulking.
    - .3 Pressure, leakage, other tests as required.
    - .4 Provide for TAB installed and operational.
  - .3 Start-up, verification for proper, normal and safe operation of mechanical and associated electrical and control systems affecting TAB including but not limited to:
    - .1 Proper thermal overload protection in place for electrical equipment.
    - .2 Air systems:
      - .1 Duct systems clean.
      - .2 Ducts, air shafts, ceiling plenums are airtight to within specified tolerances.
      - .3 Correct fan rotation.
      - .4 Volume control dampers installed and open.
      - .5 Access doors, installed, closed.
      - .6 Outlets installed, volume control dampers open.
- 1.8 APPLICATION TOLERANCES
- .1 Do TAB to following tolerances of design values:
    - .1 HVAC systems: plus 10%, minus 0%.
- 1.9 ACCURACY TOLERANCES
- .1 Measured values accurate to within plus or minus 2% of actual values.
- 1.10 INSTRUMENTS
- .1 Calibrate in accordance with requirements of AABC, NEBB or NBC.
  - .2 Calibrate within 3 months of TAB. Provide certificate of calibration to Departmental Representative, if requested.
- 1.11 TAB REPORT
- .1 TAB report to show results in SI units and to include:
    - .1 Project record drawings.
    - .2 System schematics.
  - .2 Submit 2 copies of TAB Report to Departmental Representative for verification and approval, in

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English in D-ring binders, complete with index tabs.

1.12 VERIFICATION

- .1 Reported results subject to verification by Departmental Representative.
- .2 Provide personnel and instrumentation to verify up to 30% of reported results.
- .3 Number and location of verified results as directed by Departmental Representative.
- .4 Pay costs to repeat TAB as required to satisfaction of Departmental Representative.

1.13 SETTINGS

- .1 After TAB is completed to satisfaction of Departmental Representative, replace drive guards, close access doors, lock devices in set positions, ensure sensors are at required settings.
- .2 Permanently mark settings to allow restoration at any time during life of facility. Do not eradicate or cover markings.

1.14 COMPLETION OF  
TAB

- .1 TAB considered complete when final TAB Report received and approved by Departmental Representative.

1.15 AIR SYSTEMS

- .1 Qualifications: personnel performing TAB current member in good standing of AABC, NEBB or NBC.
- .2 Measurements: to include as appropriate for systems, equipment, components, controls: air velocity, static pressure, flow rate, pressure drop (or loss), temperatures (dry bulb, dewpoint), duct cross-sectional area, RPM, electrical power, voltage, noise, vibration.
- .3 Locations of equipment measurements: to include as appropriate:
  - .1 Inlet and outlet of dampers, filter, coil, humidifier, fan, other equipment causing changes in conditions.
  - .2 At controllers, controlled device.
- .4 Locations of systems measurements to include as appropriate: main ducts, main branch, sub-branch,

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run-out (or grille, register or diffuser).

PART 2 - PRODUCTS

2.1 NOT USED .1 Not used.

PART 3 - EXECUTION

3.1 NOT USED .1 Not used.

PART 1 - GENERAL

1.1 REFERENCES

- .1 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
  - .1 Material Safety Data Sheets (MSDS).
- .2 Sheet Metal and Air Conditioning Contractor's National Association (SMACNA)
  - .1 SMACNA HVAC Air Duct Leakage Test Manual, 1985.

1.3 SUBMITTALS

- .1 Make submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Test Reports: submit certified test reports from approved independent testing laboratories indicating compliance with specifications for specified performance characteristics and physical properties. Include pressure test information and results as follows:
  - .1 Submit proposed report form and test report format to Departmental Representative for approval at least one month before proposed date of first series of tests. Do not start tests until approval received in writing from Departmental Representative.
  - .2 Prepare report of results and submit to Departmental Representative within 24 hours of completion of tests. Include:
    - .1 Schematic of entire system.
    - .2 Schematic of section under test showing test site.
    - .3 Required and achieved static pressures.
    - .4 Orifice differential pressure at test sites.
    - .5 Permissible and actual leakage flow rate (L/s) for test sites.
    - .6 Witnessed certification of results.
  - .3 Include test reports in final TAB report.
  - .4 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and

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physical properties.

.5 Instructions: submit manufacturer's installation instructions.

.6 Manufacturer's field reports specified.

1.4 QUALITY  
ASSURANCE

.1 Pre-Installation Meetings:

.1 Convene pre-installation meeting one week prior to beginning work of this Section.

.1 Verify project requirements.

.2 Review installation and substrate conditions.

.3 Co-ordination with other building subtrades.

.4 Review manufacturer's installation instructions and warranty requirements.

.2 Health and Safety:

.1 Do construction occupational health and safety in accordance with Section 01 35 29.06 - Health and Safety Requirements.

PART 2 - PRODUCTS

2.1 TEST  
INSTRUMENTS

.1 Test apparatus to include:

.1 Fan capable of producing required static pressure.

.2 Duct section with calibrated orifice plate mounted and accurately located pressure taps.

.3 Flow measuring instrument compatible with the orifice plate.

.4 Calibration curves for orifice plates used.

.5 Flexible duct for connecting to ductwork under test.

.6 Smoke bombs for visual inspections.

.2 Test apparatus: accurate to within +/- 3 % of flow rate and pressure.

.3 Submit details of test instruments to be used to Departmental Representative at least one month before anticipated start date.

.4 Test instruments: calibrated and certificate of calibration deposited with Departmental Representative no more than 28 days before start

of tests.

- .5 Re-calibrated every six months thereafter.

### PART 3 - EXECUTION

#### 3.1 MANUFACTURER'S INSTRUCTIONS

- .1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheet.

#### 3.2 TEST PROCEDURES

- .1 Maximum lengths of ducts to be tested consistent with capacity of test equipment.
- .2 Section of duct to be tested to include:
  - .1 Fittings, branch ducts, tap-ins.
- .3 Repeat tests until specified pressures are attained. Bear costs for repairs and repetition to tests.
- .4 Base partial system leakage calculations on SMACNA HVAC Air Duct Leakage Test Manual.
- .5 Seal leaks that can be heard or felt, regardless of their contribution to total leakage.

#### 3.3 SITE TOLERANCES

- .1 System leakage tolerances specified are stated as percentage of total flow rate handled by system. Pro-rate specified system leakage tolerances. Leakage for sections of duct systems: not to exceed total allowable leakage.
- .2 Leakage tests on following systems not to exceed specified leakage rates.
  - .1 Small duct systems up to 250 Pa: leakage 2%.
  - .2 VAV box and duct on downstream side of VAV box: leakage 2%.
  - .3 Large low pressure duct systems up to 500 Pa: leakage 2%.

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.4 HP duct systems up to 1000 Pa pressure classification, including upstream side of VAV boxes: leakage 1%.

.3 Evaluation of test results to use surface area of duct and pressure in duct as basic parameters.

3.4 TESTING

.1 Test ducts before installation of insulation or other forms of concealment.

.2 Test after seals have cured.

.3 Test when ambient temperature will not affect effectiveness of seals, and gaskets.

.4 Flexible connections to VAV boxes.

3.5 FIELD QUALITY CONTROL

.1 Performance Verification:

.1 Departmental Representative to witness tests and to verify reported results.

.2 To be certified by same TAB agency approved by Departmental Representative to undertake TAB on this project.

3.6 CLEANING

.1 Upon completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

PART 1 - GENERAL

1.1 REFERENCES

- .1 American Society of Heating, Refrigeration and Air Conditioning (ASHRAE).
  - .1 ANSI/ASHRAE/IESNA 90.1, SI; Energy Standard for Buildings Except Low-Rise Residential Buildings.
- .2 Canadian General Standards Board (CGSB)
  - .1 CGSB 51-GP-52Ma, Vapour Barrier, Jacket and Facing Material for Pipe, Duct and Equipment Thermal Insulation.
- .3 Thermal Insulation Association of Canada (TIAC): National Insulation Standards.
- .4 Underwriters Laboratories of Canada (ULC)
  - .1 CAN/ULC-S102, Surface Burning Characteristics of Building Materials and Assemblies.
  - .2 CAN/ULC-S701, Thermal Insulation Polyotrene, Boards and Pipe Covering.
  - .3 American Society for Testing and Materials:
    - .1 ASTM C335, Standard Test Method for Steady State Heat Transfer Properties of Pipe Insulation.
    - .2 ASTM C612, Standard Specification for Mineral Fibre Block and Board Thermal Insulation
    - .3 ASTM C553, Standard Specification for Mineral Fibre Blanket Thermal Insulation for Commercial and Industrial Applications.
    - .4 ASTM C449, Standard Specification for Mineral Fibre Hydraulic Setting Thermal Insulating and Finishing Cement.

1.2 DEFINITIONS

- .1 For purposes of this section:
  - .1 "CONCEALED" - insulated mechanical services and equipment in suspended ceilings and non-accessible chases and furred-in spaces.
  - .2 "EXPOSED" - will mean "not concealed" as defined herein.
  - .3 Insulation systems - insulation material, fasteners, jackets, and other accessories.
- .2 TIAC Codes:

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- .1 CRD: Code Round Ductwork,
- .2 CRF: Code Rectangular Finish.

1.3 SHOP DRAWINGS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit for approval manufacturer's catalogue literature related to installation, fabrication for duct jointing recommendations.

1.4 DELIVERY,  
STORAGE AND  
HANDLING

- .1 Deliver materials to site in original factory packaging, labelled with manufacturer's name, address.
- .2 Protect from weather and construction traffic.
- .3 Protect against damage from any source.
- .4 Store at temperatures and conditions recommended by manufacturer.

PART 2 - PRODUCTS

2.1 FIRE AND SMOKE  
RATING

- .1 In accordance with CAN/ULC-S102:
  - .1 Maximum flame spread rating: 25.
  - .2 Maximum smoke developed rating: 50.

2.2 INSULATION

- .1 Mineral fibre: as specified includes glass fibre, rock wool, slag wool.
- .2 Thermal conductivity ("k" factor) not to exceed specified values at 24° C mean temperature when tested in accordance with ASTM C 335.
- .3 TIAC Code C-2: Mineral fibre blanket to ASTM C 553 faced with factory applied vapour retarder jacket to CGSB 51-GP-52Ma (as scheduled in PART 3 of this section).
  - .1 Mineral fibre: to ASTM C 553.
  - .2 Jacket: to CGSB 51-GP-52Ma.
  - .3 Maximum "k" factor: to ASTM C 553.

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- 2.3 JACKETS .1 Canvas:  
.1 220 gm/m<sup>2</sup> cotton, plain weave, treated with dilute fire retardant lagging adhesive to ASTM C 921.
- .2 Lagging adhesive: Compatible with insulation.
- 2.4 ACCESSORIES .1 Vapour retarder lap adhesive:  
.1 Water based, fire retardant type, compatible with insulation.
- .2 Indoor Vapour Retarder Finish:  
.1 Vinyl emulsion type acrylic, compatible with insulation.
- .3 Insulating Cement: setting on mineral wool, to ASTM C 449.
- .4 ULC Listed Canvas Jacket:  
.1 220 gm/m<sup>2</sup> cotton, plain weave, treated with dilute fire retardant lagging adhesive to ASTM C 921 untreated.
- .5 Tape: self-adhesive, aluminum, reinforced.
- .6 Contact adhesive: quick-setting
- .7 Canvas adhesive: washable.
- .8 Tie wire: 1.5 mm stainless steel.
- .9 Banding: 19 mm wide, 0.5 mm thick stainless steel.
- .10 Fasteners: 4 mm diameter pins with 35 mm diameter square clips, length to suit thickness of insulation.

PART 3 - EXECUTION

- 3.1 PRE-INSTALLATION REQUIREMENTS .1 Surface clean, dry, free from foreign material.
- 3.2 INSTALLATION .1 Install in accordance with TIAC National Standards.

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- .2 Apply materials in accordance with manufacturers instructions.
- .3 Use two layers with staggered joints when required nominal thickness exceeds 75 mm.
- .4 Maintain uninterrupted continuity and integrity of vapour retarder jacket and finishes.
  - .1 Hangers, supports to be outside vapour retarder jacket.
- .5 Supports, Hangers in accordance with Section 23 05 29 - Hangers and Supports for HVAC Piping and Equipment.
  - .1 Apply high compressive strength insulation where insulation may be compressed by weight of ductwork.
- .6 Fasteners: At 300 mm oc in horizontal and vertical directions, minimum two rows each side.

3.3 DUCTWORK  
INSULATION SCHEDULE

- .1 Insulate all supply air ducting with 25 mm thick Type C-2 insulation complete with canvas lagging.

PART 1 - GENERAL

1.1 REFERENCES

- .1 American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE)
  - .1 ASHRAE Standard 90.1, Energy Standard for Buildings Except Low-Rise Residential Buildings (IESNA co-sponsored; ANSI approved; Continuous Maintenance Standard).
- .2 American Society for Testing and Materials International (ASTM)
  - .1 ASTM B 209M, Standard Specification for Aluminum and Aluminum Alloy Sheet and Plate [Metric].
  - .2 ASTM C 335, Standard Test Method for Steady State Heat Transfer Properties of Horizontal Pipe Insulation.
  - .3 ASTM C 411, Standard Test Method for Hot-Surface Performance of High-Temperature Thermal Insulation.
  - .4 ASTM C 449/C 449M, Standard Specification for Mineral Fiber-Hydraulic-Setting Thermal Insulating and Finishing Cement.
  - .5 ASTM C 533, Calcium Silicate Block and Pipe Thermal Insulation.
  - .6 ASTM C 547, Mineral Fiber Pipe Insulation.
  - .7 ASTM C 795, Standard Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel.
  - .8 ASTM C 921, Standard Practice for Determining the Properties of Jacketing Materials for Thermal Insulation.
- .3 Canadian General Standards Board (CGSB)
  - .1 CGSB 51-GP-52Ma, Vapour Barrier, Jacket and Facing Material for Pipe, Duct and Equipment Thermal Insulation.
  - .2 CAN/CGSB-51.53, Poly (Vinyl Chloride) Jacketing Sheet, for Insulated Pipes, Vessels and Round Ducts
- .4 Department of Justice Canada (Jus)
  - .1 Canadian Environmental Assessment Act (CEAA), 1995, c. 37.
  - .2 Canadian Environmental Protection Act (CEPA), 1999, c. 33.
  - .3 Transportation of Dangerous Goods Act (TDGA), 1992, c. 34.
- .5 Health Canada/Workplace Hazardous Materials

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Information System (WHMIS)

.1 Material Safety Data Sheets (MSDS).

.6 Manufacturer's Trade Associations

.1 Thermal Insulation Association of Canada (TIAC):  
National Insulation Standards (Revised 2004).

.7 Underwriters' Laboratories of Canada (ULC)

.1 CAN/ULC-S102, Surface Burning Characteristics  
of Building Materials and Assemblies.

.2 CAN/ULC-S701, Thermal Insulation, Polystyrene,  
Boards and Pipe Covering.

.3 CAN/ULC-S702, Thermal Insulation, Mineral  
Fibre, for Buildings

.4 CAN/ULC-S702.2, Thermal Insulation, Mineral  
Fibre, for Buildings, Part 2: Application Guidelines.

## 1.2 DEFINITIONS

.1 For purposes of this section:

.1 "CONCEALED" - insulated mechanical services in  
suspended ceilings and non-accessible chases and  
furred-in spaces.

.2 "EXPOSED" - will mean "not concealed" as  
specified.

.2 TIAC ss:

.1 CRF: Code Rectangular Finish.

.2 CPF: Code Piping Finish.

## 1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submittals: in accordance with Section 01 33 00 -  
Submittal Procedures.

.2 Product Data:

.1 Submit manufacturer's printed product  
literature, specifications and datasheet in accordance  
with Section 01 33 00 - Submittal Procedures. Include  
product characteristics, performance criteria, and  
limitations.

.1 Submit two copies of Workplace Hazardous  
Materials Information System (WHMIS) Material  
Safety Data Sheets (MSDS) in accordance with  
Section 01 33 00 - Submittal Procedures.

.2 Samples:

.1 Submit samples in accordance with Section  
01 33 00 - Submittal Procedures.

.2 Submit for approval: complete assembly of each

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type of insulation system, insulation, coating, and adhesive proposed. Mount sample on 12 mm plywood board. Affix label beneath sample indicating service.

- .5 Quality assurance submittals: submit following in accordance with Section 01 33 00 - Submittal Procedures.
  - .1 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
  - .2 Instructions: submit manufacturer's installation instructions.
    - .1 Departmental Representative will make available 1 copy of systems supplier's installation instructions.

#### 1.4 QUALITY ASSURANCE

- .1 Qualifications:
- .2 Installer: specialist in performing work of this Section, and have at least 3 years successful experience in this size and type of project, qualified to standards member of TIAC.
- .3 Health and Safety:
  - .1 Do construction occupational health and safety in accordance with Section 01 35 29.06 - Health and Safety Requirements.

#### 1.5 DELIVERY, STORAGE AND HANDLING

- .1 Packing, shipping, handling and unloading:
  - .1 Deliver, store and handle in accordance with manufacturer's written instructions and Section 01 61 00 - Common Product Requirements.
  - .2 Deliver, store and handle materials in accordance with manufacturer's written instructions.
  - .3 Deliver materials to site in original factory packaging, labelled with manufacturer's name, address.
- .2 Storage and Protection:
  - .1 Protect from weather, construction traffic.
  - .2 Protect against damage.
  - .3 Store at temperatures and conditions required by manufacturer.
- .3 Waste Management and Disposal:

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- .1 Construction/Demolition Waste Management and Disposal: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
- .2 Place excess or unused insulation and insulation accessory materials in designated containers.
- .3 Divert unused metal materials from landfill to metal recycling facility approved by Departmental Representative.
- .4 Dispose of unused adhesive material at official hazardous material collections site approved by Departmental Representative.

## PART 2 - PRODUCTS

### 2.1 FIRE AND SMOKE RATING

- .1 In accordance with CAN/ULC-S102.
  - .1 Maximum flame spread rating: 25.
  - .2 Maximum smoke developed rating: 50.

### 2.2 INSULATION

- .1 Mineral fibre specified includes glass fibre, rock wool, slag wool.
- .2 Thermal conductivity ("k" factor) not to exceed specified values at 24 degrees C mean temperature when tested in accordance with ASTM C 335.
- .3 TIAC Code A-1: rigid moulded mineral fibre with factory applied vapour retarder jacket.
  - .1 Mineral fibre: to CAN/ULC-S702, ASTM C 547.
  - .2 Maximum "k" factor: to CAN/ULC-S702.
- .4 TIAC Code A-3: rigid moulded mineral fibre with factory applied vapour retarder jacket.
  - .1 Mineral fibre: to CAN/ULC-S702, ASTM C 547.
  - .2 Jacket: to CGSB 51-GP-52Ma.
  - .3 Maximum "k" factor: to CAN/ULC-S702, ASTM C 547.

### 2.3 INSULATION SECUREMENT

- .1 Tape: self-adhesive, aluminum, reinforced, 50 mm wide minimum.
- .2 Contact adhesive: quick setting.

- .3 Canvas adhesive: washable.
- .4 Tie wire: 1.5 mm diameter stainless steel.
- .5 Bands: stainless steel, 19 mm wide, 0.5 mm thick.

#### 2.4 CEMENT

- .1 Thermal insulating and finishing cement:
  - .1 Hydraulic setting or Air drying on mineral wool, to ASTM C 449/C 449M.

#### 2.5 VAPOUR RETARDER LAP ADHESIVE

- .1 Water based, fire retardant type, compatible with insulation.

#### 2.6 INDOOR VAPOUR RETARDER FINISH

- .1 Vinyl emulsion type acrylic, compatible with insulation.

#### 2.7 JACKETS

- .1 PVC Plastic:
  - .1 One-piece moulded type and sheet with pre-formed shapes as required.
  - .2 Colours: to match adjacent finish paint by Departmental Representative.
  - .3 Minimum service temperatures: -20 degrees C.
  - .4 Maximum service temperature: 65 degrees C.
  - .5 Moisture vapour transmission: 0.012 perm.
  - .6 Thickness: 0.55 mm.
  - .7 Fastenings:
    - .1 Solvent weld adhesive compatible with insulation to seal laps and joints.
    - .2 Tacks.
    - .3 Pressure sensitive vinyl tape of matching colour.
  - .8 Locations:
    - .1 For outdoor use with UV inhibitor.
    - .2 Indoor to CAN/ULC-S102.

PART 3 - EXECUTION

3.1 MANUFACTURER'S  
INSTRUCTIONS

- .1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheet.

3.2 PRE-  
INSTALLATION  
REQUIREMENT

- .1 Pressure testing of piping systems and adjacent equipment to be complete, witnessed and certified.
- .2 Surfaces clean, dry, free from foreign material.

3.3 INSTALLATION

- .1 Install in accordance with TIAC National Standards.
- .2 Apply materials in accordance with manufacturer's instructions and this specification.
- .3 Use two layers with staggered joints when required nominal wall thickness exceeds 75 mm.
- .4 Maintain uninterrupted continuity and integrity of vapour retarder jacket and finishes.
  - .1 Install hangers, supports outside vapour retarder jacket.
- .5 Supports, Hangers:
  - .1 Apply high compressive strength insulation, suitable for service, at oversized saddles and shoes where insulation saddles have not been provided.

3.4 REMOVABLE,  
PRE-FABRICATED,  
INSULATION AND  
ENCLOSURES

- .1 Application: at expansion joints, valves, primary flow measuring elements flanges and unions at equipment.
- .2 Design: to permit movement of expansion joint and to permit periodic removal and replacement without damage to adjacent insulation.
- .3 Insulation:
  - .1 Insulation, fastenings and finishes: same as system.
  - .2 Jacket: aluminum or PVC high temperature fabric].

3.5 PIPING  
INSULATION  
SCHEDULES

- .1 Includes valves, valve bonnets, strainers, flanges and fittings unless otherwise specified.
- .2 TIAC Code: A-1.
  - .1 Securements: SS wire at 300 mm on centre.
  - .2 Seals: lap seal adhesive, lagging adhesive.
  - .3 Installation: TIAC Code 1501-H.
- .3 TIAC Code: A-3.
  - .1 Securements: Tape at 300 mm on centre.
  - .2 Seals: VR lap seal adhesive, VR lagging adhesive.
  - .3 Installation: TIAC Code: 1501-C.
- .4 Thickness of insulation as listed in following table.
  - .1 Run-outs to individual units and equipment not exceeding 4000 mm long.
  - .2 Do not insulate exposed runouts to plumbing fixtures, chrome plated piping, valves, fittings.

Applica- tion	Temp. degrees C	TIAC code	Pipe sizes (NPS) and insulation thickness (mm)					
			to 1	1 1/4 to 2	2 1/2 to 4	5 to 6	8 & over	
Domestic HWS		A-1	25	25	25	38	38	38
Domestic CWS		A-3	25	25	25	25	25	25
Domestic CWS with vapour retarder		C-2	25	25	25	25	25	25

- .5 Finishes:
  - .3 Concealed, indoors: canvas on valves, fittings. No further finish.
  - .4 Use vapour retarder jacket on TIAC code A-3 insulation compatible with insulation.
  - .6 Finish attachments: SS screws bands, at 150 mm on centre. Seals: wing closed.
  - .7 Installation: to appropriate TIAC code CRF/1 through CPF/5.

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THERMAL INSULATION  
FOR PIPING

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3.6 CLEANING

- .1 Proceed in accordance with Section 01 74 11 -  
Cleaning.
- .2 Upon completion and verification of performance of  
installation, remove surplus materials, excess  
materials, rubbish, tools and equipment.

PART 1 - GENERAL

- 1.1 SUMMARY .1 Section Includes:  
.1 Materials and installation procedures for electric heating and cooling controls.
- 1.2 REFERENCES .1 Health Canada/Workplace Hazardous Materials Information System (WHMIS)  
.1 Material Safety Data Sheets (MSDS).
- 1.3 SUBMITTALS .1 Product Data:  
.1 Submit manufacturer's printed product literature, specifications and datasheet in accordance with Section 01 33 00 - Submittal Procedures. Include product characteristics, performance criteria, and limitations.  
.1 Submit two copies of Workplace Hazardous Materials Information System (WHMIS) Material Safety Data Sheets (MSDS) in accordance with Section 01 33 00 - Submittal Procedures.  
.2 Quality assurance submittals: submit following in accordance with Section 01 33 00 - Submittal Procedures.
- 1.4 QUALITY ASSURANCE .1 Health and Safety Requirements: do construction occupational health and safety in accordance with Section 01 35 29 - Health and Safety Requirements.
- 1.5 DELIVERY, STORAGE, AND HANDLING .1 Packing, shipping, handling and unloading:  
.1 Deliver, store and handle in accordance with Section 01 61 00 - Common Product Requirements.  
.2 Deliver, store and handle materials in accordance with manufacturer's written instructions.

PART 2 - PRODUCTS

- 2.1 THERMOSTAT (LOW VOLTAGE) .1 Low voltage wall thermostat:  
.1 For use on 24 V circuit at 1.5 A capacity.  
.2 With heat anticipator adjustable 0.1 to 1.2 A.

- .3 Temperature setting range: 10 degrees C to 25 degrees C.
- .4 Without sub-base.

### PART 3 - EXECUTION

#### 3.1 MANUFACTURER'S INSTRUCTIONS

- .1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheet.

#### 3.2 INSTALLATION

- .1 Install control devices on inside walls away from direct sunlight.

#### 3.4 CLEANING

- .1 Proceed in accordance with Section 01 74 11 - Cleaning.
- .2 Upon completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

PART 1 - GENERAL

1.1 REFERENCES

- .1 American Society of Heating, Refrigerating and Air-Conditioning (ASHRAE).
- .2 American Society for Testing and Materials International, (ASTM).
  - .1 ASTM A 480/A480M, Standard Specification for General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet and Strip.
  - .2 ASTM A 635/A635M, Standard Specification for Steel, Sheet and Strip, Heavy-Thickness Coils, Carbon, Hot Rolled.
  - .3 ASTM A 653/A653M, Standard Specification for Steel Sheet, Zinc Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by the Hot-Dip Process.
- .3 Department of Justice Canada (Jus).
  - .1 Canadian Environmental Protection Act (CEPA), c. 33 .
- .4 Health Canada/Workplace Hazardous Materials Information System (WHMIS).
  - .1 Material Safety Data Sheets (MSDS).
- .5 National Fire Protection Association (NFPA).
  - .1 NFPA 90A, Standard for the Installation of Air-Conditioning and Ventilating Systems.
  - .2 NFPA 90B, Standard for the Installation of Warm Air Heating and Air-Conditioning Systems.
- .6 Sheet Metal and Air Conditioning Contractors' National Association (SMACNA).
  - .1 SMACNA HVAC Duct Construction Standards - Metal and Flexible, 2nd Edition and Addendum No. 1.
  - .2 IAQ Guideline for Occupied Buildings Under Construction, 1st Edition.
- .7 Transport Canada (TC).
  - .1 Transportation of Dangerous Goods Act (TDGA), c. 34.

1.2 SUBMITTALS

- .1 Submit shop drawings and product data in accordance with Section 01 33 00 - Submittal Procedures.

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1.3 QUALITY  
ASSURANCE

- .1 Certification of Ratings:
  - .1 Catalogue or published ratings shall be those obtained from tests carried out by manufacturer or independent testing agency signifying adherence to codes and standards.
- .2 Health and Safety:
  - .1 Do construction occupational health and safety in accordance with Section 01 35 29 - Health and Safety Requirements.

1.4 DELIVERY,  
STORAGE AND  
HANDLING

- .1 Protect on site stored or installed absorptive material from moisture damage.

PART 2 - PRODUCTS

2.1 SEAL  
CLASSIFICATION

- .1 Classification as follows:

<u>Maximum Pressure Pa</u>	<u>SMACNA Seal Class</u>
500	C
250	C
125	C
125	Unsealed

- .2 Seal classification:
  - .1 Class A: longitudinal seams, transverse joints, duct wall penetrations and connections made airtight with sealant and tape.
  - .2 Class B: longitudinal seams, transverse joints and connections made airtight with sealant and tape.
  - .3 Class C: transverse joints and connections made air tight with gaskets sealant and tape. Longitudinal seams unsealed.
  - .4 Unsealed seams and joints.

2.2 SEALANT

- .1 Sealant: oil resistant, polymer type flame resistant duct sealant. Temperature range of minus 30 degrees C to plus 93 degrees C.

2.3 TAPE

- .1 Tape: polyvinyl treated, open weave fiberglass tape, 50 mm wide.

2.4 FITTINGS

- .1 Fabrication: to SMACNA.
- .2 Radiused elbows.
  - .1 Rectangular: standard radius Centreline radius: 1.5 times width of duct.
  - .2 Round: smooth radius. Centreline radius: 1.5 times diameter.
- .3 Mitred elbows, rectangular:
  - .1 To 400 mm: with single thickness turning vanes.
  - .2 Over 400 mm: with double thickness turning vanes.
- .4 Branches:
  - .1 Rectangular main and branch: with radius on branch 1.5 times width of duct 45 degrees entry on branch.
  - .2 Provide volume control damper in branch duct near connection to main duct.
  - .3 Main duct branches: with splitter damper.
- .5 Transitions:
  - .1 Diverging: 20 degrees maximum included angle.
  - .2 Converging: 30 degrees maximum included angle.
- .6 Offsets:
  - .1 Short radiused elbows as indicated.

2.5 GALVANIZED  
STEEL

- .1 Lock forming quality: to ASTM A 653/A653M, Z90 zinc coating.
- .2 Thickness, fabrication and reinforcement: to ASHRAE SMACNA.

2.6 HANGERS AND  
SUPPORTS

- .1 Hangers and Supports: in accordance with Section 23 05 29 - Hangers and Supports for HVAC Piping and Equipment.
  - .1 Strap hangers: of same material as duct but next sheet metal thickness heavier than duct.
    - .1 Maximum size duct supported by strap hanger: 500.
  - .2 Hanger configuration: to SMACNA.

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.3 Hangers: galvanized steel angle with galvanized steel rods to SMACNA following table:

<u>Duct Size</u>	<u>Angle Size</u>	<u>Rod Size</u>
(mm)	(mm)	(mm)
up to 750	25 x 25 x 3	6

.4 Upper hanger attachments:  
.1 For concrete: manufactured concrete inserts.

### PART 3 - EXECUTION

#### 3.1 GENERAL

- .1 Do work in accordance with SMACNA.
- .2 Do not break continuity of insulation vapour barrier with hangers or rods.
  - .1 Insulate strap hangers 100 mm beyond insulated duct Ensure diffuser is fully seated.
- .3 Support risers.

#### 3.2 HANGERS

- .1 Strap hangers: install in accordance with SMACNA.
- .2 Angle hangers: complete with locking nuts and washers.
- .3 Hanger spacing: in accordance with SMACNA as follows:

<u>Duct Size</u>	<u>Spacing</u>
(mm)	(mm)
to 1500	3000
1501 and over	2500

#### 3.3 SEALING AND TAPING

- .1 Apply sealant to outside of joint to manufacturer's recommendations.
- .2 Bed tape in sealant and recoat with minimum of one coat of sealant to manufacturers recommendations.

PART 1 - GENERAL

- 1.1 SUMMARY
- .1 Section Includes:
    - .1 Materials and installation for duct accessories including flexible connections, access doors, vanes and collars.
    - .2 Sustainable requirements for construction and verification.
  - .2 Related Sections:
    - .1 Section 01 33 00 - Submittal Procedures.
- 1.2 REFERENCES
- .1 Health Canada/Workplace Hazardous Materials Information System (WHMIS).
    - .1 Material Safety Data Sheets (MSDS).
  - .2 Sheet Metal and Air Conditioning Contractors' National Association (SMACNA).
    - .1 SMACNA - HVAC Duct Construction Standards - Metal and Flexible.
- 1.3 SUBMITTALS
- .1 Submittals in accordance with Section 01 33 00 - Submittal Procedures.
  - .2 Product Data:
    - .1 Submit manufacturer's printed product literature, specifications and data sheet. Indicate the following:
      - .1 Flexible connections.
      - .2 Duct access doors.
      - .3 Turning vanes.
      - .4 Instrument test ports.
  - .3 Instructions: submit manufacturer's installation instructions.

PART 2 - PRODUCTS

- 2.1 GENERAL
- .1 Manufacture in accordance with SMACNA - HVAC Duct Construction Standards.

PART 3 - EXECUTION

- 3.1 MANUFACTURER'S INSTRUCTIONS
- .1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage

and installation instructions, and data sheet.

3.2 CLEANING

- .1 Upon completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

PART 1 - GENERAL

- 1.1 SUMMARY .1 Section Includes:  
.1 Operating dampers for mechanical forced air ventilation and air conditioning systems.
- 1.2 SUBMITTALS .1 Product Data:  
.1 Submit manufacturer's printed product literature, specifications and datasheet in accordance with Section 01 33 00 - Submittal Procedures. Include product characteristics, performance criteria, and limitations.
- 1.3 QUALITY ASSURANCE .1 Health and Safety Requirements: do construction occupational health and safety in accordance with Section 01 35 29 - Health and Safety Requirements.
- 1.4 DELIVERY, STORAGE, AND HANDLING .1 Packing, shipping, handling and unloading:  
.1 Deliver, store and handle in accordance with Section 01 61 00 - Common Product Requirements.  
.2 Deliver, store and handle materials in accordance with manufacturer's written instructions.

PART 2 - PRODUCTS

- 2.1 MULTI-LEAF DAMPERS .1 Opposed or parallel blade type.  
.2 Extruded aluminum, interlocking blades, complete with extruded vinyl seals, spring stainless steel side seals, extruded aluminum frame.  
.3 Pressure fit self-lubricated bronze bearings.  
.4 Linkage: plated steel tie rods, brass pivots and plated steel brackets, complete with plated steel control rod.  
.5 Performance:  
.1 Leakage: in closed position less than 2% of rated air flow at 249 Pa differential across damper.  
.6 Insulated aluminum dampers:  
.1 Frames: insulated with extruded polystyrene foam with RSI 0.88.  
.2 Blades: constructed from aluminum

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extrusions with internal hollows insulated with polyurethane or polystyrene foam, RSI 0.88.

2.2 DISC TYPE  
DAMPERS

- .1 Frame: insulated brake formed, welded, 1.6 mm thick, galvanized steel to ASTM A 653M.
- .2 Disc: insulated spin formed, 1.6 mm thick, galvanized steel to ASTM A 653M.
- .3 Gasket: extruded neoprene, field replaceable, with 10 year warranty.
- .4 Bearings: roller self lubricated and sealed.
- .5 Operator: compatible with damper, linear stroke operator, spring loaded actuator, zinc-aluminum foundry alloy casting cam follower.
- .6 Performance:
  - .1 Leakage: in closed position to be less than 2 % of rated air flow at 500 Pa pressure differential across damper.
  - .2 Pressure drop: at full open position to be less than 25 Pa differential across damper at 10 m/s.

PART 3 - EXECUTION

3.1 MANUFACTURER'S  
INSTRUCTIONS

- .1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheet.

3.2 INSTALLATION

- .1 Install in accordance with recommendations of SMACNA and manufacturer's instructions.
- .2 Seal multiple damper modules with silicon sealant.
- .3 Install access door adjacent to each damper. See Section 23 33 00 - Air Duct Accessories
- .4 Ensure dampers are observable and accessible.

3.3 CLEANING

- .1 Upon completion and verification of performance

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DAMPERS-OPERATING

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of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

PART 1 - GENERAL

1.1 REFERENCES

- .1 National Fire Protection Association (NFPA)
  - .1 NFPA 90A-12, Standard for the Installation of Air Conditioning and Ventilating Systems.
- .3 Underwriters Laboratories of Canada (ULC)
  - .1 CAN/ULC-S112-10, Standard Test Method of Fire Test of Fire Damper Assemblies.
  - .2 CAN/ULC-S112.2-07, Standard Method of Fire Test of Ceiling Fire Stop Flap Assemblies.
  - .3 ULC-S505-1974, Standard for Fusible Links for Fire Protection Service.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
  - .1 Submit manufacturer's instructions, printed product literature and data sheets for fire and smoke dampers and include product characteristics, performance criteria, physical size, finish and limitations.
  - .2 Indicate the following:
    - .1 Fire dampers.
    - .2 Smoke dampers.
    - .3 Fire stop flaps.
    - .4 Operators.
    - .5 Fusible links.
    - .6 Design details of break-away joints.

1.3 CLOSEOUT SUBMITTALS

- .1 Submit in accordance with Section 01 78 00 - Closeout Submittals.
- .2 Operation and Maintenance Data: submit operation and maintenance data for fire and smoke dampers for incorporation into manual.

1.4 MAINTENANCE MATERIAL SUBMITTALS

- .1 Extra Materials:
  - .1 Submit maintenance materials in accordance with Section 01 78 00 - Closeout Submittals.
  - .2 Provide:
    - .1 6 fusible links of each type.

1.5 DELIVERY,  
STORAGE AND  
HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
  - .1 Store materials off ground indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
  - .2 Store and protect fire and smoke dampers from nicks, scratches, and blemishes.
  - .3 Replace defective or damaged materials with new.

PART 2 - PRODUCTS

2.1 FIRE DAMPERS

- .1 Fire dampers: arrangement Type B, C, listed and bear label of ULC, UL, Warnock Hersey, meet requirements of provincial fire authority and NFPA 90A authorities having jurisdiction. Fire damper assemblies fire tested in accordance with CAN/ULC-S112.
- .2 Mild steel, factory fabricated for fire rating requirement to maintain integrity of fire wall and/or fire separation.
  - .1 Fire dampers: 1-1/2 hour fire rated or equal to the rating of installed wall - whichever is greater.
  - .2 Fire dampers: automatic operating type and have dynamic rating suitable for maximum air velocity and pressure differential to which it will be subjected.
- .3 Fusible link actuated, having negator-spring-closing operator for multi-leaf type or roll door type damper.
- .4 40 x 40 x 3 mm retaining angle iron frame, on full perimeter of fire damper, on both sides of fire separation being pierced.
- .5 Equip fire dampers with steel sleeve or frame.
- .6 Equip sleeves or frames with perimeter mounting angles attached on both sides of wall or floor opening. Construct ductwork in fire-rated floor-ceiling or roof-ceiling assembly systems with air ducts that pierce ceiling to conform with ULC.

- .7 Design and construct dampers to not reduce duct or air transfer opening cross-sectional area.
- .8 Dampers shall be installed so that the centerline of the damper depth or thickness is located in the centerline of the wall, partition or floor slab depth or thickness.
- .9 Unless otherwise indicated, the installation details given in SMACNA Install Fire Damp HVAC and in manufacturer's instructions for fire dampers shall be followed.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for fire and smoke damper installation in accordance with manufacturer's written instructions.
  - .1 Visually inspect substrate in presence of Departmental Representative.
  - .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
  - .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

#### 3.2 INSTALLATION

- .1 Install in accordance with NFPA 90A and in accordance with conditions of ULC listing.
- .2 Maintain integrity of fire separation.
- .3 After completion and prior to concealment obtain approvals of complete installation from authority having jurisdiction.
- .4 Install access door adjacent to each damper.
- .5 Co-ordinate with installer of fire stopping.
- .6 Ensure access doors/panels, fusible links, damper operators are easily observed and accessible.
- .7 Install break-away joints of approved design on each side of fire separation.

3.3 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
  - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

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PART 1 - GENERAL

- 1.1 GENERAL .1 This Section covers items common to Sections of Division 26. This section supplements requirements of Division 1.
- 1.2 CODES AND STANDARDS .1 Do complete installation in accordance with CSA C22.1-2012 except where specified otherwise.
- 1.3 CARE, OPERATION AND START-UP .1 Instruct Project Manager and operating personnel in the operation, care and maintenance of systems, system equipment and components.
- 1.4 VOLTAGE RATINGS .1 Operating voltages: to CAN3-C235-83.
- .2 Motors, electric heating, control and distribution devices and equipment to operate satisfactorily at 60 Hz within normal operating limits established by above standard. Equipment to operate in extreme operating conditions established in above standard without damage to equipment.
- 1.5 PERMITS, FEES AND INSPECTION .1 Submit to Electrical Inspection Department and Supply Authority necessary number of drawings and specifications for examination and approval prior to commencement of work.
- .2 Pay associated fees.
- .3 Project Manager will provide drawings and specifications required by Electrical Inspection Department and Supply Authority at no cost.
- .4 Notify Project Manager of changes required by Electrical Inspection Department prior to making changes.
- .5 Furnish Certificates of Acceptance from authorities having jurisdiction on completion of work to Project Manager.

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1.6 MATERIALS AND  
EQUIPMENT

- .1 Provide materials and equipment in accordance with Section 01 61 00 - Common Product Requirements.
- .2 Equipment and material to be CSA certified. Where there is no alternative to supplying equipment which is not CSA certified, obtain special approval from Electrical Inspection Department.
- .3 Factory assemble control panels and component assemblies.

1.7 FINISHES

- .1 Shop finish metal enclosure surfaces by application of rust resistant primer inside and outside, and at least two coats of finish enamel.
  - .1 Paint outdoor electrical equipment "equipment green" finish to EEMAC Y1-1-1955.
  - .2 Paint indoor switchgear and distribution enclosures light grey to EEMAC 2Y-1-1958.
- .2 Clean and touch up surfaces of shop-painted equipment scratched or marred during shipment or installation, to match original paint.
- .3 Clean and prime exposed non-galvanized hangers, racks and fastenings to prevent rusting.

1.8 EQUIPMENT  
IDENTIFICATION

- .1 Identify electrical equipment with nameplates and labels as follows:
- .2 Nameplates:
  - .1 Lamicoid 3 mm thick plastic engraving sheet, black face, white core, mechanically attached with self tapping screws.

NAMEPLATE SIZES

Size	Dimensions	Lines	Letter Height
Size 1	10 x 50 mm	1 line	3 mm high letters
Size 2	12 x 70 mm	1 line	5 mm high letters
Size 3	12 x 70 mm	2 lines	3 mm high letters
Size 4	20 x 90 mm	1 line	8 mm high letters
Size 5	20 x 90 mm	2 lines	5 mm high letters

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Size 6	25 x 100 mm	1 line	12 mm high letters
Size 7	25 x 100 mm	2 lines	6 mm high letters

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- .3 Wording on nameplates to be approved by Project Manager prior to manufacture.
- .4 Allow for average of twenty-five (25) letters per nameplate.
- .5 Identification to be English and French.
- .6 Use one nameplate for both languages.
- .7 Nameplates for terminal cabinets and junction boxes to indicate system and/or voltage characteristics.
- .8 Disconnects, starters and contactors: indicate equipment being controlled and voltage.
- .9 Terminal cabinets and pull boxes: indicate system and voltage.
- .10 Transformers: indicate capacity, primary and secondary voltages.

1.9 WIRING IDENTIFICATION

- .1 Identify wiring with permanent indelible identifying markings, either numbered or coloured plastic tapes, on both ends of phase conductors of feeders and branch circuit wiring.
- .2 Maintain phase sequence and colour coding throughout.
- .3 Colour code: to CSA C22.1.
- .4 Use colour coded wires in communication cables, matched throughout system.

1.10 CONDUIT AND CABLE IDENTIFICATION

- .1 Colour code conduits, boxes and metallic sheathed cables.
- .2 Code with plastic tape or paint at points where conduit or cable enters wall, ceiling, or floor,

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and at 15 m intervals.

- .3 Colours: 25 mm wide prime colour and 20 mm wide auxiliary colour.

	<u>Prime</u>	<u>Auxiliary</u>
up to 250 V	Yellow	
up to 600 V	Yellow	Green
up to 5 kV	Yellow	Blue
up to 15 kV	Yellow	Red
Telephone	Green	
Other	Green	Blue
Communication		
Systems		
Fire Alarm	Red	
Emergency	Red	Blue
Voice		
Other	Red	Yellow
Security		
Systems		

1.11 WIRING  
TERMINATIONS

- .1 Lugs, terminals, screws used for termination of wiring to be suitable for either copper or aluminum conductors.

1.12 MANUFACTURERS  
AND CSA LABELS

- .1 Visible and legible, after equipment is installed.

1.13 WARNING SIGNS

- .1 As specified and to meet requirements of Electrical Inspection Department and Project Manager.
- .2 Decal signs, minimum size 175 x 250 mm.

1.14 LOCATION OF  
OUTLETS

- .1 Do not install outlets back-to-back in wall; allow minimum 150 mm horizontal clearance between boxes.
- .2 Change location of outlets at no extra cost or credit, providing distance does not exceed 3000 mm, and information is given before installation.

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- .3 Locate light switches on latch side of doors.
- 1.15 MOUNTING HEIGHTS
- .1 Mounting height of equipment is from finished floor to centreline of equipment unless specified or indicated otherwise.
- .2 If mounting height of equipment is not specified or indicated, verify before proceeding with installation.
- .3 Install electrical equipment at following heights unless indicated otherwise.
- .1 Local switches: 1400 mm.
  - .2 Wall receptacles:
    - .1 General: 300 mm.
    - .2 Above top of continuous baseboard heater: 200 mm.
    - .3 Above top of counters or counter splash backs: 175 mm.
  - .3 Panelboards: as required by Code or as indicated.
  - .4 Telephone and interphone outlets: 300 mm.
  - .5 Wall mounted telephone and interphone outlets: 1500 mm.
- 1.16 LOAD BALANCE
- .1 Measure phase current to panelboards with normal loads (lighting) operating at time of acceptance. Adjust branch circuit connections as required to obtain best balance of current between phases and record changes.
- .2 Measure phase voltages at loads and adjust transformer taps to within 2% of rated voltage of equipment.
- .3 Submit, at completion of work, report listing phase and neutral currents on panelboards, dry-core transformers and motor control centres, operating under normal load. State hour and date on which each load was measured, and voltage at time of test.
- 1.17 CONDUIT AND CABLE INSTALLATION
- .1 Install conduit and sleeves prior to pouring of concrete. Sleeves through concrete: schedule 40 steel pipe, sized for free passage of conduit, and protruding 50 mm.

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- .2 If plastic sleeves are used in fire rated walls or floors, remove before conduit installation.
- .3 Install cables, conduits and fittings to be embedded or plastered over, neatly and close to building structure so furring can be kept to minimum.

1.18 FIELD QUALITY CONTROL

- .1 All electrical work to be carried out by qualified, licensed electricians or apprentices as per the conditions of the Provincial Act respecting manpower vocational training and qualification. Employees registered in a provincial apprentices program shall be permitted, under the direct supervision of a qualified licensed electrician, to perform specific tasks - the activities permitted shall be determined based on the level of training attained and the demonstration of ability to perform specific duties.
- .2 The work of this division to be carried out by a contractor who holds a valid Master Electrical contractor license as issued by the Province that the work is being constructed.
- .3 Furnish manufacturer's certificate or letter confirming that entire installation as it pertains to each system has been installed to manufacturer's instructions.
- .4 Insulation resistance testing.
  - .1 Megger circuits, feeders and equipment up to 350 V with a 500 V instrument.
  - .2 Megger 350-600 V circuits, feeders and equipment with a 1000 V instrument.
  - .3 Check resistance to ground before energizing.
- .5 Carry out tests in presence of Project Manager.
- .6 Provide instruments, meters, equipment and personnel required to conduct tests during and at conclusion of project.
- .7 Submit test results for Project Manager's review.

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COMMON WORK RESULTS -  
ELECTRICAL

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1.19 CO-ORDINATION  
OF PROTECTIVE  
DEVICES

.1 Ensure circuit protective devices such as  
overcurrent trips, relays and fuses are installed  
to required values and settings.

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED

.1 Not Used.

PART 1 - GENERAL

- 1.1 SECTION INCLUDES
- .1 Materials and installation for wire and box connectors.
- 1.2 REFERENCES
- .1 Canadian Standards Association (CSA International)
- .1 CAN/CSA-C22.2 No.18-98, Outlet Boxes, Conduit Boxes, Fittings and Associated Hardware.
- .2 CSA C22.2 No.65-93(R1999), Wire Connectors.
- .2 Electrical and Electronic Manufacturers' Association of Canada (EEMAC)
- .1 EEMAC 1Y-2, 1961 Bushing Stud Connectors and Aluminum Adapters (1200 Ampere Maximum Rating).
- .3 National Electrical Manufacturers Association (NEMA)

PART 2 - PRODUCTS

- 2.1 MATERIALS
- .1 Pressure type wire connectors to: CSA C22.2 No.65, with current carrying parts of copper sized to fit copper conductors as required.
- .2 Fixture type splicing connectors to: CSA C22.2 No.65, with current carrying parts of copper or copper alloy sized to fit copper conductors 10 AWG or less.
- .3 Clamps or connectors for armoured cable, flexible conduit, as required to: CAN/CSA-C22.2 No.18.

PART 3 - EXECUTION

3.1 INSTALLATION

- .1 Remove insulation carefully from ends of conductors and:
  - .1 Apply coat of zinc joint compound on aluminum conductors prior to installation of connectors.
  - .2 Install mechanical pressure type connectors and tighten screws with appropriate compression tool recommended by manufacturer. Installation shall meet secureness tests in accordance with CSA C22.2 No.65.
  - .3 Install fixture type connectors and tighten. Replace insulating cap.
  - .4 Install bushing stud connectors in accordance with EEMAC 1Y-2 NEMA.

PART 1 - GENERAL

- 1.1 RELATED SECTIONS .1 Section 26 05 20 - Wire and Box Connectors - 0 - 1000 V.
- 1.2 REFERENCES .1 CSA C22.2 No .0.3-96, Test Methods for Electrical Wires and Cables.
- 1.3 PRODUCT DATA .1 Submit product data in accordance with Section 01 33 00 - Submittal Procedures.
- 1.4 WASTE MANAGEMENT AND DISPOSAL .1 Separate and recycle waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management And Disposal.

PART 2 - PRODUCTS

- 2.1 BUILDING WIRES .1 Conductors: stranded for 8 AWG and larger.
- .2 Copper conductors: size as indicated, with 600 or 1000 V insulation of chemically cross-linked thermosetting polyethylene material rated RW90.
- .3 Copper conductors: size as indicated, with thermoplastic insulation Type TW rated at 300 V.
- 2.2 CONTROL CABLES .1 Type LVT: 2 soft annealed copper conductors, sized as indicated, with thermoplastic insulation, outer covering of thermoplastic jacket.
- .2 Twisted Shielded Cable (Non-Plenum Rated): Single twisted pair 18/2 polyethylene insulated copper conductors, aluminum foil shield, tinned copper drain wire. Outer PVC jacket.
- .3 All control wiring for this project to be installed in conduit.
- .4 Twisted Shielded Cable (Plenum Rated): Single

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twisted pair 18/2 teflon insulated conductors,  
aluminum foil shield, tinned copper drain wire.  
Outer teflon jacket. Classified for use in air  
plenums.

PART 3 - EXECUTION

N/A

PART 1 - GENERAL

- 1.1 RELATED SECTIONS
- .1 Section 01 74 21 - Construction/Demolition Waste Management And Disposal.
  - .2 Section 26 05 01 - Common Work Results - Electrical.
- 1.2 REFERENCES
- .1 Canadian Standards Association, (CSA International)
- 1.3 WASTE MANAGEMENT AND DISPOSAL
- .1 Separate and recycle waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management And Disposal.
  - .2 Remove from site and dispose of all packaging materials at appropriate landfill facilities.
  - .3 Divert unused metal materials from landfill to metal recycling facility at Municipal Landfill.

PART 2 - PRODUCTS

- 2.1 EQUIPMENT
- .1 Clamps for grounding of conductor: size as required to electrically conductive underground water pipe.
  - .2 Insulated grounding conductors: green, type RW90.
  - .3 Non-corroding accessories necessary for grounding system, type, size, material as indicated, including but not necessarily limited to:
    - .1 Grounding and bonding bushings.
    - .2 Protective type clamps.
    - .3 Bolted type conductor connectors.
    - .4 Mechanical pressure type connectors.
    - .5 Bonding jumpers, straps.
    - .6 Pressure wire connectors.

PART 3 - EXECUTION

3.1 INSTALLATION  
GENERAL

- .1 Install connectors in accordance with manufacturer's instructions.
- .2 Protect exposed grounding conductors from mechanical injury.
- .3 Use mechanical connectors for grounding connections to equipment provided with lugs.
- .4 Soldered joints not permitted.
- .5 Install bonding wire for flexible conduit, connected at one end to grounding bushing, solderless lug, clamp or cup washer and screw. Neatly cleat bonding wire to exterior of flexible conduit.
- .6 Bond single conductor, metallic armoured cables to cabinet at supply end, and provide non-metallic entry plate at load end.

3.2 EQUIPMENT  
GROUNDING

- .1 Install grounding connections to typical equipment included in, but not necessarily limited to following list. Service equipment, duct systems, frames of motors, motor control centres, starters, control panels, building steel work, and distribution panels.
- .2 Bond non-current carrying metal parts together with size AWG copper equipotential conductor. Run conductor from separate lug or service neutral bar to, but not necessarily limited to, following indoor systems and equipment:
  - .1 Hot water heating system.
  - .2 Main water pipe.
  - .3 Main building drain.
  - .4 Telephone, radio/tv, emergency and fire alarm lead-in or service conduits, near panels.
  - .5 Make connections to pipes on building side of main valves.

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3.3 COMMUNICATION  
SYSTEMS

- .1 Install grounding connections for telephone, sound, fire alarm intercommunication systems as required by the equipment manufacturer.
- .2 All metal conduits and other metal parts pertaining to communications systems shall be grounded.

3.4 FIELD QUALITY  
CONTROL

- .1 Perform tests in accordance with Section 26 05 01 - Common Work Results - Electrical.
- .2 Perform ground continuity and resistance tests using method appropriate to site conditions and to approval of Project Manager and local authority having jurisdiction over installation.
- .3 Perform tests before energizing electrical system.
- .4 Disconnect ground fault indicator during tests.

PART 1 - GENERAL

1.1 RELATED SECTIONS .1 Section 01 74 21 - Construction/Demolition Waste Management And Disposal.

1.2 WASTE MANAGEMENT AND DISPOSAL .1 Separate and recycle waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management And Disposal.  
.2 Remove from site and dispose of all packaging materials at appropriate landfill facilities.  
.3 Divert unused metal materials from landfill to metal recycling facility at Municipal Landfill.

PART 2 - PRODUCTS

2.1 SUPPORT CHANNELS .1 U shape, size 41 x 41 mm, 2.5 mm thick, suspended, steel, hot-dip galvanized.

PART 3 - EXECUTION

3.1 INSTALLATION .1 Secure equipment to hollow masonry, tile and plaster surfaces with lead anchors or nylon shields.  
.2 Secure equipment to poured concrete with expandable inserts.  
.3 Secure equipment to hollow masonry walls or suspended ceilings with toggle bolts.  
.4 Secure surface mounted equipment with twist clip fasteners to inverted T bar ceilings. Ensure that T bars are adequately supported to carry weight of equipment specified before installation.  
.5 Support equipment, conduit or cables using clips, spring loaded bolts, cable clamps designed as accessories to basic channel members.

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- .6 Fasten exposed conduit or cables to building construction or support system using straps.
  - .1 One-hole malleable iron straps to secure surface conduits and cables 50 mm and smaller.
  - .2 Two-hole steel straps for conduits and cables larger than 50 mm.
  - .3 Beam clamps to secure conduit to exposed steel work.
  
- .7 Suspended support systems.
  - .1 Support individual cable or conduit runs with 6 mm dia threaded rods and spring clips.
  - .2 Support 2 or more cables or conduits on channels supported by 6 mm dia threaded rod hangers where direct fastening to building construction is impractical.
  
- .8 For surface mounting of two or more conduits use channels at 1.5 m on centre spacing.
  
- .9 Provide metal brackets, frames, hangers, clamps and related types of support structures where indicated or as required to support conduit and cable runs.
  
- .10 Ensure adequate support for raceways and cables dropped vertically to equipment where there is no wall support.
  
- .11 Do not use wire lashing or perforated strap to support or secure raceways or cables.
  
- .12 Do not use supports or equipment installed for other trades for conduit or cable support except with permission of other trade and approval of Project Manager.
  
- .13 Install fastenings and supports as required for each type of equipment cables and conduits, and in accordance with manufacturer's installation recommendations.

PART 1 - GENERAL

1.1 REFERENCES .1 CSA C22.1-2012, Canadian Electrical Code, Part 1.

1.2 WASTE MANAGEMENT AND DISPOSAL .1 Separate and recycle waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management And Disposal.

PART 2 - PRODUCTS

2.1 OUTLET AND CONDUIT BOXES GENERAL .1 Size boxes in accordance with CSA C22.1.  
.2 102 mm square or larger outlet boxes as required for special devices.  
.3 Gang boxes where wiring devices are grouped.  
.4 Blank cover plates for boxes without wiring devices.  
.5 Combination boxes with barriers where outlets for more than one system are grouped.

2.2 SHEET STEEL OUTLET BOXES .1 Electro-galvanized steel single and multi gang flush device boxes for flush installation, minimum size 76 x 50 x 38 mm or as indicated. 102 mm square outlet boxes when more than one conduit enters one side with extension and plaster rings as required.  
.2 102 mm square or octagonal outlet boxes for lighting fixture outlets.  
.3 102 mm square outlet boxes with extension and plaster rings for flush mounting devices in finished plaster tile walls.

2.3 MASONRY BOXES .1 Electro-galvanized steel masonry single and multi gang boxes for devices flush mounted in exposed block walls.

- 2.4 CONCRETE BOXES .1 Electro-glavanized sheet steel concrete type boxes for flush mount in concrete with matching extension and plaster rings as required.
- 2.5 CONDUIT BOXES .1 Cast FS or FD feraloy boxes with factory-threaded hubs and mounting feet for surface wiring of switches and receptacle.
- 2.6 FITTINGS - GENERAL .1 Bushing and connectors with nylon insulated throats.
- .2 Knock-out fillers to prevent entry of debris.
- .3 Conduit outlet bodies for conduit up to 32 mm and pull boxes for larger conduits.
- .4 Double locknuts and insulated bushings on sheet metal boxes.

PART 3 - EXECUTION

- 3.1 INSTALLATION .1 Support boxes independently of connecting conduits.
- .2 Fill boxes with paper, sponges or foam or similar approved material to prevent entry of debris during construction. Remove upon completion of work.
- .3 For flush installations mount outlets flush with finished wall using plaster rings to permit wall finish to come within 6 mm of opening.
- .4 Provide correct size of openings in boxes for conduit, mineral insulated and armoured cable connections. Reducing washers are not allowed.

PART 1 - GENERAL

1.1 REFERENCES

- .1 Canadian Standards Association (CSA)
  - .1 CAN/CSA C22.2 No. 18-98, Outlet Boxes, Conduit Boxes, and Fittings and Associated Hardware.
  - .2 CSA C22.2 No. 45-M1981(R1992), Rigid Metal Conduit.
  - .3 CSA C22.2 No. 56-1977(R1999), Flexible Metal Conduit and Liquid-Tight Flexible Metal Conduit.
  - .4 CSA C22.2 No. 83-M1985(R1999), Electrical Metallic Tubing.
  - .5 CSA C22.2 No. 211.2-M1984(R1999), Rigid PVC (Unplasticized) Conduit.

1.2 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate and recycle waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management And Disposal.
- .2 Place materials defined as hazardous or toxic waste in designated containers.
- .3 Ensure emptied containers are sealed and stored safely for disposal.
- .4 Collect and separate plastic, paper packaging and corrugated cardboard in accordance with Waste Management Plan.

PART 2 - PRODUCTS

2.1 CONDUITS

- .1 Rigid metal conduit: to CSA C22.2 No. 45, hot dipped galvanized steel threaded.
- .2 Electrical metallic tubing (EMT): to CSA C22.2 No. 83, with couplings with expanded ends.
- .3 Rigid pvc conduit: to CSA C22.2 No. 211.2.
- .4 Flexible metal conduit: to CSA C22.2 No. 56, steel liquid-tight flexible metal.

- 2.2 CONDUIT FASTENINGS
- .1 One hole malleable iron straps to secure surface conduits 50 mm and smaller. Two hole steel straps for conduits larger than 50 mm.
  - .2 Beam clamps to secure conduits to exposed steel work.
  - .3 Channel type supports for two or more conduits at 1.5 m oc.
  - .4 Threaded rods, 6 mm dia., to support suspended channels.

- 2.3 CONDUIT FITTINGS
- .1 Fittings: manufactured for use with conduit specified. Coating: same as conduit.
  - .2 Factory "ells" where 90° bends are required for 25 mm and larger conduits.
  - .3 Watertight connectors and couplings for EMT. Set-screws are not acceptable.

- 2.4 FISH CORD
- .1 Polypropylene.

PART 3 - EXECUTION

- 3.1 INSTALLATION
- .1 Install conduits to conserve headroom in exposed locations and cause minimum interference in spaces through which they pass.
  - .2 Conceal conduits except in mechanical and electrical service rooms and in unfinished areas.
  - .3 Use rigid hot dipped galvanized steel threaded conduit except where specified otherwise.
  - .4 Use electrical metallic tubing (EMT) above 2.4 m not subject to mechanical injury.
  - .5 Use rigid PVC conduit in areas subject to water spray.
  - .6 Use flexible metal conduit for connection to

motors in dry areas connection to surface or recessed fluorescent fixtures.

- .7 Use liquid tight flexible metal conduit for connection to motors or vibrating equipment in damp, wet or corrosive locations.
- .8 Minimum conduit size for lighting and power circuits: 16 mm.
- .9 Bend conduit cold. Replace conduit if kinked or flattened more than 1/10th of its original diameter.
- .10 Mechanically bend steel conduit over 19 mm dia.
- .11 Field threads on rigid conduit must be of sufficient length to draw conduits up tight.
- .12 Install fish cord in empty conduits.
- .13 Remove and replace blocked conduit sections. Do not use liquids to clean out conduits.
- .14 Dry conduits out before installing wire.

3.2 SURFACE  
CONDUITS

- .1 Run parallel or perpendicular to building lines.
- .2 Group conduits wherever possible on suspended or surface channels.
- .3 Do not pass conduits through structural members except as indicated.
- .4 Do not locate conduits less than 75 mm parallel to steam or hot water lines with minimum of 25 mm at crossovers.

3.3 CONCEALED  
CONDUITS

- .1 Run parallel or perpendicular to building lines.
- .2 Do not install horizontal runs in masonry walls.
- .3 Do not install conduits in concrete toppings.

PART 1 - GENERAL

- 1.1 SECTION INCLUDES .1 Switches, receptacles, wiring devices, cover plates and their installation.
- 1.2 RELATED SECTIONS .1 Section 01 33 00 - Submittal Procedures.  
.2 Section 01 74 21 - Construction/Demolition Waste Management and Disposal.  
.3 Section 26 05 01 - Common Work Results - Electrical.
- 1.3 REFERENCES .1 Canadian Standards Association (CSA International)  
.1 CSA-C22.2 No.42-99(R2002), General Use Receptacles, Attachment Plugs and Similar Devices.  
.2 CSA-C22.2 No.42.1-00, Cover Plates for Flush-Mounted Wiring Devices (Bi-national standard, with UL 514D).  
.3 CSA-C22.2 No.55-M1986(July 2001), Special Use Switches.  
.4 CSA-C22.2 No.111-00, General-Use Snap Switches (Bi-national standard, with UL 20, twelfth edition).
- 1.4 SHOP DRAWINGS AND PRODUCT DATA .1 Submit shop drawings and product data in accordance with Section 01 33 00 - Submittal Procedures.

PART 2 - PRODUCTS

- 2.1 SWITCHES .1 15 A, 120 V, single pole, three-way or four-wayswitches to: CSA-C22.2 No.55 and CSA-C22.2 No.111.  
.2 Manually-operated general purpose ac switches with following features:  
.1 Terminal holes approved for No. 10 AWG wire.  
.2 Silver alloy contacts.  
.3 Urea or melamine moulding for parts subject

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to carbon tracking.

.4 Suitable for back and side wiring.

.5 Brown toggle.

.3 Toggle operated locking fully rated for tungsten filament and fluorescent lamps, and up to 80% of rated capacity of motor loads.

.4 Switches of one manufacturer throughout project.

2.2 PASSIVE INFARED  
OCCUPANCY SENSING  
SWITCH

.1 Designer style passive infared occupancy sensing switch.

.2 Features:

.1 Lights to automatically shut off when room is vacant.

.2 Adjustable sensitivity and "Time Out" period.

.3 LED indicator.

.4 Three (3) sire universal.

.5 Beep tone before lights go off.

.6 Initial time setting: 8 minutes.

.7 Rating: 1000 VA.

.8 Auto On Feature.

.9 Manual off feature.

.3 Standard of Acceptance: Watt-Stopper - WS-120-I or WS-347-I as appropriate.

2.2 RECEPTACLES

.1 Duplex receptacles, CSA type 5-15 R, 125 V, 15 A, U ground, to: CSA-C22.2 No.42 with following features:

.1 Brown urea moulded housing.

.2 Suitable for No. 10 AWG for back and side wiring.

.3 Break-off links for use as split receptacles.

.4 Eight back wired entrances, four side wiring screws.

.5 Triple wipe contacts and rivetted grounding contacts.

.2 Other receptacles with ampacity and voltage as indicated.

.3 Receptacles of one manufacturer throughout

project.

- .4 Class "A" ground-fault protection, where indicated.

2.3 COVER PLATES

- .1 Cover plates for wiring devices to: CSA-C22.2 No.42.1.
- .2 Cover plates from one manufacturer throughout project.
- .3 Sheet steel utility box cover for wiring devices installed in surface-mounted utility boxes.
- .4 Stainless steel, 1 mm thick cover plates for wiring devices mounted in flush-mounted outlet box.
- .5 Sheet metal cover plates for wiring devices mounted in surface-mounted FS or FD type conduit boxes.
- .6 Weatherproof double lift spring-loaded cast aluminum cover plates, complete with gaskets for exterior duplex receptacles.
- .7 Weatherproof spring-loaded cast aluminum cover plates complete with gaskets for single receptacles or switches.

PART 3 - EXECUTION

3.1 INSTALLATION

- .1 Switches:
  - .1 Install single throw switches with handle in "UP" position when switch closed.
  - .2 Install switches in gang type outlet box when more than one switch is required in one location.
  - .3 Mount toggle switches at height in accordance with Section 26 05 01 - Common Work Results - Electrical.
- .2 Receptacles:
  - .1 Install receptacles in gang type outlet box when more than one receptacle is required in one

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location.

.2 Mount receptacles at height in accordance with Section 26 05 01 - Common Work Results - Electrical as indicated.

.3 Where split receptacle has one portion switched, mount vertically and switch upper portion.

.3 Cover plates:

.1 Protect stainless steel cover plate finish with paper or plastic film until painting and other work is finished.

.2 Install suitable common cover plates where wiring devices are grouped.

.3 Do not use cover plates meant for flush outlet boxes on surface-mounted boxes.

PART 1 - GENERAL

- 1.1 REFERENCES .1 Canadian Standards Association (CSA)  
.1 CSA C22.2 No. 245.12-94, Low Voltage Fuses  
Part 12: Class R (Bi-National Standard with, UL  
248-12 (1st Edition).
- 1.2 SUBMITTALS .1 Provide submittals in accordance with Section  
01 33 00 - Submittal Procedures.
- .2 Product Data:  
.1 Provide fuse performance data  
characteristics for each fuse type and size above  
600 A. Performance data to include: average  
melting time-current characteristics.
- .3 Shop Drawings:  
.1 Provide shop drawings in accordance with  
Section 01 33 00 - Submittal Procedures.  
.2 Submit drawings stamped and signed by  
professional engineer registered or licensed in  
Newfoundland and Labrador.
- 1.3 DELIVERY,  
STORAGE AND  
HANDLING .1 Ship fuses in original containers.
- .2 Do not ship fuses installed in switchboard.
- .3 Store fuses in original containers in original  
container in moisture free location.
- .4 Waste Management and Disposal:  
.1 Separate waste materials for recycling in  
accordance with Section 01 74 21 -  
Construction/Demolition Waste Management and  
Disposal.
- 1.4 MAINTENANCE  
MATERIALS .1 Provide maintenance materials in accordance with  
Section 01 78 00 - Closeout Submittals.
- .2 Three (3) spare fuses of each type and size  
installed above 600 A.
- .3 Six spare fuses of each type and size installed  
up to and including 600 A.

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PART 2 - PRODUCTS

2.1 FUSES - GENERAL

- .1 Fuse type references L1, L2, J1, R1, etc. have been adopted for use in this specification.
- .2 Fuses: product of one manufacturer.

2.2 FUSE TYPES

- .1 Class J fuses.
  - .1 Type J1, time delay, capable of carrying 500% of its rated current for 10 s minimum.

PART 3 - EXECUTION

3.1 INSTALLATION

- .1 Install fuses in mounting devices immediately before energizing circuit.
- .2 Ensure correct fuses fitted to assigned electrical circuit.
- .3 Install spare fuses in fuse storage cabinet.

PART 1 - GENERAL

- 1.1 SECTION INCLUDES .1 Materials for moulded-case circuit breakers, circuit breakers, and ground-fault circuit-interrupters, fused circuit breakers.
- 1.2 RELATED SECTIONS .1 Section 01 33 00 - Submittal Procedures.  
.2 Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
- 1.3 REFERENCES .1 Canadian Standards Association (CSA International).  
.1 CSA-C22.2 No. 5-02, Moulded-Case Circuit Breakers, Molded-Case Switches and Circuit-Breaker Enclosures (Tri-national standard with UL 489, tenth edition, and the second edition of NMX-J-266-ANCE).
- 1.4 SUBMITTALS .1 Submit product data in accordance with Section 01 33 00 - Submittal Procedures.
- 1.5 WASTE MANAGEMENT AND DISPOSAL .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

PART 2 - PRODUCTS

- 2.1 BREAKERS GENERAL .1 Moulded-case circuit breakers, Circuit breakers: to CSA C22.2 No. 5  
.2 Bolt-on moulded case circuit breaker: quick-make, quick-break type, for manual and automatic operation with temperature compensation for 40 degrees C ambient.  
.3 Plug-in moulded case circuit breakers: quick-make, quick-break type, for manual and automatic operation with temperature compensation for 40

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degrees C ambient.

- .4 Common-trip breakers: with single handle for multi-pole applications.
- .5 Magnetic instantaneous trip elements in circuit breakers to operate only when value of current reaches setting.

2.2 THERMAL  
MAGNETIC BREAKERS  
DESIGN A

- .1 Moulded case circuit breaker to operate automatically by means of thermal and magnetic tripping devices to provide inverse time current tripping and instantaneous tripping for short circuit protection.

2.3 MAGNETIC  
BREAKERS DESIGN  
B

- .1 Moulded case circuit breaker to operate automatically by means of magnetic tripping devices to provide instantaneous tripping for short circuit protection.

2.4 OPTIONAL  
FEATURES

- .1 Include:
  - .1 Shunt trip where indicated.
  - .2 On-off locking device where indicated.

PART 3 - EXECUTION

3.1 INSTALLATION

- .1 Install circuit breakers as indicated.

PART 1 - GENERAL

- 1.1 SECTION INCLUDES
- .1 Materials and installation for non-fused disconnect switches.
- 1.2 RELATED SECTIONS
- .1 Section 01 33 00 - Submittal Procedures.
- .2 Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
- .3 Section 26 05 01 - Common Work Results - Electrical.
- 1.3 REFERENCES
- .1 Canadian Standards Association (CSA International).
- .1 CAN/CSA C22.2 No.4-M89 (R2000), Enclosed Switches.
- .2 CSA C22.2 No.39-M89 (R2003), Fuseholder Assemblies.
- 1.4 SUBMITTALS
- .1 Submit product data in accordance with Section 01 33 00 - Submittal Procedures.

PART 2 - PRODUCTS

- 2.1 DISCONNECT SWITCHES
- .1 Fusible and non-fusible, horsepower rated disconnect switch in CSA Enclosure as indicated, to CAN/CSA C22.2 No.4 size as indicated.
- .2 Provision for padlocking in on-off switch position by three locks.
- .3 Mechanically interlocked door to prevent opening when handle in ON position.
- .4 Quick-make, quick-break action.
- .5 ON-OFF switch position indication on switch enclosure cover.

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- 2.2 EQUIPMENT IDENTIFICATION
- .1 Provide equipment identification in accordance with Section 26 05 01 - Common Work Results - Electrical.
  - .2 Indicate name of load controlled on size 4 nameplate.

PART 3 - EXECUTION

- 3.1 INSTALLATION
- .1 Install disconnect switches complete with fuses if applicable.

PART 1 - GENERAL

1.1 REFERENCES

- .1 American National Standards Institute (ANSI)
  - .1 ANSI C82.4-92, Ballasts for High-Intensity-Discharge and Low-Pressure Sodium Lamps.
- .2 American National Standards Institute/Institute of Electrical and Electronics Engineers (ANSI/IEEE).
  - .1 ANSI/IEEE C62.41-1991, Surge Voltages in Low-Voltage AC Power Circuits.
- .3 American Society for Testing and Materials (ASTM)
  - .1 ASTM F 1137-88(1993), Specification for Phosphate/Oil and Phosphate/Organic Corrosion Protective Coatings for Fasteners.
- .4 United States of America, Federal Communications Commission (FCC)
  - .1 FCC (CFR47) EM and RF Interference Suppression.

1.2 RELATED SECTIONS

- .1 Section 01 33 00 - Submittal Procedures.
- .2 Section 01 74 21 - Construction/Demolition Waste Management And Disposal.
- .3 Section 01 45 00 - Quality Control.

1.3 SHOP DRAWINGS AND PRODUCT DATA

- .1 Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit complete photometric data prepared by independent testing laboratory for luminaires where specified, for review by Project Manager.

1.4 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate and recycle waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management And Disposal.
- .2 Place materials defined as hazardous or toxic

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waste in designated containers.

- .3 Ensure emptied containers are sealed and stored safely for disposal.
- .4 Disposal of waste fluorescent lamps.

PART 2 - PRODUCTS

2.1 LUMINAIRES

- .1 Refer to the Lighting Fixture Schedule on the drawings and the floor plans for detailed requirements of luminaires to be supplied and installed under this Contract.

2.2 LIGHTING CONTROL

- .1 Refer to drawings for lighting control particulars.

PART 3 - EXECUTION

3.1 INSTALLATION

- .1 Locate and install luminaires as required.
- .2 Special installation:
  - .1 Luminaire design.
- .3 Relocate existing lighting as indicated to accommodate new mechanical equipment installation.

3.2 WIRING

- .1 Connect luminaires to lighting circuits:
  - .1 Directly for luminaire designs.
  - .2 Through flexible rigid conduit for luminaire designs.
  - .3 By use of modular wiring system for luminaire design.

3.3 LUMINAIRE SUPPORTS

- .1 For suspended ceiling installations support luminaires independently of ceiling support luminaires from ceiling grid in accordance with local inspection requirements.

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3.4 LUMINAIRE  
ALIGNMENT

- .1 Align luminaires mounted individually parallel  
or perpendicular to building grid lines.

PART 1 - GENERAL

1.1 REFERENCES

- .1 Atomic Energy Control Board Regulations
- .2 Canadian Code for Preferred Packaging
- .3 Canadian Standards Association (CSA)
  - .1 CSA C22.2 No.141-M1985(R1992), Unit Equipment for Emergency Lighting.
  - .2 CSA C860-96, Performance of Internally-Lighted Exit Signs.
- .4 National Fire Protection Association (NFPA) requirements
- .5 National Building Code of Canada.

1.2 SUBMITTALS

- .1 Submit product data in accordance with Section 01 33 00 - Submittals.
- .2 Submit product data sheets for exit lights. Include product characteristics, performance criteria, physical size, limitations and finish.
- .3 Manufacturer's Instructions: Provide to indicate special handling criteria, installation sequence and cleaning procedures.

PART 2 - PRODUCTS

2.1 STANDARD UNITS

- .1 Exit lights: to CSA C22.2 No.141 and CSA C860, packaged in accordance with the Canadian Code for Preferred Packaging guidelines.
- .2 Housing: cold rolled steel minimum 1.0 mm thick.
- .3 Face and back plates: die formed cold rolled steel.
- .4 Lamps:LED-12 Wover 500,000 hours, 120 V supply.
- .5 Operation: designed for over 100,000 hours of continuous operation without relamping.
- .6 To be "pictogram running man" to meet latest

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edition of the National Building Code of Canada.

PART 3 - EXECUTION

3.1 INSTALLATION

- .1 Install exit lights.
- .2 Connect fixtures to exit light circuits.
- .3 Connect emergency input to emergency circuits.
- .4 Ensure that exit light circuit breaker is locked in on position.

PART 1 - GENERAL

1.1 SCOPE OF WORK

- .1 Testing and commissioning are called for throughout the individual specifications. This does not relieve this trade from providing all testing and commissioning necessary to ensure that systems and equipment operate as required and that they interface with other systems and equipment as required.

1.2 SECTION INCLUDES

- .1 Commissioning of all building electrical systems and components including:
  - .1 Testing and adjustment.
  - .2 Demonstrations and training.
  - .3 Instructions of all procedures for Owner's Personnel.
  - .4 Updating as-built data.
  - .5 Co-ordination of Operation and Maintenance material.

1.3 RELATED SECTIONS

- .1 Section 01 77 00 - Closeout Procedures
- .2 Section 01 91 13 - General Commissioning (Cx) Requirements.
- .3 Section 26 05 00 - Common Work Results - Electrical.

1.4 REFERENCES

- .1 CSA (Canadian Standards Association).
- .2 Underwriters Laboratories of Canada.

1.5 QUALITY  
ASSURANCE

- .1 Provide qualified trades persons, certified testing agencies, factory trained and approved by the Commissioning Team Leader.
- .2 Submit the names of all personnel to be used during the Commissioning activities for Owner approval.

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1.6 COMMISSIONING

- .1 The purpose of the commissioning process is to fully test all building systems including architectural, mechanical and electrical components and operating procedures by challenging these systems to realistic operation conditions.
- .2 The Commissioning activities shall be coordinated by the General Contractor.
- .3 Commissioning activities for the electrical systems must have available up to date as-built drawing information and accurate Operations and Maintenance Manuals. These documents shall be a major part of this activity.
- .4 Contractor shall be responsible to update all documentation with information and any changes duly noted during the Commissioning exercise.
- .5 Contractor shall arrange for all outside suppliers, equipment manufacturers, test agencies and others as identified in the commissioning sections of this specification. The cost associated with this requirement shall be included as part of the tender price.

1.7 SUBMITTALS

- .1 A commissioning document shall be prepared by the Owner's Representative prior to conducting these activities for use by the Commissioning Team.
- .2 The electrical sub-contractor shall be responsible for ensuring all activities are properly documented in this manual and co-ordinated through the General Contractor.
- .3 As-built drawings and data books must be available two weeks prior to commissioning for review and use by the consultant and Commissioning Team prior to the start of the commissioning activities.

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1.8 PREPARATION

- .1 Provide test instruments required for all activities as defined in the commissioning documents.
- .2 Verify all systems are in compliance with the requirements of the commissioning documents prior to the pre-commissioning check out operation.
- .3 Confirm all scheduled activities have identified personnel available.
- .4 Where systems or equipment do not operate as required, make the necessary corrections or modifications, re-test and re-commission.

1.9 SYSTEM DESCRIPTION

- .1 Perform all start-up operations, control adjustments, trouble shooting, servicing and maintenance of each item of equipment as defined in the commissioning documentation.
- .2 Owner will provide list of personnel to receive instructions and will co-ordinate their attendance at agreed upon times.
- .3 Prepare and insert additional data in the operations and maintenance manuals and update as-built drawings when need for additional data becomes apparent during the commissioning exercise.
- .4 Where instruction is specified in the commissioning manual, instruct personnel in all phases of operation and maintenance using operation and maintenance manuals as the basis of instruction.
- .5 Conduct presentation on Owner's premises. Owner will provide space.

1.10 FINAL REPORT

- .1 This trade shall assemble all testing data and commissioning reports and submit them to the Owner.
- .2 Each form shall bear signature of recorder, and that of supervisor of reporting organizer.

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SYSTEMS

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1.11 SCHEDULE OF  
ACTIVITIES

- .1 Commissioning activities shall be conducted based on pre-established schedule with all members of the commissioning team, refer to Section 01 91 13 - General Commissioning (Cx) Requirements.
- .2 In addition, there will be two meetings held through the contract duration to introduce the parties of the commissioning team, establish the schedules and deadlines for the various activities and review the Commissioning Manual.
- .3 Adhering to the established schedule is very important as the co-ordination and scheduling of the participants will be difficult to alter once this is established. Close co-ordination of this schedule is important.
- .4 In the event project cannot be commissioned in the allotted time slot, the contractor shall pay for all costs associated with assembling the Commissioning Team at a later date. If the contractor has not performed his duties to reach commissioning stage as outlined earlier, he will incur all expenses of other trades and the Commissioning Team due to his non-compliance.

PART 2 - PRODUCTS

N/A

PART 3 - EXECUTION

N/A

PART 1 - GENERAL

1.1 GENERAL

- .1 This section describes the extent of services to be provided for wiring of equipment supplied by others.
- .2 Within the context of this section, Others means:
  - .1 Other divisions of this specification (i.e.: Division 25 - Integrated Automation).
  - .2 The Owner, as defined in the Contract.

1.2 EXTENT OF SERVICES PROVIDED

- .1 The work of this contract is to include all power and control wiring of equipment which is provided by Division 26.
- .2 All power and control wiring above 50 V for equipment supplied by Division 25 will be the responsibility of this contractor. Coordinate with Integrated Automation contractor for exact requirements.
- .3 All control wiring 50 V and less for equipment supplied by Division 25 will be the responsibility of Division 25- Integrated Automation Contractor. Conduit and wire associated with this is the responsibility of Division 25.
- .4 All power and control wiring associated with equipment supplied by Division 01 will be the responsibility of this contractor. Coordinate with general contractor for exact requirements. See Section 26 27 97 - Door Hardware Wiring for exceptions for wiring of door lock systems.
- .5 Final connection of all wiring to equipment provided by others (except control wiring below 50 V associated with Division 25 equipment) will be by division 26. Coordinate with the provider for connection instructions.

1.3 RESPONSIBILITY  
OF DIVISION 26

- .1 It is the responsibility of the Division 26 subcontractor to verify final requirements for wiring of all equipment noted. Verification of wiring requirements to include:
  - .1 Confirmation of electrical characteristics.
  - .2 Location of connection point.
  - .3 Method of connection (i.e. direct or plug-in etc.)
- .2 Obtain and become familiar with shop drawings for all relevant equipment.
- .3 No claim for extra will be entertained for wiring equipment which has been indicated, or changes to installed wiring where installation proceeded prior to verification of electrical requirements.

PART 2 - PRODUCTS

N/A

PART 3 - EXECUTION

N/A

PART 1 - GENERAL

- 1.1 RELATED SECTIONS
- .1 Section 01 74 21 - Construction/Demolition Waste Management And Disposal.
- 1.2 WASTE MANAGEMENT AND DISPOSAL
- .1 Separate and recycle waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management And Disposal.
- .2 Remove from site and dispose of all packaging materials at appropriate recycling facilities.
- .3 Collect and separate for disposal paper plastic polystyrene corrugated cardboard packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.
- .4 Divert unused metal and wiring materials from landfill to metal recycling facility as approved by Representative.
- .5 Fold up metal banding, flatten and place in designated area for recycling.
- 1.3 SYSTEM DESCRIPTION
- .1 Telephone/data system consists of outlet boxes, cover plates, service conduits, pull boxes, sleeves and caps, fish wires, cabling, data rack, patch panels, termination panel, outlets, cable identification system, and service fittings.
- 1.4 TEST DATA
- .1 Include system test data in the Operation and Maintenance Manual specified in Section 01 78 00 - Closeout Submittals.
- 1.5 REFERENCES
- .1 CAN/CSA-T530-M90, Building Facilities, Design Guidelines for Telecommunications.
- .2 CAN/CSA-T529-M91, Design Guidelines for

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Telecommunications Wiring System in Commercial Buildings.

- .3 CAN/CSAC-22.2 No.214-M90, Communications Cables.
- .4 CAN/CSA-C22.2 No. 214-M90, Plugs, Receptacles, and Connectors for Communication Systems.
- .5 EIA/TIA Bulletin TSB-36, Technical Systems Bulletin Additional Cable Specifications for Unshielded Twisted Pair Cables, Electronic Industries Association (USA), November 1991.
- .6 Building Industry Consulting services International (BICSI) Telecommunications Distribution Methods Manual (TDMM).

PART 2 - PRODUCTS

2.1 TELEPHONE/DATA WIRE

- .1 All telephone/data wire inside building to be Belden 1BDN Nordex/CDT, CAT 6 white.

2.2 MATERIAL

- .1 Conduits as indicated: to Section 26 05 34 - Conduits, Conduit Fastenings and Conduit Fittings.
- .2 Junction boxes: to Section 26 05 32 - Outlet Boxes, Conduit Boxes and Fittings.
- .3 Outlet boxes and fittings:
  - .1 Double gang, minimum 100 mm x 100 mm x 54 mm deep and flush mounted in all areas.
  - .2 Outlet boxes shall be installed in locations identified. The outlet box shall be installed at 300 mm AFF or at the same height and within 300 mm of the adjacent electrical duplex receptacles, unless otherwise noted on the building plans. Wherever possible, the face of the plastic ring should be installed flush with the finished wall.
  - .3 Back to back outlet boxes shall not be used.
  - .4 Outlet boxes must be equipped with a plaster ring to accommodate the installation of telecommunication face plates.

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- .5 Plaster rings will be specified as single or double gang to accommodate requirements.
- .6 Plaster rings or raised adapter plates shall not reduce the size of the outlet such that two additional outlets could not be added in the future.
- .4 Data Cat. Cabling Distribution Box:
  - .1 Hinged wall mount bracket open frame heavy duty rack. Equal to HP 10842 G2 Wide 42U 19" AF401A.
  - .2 Cat. 6 work station patch panels to be 12, 24 or 48 port. Provide a sufficient number of points plus 25% spare.
  - .3 One horizontal CMS between each patch panel.
  - .4 Distribute patch panels equally on the rack.
  - .5 Owner supplied hubs to be mounted on the rack. Coordinate with owner for the exact mounting arrangement.
  - .6 Coordinate actual location of patch panel and hubs with Owner.
  - .7 Supply and install a #6 AWG insulated ground wire from the telephone panel ground bus to the cable distribution rack.
- .5 Horizontal Data/Voice Cabling:
  - .1 Each outlet will be wired with Category 6 FT6 cable for data and Category 6 FT6 cable for voice.
  - .2 Each data cable will terminate on its own ISDN RJ45 jack in a single enhanced Cat. 6 ISDN RJ45 mount. Flush mount for wall outlets and surface mount for modular or stand alone furniture. Coordinate with furniture system supplier for modular furniture mounting details (if applicable).
  - .3 The horizontal data cable installation must meet or exceed the EIA/TIA standard for EMI (Electro Magnetic Interference) separation.
  - .4 All horizontal cables will comply with the EIA/TIA specification for the minimum bend radius.
- .6 Cabling:
  - .1 4 pair Cat. 6 or enhanced grade FT6 cables shall be of NORDX/CDT manufacturer or approved equal.
  - .2 For every wall mount or furniture mount

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voice outlet shown on the drawings, provide and install one 4 pair UTP, Cat. 6 enhanced cables, FT6 rated. Terminate the voice cable on an RJ45 white connection.

.3 For every wall mount or furniture mount data outlet shown on the drawings, provide and install one 4 pair, UTP Cat. 6 cable. Each cable will be terminated on a Cat. 6 RJ45 blue jack. Label data cables at both ends and the outlets.

.4 Label all voice cables at both ends and the outlets.

.7 Labeling:

.1 All communication cables (Voice, Data) terminating at the same desk location shall have the same cable number designation i.e. 0001V, 0001L or 0001C where:

000	-	Room or Workstation
1	-	Outlet No. i.e. 1 or 2
V	-	V = Voice
-	-	L = Lan or Data

The labeling system shall be represented on the workstation face plate and on the appropriate patch panel port.

.8 Patch cables to be 18DN NORDEX/CDT CAT 6 Gray required for both ends.

- 1219 mm for cabinet end
- 3048 mm for deck end

.9 Voice Cable Wiring:

.1 Each 4 pair cable will terminate on a QMBIX10A block which is to be mounted on the plywood backboard. Wire all Voice/Telephone outlets to the BIX block.

.11 Wiring and General Information:

.1 Face Plates:

.1 Communication outlets shall be a single gang 4 outlet modular face plate complete with two RJ45 enhanced, Cat. 6 jacks. Provide one cable back to the Data patch panel from each outlet for data service.

.2 Voice outlets shall be mounted in the

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- above mentioned data outlet where appropriate complete with 1 RJ-11 white, enhanced, Cat. 6 jacks. Provide one Cat. 5E pair cable back to the BIX block in the Main Electrical Room.
- .3 All face plates shall be white in color.
- .12 Conduits: to Section 26 05 34 - Conduits, Conduit Fastenings and Conduit Fittings.
- .13 Outlet boxes: conduit boxes and fittings: to Section 26 05 32 - Splitters, Junction, Pull Boxes and Cabinets.
- .14 Cable: RG-6U Coaxial Cable.
- .15 Wall Taps:  
.1 Provide wall taps (outlets) in each location as indicated.  
.2 Wall taps to be in/out style complete with tap leg.  
.3 0 to 900 mHz frequency range.
- .16 Provide for a minimal 10% spare capacity.

### PART 3 - EXECUTION

#### 3.1 INSTALLATION

- .1 Install telephone/data raceway system, including fish wire, terminal cabinets, outlet boxes, pull boxes, cover plates, conduit, sleeves and caps, miscellaneous and positioning material to a constitute complete system.
- .2 Tender bids will only be accepted from the qualified cabling companies who are trained and authorized by the manufacturer they represent.
- .3 The Contractor is responsible for data and voice cabling from end to end, which includes the outlet face plate, complete with RJ-11 Cat. 6 (voice) and RJ-45 Cat. 6 (data) jacks, up to and including, the patch panel for data, and the BIX 1A for voice.
- .4 All cables, connectors, patch panels, patch

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cords, etc. shall be by the same manufacturer.

- .5 Installation to be tested and certified to enhanced Cat. 6 (voice) and Cat. 6 (data). Provide written test results to the Owner. Replace all defective materials.
- .6 Install all cables neatly. Properly support all cables. Label all cables.
- .7 Coordinate the entire installation with the Owner's staff.
- .8 Install raceway system, including fish wire, cable, splitters, terminal panels, outlet boxes, floor boxes, pull boxes, cover plates, conduit, sleeves and caps, miscellaneous and positioning material to constitute a complete system.
- .9 Identify each cable with a non-removable label indicating room and outlet serviced. Terminate all cables in telephone/data closet oneach floor and leave sufficient slack (3m) to connect to future hi-definition splitters (supplied and installed by service provider).
- .10 Provide a complete functional system.
- .11 The inside radius of a bend in a conduit shall be not less than six times the internal diameter when the conduit is less than 50 mm in diameter and ten times the internal diameter when conduit is 50 mm in diameter or larger.
- .12 All zone conduits shall be identified and labeled at both ends. Tags shall identify start and finish of conduit runs. Pull boxes shall be labeled on the exposed exterior.
- .13 All conduits shall originate and be physically connected to the telecom backboards in the MTR or Telecommunication Room, cable tray and pull box.
- .14 All metallic parts of the cable distribution supporting system shall be bonded together mechanically, including at all transition points

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(i.e. cable tray and distribution conduit not mechanically connected) using a 6 AWG green jacketed stranded copper ground wire. The metallic components of the cable distribution system shall be bonded together at the MTR and TR's and then bonded to their respective telecom ground bus bars.

- .15 All fittings, connectors and couplings are to be steel.
- .16 All conduits/sleeves that enter the MTR or any TR shall be fitted with an approved ground bushing complete with ground lug and bonded together mechanically (one continuous piece preferred). This shall be connected to the approved building ground by means of a No. 6 AWG to the grounding bus bar.
- .17 All conduits entering or exiting through the ceiling or walls of the MTR or TR shall protrude into the room 25-50 mm.
- .18 Riser sleeves in the Main Telecom Room and Telecommunication Rooms shall protrude through the floor 50 - 75 mm above finished floor (AFF).
- .19 All conduit runs shall follow building grid lines and shall be concealed where possible.
- .20 All conduits shall be thin wall EMT, reamed and bushed at both ends and bonded to the distribution system. Rigid PVC or flexible metallic or PVC conduits are NOT acceptable.
- .21 Unless otherwise specified, all conduit runs shall be maximum of 10 meters (100 ft.) in length with a maximum of two (2) 90 degree bends between pull points.
- .22 A pull box shall be placed in conduit runs where the sum of the bends exceeds 180 degrees, where the overall length of the conduit run is more than 30 m, or if there is a reverse bend in the run.
- .23 Pull boxes shall be constructed and sized in accordance with Canadian Electrical Code and TIA/ETA standards of code gauge steel and shall

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have a rust resistant finish. Locations and sizes of all pull boxes shall be as indicated on the design submission.

- .24 In all instances pull boxes shall be placed in straight sections of conduit run and shall not be used in lieu of a bend. Corresponding ends of the conduit are to be aligned with each other. Conduit fittings or pull elbow fittings shall not be used in place of pull boxes or bends.
- .25 Pull boxes shall be installed at a reasonable height, in an exposed location and such that access for installation of cables is not prohibited. Pull boxes shall not be placed in a fixed false ceiling space, unless immediately above a suitably marked and hinged access panel. Provide indicator decals on ceiling T-bar rail or ceiling tiles showing location of pull box or splice box. Refer to the Project Manager for details.
- .26 Conduit must enter the outlet boxes from the top or bottom.
- .27 All conduit shall be installed in accordance with Electrical Code, part 1, Section 12, applicable building codes and in accordance with TIA/EIA 569.
- .28 The minimum size (inside diameter) for EMT conduit running between the main Telecom Room or a Telecommunications Room and the Telecommunications outlet at an outlet location is twenty-five millimeters (25 mm).
- .29 The maximum horizontal cable run distance not to exceed 90 metres. The cable length from the mechanical termination in the TR and MTR rooms to the Telecommunications outlet. Where the horizontal distance exceeds 90 meters, provide additional rooms as required.
- .30 Cable fill capacities of conduit, cable tray and raceways shall not be greater than 40%.
- .31 Future requirements for additional cables or fibre optics to each outlet shall be considered. Refer to Project Manager for any additional

requirements.

- .32 A pull cord or fish tape shall be installed in all conduits.
- .33 The telecommunications outlet conduit system shall be labeled green.
- .25 Place pull boxes in readily accessible locations only.
- .34 The use of C, LB, LL, LR and T type fittings or elbows fittings is not permitted.
- .35 Conduits ending in the vicinity of a cable tray shall be terminated at a height of no less than 100 mm and no more than 150 mm from the top of the cable tray. Conduit runs shall not be punched through the side of the cable tray. Conduit ends are to be bonded to the cable tray. Installer is to ensure that the bonding cable is secured to the outside of the cable tray.
- .36 Installation shall comply with the latest version of National Building Code, the National Fire Code and the Canadian Electrical Code. Provincial Building Codes shall apply to design and construction if and when they are more stringent than National Codes. Regional and Municipal Codes/Bylaws may be applicable when not located on Crown Land.
- .37 Building telecommunication pathways are used for the horizontal and vertical distribution of Voice, Data and CATV circuits within a building. Telecommunication circuits can share the same pathways (conduits and cable trays) to a maximum of 40% fill ratio.

PART 1 - GENERAL

- 1.1 Description of System .1 The system is intended to provide Remote Monitoring of Intrusion, Fire or Supervisory Alarm Conditions, by an NFPA 71/ULC approved Central Monitoring Station. The first phase of the Contract consists of the supply and installation of the Intrusion Alarm Systems. The second phase of the Contract shall supply Monitoring, Maintenance and Service for a period of one year for the system installed under Phase I.
- .2 Equipment installed at the building shall become the property of the building Owner.
- .3 The system shall be monitored on a continuous dial-in basis at an approved Central Monitoring Station. The monitoring method shall be ULC certified.
- .4 System shall provide card access control as indicated.
- 1.2 Shop Drawings .1 Submit shop drawings in accordance with Section 01 33 00.
- .2 Include but not be limited to the following components:
- .1 Main Control Panel.
  - .2 Power Supplies.
  - .3 Battery Support Module.
  - .4 Communication Devices.
  - .5 Addressable Detectors: provide information on each type of detector or contact device being proposed for use on the project.
  - .6 Proximity cards.
  - .7 Proximity card readers.
  - .8 Control/Operating Panels.
  - .9 System Capabilities.
  - .10 Programming Details.
  - .11 Wire types proposed for interconnection of components.
  - .12 Communication system details including method of transmission, data, rate, error handling methods, etc.
  - .13 Programming charts for use by Owner in assigning staff and pass-codes.
  - .14 Details and location of Central

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Monitoring Station.

.15 Communication methods and systems.

.16 Motion detectors.

1.3 Reference Standards

- .1 The Intrusion Alarm Systems supplied and monitored under this project must meet the latest edition of all applicable NFPA, CSA and ULC Standards. Applicable standards include but are not limited to:
  - .1 NFPA 72 -National Fire Alarm Code.
  - .2 CAN/ULC - S304-M - "Standard for Central and Monitoring Station Burglar Alarm Units.
  - .3 Canadian Electrical Code - C22.1 -2002.
- .2 The Central Monitoring Station which supplies the monitoring for this project shall meet the latest editon of all applicable NFPA, CSA and ULC Standards. Applicable standards include but are not limited to:
  - .1 NFPA 72 - National Fire Alarm Code.
  - .2 CAN/ULC - S301-M - "Standard for Central and Monitoring Burglar Alarm Systems".
  - .3 Communication links must conform with NFPA 72 - National Fire Alarm Code.
- .3 The Central Monitoring Station shall have and maintain for the duration of the service contract a ULC listing as an approved station.

1.4 Operating and Maintenance Manuals

- .1 Submit in accordance with Section 01 33 00.
- .2 Include complete operation and maintenance details on all components supplied under this contract. Include but not be limited to:
  - .1 Control panels/operating panels.
  - .2 Power/battery systems.
  - .3 Motion detectors.
  - .4 Communication devices.
  - .5 Wiring.
  - .6 Zone assignments.
  - .7 Programming methods.
  - .8 Trouble-shooting and repair procedures.
  - .9 Contact telephone numbers for repair and maintenance.
  - .10 Dual Dialer System.
  - .11 Proximity card readers.
  - .12 Proximity cards.
- .3 Classified Information:

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.1 Two of the required Operation and Maintenance Manuals must contain complete "As Programmed" listings of all passcodes and names of personnel associated with each building or system. This information shall be treated as confidential and shall be turned over to authorized Owner's representatives only.

## PART 2 - PRODUCTS

### 2.1 System Overview .1

The system shall be a Burglary/Fire/Access Control integrated control panel, with the following capabilities:

- .1 Up to 8 System Partitions.
- .2 1500 User Codes.
- .3 3000 Event Buffer.
- .4 34 Programmable Zone Types.
- .5 61 Programmable Output Types.
- .6 Local and Remote Upload/Download.
- .7 99 Date Schedules.
- .8 50 Arm/Disarm Schedules.
- .9 99 Open/Close Suppression Schedules.
- .10 50 Seismic Sensor Test Schedules.
- .11 50 CTT (Close-Time Timer) Arming Schedules.
- .12 Two-Year Holiday Scheduling.
- .13 Automatic Daylight Savings Adjustment.
- .14 Expandable to 128 Zones Via Hardwire, Wireless and 2-Wire Addressable Loop Devices.
- .15 Add Up To 16 LCD Keypads.
- .16 Add Up To 64 Programmable Relays.
- .17 Add Up To 144 Low Power Outputs.
- .18 Add Point/Graphic Annunciation.
- .19 UL & ULC Listed For Residential and Commercial Applications.
- .20 Internet (IP) Communication.
- .21 2-Way Communication Port (RS-232) for Use with 3 Party Software Packages.
- .22 Remote System Administrator Software.
- .23 Fixed Point Alarms/Personal Portable Alarms will trigger a silent alarm and activate an internal and external response.

### 2.2 Control Panels .1

The security control panel shall have a total capacity of 128 zones. Base panel shall have a capacity of 16 hardwire zones and 112 addressable zones on two addressable loops. All zones shall be fully supervised and programmable. Panel shall be complete with integral power supply and supervised battery

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charger, auxiliary power for powering security detection devices, programmable switched auxiliary power supply for 4-wire smoke detectors, integral supervised digital alarm communicator, supervised bell/siren output, and two general purpose programmable outputs which can be programmed as general purpose output or as the systems addressable loops.

- .2 Units to support multiple remote operating panels.
- .3 Capable of communication with the Central Station.
- .4 Built-in power supply with standby batteries. Batteries to maintain a minimum 24 hour reserve. Batteries shall be capable of supporting the entire system including all detection devices and operating panels for the full twenty-four (24) hours.
- .5 Passcode system.
- .6 Built-in test feature to test both control panel and sensors.
- .7 Self-diagnostic programs.
- .8 Zone by-pass capability except for zones reserved for "Fire Alarm Signals", "Guarded Plant Alarms" and other supervisory signals such as "Low Temperature Alarms".
- .9 Passcode identification and time of entry/exit information to be transmitted and recorded at the Central Monitoring Station.
- .10 120 Volt power input.
- .11 Tamper resistant case complete with lock and tamper switch.
- .12 UL listed.
- .13 Power-on LED.
- .14 Fire Alarm reset switch.
- .15 Burglar Alarm reset switch.
- .16 Capable of supporting all other components identified in this section.

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- .17 Equipped with one (1) Form "C" output relays.
- .18 All zones which do not contain an Operating Panel shall be considered as Instantaneous and shall activate immediately on receipt of an alarm condition. All other zones shall have an adjustable delay built-in. Initial setting shall be 90 seconds.
- .19 Device Communication Bus:
  - .1 The system shall be complete with a standard, shielded, 4 conductor station wire bus for powering and communicating with remote hardwired system expansion modules and devices. The device communication bus shall be composed of up to 4 legs, with each leg up to 1,000 feet long.
- .20 Expansion:
  - .1 The panel shall be expandable to a maximum of 128 zones by adding standard hardwired 8 and/or 16 zone modules connected to the base panel via the device communication bus, by adding up to 112 addressable loops on the base panel, and by adding a 64 zone 900 MHz. Spread spectrum wireless receiver to the four-wire communication bus. The system shall be capable of expansion using hardwired, addressable and wireless simultaneously in any mix that suits the application.
- .21 User Codes:
  - .1 The system shall provide for 1,000 user codes selectable as either 4 or 6 digits. For Access Control, user codes shall be assignable to 1 of 64 access levels. User codes shall be assignable to one or multiple partitions.
- .22 Partitions:
  - .1 The system shall be programmable for up to 8 fully independent partitions each partition shall have its own account code. Keypads shall be assignable as "partition" keypads or "global" keypads. Each zone in the system shall be assignable to one or more partitions.
- .23 Data:
  - .1 The system shall provide opening/closing schedules suppression to prevent opens and closes from being reported to the central station. The system shall be capable of reporting all alarms, trouble, and and system

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status information by combinations of all communication methods installed including: digital communicator, a cellular transmitter, and DVAC.

- .24 System Event Buffer:
  - .1 The system shall have a 3,000 event buffer. All events shall be printable from the system printer. The 2,800 most recent events shall be viewable by keypad LCD display. All events shall be viewable by upload/download PC.
  
- .25 Power Supply Relay Output Modules:
  - .1 The system shall be capable of including up to 64 fully programmable output relays with form 'C' contacts rated 2 Amps at 30VDC. Relays shall be added in modules of four and may be located anywhere on the communications bus. Each module shall include a supervised 350mA 12VDC battery charger, and integral power supply to supply up to 1.0 Amp of auxiliary power at 12VDC to power direct connected devices or repower the communications bus. Provide adequate relay modules for door hardware control plus 2-% spare.
  
- .26 Central Station Reporting:
  - .1 The system shall provide high speed 20 bps 1400/2300 Hz handshake, contact ID and SIA reporting formats and shall be capable of being programmed to call up to 3 telephone numbers. The system shall also allow communication to a pager. The telephone numbers shall be programmable for "backup" dialing should the primary number fail. The system shall be programmable for split reporting such that alarms/restorals, openings/closing and miscellaneous events can be sent to different telephone numbers. The system shall report a separate account code for each partition and for non-partition (system) events.
  
- .27 Scheduling:
  - .1 The system shall provide for 99 date schedules with 4 intervals per schedule, 4 holiday schedules with 2 years of scheduling capacity, 50 open/close suppression schedules and 16 automation schedules. All schedules shall be programmable via the LCD keypads and via downloading either locally or remotely.

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- .28 Ground Fault Detection:
  - .1 The system shall include an integral ground fault detector which shall detect a single ground fault on any extended conductor in the system.
  
- .29 Supervision:
  - .1 Each zone in the system shall be supervised. The base panel and any remote panel with its own AC input shall be supervised for AC loss. Batteries for the base panel and all remote panels shall be supervised for low power and be short circuit protected. Each addressable device and each wireless input device shall be supervised for its presence. The communications bus shall be supervised for low voltage and the presence of each enrolled module and keypad. Digital alarm communicators shall be supervised for telephone line trouble and failure to communicate and the system shall report any cellular communication panel trouble.
  
- .30 False Alarm Prevention:
  - .1 The system shall include the following false alarm prevention features:
    - .1 audible exit fault.
    - .2 arm/disarm bell squawk.
    - .3 audible exist fault.
    - .4 urgency on entry delay.
    - .5 no entry arming/disarming.
    - .6 swinger shutdown.
    - .7 programmable by zone.
    - .8 transmission delay by zone.
    - .9 AC fail.
    - .10 TLM trouble and low battery trouble transmission delay.
    - .11 recent close code transmission.
    - .12 police code (cross zone) transmission.
    - .13 opening after alarm transmission
    - .14 arming/disarming from outside the protected space using access control.
  
- .31 System Programming:
  - .1 The system shall be fully programmable via the LCD keypads and shall also allow event buffer viewing via the keypads.
  - .2 Separate PC based upload/download software shall allow programming and operation from a directly connected local computer, or from a remote computer via a telephone line or LINKS cellular communications equipment. Remote access shall be controlled by the owner

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to prevent unauthorized access.

- .32 Wireless receiver: up to 32 inputs per unit, supports panic button 319.5 UHZ frequency

2.3 Operating Panels

- .1 Suitable for operation with the Control Panel.
- .2 Complete with a keyless touch-pad, alpha-numeric display and internal buzzer.
- .3 Panel to provide display, test, ON, Bypass and programming interfaces to the control panel.
- .4 Capable of a verbal point alarm indication and description.
- .5 UL listed for use with Control Panel.

2.4 Detection Devices

- .1 Provide as indicated on drawings. Identify each detector with the device number so as to permit quick identification and location of detectors in alarm.
- .2 Adjust location as necessary to suit site conditions and to optimize coverage.
- .3 All devices to be ULC listed and suitable for use with control panel.
- .4 All detectors must operate between -17° C to 50° C.
- .5 All detectors shall have screw terminals for attachment of communication's conductors.
- .6 Mounting Brackets: Provide corner, ceiling or wall brackets as appropriate.
- .7 Passive Infrared Detector - Type "PU":
  - .1 Multi-level addressable detector compatible with main panel and communications bus.
  - .2 Range: 15.2 m by 90°
  - .3 Temperature compensated.
  - .4 Closed circuit tamper switch and alarm output form relay.
  - .5 Dimensions (approximate): 90 mm high, 65 mm wide, 48 mm deep.

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- .8 Passive Infrared detector - addressable ceiling mounted - Type "PC":
  - .1 Suitable for mounting heights between 2.4 m and 4.5 m.
  - .2 Range: 7.3 m x 360°
  - .3 12 curtain field of view.
  - .4 Bi-directional, 1 zone (2 pulses) with motor verification.
  - .5 Closed circuit tamper switch and alarm output form C relay.
  - .6 Dimensions (approximate): 125 mm diameter by 87.5 mm deep.
  
- .9 Door Contacts - Type "DC" or Type "DX":
  - .1 Addressable waterproof magnetic glass enclosed reed type.
  - .2 Use embedded version if possible. If not possible use surface mounting type.
  - .3 Maximum working gap: 19 mm.
  - .4 Form C relay contacts.

2.5 Panic Button

- .1 Wireless single pushbutton device for Facilities Personnel use to activate a remote alarm at monitoring station, compact design, 2 second activation delay, LED light to indicate signal transmission, 433 MHZ technology, supervised system, ULC approved, complete with lithium batteries, multifunction attachment clip and neck strap. Acceptable Material: DSC Model WS4938. Supply 10 units.

2.6 Access Control .1

- .1 The system shall be capable of accepting up to 16 dual card reader modules for a total of 32 access readers. Each dual module shall be complete with an integral power supply, supervised battery charger and shall provide full standalone operation if communication with the base panel is lost. The module shall include non-volatile memory to retain all schedules and programming information even if AC and battery power are lost. The dual reader panels shall be capable of being added to the system anywhere on the 4-wire communication bus up to 1,000 feet per leg from the base panel.
  
- .2 The dual access control module shall accept a variety of proximity readers, magnetic stripe readers and any 26 bit Wiegand reader and readers shall be capable of being located up to 500 feet from the module. The dual module shall have inputs for 'request-to-exit' detectors,

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'postpone arm' pushbuttons, 'arm' pushbuttons,  
'door' contacts and outputs for door strikes.

- .3 Access control software shall be an integral component of the base panel software and shall provide the following functions: capacity for 1,500 cards and up to 64 access levels, 99 seven day schedules with 4 intervals per schedule, holiday scheduling for a two year period, individual door unlock schedules, a programmable option to require 2 cards to open a specific door, ability to unlock doors automatically on fire alarm and automatic daylight saving time adjust. Access control functions shall be fully programmable through any system keypad and either locally or remotely using any PC and the upload/download software.
- .4 All access control transactions shall be recorded in the systems 3,000 event buffer for viewing via the keypad, for printing on a local printer or viewing locally or remotely via the upload/download software.

2.7 Proximity Card Readers

- .1 26-bit Wiegand format.
- .2 Up to 300m (1000 ft) unshielded cable.
- .3 Up to 73cm (29in) read range.
- .4 Digital signal processing (DSP) for enhanced security.
- .5 Indoor/outdoor use.
- .6 Integrated piezo buzzer & bicolor LED.
- .7 Integrated tamper switch.
- .8 Voltage Requirements: 12 to 28 VDC.
- .9 Integrated 12 button keypad with arming/disarming and alarm triggering features.
- .10 Standard of Acceptance: Kantech ioProx P600 Series.

2.8 Proximity Cards

- .1 26-bit wiegand format.

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- .2 Read range up to 73cm.
- .3 Long-life passive card for unlimited number of reads.
- .4 Card Construction: ABS and PVC.
- .5 Color: White.
- .6 Standard of Acceptance: Kantech ioProx P10SHL.

2.9 Communications  
Methods

- .1 Built in digital dialer to use existing telephone lines on the line seizure method.
- .2 Long distance charges shall be kept to a minimum, i.e. initially only alarms shall be communicated. At the Owner's discretion, however, openings and closing and a daily check-in shall be implemented.
- .3 Dual Dialer:
  - .1 Provide a dual line dialer meeting NFPA 71 requirements. Dialer to be ULC listed.
  - .2 Dialer must:
    - .1 Seize telephone line and await dial tone.
    - .2 Dial.
    - .3 Establish connection with the Central Monitoring Station.
    - .4 Transmit data.
    - .5 Receive and acknowledge signal before completing call.
  - .3 Dialer must be capable of dialing a second Central Monitoring Station telephone number should the first number fail.
  - .4 Dialer must send test signals on a daily basis to the Central Monitoring Station.
  - .5 Dialer to use frequency shift keying (FSK) communications format.
  - .6 Dialer to try minimum of ten (10) attempts to access the Central Monitoring Station in the event of an alarm or trouble condition or in the event of leased telephone line trouble.
  - .7 Dialer to be capable of storing four telephone numbers.
  - .8 Dialers shall be capable of line seizures so as to permit the owner to use existing telephone lines.

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- 2.10 Telephone Lines .1 The Owner shall pay only local telephone charges plus all monthly telephone service charges for the building being serviced under this Tender Document. All long distance charges shall be paid by the central monitoring station through the use of a 1-800 number.
- .2 Call back:  
.1 The Bidder shall also include for the duration of this contract a 1-800 toll free number to which owner's staff can access the Central Monitoring Station.
- 2.11 Power .1 Install wiring from each control panel to the appropriate electrical panelboard as indicated.
- .2 All power wiring shall be to section 26 05 21.
- .3 All circuit breakers supplying power to Intrusion Alarm Control panels must have a lock-on device installed.
- .4 All connections to be hard-wired. The use of plug-in transformers or power cords is not acceptable.
- 2.12 Wiring .1 Use for all inter-connecting wiring between control panels, operating panels, detectors and monitoring devices.
- .2 22 gage, four conductor shielded quad cable. Install all cable in conduit, except in areas with wooden frame construction.
- 2.13 Fire Alarm Monitoring .1 Provide and install fire alarm, alarm and trouble monitoring as indicated on the Drawings.
- 2.14 Training .1 Training shall be provided to the appointed Owner's staff. Training shall include but not be limited to:  
.1 A minimum of three hours instruction.  
.2 Time and date of instructions shall be at a time mutually agreeable to all parties but must be held before the Substantial Completion certificate is awarded.  
.3 All necessary descriptive brochures and

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training aids are to be supplied under this contract.

.4 Repeat training, shall be provided, at no additional cost to Owner, should the initial training session be insufficient to properly familiarize Owner's staff with systems.

.5 Training shall include but not be limited to:

.1 System description.

.2 System features.

.3 System activation/deactivation.

.4 Resets.

.5 Procedures involved for trouble calls, false alarms and maintenance.

.6 During the training session, each staff member shall be provided with their access code and shall be permitted to activate and de-activate the system until they are comfortable with the operation.

.7 Staff training shall be conducted in groups of four or less persons.

2.15 Code Assignment and Programs

- .1 Close coordination will be required with Owner's staff for assignment of passcodes and level of access to building.
- .2 Prepare a programming chart to identify the levels of coding available and to assist the Owner in selecting passcode assignments
- .3 Distribute passcodes at the Owner's discretion.

2.16 Warning Tags

- .1 Provide and install appropriate warning tags on all exterior doors to each building and on at least one window per building face.
- .2 Tags may be the supplier's standard version but shall indicate that the building is protected by an Intrusion System which shall activate upon un-authorized entry.

2.17 Standard of Acceptance

- .1 DSC Security Inc. Maxsys System.

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- 2.18 Monitoring .1 Include one year's monitoring in the package. Include all costs in the tender price for the one year's monitoring.
- .2 Monitoring agency shall contact the Owner to arrange future extensions of the monitoring contract.

PART 3 - EXECUTION

- 3.1 Installation General .1 Rigidly attach Operating Panel to wall. Install Intrusion Alarm Control Panel and make final power and telephone connections.
- .2 Insure all equipment is installed in accordance with applicable codes and to manufacturer's recommendations.
- .3 Install all warning tags.
- .4 Program each system as agreed with Owner.
- .5 Conduct all training courses.

- 3.2 Wiring .1 Install wiring to all components.
- .2 All wiring except in areas with wooden frame construction shall be installed in conduit.
- .3 Wiring to motion detectors not required to be installed in conduit.

- 3.3 Component Installation .1 Install detection components in general conformance with Drawings. Re-locate detectors as necessary to optimize coverage pattern. Relocation of components to simplify the installation may be permitted with the engineer's approval as long as coverage patterns are maintained.
- .2 Install all necessary mounting brackets, corner brackets and braces.

3.4 Testing

- .1 Test and verify the operation of each and every system component and detector to engineer's satisfaction.
- .2 Maintain a written record of all component and detector tests.
- .3 Check all functions of control panel.
- .4 Verify that alarm activation of EACH zone annunciates properly at the Central Monitoring Station (if so required).
- .5 Test communication links and time response to alarms.
- .6 Test operation of each passcode. Test operation/monitoring of fire alarm and fire alarm trouble.
- .7 Make written records of all tests performed and place in Operation and Maintenance Manuals specified in Section 01 33 00.
- .8 Provide print-outs from Central Monitoring Station to verify testing of all zones, codes, etc.
- .9 Provide two copies of all reports to Owner prior to substantial completion application.
- .10 Ensure system is tested in accordance with applicable ULC standards.
- .11 Verify that all telephone numbers are correct. Maintain a record of all test calls.
- .12 Place results in the Operating and Maintenance Manual specified in Section 01 33 00.

3.5 Programming

- .1 Assist Owner's staff in programming of passcodes.
- .2 Ensure system is left in the proper operating condition with no alarm or trouble signals present.

3.6 Training

- .1 Training shall be provided for the complete intrusion detection system under this contract.
- .2 Training shall be provided to the appointed Owner's staff on site. Training shall include but not be limited to:
  - .1 A minimum of two (2) hours instruction per group. Allows for a minimum of two groups at two separate times.
  - .2 Time and date of instructions shall be at a time mutually agreeable to all parties but must be held before the Substantial Completion Certificate is awarded.
  - .3 All necessary descriptive brochures and training aids are to be supplied under this contract.
  - .4 Repeat training, shall be provided, at no additional cost to Owner, should the initial training session be insufficient to properly familiarize Owner's staff with systems.
  - .5 Training shall include but not be limited to:
    - .1 System description.
    - .2 System features.
    - .3 System activation/deactivation.
    - .4 Resets.
    - .5 Procedures involved for trouble calls, false alarms and maintenance.
  - .6 During the training session, each staff member shall be permitted to activate and operate the system until they are comfortable with the operation.
  - .7 Staff training shall be conducted in groups of four or less persons.

PART 1 - GENERAL

1.1 REFERENCES

- .1 Government of Canada
  - .1 TB OSH Chapter 3-03, Treasury Board of Canada, Occupational Safety and Health, Chapter 3-03, Standard for Fire protection Electronic Data Processing Equipment.
  - .2 TB OSH Chapter 3-04, Treasury Board of Canada, Occupational Safety and Health, Chapter 3-04, Standard for Fire Alarm Systems.
- .2 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
  - .1 Material Safety Data Sheets (MSDS).
- .3 Underwriter's Laboratories of Canada (ULC)
  - .1 CAN/ULC-S524, Standard for the Installation of Fire Alarm Systems.
  - .2 CAN/ULC-S525, Audible Signal Device for Fire Alarm Systems.
  - .3 CAN/ULC-S526, Visual Signal Devices for Fire Alarm Systems.
  - .4 CAN/ULC-S527, Control Units.
  - .5 CAN/ULC-S528, Manual Pull Stations for Fire Alarm Systems.
  - .6 CAN/ULC-S529, Smoke Detectors for Fire Alarm Systems.
  - .7 CAN/ULC-S530, Heat Actuated Fire Detectors for Fire Alarm Systems.
  - .8 CAN/ULC-S531, Standard for Smoke Alarms.
  - .9 CAN/ULC-S536-S537, Burglar and Fire Alarm Systems and Components.
- .4 National Fire Protection Association
  - .1 NFPA 72, National Fire Alarm Code.
  - .2 NFPA 90A, Installation of Air Conditioning and Ventilating Systems.
- .5 NBCC -2010 3.2.4.
- .6 CSA/ULC S524-01.

1.2 SUBMITTALS

- .1 Product Data:
  - .1 Submit manufacturer's printed product literature, specifications and datasheet in

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accordance with Section 01 33 00 - Submittal Procedures.

.1 Submit two copies of Workplace Hazardous Materials Information System (WHMIS) Material Safety Data Sheets (MSDS) in accordance with Section 01 33 00 - Submittal Procedures.

.2 Shop Drawings:

.1 Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.

.1 Shop drawings: stamped and signed by professional engineer registered or licensed in Province of NL, Canada.

.2 Include:

.1 Layout of equipment.

.2 Zoning.

.3 Complete wiring diagram, including schematics of modules.

.3 Quality assurance submittals: submit following in accordance with Section 01 33 00 - Submittal Procedures.

.1 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.

.2 Instructions: submit manufacturer's installation instructions.

.3 Manufacturer's Field Reports: manufacturer's field reports specified.

.4 Closeout Submittals:

.1 Submit maintenance and engineering data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals in accordance with ANSI/NFPA 20.

.2 Authority of Jurisdiction will delegate authority for review and approval of submittals required by this Section.

.3 Submit to Authority of Jurisdiction 2 sets of approved submittals and drawings immediately after approval but no later than 15 working days to prior to final inspection.

.4 Submit following:

.1 Manufacturer's Data for:

.1 Manual pull stations.

.2 Heat detectors.

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- .3 Open-area smoke detectors.
- .4 Alarm bells.
- .5 Alarm horns.
- .6 Visible appliances.
- .7 Fittings for conduit and outlet boxes.

1.3 QUALITY  
ASSURANCE

- .1 Qualifications:
  - .1 Installer: company or person specializing in fire alarm system installations with 5 -years documented experience approved by manufacturer.
- .2 Provide services of representative or technician from manufacturer of system, experienced in installation and operation of type of system being provided, to supervise installation, adjustment, preliminary testing, and final testing of system and to provide instruction to project personnel.
- .3 System:
  - .1 To Canadian Forces Fire Marshal approval.

1.4 DELIVERY,  
STORAGE, AND  
HANDLING

- .1 Packing, shipping, handling and unloading:
  - .1 Deliver, store and handle materials in accordance with manufacturer's written instructions.
- .2 Waste Management and Disposal:
  - .1 Construction/Demolition Waste Management and Disposal: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

1.5 SYSTEM  
DESCRIPTION

- .1 Provide new fire alarm devices to be integrated into the existing fire alarm system. Provide all necessary equipment for fully operational system. Re-verify system in accordance with latest edition of CAN/ULC-S537.
- .2 System to carry out fire alarm and protection

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functions; including receiving alarm signals; initiating general alarm; supervising components and wiring; actuating auxiliary functions; initiating trouble signals and signaling to central monitoring system.

- .3 Zoned, non-coded single stage.
- .4 Modular in design to allow for future expansion.
- .5 Operation of system shall not require personnel with special computer skills.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- .1 Equipment and devices: ULC listed and labeled and supplied by single manufacturer.
- .2 Audible signal devices: to CAN/ULC-S525.
- .3 Visual signal devices: to CAN/ULC-S526.
- .4 Manual pull stations: to CAN/ULC-S528.
- .5 Thermal detectors: to CAN/ULC-S530.
- .6 Smoke detectors: to CAN/ULC-S529.

### 2.2 SYSTEM OPERATION: SINGLE STAGE

- .1 Actuation of any alarm initiating device to:
  - .1 Cause electronic latch to lock-in alarm at central control unit.
  - .2 Indicate zone of alarm at central control unit.
  - .3 Cause audible signaling devices to sound continuously throughout building and at central control unit.
  - .4 Transmit signal to monitoring agency via alarm panel.
- .2 Acknowledging alarm: indicated at central control unit.
- .3 Possible to silence signals by alarm silence switch at control unit, after 60 second period of

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operation.

- .4 Subsequent alarm, received after previous alarm has been silenced, to re-activate signals.
- .5 Actuation of supervisory devices to:
  - .1 Cause electronic latch to lock-in supervisory state at central control unit.
  - .2 Indicate respective supervisory zone at central control unit.
  - .3 Cause audible signal at central control unit to sound.
  - .4 Activate common supervisory sequence.
- .6 Resetting alarm or supervisory device not to return system indications/functions back to normal until control unit has been reset.
- .7 Trouble on system to:
  - .1 Indicate circuit in trouble at central control unit.
  - .2 Activate system trouble indication, buzzer and common trouble sequences. Acknowledging trouble condition to silence audible indication; whereas visual indication to remain until trouble is cleared and system is back to normal.
- .8 Trouble on system to be suppressed during course of alarm.
- .9 Trouble condition on any circuit in system not to initiate any alarm conditions.

### 2.3 POWER SUPPLIES

- .1 120 V, 60 Hz as primary source of power for system.
- .2 Voltage regulated, current limited distributed system power.
- .3 Primary power failure or power loss (less than 102 V) will activate common trouble sequence.
- .4 Interface with battery charger and battery to provide uninterruptible transfer of power to standby source during primary power failure or loss.

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- .5 During normal operating conditions fault in battery charging circuit, short or open in battery leads to activate common trouble sequence and standby power trouble indicator.
- .6 Standby batteries: sealed, maintenance free.
- .7 Continuous supervision of wiring for external initiating and alarm circuits to be maintained during power failure.

#### 2.4 INITIATING/INPUT CIRCUITS

- .1 Receiving circuits for alarm initiating devices such as manual pull stations, smoke detectors, and heat detectors wired in DCLA configuration to central control unit.
- .2 Alarm receiving circuits (active and spare): compatible with smoke detectors and open contact devices.
- .3 Actuation of alarm initiating device: cause system to operate as specified in "System Operation".
- .4 Receiving circuits for supervisory, N/O devices. Devices: wired in DCLA configuration to central control unit.
- .5 Actuation of supervisory initiating device: cause system to operate as specified in "System Operation".

#### 2.5 ALARM OUTPUT CIRCUITS

- .1 Alarm output circuit: connected to signals, wired in class B configuration to central control unit.
  - .1 Signal circuits operation to follow system programming; capable of sounding horns continuously. Each signal circuit: rated at 2 A, 24 V DC; fuse-protected from overloading/overcurrent.
- .2 Manual alarm silence, automatic alarm silence and alarm silence inhibit to be provided by system's common control.

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2.6 AUXILIARY  
CIRCUITS

- .1 Auxiliary contacts for control functions.
- .2 Actual status indication (positive feedback) from controlled device.
- .3 Alarm or supervisory trouble on system to cause operation of programmed auxiliary output circuits.
- .4 Upon resetting system, auxiliary contacts to return to normal or to operate as pre-programmed.
- .5 Auxiliary circuits: rated at 2A, 24 V DC or 120 V AC, fuse-protected.
- .6 Auxiliary contacts for shut down of all ventilation/exhaust units indicated.
- .7 Auxiliary contacts for release of hold-open devices and roll up shutters.

2.7 WIRING

- .1 Multi-conductor cable assemblies with dedicated bonding wire CSA FAS105 and FT-4 rated. Standard of Acceptance: Securex I.
- .2 To initiating circuits: 18 AWG minimum, and in accordance with manufacturer's requirements.
- .3 To signal circuits: 16 AWG minimum, and in accordance with manufacturer's requirements.
- .4 To control circuits: 14 AWG minimum, and in accordance with manufacturer's requirements.
- .5 Fire alarm cable to be run in EMT conduit unless otherwise noted.

2.8 MANUAL ALARM  
STATIONS

- .1 Addressable manual pull station.
  - .1 Pull lever, break glass rod, semi-flush wall mounted type, single action, single stage, electronics to communicate station's status to addressable module/transponder over 2 wires and to supply power to station. Station address to be set on station in field.

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2.9 AUTOMATIC ALARM  
INITIATING DEVICES

- .1 Addressable variable-sensitivity smoke detectors.
  - .1 Photo-electric type.
  - .2 Electronics to communicate detector in field.
  - .3 Detector address to be set on detector in field.
- .2 Sensitivity settings: 3 settings, determined and operated by control panel. No shifting in detector sensitivity due to atmospheric conditions (dust, dirt) within certain parameters.
- .3 Ability to annunciate minimum of 2 levels of detector contamination automatically with trouble condition at control panel.

2.10 AUDIBLE SIGNAL  
DEVICES

- .1 Vibrating horn: semi-flush mounted, red enamel, 24 V DC, 94 dB.
- .2 Exterior horns to be weatherproof design mounted in PVC yard hood.

2.11 VISUAL ALARM  
SIGNAL DEVICES

- .1 Strobe: flashing white, 24 V dc semi-flush mounted in finished areas.

2.12 END-OF-LINE  
DEVICES

- .1 End-of-line devices to control supervisory current in signaling circuits sized to ensure correct for each circuit. Open, short or ground fault in any circuit will alter supervisory current in that circuit, producing audible and visible alarm at main control panel and remotely as indicated.

2.13 ADDRESSABLE  
CONTROL/MONITOR  
MODULES

- .1 Addressable modules with address set in field for control/monitoring or external circuits.
- .2 Applications: sprinkler device monitoring.

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- 2.14 ISOLATION  
MODULES
- .1 Isolation modules for segmenting of fire alarm detection loop as indicated.
- 2.15 REMOTE  
ANNUNCIATORS
- .1 LCD type annunciators providing information as per display on control panel display, to be located as indicated.
- 2.16 REMOTE  
MONITORING
- .1 Provide remote monitoring to transmit fire alarm signal to base fire hall.

PART 3 - EXECUTION

- 3.1 MANUFACTURER'S  
INSTRUCTIONS
- .1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheet.
- 3.2 INSTALLATION
- .1 Install systems in accordance with CAN/ULC-S524 and TB OSH Chapter 3-04.
- .2 Run all fire alarm wiring in conduit.
- .3 Install central control unit and connect to ac power supply.
- .4 Connect alarm circuits to main control panel.
- .5 Install manual alarm station and connect to alarm circuit wiring.
- .6 Connect alarm circuits to main control panel.
- .7 Install horns and visual signal devices and connect to signaling circuits.
- .8 Connect signaling circuits to main control panel.
- .9 Install end-of-line devices at end of signaling

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circuits.

- .10 Splices are not permitted.
- .11 Provide necessary raceways, cables and wiring to make interconnections to terminal boxes, annunciator equipment and CCU, as required by equipment manufacturer.
- .12 Ensure that wiring is free of opens, shorts or grounds, before system testing and handing over.
- .13 Identify circuits and other related wiring at central control unit, annunciators, and terminal boxes.
- .14 Connect fire alarm control panel to remote monitoring station and onto base fire hall.
- .15 Install remote annunciators and connect to main control panel.

3.3 FIELD QUALITY CONTROL

- .1 Site Tests:
  - .1 Perform tests in accordance with Section 26 05 01 - Common Work Results - for Electrical and CAN/ULC-S537.

3.4 CLEANING

- .1 Proceed in accordance with Section 01 74 11 - Cleaning.
- .2 Upon completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.