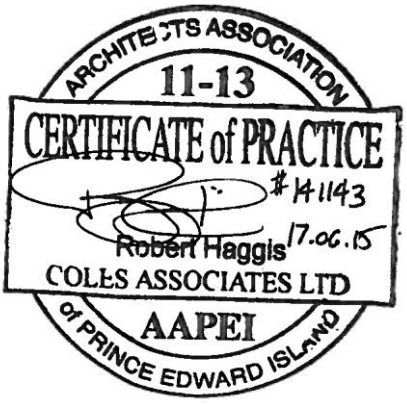
SPECIFICATIONS

ESDC CONSOLIDATION FIT-UP
JEAN CANFIELD BUILDING
CHARLOTTETOWN, PEI



Prime Consultants:
Coles Associates Ltd.

Project Number R.061033.001 **June 17, 2015**

1 General

1.1 LIST OF DRAWINGS

.1 A1 of 3 - Main & Second Floor Plan Zone A & B Demolition & Renovation
.2 A2 of 3 - Second Floor Plan Zone C Demolition & Renovation
.3 A3 of 3 - Interior Elevations
.4 E1 of 4 - Main Floor Plan Zone A Electrical Power, Communications & Lighting
.5 E2 of 4 - Second Floor Plan Zone B Electrical Power, Communications & Lighting
.6 E3 of 4 - Second Floor Plan Zone C Electrical Power & Communications
.7 E4 of 4 - Second Floor Plan Zone C Electrical Lighting
.8 H1 of 4 - Main Floor Zone A Ceiling Level and Under Floor Mechanical Demolition & Renovation
.9 H2 of 4 - Second Floor Zone B Ceiling Level and Under Floor Mechanical Demolition & Renovation
.10 H3 of 4 - Second Floor Zone C Under Floor Mechanical Demolition & Renovation
.11 H4 of 4 - Second Floor Zone C Ceiling Level Mechanical Demolition & Renovation

End of Section

1 General

1.1 DESCRIPTION OF WORK

.1 Work under this contract consists of:
- .1 Demolition and de-construction of existing spaces as identified on drawings.
- .2 Reinstatement of new demountable partitions as shown on drawings.
- .3 Reuse and salvage existing fixtures, flooring, demountable partitions, doors, hardware etc., as shown on drawings.
- .4 Fit up and finish of spaces as show on drawings.
- .5 Mechanical and electrical services as shown on drawings.

.2 Site of work is at Jean Canfield Building, Charlottetown, PEI.

1.2 FAMILIARIZATION WITH SITE

.1 Before submitting their tender, it is recommended that tenderers inspect and examine the site and its surroundings and satisfy themselves as to the form and nature of the work and materials necessary for the completion of the work, the means of access to the site, the accommodation they may require, and in general shall themselves obtain all necessary information as to risks, contingencies and other circumstances which may influence or affect their tender. No allowance shall be made subsequently in this connection on account of error or negligence to properly observe and determine the conditions that will apply.

.2 Obtain prior permission from the Departmental Representative before carrying out such site inspection.

1.3 STANDARDS

.1 Perform Work in accordance with the 2010 National Building Code of Canada and any other code of federal, provincial or local application including all amendments up to project tender closing date provided that in any case of conflict or discrepancy, the more stringent requirements shall apply.

.2 Materials and Workmanship must meet or exceed requirements of specified standards, codes and referenced documents.

1.4 SETTING OUT WORK

.1 Give Departmental Representative reasonable notice of construction layout requirements.

.2 Assume full responsibility for and execute complete layout of Work to locations, lines and elevations indicated.

.3 Provide devices needed to lay out and construct Work.

.4 Supply such devices as straight edges and templates required to facilitate Departmental Representative's inspection of Work.

.5 Supply survey markers required for laying out Work.

1.5 INTERPRETATION OF DOCUMENTS

.1 Supplements to the General Conditions and the Division 01 sections of the Specifications take precedence over technical specifications in other Divisions of the Specifications.

1.6 COST BREAKDOWN

.1 Before submitting first progress claim submit breakdown of Contract price in detail as directed by Departmental Representative and aggregating contract price. Departmental Representative will provide the required forms for application of progress payment.

.2 Provide cost breakdown in same format as the numerical and subject title system used in this specification project manual and thereafter sub-divided into major work components or building systems as directed by Departmental Representative.

.3 Upon approval by Departmental Representative, cost breakdown will be used as basis for progress payment.

1.7 MEASUREMENT FOR PAYMENT

.1 Notify Departmental Representative sufficiently in advance of operations to permit required measurements for payment.

1.8 DOCUMENTS REQUIRED

.1 Maintain at job site, one copy each of the following:
- .1 Contract Drawings
- .2 Specifications
- .3 Addenda
- .4 Reviewed Shop Drawings
- .5 List of outstanding shop drawings
- .6 Change Orders
- .7 Other modifications to Contract
- .8 Field Test Reports
- .9 Copy of Approved Work Schedule
- .10 Health and Safety Plan and other safety related documents.
- .11 Other documents as stipulated elsewhere in the Contract Documents.

1.9 PERMITS

.1 In accordance with the General Conditions, obtain and pay for building permit, certificates, licenses and other permits as required by municipal, provincial and federal authorities.
.2 Provide appropriate notifications of project to municipal and provincial inspection authorities.
.3 Obtain compliance certificates as prescribed by legislative and regulatory provisions of municipal, provincial and federal authorities as applicable to the performance of Work.
.4 Submit to Departmental Representative, copy of application submissions and approval documents received for above referenced authorities.

1.10 ALTERATIONS, ADDITIONS OR REPAIRS TO EXISTING BUILDING

.1 Execute Work with least possible interference or disturbance to building operations, occupants, public and normal use of premises by government departments. Arrange with Departmental Representative to facilitate execution of Work.
.2 Where security has been reduced by Work of Contract, provide temporary means to maintain security.
.3 Where elevators, dumbwaiters, conveyors or escalators exist in building, only those assigned for Contractor's use may be used for moving workers and material within building. Protect walls of passenger elevators, to approval of Departmental Representative prior to use. Accept liability for damage, safety or equipment and overloading of existing equipment.
.4 Provide temporary dust screens, barriers, warning signs in locations where renovations and alteration work is adjacent to areas which will be operative during such Work.

1.11 ROUGHING-IN

.1 Be responsible for obtaining manufacturer's literature and for correct roughing-in and hook-up of equipment, fixtures and appliances.

1.12 CUTTING, FITTING AND PATCHING

.1 The General Contractor shall ensure that cutting and patching for all trades is included in his tender price bid for the Work.
.2 Execute cutting, fitting and patching required to make work fit properly.
.3 Where new work connects with existing and where existing Work is altered, cut, patch and make good to match existing Work. This includes patching of openings in existing work resulting from removal of existing services.

.4 Do not cut, bore or sleeve load-bearing members.
.5 Make cuts with clean, true, smooth edges. Make patches inconspicuous in final assembly.
.6 Fit work airtight to pipes, sleeves ducts and conduits.

1.13 CONCEALMENT

.1 Conceal pipes, ducts and wiring in floor, wall and ceiling construction of finished areas except where indicated otherwise.

1.14 LOCATION OF FIXTURES

.1 Location of equipment, fixtures and outlets, shown or specified shall be considered as approximate. Actual location shall be as required to suit conditions at time of installation and as is reasonable.
.2 Locate equipment, fixtures and distribution systems to provide minimum interference and maximum usable space and in accordance with manufacturer's recommendations for safety, access and maintenance.
.3 Inform Departmental Representative when impending installation conflicts with other new or existing components. Follow directives for actual location.
.4 Submit field drawings to indicate relative position of various services and equipment when required by Departmental Representative.

1.15 EXISTING SERVICES

.1 Where Work involves breaking into or connecting to existing services, carry out work at times directed by governing authorities, with minimum of disturbance to tenant operations.
.2 Before commencing Work, establish location and extent of service lines in area of Work and notify Departmental Representative of findings.
.3 Submit schedule to and obtain approval from Departmental Representative for any shut-down or closure of active service or facility. This includes disconnection of electrical power and communication services to tenant's operational areas. Adhere to approved schedule and provide notice to affected parties.
.4 Provide temporary services to maintain critical building and tenant systems.
.5 Where unknown services are encountered, immediately advise Departmental Representative and confirm findings in writing.
.6 Protect, relocate or maintain existing active services as required. When inactive services are encountered, cap off in manner approved by authorities having jurisdiction over service. Record locations of maintained, re-routed and abandoned service lines.

1.16 BILINGUAL NOTATIONS

.1 Any items supplied and installed under this contract which have operating instructions on them such as door hardware, washroom accessories, push button activation controls, powered hand dryers, mechanical equipment such as water coolers, etc., and which can be expected to be used by the public and building tenants, must have such operating instructions in bilingual format - English and French.
.2 Factory embossed or recessed symbols illustrating equipment operation is an acceptable alternate to lettering.
.3 Items supplied with factory - embossed or recessed lettering in one official language with an applied sticker or decal representing the second official language is not acceptable unless the Departmental Representative give prior approval before any such items are ordered.
.4 Internationally recognized color coding such as red and blue center pieces for plumbing brass is acceptable.
.5 Public Works and Government Services Canada will not be responsible for re-stocking or re-ordering costs incurred by the Contractor as a result of his failure to ensue bilingual designation on such items.
.6 The Contractor is responsible for ensuring that all trades are made aware of these requirements.

1.17 BUILDING SMOKING ENVIRONMENT

.1 Comply with smoking restrictions. The building and grounds are non-smoking.

1.18 ASBESTOS DISCOVERY

.1 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, stop and notify Departmental Representative immediately. Do not proceed until written instructions have been received from Departmental Representative.

End of Section

1 General

1.1 SUBMITTALS

.1 Upon award of contract 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 Environmental Plan specified in section 01 35 43.
- .4 Health and Safety Plan specified in section 01 35 28.
- .5 Lockout Procedures specified in section 01 35 25.
- .6 Dust Control Plan specified in section 01 50 00.
- .7 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 notification of tender acceptance submit:
- .1 Work schedule submitted 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 tender.

.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.

.5 Work schedule must take into consideration and reflect the required sequence of Work, special conditions and operational restrictions as specified below.

.6 Schedule Work in cooperation with the Departmental Representative. Departmental Representative's decision is final in regards to time and order of Work. Incorporate within Work Schedule, items identified by Departmental Representative during review of preliminary schedule.

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

.8 It is the Contractor's responsibility to ensure all subtrades and subcontractors are made aware of the work restraints and operational restriction specified.

.9 Schedule Updates:
- .1 Submit when requested by Departmental Representative.
- .2 Provide information and pertinent details explaining reasons for necessary changes to implementation plan.
- .3 Identify problem areas, anticipated delays, impaction 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 of work as identified by reviews and as directed by Departmental Representative. Update schedule accordingly.

.11 In every instance, change or deviation from work scheduling, 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 PROJECT PHASING

.1 Be aware that Building must be kept operational for the full duration of work of this contract. Building services to areas under use by tenants must also be maintained at all times during the Facility's operational hours and as specifically defined in operational restrictions specified in this section.

1.4 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 and conscience 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 other 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: for the purposes of this contract, "off-hours" are defined as follows:

- .1 Weeknight Hours: between the hours of 18:00 and 7:00 for each weekday Monday to Thursday inclusive.
- .2 Weekend Hours: between the hours of 18:00 Friday evening to 7:00 Monday morning.
- .3 Dependent on the nature and location of the construction activity,the day of the week and the time of the year, "off-hours" could be subject to redefinition to start or end at adjusted time periods. Scheduling of "off-hours" work will be subject to approval by the Departmental Representative.

.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;
- .4 All work involving saw curring 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 which requires the temporary disconnection of power and communication services to occupied areas;
- .11 Testing of fire alarms and other emergency annunciating system;
- .12 Delivery of materials and equipment from exterior to the interior of building when access routes are located in tenant occupied spaces.
- .13 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 by Owner 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 prices.

.8 See section 01 35 54 in regards to:
- .1 Special security requirements which must be observed in the course of work.
- .2 Provisions of security personnel by Contractor as part of the work.

.9 Limited Manoeuvring Space on Site:
- .1 Coordinate with Departmental Representative for loading/off loading. Parking is available on-site, coordinate with Departmental Representative.

.10 Facility circulation maintained:
- .1 Ensure that entrances, corridors, stairwells, exits and other circulation routes are maintained free and clear providing safe and uninterrupted passage for facility users and public at all times for duration of work.
- .2 Maintain those areas clean and free of construction materials and equipment during operational hours of Facility. Provide temporary and adequate devices to ensure users are not exposed to construction hazardous conditions and are protected from exposure to dust, noise and hazardous materials.
- .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 free escape routes accessible and fire fighting access open all times for the duration of the project. Do no under any circumstances block fire exit doors and do not leave construction materials or debris in corridors, stairwells and in 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 meter. Number of signs required will be dependent on number of areas in facility under renovation at any one time.
- .4 Include cost for the supply and installation of these signs in the tender 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 accumulated 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 Building.
- .7 Avoid situation and practices which results in dust and dirt being brought from the construction areas or from the exterior and traced inside the building into occupied areas used by tenants or 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 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 complaint 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 his 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 particularly the work restrictions specified herein due to tenant operational requirements.

1.5 PROJECT MEETINGS

.1 Schedule and administer project meetings, held on a minimum weekly basis, for entire duration of work and more often when directed by Departmental Representative as deemed necessary due to progress of work of 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 3 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.

.6 Departmental Representative will arrange project meetings and assume responsibility for setting times and recording minutes.

1.6 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 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, service 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 Public Works and Government Services Canada will not be responsible for or held accountable for any extra costs incurred as a result of the failure to carry out coordination work. Disputes between the various trades as a result of their not bing informed of the areas and extent of interface work shall be the sole responsibility of the General Contractor and shall be resolved by him at no extra cost to the Contract.

End of Section

1 General

1.1 SECTION INCLUDES

.1 Shop drawings and product data.
.2 Samples.
.3 Certificates.

1.2 RELATED SECTIONS

.1 Section 01 45 00 - Quality Control.
.2 Section 01 78 00 - Closeout Submittals.
.3 Section 01 91 13 - General Commissioning Requirements.

1.3 SUBMITTAL GENERAL REQUIREMENTS

.1 Submit to Departmental Representative for review requested submittals specified in various sections of the specifications including shop drawings, samples, permits, compliance certificates, test reports, work management plans and other data required as part of the work.
.2 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.
.3 Do not proceed with work until relevant submissions are reviewed by Departmental Representative
.4 Present shop drawings, product data, samples and mock-ups in SI Metric units.
.5 Where items or information is not produced in SI Metric units, provide soft converted values.
.6 Review submittals prior to submission to Departmental Representative. Ensure during review that necessary requirements have been determined and verified, required field measurements or data have been taken, and that each submittal has been checked and co-ordinated with requirements of Work and Contract Documents.
    .1 Submittals not stamped, signed, dated and identified as to specific project will be returned unexamined by Departmental Representative and considered rejected.
.7 Notify Departmental Representative, in writing at time of submission, identifying deviations from requirements of Contract Documents stating reasons for deviations.
.8 Verify field measurements and affected adjacent Work are coordinated.
.9 Contractor's responsibility for errors, omissions or deviations in submission from requirements of Contract Documents is not relieved by Departmental Representative's review.
.10 Submittal format: paper originals, or alternatively clear and fully legible photocopies of originals. Facsimiles are not acceptable, except in special circumstances pre-approved by Departmental Representative. Poorly printed non-legible photocopies or facsimiles will not be accepted and be returned for resubmission.
.11 Make changes or revision to submissions which Departmental Representative may require, consistent with Contract Documents and resubmit as directed by Departmental Representative. When resubmitting, notify Departmental Representative in writing of any revisions other than those requested.
.12 Keep one reviewed copy of each submittal document on site for duration of Work.

1.4 SHOP DRAWINGS AND PRODUCT DATA

.1 The term "shop drawings" means drawings, diagrams, illustrations, schedules, performance charts, product data, brochures and other data which are to be provided by Contractor to illustrate details of a portion of Work.
.2 Number of Shop Drawings: submit sufficient copies of shop drawings which are required by the General Contractor and sub-contractors plus 4 copies which will be retained by Departmental Representative. Ensure sufficient numbers are submitted to enable one complete set to be included in each of the maintenance manuals specified in 01 78 00.
.3 Shop Drawing Submittal Schedule:

.1 Submit, within 10 working days of contract award, in format acceptable to Departmental Representative, a submittal schedule listing all shop drawings to be submitted for project as specified in various sections of the Specifications.
.2 Schedule to indicate proposed submission date of each shop drawing, status of review status and anticipated product delivery date to site. Track all submissions for entire project.
.3 As work progresses, revise schedule identifying those items which have been reviewed and finalized and indicating list of outstanding shop drawings.
.4 Submit schedule updates at stipulated dates or project time intervals as predetermined and agreed upon between Contractor and Departmental Representative at commencement of Work.

.4 Shop Drawings Content and Format:
.1 Indicate materials, methods of construction and attachment or anchorage, erection diagrams, connections, explanatory notes and other information necessary for completion of Work. Where items or equipment attach or connect to other items or equipment, confirm that all interrelated work have been coordinated, regardless of section or trade from which the adjacent work is being supplied and installed.
.2 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.
.3 Supplement manufacturer's standard drawings and literature with additional information to provide details applicable to project.
.4 Delete information not applicable to project on all submittals.
.5 Equipment installation/start-up data: include with shop drawing submission the manufacturer's recommended installation instructions, pre-start and start-up checklists for those pieces of equipment and systems designated to be commissioned as specified in section 01 91 13.

.5 Allow 10 calendar days for Departmental Representative's review of each submission.
.6 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.
.7 If upon review by Departmental Representative, no errors or omissions are discovered or if only minor corrections and comments are made, fabrication and installation may proceed upon receipt of shop drawings. If shop drawings are rejected and noted to be Resubmitted, do not proceed with that portion of work until resubmission and review of corrected shop drawings, through same submission procedures indicated above.
.8 In accordance with article 17.2 of the General Conditions "C", costs and expenses incurred by Departmental Representative to conduct more than one review of incorrectly prepared shop drawing submittal for a particular material, equipment or component of work will be assessed against the Contractor in the form of a financial holdback to the Contract.
.9 Accompany each submissions with transmittal letter containing:
.1 Date.
.2 Project title and project number.
.3 Contractor's name and address.
.4 Identification and quantity of each shop drawing, product data nd sample.
.5 Other pertinent data.
.10 Submissions shall include:
.1 Date and revision dates.
.2 Project title and project number.

.3 Name and address of:
  .1 Subcontractor.
  .2 Supplier.
  .3 Manufacturer.
.4 Contractor's stamp, signed by Contractor's authorized representative certifying approval of submissions, verification of field measurements and compliance with Contract Documents.
.5 Cross references to particular details of contract drawings and specifications section number for which shop drawing submission addresses.
.6 Details of appropriate portions of Work as applicable:
  .1 Fabrication.
  .2 Layout, showing dimensions, including identified field dimensions, and clearances.
  .3 Setting or erection details.
  .4 Capacities.
  .5 Performance characteristics.
  .6 Standards.
  .7 Operating weight.
  .8 Wiring diagrams.
  .9 Single line and schematic diagrams.
  .10 Relationship to adjacent work.
.11 After Departmental Representative's review, distribute copies.
.12 The review of shop drawings by Public Works and Government Services Canada (PWGSC) or its authorized Consultant is for sole purpose of ascertaining conformance with general concept. This review shall not mean that PWGSC 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.

1.5 SAMPLES

.1 Submit for review samples as specified in respective specification Sections. Label samples with origin and intended use.
.2 Deliver samples prepaid PWGSC Departmental Representative's office. Do not drop off samples at construction site except for special circumstances previously approved by Departmental Representative.
.3 Notify Departmental Representative in writing, at time of submission of deviations in samples from requirements of Contract Documents.
.4 Where colour, pattern or texture is criterion, submit full range of samples.
.5 Adjustments made on samples by Departmental Representative are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Departmental Representative prior to proceeding with Work.
.6 Make changes in samples which Departmental Representative may require, consistent with Contract Documents.
.7 Reviewed and accepted samples will become standard of workmanship and material against which installed Work will be verified.

1.6 MOCK-UPS

.1 Erect mock-ups in accordance with 01 45 00 - Quality Control.

1.7 SCHEDULES, PERMITS AND CERTIFICATES

.1 Upon award of contract, submit to Departmental Representative copy of Work Schedule and various other schedules, permits, certification documents and project management plans as specified in other sections of the Specifications.

.2 Submit copy of permits, notices, compliance Certificates received by Regulatory Agencies having jurisdiction and as applicable to the Work.

.3 Submission of above documents to be in accordance with Submittal-General Requirements procedures specified in this section.

End of Section

1 General

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 28 Health and Safety Requirements.
.2 Section 01 33 00 Submittal Procedures.

1.3 REFERENCES

.1 Fire Protection Standards issued by Fire Protection Services of Human Resources Development Canada as follows:
  .1 FCC No. 301 - June 1982 Standard for Construction Operations.
  .2 FCC No. 302 - June 1982 Standard for Welding and Cutting.

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.

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 after contract award.
.2 Submit in accordance with the Submittal Procedures - specified in 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, 2005.
  .2 Fire Protection Standards FCC 301 and FCC 302.
  .3 Federal and Provincial Occupational Health and Safety Acts and Regulations as specified in section 01 35 28.
.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.

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 during performance of hot work, Departmental Representative will provide authorization to proceed as follows:
  .1 Issue one written "Authorization to Proceed" covering the entire project for duration of work or;
  .2 Separate work, or segregate certain parts of work, into individual entities. Each entity requiring a separately written "Authorization to Proceed" from Departmental

Representative. Follow Departmental Representative's directives in this regard.

.4 Requirement for individual authorization 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 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 Procedures to include:
- .1 Requirement to perform hazard assessment of site and immediate hot work area for each hot work event in accordance with Hazard Assessment and Safety Plan requirements of section 01 35 28.
- .2 Use of a Hot Work Permit system for each hot work event.
- .3 The step by step process of how to prepare and issue permit.
- .4 Permit shall be issued by Contractor's site Superintendent, or other authorized person designated by Contractor, granting permission to worker or subcontractor to proceed with hot work.
- .5 Provision of a designated person to carryout a Fire Safety Watch for a minimum of 60 minutes immediately upon completion of the hot work.
- .6 Compliance with fire safety codes and standards specified herein and occupational health and safety regulations specified in section 01 35 28.

.3 Generic procedures, if used, must be edited and supplemented with pertinent information tailored to reflect specific project conditions. Clearly label as being the Hot Work Procedures applicable to this contract.

.4 Hot Work Procedures shall clearly establish worker instructions and allocate responsibilities of:
- .1 Worker(s),
- .2 Authorized person issuing the Hot Work Permit,
- .3 Fire Safety Watcher,
- .4 Subcontractors and Contractor.

.5 Brief all workers and subcontractors on Hot Work Procedures and Permit system established for project. Stringently enforce compliance.
- .1 Failure to comply with the established procedures may result in the issuance of a Non-Compliance Notification at Departmental Representative's discretion with possible disciplinary measures imposed as specified in section 01 35 28.

1.9 HOT WORK PERMIT

.1 Hot Work Permit to include, as a minimum, the following data:
- .1 Project name and project number;
- .2 Building name, address and specific room or area where hot work will be performed;
- .3 Date when permit issued
- .4 Description of hot work type to be performed;
- .5 Special precautions required, including type of fire extinguisher needed;
- .6 Name and signature of person authorized to issue the permit.
- .7 Name of worker (clearly printed) to which the permit is being issued.
- .8 Time Duration that permit is valid (not to exceed 8 hours). Indicate start time & date and completion time & date.
- .9 Worker signature with date and time upon hot work termination.

.10 Specified time period requiring safety watch.
.11 Name and signature of designated Fire Safety Watcher, complete with time & date when safety watch terminated, certifying that surrounding area was under his continual surveillance and inspection during the full watch time period specified in Permit and commenced immediately upon completion of Hot Work.

.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 and signed as follows:
.1 Authorized person issuing Permit before hot work commences;
.2 Worker upon completion of Hot Work;
.3 Fire Safety Watcher upon termination of safety watch;
.4 Returned to Contractor's Site Superintendent for safe keeping.

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.

End of Section

1 General

1.1 SECTION INCLUDES

.1 Procedures to isolate and lockout electrical facility or other equipment from energy source.

1.2 RELATED WORK

.1 Section 01 35 28 - Health and Safety Requirements.
.2 Section 01 33 00 - Submittal Procedures.

1.3 REFERENCES

.1 CSA C22.1-2010 - Canadian Electrical Code, Part 1, Safety Standard for Electrical Installations.
.2 CSA C22.3 No. 1-M87 (R2001) - Overhead Systems.
.3 CSA C22.3 No. 7-94 (R2000) - 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 is 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 Perform lockouts in compliance with:
  .1 Canadian Electrical Code
  .2 Federal and Provincial Occupational Health and Safety Acts and Regulations as specified in section 01 35 28.
  .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 form of lockout permit or lockout tags for review.
.2 Submit documentation within 7 calendar days of contract award. Do not proceed with work until submittal has been reviewed by Departmental Representative.

.3 Submit above documents in accordance with the submittal requirements specified in section 01 33 00.
.4 Resubmit Lockout Procedures with noted revisions as may result from Departmental Representative's review.

1.7 ISOLATION OF EXISTING SERVICES

.1 Obtain Departmental Representative's written authorization prior to conducting work on an existing active, energized service or facility required as part of the work and before proceeding with lockout of such services or facility.
.2 To obtain authorization, submit to Departmental Representative following documentation:
  .1 Written Request for Isolation of the 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 Representative, and as follows:
  .1 Fill-out standard forms in current use at the Facility when so directed by Departmental Representative or;
  .2 Where no form exist at Facility, make request in writing identifying:
    .1 Identification of system or equipment to be isolated, including it's location;
    .2 Time duration, indicating Start time & date and Completion time & date when isolation will be in effect.
    .3 Voltage of service feed to system or equipment being isolated.
    .4 Name of person making the request.
  .3 Document to be in typewritten format.
.4 Do not proceed until receipt of written notification from Departmental Representative granting the Isolation Request and authorization to proceed with the isolation of designated equipment or facility. Departmental Representative may designate other individual at the Facility as the person authorized to grant the Isolation Request.
.5 Conduct safe, orderly shut down of equipment or facilities, de-energize and isolate power and other sources of energy and lockout items in accordance with requirement of clause 1.8 below.
.6 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.
.7 Determine in advance, as much as possible, in cooperation with the Departmental Representative, the type and frequency of situations which will require a Request for Isolation. Follow Departmental Representative's directives in this regard.
.8 Conduct hazard assessment as part of the planning process of isolating existing equipment and facilities. Hazard Assessments to conform with requirements of Health and Safety Section 01 35 28.

1.8 LOCKOUTS

.1 Isolate and lockout electrical facilities, mechanical equipment and machinery from all potential energy sources prior to starting work on such items.
.2 Develop and implement lockout procedures to be followed on site as an integral part of the Work.
.3 Use energy isolation lockout devices specifically designed and appropriate for type of facility or equipment being locked out.
.4 Use industry standard lockout tags.
.5 Provide appropriate safety grounding and guards as required.
.6 Prepare Lockout Procedures in writing. Describe safe work practices, work functions and sequence of activities to be followed on site to safely isolate all potential energy sources and lockout/tagout facilities and equipment.
.7 Include within procedures a system of worker request and issuance of individual lockout permit by a person, employed by Contractor, designated to be "in-charge" and being responsible for:
  .1 Controlling issuance of permits or tags to workers.
  .2 Determining permit duration.
  .3 Maintaining record of permits and tags issued.
  .4 Submitting a Request for Isolation to Departmental Representative when required in

accordance with Clause 1.7 above.

.5 Designating a Safety Watcher, when one is required based on type of work.

.6 Ensuring equipment or facility has been properly isolated, providing a Guarantee of Isolation to worker(s) prior to proceeding with work.

.7 Collecting and safekeeping lockout tags, returned by workers, as a record of the event.

.8 Clearly establish, describe and allocate, within procedures, the responsibilities of:

.1 Workers.

.2 Designated person controlling issuance of lockout tags/permits.

.3 Safety Watcher.

.4 Subcontractors and General Contractor.

.9 Procedures shall meet the requirements of Codes and Regulations specified in clause 1.5 above.

.10 Generic procedures, if used, must be edited, supplemented with pertinent information and tailored to reflect specific project conditions. Clearly label as being the procedures applicable to this contract.

.1 Incorporate site specific rules and procedures established by Facility Manager and in force at site. Obtain such procedures through Departmental Representative.

.11 Procedures to be in typewritten format.

.12 Submit copy of Lockout Procedures to Departmental Representative, in accordance with submittal requirements of clause 1.6 herein, prior to commencement of work.

1.9 CONFORMANCE

.1 Ensure that lockout procedures, as established for project on site, are stringently followed. Enforce use and compliance by all workers.

.2 Brief all persons working on electrical facilities, mechanical and other equipment fed by an energy source on requirements of this section.

.3 Failure to perform lockouts in accordance with regulatory requirements or follow procedures specified herein may result in the issuance of a Non-Compliance Notification at Departmental Representative's discretion with possible disciplinary measures imposed 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 submitted to Departmental Representative and lockout permits or tags issued to workers during the course of work for full project duration.

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

.4 Retain Hot Work Permits and Hazard Assessments.

End of Section

1 General

1.1 RELATED WORK

.1 Section 01 35 24: Special Procedures on Fire Safety Requirements.
.2 Section 01 33 00: Submittal Procedures.
.3 Section 01 10 10: General Instructions.

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 and Provincial Inspectors and other Authorities having jurisdiction.
  .4 Accident or Incident Reports
  .5 MSDS data sheets.
  .6 Name of Contractor's representative designated to perform health and safety supervision on site.
  .7 Name of person designated as Health and Safety Site Coordinator.
.2 Medical Surveillance: Obtain and maintain worker medical surveillance documentation for work posing a potential health hazard to workers as stipulated in Federal or Provincial Occupational Safety and Health Regulations. Upon request, submit copy of documentation to Departmental Representative.
.3 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.
.4 Submit above documents in accordance with 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 Prince Edward Island, and the Occupational Health and Safety Act 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 2010 National Building Code of Canada, Part 8;
  .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)
.6 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 site 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 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 FILING OF NOTICE

.1 File Notice of Project and other Notices with Provincial authorities prior to commencement of Work.
- .1 Departmental Representative will assist in locating address for Filing Notice of Project if needed.

1.8 PERMITS

.1 Obtain building permit, licenses, compliance certificates and other permits as specified in Section 01 10 10 before and during progress of work. Post on site.

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

1.9 HAZARD ASSESSMENTS

.1 Conduct site specific health and safety hazard assessment before commencing project and during course of work identifying 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 sub-contractor 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.

1.10 PROJECT/SITE CONDITIONS

.1 Obtain from Departmental Representative, copy of MSDS Data sheets for existing hazardous products stored on site or used by Facility personnel.

1.11 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 Health & Safety Site Coordinator.
  .4 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.
  .3 Conduct formal meetings on a minimum monthly basis.

1.12 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 7 calendar days of Contract Award.
  .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 of authorities having jurisdiction and local emergency resource organizations, as needed base on nature of emergency.
      .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	Part 2	Part 3a/3b
Identified Hazards	Safety Measures	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 or those which would otherwise be applicable to the site of the work.

1.13 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 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.

1.14 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.

.2 Maintain evidence and records of worker training.

1.15 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 sub-contractors 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.

1.16 ACCIDENT REPORT

.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.

1.17 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.

1.18 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 Engineer 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.

1.19 POWDER ACTUATED DEVICES

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

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, or 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 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 is issued to the General Contractor, by the Departmental Representative, whenever there is a violation or non compliance of the project's health and safety requirements and of those of Provincial and Federal regulations by any worker, subcontractor or other person to whom the Contractor has granted access to the work site.
    .2 Non-Compliance notifications are progressive in nature resulting in 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 Document "C".
.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 contract award 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 offense, 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 Work" until so notified to proceed.
      .2 Review of all non compliance and/or accident occurrences in the project with possible investigation by the Department of PWGSC.
      .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 Document "C"
    .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 after Contract award.

.11 Be responsible to fully brief workers and subcontractors on the operation and importance of this system.

End of Section

1 General

1.1 RELATED SECTIONS

.1 Section 01 74 19: Construction/Demolition Waste Management and Disposal.
.2 Section 01 14 10: Scheduling and Management Work.

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 DISPOSAL OF WASTES

.1 Do not bury rubbish and waste materials on site. Dispose at approved landfill sites as specified in section 01 74 19.
.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.
.3 Store, handle and dispose of hazardous materials and hazardous waste in accordance with applicable federal and provincial laws, regulations, codes and guidelines.

1.5 DRAINAGE

.1 Not Applicable.

1.6 POLLUTION CONTROL

.1 Control emissions from equipment and plant to local authorities emission requirements.
.2 Cover or wet down dry materials and rubbish to prevent blowing dust and debris.
.3 Maintain inventory of hazardous materials and hazardous waste stored on site. List items by product name, quantity and date when storage began.
.4 Have emergency spill response equipment and rapid clean-up kit, appropriate to work, at site. Locate adjacent to work and where hazardous materials are stored. Provide personal protective equipment as required for clean-up.
.5 Report, to Federal and Provincial Department of the Environment, spills of petroleum and other hazardous materials as well as accidents having potential of polluting the environment. Also notify Departmental Representative and submit a written spill report to Departmental Representative within 24 hours of occurrence.

End of Section

1 General

1.1 RELATED SECTIONS

.1 Section 01 14 10: Scheduling and Management Work.

1.2 GENERAL

.1 Due to nature of this Facility, and client operations therein, security regulations pertaining to site will be in place during the work and result in need for:
- .1 Control and limit movement of construction workers at the site and inside building;
- .2 Escort and continuous supervision of workers by security personnel;
- .3 Workers may undergo a security clearance process;
- .4 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 and obtain security clearances for all workers (if required);
- .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.
- .4 Obtain and pay for a Security Commissionaire during the course of the work. Price to be carried in the Contractor's bid amount. Contact information for pricing and scheduling of Security Commissionaire as follows:
  - .1 Chris Collins
    Regional Manager Assistant
    Canadian Corps of Commissionaires
    NB/PEI Division
    Email: charlottetown@cccnbpei.ca
    Telephone: 902-894-7026
    Facsimile: 902-894-9564

.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.

1.3 SECURITY PASSES

.1 Visitor or worker ID Tags are required for all personnel requiring access on site.

.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. 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.

End of Section

1 General

1.1 SECTION INCLUDES

.1 Inspection and testing, administrative and enforcement requirements.
.2 Mock-ups.
.3 Equipment and system adjust and balance.

1.2 RELATED SECTIONS

.1 Section 01 33 00 - Submittal Procedures.
.2 Section 01 78 00 - Closeout Submittals.

1.3 INSPECTION

.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 Give timely notice requesting inspection of Work designated for special tests, inspections or approvals by Departmental Representative or by inspection authorities having jurisdiction.
.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. Pay costs to uncover and make good such Work.
.4 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.

1.4 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 conveying systems, mechanical and electrical equipment and systems.
  .4 Tests as specified within various sections designated to be carried out by Contractor under the supervision of Departmental Representative.
  .5 Additional tests specified in Clause 1.4.2.
.2 Where tests or inspections by designated Testing Agency reveal work not in accordance with contract requirements, Contractor shall pay costs for additional tests or inspections as Departmental Representative may require to verify acceptability of corrected work.
.3 Employment of inspection and testing agencies by Departmental Representative does not relax responsibility to perform Work in accordance with Contract Documents.

1.5 ACCESS TO WORK

.1 Furnish labour and facility to provide access to the work being inspected and tested.
.2 Co-operate to facilitate such inspections and tests.
.3 Make good work disturbed by inspections and tests.

1.6 PROCEDURES

.1 Notify Departmental Representative sufficiently in advance of when work is ready for tests, in order for Departmental Representative to make attendance arrangements with Testing Agency. When directed by Departmental Representative, notify such Agency directly.
.2 Submit representative samples of materials specified to be tested. Deliver in required quantities to Testing Agency. Submit with reasonable promptness and in an orderly sequence so as not to

cause delay in Work.

.3 Provide labour and facilities to obtain and handle samples on site. Provide sufficient space on site for Testing Agency's exclusive use to store equipment and cure test samples.

1.7 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 existing or new work resulting from removal or replacement of defective work.

1.8 TESTING BY CONTRACTOR

.1 Provide all necessary instruments, equipment and qualified personnel to perform tests designated as Contractor's responsibilities herein or elsewhere in the Contract Documents.

.2 At completion of tests, turn over 2 copies of fully documented test reports to Departmental Representative. Additionally, obtain other copies in sufficient quantities to enable one complete set of test reports to be placed in each of the maintenance manuals specified in Section 01 78 00.

.3 Submit mill test certificates and other certificates as specified in various sections.

.4 Submit adjustment and balancing reports for mechanical, electrical and building equipment systems specified in trade sections.

.5 Furnish test results and mix designs as specified in various sections.

1.9 MOCK-UPS

.1 Prepare mock-ups for Work specifically requested in specifications. Include for Work of Sections required to provide mock-ups.

.2 Construct in locations acceptable to Departmental Representative.

.3 Prepare mock-ups for Departmental Representative review with reasonable promptness and in orderly sequence, to not cause delays in Work.

.4 Failure to prepare mock-ups in ample time is not considered sufficient reason for 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 schedule fixing dates for preparation.

.6 Remove mock-up at conclusion of Work or when acceptable to Departmental Representative.

1.10 EQUIPMENT AND SYSTEMS

.1 Submit adjustment and balancing reports for mechanical, electrical and building equipment systems.

End of Section

1 General

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.

1.2 BUILDING ACCESS

.1 Use only access doors, and circulation routes and elevators within building as designated by Departmental Representative to access interior work.

1.3 CONTRACTOR'S SITE OFFICE

.1 Be responsible for and provide own site office, if required, including electricity, heat, lights and telephone. Locate site office as directed by Departmental Representative.

1.4 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.
.3 Make arrangements elsewhere in the city as deemed required and pay all costs for storage of materials not ready for incorporation into work.

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 at entrance doors to work to fully isolate construction from other parts of the building.
    .2 Construct dust partitions as follows:
        .1 Use 10 mm polyethylene installed and sealed tightly to abutting walls, ceilings and floor with continuous duct tape along all edges and seams. Support in position with 38 x 89 wood framing at 400 mm o.c. Locate seams only at framing members and overlap sheeting by minimum of 150 mm.
.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 USE OF EXISTING ELEVATOR

.1 The existing elevator will be available for use at off business hours for material movement if required.
.2 Protect all finishes both inside and outside elevator.
.3 Be responsible for all damage to finishes or equipment to the elevator caused by Contractor.

1.8 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, panelboards, 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 28 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.

1.9 WATER SUPPLY

.1 Water supply is available on site 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.

1.10 SCAFFOLDING

.1 Design, construct and maintain scaffolding in rigid, secure and safe manner in accordance with CAN/CSA-S269.2-M87(R1998).
.2 Erect scaffolding independent of walls. Remove when no longer required.

1.11 HEATING AND VENTILATING

.1 Heating by existing facility systems at Owner's cost.
.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 Ventilate storage spaces containing hazardous or volatile materials.
  .4 Continue operation of ventilation and exhaust system for time after cessation of work process to assure removal of harmful contaminants, coordinate with Departmental Representative.
.3 Submit tenders assuming existing equipment and systems will be used for heating and ventilating.

1.12 REMOVAL OF TEMPORARY FACILITIES

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

End of Section

1 General

1.1 RELATED SECTIONS

.1 Section 01 77 00: Closeout Procedures.
.2 Section 01 78 00: Closeout Submittals.
.3 Section 01 33 00: Submittal Procedures.
.4 Section 01 35 28: Health and Safety Requirements.

1.2 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.

1.3 PRODUCT QUALITY & REFERENCED STANDARDS

.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, Document "C".

1.4 ACCEPTABLE MATERIALS AND ALTERNATIVES

.1 Acceptable Materials: When materials specified include trade names or trade marks or manufacturer's or supplier's name as part of the material description, select and only use one of 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 tendering period following procedures indicated in the Instructions to Tenderers.
.3 Substitutions: After contract award, substitution to a specified material will be dealt with as a change to the Work in accordance with the General Conditions Document "C".

1.5 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 manufacturers instructions, so that Departmental Representative will designate which document is to be followed.

1.6 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.

1.7 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 General Conditions, document "C".
.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.
.5 Coordinate placement of openings, sleeves and accessories.

1.8 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 01 35 28 - Health and Safety Requirements in this regard.

1.9 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.

1.10 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.
.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.

1.11 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.

End of Section

1 General

1.1 RELATED SECTIONS

.1 Section 01 77 00: Closeout Procedures.
.2 Section 01 74 19: Construction/Demolition Waste Management and Disposal.
.3 Section 01 50 00: Temporary Facilities.

1.2 GENERAL

.1 Conduct cleaning and disposal operations to comply with local ordinances and anti-pollution laws.
.2 Store volatile waste in covered 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.

1.3 MATERIALS

.1 Use only cleaning materials recommended by manufacturer of surface to be cleaned, and as recommended by cleaning material manufacturer.

1.4 CLEANING DURING CONSTRUCTION

.1 Maintain work site in a tidy condition, free from accumulations of waste material and debris. Clean areas on a daily basis.
.2 Keep existing building entrances, corridors and stairwells used by workers in clean dust free condition at all times. Conduct thorough cleaning of these areas at end of each workshift.
.3 Provide on-site waste containers for collection of waste materials and debris.
.4 Use separate collection bins, clearly marked as to purpose, for collection of waste and demolition debris intended for source separation and recycling process of waste management procedures specified in section 01 74 19.
.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 and employ dust barriers, dividers, seals on doors and other dust control measures as required to ensure dust and dirt generated by work are not transmitted to other existing areas of building. Should dust accidentally migrate into areas under use by building occupants or public, employ such means as may be necessary to immediately clean all contaminated surfaces within these area(s) 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, stairwells and within tenant occupied areas resulting from use by workers.
    .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.

1.5 FINAL CLEANING

.1 In preparation for acceptance of the project on an interim or final certificate of completion 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.

End of Section

1 General

1.1 SECTION INCLUDES

.1 Text, schedules and procedures for systematic Waste Management Program for construction, deconstruction, demolition, and renovation projects, including:
- .1 Diversion of Materials.
- .2 Waste Audit (WA) - Schedule A.
- .3 Waste Reduction Workplan (WRW) - Schedule B.
- .4 Demolition Waste Audit (DWA) - Schedule C.
- .5 Cost/Revenue Analysis Workplan (CRAW) - Schedule D.
- .6 Materials Source Separation Program (MSSP).
- .7 Canadian Governmental Responsibility for the Environment Resources - Schedule E.

1.2 RELATED SECTIONS

.1 Section 01 33 00 - Submittal Procedures.

1.3 PRECEDENCE

.1 For Federal Government projects, Division 1 Sections take precedence over technical specification sections in other Divisions of this Project Manual.

1.4 DEFINITIONS

.1 Materials Source Separation Program (MSSP): Consists of series of ongoing activities to separate reusable and recyclable waste material into material categories from other types of waste at point of generation.

.2 Recyclable: Ability of product or material to be recovered at end of its life cycle and re-manufactured into new product for reuse by others.

.3 recycle: Process by which waste and recyclable materials are transformed or collected for purpose of being transferred into new products.

.4 Recycling: Process of sorting, cleansing, treating and reconstituting solid waste and other discarded materials for purpose of using in altered form. Recycling does not include burning, incinerating, or thermally destroying waste.

.5 Reuse: Repeated use of product in same form but not necessarily for same purpose. Reuse includes:
- .1 Salvaging reusable materials from re-modeling projects, before demolition stage, for resale, reuse on current project or for storage for use on future projects.
- .2 Returning reusable items including pallets or unused products to vendors.

.6 Salvage: Removal of structural and non-structural materials from deconstruction/disassembly projects for purpose of reuse or recycling.

.7 Separate Condition: Refers to waste sorted into individual types.

.8 Source Separation: Acts of keeping different types of waste materials separate beginning from first time they became waste.

1.5 DOCUMENTS

.1 Maintain at job site, one copy of following documents:
- .1 Waste Reduction Workplan.
- .2 Material Source Separation Plan.

1.6 SUBMITTALS

.1 Submittals in accordance with Section 01 33 00 - Submittal Procedures.

.2 Prepare and submit following prior to project start-up:
- .1 2 copies of Materials Source Separation Program (MSSP) description.

1.7 QUALITY ASSURANCE - SITE VISIT

.1 Pre-bid site visit:
  .1 Walk-through of project site prior to completion of bid submittal is mandatory.
  .2 Date, time and location to be arranged by Departmental Representative.

1.8 MATERIALS SOURCE SEPARATION PROGRAM (MSSP)

.1 Prepare MSSP and have ready for use prior to project start-up.
.2 Implement MSSP for waste generated on project in compliance with approved methods and as reviewed by Departmental Representative.
.3 Provide on-site facilities for collection, handling, and storage of anticipated quantities of reusable and recyclable materials.
.4 Provide containers to deposit reusable and recyclable materials.
.5 Locate containers in locations, to facilitate deposit of materials without hindering daily operations.
.6 Locate separated materials in areas which minimize material damage.

1.9 STORAGE, HANDLING AND PROTECTION

.1 Store, materials to be reused, recycled and salvaged in locations as directed by Departmental Representative.
.2 Separate non-salvageable materials from salvaged items. Transport and deliver non-salvageable items to licensed disposal facility.
.3 Prevent contamination of materials to be recycled and handle materials in accordance with requirements for acceptance by designated facilities.
  .1 On-site source separation is recommended.

1.10 DISPOSAL OF WASTES

.1 Do not bury rubbish or waste materials.
.2 Do not dispose of waste into waterways, storm, or sanitary sewers.
.3 Remove materials from deconstruction as deconstruction/disassembly Work progresses.

1.11 USE OF SITE AND FACILITIES

.1 Execute work with least possible interference or disturbance to normal use of premises.
.2 Maintain security measures established by existing facility.

1.12 SCHEDULING

.1 Coordinate Work with other activities at site to ensure timely and orderly progress of Work.

2 Products

2.1 NOT USED

.1 Not used.

3 Execution

3.1 APPLICATION

.1 Do Work in compliance with WRW.
.2 Handle waste materials not reused, salvaged, or recycled in accordance with appropriate regulations and codes.

3.2 CLEANING

.1 Remove tools and waste materials on completion of Work, and leave work area in clean and orderly condition.
.2 Clean-up work area as work progresses.
.3 Source separate materials to be reused/recycled into specified sort areas.

3.3 DIVERSION OF MATERIALS

.1 From following list, separate materials from general waste stream and stockpile in separate piles or containers, as reviewed by Departmental Representative, and consistent with applicable fire regulations.
  .1 Mark containers or stockpile areas.
  .2 Provide instruction on disposal practices.
.2 On-site sale of salvaged materials.

Demolition Waste

	Material Type	Recommended Diversion %	Actual Diversion %
.4	Acoustic Tile	50	___
.5	Acoustical Insulation	100	___
.6	Carpet	100	___
.7	De-mountable Partitions	80	___
.8	Doors and Frames	100	___
.9	Electrical Equipment	80	___
.10	Furnishings	80	___
.11	Mechanical Equipment	100	___
.12	Metals	100	___
.13	Rubble	100	___
.14	Wood (uncontaminated)	100	___
.15	Other		___

Construction Waste

	Material Type	Recommended Diversion %	Actual Diversion %
.17	Cardboard	100	___
.18	Plastic Packaging	100	___
.19	Rubble	100	___
.20	Steel	100	___
.21	Wood (uncontaminated)	100	___
.22	Other		___

3.4 WASTE AUDIT (WA)

.1 Schedule A - Waste Audit (WA)
.2 (1) Material Category, (2) Material Quantity Unit, (3) Estimated Waste %, (4) Total Quantity of Waste (unit), (5) Generation Point, (6) % Recycled, (7) % Reused.
.3 Wood and Plastics Material Descrip.
.4 Off-cuts
.5 Warped Pallet Forms
.6 Plastic Packaging
.7 Cardboard Packaging
.8 Other
.9 Doors and windows material Descrip.
.10 Painted Frames

.11 Glass
.12 Wood
.13 Metal
.14 Other

3.5 WASTE REDUCTION WORKPLAN (WRW)

.1 Schedule B
.2 (1) Material Category, (2) Person(s) Responsible, (3) Total Quantity of Waste (unit), (4) Reused Amount (units) Projected Actual, (5) Recycled Amount (unit) Projected Actual, (6) Material (s) Destination.
.3 Wood and Plastics Material Description.
.4 Chutes.
.5 Warped Pallet Forms.
.6 Plastic Packaging.
.7 Card- board Packaging.
.8 Other.
.9 Doors and Windows Material Descrip.
.10 Painted Frames
.11 Glass
.12 Wood
.13 Metal
.14 Other

3.6 DEMOLITION WASTE AUDIT (DWA)

.1 Schedule C - Demolition Waste Audit (DWA)
.2 (1) Material Description, (2) Quantity, (3) Unit, (4) Total, (5) Volume (cum), (6) Weight (cum), (7) Remarks and Assumptions.
.3 Wood.
.4 Wood Stud.
.5 Plywood.
.6 Baseboard-Wood.
.7 Door Trim - Wood.
.8 Cabinet.
.9 Doors and Windows.
.10 Panel Regular.
.11 Slab Regular.
.12 Wood Laminate.
.13 Byfold - Closet.
.14 Glazing.

3.7 COST/REVENUE ANALYSIS WORKPLAN (CRAW)

.1 Schedule D - Cost/Revenue Analysis Workplan (CRAW)
.2 (1) Material Description, (2) Total Quantity (unit), (3) Volume (cum), (4) Weight (cum), (5) Disposal Cost/Credit $(+/-), (6) Category Sub-Total $(+/-).
.3 Wood.
.4 Wood Stud.
.5 Plywood.
.6 Baseboard - Wood.
.7 Door Trim - Wood.
.8 Cabinet $.
.9 Doors and Windows.
.10 Panel Regular.

.11 Slab Regular.
.12 Wood Laminate.
.13 Byfold - Closet.
.14 Glazing $.
.15 (7) Cost (-) / Revenue (+) $

3.8 CANADIAN GOVERNMENTAL DEPARTMENTS CHIEF RESPONSIBILITY FOR THE ENVIRONMENT

.1 Schedule E - Government Chief Responsibility for the Environment
.2 Province, Address, General Inquires, Fax
.3 The Clean Environment Commission, 284 Reimer Avenue, Box 21420, Steinback, MB R0A 2T3, (204) 326-2395, (204) 326-2472
.4 Environment Canada Toronto, ON, (416) 734-4494
.5 Prince Edward Island, Department of Environmental Resources, 11 Kent Street, 4 th Floor, PO Box 2000, Charlottetown, PE C1A 7N8, (902) 368-5000, (902) 368-5830

End of Section

1 General

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 and Acceptance.

.2 Departmental Representative's Inspection: Accompany Departmental Representative during all interim and final inspections of Work. Address defects, faults and outstanding items of work identified by such inspections.

.3 Notwithstanding Clause CG44.2 of the General Conditions document "C", the Contractor's attention is drawn to the fact that the Departmental Representative will not issue an Interim Certificate of Completion until such time that Contractor performs following work and turns over to Departmental Representative 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, balancing [and commissioning] of equipment and systems complete with submission of support documents.

.4 At completion of project, in company with the Architect/Departmental Representative, make a check of all work and correct all discrepancies and defects. Be aware that the Final Certificate of Completion will not be issued until such time that Contractor has fully completed and turned over all specified as-built project record documents, training, maintenance manuals, test results and any guarantee certificate as issued by particular manufacturer.

.5 Correct all discrepancies before final inspection and acceptance of Work.

End of Section

1 General

1.1 SECTION INCLUDES

.1 Project Record Documents as follows:
- .1 As-built drawings;
- .2 As-built specifications;
- .3 Reviewed shop drawings.

.2 Operations and Maintenance data as follows:
- .1 Operations and Maintenance Manual;
- .2 Maintenance Materials;
- .3 Spare Parts;
- .4 Special Tools.

1.2 RELATED SECTIONS

.1 Section 01 33 00 - Submittal Procedures.
.2 Section 01 79 00 - Demonstration and Training.

1.3 PROJECT RECORD DOCUMENTS

.1 Departmental Representative will provide two white print sets of contract drawings and two copies of Specifications Manual specifically for "as-built" purposes.
.2 Maintain at site one set of the contract drawings and specifications to record actual as-built site conditions.
.3 Maintain up-to-date, real time as-built drawings and specifications in good condition and make available for inspection by the Departmental Representative at any time during construction.
.4 As-Built Drawings:
- .1 Record changes in red ink on the prints. Mark only on one set of prints and at completion of project and prior to interim inspection, neatly transfer notations to second set (also by use of red ink). Submit both sets to Departmental Representative. All drawings of both sets shall be stamped "As-Built Drawings" and be signed and dated by Contractor.
- .2 Show all modifications, substitutions and deviations from what is shown on the contract drawings or in specifications.
- .3 Record following information:
  - .1 Location of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of structure;
  - .2 Field changes of dimension and detail;
  - .3 Location of all capped or terminated services and utilities.
  - .4 Chases for mechanical, electrical and other services;
  - .5 Ceiling and floor elevations;
  - .6 Reflected ceiling plan condition showing finished layout of all ceiling-mounted services and devices;
  - .7 Plumbing, heating, air conditioning and ventilation, sprinkler and electrical service installation locations; all to be dimensioned and referenced to building columns or load bearing walls;
  - .8 All design elevations, sections, floor plans and details dimensioned and marked-up to consistently report finished installation conditions;
  - .9 Any details produced in the course of the contract by the Departmental Representative to supplement or to change existing design drawings must also be marked-up and dimensioned to reflect final as-built conditions and appended to the as-built drawing document;
  - .10 All change orders issued over the course of the contract must be documented on the finished as-built documents, accurately and consistently depicting the changed condition as it applies to all affected drawing details.

.5 As-built Specifications: legibly mark in red each item to record actual construction, including:
- .1 Manufacturer, trade name, and catalogue number of each product actually installed,

particularly items substituted from that specified.

.2 Changes made by Addenda and Change Orders.

.3 Mark up both copies of specifications; stamp "as-built", sign and date similarly to drawings as per above clause.

.6 Maintain As-built documents current as the contract progresses. Departmental Representative will conduct reviews and inspections of the documents on a regular basis. Frequency of reviews will be subject to Departmental Representative's discretion. Failure to maintain as-builts current and complete to satisfaction of the Departmental Representative shall be subject to financial penalties in the form of progress payment reductions and holdback assessments.

1.4 REVIEWED SHOP DRAWINGS

.1 Compile full set of shop drawings and product data reviewed on project and incorporate into Operations and Maintenance Manual. Supply number of shop drawing sets equal to the required number of final Operations and Maintenance manuals.

.2 Submit shop drawing sets at same time and as part of the contents of the Operation and Maintenance manuals specified in this section.

1.5 UPDATING OF DIGITAL DRAWINGS

.1 Be aware that beyond the requirement to provide "red marked" as-built paper documents, as specified in Clause 1.3 above, Contractor shall also provide, as part of the contract requirements, the service of updating the digital drawings which were used to produce the contract drawings.

.2 The Departmental Representative will provide one set of AutoCad Release 2000 drawing files specifically for "as-built" purposes. The AutoCad drawing files shall be updated to record same as-built information as specified in above clauses for the provision of paper as-built drawing documentation.

.3 All "As-Built" changes to the electronic files provided shall be done following the standards as specified in the PWGSC Atlantic Region CADD Data Specification manual dated April 2002. A copy of this manual will be provided by the Departmental Representative upon request.

.4 Make revisions to electronic files found to be in non-conformance with the CADD Data Specifications Manual as directed by Departmental Representative.

.5 In regards to updating the digital files to reflect changes resulting from Change Orders, the change in cost of completing the As-Built documentation of changes is to be included in the amount for each Change Order issued. The amount included will constitute only the increase or decrease in CADD related costs resulting directly from the change. In determining the cost difference, full consideration will be given to the fact that other clauses of this section require As-Built CADD updates to the drawings irrespective of any Change Orders.

.6 Deliver the digital information in same format and sequence as per contract drawings, submitted on writable CD's.

.7 Submit the digital as-built files to the Departmental Representative at the same time as when turning over the two sets of marked-up paper white prints. Supply of digital as-builts documents does not replace the requirement for the provision of the marked-up white prints specified elsewhere in this section.

.8 Also provide 1 set of reproducible velum plots of the updated electronic as-built CADD drawing files.

1.6 OPERATIONS AND MAINTENANCE MANUALS

.1 Definition: an organized compilation of operating and maintenance data including detailed technical information, documents and records describing operation and maintenance of individual products or systems as specified in individual sections of the specifications.

.2 Manual Language: final manuals to be in English language.

.3 Number of copies required:

.1 Submit 2 interim copies of the manual for review and inspection by Departmental Representative. Make revisions and additions as directed and resubmit.

.2 Upon review and acceptance by Departmental Representative, submit 3 final copies. Initial

copies are not to be considered as part of the final copies unless they have been fully revised and are identical to the final approved version.

.4 Submission Date: submit complete operation and maintenance manual to Departmental Representative 3 weeks prior to application for Interim Certificate of Completion of project.

.5 Binding:

.1 Assemble, coordinate, bind and index required data into Operation and Maintenance Manual.

.2 Use vinyl, hard covered, 3 "D" ring binders, loose leaf, sized for 215 x 280 mm paper, with spine pocket.

.3 Where multiple binders are needed, correlate data into related consistent groupings.

.4 Identify contents of each binder on spine.

.5 Organize and divide data into sections same as 16 division numerical order of contract specifications and thereafter subdivided into various equipment or building systems.

.6 Material: separate each section by use of cardboard dividers and labels. Provide tabbed fly leaf for each separate product or system within each section and with typed description of product and major component parts of equipment.

.7 Type lists and notes. Do not hand write.

.8 Drawings, diagrams and manufacturers' literature must be legible. Provide with reinforced, punched binder tab. Bind in with text; fold larger drawings to size of text pages.

.6 Manual Contents:

.1 Cover sheet containing:

.1 Date submitted.

.2 Project title, location and project number.

.3 Names and addresses of Contractor, and all Sub-contractors.

.2 Table of Contents: provide full table of contents in each binder(s), clearly indicate which contents are in each binder.

.3 List of maintenance materials.

.4 List of spare parts.

.5 List of special tools.

.6 Original or certified copy of Warranties and Guarantees.

.7 Copies of approvals, and certificates issued by Inspection Authorities.

.8 Copies of reports and results from tests designated as Contractor's responsibilities.

.9 Product Information Data on all materials, equipment and systems as specified in individual sections of the specifications to include:

.1 List of equipment including manufacturer's name, supplier, local source of supplies and service depot(s). Provide full addresses and telephone numbers.

.2 Nameplate information including equipment number, make, size, capacity, model number and serial number.

.3 Parts list.

.4 Installation details.

.5 Operating instructions.

.6 Maintenance instructions for equipment.

.7 Maintenance instructions for finishes.

.7 Shop drawings:

.1 Bind one complete set of reviewed shop drawings into each copy of operations and maintenance manual.

.2 Bind the shop drawings in a manner such that they correspond with the specification section they relate to.

.3 Where large quantity of data is supplied due to size of project, fold and bind professionally into separate correctly sized binder.

.8 Equipment and Systems Data: the following list indicates the type of data and extent of information required to be included for each item of equipment and for each system:

.1 Description of unit or system, and component parts. Give function, normal operation characteristics, and limiting conditions. Include performance curves, with engineering data

and tests, and complete nomenclature and commercial number of replaceable parts.
.2 Panel board circuit directories: provide electrical service characteristics, controls, and communications.
.3 Include installed colour coded wiring diagrams.
.4 Operating Procedures: include start-up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shut-down, and emergency instructions. Include summer, winter, and any special operating instructions.
.5 Maintenance Requirements: include routine procedures and guide for trouble-shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.
.6 Servicing and lubrication schedule, and list of lubricants required.
.7 Manufacturer's printed operation and maintenance instructions.
.8 Sequence of operation by controls manufacturer.
.9 Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.
.10 Provide installed control diagrams by controls manufacturer.
.11 Provide Contractor's coordination drawings, with installed colour coded piping diagrams.
.12 Provide charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.
.13 Provide list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.
.14 Include test and balancing reports.
.15 Additional requirements as specified in individual specification sections.

.9 Materials and Finishes Maintenance Data:
.1 Building Products, Applied Materials, and Finishes: include product data, with catalogue number, size, composition, and colour and texture designations.
.2 Instructions for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.
.3 Moisture-protection and Weather-exposed Products: include manufacturer's recommendations for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.
.4 Additional Requirements: as specified in individual specifications sections.

1.7 SPARE PARTS, TOOLS AND MAINTENANCE MATERIALS

.1 Provide spare parts, special tools and extra materials for maintenance purposes in quantities specified in individual specification sections.
.2 Tag all items with associated function or equipment.
.3 Provide items of same manufacture and quality as items in Work.
.4 Deliver to site in well packaged condition. Store in location as directed by Departmental Representative.
.5 Clearly mark as to contents indicating:
.1 Part number.
.2 Identification of equipment or system for which parts are applicable.
.3 Installation instructions or intended use as applicable.
.4 Name, address and telephone number of nearest supplier.
.6 Prepare and submit complete inventory list of items supplied. Include list within Maintenance Manual.

End of Section

1 General

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 Provide evidence to Departmental Representative when deemed required of individual Trainer's knowledge and qualifications.

1.4 SUBMITTAL

.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 two weeks prior to designated dates, for Departmental Representative's approval.
.2 Submit reports within one 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, fully operational and all testing, adjusting and balancing 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.

End of Section

1 General

1.1 RELATED SECTIONS

.1 Operations and Maintenance Manuals: Section 01 78 00.
.2 Demonstration and Training: Section 01 79 00.

1.2 COMMISSIONING OBJECTIVE

.1 Perform commissioning activities in order to achieve the following objectives:
  .1 Collect data on equipment and systems supplied; and to document their installation;
  .2 Conduct checks and tests on fully installed building component, 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.
.2 Commissioning activities conducted by Departmental Representative and/or Design Consultant does not replace checks, tests, adjustments, balancing and other performance verification responsibilities to be performed by Contractor as part of the work and as specified in other sections of the Specifications.

1.3 DEFINITIONS

.1 For the purpose of this contract, the following terms, used in this section, as they relate directly or indirectly to the commissioning process, shall be deemed to have the meaning as defined hereafter.
.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 1.2 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 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 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 Contractor: means the General Contractor, however it also refers to any personnel from subcontractors, including the controls and subcontractors, suppliers and manufacturer representatives with whom the General Contractor contracts or obtains services for the performance of work and designated commissioning duties.
.5 Design Consultant: persons from the civil, architectural, mechanical and electrical design disciplines of the consultant engineering firm(s) engaged by Departmental Representative to prepare the final design and contract documents.

.6 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

.7 Installation/Start-up Checks:(sometimes referred to as pre-functional checks). 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.

.8 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.

.9 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.

1.4 CONTRACTOR'S COMMISSIONING RESPONSIBILITIES

.1 General:

.1 Coordinate the participation of the various subcontractors, their specialists and manufacturer's representatives in providing the commissioning activities described below.

.2 Ensure that workers and manufacturer's personnel are knowledgeable and qualified to interpret system functions and intended design criteria.

.3 Develop a commissioning schedule.

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

.5 Commissioning of Facility and designated systems will only commence once that required documentation has been received and all installed equipment and systems have undergone successful performance verification.

.6 Be aware that interim inspection certificate will only be issued by Departmental Representative when:

.1 All commissioning documentation has been received, reviewed for suitability and approved by Departmental Representative;

.2 Designated facility components and systems have been commissioned and;

.3 Training has been completed.

.7 Non-Conformance of Performance Verification Requirements:
.1 Should incorrectly installed or malfunctioning equipment, system components or associated controls be found while Facility is being commissioned, Contractor shall be required to re-verify 100% of all equipment and components within the nonfunctional system, including other related system as deemed required by Departmental Representative, to correct deficiencies and ensure effective performance.
.2 Costs to correct work and any additional tests or inspections, as deemed required by Departmental Representative, to determine acceptability and proper performance of such items to be paid for by Contractor.
.1 Above costs held against Contractor will be as financial penalties in the form of progress payment reductions or holdback assessments.

.2 Prior to Facility being Commissioned:
.1 Submit commissioning documentation as specified in clause 1.8 for use during commissioning.
.2 Carryout pre-start-up and start-up of equipment.
.3 Conduct performance verification on all installed equipment and systems. Ensure they are fully functional.
.4 Address deficiencies in Work identified during performance verification of equipment and systems. Conduct additional performance verification checks and tests to ensure acceptability of Work.
.5 Arrange for special tools and devices, identified at commissioning meeting(s), as deemed required to assist with commissioning.
.6 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 present at site to assist commissioning activity.
.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 Departmental Representative.
.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 Departmental Representative.
.3 Specific procedures used to commission Facility will be provided by Departmental Representative 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 Departmental Representative.
.5 Monitor equipment and system responses.
.6 Record test results, measurements and other data.
.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 1.7below.
.2 Turn over any filled-in checks sheets or reports resulting from commissioning.

.5 During Warranty period at Occupancy Stage:
.1 Fine tune components, systems and integrated systems and continue system debugging to optimize Facility performance.
.2 Rectify warranty issues.
.3 Submit written report to 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.
.4 Departmental Representative to be present during such work.

1.5 COMMISSIONING MEETINGS

.1 Convene Cx meetings following project meetings: as required through the project to coordinate Cx requirements.
.2 Purpose: to resolve issues, monitor progress, identify deficiencies, relating to Cx.
.3 Continue Cx meetings on regular basis until commissioning deliverables have been addressed.
.4 At 60% construction completion stage. Contractor to call a separate Cx scope meeting to review progress including consultant, discuss schedule of equipment start-up activities and prepare for Cx. Issues at meeting to include:
.1 Review duties and responsibilities of Contractor and subcontractors, addressing delays and potential problems.
.2 Determine the degree of involvement of trades and manufacturer's representatives in the commissioning process.
.5 Thereafter Cx meetings to be held until project completion and as required during equipment start-up and functional testing period.
.6 Meeting will be chaired by Contractor, who will record and distribute minutes within 3 business days.
.7 Ensure subcontractors and relevant manufacturer representatives are present at subsequent Cx meetings and as required.

1.6 COMMISSIONING SCHEDULE

.1 Address commissioning activities within the construction work schedule. Clearly identify allocated time period for commissioning and training activities.
.2 Provide a 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 updates thereafter,
.3 Indicate allocated time 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.

1.7 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 Departmental Representative has given approval to proceed with the training process.
.3 Provide training and demonstration on equipment, sub-systems, systems and integrated systems.
.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 Departmental Representative.
.6 Submit training manuals for review 2 weeks prior to actual training.
.7 Ensure required tools and O&M Manuals are on site for training and system demonstration.
.8 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.
.9 Submit typewritten record of training sessions given and list of attendees. Use forms of format approved by Departmental Representative.

1.8 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 Copy of any static and dynamic test and reports conducted.
  .4 Reports as specified in various trade sections.
.2 Documentation to include detailed information and number of copies as specified for maintenance manuals of section 01 78 00.

End of Section

1 General

1.1 SECTION INCLUDES

.1 Methods and procedures for deconstruction of structures and parts of structures, elements as shown on drawings.

1.2 RELATED SECTIONS

.1 Section 01 33 00 - Submittal Procedures.
.2 Section 01 74 19 - Construction/Demolition Waste Management And Disposal.
.3 Section 01 35 43 - Environmental Procedures.
.4 Section 01 35 28 - Health and Safety Requirements.

1.3 REFERENCES

.1 Canadian Standards Association (CSA International).
  .1 CSA S350-(R1998), Code of Practice for Safety in Demolition of Structures.
.2 Federal Legislation.
  .1 Canadian Environmental Assessment Act (CEAA), 1992, c. 37.
  .2 Canadian Environmental Protection Act (CEPA), 1999, c. 33.

1.4 DEFINITIONS

.1 Alternate Disposal: reuse and recycling of materials by designated facility, user or receiving organization which has valid Certificate of Approval to operate. Alternative to landfill disposal.
.2 Deconstruction: systematic dismantling of structure in a manner that achieves safe removal/disposal of hazardous materials and maximum salvage/recycling of materials.
  .1 Ultimate objective is to recover potentially valuable resources while diverting from landfill what has traditionally been significant portion of waste system.
.3 Hazardous Materials: dangerous substances, dangerous goods, hazardous commodities and hazardous products, including but not limited to: corrosive agents, flammable substances, ammunition, explosives, radioactive substances, or other material that can endanger human health, well being or environment if handled improperly.
.4 Recycle: process by which waste and recyclable materials are transformed or collected for purpose of being transferred into new products.
.5 Recycling: process of sorting, cleansing, treating and reconstituting solid waste and other discarded materials for purpose of using in altered form.
  .1 Recycling does not include burning, incinerating, or thermally destroying waste.
.6 Reuse: repeated use of product in same form but not necessarily for same purpose. Reuse includes:
  .1 Salvaging reusable materials from remodeling projects, before demolition stage, for resale, reuse on current project or for storage for use on future projects.
  .2 Returning reusable items including pallets or unused products to vendors.
.7 Salvage: removal of structural and non-structural materials from deconstruction/disassembly projects for purpose of reuse or recycling.
.8 Source Separation: acts of keeping different types of waste materials separate, beginning from first time they became waste.
.9 Waste Management Coordinator (WMC): contractor representative responsible for supervising waste management activities as well as coordinating related, required submittal and reporting requirements.

1.5 SUBMITTALS

.1 Submittals in accordance with Section 01 33 00 - Submittal Procedures.
.2 Prior to beginning of Work on site submit detailed Waste Reduction Workplan in accordance with Section 01 74 19 - Construction/Demolition Waste Management and Disposal and indicate:
  .1 Descriptions of and anticipated quantities in percentages of materials to be salvaged

reused, recycled and landfilled.
.2 Schedule of selective demolition.
.3 Number and location of dumpsters.
.4 Anticipated frequency of tippage.
.5 Name and address of haulers.

1.6 QUALITY ASSURANCE

.1 Ensure Work is performed in compliance with CEPA.

1.7 ENVIRONMENTAL REQUIREMENTS

.1 Do Work in accordance with Section 01 35 43 - Environmental Procedures.

1.8 SITE CONDITIONS

.1 Existing Conditions.
.1 Should materials resembling spray or trowel applied asbestos or other designated substance listed as hazardous be encountered in course of deconstruction, stop work, take preventative measures, and notify Departmental Representative immediately. Do not proceed until written instructions have been received.
.2 Protection.
.1 Take precautions to protect environment.

1.9 PROTECTION

.1 Protect existing items designated to remain. In event of damage, immediately replace such items or make repairs to approval of Consultant and at no additional cost to Owner.

1.10 DESCRIPTION OF WORK

.1 Perform all demolition and removal as specified in this Section and indicated on the Drawings.

1.11 DEMOLITION

.1 Demolish the following items:
.1 Remove, disassemble and/or demolish existing as noted on drawings.

1.12 SALVAGE

.1 Salvage the following items:
.1 Doors
.2 Frames
.3 Door Hardware
.1 Latches
.2 Hinges
.3 Closers
.4 Push/Pulls
.5 Grilles
.6 Signage
.4 Demountable 'Starwall' Partitions
.5 Door Hooks
.6 Garbage Cans
.7 Sprinkler Heads
.8 Ceiling Diffusers
.9 Ceiling Tiles
.10 Light Fixtures
.11 Emergency Exit Lights
.12 Motion Sensors
.13 Speakers

.14 Fire Alarm Bell
.15 Thermostats
.16 Face Plates
.17 Electrical Outlets
.18 Switches
.19 Radiators
.20 Data Plates
.21 Hand Sanitizers

2 Products

2.1 EQUIPMENT

.1 Leave equipment and machinery running only while in use.
.2 Where possible use water efficient wetting equipment/trucks/attachments when minimizing dust.

3 Execution

3.1 SITE VERIFICATION OF CONDITIONS

.1 Determine if Environmental Assessment (EA) is required under requirements of CEAA.
  .1 If necessary, employ licensed consultant to perform EA.
  .2 Communicate findings and conclusions in writing to Departmental Representative prior to start of Work.

3.2 PREPARATION

.1 Do Work in accordance with Section 01 35 28 - Health and Safety Requirements.

3.3 DISASSEMBLY

.1 Employ workmanship procedures which minimize damage to materials and equipment.
.2 Ensure workers and subcontractors are briefed to carry out work in accordance with appropriate deconstruction techniques.
.3 Deconstruct in accordance with CSA S350 and.
.4 Workers must utilize adequate fall protection.
.5 Systematically remove finishes.
.6 Source separate for recycling materials that cannot be salvaged for reuse.
.7 Remove materials that cannot be salvaged for reuse or recycling and dispose of in accordance with applicable codes at licensed facilities.

3.4 PROCESSING

.1 Supply separate, marked disposal bins for categories of waste material.

3.5 MATERIAL REUSE

.1 All materials being reused are to be handled with care. Contractor carries responsibility for the replacement of damaged or broken materials specified for reuse.

3.6 REMOVAL FROM SITE

.1 Transport material designated for disposal by approved haulers in accordance with applicable regulations.

3.7 CLEANING AND RESTORATION

.1 Keep site clean and organized throughout deconstruction.
.2 Upon completion, remove debris and leave work site clean.
.3 Upon completion of project, reinstate areas affected by Work to condition which existed prior to beginning of Work.

End of Section

1 General

1.1 RELATED SECTIONS

.1 Section 02 41 19 - Selective Demolition

1.2 DESCRIPTION OF WORK

.1 The work of this section comprises the furnishing of all labor, material and equipment necessary for the following, in accordance with the requirements of this Section and as shown on the Drawings.
  .1 Filling of gaps and holes in concrete slabs produced or exposed from demolition work performed.
  .2 Sandblasting concrete finishes (if necessary).

1.3 REFERENCES

.1 Canadian General Standards Board (CGSB)
  .1 CAN/CGSB-25.20-95 , Surface Sealer for Floors.
.2 Canadian Standards Association (CSA)
  .1 CSA-A23.1-09 , Concrete Materials and Methods of Concrete Construction.

1.4 PERFORMANCE REQUIREMENTS

.1 Product quality and quality of work in accordance with Section 01 61 00 - Common Product Requirements.
.2 Submit written declaration that components used are compatible and will not adversely affect finished flooring products and their installation adhesives.

1.5 PRODUCT DATA

.1 Submit product data in accordance with Section 01 33 00 - Submittal Procedures.
.2 Submit WHMIS MSDS - Material Safety Data Sheets in accordance with Section 01 33 00 - Submittal Procedures. WHMIS MSDS acceptable to Labour Canada and Health and Welfare Canada for concrete floor treatment materials. Indicate VOC content.
.3 Include application instructions for concrete floor treatments .

1.6 ENVIRONMENTAL REQUIREMENTS

.1 Work area:
  .1 Make the work area water tight protected against rain and detrimental weather conditions.
.2 Temperature:
  .1 Maintain ambient temperature of not less than 10°C from 7 days before installation to at least 48 hours after completion of work and maintain relative humidity not higher than 80% during same period.
.3 Moisture:
  .1 Ensure concrete substrate is within moisture limits prescribed by flooring manufacturer.
.4 Safety:
  .1 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of hazardous materials.
.5 Ventilation:
  .1 Contractor will arrange for ventilation system to be operated during installation of concrete floor treatment materials.
  .2 Ventilate enclosed spaces in accordance with Section 01 50 00 - Temporary Utilities.
  .3 Provide continuous ventilation during and after coating application.

1.7 QUALITY CONTROL

.1 The quality of the finished concrete is to be equal or better than the existing.

1.8 WASTE MANAGEMENT AND DISPOSAL

.1 Collect and separate for disposal waste material generated by this Section.
.2 Place in appropriate on-site bins in accordance with Waste Management Plan.
.3 A weekly clean-up is mandatory and is to be undertaken the day prior to job site meeting.
.4 Failure to comply will result in clean-up and administrative costs being allocated and backcharged on a pro rated basis.
.5 Place materials defined as hazardous or toxic waste in designated containers.
.6 Ensure emptied containers are sealed and stored safely for disposal.
.7 Use chemical hardeners that are non-toxic, .
.8 Dispose of surplus chemical and finishing materials in accordance with federal, provincial and municipal regulations.
.9 Dispose of waste from stripping of floors in a manner that will not have unfavorable effects on the environment.

2 Products

2.1 MIXES

.1 Mixing, ratios and application in accordance with manufacturer's instructions.

3 Execution

3.1 EXAMINATION

.1 Verify that slab surfaces are ready to receive work and elevations are as indicated on shop drawings.

3.2 PREPARATION OF EXISTING SLAB

.1 Rub exposed sharp edges of concrete with carborundum to produce 3 mm radiused edges unless otherwise indicated .
.2 Use strong solvent to remove chlorinated rubber or existing surface coatings.
.3 Use protective clothing during stripping of chlorinated rubber or existing surface coatings.

3.3 APPLICATION

.1 Apply floor and ceiling treatment in accordance with concrete fillers manufacturer's written instructions.
.3 Clean as specified by concrete manufacturer's instructions.

3.4 CONCRETE FINISHES

.1 Finish concrete in accordance with CAN3-A23.1.
  .1 Interior floor slabs and ceilings: Hard, smooth dense, troweled to flat tolerance classification (5mm in 3m).
  .2 Finishes:
    .1 Anticipate that 50% of Level 100 walls, columns and ceilings will be exposed concrete.
    .2 Exposed concrete is to be smooth, even, joints are to be rubbed to remove joint edges and free from excess air pockets. All as evaluated against the submitted sample.
.2 Do not sprinkle dry cement or dry cement and sand mixture over concrete surfaces.

3.5 PROTECTION

.1 Protect finished installation in accordance with manufacturer's instructions.

End of Section

1 General

1.1 SUMMARY

.1 The work of this Section comprises the furnishing of all equipment, labour and materials necessary for the supply and installation of the following, including all accessories, as specified in this Section and indicated on the Finish Schedule and Drawings:
  .1 Vinyl composition tile in all rooms where vinyl composition tile (VCT) is indicated as the floor material on the Drawings.
  .2 Preparation of sub-floor to receive VCT, including filling of saw-cut control joints.
.2 The substrate for the VCT will be:
  .1 Existing concrete slab on grade.

1.2 RELATED WORK

.1 Section 09 68 00 - Carpeting.

1.3 REFERENCES

.1 CSA-A126.1-M1984, Vinyl Composition Floor Tile
.2 CAN/ULC-S102-2-M88, Standard Method of Test for Surface Burning Characteristics of Flooring, Floor Covering, and Miscellaneous Materials and Assemblies.
.3 CGSB 25-GP-21M-78, Floor Polish, Water Emulsion, Detergent Resistant, Non-buffable.

1.4 SAMPLES

.1 Submit samples complete with full range of available colors in accordance with Section 01 33 00 - Submittal Procedures.

1.5 MAINTENANCE DATA

.1 Provide data for maintenance of resilient flooring for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

1.6 MAINTENANCE MATERIAL

.1 Deliver 2% of each color, pattern and type flooring material including base required for this project for maintenance use. Identify each box. Store where directed by owner.
.2 Maintenance materials to be of same production run as installed materials.

1.7 ENVIRONMENTAL REQUIREMENTS

.1 Maintain air temperature and structural base temperature at flooring installation area above 20 C for 48 hours before, during and for 48 hours after installation.

1.8 WASTE MANAGEMENT AND DISPOSAL

.1 Collect and separate for disposal waste material generated by this Section.
.2 Place in appropriate on-site bins in accordance with Waste Management Plan.
.3 A clean worksite is mandatory at all times. Failure to maintain the site in a clean, safe condition shall result in the Owner initiating a clean-up and related costs being deducted from progress claims.

2 Products

2.1 MATERIALS

.1 Vinyl composition tile (VCT):
  .1 To CSA A-126.1 and CAN/ULC-S102.2
  .2 Type: A

.3 Fire test data:
.1 Flame spread: 75 or less.
.2 Smoke developed: 300 or less.
.4 Size: 457 mm x 457 mm.
.5 Thickness: 4 mm.
.6 Pattern: ship lap & square.
.7 Texture: smooth.
.8 Color: 'Grey Slateas' (FF203).
.9 Acceptable Materials:
.1 Majestic; Freefit.

.2 Primers and adhesives:
.1 As recommended by resilient flooring manufacturer for specific installation, except products with VOC's not permitted.
.3 Sub-floor filler and leveler: while premix latex requiring water only to produce cementitious paste.
.4 Edge strips: extruded or formed metal.
.1 VCT-to-carpet by section 09680 - Carpeting.
.5 Sealer: type recommended by flooring manufacturer.
.6 Wax: type recommended by flooring manufacturer.

3 Execution

3.1 INSPECTION

.1 Ensure concrete floors are dry using test methods recommended by flooring manufacturer, and exhibit negative alkalinity, carbonization or dusting.

3.2 SUB-FLOOR TREATMENT

.1 Remove sub-floor ridges and bumps. Fill low spots, cracks, joints, saw-cut control joints and other defects with sub-floor filler.
.2 Clean floor and apply filler, trowel and float to leave smooth, flat hard surface. Prohibit traffic until filler cured.
.3 Seal concrete to flooring manufacturer's recommendations.

3.3 FLOORING-APPLICATION GENERAL

.1 Lay flooring in strict accordance with manufacturer's printed instructions for substrate over which material is being laid.
.2 Lay flooring with joints parallel to building lines to produce symmetrical tile pattern. Border tiles minimum half width of tile.
.3 Install flooring in staggered grid pattern with continuous joints and pattern grain parallel for all units and parallel to width or room.
.4 Roll flooring to ensure full adhesion in accordance with flooring manufacturer's recommendations.
.5 Cut flooring neatly around fixed objects.
.6 Install flooring in pan type floor access covers. Maintain floor pattern.
.7 Terminate flooring at centerline of door openings where adjacent floor finish or color is dissimilar.
.8 Install metal edge strips at unprotected or exposed edges where flooring terminates and between flooring and dissimilar materials, in accordance with Par. 2.1.5 above.

3.4 CLEANING AND WAXING

.1 Remove excess adhesive from floor, base and wall surfaces without damage.
.2 Clean, seal and wax floor surface to flooring manufacturer's instructions.

3.5 PROTECTION OF FINISHED WORK

.1 Protect new floors from after initial waxing until just before final waxing and final inspection.
.2 Prohibit traffic on floor for 48 hours after installation.

End of Section

1 General

1.1 RELATED SECTIONS

.1 Section 01 33 00 - Submittal Procedures.
.2 Section 01 74 19 - Construction/Demolition Waste Management And Disposal.
.3 Section 01 78 00 - Closeout Submittals.

1.2 REFERENCES

.1 American Association of Textile Chemists and Colorists (AATCC)
- .1 AATCC 16-1998, Color Fastness to Light.
- .2 AATCC 23-1999, Color Fastness to Burn Gas Fumes.
- .3 AATCC 118-1997, Oil Repellency: Hydrocarbon Resistance Test.
- .4 AATCC 129-2001, Colour Fastness to Ozone in the Atmosphere Under High Humidities.
- .5 AATCC 134-2001, Electrostatic Propensity of Carpet.
- .6 AATCC 171-2000, Carpets: Cleaning of; Hot Water Extraction Method.
- .7 AATCC 174-1998, Antimicrobial Activity Assessment of Carpets.
- .8 AATCC 175-1998, Stain Resistance: Pile Floor Coverings.
- .9 AATCC 189-2001, Fluorine Content of Carpet Fibers.

.2 American Society for Testing and Materials (ASTM International)
- .1 ASTM D1055-97, Specification for Flexible Cellular Materials - Latex Foam.
- .2 ASTM D1335-98, Tuft Bind of Pile Floor Coverings.
- .3 ASTM D1667-97, Standard Specification for Flexible Cellular Materials-Vinyl Chloride Polymers and Copolymers (Closed-Cell Foam).
- .4 ASTM D3936-00 Standard Test Method for Resistance to Delamination of the Secondary Backing of Pile Yarn Floor Covering.
- .5 ASTM D5252-98a, Standard Practice for the Operation of the Hexapod Drum Tester.
- .6 ASTM D5417-99, Standard Practice for Operation of the Vettermann Drum Tester.
- .7 ASTM E84-01, Test Method for Surface Burning Characteristics of Building Materials.
- .8 ASTM E648-00, Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source.
- .9 ASTM E662-01, Standard Test Method for Specific Optical Density of Smoke Generated by Solid Materials.

.3 Canadian General Standards Board (CGSB)
- .1 CAN/CGSB-4.2 No.27.6-M91, Textile Test Methods - Flame Resistance - Methemine Tablet Test for Textile Floor Coverings.
- .2 CAN/CGSB-4.2 No.77.1-94/ISO 4919:1978, Textile Test Methods - Carpets - Determination of Tuft Withdrawal Force.
- .3 CGSB 4-GP-36M-78, Carpet Underlay, Fiber Type.
- .4 CAN/CGSB-4.129-93(R1997), Carpets for Commercial Use.
- .5 CGSB 20-GP-23M-78, Cushion, Carpet, Flexible Polymeric Material.
- .6 CAN/CGSB-25.20-95, Surface Sealer Floors.

.4 Carpet and Rug Institute (CRI)
- .1 CRI-104-96, Standard Installation of Commercial Carpet.
- .2 IAQ Carpet Testing Program.

.5 National Floor Covering Association (NFCA)
- .1 Floor Covering Specification Manual 1998.

.6 Underwriters' Laboratories of Canada (ULC)
- .1 CAN/ULC-S102-88(R2000), Surface Burning Characteristics of Building Materials and Assemblies.
- .2 CAN/ULC-S102.2-88(R2000), Surface Burning Characteristics of Flooring, Floor Covering and Miscellaneous Materials and Assemblies.

1.3 SUBMITTALS

.1 Submit control submittals in accordance with Section 01 33 00 - Submittal Procedures.
.2 Submit verification to demonstrate compliance with CAN/ULCS102.
.3 Submit proof that carpet has been tested and passed the Indoor Air Quality (IAQ) Carpet Testing Program requirements of the Carpet and Rug Institute (CRI) and the Canadian Carpet Institute (CCI).
.4 Submit report verifying that tuft bind meets requirements of CAN/CGSB-4.129 when tested to CAN/CGSB-4.2 No.77.1.
.5 Submit report outlining proposed dust control measures.
.6 Submit carpet schedule using same room designations indicated on drawings.
.7 Submit carpet manufacturer's installation instructions: Indicate special procedures and perimeter conditions requiring special attention.
.8 Submit certification and description of carpet reclamation process.

1.4 PRODUCT DATA

.1 Submit product data in accordance with Section 01 33 00 - Submittal Procedures.
.2 Submit product data sheet for each carpet, adhesive, carpet protection and subfloor patching compound.
.3 Submit WHMIS MSDS - Material Safety Data Sheets acceptable to Labour Canada and Health Canada for carpet adhesive. Indicate VOC content.
.4 Submit data on specified products, describing physical and performance characteristics, sizes, patterns, colours, and methods of installation.

1.5 SHOP DRAWINGS

.1 Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.
.2 Contractor to verify on site that existing tile matches sample tile provided as part of the shop drawing submission approval process.
.3 Submit drawings showing columns, doorways, enclosing walls or partitions, built-in cabinets, and locations where cutouts are required as well as pattern, location of edge moldings and edge bindings to Departmental Representative for review prior to installation of carpet.

1.6 SAMPLES

.1 Submit samples in accordance with Section 01 33 00 - Submittal Procedures.
.2 Submit duplicate 600 x 600 mm pieces of each color of carpet specified.

1.7 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.

1.8 QUALIFICATIONS

.1 Installer Qualifications:
  .1 Flooring contractor requirements.
    .1 Specialty contractor normally engaged in this type of work, with prior experience in installation of these types of materials.
    .2 Certified by carpet manufacturer prior to tender submission.
    .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.

1.9 REGULATORY REQUIREMENTS

.1 Prequalification: compliance with Department of Consumers and Corporate Affairs regulations under "Hazardous Products Act", Part II of the Schedule,.

.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.

1.10 DELIVERY, STORAGE AND HANDLING

.1 Label packaged materials. For carpet tile products indicate nominal dimensions of tile and indicate installation direction.

.2 Store packaged materials in original containers or wrapping with manufacturer's seals and labels intact.

.3 Store carpet and adhesive at minimum temperature of 18°C and relative humidity of maximum 65% for minimum of 48 hours before installation.

.4 Prevent damage to materials during handling and storage. Keep materials under cover and free from dampness.

.5 Store materials in area of installation for minimum period of 48 hours prior to installation.

.6 Modular carpet: store on pallet form as supplied by Manufacturer. Do not stack pallets.

1.11 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials in accordance with Section 01 74 19 - Construction/Demolition Waste Management And Disposal, and with Waste Reduction Workplan.

.2 Remove from site and dispose of packaging materials at appropriate recycling facilities.

.3 Collect and separate for disposal paper packaging material in appropriate on-site for recycling in accordance with Waste Management Plan.

.4 Vacuum used carpet before removal.

.5 Maintain possession of removed used carpet.

.6 Remove used broadloom in large pieces, roll tightly and pack in container. Use effective packing techniques to maximize amount of material in container. Do not stack carpet tile higher than 1800 mm high.

1.12 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 between 10 and 65% 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 Departmental Representative will arrange for ventilation system to be operated during installation of carpet.
- .2 Ventilate enclosed spaces in accordance with PWGSC Temporary Hoarding & Venting Guidelines. Provide fans with HEPA filters as needed.
- .3 Provide continuous ventilation during and after carpet application. Run ventilation system 24 hours per day during installation; provide continuous ventilation for 7 days after completion of carpet installation.

.6 Do not install carpet work above ceilings is complete.

1.13 EXTRA MATERIALS

.1 Provide extra materials of carpet, carpet base, and adhesives in accordance with Section 01 78 00 - Closeout Submittals.
.2 Provide 5% of net amount of tile required to complete the work as noted.
.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 site and store where directed by Departmental Representative.

2 Products

2.1 MANUFACTURERS

.1 Certified to Carpet and Rug Institute's and the Canadian Carpet Institute IAQ requirements.

2.2 MODULAR CARPET

.1 Acceptable material:
  .1 Interface, Urban Grid; color Gold, Champagne & Brown.
  .2 Carpet color to match existing carpet per zone (refer to Drawings).

2.3 ACCESSORIES

.1 N/A.

3 Execution

3.1 DEMOLITION

.1 Remove and divert existing carpet for reuse in accordance with Section 01 74 19 - Construction/Demolition Waste Management And Disposal, and with Waste Reduction Workplan. Coordinate with Departmental Representative.

3.2 SUB-FLOOR TREATMENT

.1 Existing raised steel panel floor to be inspected and levelled as required for proper installation of non tile flooring.
.2 Any and all existing carpet glue left from demo work to be removed.

3.3 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.

3.4 INSTALLATION

.1 Install carpet in accordance with manufacturer's printed instructions and in accordance with Carpet and Rug Institute Standard for Installation of Commercial Carpet.
.2 Install carpet after finishing work is completed but before office furniture is installed.
.3 Finish installation to present smooth wearing surface.
.4 Use material from same dye lot. Ensure colour, pattern and texture match within any one visual area. Maintain proper tile direction.
.5 Fit neatly around architectural, mechanical, electrical and telephone outlets into recesses and around projections.
.6 Extend carpet into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.
.7 Install carpet smooth and free of bubbles, puckers, and other defects.

3.5 CARPET BINDER BARS

.1 Install binder bars at exposed carpet edges and centre under doors in door openings.
.2 Provide metal thresholds as required for floor to floor transitions.

3.6 BASE INSTALLATION

.1 Lay out base to keep number of joints at minimum.
.2 Set base on adhesive tightly, using 3kg hand roller, against wall and floor surfaces.
.3 Install straight and level to variation of 1:1000.
.4 Scribe and fit to door frames and other obstructions.
.5 Cope internal corners.

3.7 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.

End of Section

1 General

1.1 RELATED SECTIONS

.1 Section 01 33 00 - Submittal Procedures.
.2 Section 01 35 28 - Health and Safety Requirements.
.3 Section 01 35 43 - Environmental Procedures.
.4 Section 01 45 00 - Quality Control.
.5 Section 01 61 00 - Common Product Requirements.
.6 Section 01 77 00 - Closeout Procedures.
.7 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)
  .1 SSPC Painting Manual, Volume Two, 8th Edition, Systems and Specifications Manual.

1.3 QUALITY ASSURANCE

.1 Qualifications:
  .1 Contractor: minimum of five years proven satisfactory experience.
  .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 Pre-Installation Meeting:
  .1 Attend pre-installation meeting one week prior to beginning work of this Section.
    .1 Verify project requirements.
    .2 Review installation and substrate conditions.
    .3 Coordination with other building subtrades.
    .4 Review quality expectations.
.3 Standard of Acceptance:
  .1 Walls: No defects visible from a distance of 1000 mm at 900 to surface.
  .2 Soffits: No defects visible from floor at 450 to surface when viewed using final lighting source.
  .3 Final coat to exhibit uniformity of color and uniformity of sheen across full surface area.

1.4 HEALTH AND SAFETY

.1 Occupational Health and Safety in accordance with Section 01 35 28 - Health and Safety Requirements.

1.5 ENVIRONMENTAL PERFORMANCE REQUIREMENTS

.1 Environment Choice Program:

.1 Provide paint products certified to meet the requirements of the Environmental Choice Program, Department of the Environment.
.2 Submit CSA Certification Reports that products proposed for use are certified under the Environmental Choice Program.

1.6 INSPECTION REQUIREMENTS

.1 Interior surfaces requiring painting shall be inspected by Paint Inspection Agency who shall notify Consultant and Construction Manager in writing of defects or problems, prior to commencing painting work, or after prime coat shows defects in substrate.
.2 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 Owner.
.3 Exterior 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 the 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.
.4 Exterior surfaces requiring painting shall be inspected by the Paint Inspection Agency who shall notify Consultant and Construction Manager in writing of defects or problems, prior to commencing painting work, or after prime coat shows defects in substrate.

1.7 QUALITY CONTROL

.1 Provide mock up in accordance with Section 01 45 00 - Quality Control.
.2 When requested by Consultant, prepare and paint designated surface, area, room or item (in each color scheme) to requirements specified herein, with specified paint or coating showing selected colors, gloss/sheen, textures and workmanship to MPI Painting Specification Manual standards for review and approval. When approved, surface, area, room and/or items shall become acceptable standard of finish quality and workmanship for similar on site work.

1.8 SUBMITTALS

.1 Submittals in accordance with Section 01 33 00 - Submittal Procedures.
.2 Samples:
  .1 Submit full range color sample chips to indicate where color availability is restricted.
  .2 Submit duplicate 200 mm sample panels of each paint with specified paint or coating in colors, gloss/sheen and textures required to MPI Painting Specification Manual standards submitted on the 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.
    .5 10 mm cedar for finishes over wood surfaces.
    .6 When approved, samples shall become acceptable standard of quality for appropriate on-site surface with one of each sample retained on-site.
.3 Manufacturer's Instructions:
  .1 Submit manufacturer's installation and instructions.
.4 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 Color numbers and associated locations.

1.9 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.
.2 Deliver and store materials in original containers, sealed, with labels intact.
.3 Labels shall clearly indicate:
  .1 Manufacturer's name and address.
  .2 Type of paint or coating.
  .3 Compliance with applicable standard.
  .4 Color number in accordance with established color schedule.
.4 Remove damaged, opened and rejected materials from site.
.5 Provide and maintain dry, temperature controlled, secure storage.
.6 Observe manufacturer's recommendations for storage and handling.
.7 Store materials and supplies away from heat generating devices.
.8 Store materials and equipment in a well ventilated area with temperature range 7°C to 25°C.
.9 Store temperature sensitive products above minimum temperature as recommended by manufacturer.
.10 Keep areas used for storage, cleaning and preparation, clean and orderly to approval of Consultant. After completion of operations, return areas to clean condition to approval of Consultant.
.11 Remove paint materials from storage only in quantities required for same day use.
.12 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling storage, and disposal of hazardous materials.

1.10 FIRE SAFETY REQUIREMENTS

.1 Provide one - 3kg Type ABC 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 the National Fire Code of Canada.

1.11 SITE CONDITIONS

.1 Ventilate enclosed spaces.
.2 Perform no painting work when maximum moisture content of substrate exceeds:
  .1 12% for concrete.
  .2 12% for clay and concrete brick and block.
  .3 15% for wood.
  .4 12% for stucco, plaster and gypsum board.
.3 Surface and Environmental Conditions:
  .1 Apply paint finish only 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 only to adequately prepared surfaces and to surfaces within moisture limits noted herein.
  .3 Apply paint only when previous coat of paint is dry or adequately cured.
  .4 Apply paint finishes only when conditions forecast for entire period of application fall within manufacturer's recommendations.
  .5 Do not apply paint when:
    .1 Temperature is expected to drop below 10°C before paint has thoroughly cured.
    .2 Substrate and ambient air temperatures are expected to fall outside MPI or paint manufacturer's limits.
    .3 Surface to be painted is wet, damp or frosted.
  .6 Provide and maintain cover when paint must be applied in damp or cold weather. Heat substrates and surrounding air to comply with temperature and humidity conditions specified by manufacturer. Protect until paint is dry or until weather conditions are

suitable.

.7 Schedule painting operations such that surfaces exposed to direct, intense sunlight are scheduled for completion during early morning.

.8 Remove paint from areas which have been exposed to freezing, excess humidity, rain, snow or condensation. Prepare surface again and repaint.

.9 Paint occupied facilities in accordance with approved schedule only. Schedule operations to approval of the Consultant such that painted surfaces will have dried and cured sufficiently before occupants are affected.

1.12 EXTRA MATERIAL

.1 Submit maintenance materials in accordance with Section 01 78 00 - Closeout Submittals.

.2 Submit one - one liter can of each type and color of primer. Identify color and paint type in relation to established color schedule and finish system.

.3 Deliver and store where directed.

1.13 SCHEDULING OF THE WORK

.1 Submit work schedule for various stages of painting to Consultant for approval. Submit schedule minimum of 48 hours in advance of proposed operations.

.2 Obtain written authorization from Consultant for changes in work schedule.

.3 Schedule painting operations to prevent disruption of occupants in and about the building.

1.14 WASTE MANAGEMENT AND DISPOSAL

.1 Remove from site and dispose of packaging materials to appropriate recycling facilities.

.2 Collect and separate for disposal waste material in appropriate on-site bins for recycling in accordance with Waste Management Plan.

.3 Separate for reuse and place in designated containers steel waste in accordance with Waste Management Plan.

.4 Handle and dispose of hazardous materials in accordance with CEPA, regulations.

.5 Unused paint materials must be disposed of at official hazardous material collections site.

2 Products

2.1 MATERIALS

.1 Provide paint materials for paint systems from single manufacturer.

.2 Conform to latest MPI requirements for painting work including preparation and priming.

.3 Materials (primers, paints, coatings, varnishes, stains, lacquers, fillers, thinners, solvents, etc.) in accordance with MPI Architectural Painting Specification Manual "Approved Product" listing.

.4 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.

.5 Provide paint products meeting MPI "Environmentally Friendly", E2 ratings based on VOC (EPA Method 24) content levels.

.6 Formulate and manufacture water-borne surface coatings with no aromatic solvents, formaldehyde, halogenated solvents, mercury, lead, cadmium, hexavalent chromium or their compounds.

.7 Water-borne surface coatings and recycled water-borne surface coatings must have a flash point of 61.00C or greater.

.8 Both water-borne surface coatings and recycled water-borne surface coatings must be made by a process that does not release:

.1 Matter in undiluted production plant effluent generating a 'Biochemical Oxygen Demand' (BOD) in excess of 15 mg/L to a natural watercourse or a sewage treatment facility lacking secondary treatment.

.2 Total Suspended Solids (TSS) in undiluted production plant effluent in excess of 15 mg/L

to a natural watercourse or a sewage treatment facility lacking secondary treatment.

.9 Water-borne paints and stains, recycled water-borne surface coatings and water borne varnishes must meet a minimum "Environmentally Friendly" E2 rating.

.10 Recycled water-borne surface coatings must contain 50 % post-consumer material by volume.

.11 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 Hexavelant 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.

.12 The following must be performed on each batch of consolidated post-consumer material before surface coating is reformulated and canned. These tests must be performed at a laboratory or facility which has been accredited by the 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 Vapor Atomic Absorption Spectroscopy using Technique no. 7471 as defined in EPA SW-846.

.13 Organochlorines and PCBs are to be determined by Gas Chromatography using Technique No. 8081 as defined in EPA SW-846.

.14 Painting products:except where specifically specified otherwise all paint to be latex base with the following manufacturer's product lines as Acceptable Material for use on this project.

.1 PPG - Pure Performance - 0 VOC.

.2 Benjamin Moore - Genex - 0 VOC.

.3 Glidden Lifemaster 2000 - 0 VOC.

.4 Interior Latex:

.1 Colour Your World "Velvet Pastel" 5250 Line.

.2 CIL - 9490 Series.

.3 Glidden - 5800 Series.

.4 PPG - 6 Series

.5 Primers

.1 Latex or alkyd as recommended by paint manufacturer except where specifically indicated otherwise.

2.2 COLOURS

.1 Consultant will provide Color Schedule after Contract award.

.2 Color schedule will be based upon selection of one (1) base color and one (1) accent color.

.3 Selection of colors from manufacturers full range of colors.

.4 Second coat in three coat system to be tinted slightly lighter color than top coat to show visible difference between coats.

2.3 MIXING AND TINTING

.1 Perform color tinting operations prior to delivery of paint to site in strict accordance with manufacturer's written instructions.

.2 Paste, powder or catalyzed paint mixes shall be mixed.

.3 Where thinner is used, addition shall not exceed paint manufacturer's recommendations. Do not use kerosene or any such organic solvents to thin water-based paints.

.4 Thin paint for spraying according in strict accordance with paint manufacturer's instructions. If directions are not on container, obtain instructions in writing from manufacturer and provide copy of instructions to Consultant.

.5 Re-mix paint prior to and during application to ensure break-up of lumps, complete dispersion of settled pigment, and color 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	
.2	Gloss Level 1 -	Matte Finish (flat)	Max. 5	Max. 10
.3	Gloss Level 2 -	Velvet-Like Finish	Max.10	10 to 35
.4	Gloss Level 3 -	Eggshell Finish	10 to 25	10 to 35
.5	Gloss Level 4 -	Satin-Like Finish	20 to 35	min. 35
.6	Gloss Level 5 -	Traditional Semi-Gloss Finish	35 to 70	
.7	Gloss Level 6 -	Traditional Gloss	70 to 85	
.8	Gloss Level 7 -	High Gloss Finish	More than 85	

.9 Gloss level ratings of painted surfaces as indicated.

2.5 INTERIOR PAINTING SYSTEMS

.1 Plaster and gypsum board: gypsum wallboard, drywall, "sheet rock type material", and textured finishes:

- .1 INT 9.2A - Latex gloss level 3-eggshell finish (over latex sealer).
- .2 INT 9.2B - High performance architectural latex gloss level finish.
- .3 INT 9.2C - Alkyd gloss level 3-eggshell finish (over latex sealer).
- .4 INT 9.2E - Epoxy (tile-like) finish.
- .5 INT 9.2F - Waterborne epoxy (tile-like) finish.
- .6 INT 9.2G - Multicolor finish.
- .7 INT 9.2H - Clear fire retardant coating (ULC rated).
- .8 INT 9.2K - Latex gloss level 3-eggshell finish (over alkyd primer) for plaster surfaces only.
- .9 INT 9.2M - Institutional low odor/low VOC gloss level 3-eggshell finish.

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.

.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 Consultant damages, defects, unsatisfactory or unfavorable 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.

3.4 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.
- .2 Protect items that are permanently attached such as Fire Labels on doors and frames.
- .3 Protect factory finished products and equipment.

.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. 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.

.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.

.4 Prevent contamination of cleaned surfaces by salts, acids, alkalies, 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.

.5 Apply vinyl sealer to MPI #36 over knots, pitch, sap and resinous areas.

.6 Apply wood filler to nail holes and cracks.

.7 Tint filler to match stains for stained woodwork.

.8 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.

.9 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.

3.5 APPLICATION

.1 Method of application to be as approved by Consultant.

.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 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 color 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 matte 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 natural gas piping yellow.
.11 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.
.12 Do not paint interior transformers and substation equipment.

3.7 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 Consultant and General Contractor 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 Consultant.
.4 Field inspection of painting operations to be carried out be independent inspection firm as designated by Consultant.
.5 Advise Consultant when surfaces and applied coating is ready for inspection. Do not proceed with subsequent coats until previous coat has been approved.
.6 Cooperate with inspection firm and provide access to areas of work.
.7 Retain purchase orders, invoices and other documents to prove conformance with noted MPI requirements when requested by Consultant.

3.8 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 Consultant. Avoid scuffing newly applied paint.
.5 Restore areas used for storage, cleaning, mixing and handling of paint to clean condition as approved by Consultant.

End of Section

1 General

1.1 SECTION INCLUDES

.1 Materials and installation for demountable partitions of metal studs system.

1.2 RELATED SECTIONS

.1 Section 01 33 00 - Submittal Procedures.
.2 Section 01 35 73 - Procedures for Deconstruction of Structures.
.3 Section 01 45 00 - Quality Control.
.4 Section 09 91 00 - Painting.

1.3 REFERENCES

.1 Aluminum Association (AA)
  .1 AA DAF45-R03, Designation System for Aluminum Finishes, 9th Edition.
.2 American Society for Testing and Materials International, (ASTM)
  .1 ASTM A 653/A 653M-02a, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
  .2 ASTM C 36/C 36M-01, Standard Specification for Gypsum Wallboard.
  .3 ASTM C 645-00, Standard Specification for Nonstructural Steel Framing Members.
  .4 ASTM C 960/C 960M-01, Standard Specification for Predecorated Gypsum Board.
  .5 ASTM E 90-02, Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements.
.3 Canadian General Standards Board (CGSB)
  .1 CAN/CGSB-1.81-M90, Air Drying and Baking Alkyd Primer for Vehicles and Equipment.
  .2 CAN/CGSB-1.88-92, Gloss Alkyd Enamel, Air Drying and Baking.
  .3 CAN/CGSB-1.104-M91, Semigloss Alkyd Air Drying and Baking Enamel.
.4 Underwriters Laboratories of Canada (ULC)
  .1 CAN/ULC-S102-1988(R2000), Surface Burning Characteristics of Building Materials and Assemblies.
.5 The Master Painters Institute (MPI)
  .1 Architectural Painting Specification Manual - March 1998(R2002).
.6 United Nations Environment Programme (UNEP)/UNEP World Conservation Monitoring Centre (WCMC) - 2000
  .1 Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) - 1973-(A1979).

1.4 SYSTEM DESCRIPTION

.1 Basic system is existing on site and is provided by Starwall (1-418-696-1000) Contractors are to dis-assemble partitions noted and re-assemble in new location. Un-used elements (left over) are to be packed carefully and stored as directed by Departmental Representative.

1.5 DESIGN REQUIREMENTS

.1 Partition assembly is non-combustible construction, fully demountable and relocatable, progressive, extend in four directions without disturbing other panels, accommodate floor/ceiling height variations of 25 mm.
.2 Components to be distortion free, uniform in dimension, construction and appearance, made to suit specific function and to have been proven in use.
.3 Minimum sound transmission rating of installed panel partition to be STC43, tested to ASTM E 90.
.4 Partition system to accommodate electrical, telephone, wiring and outlets as noted.

2 Products

2.1 MATERIALS

.1 Stud type demountable partition.
  .1 Existing material: Starwall 'Classic' Series.
.2 Acoustical insulation and sealant: type recommended by partition manufacturer to achieve STC rating specified.
.3 Sound/light seal: self adhesive closed cell, inorganic, permanently elastic, sponge type stripping, 12 x 12 mm size, black.
.4 Glass and glazing materials:
  .1 Glass: Existing re-used.
  .2 Glazing material: furnish neoprene glazing gaskets for setting glass as necessary.
.5 Aluminum extrusions: Aluminum Association alloy AA 6063-T5.
.6 Galvanized steel sheet: furniture grade to ASTM A 653/A 653M with Z275 zinc coating.

2.2 COMPONENTS

.1 Glazing frames: Existing re-used.
.2 Door frames: Existing re-used.

3 Excecution

3.1 ERECTION

.1 Install partition after floor finishes, in accordance with manufacturer's instructions.
.2 Fasten runners to floors, ceiling and abutting vertical surfaces at 600 mm on centre.
  .1 At ceilings use fasteners that rigidly support partition without damaging or defacing ceiling panels or grid system members.
  .2 Ceiling anchors must not penetrate more than 25mm into the concrete ceiling. Power actuated anchors are only to be used on written approval of the Departmental Representative.
.3 Erect partitions, plumb, square and level.
  .1 Accurately fit and fasten to abutting surfaces.
  .2 Shim under partitions at uneven floors to ensure level installation.
.4 Brace studs at 1200 mm on centre horizontally.
.5 Install continuous light/sound seal at junction of ceiling height partitions with floors, ceilings and vertical surfaces.
.6 Install acoustical insulation and sealant in sound rated partitions to correspond with tested assembly.
.7 Install panels in accordance with manufacturer's printed instructions. Apply panels full height floor to ceiling.
.8 Cover panel joints with one piece, full height battens Butt panels together to moderate contact.
.9 Install sealant in accordance with manufacturer's specifications.
.10 Install glass in accordance with manufacturer's specifications.

3.2 DISASSEMBLY

.1 Walls to be disassembled as per 'Starwall' manufacturer's printed instructions.
.2 Demounted wall system to be properly handled, stored, and transported to new specified location (as noted on the drawings).

End of Section

1 General

1.1 RELATED SECTIONS

.1 Section 01 10 00 - Summary.

1.2 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 Province of Prince Edward Island, Canada.
.3 Shop drawings to show:
  .1 Mounting arrangements.
  .2 Operating and maintenance clearances.
.4 Shop drawings and product data accompanied by:
  .1 Detailed drawings of bases, supports, and anchor bolts.
  .2 Acoustical sound power data, where applicable.
  .3 Points of operation on performance curves.
  .4 Manufacturer to certify current model production.
  .5 Certification of compliance to applicable codes.
.5 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.
.6 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, Consultant 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.
    .6 Valves schedule and flow diagram.
    .7 Color coding chart.
  .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 after commissioning is complete.
    .2 Equipment performance verification test results.
    .3 Special performance data as specified.
  .6 Approvals:
    .1 Submit 2 copies of draft Operation and Maintenance Manual to Consultant for approval 4 weeks prior to Substantial Completion. Submission of individual data will not be accepted unless directed by Consultant.
    .2 Make changes as required and re-submit as directed by Consultant.
  .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 Consultant 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 weekly to reproducibles, revising reproducibles to show work as actually installed.

.3 Use different color waterproof ink for each service.

.4 Make available for reference purposes and inspection.

.9 As-built drawings:

.1 Prior to start of testing, 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 Consultant for approval and make corrections as directed.

.4 Perform testing, adjusting and balancing using as-built drawings.

.5 Submit completed electronic and reproducible as-built drawings with Operating and Maintenance Manuals.

.10 Submit copies of as-built drawings for inclusion in final TAB report.

1.3 QUALITY ASSURANCE

.1 Quality Assurance: in accordance with Section 01 45 00 - Quality Control.

.2 Health and Safety Requirements: do construction occupational health and safety in accordance with Section 01 35 29 - Health, Safety and Emergency Response Procedures.

1.4 MAINTENANCE

.1 Furnish spare parts in accordance with Section 01 78 00 - Closeout Submittals as follows:

.1 One glass for each gauge glass.

.2 One filter cartridge or set of filter media for each filter or filter bank in addition to final operating set.

.3 One trap per 10 trap used each size.

.2 Provide one set of special tools required to service equipment as recommended by manufacturers and in accordance with Section 01 78 00 - Closeout Submittals.

.3 Furnish one commercial quality grease gun, grease and adapters to suit different types of grease and grease fittings.

1.5 DELIVERY, STORAGE, AND HANDLING

.1 Waste Management and Disposal:

.1 Construction/Demolition Waste Management and Disposal: separate waste materials for reuse in accordance with Section 01 74 19 - Construction Waste Management and Disposal.

1.6 DEFICIENCY LIST

.1 Lists of work deficiencies will be issued at anytime. Rectify immediately work to satisfaction of Consultant.

.2 Submit requests for takeover inspection in writing.

1.7 SITE SERVICES

.1 Known Services:

.1 Drawings indicate known existing facilities.

.2 Locate all known services prior to initiating work.

.3 Consult with and follow Engineer's written instructions before commencing work.

.4 Once location has been set out, assume responsibility for all damage during installation.

Bear cost of repairs and replacements made necessary.

.2 Unknown Services:
  .1 Locate all services whose exact location is not known.
  .2 Avoid damaging or displacing existing services where exact position is not known. Should any damage occur, advise Engineer in writing for remedial instructions.

1.8 CO-ORDINATION

.1 Locate distribution systems, equipment and materials to provide minimum interference and maximum usable space.
.2 Where interference occurs, Consultant shall approve location of equipment and materials regardless of installation sequence.

1.9 REGULATIONS

.1 Comply with most stringent requirements of NBC, Provincial and Municipal regulations and by-laws, specified standards, codes and these specifications and plans. Practices contained in these standards or standards suggested or recommended by referenced organizations, are to be taken as minimum requirements.
.2 Furnish certificates confirming work installed conforms to requirements of authorities having jurisdiction.

1.10 DRAWINGS

.1 Drawings:
  .1 Are not intended to show structural details or architectural features.
  .2 Are not to be scaled.
  .3 Except where dimensioned, the drawings indicate general mechanical layouts only.
.2 Provide field drawings to indicate relative position of various services when required by Consultant. Obtain Consultant's approval before commencing work.
.3 As-Built (Record) Drawings:
  .1 Maintain as specified in Section 01 78 00 - Closeout Submittals.

1.11 EQUIPMENT LIST

.1 Submit list of manufacturers named within 7 days after award of the contract. Do not order equipment until list is approved.

1.12 ENERGY CONSUMPTION

.1 Consultant may reject equipment submitted for approval on basis of performance or energy consumed or demanded.

1.13 APPROVAL OF EQUIPMENT

.1 When equipment list has been reviewed by Consultant, conform to Section 01 33 00 - Submittal Procedures for items shown on equipment list and all other materials and equipment necessary to complete requirements of mechanical systems. This includes equipment named under Standard of Acceptance.

1.14 BREAKDOWN OF COSTS

.1 Price will be broken down at tender time as required by depository instructions.
.2 Immediately upon notice of contract award, further break down tender price as per Par. 1.34.

1.15 APPROVED EQUALS

.1 Submission for an Approved Equal is to contain literature and descriptive information with full specification data. Where the requested item is contained on a printed document with other items, it is to be clearly identified.
.2 The Consultant will not search catalogs, e-mails or websites or contact suppliers to obtain the

necessary information for proper evaluation.

.3 Submission by Bidders for evaluation of products requested to be considered as equal must be submitted to Consultant no less than 5 working days prior to closing of tenders. No consideration will be given to approving equals after the close of tenders, except when the specified product is found to have been discontinued by the manufacturer.

.4 The consideration of a product(s) for Approved Equal status and the acceptance of individual products as approved equals is entirely at the discretion of the Consultant.

.5 When products are given Approved Equal status these products may, at the discretion of bidders, be carried in their tender price, provided that ALL costs related to changes to the contract work required to incorporate the Approved Equal product are included in the tender price.

.6 The acceptance of a product by the Consultant as an "Approved Equal," even where not specifically indicated on the Approved Equals listing in the Addendum, is to be understood as being contingent upon the provision of the particular series, model and/or type, complete with all options to meet the specified requirements of the Acceptable Material product.

.7 Products given approved status that are found, during construction period, to not have all specified options available, or to have discontinued production of same, or to have made other design changes since the time of approval, will not be accepted for use on this project, except when financial compensation has been mutually agreed upon between the Contractor and the Owner and deemed acceptable by the Consultant. Compensation will not be paid to the Contractor for products acknowledged by the Consultant to be superior to the specified products.

1.16 AS INDICATED

.1 Means that the item or items specified are shown or noted on the drawings.

1.17 EQUIPMENT REQUIREMENTS & INSTALLATION

.1 Permit equipment maintenance and disassembly by use of unions or flanges to minimize disturbance to connecting piping without interference from building structure or other equipment.

.2 Provide accessible means for lubricating equipment including permanent lubricated "lifetime" bearings.

.3 Mount base mounted equipment on chamfered edge housekeeping pads a minimum of 100mm high and 50mm larger than equipment dimension all around. Pads provided by this Contractor. Co-ordinate sizes with equipment provider.

.4 Pipe drain lines to drains in a manner to avoid disruption of surrounding space.

.5 Line-up equipment, rectangular cleanouts and similar items with building walls wherever possible.

.6 Contractor to provide metal caps and counter flashing for all roof penetrations provided under this section. Installation by this Contractor. This Contractor responsible for all membrane flashing.

1.18 RESPONSIBILITY FOR TEMPORARY TRIAL USAGE

.1 Protect work against damage or loss until accepted by the Consultant.

.2 Obtain written permission to start and test permanent equipment and systems prior to acceptance by Consultant.

.3 Consultant may use equipment and systems for test purposes prior to acceptance. Supply labour, material and instruments required for testing.

.4 See Division 21 for temporary usage. Guarantee period and commencement date shall not be affected.

.5 Clean and renew equipment and system used prior to acceptance. Restore to original, new and full working condition.

.6 Temporary usage includes steam blow.

1.19 ANCHOR BOLTS & TEMPLATES

.1 Supplied and installed by Contractor responsible.

1.20 PROTECTION OF OPENINGS

.1 Protect equipment, system openings including rough-in plumbing from dirt, dust and other foreign materials with materials compatible to the system.

1.21 ELECTRIC MOTORS, EQUIPMENT AND CONTROLS

.1 Electric equipment shall bear CSA label.
.2 Conform to requirements of Canadian Electrical Code, Local Provincial and Municipal Authorities and specified standards.
.3 Division 21, 22 and 23 responsible for their respective conduit, wiring and connections below 50 V which are related to control systems specified in Division 15 and shown on mechanical drawings. Refer to Electrical section for quality of materials and workmanship for wiring and conduit.
.4 Motors.
  .1 Provide motors for mechanical equipment.
  .2 If delivery of specified motor will delay delivery or installation of any equipment, install a motor for temporary use. Final acceptance of equipment will not occur until specified motor is installed.
.5 Motors under 372 W: Speed as indicated, continuous duty, built-in overload protection, resilient mount, single phase, 115V or 208V, unless otherwise specified.
.6 Motors 372 W and larger: EEMAC Class B, squirrel cage induction, continuous duty, drip proof, ball bearing, maximum temperature rise 40EC, three phase, 208V in building, unless otherwise specified.
.7 Provide motors, low voltage 50 V and less, wiring from transformers, and temperature pressure, humidity control devices.
.8 Furnish composite wiring diagrams with remote interlocks for control systems, including performance and sequence of operation description of mechanical systems. Submit for approval by Consultant.

1.22 SLEEVES

.1 Provide pipe sleeves at points where pipes pass through masonry or concrete walls or floors.
.2 Provide acoustical pipe penetration seals where pipes pass through equipment room walls or floors.
  .1 Seals to consist of two bolted pipe halves with minimum 19mm neoprene sponge bonded to inner face.
  .2 Seal shall be tightened around the pipe to eliminate clearance between the inner sponge face and the piping.
.3 Use cast iron or steel pipe sleeves with annular fin continuously welded at midpoint:
  .1 Through foundation walls.
  .2 Where sleeve extends above finished floor.
.4 Sizes:
  .1 Provide 6mm clearance all around, between sleeve and pipes or between sleeve and insulation.
  .2 Where piping passes below footings, provide minimum clearance of 50mm between sleeve and pipe. Backfill up to underside of footing with concrete of same strength as footing.
.5 Terminate sleeves flush with surface of concrete and masonry and 50mm above floors in mechanical or fan rooms or rooms susceptible to leaks. Not applicable to concrete floors on grade.
.6 For pipes passing through roofs, use cast iron sleeves with caulking recess and flashing clamp device. Provide flashing and counter flashing as necessary for installation by Division 21, 22 or 23 contractor responsible. Anchor sleeves in roof construction; caulk between sleeve recess and pipe; fasten roof flashing to clamp device; make water-tight durable joint.
.7 Fill voids around pipes. Remove plastic sleeves.
  .1 Caulk between sleeve and pipe in foundation walls and below grade floors with waterproof pre-retardant non-hardening mastic.
  .2 Where sleeves pass through walls or floors, caulk space between insulation and sleeve or

between pipe and sleeve with waterproof fire retardant non-hardening mastic. Seal space at each end also with same.

.3 Ensure no contact between copper tube or pipe and ferrous sleeve.

.4 Fill future-use sleeves with lime plaster.

.5 Coat exposed exterior surfaces of ferrous sleeves with heavy application of zinc rich paint to CGSB 1-GP-181M + Amdt - Mar-78.

.8 Temporarily plug all openings during construction.

1.23 ESCUTCHEONS AND PLATES

.1 Provide on pipes passing through finished walls, partitions, floors and ceilings.

.2 Use chrome or nickel plated brass, solid type, with set screws for ceiling or wall mounting. Use cast iron type in equipment room.

.3 Inside diameter shall fit around finished pipe. Outside diameter shall cover opening or sleeve.

.4 Where sleeve extends above finished floor, escutcheons or plates shall clear sleeve extension.

.5 Secure to pipe or finished surface but not insulation.

1.24 TESTS

.1 Provide the following supplementary requirements to tests specified:

.1 Give written 24 hours notice of date when tests will be made.

.2 Do not insulate or conceal work until tested and approved. Follow construction schedule and arrange for tests.

.3 Conduct tests in presence of Engineer.

.4 Bear costs including retesting and making good.

.5 Pipe pressure:

.1 Hydraulically test all water supply and steam supply systems at 12 times system operating pressure or minimum 860 kPa.

.2 Maintain test pressures without loss for 4 hours unless otherwise specified.

.3 Test drainage, waste and vent piping to code.

.4 Prior to test isolate all equipment or other parts which are incomplete or not designed to withstand test pressures.

.5 All piping of the drainage and venting systems shall be tested by means of filling the system with water after all outlets have been plugged. All joints shall be checked and the water level must hold without dropping for a period of one hour before the work is to be backfilled or otherwise built-in. Sections of the system may be tested separately provided they are at least 3000mm high and include at least 1500mm of the section below, where applicable. Any leaks observed must be corrected by additional caulking of joints or if necessary by removal of any section of pipe required.

.6 Testing shall be done before pipe covering is installed. Leaks must be located, corrected and test reapplied before acceptance of building.

.7 Provide test certification for all tests signed by Engineer or designated representative.

1.25 PAINTING

.1 Apply at least one coat of corrosion resistant primer paint to supports, and equipment fabricated from ferrous metals.

.2 Prime and touch up marred finished paintwork to match original.

1.26 SPECIAL TOOLS AND SPARE PARTS

.1 Furnish spare parts as follows:

.1 One set of mechanical seals for pump.

.2 One casing joint gasket for pump.

.3 One set of gaskets for each heat exchanger.

.4 One glass for each gauge glass installed.

.2 Identify spare parts containers as to contents and replacement parts numbers.
.3 Provide one set of special tools required to service equipment as recommended by manufacturers.
.4 Furnish one grease gun and adapters to suit different types of grease and grease fittings complete with 2 tubes of each kind of grease.

1.27 ACCESS DOORS

.1 This section to supply access doors for furred ceilings or spaces for servicing equipment and accessories or for inspection of safety, operating or fire devices for installation under section erecting the walls or ceilings. Provide ULC rated doors in fire rated construction. Installation by General Contractor.
.2 Access doors shall be flush mounted with integral drywall bead, sized 600 x 600 mm for body entry 300 x 300 mm for hand entry, or as noted on the drawings. Doors shall open 180 degrees have rounded safety corners, concealed hinges, screwdriver latches and anchor straps. Steel shall be prime coated. Doors shall be of approved manufacturer with published literature.
.3 Provide stainless steel access doors for tiled, marble or terrazzo surfaces or special surfaces, including all surfaces in the pool area.
.4 Provide cam type locking device with hand or key lock when located in public corridors and washrooms complete with master keys.
.5 Standard of Acceptance: Williams #WB-DW, Acudor #DW-5040, MIFAB #MDW.

1.28 DIELECTRIC COUPLINGS

.1 Provide wherever pipes of dissimilar metals are jointed.
.2 Provide insulating unions for pipe sizes NPS 2 and under and insulating flanges for pipe sizes over NPS 2.
.3 Cast brass adapters may be used where approved by Engineer.
.4 Provide felt or rubber gaskets to prevent dissimilar metals contact.

1.29 DRAIN VALVES

.1 Minimum NPS 19mm unless otherwise specified: straight pattern bronze with hose end male thread and complete with cap and chain.
.2 Locate at all low points and section isolating valves unless otherwise specified.
.3 Acceptable Product: Dahl

1.30 INSTRUCTION OF OPERATING STAFF

.1 Provide certified personnel to instruct operating staff on operation of mechanical equipment. Provide maintenance specialist personnel to instruct operating staff on maintenance and adjustment of mechanical equipment and any changes or modification in equipment made under terms of guarantee.
.2 Provide instruction during regular work hours prior to acceptance and turn-over to operating staff for regular operation.
.3 Use operation and maintenance data manual for instruction purposes. On completion of instruction, turn one manual over to Owner and the balance to Engineer.
.4 This Contractor to ensure mechanical systems are complete and fully operational as per the requirements of these documents and the applicable codes. Premature failure of any mechanical system(s) and/or related accessories deemed to be the result of poor workmanship shall be the financial responsibility of the Contractor responsible.

1.31 OPERATING AND MAINTENANCE MANUAL

.1 Provide operation and maintenance data for incorporation into manual specified in the Section 01 78 00 - Closeout Submittals.
.2 Definition: detailed information and records of individual products provided by manufacturer of supplier as part of project requirements, and of systems, describing operation and maintenance of each item.
.3 Operating data to include:

.1 Environmental and other control schematics for each system.
.2 Description of each system and its controls.
.3 Description of operation of each system at various loads together with reset schedules and seasonal variances.
.4 Operating instruction for each system and each component.
.5 Description of actions to be taken in event of equipment failure.
.6 Valves schedule and flow diagram.
.7 Color coding chart.

.4 Maintenance data shall include:
.1 Servicing, maintenance, operating and trouble-shooting instructions for each item of equipment.
.2 Equipment manufacturer's performance data sheets.
.3 Equipment performance verification test results.

.5 Approvals:
.1 Submit 1 draft of Operating and Maintenance Manual to Engineer for approval one month prior to estimated substantial completion date. Submission of individual data will not be accepted unless so directed by Engineer.
.2 Make any changes in submission as may be required and re-submit as directed.
.3 Failure to do so will result in delay of progress payment.

.6 Provide two (2) bound final copies of operating and maintenance manuals to Owner and one (1) bound final copy to Engineer.

1.32 SHOP DRAWINGS AND PRODUCT DATA

.1 Submit shop drawings and product data in accordance with Section 01 33 00 - Submittal Procedures. Provide all shop drawings within 30 days after contract has been awarded. Failure to do so will delay progress payments. Photocopies of fax sheets or poor quality photocopies will not be acceptable for shop drawings.

.2 Shop drawings and product data shall show:
.1 Mounting arrangements.
.2 Operating and maintenance clearances, access door swing spaces.
.3 Internal wiring diagrams if applicable.

.3 Shop drawings and product data shall be accompanied by:
.1 Detailed drawings of bases, supports, and anchor bolts.
.2 Sound power data, where applicable.
.3 Points of operation on performance curves.
.4 Manufacturer to certify as to current production.
.5 Certification of compliance to applicable codes.

.4 Keep 1 copy of shop drawings and product data on site, available for reference purposes at all times.

1.33 CLEANING AND FINAL ADJUSTMENT

.1 Clean interior and exterior of all systems including strainers.
.2 Clean and refurbish all equipment and leave in first class operating condition including replacement of all filters in all piping systems.
.3 Balance and adjust all systems and each piece of equipment to operate efficiently.

1.34 AS-BUILT RECORD DRAWINGS BY CONTRACTOR

.1 General: to be read in conjunction with Section 01 78 00 - Closeout Submittals.

.2 Site records:
.1 Mark thereon all changes as work progresses and as changes occur.
.2 Transfer information to show all work as actually installed.
.3 Make these drawings available for reference purposes and to inspection at all times.

.3 As-built drawings:
.1 Prior to start of testing, balancing and adjusting, finalize production of ACAD as-built

drawings.
.2 Identify each drawing in lower right hand corner in letters at least 12 mm high as follows: "AS BUILT DRAWINGS". Signature of contractor and date to be included.
.3 Submit to Engineer for approval and make all corrections as directed.
.4 Testing, balancing and adjusting to be performed using as-built drawings.
.5 Hand over completed reproducible as-built drawings with Operating and Maintenance Manuals.

1.35 EXCAVATION, TRENCHING AND BACKFILLING

.1 All excavation, trenching, granular base or bedding and backfilling, both inside and outside the building, required for the work of Division 15 shall be the financial responsibility of, and carried out by the General Contractor under the direction of the Division 15 Sub-contractor.
.1 This work includes the breaking out of existing concrete where new lines are installed below existing concrete floors.

1.36 CUTTING & PATCHING

.1 All cutting and patching required to properly accommodate the work of this Division shall be the financial responsibility of respective Division 21, 22 or 23 and carried out by trades to the applicable Specifications provided in this document.

1.37 FIRESTOPPING AND SMOKE SEALS

.1 All firestopping and smoke seals required to properly accommodate the work of this Division shall be the financial responsibility of the respective Division 21, 22 or 23 and carried out by trades to the applicable Specifications provided in this document.
.2 Work must be performed by a company with experience in the application of firestopping and smoke seals to ULC requirements.

2 Products

2.1 MATERIALS

.1 Materials and products in accordance with Section 01 47 15 - Sustainable Requirements: Construction.

3 Execution

3.1 REPAIRS/ RESTORATION

.1 To Section 09 91 00 - Painting.
.2 Prime and touch up marred finished paintwork to match original.
.3 Restore to new condition, finishes which have been damaged extensively for priming and touch-up.

3.2 CLEANING

.1 Clean interior and exterior of all systems including strainers. Vacuum interior of ductwork and air handling units.

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.
.1 Radiographic testing.
.2 Pressure test.
.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 Verification requirements in accordance with Section 01 47 17 - Sustainable Requirements: Contractor's Verification, include:

.1 Materials and resources.
.2 Storage and collection of recyclables.
.3 Construction waste management.
.4 Resource reuse.
.5 Recycled content.
.6 Local/regional materials.
.7 Certified wood.
.8 Low-emitting materials.

3.4 DEMONSTRATION

.1 Consultant will use equipment and systems for test purposes prior to acceptance. Supply labour, material, and instruments required for testing.

.2 Trial usage to apply to following equipment and systems:

.1 Steam and condensate lines and appurtenance.

.3 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.

.4 Where specified elsewhere in Division 22 or 23 manufacturers to provide demonstrations and instructions.

.5 Use operation and maintenance manual, as-built drawings, and audio visual aids as part of instruction materials.

.6 Instruction duration time requirements as specified in appropriate sections.

.7 Consultant will 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.

End of Section

1 General

1.1 REFERENCES

.1 American National Standards Institute/National Fire Prevention Association (ANSI/NFPA)
  .1 ANSI/NFPA 13- 1997 , Installation of Sprinkler Systems.
.2 Underwriters Laboratories of Canada (ULC)
  .1 ULC S543- 1984 , Internal Lug Quick Connect Couplings for Fire Hose.

1.2 RELATED SECTIONS

.1 Section 23 05 21 - Thermometers and Pressure Gauges - Piping Systems.

1.3 SHOP DRAWINGS AND PRODUCT DATA

.1 Submit shop drawings and product data in accordance with Section 01 33 00 - Submittal Procedures and in accordance with ANSI/NFPA 13, working plans and design requirements.
.2 Shop drawings shall be stamped and signed by a professional engineer registered or licensed in the Province of Prince Edward Island, Canada.

1.4 SAMPLES

.1 Submit samples in accordance with Section 01 33 00 - Submittal Procedures.
.2 Submit samples of following:
  .1 Each type of sprinkler head.
  .2 Signs.

1.5 ENGINEERING DESIGN CRITERIA

.1 Contractor shall note that this project consists only of a renovation to an existing building and its systems. All bidders are responsible for determining exact site requirements and the extent of work required to maintain fire protection in accordance with NFPA 13.
.2 Design system in accordance with ANSI/NFPA 13, using following parameters:
  .1 Hazard:
    .1 To suit occupancy as indicated.
  .2 Pipe size and layout:
    .1 Hydraulic design .
    .2 Sprinkler head layout: to ANSI/NFPA 13 or as directed by authorities having jurisdiction .
  .3 Water supply:
    .1 Use existing sprinkler information available on site to determine basis of design in accordance with NFPA 13.
  .4 Zoning:
    .1 System zoning as indicated.

1.6 CLOSEOUT SUBMITTALS

.1 Provide maintenance data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

1.7 EXTRA MATERIALS

.1 Provide maintenance materials in accordance with Section 01 78 00 - Closeout Submittals.
.2 Provide spare sprinklers and tools as required by ANSI/NFPA 13.

2 Products

2.1 PIPE, FITTINGS AND VALVES

.1 Pipe:
  .1 Ferrous: to ANSI/NFPA 13.
  .2 Copper tube: to ANSI/NFPA 13.
.2 Fittings and joints to ANSI/NFPA 13:
  .1 Ferrous: screwed, welded, flanged or roll grooved.
  .2 Copper tube: screwed, soldered, brazed.
.3 Valves:
  .1 ULC listed for fire protection service.
  .2 Up to NPS 2: bronze, screwed ends, OS & Y; gate.
  .3 NPS 2 1/2 and over: cast iron, flanged or roll grooved ends, indicating butterfly valve.
  .4 Swing check valves.
  .5 Ball drip.
.4 Pipe hangers:
  .1 ULC listed for fire protection services.

2.2 SPRINKLER HEADS

.1 General: to ANSI/NFPA 13 and ULC listed for fire services.
.2 SPRINKLER HEAD TYPE A
  .1 Upright bronze.
.3 SPRINKLER HEAD TYPE B
  .1 Pendant chrome link and lever type.
.4 SPRINKLER HEAD TYPE C
  .1 Pendant chrome glass bulb type.
.5 SPRINKLER HEAD TYPE D
  .1 Recessed polished type with ring and cup.
.6 SPRINKLER HEAD TYPE E
  .1 Flush polished link and lever type.
.7 SPRINKLER HEAD TYPE F
  .1 Side wall polished link and lever type.

2.3 PRESSURE GAUGES

.1 ULC listed and to Section 23 05 21 - Thermometers and Pressure Gauges - Piping Systems.
.2 Shall have maximum limit of not less than twice normal working pressure at point where installed.

3 Execution

3.1 INSTALLATION

.1 Install, inspect and test to acceptance in accordance with ANSI/NFPA 13.
.2 Install excess pressure pump across alarm valve in accordance with manufacturers instructions.
.3 Testing to be witnessed by Departmental Representative.
.4 Install water gong as indicated.

End of Section

1 General

1.1 USE OF SYSTEMS

.1 Use of new permanent heating and/or ventilating systems for supplying temporary heat or ventilation is permitted only under following conditions:
- .1 Entire system is complete, pressure tested, cleaned, flushed out.
- .2 Specified water treatment system has been commissioned, water treatment is being continuously monitored.
- .3 Building has been closed in, areas to be heated/ventilated are clean and will not thereafter be subjected to dust-producing processes.
- .4 There is no possibility of damage.
- .5 Supply ventilation systems are protected by 60 % filters, inspected daily, changed every 2 weeks or more frequently as required.
- .6 Return systems have approved filters over openings, inlets, outlets.
- .7 Systems will be:
  - .1 Operated as per manufacturer's recommendations and instructions.
  - .2 Operated by Contractor.
  - .3 Monitored continuously by Contractor.
- .8 Warranties and guarantees are not relaxed.
- .9 Regular preventive and other manufacturers recommended maintenance routines are performed by Contractor at own expense and under supervision of Consultant.
- .10 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.

2 Products

2.1 NOT USED

.1 Not Used.

3 Execution

3.1 NOT USED

.1 Not Used.

End of Section

1 General

1.1 SUMMARY

.1 Section Includes:
- .1 Concrete housekeeping pads, 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 B31.1-04, Power Piping.

.2 American Society for Testing and Materials International (ASTM)
- .1 ASTM A125-1996(R2001), Specification for Steel Springs, Helical, Heat-Treated.
- .2 ASTM A307-04, Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
- .3 ASTM A563-04a, Specification for Carbon and Alloy Steel Nuts.

.3 Factory Mutual (FM)

.4 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
- .1 Material Safety Data Sheets (MSDS).

.5 Manufacturer's Standardization Society of the Valves and Fittings Industry (MSS)
- .1 MSS SP58-2002, Pipe Hangers and Supports - Materials, Design and Manufacture.
- .2 ANSI/MSS SP69-2003, Pipe Hangers and Supports - Selection and Application.
- .3 MSS SP89-2003, Pipe Hangers and Supports - Fabrication and Installation Practices.

.6 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 ASME B31.1 or MSS SP58.
- .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.

1.4 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 Province of Prince Edward Island, Canada.

.3 Submit shop drawings and product data for following items:
- .1 Bases, hangers and supports.
- .2 Connections to equipment and structure.
- .3 Structural assemblies.

.4 Closeout Submittals:
- .1 Provide maintenance data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

1.5 QUALITY ASSURANCE

.1 Health and Safety:
- .1 Do construction occupational health and safety in accordance with Section 01 35 29 - Health, Safety and Emergency Response Procedures.

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: galvanized after manufacture.
- .2 Use electro-plating galvanizing process or hot dipped galvanized process.
- .3 Ensure steel hangers in contact with copper piping are copper plated or 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, 13mm FM approved.
- .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, UL listed, FM approved to MSS-SP58 and MSS-SP69.

.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, UL listed.
- .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 UL listed.

.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 to MSS SP69.

.5 Shop and field-fabricated assemblies:
- .1 Trapeze hanger assemblies: to MSS-SP89.
- .2 Steel brackets: to MSS-SP89.

.6 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.
- .3 Do not use 22 mm or 28 mm rod.

.7 Pipe attachments: material to MSS SP58:
- .1 Attachments for steel piping: carbon steel galvanized.
- .2 Attachments for copper piping: copper plated black steel.
- .3 Use insulation shields for hot pipework.
- .4 Oversize pipe hangers and supports.

.8 Adjustable clevis: material to MSS SP69 UL listed or FM approved, clevis bolt with nipple spacer and vertical adjustment nuts above and below clevis.
- .1 Ensure "U" has hole in bottom for riveting to insulation shields.

.9 Yoke style pipe roll: carbon steel yoke, rod and nuts with cast iron roll, to MSS SP69.

.10 U-bolts: carbon steel to MSS SP69 with 2 nuts at each end to ASTM A563.
- .1 Finishes for steel pipework: galvanized.
- .2 Finishes for copper, glass, brass or aluminum pipework: black with formed portion plastic coated or epoxy coated.

.11 Pipe rollers: cast iron roll and roll stand with carbon steel rod to MSS SP69.

2.3 RISER CLAMPS

.1 Steel or cast iron pipe: galvanized carbon steel to MSS SP58, type 42, UL listed.
.2 Copper pipe: carbon steel copper plated to MSS SP58, type 42.
.3 Bolts: to ASTM A307.
.4 Nuts: to ASTM A563.

2.4 INSULATION PROTECTION SHIELDS

.1 Insulated cold piping:
  .1 64 kg/m3 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 center plate for pipe sizes NPS 12 and over, carbon steel to comply with MSS SP69.

2.5 CONSTANT SUPPORT SPRING HANGERS

.1 Springs: alloy steel to ASTM A125, shot peened, magnetic particle inspected, with +/-5% spring rate tolerance, tested for free height, spring rate, loaded height and provided with Certified Mill Test Report (CMTR).
.2 Load adjustability: 10 % minimum adjustability each side of calibrated load. Adjustment without special tools. Adjustments not to affect travel capabilities.
.3 Provide upper and lower factory set travel stops.
.4 Provide load adjustment scale for field adjustments.
.5 Total travel to be actual travel + 20%. Difference between total travel and actual travel 25 mm minimum.
.6 Individually calibrated scales on each side of support calibrated prior to shipment, complete with calibration record.

2.6 VARIABLE SUPPORT SPRING HANGERS

.1 Vertical movement: 13 mm minimum, 50 mm maximum, use single spring pre-compressed variable spring hangers.
.2 Vertical movement greater than 50 mm: use double spring pre-compressed variable spring hanger with 2 springs in series in single casing.
.3 Variable spring hanger complete with factory calibrated travel stops. Provide certificate of calibration for each hanger.
.4 Steel alloy springs: to ASTM A125, shot peened, magnetic particle inspected, with +/-5 % spring rate tolerance, tested for free height, spring rate, loaded height and provided with CMTR.

2.7 EQUIPMENT SUPPORTS

.1 Fabricate equipment supports not provided by equipment manufacturer from structural grade steel meeting requirements of Section 05 12 23 - Structural Steel for Buildings. Submit calculations with shop drawings.

2.8 EQUIPMENT ANCHOR BOLTS AND TEMPLATES

.1 Provide templates to ensure accurate location of anchor bolts.

2.9 PLATFORMS AND CATWALKS

.1 To Section 05 50 00 - Metal Fabrications.

2.10 HOUSE-KEEPING PADS

.1 Provide 100 mm high concrete housekeeping pads for base-mounted equipment; size pads 50 mm larger than equipment; chamfer pad edges.
.2 Concrete: to Section 03 30 00 - Cast-in-Place Concrete.

2.11 OTHER EQUIPMENT SUPPORTS

.1 Fabricate equipment supports from structural grade steel meeting requirements of Section 05 12 23 - Structural Steel for Buildings.
.2 Submit structural calculations with shop drawings.

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 Vibration Control Devices:
  .1 Install on piping systems at pumps, boilers, chillers, cooling towers, and as indicated.
.3 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 Steel pipes: install below coupling or shear lugs welded to pipe.
  .4 Cast iron pipes: install below joint.
.4 Clevis plates:
  .1 Attach to concrete with 4minimum concrete inserts, one at each corner.
.5 Provide supplementary structural steelwork where structural bearings do not exist or where concrete inserts are not in correct locations.
.6 Use approved constant support type hangers where:
  .1 vertical movement of pipework is 13 mm or more,
  .2 transfer of load to adjacent hangers or connected equipment is not permitted.
.7 Use variable support spring hangers where:
  .1 transfer of load to adjacent piping or to connected equipment is not critical.
  .2 variation in supporting effect does not exceed 25 % of total load.

3.3 HANGER SPACING

.1 Plumbing piping: to Canadian Plumbing Code.
.2 Fire protection: to applicable fire code.
.3 Gas and fuel oil piping: up to NPS 1/2: every 1.8 m.
.4 Copper piping: up to NPS 1/2: every 1.5 m.
.5 Flexible joint roll groove pipe: in accordance with table below, but not less than one hanger at joints.
.6 Within 300 mm of each elbow.
.7

Maximum Pipe Size : NPS	Maximum Spacing Steel	Maximum Spacing Copper
up to 1-1/4	2.1 m	1.8 m
1-1/2	2.7 m	2.4 m
1	3.0 m	2.7 m
2-1/2	3.6 m	3.0 m
2	3.6 m	3.0 m
3-1/2	3.9 m	3.3 m
4	4.2 m	3.6 m
5	4.8 m	
6	5.1 m	

8	5.7 m
10	6.6 m
12	6.9 m

.8 Pipework greater than NPS 12: to MSS SP69.

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.

End of Section

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.
- .2 Sustainable requirements for construction and verification.

1.2 REFERENCES

.1 Canadian Gas Association (CGA)
- .1 CSA/CGA B149.1-05, Natural Gas and Propane Installation Code.

.2 Canadian General Standards Board (CGSB)
- .1 CAN/CGSB-1.60-97, Interior Alkyd Gloss Enamel.
- .2 CAN/CGSB-24.3-92, Identification of Piping Systems.

.3 National Fire Protection Association (NFPA)
- .1 NFPA 13-2002, Standard for the Installation of Sprinkler Systems.
- .2 NFPA 14-2003, Standard for the Installation of Standpipe and Hose Systems.

1.3 SUBMITTALS

.1 Product Data:

.2 Submittals: in accordance with Section 01 33 00 - Submittal Procedures.

.3 Product data to include paint colour chips, other products specified in this section.

.4 Samples:
- .1 Submit samples in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Samples to include nameplates, labels, tags, lists of proposed legends.

1.4 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 Section 01 35 29 - Health, Safety and Emergency Response Procedures.

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.

.2 Waste Management and Disposal:
- .1 Construction/Demolition Waste Management and Disposal: separate waste materials for reuse in accordance with Section 01 74 19 - Construction Waste Management and Disposal.
- .2 Dispose of unused paint material at official hazardous material collections site approved by Departmental Representative.
- .3 Do not dispose of unused paint material into sewer system, into streams, lakes, onto ground or in locations where it will pose health or environmental hazard.

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:

.1 3 mm thick laminated plastic, matte finish, with square corners, letters accurately aligned and machine engraved into core.

.3 Sizes:

.1 Conform to following table:

Size # mm	Sizes (mm)	No. of Lines	Height of Letters (mm)
1	10 x 50	1	3
2	13 x 75	1	5
3	13 x 75	2	3
4	20 x 100	1	8
5	20 x 100	2	5
6	20 x 200	1	8
7	25 x 125	1	12
8	25 x 125	2	8
9	35 x 200	1	20

Use maximum of 25 letters/numbers per line.

.4 Locations:

.1 Terminal cabinets, control panels: use size # 5.

.2 Equipment in Mechanical Rooms: use size # 9.

.5 Identification for PWGSC Preventive Maintenance Support System (PMSS):

.1 Use arrangement of Main identifier, Source identifier, Destination identifier.

.2 Equipment in Mechanical Room:

.1 Main identifier: size #9.

.2 Source and Destination identifiers: size #6.

.3 Terminal cabinets, control panels: size #5.

.3 Equipment elsewhere: sizes as appropriate.

2.3 EXISTING IDENTIFICATION SYSTEMS

.1 Apply existing identification system to new work.

.2 Where existing identification system does not cover for new work, use identification system specified this section.

.3 Before starting work, obtain written approval of identification system from Departmental Representative.

2.4 PIPING SYSTEMS GOVERNED BY CODES

.1 Identification:

.1 Natural gas: to CSA/CGA B149.1.

.2 Propane gas: to CSA/CGA B149.1.

.3 Sprinklers: to NFPA 13.

.4 Standpipe and hose systems: to NFPA 14.

2.5 IDENTIFICATION OF PIPING SYSTEMS

.1 Identify contents by background colour marking, pictogram (as necessary), legend; direction of flow by arrows. To CAN/CGSB 24.3 except where specified otherwise.

.2 Pictograms:

.1 Where required: Workplace Hazardous Materials Information System (WHMIS) regulations.

.3 Legend:

.1 Block capitals to sizes and colours listed in CAN/CGSB 24.3.

.4 Arrows showing direction of flow:

.1 Outside diameter of pipe or insulation less than 75 mm: 100 mm long x 50 mm high.

.2 Outside diameter of pipe or insulation 75 mm and greater: 150 mm long x 50 mm high.

.3 Use double-headed arrows where flow is reversible.

.5 Extent of background colour marking:

.1 To full circumference of pipe or insulation.

.2 Length to accommodate pictogram, full length of legend and arrows.

.6 Materials for background colour marking, legend, arrows:

.1 Pipes and tubing 20 mm and smaller: waterproof and heat-resistant pressure sensitive plastic marker tags.

.2 Other pipes: pressure sensitive plastic-coated cloth or vinyl with protective overcoating, waterproof contact adhesive undercoating, suitable for ambient of 100% RH and continuous operating temperature of 150 degrees C and intermittent temperature of 200 degrees C.

.7 Colours and Legends:

.1 Where not listed, obtain direction from Departmental Representative.

.2 Colours for legends, arrows: to following table:

Background colour:	Legend, arrows:
Yellow	BLACK
Green	WHITE
Red	WHITE

.3 Background colour marking and legends for piping systems:

** Add design temperature

++ Add design temperature and pressure

Contents	Background colour marking	Legend
Raw water	Green	RAW WATER
River water	Green	RIVER WATER
Sea water	Green	SEA WATER
City water	Green	CITY WATER
Treated water	Green	TREATED WATER
Brine	Green	BRINE
Condenser water supply	Green	COND. WTR. SUPPLY
Condenser water return	Green	COND. WTR. RETURN
Chilled water supply	Green	CH. WTR. SUPPLY
Chilled water return	Green	CH. WTR. RETURN
Hot water heating supply	Yellow	HEATING SUPPLY
Hot water heating return	Yellow	HEATING RETURN
High temp HW Htg. supply	Yellow	HTHW HTG. SUPPLY++
High temp HW Htg. return	Yellow	HTHW HTG. RETURN++
Make-up water	Yellow	MAKE-UP WTR
Boiler feed water	Yellow	BLR. FEED WTR
Steam ___kPa	Yellow	___ kPa STEAM
Steam condensate (gravity)	Yellow	ST.COND.RET (GRAVITY)
Steam condensate (pumped)	Yellow	ST.COND.RET (PUMPED)
Safety valve vent	Yellow	STEAM VENT
Intermittent blow-off	Yellow	INT. BLOW-OFF
Continuous blow-off	Yellow	CONT. BLOW-OFF

Chilled drinking water	Green	CH. DRINK WTR
Drinking water return	Green	CH. DRINK WTR. CIRC
Domestic hot water supply	Green	DOM. HW SUPPLY
Dom. HWS recirculation	Green	DOM. HW CIRC
Domestic cold water supply	Green	DOM. CWS
Waste water	Green	WASTE WATER
Contaminated lab waste	Yellow	CONT. LAB WASTE
Acid waste	Yellow	ACID WASTE (add source)
Storm water	Green	STORM
Sanitary	Green	SAN
Plumbing vent	Green	SAN. VENT
Refrigeration suction	Yellow	REF. SUCTION
Refrigeration liquid	Yellow	REF. LIQUID
Refrigeration hot gas	Yellow	REF. HOT GAS
No. ___ fuel oil suction	Yellow	# ___ FUEL OIL
No. ___ fuel oil return	Yellow	# ___ FUEL OIL
Engine exhaust	Yellow	ENGINE EXHAUST
Lubricating oil	Yellow	LUB. OIL
Hydraulic oil	Yellow	HYDRAULIC OIL
Gasoline	Yellow	GASOLINE
Natural gas	to Codes	
Propane	to Codes	
Gas regulator vents	to Codes	
Distilled water	Green	DISTILL. WTR
Demineralized water	Green	DEMIN. WATER
Chlorine	Yellow	CHLORINE
Nitrogen	Yellow	NITROGEN
Oxygen	Yellow	OXYGEN
Compressed air (700kPa)	Green	COMP. AIR ___ kPa
Compressed air (>700kPa)	Yellow	COMP. AIR ___ kPa
Vacuum	Green	VACUUM
Fire protection water	Red	FIRE PROT. WTR
Sprinklers	Red	SPRINKLERS
Carbon dioxide	Red	CO2
Instrument air	Green	INSTRUMENT AIR

2.6 IDENTIFICATION DUCTWORK SYSTEMS

.1 50 mm high stencilled letters and directional arrows 150 mm long x 50 mm high.
.2 Colours: back, or co-ordinated with base colour to ensure strong contrast.

2.7 VALVES, CONTROLLERS

.1 Brass tags with 12 mm stamped identification data filled with black paint.
.2 Include flow diagrams for each system, of approved size, showing charts and schedules with identification of each tagged item, valve type, service, function, normal position, location of tagged item.

2.8 CONTROLS COMPONENTS IDENTIFICATION

.1 Identify all systems, equipment, components, controls, sensors with system nameplates specified in this section.
.2 Inscriptions to include function and (where appropriate) fail-safe position.

2.9 LANGUAGE

.1 Identification in English.
.2 Use one nameplate and label for each language.

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 TIMING

.1 Provide identification only after painting has been completed.

3.3 INSTALLATION

.1 Perform work in accordance with CAN/CGSB-24.3 except as specified otherwise.
.2 Provide ULC and CSA registration plates as required by respective agency.
.3 Identify systems, equipment to conform to PWGSC PMSS.

3.4 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.

3.5 LOCATION OF IDENTIFICATION ON PIPING AND DUCTWORK SYSTEMS

.1 On long straight runs in open areas in boiler rooms, equipment rooms, galleries, tunnels: at not more than 17 m intervals and more frequently if required to ensure that at least one is visible from any one viewpoint in operating areas and walking aisles.
.2 Adjacent to each change in direction.
.3 At least once in each small room through which piping or ductwork passes.
.4 On both sides of visual obstruction or where run is difficult to follow.
.5 On both sides of separations such as walls, floors, partitions.
.6 Where system is installed in pipe chases, ceiling spaces, galleries, confined spaces, at entry and exit points, and at access openings.
.7 At beginning and end points of each run and at each piece of equipment in run.
.8 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.
.9 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.

3.6 VALVES, CONTROLLERS

.1 Valves and operating controllers, except at plumbing fixtures, radiation, or where in plain sight of equipment they serve: Secure tags with non-ferrous chains or closed "S" hooks.
.2 Install one copy of flow diagrams, valve schedules mounted in frame behind non-glare glass where directed by Departmental Representative. Provide one copy (reduced in size if required) in each operating and maintenance manual.
.3 Number valves in each system consecutively.

3.7 CLEANING

.1 Proceed in accordance with Section 01 74 00 - Cleaning and Waste Management.
.2 Upon completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

End of Section

1 General

1.1 SUMMARY

.1 Section Includes:
- .1 Materials and installation of low-pressure metallic ductwork, joints and accessories.

.2 Related Sections:
- .1 Section 01 33 00 - Submittal Procedures.
- .2 Section 01 35 29 - Health, Safety and Emergency Response Procedures.
- .3 Section 02 61 00 - Hazardous Facility Remediation.
- .4 Section 07 84 00 - Firestopping.
- .5 Section 23 05 29 - Hangers and Supports for HVAC Piping and Equipment.

1.2 REFERENCES

.1 American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. (ASHRAE).

.2 American Society for Testing and Materials International, (ASTM).
- .1 ASTM A480/A480M, Standard Specification for General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet and Strip.
- .2 ASTM A635/A635M, Standard Specification for Steel, Sheet and Strip, Heavy-Thickness Coils, Carbon, Hot Rolled.
- .3 ASTM A653/A653M, Standard Specification for Steel Sheet, Zinc Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by the Hot-Dip Process.

.3 Health Canada/Workplace Hazardous Materials Information System (WHMIS).
- .1 Material Safety Data Sheets (MSDS).

.4 National Fire Protection Association (NFPA).
- .1 NFPA 90B, Standard for the Installation of Warm Air Heating and Air-Conditioning Systems.

.5 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 SMACNA HVAC Air Duct Leakage Test Manual, 1st Edition.
- .3 IAQ Guideline for Occupied Buildings Under Construction, 1st Edition.

1.3 SUBMITTALS

.1 Submit shop drawings and product data in accordance with Section 01 33 00 - Submittal Procedures.

.2 Product Data: submit WHMIS MSDS - Material Safety Data Sheets in accordance with Section 01 35 28 - Health and Safety Requirements for the following:
- .1 Sealants.
- .2 Tape.
- .3 Proprietary Joints.

1.4 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 28 - Health and Safety Requirements

.3 Indoor Air Quality (IAQ) Management Plan.
- .1 Develop and implement an Indoor Air Quality (IAQ) Management Plan for construction and preoccupancy phases of building.
- .2 During construction meet or exceed the requirements of SMACNA IAQ Guideline for Occupied Buildings under Construction.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Protect on site stored or installed absorptive material from moisture damage.
.2 Waste Management and Disposal:
  .1 Separate waste materials for reuse in accordance with Section 01 74 19 - Construction Waste Management and Disposal.
  .2 Remove from site and dispose of packaging materials at appropriate recycling facilities.
  .3 Collect and separate for disposal paper packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.
  .4 Separate for reuse and place in designated containers Steel waste in accordance with Waste Management Plan.
  .5 Place materials defined as hazardous or toxic in designated containers.
  .6 Handle and dispose of hazardous materials in accordance with CEPA, regulations.
  .7 Fold up metal banding, flatten and place in designated area for recycling.

2 Products

2.1 SEAL CLASSIFICATION

.1 Classification as follows:

Maximum Pressure Pa	SMACNA Seal Class
1	C
2	C
3	C
4	Unsealed

.2 Seal classification:
  .1 Class C: transverse joints and connections made air tight with gaskets, sealant, tape or a combination thereof. Longitudinal seams unsealed.

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 DUCT LEAKAGE

.1 In accordance with SMACNA HVAC Air Duct Leakage Test Manual.

2.5 FITTINGS

.1 Fabrication: to SMACNA.
.2 Radiused elbows.
  .1 Rectangular: centreline radius: 1.5 times width of duct.
  .2 Round: smooth radius or 5 piece. 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.
  .2 Round main and branch: enter main duct at 45 degrees with conical connection.
  .3 Provide volume control damper in branch duct near connection to main duct.
  .4 Main duct branches: with splitter damper.
.5 Transitions:
  .1 Diverging: 20 degrees maximum included angle.
  .2 Converging: 30degrees maximum included angle.

.6 Offsets:
.1 Full radiused elbows.
.7 Obstruction deflectors: maintain full cross-sectional area.
.1 Maximum included angles: as for transitions.

2.6 FIRE STOPPING

.1 Retaining angles around duct, on both sides of fire separation in accordance with Section 07 84 00 - Firestopping.
.2 Fire stopping material and installation must not distort duct.

2.7 GALVANIZED STEEL

.1 Lock forming quality: to ASTM A653/A653M, Z90 zinc coating.
.2 Thickness, fabrication and reinforcement: to SMACNA.
.3 Joints: to SMACNA or proprietary manufactured duct joint. Proprietary manufactured flanged duct joint to be considered to be a class A seal.

2.8 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 ASHRAE.
.3 Hangers: black steel angle with black steel rods to ASHRAE:

.2

Duct Size (mm)	Angle Size (mm)	Rod Size (mm)
up to 750	25 x 25 x 3	6
751 to 1050	40 x 40 x 3	6
1051 to 1500	40 x 40 x 3	10
1501 to 2100	50 x 50 x 3	10
2101 to 2400	50 x 50 x 5	10
2401 and over	50 x 50 x 6	10

.1 Upper hanger attachments:
.1 For concrete: manufactured concrete inserts.
.2 For steel joist:manufactured joist clamp.
.3 For steel beams: manufactured beam clamps:

3 Execution

3.1 GENERAL

.1 Do work in accordance with, NFPA 90A & 90B, ASHRAE and SMACNA.
.2 Do not break continuity of insulation vapour barrier with hangers or rods.
.1 Insulate strap hangers 100 mm beyond insulated duct.
.3 Support risers in accordance with SMACNA.
.4 Install breakaway joints in ductwork on sides of fire separation.
.5 Install proprietary manufactured flanged duct joints in accordance with manufacturer's instructions.
.6 Manufacture duct in lengths and diameter to accommodate installation of acoustic duct lining.

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

Duct Size (mm)	Spacing (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.

End of Section

1 General

1.1 SUMMARY

.1 Related Sections:
- .1 Section 01 33 00 - Submittal Procedures.
- .2 Section 01 35 29 - Health, Safety and Emergency Response Procedures.
- .3 Section 02 61 00 - Hazardous Facility Remediation.

1.2 REFERENCES

.1 American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. (ASHRAE).
.2 Department of Justice Canada (Jus).
- .1 Canadian Environmental Protection Act (CEPA), 1999, c. 33.
- .2 Transportation of Dangerous Goods Act, 1992 (TDGA), c. 34.

.3 Health Canada/Workplace Hazardous Materials Information System (WHMIS).
- .1 Material Safety Data Sheets (MSDS).

.4 National Fire Protection Association (NFPA).
- .1 NFPA 90A, Standard for the Installation of Air-Conditioning and Ventilating Systems.
- .2 NFPA 90B, Standard for Installation of Warm Air Heating and Air-Conditioning Systems.

.5 Sheet Metal and Air-Conditioning Contractors' National Association (SMACNA).
- .1 SMACNA HVAC Duct Construction Standards - Metal and Flexible, (Addendum No.1, November 1997).
- .2 SMACNA IAQ Guideline for Occupied Buildings under Construction, 1st Edition.

.6 Underwriters' Laboratories Inc. (UL).
- .1 UL 181, Standard for Factory-Made Air Ducts and Air Connectors.

.7 Underwriters' Laboratories of Canada (ULC).
- .1 CAN/ULC-S110, Fire Tests for Air Ducts.

1.3 SUBMITTALS

.1 Make submittals in accordance with Section 01 33 00 - Submittal Procedures.
.2 Product Data: submit WHMIS MSDS in accordance with Section 01 35 28 - Health and Safety Requirements for the following:
- .1 Thermal properties.
- .2 Friction loss.
- .3 Acoustical loss.
- .4 Leakage.
- .5 Fire rating.

.3 Samples: submit samples with product data of different types of flexible duct being used in accordance with Section 01 33 00 - Submittal Procedures.

1.4 QUALITY ASSURANCE

.1 Certification of Ratings:
- .1 Catalogue or published ratings to 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 28 - Health and Safety Requirements

1.5 DELIVERY, STORAGE AND HANDLING

.1 Protect on site stored or installed absorptive material from moisture damage.
.2 Waste Management and Disposal:
- .1 Separate waste materials for reuse in accordance with Section 01 74 00 - Construction Waste Management and Disposal.
- .2 Remove from site and dispose of packaging materials at appropriate recycling facilities.

.3 Collect and separate for disposal paper 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 CEPA, regulations.
.6 Ensure emptied containers are sealed and stored safely.
.7 Fold up metal banding, flatten and place in designated area for recycling.

1.6 INDOOR AIR QUALITY (IAQ) MANAGEMENT PLAN

.1 During construction meet or exceed the requirements of SMACNA IAQ Guideline for Occupied Buildings under Construction.

2 Products

2.1 GENERAL

.1 Factory fabricated to CAN/ULC-S110.
.2 Pressure drop coefficients listed below are based on relative sheet metal duct pressure drop coefficient of 1.00.
.3 Flame spread rating not to exceed 25. Smoke developed rating not to exceed 50.

2.2 METALLIC - UNINSULATED

.1 Type 1: spiral wound flexible aluminum, as indicated.
.2 Performance:
.1 Factory tested to 2.5 kPa without leakage.
.2 Maximum relative pressure drop coefficient: 3.

2.3 METALLIC - INSULATED

.1 Type 2: spiral wound flexible aluminum with factory applied, 37 mm thick flexible glass fibre thermal insulation with vapour barrier and vinyl, reinforced mylar/neoprene laminate, or aluminum jacket, as indicated.
.2 Performance:
.1 Factory tested to 2.5 kPa without leakage.
.2 Maximum relative pressure drop coefficient: 3.
.3 Thermal loss/gain: 1.3 W/m2. degrees C mean.

2.4 NON-METALLIC - UNINSULATED

.1 Type 3: non-collapsible, coated mineral base fabric or aluminum foil mylar type, mechanically bonded to, and helically supported by, external steel wire, as indicated.
.2 Performance:
.1 Factory tested to 2.5 kPa without leakage.
.2 Maximum relative pressure drop coefficient: 3.

2.5 NON-METALLIC - INSULATED

.1 Type 4: non-collapsible, coated mineral base fabric or aluminum foil/mylar type mechanically bonded to, and helically supported by, external steel wire with factory applied, 37 mm thick flexible mineral fibre thermal insulation with vapour barrier and vinyl or reinforced mylar/neoprene laminate jacket, as indicated.
.2 Performance:
.1 Factory tested to 2.5 kPa without leakage.
.2 Maximum relative pressure drop coefficient: 3.
.3 Thermal loss/gain: 1.3 W/m2. degrees C mean.

2.6 NON-METALLIC - ACOUSTIC INSULATED

.1 Type 5: non-collapsible, coated mineral base perforated fabric type helically supported by and mechanically bonded to steel wire with factory applied flexible mineral fibre acoustic insulation and encased in aluminum foil/mylar laminate vapour barrier, as indicated.

.2 Performance:

.1 Factory tested to 2.5 kPa without leakage.

.2 Maximum relative pressure drop coefficient: 3 .

.3 Acoustical performance: Minimum attenuation (dB/m) to following table:

Duct Diam.	Frequency (Hz):	125	250	500	1000	2000
100		0.6	3	12	27	0
150		1.2	3	12	22	27
200		2.0	5	12	19	20
300		2.4	5	12	16	15

3 Execution

3.1 DUCT INSTALLATION

.1 Install in accordance with: CAN/ULC-S110, NFPA 90A & 90B and SMACNA.

End of Section

1 General

1.1 REFERENCES

.1 Canadian Standards Association (CSA)

.1 CSA C22.1, Canadian Electrical Code, Part 1, Safety Standard for Electrical Installations.

.2 CAN/CSA-22.3 No. 1, Overhead Systems.

.3 CAN3-C235-83(R2000), Preferred Voltage Levels for AC Systems, 0 to 50,000 V.

.4 CSA Z462-12, Workplace Electrical Safety.

.2 Institute of Electrical and Electronics Engineers (IEEE) / National Electrical Safety Code Product Line (NESC).

.1 IEEE SP1122-2000, The Authoritative Dictionary of IEEE Standard Terms, 7th Edition.

1.2 DEFINITIONS

.1 Electrical terms used in electrical specifications and on electrical drawings are those defined by IEEE SP1122.

1.3 CARE, OPERATION AND START-UP

.1 Instruct Departmental Representative and operating personnel in the operation, care and maintenance of systems, system equipment and components.

.2 Operating instructions to include following:

.1 Wiring diagrams, control diagrams, and control sequence for each principal system and item of equipment.

.2 Start up, proper adjustment, operating, maintenance, and shutdown procedures.

.3 Safety precautions.

.4 Procedures to be followed in event of equipment or component failure.

.5 Other items of instruction as recommended by manufacturer of the system or equipment.

.3 Print or engrave operating instructions and mount under glass or laminated plastic adjacent to equipment or systems interface.

.4 Arrange and pay for manufacturer's factory service technician to supervise start-up, installation, check, adjust, balance and calibrate components and instruct operating personnel.

.5 Provide these services for such period, and for as many visits as necessary to put equipment in operation, and ensure that operating personnel are conversant with all aspects of its care and operation.

1.4 DESIGN REQUIREMENTS

.1 Operating voltages: to CAN3-C235-83(R2000).

.2 Electric 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 SITE VISIT

.1 Prior to tender submission visit the site and become familiar with the job and all conditions which may affect the overall cost. Ignorance of existing conditions will not be considered as basis for extra claims. Refer to Division 01 - General Requirements for additional information.

1.6 SUBMITTALS

.1 Submit shop drawings and product data in accordance with Division 01 - General Requirements.
- .1 Submit shop drawings for all electrical equipment unless otherwise indicated.
- .2 Submit wiring diagrams and installation details of equipment indicating proposed location, layout and arrangement, control panels, accessories, piping, ductwork, and other items that must be shown to ensure coordinated installation.
- .3 Identify on wiring diagrams circuit terminals and indicate internal wiring for each item of equipment and interconnection between each item of equipment.
- .4 Indicate on drawings clearances for operation, maintenance, and replacement of operating equipment devices.
- .5 If changes are required, resubmit corrected shop drawings.

.2 Manufacturer's Field Reports: submit to Departmental Representative within 7 days of review, verifying compliance of work and electrical system and instrumentation testing, as described in PART 3 - FIELD QUALITY CONTROL.

.3 Submit WHMIS MSDS information in accordance with Division 01 - General Requirements.

.4 Upon completion of work submit As-Built Drawings, Maintenance Manuals, and Submittals in accordance with Division 01 - General Requirements.

1.7 QUALITY ASSURANCE

.1 Quality Assurance: in accordance with Division 01 - General Requirements.

.2 All electrical work is to be carried out by qualified, licensed electricians or apprentices for the province of Prince Edward Island and the electrical contractor must have a valid contractor license issued by the province of Prince Edward Island.
- .1 Permitted activities: determined based on training level attained and demonstration of ability to perform specific duties.

.3 The Departmental Representative reserves the right to approve the quality of material and workmanship, and to call for any tests which they deem necessary to establish the integrity of the installation during the progress of the work and a complete test of each system at the completion of the work. The cost of such tests are not to be considered as extras.

.4 Health and Safety: in accordance with Division 01 - General Requirements.
- .1 Protect exposed live equipment during construction for personnel safety.
- .2 Shield and mark all live parts “LIVE 120 VOLTS”, or with appropriate voltage in English.
- .3 Arrange for installation of temporary doors for rooms containing electrical distribution equipment. Keep these doors locked except when under direct supervision of an electrician.

.5 Quality Control: in accordance with Division 01 - General Requirements.
- .1 Provide CSA certified equipment and material. Where CSA certified equipment and material is not available, submit such equipment and material to the authority having jurisdiction for approval before delivery to site.
- .2 Submit test results of installed electrical systems and instrumentation.
- .3 Upon completion of work, submit load balance report as described in PART 3 - LOAD BALANCE.
- .4 Submit certificate of acceptance from authority having jurisdiction upon completion of work to Departmental Representative.

1.8 PERMITS, FEES AND INSPECTION

.1 Submit to Electrical Inspection Division and Supply Authority necessary number of drawings and specifications for examination and approval prior to commencement of

work.

.2 Pay all associated fees.

.3 Notify Departmental Representative of changes required by Electrical Inspection Division prior to making changes.

.4 Submit Certificates of Acceptance from Electrical Inspection Division or authorities having jurisdiction on completion of work to Departmental Representative.

1.9 CO-ORDINATION

.1 Co-ordinate all work with work of other divisions to avoid conflict and notify Departmental Representative if any changes are required.

.2 Locate electrical systems, equipment, and materials to provide minimum interference and maximum usable space.

.3 Where interference occurs, the Departmental Representative must approve relocation of equipment and materials regardless of installation order.

.4 Notwithstanding the review of shop drawings, the Electrical Contractor may be required to relocate electrical equipment which interferes with the equipment of other trades, due to lack of co-ordination of the Electrical Contractor with other trades. The cost of this relocation will be the responsibility of the Electrical Contractor and the Departmental Representative will determine the extent of relocation required.

.5 Leave space clear, and install equipment to accommodate future materials and/or equipment as indicated or specified, or to accommodate equipment and/or materials supplied by other Contractors.

.6 Verify that the spaces in which the equipment is to be installed is sufficient and install all equipment to maintain head room and clearances, to conserve space, comply with codes, and to ensure adequate space for future servicing.

.7 The Drawings for the Electrical work are diagrammatic performance Drawings only intended to convey the scope of work and indicate the general arrangement, approximate location of apparatus and fixtures, and the approximate sizes and locations of equipment and outlets. The Drawings do not show Architectural, Mechanical or Structural details.

.8 Do not scale or measure Drawings, but obtain information regarding accurate dimensions, from the dimensions shown on the Architectural Drawings or by site measurements. Follow the Electrical Drawings for laying out the work.

1.10 CUTTING AND PATCHING

.1 Electrical Contractor to inform all other divisions in time, of required electrical openings and/or penetrations. Where this requirement is not met, the cost of all cutting and associated work to provide openings and/or penetrations will be the responsibility of the Electrical Contractor. Obtain written approval of Departmental Representative before drilling through any beams or floors. Keep hole sizes to a minimum and be responsible to repair damage caused by lack of coordination.

1.11 DELIVERY, STORAGE AND HANDLING

.1 Provide Departmental Representative with material delivery schedule within two weeks after award of contract.

.2 Arrange for delivery access and unloading and/or storage areas with General Contractor.

1.12 INSPECTION OF WORK

.1 Periodic visits to the site during construction phase will take place to ascertain reasonable conformity to plans and specifications. The Contractor will be responsible for the execution of their work in conformity with the construction documents, the Contract, and the requirements of the inspection authority.

1.13 SCHEDULING OF WORK

.1 Note that the Owner intends to carry on business as usual and work activities must be coordinated to maintain electrical services in occupied areas. Provide any required temporary work.

.2 Work activities which disrupt occupants of the building, such as excessive noise caused by drilling of walls, floors or ceilings must be approved and scheduled in writing by the Departmental Representative at least 48 hours in advance.

.3 All power shutdowns which affect building occupants or building operation must have prior approval of Owner and must be scheduled in writing at least 48 hours in advance with the Departmental Representative.

.4 Overtime work, and work outside normal work hours deemed necessary to accomplish scheduling are the responsibility of the Contractor and must meet the requirements of the PEI Employment Standards Act. All costs resulting from such overtime work must be included in the Contractor's total tender price.

1.14 FIRE RATING OF PENETRATIONS

.1 Provide fire stopping and smoke seal materials at openings around cabling conduits passing through floors, ceilings and fire rated walls, as required to maintain fire rating equal to the fire rated assembly.

.2 Use ULC or approved equal fire barrier products installed in accordance with manufacturers instructions at each penetration.

2 Products

2.1 PRIOR APPROVAL OF PRODUCTS

.1 The use of any product not listed by name in the specification must be approved by Departmental Representative prior to tender submission.

.2 By using pre-approved product substitutions the Contractor accepts the responsibility and associated costs for all required modifications to circuitry, devices and wiring. The Contractor is to submit shop drawings with deviation from the original design highlighted to the Departmental Representative for review and approval prior to rough-in.

2.2 MATERIALS AND EQUIPMENT

.1 Provide materials and equipment in accordance with Division 01 - General 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 Division prior to delivery and submit such approval as described in Part 1 - Submittals.

2.3 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 indoor electrical equipment enclosures light grey to EEMAC 2Y-1.

2.4 WARNING SIGNS

.1 As specified and to meet requirements of Electrical Inspection Department.

.2 Porcelain enamel decal signs, minimum size 175 x 250 mm.

2.5 WIRING TERMINATIONS

.1 Ensure lugs, terminals, screws used for termination of wiring are suitable for either copper or aluminum conductors.

2.6 EQUIPMENT IDENTIFICATION

.1 All junction and pull boxes are to be marked with an indelible ink marker to designate the circuit number of enclosed wiring, the designated panel name and electrical characteristics. Where boxes are painted in exposed areas, information is to be written on inside of cover.

.2 Identify electrical equipment with nameplates and labels as follows:

.1 Nameplates: Lamicoid 3 mm thick plastic engraving sheet, black face, white core for normal power and red face with white core for emergency power, mechanically attached with self tapping screws.

.2 Sizes as follows:

NAMEPLATE SIZES:

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
Size 6	25 x 100 mm	1 line	12 mm high letters
Size 7	25 x 100 mm	2 line	6 mm high letters

.3 Labels:

.1 Embossed plastic labels with 6 mm high letters unless specified otherwise.

.4 Wording on nameplates and labels to be approved by Departmental Representative prior to manufacture.

.5 Allow for average of twenty-five (25) letters per nameplate and label.

.6 Identification to be English.

.7 Nameplates for pull boxes and junction boxes to indicate system name and voltage characteristics.

.8 Nameplates for disconnects, starters and contactors to indicate equipment being controlled, wire, voltage, phase, number of power source and branch circuit breaker number.

.9 Nameplates for pull boxes, splitters and panelboards to indicate system name, overcurrent protection device rating, voltage, phase, and number of wire, and power source.

.10 Nameplate for transformers to indicate capacity, primary and secondary voltages and transformer number.

2.7 WIRING IDENTIFICATION

.1 Identify wiring with indelible pre-printed self-adhesive vinyl tape, indicating panel and circuit number. Wiring to be identified at both ends and at junction, pull boxes and splices.

.2 Maintain phase sequence and colour coding throughout.

.3 Colour code: to CSA C22.1, Canadian Electrical Code.

2.8 CONDUIT AND CABLE IDENTIFICATION

.1 Colour code conduits, boxes and metallic sheathed cables.

.2 Code with plastic tape at points where conduit or cable enters wall, ceiling, or floor, and at 15 m intervals.

.3 Colours: 25 mm wide prime colour and 20 mm wide auxiliary colour.

SYSTEM	PRIME COLOR
600V/347V power	Orange
208/120V lighting & power	Yellow
Telephone	Black
Data	Blue
Fire Alarm	Red
Access Control/Security	Brown
CATV	Red
Low Voltage	Yellow
P/A & Intercom	Blue

3 Execution

3.1 NAMEPLATES AND LABELS

.1 Ensure manufacturer's nameplates, CSA labels and identification nameplates are visible and legible after equipment is installed.

3.2 LOCATION OF EQUIPMENT

.1 Change location of equipment at no extra cost or credit, providing distance does not exceed 3000 mm, and information is given before installation.

3.3 MOUNTING HEIGHTS

.1 Mounting height of equipment is from finished floor to centreline of equipment unless indicated otherwise.

.2 If mounting height of equipment is not specified or indicated, verify with Departmental Representative before proceeding with installation.

.3 Install electrical equipment at the following heights:

- .1 Local switches: 1200 mm.
- .2 Wall receptacles:
  - .1 General: 400 mm.
  - .2 Above top of continuous baseboard heater: 200 mm.
  - .3 Above top of counters or counter splash backs: 375 mm.
  - .4 In mechanical rooms: 1200 mm.
- .3 Telephone and data outlets: 400 mm.
- .4 Fire alarm manual stations: 1200 mm.
- .5 Fire alarm visual and/or audible signal devices: 2100 mm.
- .6 Wall mounted exit lights: 2100 mm.
- .7 Emergency lighting heads: 2100 mm.
- .8 Luminaires: As indicated on the Drawings.

3.4 CO-ORDINATION OF PROTECTIVE DEVICES

.1 Ensure circuit protective devices such as overcurrent trips, relays and fuses are installed to required values and settings.

3.5 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 will be permitted, under the direct supervision of a qualified licensed electrician.

- .1 Permitted activities are to 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 Code 1

Electrical Contractor License as issued by the Province.

.3 Load Balance:

.1 Measure phase current to panelboard 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.

.4 Conduct and pay for following commissioning, verification and tests in accordance with Division 01 - General Requirements.

.1 Lighting and its control.

.5 Furnish manufacturer’s certificate or letter confirming that entire installation as it pertains to each system has been installed to manufacturer’s instructions.

.6 Insulation resistance testing.

.1 Megger and record circuits, feeders and equipment up to 350 V with a 500 V instrument.

.2 Check resistance to ground before energizing and record value.

.7 Carry out tests in presence of Departmental Representative.

.8 Provide instruments, meters, equipment and personnel required to conduct tests during and conclusion of project.

3.6 CLEANING

.1 Clean and touch up surfaces of shop-painted equipment scratched or marred during shipment or installation, to match original paint.

End of Section

1 General

1.1 DESCRIPTION OF WORK

.1 Work of this Section consists of the complete removal of all obsolete or abandoned electrical equipment including, but not limited to:

.1 Existing obsolete lighting, conduit and wire, and raceway as indicated on the Drawings.

.2 Existing obsolete power, communication, and access control system conduit and wire/cabling as indicated on the Drawings.

.2 All removal or alteration work of electrical construction to be done in accordance with the safety standards outlined in the Canadian Electrical Code.

1.2 RELATED SECTIONS

.1 Section 26 05 00 - Common Work Results - Electrical.

1.3 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for reuse and recycling in accordance with Division 01 - General Requirements.

1.4 SITE SURVEY

.1 Prior to Tender submission, visit the site and survey and quantify the extent of the removals/alterations required for this contract and include for all costs in the total tendered price. Any existing conditions information indicated on the drawings is for general guidance only.

.2 In conjunction with site visit, review all drawings and include all costs due to existing conditions in total tendered price.

1.5 PROTECTION

.1 The Contractor is responsible for any damages to existing structures or systems as a result of the work.

1.6 SALVAGE MATERIAL

.1 Existing equipment and devices designated for reuse are to be removed, stored, cleaned and re-installed as indicated on the drawings.

.2 Identify any damaged equipment or materials intended for reuse prior to demolition and point out deficiencies to the Departmental Representative at that time.

2 Products

2.1 NOT APPLICABLE

.1 Not Applicable.

3 Execution

3.1 GENERAL REMOVALS

.1 Where indicated remove all obsolete or abandoned equipment or electrical services including wire and conduit back to the source.

.2 Coordinate work of this Section with other trades.

.3 Schedule all removal work with the Departmental Representative. Do not disrupt building operations except as permitted by the Schedule.

.4 Any existing conduit, wiring, boxes or equipment that is to remain in service is to be properly supported as required by the CEC. Any additional hangers, straps or fasteners

required are to be supplied under this contract.

.5 Make alterations to existing electrical services as required and make good all circuits affected by the renovations.

.6 Any existing electrical circuits and/or equipment that are interrupted during construction to accommodate alterations but are to remain in service are to be reconnected and circuits made good.

.7 Any relocating of existing equipment and any rerouting of existing wire and conduit to coordinate with new work to be included in total tendered price.

3.2 IDENTIFICATION OF EXISTING CIRCUITS AND EQUIPMENT

.1 All modified circuits in existing panelboards serving renovated areas are to be traced out to identify any devices not labeled on existing directories and to confirm all circuits indicated on directories are accurate. Provide new, updated, typewritten circuit directories in all panelboards modified by the renovations.

.2 Provide identification indicating circuit and panel number at all new and existing wiring devices in renovated area.

.3 Provide equipment nameplates and labels for all new and existing equipment in renovated area.

.4 Equipment identification, wiring identification and conduit and cable identification is to be in accordance with Section 26 05 00 - Common Work Results - Electrical.

3.3 CUTTING

.1 Cutting required for removals and alterations to be to the approval of the Departmental Representative and performed with appropriate power tools.

3.4 CLEANING

.1 Reused existing equipment to be cleaned in accordance with Division 01 - General Requirements.

End of Section

1 General

1.1 REFERENCES

.1 Canadian Standards Association (CSA)

.1 CAN/CSA-C22.2 No.18-98 (R2003), Outlet Boxes, Conduit Boxes, Fittings and Associated Hardware.

.2 CSA C22.2 No.65-93 (R2008), Wire Connectors.

2 Products

2.1 MATERIALS

.1 Crimp style wire connectors, nylon insulated, with current carrying parts of copper alloy for conductors #16 AWG and smaller.

.2 Fork tongue or ring style connectors, nylon insulated crimp style. Terminals for connecting conductors #16 AWG and smaller to screw down terminals.

.3 Pressure type wire connectors to: CSA C22.2 No.65, with current carrying parts of copper sized to fit copper conductors as required. Use twist-on connectors for #14 AWG to #8 AWG conductors.

.4 Fixture type twist-on splicing connectors to: CSA C22.2 No.65, with current carrying parts of copper sized to fit copper conductors #10 AWG or less.

.5 Compression type connectors for connecting #6 AWG conductors and larger, unless indicated otherwise.

3 Execution

3.1 INSTALLATION

.1 Remove insulation carefully from ends of conductors and:

.1 Install mechanical pressure type connectors and tighten screws with appropriate compression tool recommended by manufacturer. Installation is to meet secureness tests in accordance with CSA C22.2 No.65.

.2 Install fixture type connectors and tighten. Replace insulating cap.

.3 Install crimp style connectors with snap-on nylon caps on splices and joints on branch circuits.

.2 All connections are to be made electrically and mechanically secure. Size and type of connector to be in accordance with Manufacturers recommendations for each wire size and combination of wires.

3.2 RESTRICTIONS

.1 Circuit splices are NOT permitted in equipment enclosures or electrical panelboards.

End of Section

1 General

1.1 RELATED SECTIONS

.1 Section 26 05 00 - Common Work Results - Electrical.
.2 Section 26 05 20 - Wire and Box Connectors (0-1000V).
.3 Section 26 05 29 - Hangers and Supports for Electrical Systems.
.4 Section 26 05 34 - Conduits, Conduit Fastenings and Conduit Fittings.
.5 Section 26 50 00 - Lighting.

1.2 REFERENCES

.1 Canadian Standards Association (CSA)
  .1 CSA C22.2 No. 03-96, Test Methods for Electrical Wires and Cables.
  .2 CSA C22.2 No. 51, Armoured Cables.

2 Products

2.1 BUILDING WIRES

.1 Conductors: stranded for #8 AWG and larger, solid for #10 AWG and smaller.
.2 Minimum size to be #12 AWG for lighting and power, #14 AWG for controls, #16 AWG for low voltage and lighting relay/controls.
.3 Conductors to be sized as indicated, with 600 V insulation of cross-linked thermosetting polyethylene material rated RW90 XLPE.
.4 Single conductor metal sheathed cables are not permitted .
.5 Conductor sizes on drawings are based on copper conductors.
.6 Conductor insulation shall be colour coded as follows:

.1	Phase A	-	Red
.2	Phase B	-	Black
.3	Phase C	-	Blue
.4	Neutral	-	White
.5	Ground	-	Green
.6	Isolated Power	-	as indicated herinafter.

  .7 Where extra colours are required for three-way switches, etc., they shall be yellow.

2.2 ARMOURED CABLES

.1 Conductors: insulated, copper, size as indicated.
.2 Type: AC90.
.3 Armour: interlocking type fabricated from aluminum strip.
.4 Connectors: standard as required, complete with double split rings in accordance with Section 26 05 20 - Wire and Box Connectors (0 - 1000 V).
.5 Anti-short.

2.3 CONTROL CABLES

.1 Type LVT: 2 soft annealed copper conductors, sized as indicated, with thermoplastic insulation, outer covering of thermoplastic jacket.
.2 Low energy 300 V control cable: stranded annealed copper conductors sized as indicated, with PVC insulation type TW -40°C polyethylene insulation with shielding of tape coated with paramagnetic material wire braid over each conductor and overall covering of PVC jacket.

3 Execution

3.1 WIRING METHODS

.1 All work to be concealed in finished areas where possible, wire in white painted conduit where exposed in finished areas.

.2 All work in or through fire rated or acoustic structures to be in accordance with Section 26 05 00 - Common Work Results - Electrical.

.3 Branch circuit work:

- .1 Concealed work in wall partitions: building wire in conduit or armoured cable.
- .2 Horizontal work above accessible ceilings: building wire in conduit or armoured cable.
- .3 Surface work in unfinished areas: building wire in conduit.
- .4 Armoured cable may be used where permitted by the CEC for drops to new equipment in existing gypsum board walls and ceilings.

.4 Drops to light fixtures to be building wire in flexible conduit or armoured cable, maximum length 1.5 m.

.5 Branch circuit wiring to be sized for a maximum voltage drop of 3% in accordance with the CEC.

3.2 GENERAL CABLE INSTALLATION

.1 Support cables in accordance with Section 26 05 29 - Hangers and Supports for Electrical Systems.

.2 Terminate cables in accordance with Section 26 05 20 - Wire and Box Connectors (0-1000 V).

.3 Cable Colour Coding: to Section 26 05 00 - Common Work Results - Electrical.

.4 Conductor length for parallel feeders to be identical.

.5 Lace or clip groups of feeder cables at distribution centres, pull boxes, and termination points.

.6 Wiring in walls: typically drop or loop vertically from above to better facilitate future renovations. Generally wiring from below and horizontal wiring in walls to be avoided unless indicated.

.7 Provide numbered wire collars for control wiring. Numbers to correspond to control shop drawing legend. Obtain wiring diagram for control wiring.

3.3 INSTALLATION OF BUILDING WIRES

.1 Install wiring as follows:

- .1 In conduit systems in accordance with Section 26 05 34 - Conduits, Conduit Fastenings and Conduit Fittings.
- .2 In cable troughs in accordance with Section 26 05 36 - Cable Trays for Electrical Systems.

3.4 INSTALLATION OF ARMOURED CABLES

.1 Group cables wherever possible.

.2 Use permitted only for work in movable partitions and vertical power supply drops to lighting fixtures.

.3 Install anti-shorts as required.

.4 Terminate cables in accordance with Section 26 05 20 - Wire and Box Connectors (0 - 1000 V).

3.5 INSTALLATION OF CONTROL CABLES

.1 Install control cables in conduit as indicated.

.2 Ground control cable shield.

.3 Terminate cables in accordance with Section 26 05 20 - Wire and Box Connectors (0 - 1000 V).

3.6 RESTRICTIONS

.1 Splices in wire and cable #6 AWG and larger is not permitted.

.2 Flexible conduit or armoured cable drops to luminaires are to be installed from junction box to luminaires, loops between luminaires is not permitted.

.3 Wiring and cabling installed directly accessible in ceiling cavities is to be installed parallel and/or perpendicular to building lines. When possible, wiring and cabling is to follow a common pathway.

3.7 FIELD QUALITY CONTROL

.1 Perform tests in accordance with Section 26 05 00 - Common Work Results - Electrical.

.2 Perform tests using method appropriate to site conditions and to approval of Departmental Representative and local authority having jurisdiction over installation.

.3 Perform tests before energizing electrical system.

End of Section

1 General

1.1 RELATED SECTIONS

.1 Section 26 05 00 - Common Work Results - Electrical.

1.2 REFERENCES

.1 Canadian Standards Association (CSA)

.1 CSA C22.2 No. 18.4-04 (R2009), Hardware for the support of Conduit, Tubing, and Cable (Bi-National Standard with UL 2239).

2 Products

2.1 SUPPORT CHANNELS

.1 U shape, size 41 x 41 mm, 2.5 mm thick, surface mounted suspended or set in poured concrete walls and ceilings as required.

2.2 SPECIFIC PURPOSE SUPPORTS

.1 Specific purpose heat treated, spring steel fasteners to support boxes, conduit and cable from main structure, channels, and metal studs.

3 Execution

3.1 INSTALLATION

.1 Secure equipment to hollow or solid 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 bar type box hangers. Ensure that box hangers 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.

.6 Fasten exposed conduit or cables to building construction or support system using straps.

.1 One-hole steel 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.

.4 Strap AC90 at box location and at every 900 mm.

.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 Install fastenings and supports as required for each type of equipment cables and conduits, and in accordance with manufacturer's installation recommendations.

.12 Electrical boxes concealed in hollow gypsum board walls to be supported by specific

purpose brackets or clips designed for stud wall construction.

3.2 RESTRICTIONS

.1 Do not use wire lashing, wood blocking, nylon or plastic strap ('Ty-Wraps') to support or secure raceways or cables.

.2 Do not use supports or equipment installed for other trades for conduit or cable support except with permission of other trade and approval of Departmental Representative.

End of Section

1 General

1.1 RELATED SECTIONS

.1 Section 26 05 00 – Common Work Results – Electrical.

.2 Section 26 05 29 – Hangers and Supports for Electrical Systems.

.3 Section 26 05 34 - Conduits, Conduit Fastenings and Conduit Fittings.

1.2 REFERENCES

.1 Canadian Standards Association (CSA)

.1 CSA C22.2 No. 18-98 (R2003), Outlet Boxes, Conduit Boxes, and Fittings and Associated Hardware, a National Standard of Canada.

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.

.3 Gang boxes where wiring devices are grouped.

.4 Blank cover plates for boxes without wiring devices.

.5 Combination boxes with steel barriers where outlets for more than one system are grouped.

2.2 GALVANIZED 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 Electro-galvanized steel utility boxes for outlets connected to surface-mounted EMT conduit, minimum size 102 x 54 x 48 mm.

.1 Screw-on, turned edge covers for surface mounted boxes.

.3 102 mm square outlet boxes with extension and plaster rings for flush mounting devices in finished plaster walls.

.4 102 mm square or octagonal outlet boxes for luminaires.

2.3 FLOOR BOXES

.1 Not Applicable.

2.4 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.

.5 Double split rings for AC90 terminations.

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 and armoured cable connections. Reducing washers are not allowed.

.5 Vacuum clean interior of outlet boxes before installation of wiring devices.

.6 Identify systems for outlet boxes in accordance with Section 26 05 00 - Common Work Results - Electrical.

.7 Outlet boxes and conduit boxes to be flush mounted in new construction. Outlet and conduit boxes in existing construction to be flush mounted except in existing masonry filled block walls.

.8 Install vapour barrier boxes around all device boxes installed in exterior walls and structures.

End of Section

1 General

1.1 REFERENCES

.1 Canadian Standards Association (CSA)

.1 CSA C22.2 No. 56-04, Flexible Metal Conduit and Liquid-Tight Flexible Metal Conduit.

.2 CSA C22.2 No. 83-M1985 (R2003), Electrical Metallic Tubing.

.3 CSA C22.2 No. 18.3-12, Conduit, Tubing, and Cable Fittings (Tri-National Standard with ANCE NMX-J-017 & UL 514B).

1.2 SUBMITTALS

.1 Provide shop drawings and product data in accordance with Division 01 - General Requirements.

1.3 LOCATION OF CONDUITS

.1 Drawings do not show all conduits. Those shown are in diagramatic form only.

2 Products

2.1 CONDUITS

.1 Electrical metallic tubing (EMT): to CSA C22.2 No. 83, with steel set-screw couplings and connectors.

.1 Exposed conduit to be painted in finished areas to match adjacent finished surfaces where indicated.

.2 Flexible metal conduit: to CSA C22.2 No. 56, aluminum flexible metal.

2.2 CONDUIT FASTENINGS

.1 One hole steel 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 spaced every 1.5 m on center.

.4 Threaded rods, 6 mm dia., to support suspended channels.

2.3 CONDUIT FITTINGS

.1 Fittings: To CAN/CSA C22.2 No. 18.3, manufactured for use with conduit specified. Coating: same as conduit.

.2 Factory "ells" where 90° bends are required for 25 mm and larger conduits, unless indicated otherwise.

.3 Ensure conduit bends other than factory “ells” are made with an approved bender. Making offsets and other bends by cutting and rejoining 90 degree bends is not permitted.

.4 Connectors and couplings for EMT. Steel set-screw type, size as required.

2.4 FISH CORD

.1 Polypropylene.

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 INSTALLATION

.1 Install all conduit, conduit fittings and accessories in accordance with the latest edition of the Canadian Electrical Code in a manner that does not alter, change or violate any part of the installed system components or the certification of the components.

.2 Install conduits to conserve headroom in exposed locations and cause minimum interference in spaces through which they pass.

.3 Conceal conduits except in mechanical and electrical service rooms and in unfinished areas.

.4 Surface mount conduits except in finished areas or as indicated.

.5 Use electrical metallic tubing (EMT) except in cast concrete and above 2.4 m not subject to mechanical injury, as well as concealed work in masonry construction.

.6 Use flexible metal conduit for connection to motors in dry areas connection to recessed incandescent fixtures without a prewired outlet box connection to surface or recessed fluorescent fixtures work in movable metal partitions.

.7 Use AC-90 for vertical power supply drops to light fixtures.

.8 Minimum conduit size for lighting and power circuits: 19 mm. 12 mm conduit is acceptable for switch leg drops only where one two-wire circuit and ground is required.

.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 Install fish cord in empty conduits.

.12 Remove and replace blocked conduit sections. Do not use liquids to clean out conduits.

.13 Dry conduits out before installing wire.

3.3 SURFACE CONDUITS

.1 Run parallel or perpendicular to building lines.

.2 Run conduits in flanged portion of structural steel.

.3 Group conduits wherever possible on suspended channels.

.4 Do not pass conduits through structural members except as indicated.

.5 Do not locate conduits less than 75 mm parallel to steam or hot water lines with minimum of 25 mm at crossovers.

3.4 CONCEALED CONDUITS

.1 Run parallel or perpendicular to building lines.

3.5 CLEANING

.1 On completion and verification of performance of installation, remove surplus materials, excess materials rubbish, tools and equipment.

End of Section

1 General

1.1 RELATED SECTIONS

.1 Section 01 33 00 - Submittal Procedures.

.2 Section 01 91 13 – General Commissioning (Cx) Requirements.

.3 Section 26 05 00 – Common Work Results - Electrical.

1.2 REFERENCES

.1 Canadian Standards Association (CSA)

.1 CSA-C22.2 No.42, General Use Receptacles, Attachment Plugs and Similar Devices.

.2 CSA-C22.2 No.42.1, Cover Plates for Flush-Mounted Wiring Devices (Bi-national standard, with UL 514D).

.3 CSA-C22.2 No.111, General-Use Snap Switches (Bi-national standard, with UL 20, twelfth edition).

1.3 SUBMITTALS

.1 Submit shop drawings and product data in accordance with Division 01 - General Requirements.

2 Products

2.1 SWITCHES

.1 Not Applicable.

2.2 RECEPTACLES

.1 Duplex receptacles, CSA type as indicated, U ground, to: CSA-C22.2 No.42 with following features:

.1 White thermoplastic moulded housing.

.2 Suitable for # 10 AWG conductor 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.

.6 Specification grade.

.7 Acceptable manufacturer or approved equal:

.1 Decora Duplex, CSA 5-15R:

.1 Cooper #6252W.

.2 Hubbell #DR15WHI.

.3 Leviton #DR15-WH.

.4 Pass & Seymour #PT26252W.

.2 Receptacles of one manufacturer throughout project.

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 Nylon white cover plates as indicated, thickness 2.5 mm for wiring devices mounted in flush-mounted outlet box.

.4 All wiring device cover plates to be labeled using white background, self adhesive vinyl strips with black type lettering identifying panel and circuit number for each device.

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 switches at height in accordance with Section 26 05 00 - Common Work Results - Electrical.

.2 Receptacles:

- .1 Install receptacles in gang type outlet box when more than one receptacle is required in one location.
- .2 Mount receptacles at height in accordance with Section 26 05 00 - Common Work Results - Electrical.
- .3 Do not use back entrances for connecting wiring devices to circuits. Wrap conductors around screw terminals and tighten. Tighten all unused screw terminals.

.3 Cover plates:

- .1 Protect 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.
- .4 Do not install outlet boxes back-to-back in wall; allow 150 mm horizontal clearance between boxes.

End of Section

1 General

1.1 REFERENCE STANDARDS

.1 CSA C22.2 No. 9-1968 – General Requirements for Luminaires.
.2 CSA C22.2 No. 84 - Incandescent lamps.
.3 CSA C22.2 No. 84-1974 - Tungsten halogen lamps.
.4 ANSI C78 series - Fluorescent lamps.
.5 CSA C22.2 No. 74 – Ballasts. Equipment for use with Electric Discharge Lamps.
.6 CSA C22.2 No. 8 - Radio interference suppressor. Electromagnetic Interference (EMI) Fitters.

1.2 RELATED WORK

.1 Section 26 05 00 - Common Work Results - Electrical.

1.3 SHOP DRAWINGS AND PRODUCT DATA

.1 Not Applicable

1.4 OPERATION AND MAINTENANCE DATA

.1 Not Applicable

1.5 GUARANTEE

.1 Not Applicable

2 Products

2.1 LUMINARY DETAILS

.1 Provide fixtures as indicated.
.2 Provide supporting devices, surface mounted junction boxes and outlet boxes where required.

2.2 LAMPS

.1 On completion of the project, provide a full set of best quality lamps for all lighting fixtures. Lamps shall be new and of a type suitable for the fixtures in which they are installed.
.2 Generally fluorescent lamps shall be TCLP compliant to a level of 0.1mg/liter for mercury, T8, 28 watt, mean lumen of 2700, CRI of at least 80, 3500K and 20,000 average life hours. (GE F28T8/SP35/ECO). T5HO, 54 watt, mean lumen of 5,000, CRI of at least 80, 3500K and 30,000 hour average life @ 3hr/start (GE F54T5/XL/835).
.3 Compact Fluorescent lamps shall be triple tube, 26 and 32 watt, mean lumen of 1400 and 1800, CRI of 82, 3500K and 12,000 average life hours. (GE 26TBX/SPX35 and GE F32TBX/835).
.4 Provide spare lamps in the quantity of:
  .1 T-8, 28 watt and T5HO, 54 watt fluorescent lamps, 12 or 5% which ever is greater.
  .2 All other lamps, 2.

2.3 LAMP MANUFACTURERS

.1 Standard of Acceptance: GE
.2 Other approved manufacturers: OSRAM or Phillips.

2.4 BALLASTS AND ACCESSORIES

.1 Fluorescent ballasts unless otherwise indicated shall be supplied with voltages matching the supply voltage indicated in the Fixture Schedule, and output current and voltage ratings of the lamp or lamps they are designed to operate. All ballasts shall be electronic type ballasts high power factor (99%+) instant starting type, less than 20% harmonics. All ballasts shall meet the requirements of the Certified Ballast Manufacturing Association.

.1 Standard of Acceptance: Universal.

.2 Compact fluorescent downlight fixtures indicated on drawings to be ballast for control of triple-tube compact fluorescent lamps. For operation on 347 volt.

.1 Standard of Acceptance: Universal; C242/347

2.5 LUMINAIRE SUPPORTS

.1 Provide supports for suspended fixtures as recommended by manufacturer.

2.6 ACCEPTABLE MANUFACTURERS

.1 Equivalents acceptable as hereafter specified.

.2 Approved equals shall be submitted to Departmental Representative prior to tender closing to be reviewed as an equivalent to that specified.

3 Execution

3.1 INSTALLATION

.1 This work shall include the supplying and installation and connection of all lighting units and allied equipment as specified hereinafter and on the drawings as well as the receiving, storing and testing of same.

.2 Locate fixtures as indicated.

.3 Catalogue references numbers given for individual fixtures may not necessarily be correct but are intended as a guide when read with the description and may not agree with the type of fixture finally supplied; therefore the catalogue reference shall be verified with the description and coordinated with the installation conditions with particular regard to ceiling construction details, type and finish before ordering the fixtures.

.4 Recessed fixtures shall have trim and frame details to match the ceiling suspension system and the Electrical Contractor shall co-ordinate with ceiling contractor.

3.2 WIRING

.1 Connect fixtures to lighting circuits as indicated.

3.3 LAMPS

.1 Adjust lamp light to center position to produce optimum beam distribution for fixtures.

3.4 FIXTURE ALIGNMENT

.1 Align fixtures mounted in continuous rows to form straight uninterrupted line.

.2 Align luminaries mounted individually parallel or perpendicular to building grid lines.

3.5 FIXTURE SUPPORTS

.1 Provide luminare supports required to mount fixtures as specified.

.2 Hang all light fixtures in such a manner that their attachment to the ceiling shall be secure in all respects.

.3 Fixtures shall not be hung directly from suspended gypsum board ceilings, but shall derive their support from channels independently mounted in the ceiling space.

.4 Generally wire hangers shall be used to adequately secure and support the fixtures; these shall be provided and installed under work of this Contract.

3.6 DEFECTED OR DAMAGED FIXTURES

.1 Check fixtures and replace all defective lamps, ballasts and accessories on any fixtures that have been damaged or scratched during construction.

.2 Replace lamps that have burned out as per paragraph 1.5 of this section.

3.7 TESTS

.1 Perform tests in accordance with Section 26 05 00 - Common Work Results - Electrical.

3.8 BUILDING TAKEOVER

.1 All fixtures shall be operable, undamaged, and as specified at the time of building takeover.

.2 All lamps shall be new and burning at the time of takeover. All fixtures shall be clean and like new condition, at the time of takeover.

End of Section

1 General

1.1 RELATED SECTIONS

.1 Section 26 05 00 - Common Work Results - Electrical.

.2 Section 26 05 32 - Outlet Boxes, Conduit Boxes and Fittings.

.3 Section 26 05 34 - Conduits, Conduit Fastenings and Conduit Fittings.

1.2 SYSTEM DESCRIPTION

.1 Telecommunications pathway system consists of outlet boxes, conduits, pull boxes, and J-hooks. Use existing telecommunications pathways for new cabling where possible

1.3 SUBMITTALS

.1 Submit shop drawings and product data in accordance with Division 01 - General Requirements.

2 Products

2.1 MATERIAL

.1 Conduits: type, in accordance with Section 26 05 34 - Conduits, Conduit Fastenings and Conduit Fittings.

.2 Outlet boxes: 100 mm square with single device cover and fittings: in accordance with Section 26 05 32 – Outlet Boxes, Conduit Boxes and Fittings.

.3 J-hook support clips: Caddy “CableCat Clip” or approved equal.

.4 Velcro cable ties: Panduit #HLS-15RO or approved equal.

3 Execution

3.1 INSTALLATION

.1 Install raceway system, including outlet boxes, conduit, miscellaneous and positioning material to constitute complete system.

.2 Ensure all data/ telephone system conduits are properly grounded. Where required, install ground bushings and a #14 AWG bare bonding conductor to closest grounded raceway or junction box.

.3 Dress cabling using Velcro cable ties. The use of nylon or plastic ties is not permitted.

End of Section

1 General

1.1 RELATED SECTIONS

.1 Not applicable.

1.2 REFERENCES

.1 Canadian Standards Association (CSA International)

- .1 ANSI S1.4-1983(R2004), American National Standard Specification for Sound Level Meters.
- .2 ANSI S1.11-1986(R2004)/ASA 65, American National Standard Specification for Octave-Band and Fractional-Octave-Band Analog and Digital Filters.
- .3 CSA C22.1-12, Canadian Electrical Code, Part 1 (22ndEdition), Safety Standard for Electrical Installations.

.2 American Society for Testing and Materials (ASTM):

- .1 ASTM E1041- 85 Standard Guide for Measurement of Masking Sound in Open Offices.
- .2 ASTM E1573-09 Standard Test Method for Evaluating Masking Sound in Open Offices, Using A-Weighted and One-Third Octave Band Sound Pressure Levels.
- .3 ASTM E1130-08 Standard Test Method for Objective Measurement of Speech Privacy in Open Plan Spaces Using Articulation Method.
- .4 ASTM E 1374-02 Standard Guide for Open Office Acoustics and Applicable ASTM Standards

.3 International Electro-technical Vocabulary (IEC):

- .1 IEC 651, Live Working.

1.3 DEFINITIONS

.1 Electrical and electronic terms: unless otherwise specified or indicated, terms used in these specifications, and on drawings, are those defined by IEZEE SP1122.

1.4 DESCRIPTION OF A DIGITAL WIRELESS SINGLE ZONE MASKING SYSTEM

.1 An electronic, frequency contoured sound masking system which includes the following:

- .1 Strategically located speaker assemblies installed above conventional suspended acoustic tile ceiling in areas indicated.
- .2 Speaker assemblies generating unique, diffuse and unobtrusive sound with spatial and temporal uniformity, and having a spectrum shape designed to mask speech and low level unwanted noise.
- .3 System Components Must Include: The Vibra–Sonic, Digital Sound Masking System is based on the DSP 110 Processor. It is a self contained single-zone digital DSP-GUI controlled processor with Digital Class D Amplifiers, Third Octave 31 Band Equalizers, and Power, all onboard.
- .4 Processor must be housed in a 4.5”w x 1”h (11.5 cm x 2.75 cm) speaker or wall mountable chassis that is black powder coat CRS cold roll steel.
- .5 Must include an 11” (28 cm) bracket for speaker or wall mounting.
- .6 The system shall be (1) programmable channel and serve a single Zone up to 15 speakers.
- .7 Each DSP110 must have one 1/3 octave band equalizer allowing the development of 1 sound masking spectrum.

1.5 PERFORMANCE REQUIREMENTS

.1 Provide sound masking in accordance with the system description to all areas indicated on drawings and/or schedule. Sound level performance shall comply with the following one-third octave sound pressure levels and tolerances:

1/3 Octave ISO Centre Frequency (Hz)	1/3 Octave Band Sound Pressure Levels (dB)	Tolerances (± dB)
125	44	± 3
160	43	± 3
200	42	+2-3
250	41	+1-2
315	40	± 1
400	39	± 1
500	37.5	± 1
630	36	± 1
800	34.5	± 1
1,000	33	± 1
1,250	31.5	± 1
1,600	30	± 1
2,000	28	± 1
2,500	26	± 1
3,150	24	± 1
4,000	22	± 1
5,000	20	± 1
6,300	17	+1-2
8,000	14	+1-2

.2 Spatial Average Overall Sound Pressure Levels: Minimum 43 decibels and maximum 45 decibels, A-weighted (dBA).

1.6 SUBMITTALS

.1 Provide requested items in accordance with Section 013300 –Submittals.

.2 Submit shop drawings indicating proposed quantity and location of all system components and related wiring and accessories

.3 Obtain Departmental Representative's approval for any changes in quantity or location of sound masking units from Departmental Representative reviewed shop drawings.

.4 After completing installation, testing, adjusting and balancing, submit the following:

.1 Project record drawings in the form of the above noted shop drawings, revised as necessary to accurately indicate locations of all system components, as installed.

.2 Copy of all final sound pressure levels readings taken, including accurate description of reading locations and test methods and equipment used.

1.7 QUALITY ASSURANCE

.1 Quality Assurance: in accordance with Section 01 45 00 – Quality Control.

1.8 DELIVERY, STORAGE AND HANDLING

.1 Material Delivery Schedule: provide Departmental Representative with schedule within 2 weeks after award of contract.

1.9 SYSTEM STARTUP

.1 Installer shall make measurements to verify that the installed sound masking system meets specified acoustical performance requirements with Departmental Representative.

.2 Verification by the Departmental Representative will be performed with mechanical systems shut down in area being tested.

1.10 OPERATING INSTRUCTIONS

.1 Testing, tuning, and balancing will be performed after normal working hours of facility users, or as otherwise required by Departmental Representative.

.2 Schedule testing, adjusting, and balancing will be performed after above-ceiling mechanical and electrical work, suspended acoustic tile ceiling, and sound masking system installation are complete.

2 Products

2.1 SPEAKER

.1 Cone: 100-200mm (3.9” – 7.9”), single, Low Q”.

.2 Frequency Response: 125-8000 Hz +/- 4dB on axis.

.3 Sensitivity: 94 dB EIA minimum.

.4 Power Handling: 5 watts EIA minimum.

.5 Resonant Frequency: 99 Hz maximum

.6 Mounting: four screws (studs) to grill cover.

2.2 TRANSFORMERS

.1 Type: 70.7volt

.2 Minimum Primary Power Taps: COM, 0.25, 0.5, 1, 2, 4 watts set with exterior switch.

.3 Mounting: directly to speaker frame.

2.3 SPEAKER ENCLOSURES

.1 Size: 300mm (11.8”) square (round) 100mm (3.9”) deep.

.2 Construction: 0.6mm (1/42”) minimum thickness sheet steel.

.3 Undercoating: factory applied to eliminate resonance.

.4 Mounting: Bracket

2.4 GRILLE COVERS

.1 Construction: one piece, 0.6mm (1/42”) minimum thickness sheet steel.

.2 Perforated speaker opening to suit speaker size.

.3 Four screw clip opening to enclosure.

.4 Colour to be white.

2.5 MICRO PROCESSOR CONTROL

.1 The DSP110 digital processor/amp shall be capable of producing pink noise and 15 watts of amplification.

.2 The DSP is integrated in the self contained unit.

.3 The system shall be monitored and adjusted with a computer connected to the Nano Controller.

.4 Processing capacity: 264 MIPS, 528 MFLOPS sustained operation.

.5 Memory storage is non-volatile RAM (Random Access Memory) for all programs and set up parameters which are stored and recoverable during power outages for up to ten (10) years.

.6 DSP must be capable of control of volume and equalization for one zone.

2.6 POWER SUPPLY

.1 Input voltage: 85 to 264VAC.

.2 Output current: 0 to 1.56A continuous.

.3 Power factor: >.90 at full load.

.4 Overload protection: Shall incorporate current limit to protect from damage

.5 Power mains: I.T.E Power Supply 24V~0.0-.5A UL Listed.

2.7 NOISE GENERATION

.1 1 channel independent, uncorrelated full random non - repeating noise generation with constant energy per octave bandwidth.
.2 Minimum spectrum accuracy: 1 dB from 40-10,000 Hz.
.3 Repetition Rate: repeats every 271 hours.
.4 Mounting: Integrated within Digital Signal Processing.

2.8 EQUALIZER FILTERS

.1 Requirement on the output channel with control over 31 - 1/3 octave.
.2 Integrated within Digital Signal Processing unit.
.3 Equalization: 1/3 octave using ISO standard frequencies from 63-12, 500Hz minimum.
.4 Output: 600 ohms balanced and adjustable.
.5 Filters: adjustable minimum 20 dB adjustment per band.
.6 Level Tolerance: +/- 1 dB from 200-4000 Hz.
.7 Total Harmonic Distortion: less than 0.5% at full rated output.
.8 Equivalent Input Noise: less than –85 dBA from 20-20,000 Hz un- weighted.
.9 Output: transformer isolated.
.10 Front panel security cover.
.11 Mounting: Integrated in self contained unit

2.9 AMPLIFIERS

.1 1 Channel, CLASS D solid state, EIA rated
.2 Audio power handling: continuous for speaker load plus minimum 3 dB margin (single or multi-channel).
.3 Frequency response +/- 0.3 dB 20Hz – 20kHz at 100 Ohm
.4 Total Harmonic Distortion: less than 1% at 1kHz at rated output.
.5 Transformer Output: 25 volts
.6 Manual gain control adjustable to 34 dB
.7 Output Regulation within 2dB, from no load to full load.
.8 Power Supply: self-contained and CSA approved.
.9 Mounting: Integrated self contained unit to be mounted on an M1000 speaker or a wall.
.10 Input impedance: 50K Ohm.
.11 Output impedance: 0.08 Ohm.
.12 Carrier Frequency: 400 kHz.
.13 Constant voltage at 50 W.
.14 +/- 15 VDC and 100 kHz square sine wave
.15 Peak current: 1.2 Amps

2.10 MATERIALS

.1 All plastics shall meet UL94VO flammability rating.
.2 Cold roll steel - 18 AWG - .047” nominal.
.3 Black powder coat paint.
.4 Corrosion resistant.
.5 White silk screen on rear.
.6 Front LCD Lights.
.7 Wireless Antennae.

2.11 ACCEPTABLE MATERIALS

.1 Subject to compliance with requirements, products that may be incorporated into the

Work include:

.1 NanoMaskIt Digital Centralized remote, Single Zone Sound Masking Systems as designed by Vibra-Sonic Control and Materials Handling Inc.
Vancouver - (604) 294-9495 fax - (604) 294-8033
Calgary - (403) 217-3555 fax - (403) 237-5064

3 Execution

3.1 INSTALLATION

.1 Install system components above suspended ceiling in accordance with manufacturer's instructions and in a manner that will permit specified acoustical performance requirements will be met.

.2 Suspend sound masking units with mounting chains securely anchored to underside of structure. Ensure that there is no strain on any electrical wiring. Avoid mounting that could result in generation of vibration noise or distortion.

.3 Mount closed enclosure to radiate sound upward.

.4 Install centralized Single Zone Digital Signal Processors securely mounted to M1000 speaker in plenum.

.5 Ground audio system to building power supply ground.

3.2 NAMEPLATES AND LABELS

.1 Ensure manufacturer’s nameplates, CSA labels and identifications nameplates are visible and legible after equipment is installed

3.3 INSTALLATION, CABLE

.1 Avoid damage to cables. Provide adequate cable strain relief.

.2 Run cables parallel and perpendicular to building lines. Attach wiring to top of structural elements in a non-obstructive fashion. Secure every 2 meters and at changes in direction.

.3 Connect each speaker wire pair to one terminal pair on screw terminal blocks at plenum located NanoMaskIt.

3.4 TESTING, ADJUSTING, AND BALANCING

.1 Test, adjust, and balance system with mechanical system and other noise generating equipment shut down in areas receiving sound masking.

.2 Test, adjust, and balance system until sound spectrum and levels meet specified performance requirements. Adjust settings of installed units, relocate installed units, or add additional units, if and as required.

.3 Upon completion of tests, perform walk-through verification of areas that will be covered by sound masking. Adjust and re-test areas having abnormal characteristics or levels.

3.5 TESTS AND TEST METHODS

.1 Test to determine each zone’s octave band sound pressure levels. Take a series of readings for unit coverage area.

.2 Test to determine spatial average overall sound pressure levels. Take minimum of one reading for each enclosed room covered by sound masking and minimum of one reading per 20 m2(215 ft2) of floor area in all open spaces covered by sound masking.

.3 Position of Measuring Microphone: 1220 mm (48”) above floor and minimum 1000 mm (40”) away from any sound reflecting surface, in locations representative of each area that are sound masked.

3.6 MEASURE SOUND PRESSURE LEVELS USING ONE OF FOLLOWING METHODS

.1 An Equivalent Continuous Sound Level (LEQ) mode for minimum interval of 15 seconds.

.2 IEC 651 'slow' time constant, average reading of the highest and lowest level during 15 second intervals.

3.7 TEST EQUIPMENT

.1 Sound Level Meter: to ANSI S1.4-1983, Type 1 or

.2 Octave Band Filter: to ANSI S1.11, Class II or better.

.3 Accuracy of Acoustic Calibrator: within ±0.3 dB at

End of Section

1 General

1.1 RELATED SECTIONS

.1 Not applicable.

1.2 REFERENCES

.1 Canadian Standards Association (CSA International)

- .1 ANSI S1.4-1983(R2004), American National Standard Specification for Sound Level Meters.
- .2 ANSI S1.11-1986(R2004)/ASA 65, American National Standard Specification for Octave-Band and Fractional-Octave-Band Analog and Digital Filters.
- .3 CSA C22.1-12, Canadian Electrical Code, Part 1 (22nd Edition), Safety Standard for Electrical Installations.

.2 American Society for Testing and Materials (ASTM):

- .1 ASTM E1041- 85 Standard Guide for Measurement of Masking Sound in Open Offices.
- .2 ASTM E1573-09 Standard Test Method for Evaluating Masking Sound in Open Offices, Using A-Weighted and One-Third Octave Band Sound Pressure Levels.
- .3 ASTM E1130-08 Standard Test Method for Objective Measurement of Speech Privacy in Open Plan Spaces Using Articulation Method.
- .4 ASTM E 1374-02 Standard Guide for Open Office Acoustics and Applicable ASTM Standards.

.3 International Electro-technical Vocabulary (IEC):

- .1 IEC 651, Live Working.

1.3 DEFINITIONS

.1 Electrical and electronic terms: unless otherwise specified or indicated, terms used in these specifications, and on drawings, are those defined by IEZEE SP1122.

1.4 DESCRIPTION OF A DIGITAL CENTRALIZED MASKING/PA SYSTEM

.1 An electronic, frequency contoured sound masking system which includes the following:

- .1 Strategically located speaker assemblies installed above conventional suspended acoustic tile ceiling in areas indicated.
- .2 Speaker assemblies generating unique, diffuse and unobtrusive sound with spatial and temporal uniformity, and having a spectrum shape designed to mask speech and low level unwanted noise.
- .3 System Components Must Include: The Vibra–Sonic, Digital Sound Masking System is based on the DSP2210 Digital Signal Processor. It is a self-contained multi-zone digital DSP-GUI controlled processor with Digital Class D Amplifiers, Third Octave 31 Band Equalizers, Power, Public Address Paging and Music Inputs, all onboard.
- .4 Processor must be housed in a 19”w x 3.5”h (48.3 cm x 8.9 cm) - (2 Rack Units high) rack or wall mount chassis that is black powder coat CRS cold roll steel.
- .5 Must include adjustable brackets for 19” (48.3 cm) rack or wall mounting.
- .6 The system shall be (2) independent programmable channels.
- .7 Each channel must have independent equalization allowing separate sound masking spectrums for each zone.

1.5 PERFORMANCE REQUIREMENTS

.1 Provide sound masking in accordance with the system description to all areas indicated on drawings and/or schedule. Sound level performance shall comply with the following one-third octave sound pressure levels and tolerances:

1/3 Octave ISO Centre Frequency (Hz)	1/3 Octave Band Sound Pressure Levels (dB)	Tolerances (± dB)
125	44	± 3
160	43	± 3
200	42	+2-3
250	41	+1-2
315	40	± 1
400	39	± 1
500	37.5	± 1
630	36	± 1
800	34.5	± 1
1,000	33	± 1
1,250	31.5	± 1
1,600	30	± 1
2,000	28	± 1
2,500	26	± 1
3,150	24	± 1
4,000	22	± 1
5,000	20	± 1
6,300	17	+1-2
8,000	14	+1-2

.2 Spatial Average Overall Sound Pressure Levels: Minimum 43 decibels and maximum 45 decibels, A-weighted (dBA).

1.6 SUBMITTALS

.1 Provide requested items in accordance with Section 01 33 00 –Submittals.

.2 Submit shop drawings indicating proposed quantity and location of all system components and related wiring and accessories.

.3 Obtain Departmental Representative approval for any changes in quantity or location of sound masking units from Departmental Representative's reviewed shop drawings.

.4 After completing installation, testing, adjusting and balancing, submit the following:

.1 Project record drawings in the form of the above noted shop drawings, revised as necessary to accurately indicate locations of all system components, as installed.

.2 Copy of all final sound pressure levels readings taken, including accurate description of reading locations and test methods and equipment used.

1.7 QUALITY ASSURANCE

.1 Quality Assurance: in accordance with Section 01 45 00 – Quality Control.

1.8 DELIVERY, STORAGE AND HANDLING

.1 Material Delivery Schedule: provide Departmental Representative with schedule within 2 weeks after award of contract.

1.9 SYSTEM STARTUP

.1 Installer shall make measurements to verify that the installed sound masking system meets specified acoustical performance requirements with Departmental Representative.

.2 Verification by the Departmental Representative will be performed with mechanical systems shut down in area being tested.

1.10 OPERATING INSTRUCTIONS

.1 Testing, tuning, and balancing will be performed after normal working hours of facility users, or as otherwise required by Departmental Representative.

.2 Schedule testing, adjusting, and balancing will be performed after above-ceiling mechanical and electrical work, suspended acoustic tile ceiling, and sound masking system installation are complete.

2 Products

2.1 SPEAKER

.1 Cone: 100-200mm (3.9” – 7.9”), single, Low Q”.

.2 Frequency Response: 125-8000 Hz +/- 4dB on axis.

.3 Sensitivity: 94 dB EIA minimum.

.4 Power Handling: 5 watts EIAminimum.

.5 Resonant Frequency: 99 Hz maximum.

.6 Mounting: four screws (studs) to grill cover.

2.2 TRANSFORMERS

.1 Type: 70.7volt

.2 Minimum Primary Power Taps: COM, 0.25, 0.5, 1, 2, 4 watts set with exterior switch.

.3 Mounting: directly to speaker frame.

2.3 SPEAKER ENCLOSURES

.1 Size: 300mm (11.8”) square (round) 100mm (3.9”) deep.

.2 Construction: 0.6mm (1/42”) minimum thickness sheet steel.

.3 Undercoating: factory applied to eliminate resonance.

.4 Mounting: Bracket

2.4 GRILLE COVERS

.1 Construction: one piece, 0.6mm (1/42”) minimum thickness sheet steel.

.2 Perforated speaker opening to suit speaker size.

.3 Four screw clip opening to enclosure.

.4 Colour to be white.

2.5 MICRO PROCESSOR CONTROL

.1 The DSP2210 digital processor/amp shall be capable of automatic mixing, set-up and administration of all 2 inputs per zone via GUI from a desktop PC or laptop.

.2 The DSP is integrated within the self contained unit.

.3 The system shall be monitored and adjusted with a computer from a centralized control area.

.4 Processing capacity: 264 MIPS, 528 MFLOPS sustained operation.

.5 Memory storage is non-volatile RAM (Random Access Memory) for all programs and set up parameters which are stored and recoverable during power outages for up to ten (10) years.

.6 DSP must be capable of control of volume and equalization of zonal PA and music, if required initially on project or at some future date.

2.6 POWER SUPPLY

.1 Input voltage: 85 to 264VAC

.2 Output current: 0 to 1.56A continuous

.3 Power factor: >.90 at full load

.4 Overload protection: Shall incorporate current limit to protect from damage.
.5 Power mains: IEC 3-pin with ground.
.6 Packaging: Integrated within 1RU metal chassis.

2.7 NOISE GENERATION

.1 2 channel independent, uncorrelated full random non - repeating noise generation with constant energy per octave bandwidth.
.2 Minimum spectrum accuracy: 1 dB from 40-10,000 Hz
.3 Repetition Rate: repeats every 271 hours.
.4 Mounting: Integrated within Digital Signal Processing

2.8 SYSTEM INPUTS

.1 PA: 3-pin phoenix connector at over
2K Ohm Microphone pre-gain: 30-60dB
Frequency: 80Hz – 18kHz
.2 Background Music: RCA terminations at over 10K Ohm
Frequency: 50Hz – 20 kHz
.3 Audio – 2 Channels

2.9 EQUALIZER FILTERS

.1 Requirement on each output channel with control over 31 - 1/3 octave bands on each channel.
.2 Integrated within Digital Signal Processing unit.
.3 Equalization: 1/3 octave using ISO standard frequencies from 63-12,500 Hz minimum.
.4 Output: 600 ohms balanced and adjustable.
.5 Filters: adjustable minimum 20 dB adjustment per band.
.6 Level Tolerance: +/- 1 dB from 200-4000 Hz.
.7 Total Harmonic Distortion: less than 0.5% at full rated output.
.8 Equivalent Input Noise: less than –85 dBA from 20-20,000 Hz unweighted.
.9 Output: transformer isolated.
.10 Front panel security cover.
.11 Mounting: Integrated in self contained unit to be mounted in 1 RU chassis.

2.10 AMPLIFIERS

.1 2 Channel, CLASS D solid state, EIA rated
.2 Audio power handling: continuous for speaker load plus minimum 3 dB margin (single or multi-channel).
.3 Frequency response +/- 0.3 dB 20Hz – 20kHz at 100 Ohm.
.4 Total Harmonic Distortion: less than 1% at 1kHz at rated output.
.5 Transformer Output: 70.7volt line and audio line level.
.6 Automatic and manual gain control adjustable to 34 dB.
.7 Output Regulation within 2dB, from no load to full load.
.8 Power Supply: self-contained and CSA approved.
.9 Mounting: Integrated in self contained unit to be mounted in 1RU chassis.
.10 Input impedance: 50K Ohm.
.11 Output impedance: 0.08 Ohm.
.12 Carrier Frequency: 400kHz.
.13 Constant voltage at 25W
.14 +/- 15VDC and 100kHz square sine wave.
.15 Peak current: 1.2 Amps.

2.11 MATERIALS

.1 All electronic components shall be ROHS and UL recognized.
.2 All plastics shall meet UL94VO flammability rating.
.3 Cold roll steel - 18 AWG - .047” nominal.
.4 Black powder coat paint.
.5 Corrosion resistant.
.6 White silk screen on rear.
.7 Molex front cover.

2.12 SCHEDULER: PROGRAMMABLE TIMER

.1 Adjusts masking volume levels according to a calendar-based, programmed schedule with automatic adjustment of Daylight Savings Time.
.2 Assigns schedules to each specified zone.
.3 Offers a programmed acclimatization process with independent schedules for each timer zone.
.4 Allows for independent timer schedules for each day of the week.

2.13 ACCEPTABLE MATERIALS

.1 Subject to compliance with requirements, products that may be incorporated into the Work include:
  .1 SoundMaskIt Digital Centralized Sound Masking Systems as designed by Vibra-Sonic Control and Materials Handling Inc.
  Vancouver - (604) 294-9495 fax - (604) 294-8033
  Calgary - (403) 217-3555 fax - (403) 237-5064

3 Execution

3.1 INSTALLATION

.1 Install system components above suspended ceiling in accordance with manufacturer's instructions and in a manner that will permit specified acoustical performance requirements will be met.
.2 Suspend sound masking units with mounting brackets/chain securely anchored to underside of structure. Ensure that there is no strain on any electrical wiring. Avoid mounting that could result in generation of vibration noise or distortion.
.3 Mount closed enclosure to radiate sound upward (unless otherwise specified).
.4 Install centralized Digital Signal Processors securely inside equipment cabinet(s) / client’s rack or on to the wall using supplied mounting hardware. Locate equipment cabinet at location directed by the consultant.
.5 Ground audio system to building power supply ground.

3.2 NAMEPLATES AND LABELS

.1 Ensure manufacturer’s nameplates, CSA labels and identifications nameplates are visible and legible after equipment is installed.

3.3 INSTALLATION, CABLE

.1 Avoid damage to cables. Provide adequate cable strain relief.
.2 Run cables parallel and perpendicular to building lines. Attach wiring to top of structural elements in a non-obstructive fashion. Secure every 2 meters and at changes in direction.
.3 Connect each speaker wire pair to one terminal pair on screw terminal blocks at centralized cabinet equipment.

3.4 TESTING, ADJUSTING AND BALANCING

.1 Calibrate the microphone and related test equipment prior to testing.

.2 Test, adjust, and balance system with mechanical system and other noise generating equipment shut down in areas receiving sound masking.

.3 Test, adjust, and balance system until sound spectrum and levels meet specified performance requirements. Adjust settings of installed units, relocate installed units, or add additional units, if and as required.

.4 Upon completion of tests, perform walk-through verification of areas that will be covered by sound masking. Adjust and re-test areas having abnormal characteristics or levels.

3.5 TESTS AND TEST METHODS

.1 Test to determine each zone’s octave band sound pressure levels. Take a series of readings for unit coverage area.

.2 Test to determine spatial average overall sound pressure levels. Take minimum of one reading for each enclosed room covered by sound masking and minimum of one reading per 20 m2 (215 ft2) of floor area in all open spaces covered by sound masking.

.3 Position of Measuring Microphone: 1220 mm (48”) above floor and minimum 1000 mm (40”) away from any sound reflecting surface, in locations representative of each area that are sound masked.

3.6 MEASURE SOUND PRESSURE LEVELS USING ONE OF FOLLOWING METHODS

.1 An Equivalent Continuous Sound Level (LEQ) mode for minimum interval of 15 seconds.

.2 IEC 651 'slow' time constant, average reading of the highest and lowest level during 15 second intervals.

3.7 TEST EQUIPMENT

.1 Sound Level Meter: to ANSI S1.4-1983, Type 1 or better.

.2 Octave Band Filter: to ANSI S1.11, Class II or better.

.3 Accuracy of Acoustic Calibrator: within ±0.3 dB at 25°C.

End of Section