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1 General

1.1 LIST OF DRAWINGS

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End of Section

1 General

1.1 DESCRIPTION OF WORK

.1 Work under this contract consists of:
  .1 Demolition of existing spaces as identified on drawings.
  .2 Construction of new partitions as shown on drawings.
  .3 Reuse and salvage existing fixtures, flooring 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 Joseph A. Ghiz Building, Summerside, 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.
  .3 FCC standards, may be viewed at the Regional Fire Protection Services' office (previously known as the Fire Commissioner of Canada) located at 99 Wyse Road, 8th Floor, Dartmouth, NS, Tel: (902)426-6053.

1.4 DEFINITIONS

.1 Hot Work defined as:
  .1 Welding work.
  .2 Cutting of materials by use of torch or other open flame devices.
  .3 Grinding with equipment which produces sparks.

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.

.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 Proecedures.
.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

.3	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

.16	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 existing as noted on demolition washroom (west) 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 Toilets
  .5 Toilet Seats

.6 Lavatories
.7 Mirrors
.8 WR. Partitions
.9 Toilet Tissue Dispensers
.10 Door Hooks
.11 Paper Towel Dispensers
.12 Soap Dispensers
.13 Sanitary Napkin Dispensers
.14 Garbage Cans
.15 Air Freshener Containers
.16 Hair Dryers
.17 Sprinkler Heads
.18 Ceiling Diffusers
.19 Grab Bars
.20 Towel Bars
.21 Benches
.22 Lockers
.23 Ceiling Tiles
.24 Faucets
.25 Plumbing Brass
.26 Flushers
.27 Floor Drain Covers
.28 Shower Heads
.29 Shower Valves & Trim
.30 Shower Curtain Rods and Hooks
.31 Light Fixtures
.32 Emergency Exit Lights
.33 Motion Sensors
.34 Speakers
.35 Fire Alarm Bell
.36 Thermostats
.37 Face Plates
.38 Electrical Outlets
.39 Switches
.40 Radiators
.41 Data Plates
.42 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 09 30 16 - Quarry Tiling
.2 Section 01 50 00 - Temporary Facilities

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 Finishing of all interior floor slabs, stair treads and landings and in-fill areas.
  .2 Finishing of exterior slabs at entrances, exits and walkways.
  .3 Supply and application of all curing, sealing, hardening compounds.
  .4 Saw-cutting of all saw-cut control joints.
  .5 Filling of saw-cut control joints at interior concrete floor slabs.
  .6 Sandblasting concrete finishes.

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 Pre-Pour Meeting
.1 Attend a pre-pour quality control meeting including all relevant sub-trades to review the quality of exposed concrete finishes, hardener/sealer application, saw cuts, prepared sub-base, under floor services, pour sequence and related issues.
.2 Prior to pouring concrete, provide a 750mm high x 450mm x 450mm sample complete with chamfered corners for the purpose of establishing finish quality of exposed concrete columns, walls and ceilings.
.3 The quality of the finished concrete is to be equal or better than the accepted sample.
.4 Where the quality of finished concrete falls short of accepted sample for exposed concrete, the Contractor must pay all associated costs to achieve quality of exposed concrete as provided by approved sample.

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 Saw cut control joints to CSA-A23.1, 24 hours maximum after placing of concrete. Saw cuts not cut straight will be rejected and concrete replaced.
.3 Use strong solvent to remove chlorinated rubber or existing surface coatings.
.4 Use protective clothing during stripping of chlorinated rubber or existing surface coatings.

3.3 APPLICATION

.1 After floor treatment is dry, seal control joints and joints at junction with vertical surfaces with Joint Filler.
.2 Apply floor treatment in accordance with Sealer manufacturer's written instructions.
.3 Clean over spray. Clean sealant from adjacent surfaces.

3.4 CONCRETE FINISHES

.1 Finish concrete in accordance with CAN3-A23.1.
  .1 Interior floor slabs: 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 Saw cut crack control joints to CAN3-A23.1, to match existing locations and to layouts indicated on drawings.

3.5 PROTECTION

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

End of Section

1 General

1.1 RELATED SECTIONS

.1 Section 04 05 13 - Masonry Mortaring
.2 Section 04 05 19 - Masonry Anchorage and Reinforcing.
.3 Section 05 50 00 - Metal Fabrications.
.4 Section 07 92 00 - Joint Sealants.
.5 Section 01 61 00 - Common Product Requirements.

1.2 REFERENCES

.1 Canadian Standards Association (CSA International).
  .1 CAN/CSA A165 Series-04, Standards on Concrete Masonry Units.
  .2 CAN/CSA A179-04, Mortar and Grout for Unit Masonry.
  .3 CAN/CSA A371-04, Masonry Construction for Buildings.

1.3 SUBMITTALS

.1 Make submittals in accordance with Section 01 33 00 - Submittal Procedures.
.2 Product Data.
  .1 Submit manufacturer's printed product literature, specifications and data sheet in accordance with Section 01 33 00 - Submittal Procedures.
.3 Samples.
  .1 Submit:
    .1 One of each type of masonry unit specified.
    .2 One of each type of masonry accessory specified.
    .3 One of each type of masonry reinforcement, tie and connector proposed for use.
    .4 A minimum of six for testing purposes if requested.
  .2 Submit samples tested to laboratories employing technicians certified/trained in procedures for testing masonry units.
.4 Manufacturer's Instructions.
  .1 Submit manufacturer's installation instructions.

1.4 QUALITY ASSURANCE

.1 Test Reports.
  .1 Certified test reports showing compliance with specified performance characteristics and physical properties.
  .2 Submit laboratory test reports.
  .3 Submit laboratory test reports certifying compliance of masonry units and mortar ingredients with specification requirements.
.2 Certificates:
  .1 Product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

1.5 DELIVERY, STORAGE, AND HANDLING

.1 Deliver, store, handle and protect materials in accordance with Section 01 61 00 - Common Product Requirements.
.2 Deliver materials to job site in dry condition.
.3 Storage and Protection.
  .1 Keep materials dry until use except where wetting of bricks is specified.
  .2 Store under waterproof cover on pallets or plank platforms held off ground by means of plank or timber skids.

1.6 SITE CONDITIONS

.1 Site Environmental Requirements.
.2 Cold weather requirements:
  .1 Supplement Clause 5.15.2 of CSA-A371 with following requirements.
    .1 Maintain temperature of mortar between 5 degrees C and 20 degrees C until batch is used or becomes stable.
    .2 Maintain ambient temperature between 5 degrees C and 20 degrees C and protect site from wind chill.
.3 Hot weather requirements.
  .1 Protect freshly laid masonry from drying too rapidly, by means of waterproof, non-staining coverings.
  .2 Keep masonry dry using waterproof, non-staining coverings that extend over walls and down sides sufficient to protect walls from wind driven rain, until masonry work is completed and protected by flashings or other permanent construction.

2 Products

2.1 MATERIALS

.1 Masonry materials are specified in Related Sections.

3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 PREPARATION

.1 Provide temporary bracing of masonry work during and after erection until permanent lateral support is in place.

3.3 INSTALLATION

.1 Do masonry work in accordance with CSA-A371 except where specified otherwise.
.2 Build masonry plumb, level, and true to line, with vertical joints in alignment.
.3 Layout coursing and bond to achieve correct coursing heights, and continuity of bond above and below openings, with minimum of cutting.

3.4 CONSTRUCTION

.1 Exposed masonry.
  .1 Remove chipped, cracked, and otherwise damaged units, in exposed masonry and replace with undamaged units in accordance with CSA A-165, Clause 82.
.2 Jointing.
  .1 Allow joints to set just enough to remove excess water, then tool with round jointer to provide smooth, joints true to line, compressed, uniformly concave joints where concave joints are indicated.
  .2 Allow joints to set just enough to remove excess water, then rake joints uniformly to 6 mm depth and compress with square tool to provide smooth, compressed, raked joints of uniform depth where raked joints are indicated.
  .3 Strike flush joints concealed in walls and joints in walls to receive plaster, tile, insulation, or other applied material except paint or similar thin finish coating.

.3 Cutting.
- .1 Cut out for electrical switches, outlet boxes, and other recessed or built-in objects.
- .2 Make cuts straight, clean, and free from uneven edges.

.4 Building-In.
- .1 Build in items required to be built into masonry.
- .2 Prevent displacement of built-in items during construction. Check plumb, location and alignment frequently, as work progresses.
- .3 Brace door and windows jambs to maintain plumb. Fill spaces between jambs and masonry with mortar.

.5 Wetting of bricks.
- .1 Except in cold weather, wet bricks having an initial rate of absorption exceeding 1 g/minute/1000 mm2: wet to uniform degree of saturation, 3 to 24 hours before laying, and do not lay until surface dry.
- .2 Wet tops of brick walls qualifying for wetting, when recommencing work on such walls.

.6 Support of loads.
- .1 Use 20 MPa concrete where concrete fill is used in lieu of solid units.
- .2 Use grout to CSA A179 where grout is used in lieu of solid units.
- .3 Install building paper below voids to be filled with concrete; keep paper 25 mm back from faces of units.

.7 Provision for movement.
- .1 Leave 3 mm space below shelf angles.
- .2 Leave 40 mm space between top of non-load bearing walls and partitions and structural elements. Do not use wedges.
- .3 Built masonry to tie in with stabilizers, with provision for vertical movement.

.8 Loose steel lintels.
- .1 Install loose steel lintels. Centre over opening width.

.9 Control joints.
- .1 Construct continuous control joints as indicated.

.10 Expansion joints.
- .1 Build-in continuous expansion joints as indicated.

.11 Interface with other work.
- .1 Cut openings in existing work as indicated.
- .2 Openings in walls: approved by Consultant.
- .3 Make good existing work. Use materials to match existing.

3.5 LATERAL SUPPORT

.1 Install all interior masonry lateral support angles supplied under the work of this contract.

3.6 SITE TOLERANCES

.1 Tolerances in notes to Clause 5.3 of CSA-A371 apply.

3.7 FIELD QUALITY CONTROL

.1 Damaged masonry and/or masonry not meeting the quality established by the accepted mock up WILL be removed at Contractor's expense.

3.8 CLEANING

.1 Perform cleaning after installation to remove construction and accumulated environmental dirt.
.2 Upon completion of installation, remove surplus materials, rubbish, tools and equipment barriers.

3.9 PROTECTION

.1 Protect masonry and other work from marking and other damage. Protect completed work from mortar droppings. Use non-staining coverings.

End of Section

1 General

1.1 RELATED SECTIONS

.1 Section 01 33 00 - Submittal Procedures.
.2 Section 04 05 00 - Common Work Results for Masonry.
.3 Section 04 22 00 - Concrete Unit Masonry.

1.2 REFERENCES

.1 Canadian Standards Association (CSA International).
  .1 CAN/CSA A179-04, Mortar and Grout for Unit Masonry.

1.3 SUBMITTALS

.1 Product Data.
  .1 Submit manufacturer's printed product literature, specifications and data sheet in accordance with Section 01 33 00 - Submittal Procedures.
  .2 Submit two copies of WHMIS MSDS - Material Safety Data Sheets in accordance with Section 01 33 00 - Submittal Procedures. Indicate VOC's mortar, grout, parging, color additives and admixtures.
.2 Samples.
  .1 Submit samples in accordance with Section 01 33 00 - Submittal Procedures.
  .2 Submit two samples of mortar.
.3 Manufacturer's Instructions.
  .1 Submit manufacturer's installation instructions.

1.4 QUALITY ASSURANCE

.1 Test Reports: certified test reports showing compliance with specified performance characteristics and physical properties.
  .1 Submit laboratory test reports.
.2 Certificates: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

1.5 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.

2 Products

2.1 MATERIALS

.1 Use same brands of materials and source of aggregate for entire project.
.2 Mortar and grout: CSA A179.
.3 Use aggregate passing 1.18 mm sieve where 6 mm thick joints are indicated.
.4 Color: ground colored natural aggregates or metallic oxide pigments.
.5 Mortar for exterior masonry above grade:
  .1 Load bearing: type S based on property specifications.
  .2 Non-Load bearing: type N based on property specifications.

.3 Parapet walls, chimneys, unprotected walls: type N based on property specifications.
.4 Glass block: type S
.5 All other applications: type N

.6 Mortar for foundation walls, manholes, sewers, pavements, walks, patios and other exterior masonry at or below grade: type M based on property specifications.

.7 Mortar for interior masonry.
.1 Load bearing: type N based on property specifications.
.2 Non-Load bearing: type N based on property specifications.

.8 Following applies regardless of mortar types and uses specified above:
.1 Mortar for calcium silicate brick and concrete brick: type O based on Proportion specifications.
.2 Mortar for stonework: type N based on proportion specifications.
.3 Mortar for grouted reinforced masonry: type S based on property specifications.
.4 Mortar for glass block: 1 part Portland cement, 1 part hydrated lime, 4 parts aggregate by volume.

.9 White mortar: use white Portland cement, and lime to produce mortar type specified.

.10 Colored mortar: use coloring admixture not exceeding 10% of cement content by mass, or integrally colored masonry cement, to produce colored mortar to match approved sample.

.11 Non-Staining mortar: use non-staining masonry cement for cementitious portion of specified mortar type.

.12 Grout: to CSA A179, Table 3, minimum 25MPa.

2.2 MIXES

.1 Color and mix grout to semi-fluid consistency.

.2 Colored mortars: incorporate color into mixes in accordance with manufacturer's instructions.
.1 Use clean mixer for colored mortar.

3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 CONSTRUCTION

.1 Do masonry mortar and grout work in accordance with CSA A179 except where specified otherwise.

.2 All glass block in accordance with manufacturers recommendations and/or instructions.

.3 Grout the following masonry components:
.1 All cores of block for full height of vertical reinforcement.
.2 All cores of block for full height of dowels.
.3 All lintel blocks and continuous bond beams.
.4 All cores in which both horizontal and vertical anchor bolts and similar devices are embedded.
.5 Top two courses of block at locations where concrete block forms back up for exterior walls.
.6 Reinforce and fully grout every core of block walls and door frames. Joints are to be flush.
.7 Top two courses where block walls terminate below structure and carry up as steel stud partition.
.8 All cores at block courses supporting stair landing bearing end/supports.
.9 All other locations where vertical reinforcing or grout is indicated on drawings.

3.3 CLEANING

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

End of Section

1 General

1.1 RELATED SECTIONS

.1 Section 01 33 00 - Submittal Procedures.
.2 Section 04 05 00 - Common Work Results for Masonry.
.3 Section 04 05 13 - Masonry Mortaring.
.4 Section 04 22 00 - Concrete Unit Masonry.

1.2 REFERENCES

.1 Canadian Standards Association (CSA International).
  .1 CAN/CSA A23.1-09/A23.2-09, Concrete Materials and Methods of Concrete Construction/ Methods of Test for Concrete.
  .2 CAN/CSA A370-04, Connectors for Masonry.
  .3 CAN/CSA A371-04, Masonry Construction for Buildings.
  .4 CSA G30.14-M1983(R1998), Deformed Steel Wire For Concrete Reinforcement.
  .5 CSA G30.18-09, Carbon Steel Bars for Concrete Reinforcement.
  .6 CSA S304.1-04, Design of Masonry Structures.
  .7 CSA W186-M1990(R2007), Welding of Reinforcing Bars in Reinforced Concrete Construction.
  .8 CAN/CSA A179-04, Mortar and Grout For Unit Masonry.

1.3 SUBMITTALS

.1 Product Data:
  .1 Submit manufacturer's printed product literature, specifications and data sheet in accordance with Section 01 33 00 - Submittal Procedures.
  .2 Submit two copies of WHMIS MSDS - Material Safety Data Sheets in accordance with Section 01 33 00 - Submittal Procedures. Indicate VOC's for epoxy coatings and galvanized protective coatings and touch-up products.
.2 Shop Drawings :
  .1 Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.
  .2 Shop drawings consist of bar bending details, lists and placing drawings.
  .3 On placing drawings, indicate sizes, spacing, location and quantities of reinforcement and connectors.
.3 Manufacturer's Instructions:
  .1 Submit manufacturer's installation instructions.

1.4 QUALITY ASSURANCE

.1 Pre-Installation Meetings: attend pre-installation meeting to verify project requirements, manufacturer's installation instructions and manufacturer's warranty requirements.

1.5 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.

2 Products

2.1 MATERIALS

NOTE: Not all materials noted below may be required for project specific unit masonry wall installation.

.1 Use 2-rod continuous ladder type reinforcement with adjustable hook type box ties with side rods minimum 4.76mm and box tie rods minimum 4.76mm at all masonry cavity walls.
.2 Reinforcement sized to suit wall thickness and width of cavity.
.3 Finish, hot-dipped galvanized to ATM A153, Class B2, 457 g/m2.
.4 Connectors and wire reinforcement to CSA-A370 and as follows:
  .1 Use truss type reinforcement sized to suit wall thickness at all single wythe masonry walls. Finish, hot-dipped galvanized to ASTM A153 Class B2, 457 g/m2.
  .2 Load bearing walls: use reinforcement with two 4.76mm side rods and 4.76mm cross rods.
  .3 Non-load bearing walls: use reinforcement with two 3.66mm side rods and 3.66mm cross rods.
  .4 Acceptable Material:
    .1 Blok-Lok adjustable Econo-Cavity Lok II, BL 10.
    .2 Dur-O-Wall, adjustable DA 310 Truss.
.5 Use adjustable, triangular galvanized steel ties with clip type anchors with 4.76mm x length required galvanized steel ties, for securing all new masonry where ends of new masonry walls abut concrete walls.
  .1 Acceptable Material:
    .1 Blok-Lok, Type "C".
    .2 Dur-O-Wall DA801.
.6 Use flexible rectangular ties with flat/hump plate anchors between structural steel and masonry, with 4.76 mm galvanized tie, overall length 300 mm, width of tie sized to suite wall.
  .1 Acceptable Material:
    .1 Blok-Lok, Adjustable Flex O Lock - Type "C" w/BLT 9.
    .2 Dur-O-Wall D/A 210 w/triangle ties 700.
.7 Anchorage to existing concrete or concrete block:
  .1 Acceptable Material:
    .1 Blok-Lok BL-5407
.8 Flat plate anchors:
  .1 4.76mm hot-dipped galvanized steel to lengths and configurations required.
  .2 Acceptable Material:
    .1 Blok-Lok BLT series.
.9 Bar type reinforcement:
  .1 To CSA-A371 and CAN/CSA G30.18, Grade 400, deformed bars.
.10 Bolts and anchors:
  .1 To CSA-A370.
.11 Corrosion protection:
  .1 To CSA-S304 and as specified for horizontal reinforcing in interior walls.
.12 Control joint filler:
  .1 Brick masonry: purpose-made closed cell neoprene to ASTM D1056, Class RE41.
  .2 Acceptable Material:
    .1 Dur-O-Wall "Rapid Expansion Joint" - DA 2015
.13 Weep hole vents:
  .1 Purpose-made plastic or galvanized steel, designed to drain cavities to exterior by means of 10mm sloped tubing.
.14 Masonry flashing:
  .1 Minimum 40 mil thick specially compounded, plasticized polyvinyl chloride permanently

bonded to 10 x 10 woven glass fiber mesh.

.2 Acceptable Material::
  .1 Lexsuco FR-40.

.3 At walls with air/vapor barrier membrane use through-wall flashing supplied by air vapor barrier manufacturer specifically for this purpose.

2.2 FABRICATION

.1 Fabricate reinforcing in accordance with CAN/CSA-A23.1 and Reinforcing Steel Manual of Standard Practice by the Reinforcing Steel Institute of Ontario.

.2 Fabricate connectors in accordance with CSA-A370.

.3 Obtain Consultant's approval for locations of reinforcement splices other than shown on placing drawings.

.4 Upon approval of Consultant, weld reinforcement in accordance with CSA W186.

.5 Ship reinforcement and connectors, clearly identified in accordance with drawings.

2.3 SOURCE QUALITY CONTROL

.1 Upon request, provide Consultant with certified copy of mill test report of reinforcement steel and connectors, showing physical and chemical analysis, minimum 5 weeks prior to commencing reinforcement work.

.2 Upon request inform Consultant of proposed source of material to be supplied.

3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 GENERAL

.1 Supply and install masonry connectors and reinforcement in accordance with CSA-A370, CSA-A371, CAN/CSA-A23.1 and CSA-S304.1 unless indicated otherwise.

.2 Prior to placing concrete, obtain Consultant's approval of placement of reinforcement and connectors.

.3 Supply and install additional reinforcement to masonry as indicated.

3.3 BONDING AND TYING

.1 Bond walls of two or more wythes using metal connectors in accordance with CSA-S304, CSA-A371 and as indicated.

.2 Tie masonry veneer to backing in accordance with NBC, CSA-S304.1, CSA-A371 and as indicated.

.3 Bond masonry cavity walls using metal ties spaced at 400mm o.c. vertically and in accordance with CSA-A370.

.4 Tie ends of all new concrete unit masonry walls with adjustable triangular ties spaced at 400mm o.c. vertically, anchored securely to existing wall.

.5 Tie masonry to steel columns using connectors.
  .1 Attach ties to continuous hump-type anchor straps welded to structural steel at 400 mm spacing.
  .2 Embed ties solidly in mortar to develop maximum resistance to design forces.

.6 Interconnect concrete block at column enclosures and elsewhere as indicated using flat plate anchors.

3.4 HORIZONTAL REINFORCING

.1 Install truss type reinforcing as follows:
  .1 Interior walls:
    .1 Load-bearing walls: at vertical intervals of 400mm.
    .2 Non-load bearing walls: at vertical intervals of 400mm.

.2 In addition:
  .1 Install reinforcing in the first and second courses immediately above and below all wall openings and at the top course immediately below roof and floor levels.
  .2 Reinforcement in the second bed joint above or below openings shall extend 600mm beyond the jambs.
  .3 All other reinforcement shall be continuous except that it shall not pass through vertical masonry control joints.
  .4 Lap side rods minimum 150 mm at splices.
  .5 Use prefabricated corner and tee sections to form continuous reinforcement around corners and for anchoring abutting walls and partitions.
  .6 Material in corner and tee sections shall correspond to the type and design of reinforcement used.

3.5 VERTICAL REINFORCING

.1 For load bearing masonry walls, install vertical No. 20 rebar reinforcement in cavities of hollow concrete masonry at 1200 mm spacing.

.2 Fill cores solid with grout to requirement of Section 04 05 13 - Masonry Mortaring.

3.6 REINFORCED LINTELS AND BOND BEAMS

.1 Reinforce masonry lintels and bond beams as indicated.

.2 Make joints in lintels/bond beams to match adjacent walls.
  .1 Includes bond beams at guide rail brackets in elevator shaft.
  .2 Includes bond beams at stair landings.

.3 Place and grout reinforcement in accordance with CSA-S304.1, CSA-A371, and CSA-A179. Use concrete of 20 MPa strength.
  .1 Provide 200mm deep masonry bond beams at all floor and roof levels filled solid with grout reinforced with two 25M rebar.

.4 Provide a continuous 200mm deep masonry bond beam filled solid with grout reinforced with two 15M rebar at top of all masonry partition walls.

.5 Provide one 20M vertical rebar each side of all openings in masonry walls. Extend rebar minimum 800mm beyond opening.

3.7 GROUTING

.1 Grout masonry in accordance with CSA-S304.1, CSA-A371 and CSA-A179 and as indicated.

3.8 ANCHORS

.1 Supply and install metal anchors as indicated.

3.9 LATERAL SUPPORT AND ANCHORAGE

.1 Supply and install lateral support and anchorage in accordance with CSA-S304.1 and as indicated.

3.10 MOVEMENT JOINTS

.1 Reinforcement will not be continuous across movement joints unless otherwise indicated.

3.11 FIELD BENDING

.1 Do not field bend reinforcement and connectors except where indicated or authorized by Consultant.
.2 When field bending is authorized, bend without heat, applying a slow and steady pressure.
.3 Replace bars and connectors which develop cracks or splits.

3.12 FIELD TOUCH-UP

.1 Touch up damaged and cut ends of epoxy coated or galvanized reinforcement steel and connectors with compatible finish to provide continuous coating.

3.13 CLEANING

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

End of Section

1 General

1.1 RELATED SECTIONS

.1 Section 04 05 00 - Common Work Results for Masonry.
.2 Section 04 05 13 - Masonry Mortaring
.3 Section 04 05 19 - Masonry Anchorage and Reinforcing.

1.2 REFERENCES

.1 Canadian Standards Association (CSA International)
  .1 CAN/CSA A165 SERIES-04, CSA Standards on Concrete Masonry Units.

1.3 QUALITY ASSURANCE

.1 Certificates: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.
.2 Pre-Installation Meetings: conduct pre-installation meeting to verify project requirements, manufacturer's installation instructions and manufacturer's warranty requirements.
.3 Units having a required fire resistance rating shall be identified by the manufacturer by marking each pallet or cube, or by other means.

1.4 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.

2 Products

2.1 MATERIALS

.1 Standard hollow concrete masonry units to CSA-A165 for all interior walls as noted on drawings.
  .1 Classification: H/15/A/M
  .2 Size: modular (to match existing)
  .3 Special shapes: provide as follows:
    .1 Bull-nosed units for all exposed corners.
    .2 Square sash-block units at all control joint locations.
    .3 Purpose-made shapes for lintels and bond beams.
    .4 Additional shapes as required.
  .4 Acceptable Materials:
    .1 E.J. Casey Concrete Limited
    .2 L.E. Shaw Limited
    .3 South Shore Ready Mix Limited
    .4 V.J. Rice Concrete Limited

3 Execution

3.1 INSTALLATION

.1 Concrete block units.
  .1 Bond: running.

.2 Coursing height: 200 mm for one block and one joint (to match existing).
.3 Jointing:
  .1 Concave where exposed or where paint or other similar finish coating is specified
  .2 Flush at interior wall faces for tile or similar applied finish.
  .3 Maintain cavity at masonry walls free from mortar droppings.

3.2 QUALITY CONTROL

.1 Notwithstanding visual inspection requirements of CSA Standards, masonry units shall be free of surface indentations, surface cracks due to manufacture, or chipping.
.2 THE REQUIREMENTS OF CLAUSE .1 ABOVE WILL BE STRICTLY ENFORCED AND CONTRACTOR WILL BE REQUIRED TO EITHER REPLACE UNACCEPTABLE UNITS, OR AT THE CONSULTANT'S DISCRETION, DEMOLISH PART OF ALL OF A WALL DEEMED BY THE CONSULTANT, AS NOT MEETING THOSE REQUIREMENTS.

3.3 GROUTING-IN OF DOOR FRAMES

.1 Fill fire-rated door frames solid with mortar.

3.4 CLEANING

.1 Standard block: Allow mortar droppings on masonry to partially dry then remove by means of trowel, followed by rubbing lightly with small piece of block and finally by brushing.
.2 Glazed block: Clean masonry as work progresses using soft, clean cloths, within few minutes after laying. Upon completion, when mortar has set so that it will not be damaged by cleaning, clean with soft sponge or clean cloths, brush, and clean water. Polish with soft, clean cloths.

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 09 21 16 - Gypsum Board Assemblies
.4 Section 09 22 16 - Non-Structural Metal Framing

1.2 REFERENCES

.1 American Society for Testing and Materials International (ASTM)
  .1 ASTM A653/A653M-09a, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
  .2 ASTM A792/A792M-09a, Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.
.2 Canadian General Standards Board (CGSB)
  .1 CAN/CGSB 1.181-99, Ready-Mixed Organic Zinc-Rich Coating.
.3 Canadian Standards Association (CSA International)
  .1 CAN/CSA G164-M92(R2003), Hot Dip Galvanizing of Irregularly Shaped Articles.
  .2 CSA W47.1-09, Certification of Companies for Fusion Welding of Steel.
  .3 CSA W55.3-08, Certification of Companies for Resistance Welding of Steel and Aluminum.
  .4 CSA W59-03 (R2008), Welded Steel Construction (Metal Arc Welding).
  .5 CSA S136-07), North American Specification for the Design of Cold Formed Steel Structural Members, Includes Update No. 1 (2009), Update No. 2 (2010).
  .6 CSA A370-04 Connectors for Masonry, Includes Updates Nos. 1,2,4.
.4 Canadian Sheet Steel Building Institute (CSSBI)
  .1 CSSBI 50M-87, Lightweight Steel Framing Manual.
  .2 CSSBI 52M-91, Lightweight Steel Framing Binder.
  .3 CSSBI Fact Sheet #3 February 2006, Care and Maintenance of Prefinished Sheet Steel Building Products.
  .4 CSSBI Technical Bulletin Vol. 7, No. 2 November 2004, Changing Standard Thicknesses for Canadian Lightweight Steel Framing Applications.
  .5 CSSBI S5-08, Guide Specification for Wind Bearing Steel Studs.
.5 The Master Painters Institute (MPI) / Architectural Painting Specification Manual - February 2004
  .1 MPI # 18, Organic Zinc Rich Primer.

1.3 SUBMITTALS

.1 Make submittals in accordance with Section 01 33 00 - Submittal Procedures.
.2 Shop Drawings:
  .1 Indicate design loads, member sizes, materials, design thickness exclusive of coatings, coating specifications, connection and bracing details, screw sizes and spacing, and anchors.
  .2 Indicate locations, dimensions, openings and requirements of related work.
  .3 Indicate welds by welding symbols as defined in CSA W59.
  .4 Prior to beginning Work, submit: two certified copies of mill reports covering material properties.

1.4 QUALITY ASSURANCE

.1 Pre-installation Meetings: conduct pre-installation meeting to verify project requirements,

manufacturer's installation instructions and manufacturer's warranty requirements.

.2 Health and Safety:
  .1 Do construction Occupational Health and Safety in accordance with Section 01 35 28 - Health and Safety Requirements.

1.5 DESIGN CRITERIA

.1 Design shall be based on Limit States Design principles using factored loads and resistances.
.2 Loads and load factors shall be in accordance with the NBCC 2010. For wind load calculators, the reference velocity pressure, q, shall be based on a 1 in 30 probability of being exceeded in any one year for strength design and 1 in 10 for deflection.
.3 Stud depths and spacings are as shown on the drawings.
.4 Maximum flexural deflections under specified wind loads shall conform to the following:
  .1 Wall studs supporting masonry veneer shall meet the requirements of CSA 5304.1 with stud deflections limited to L/360.
  .2 Wall studs supporting other finishes. L/360

1.6 DELIVERY, STORAGE AND HANDLING

.1 Protect steel studs during transportation, site storage and installation in accordance with CSSBI Sheet Steel Facts #3.
.2 Handle and protect galvanized materials from damage to zinc coating.

1.7 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.

2 Products

2.1 MATERIALS

.1 Steel: to CSA S136, fabricated from ASTM A653/A653M, Grade 230 steel.
.2 Zinc coated steel sheet: quality to ASTM A653/A653M, with Z180 designation coating.
.3 Aluminum-zinc alloy coated steel sheet: quality to ASTM A792/A792M, with AZM150 designation coating.
.4 Welding materials: to CSAW59 and certified by Canadian Welding Bureau.
.5 Screws: pan head, self-drilling, self-tapping sheet metal screws, corrosion protected with minimum zinc coating thickness of 0.008 mm.
.6 Anchors: concrete expansion anchors or other suitable drilled type fasteners.
.7 Bolts, nuts, washers: hot dipped galvanized to CAN/CSA-G164, 380 g/m2 zinc coating.
.8 Touch up primer: zinc rich, to CAN/CGSB-1.181.

2.2 STEEL STUD DESIGNATIONS

.1 Color code: to CSSBI Technical Bulletin Vol.7, No. 2.

2.3 METAL FRAMING

.1 Steel studs: to CSA S136, fabricated from metallic coated steel, depth as indicated.
  .1 Minimum steel thickness of 1.087 mm.
.2 Stud tracks: fabricated from same material and finish as steel studs, depth to suit.
  .1 Bottom track: single piece.

.2 Top track: single piece.
.3 Bridging: fabricated from same material and finish as studs, 38 x 12 x 1.09 mm minimum thickness.
.4 Angle clips: fabricated from same material and finish as studs, 38 x 38 mm x depth of steel stud, 1.37 mm minimum thickness.
.5 Tension straps and accessories: as recommended by manufacturer.

2.4 SOURCE QUALITY CONTROL

.1 Provide 3 copies of mill reports covering material properties prior to natural delivery.

3 Execution

3.1 GENERAL

.1 Do welding in accordance with CSA W59.
.2 Certification of companies: CSA W47.1 for fusion welding.
.3 Do work to CSSBI S5.
.4 Steel fabrication companies to be Canadian Institute of Steel Construction (CISC) certified.

3.2 ERECTION

.1 Erect components to requirements of reviewed shop drawings.
.2 Anchor tracks securely to structure at 800 mm on center maximum, unless lesser spacing prescribed on shop drawings.
.3 Erect studs plumb, aligned and securely attached with two screws minimum,.
.4 Seat studs into bottom tracks.
.5 Install 50.0 mm minimum telescoping track at top of walls where required to accommodate vertical deflection.
.1 Nest top track into deflection channel minimum of 30.0 mm and maximum of 40.0 mm.
.2 Do not fasten tracks together.
.3 Stagger joints.
.6 Install studs at not more than 50.0 mm from abutting walls, openings, and each side of corners and terminations with dissimilar materials.
.7 Brace steel studs with horizontal internal bridging at 1200 mm maximum.
.1 Fasten bridging to steel clips fastened to steel studs with screws or by welding.
.8 Frame openings in stud walls to adequately carry loads by use of additional framing members and bracing as detailed on shop drawings.
.9 Touch up welds with coat of zinc rich primer.

3.3 ERECTION TOLERANCES

.1 Plumb: not to exceed 1/500th of member length.
.2 Camber: not to exceed 1/1000th of member length.
.3 Spacing: not more than +/- 3.0 mm from design spacing.
.4 Gap between end of stud and track web: not more than 4.0 mm.

3.4 CUTOUTS

.1 Maximum size of cutouts for services as follows:

Member Depth	Across Member Depth	Along Member Length	Centre to Centre Spacing(mm)
92	40 max.	105 max.	600 min.
102	40 max.	105 max.	600 min.

152	65 max.	115 max.	600 min.

.2 Limit distance from centerline of last unreinforced cutout to end of member to less than 300 mm.

End of Section

1 General

1.1 SUMMARY

.1 Work included: Provide metal fabrications including but not limited to following:
- .1 Overhead door track and operator anchorage.
- .2 Steel supports within architectural woodwork.
- .3 Lighting valance supports.
- .4 Swing-up grab bar supports.

1.2 RELATED SECTIONS

.1 Following description of work is included for reference only and shall not be presumed to be complete:
- .1 Section 01 33 00 - Submittal Procedures.
- .2 Section 04 05 00 - Common Work Results for Masonry.
- .3 Section 04 05 19 - Masonry Anchorage and Reinforcing.
- .4 Section 09 91 00 - Painting.

1.3 REFERENCES

.1 American Society for Testing and Materials International, (ASTM)
- .1 ASTM A53/A53M-07, Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.
- .2 ASTM A269-10, Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service.
- .3 ASTM A307-07b, Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
- .4 ASTM A123/A123M-09, Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
- .5 ASTM A153/A153M-09, Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
- .6 ASTM A307-07b, Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength.
- .7 ASTM A325M-07a, Specification for High-Strength Bolts for Structural Steel joints [Metric]
- .8 ASTM A653M-09a, Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
- .9 ASTM B117-09, Practice for Operating Salt Spray (Fog) Apparatus
- .10 ASTM E119-09c, Test Methods for Fire Tests of Building Construction and Materials
- .11 ASTM E736-00 (2006), Test Method for Cohesion/Adhesion of Sprayed Fire-Resistive Materials Applied to Structural Members
- .12 ASTM F436M-10, Specification for Hardened Steel Washers [Metric]
- .13 ASTM F738M-02 (2008), Specification for Stainless Steel Metric Bolts, Screws, and Studs
- .14 ASTM F836M-02, Specification for Style 1 Stainless Steel Metric Nuts
- .15 ASTM F844-07a, Specification for Washers, Steel, Plain (Flat), Unhardened for General Use

.2 Canadian General Standards Board (CGSB)
- .1 CAN/CGSB 1.40-97, Anti-corrosive Structural Steel Alkyd Primer.
- .2 CAN/CGSB 1.181-99, Ready Mixed Organic Zinc-Rich Coating
- .3 CAN/CGSB 85.10-99, Protective Coatings for Metals

.3 Canadian Standards Association (CSA International)
- .1 CAN/CSA G40.20-04/G40.21-04, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
- .2 CAN/CSA G164-M92 (R2003), Hot Dip Galvanizing of Irregularly Shaped Articles.

.3 CAN/CSA S16-09, Design of Steel Structures.
.4 CSA W48-06, Filler Metals and Allied Materials for Metal Arc Welding.
.5 CSA W59-03 (R2008),Welded Steel Construction (Metal Arc Welding).
.6 CSA S136-07 - North American Specification for the Design of Cold Formed Steel Structural Members (Using Appendix B provisions applicable to Canada)
.7 CSA W47.1-09 - Certification of Companies for Fusion Welding of Steel
.8 CSA W47.2-M1987 (R2008) - Certification of Companies for Fusion Welding of Aluminum
.9 CSA W48.1-M1991 (R1998) - Carbon Steel Covered Electrodes for Shielded Metal Arc Welding
.10 CSA W48-06 - Filler Metals and Allied Materials for Metal Arc Welding
.11 CSA W59-03 (R2008) - Welded Steel Construction (Metal Arc Welding)
.12 CSA W117.2-06 - Safety in Welding, Cutting, and Allied Processes
.13 SSPC - Steel Structures Painting Council, "Steel Structures Painting Manual, Vol. 2"

1.4 SYSTEM DESCRIPTION

.1 Design Requirements:
.1 Drawings and details are diagrammatic and are intended to show design concept, configuration, components and arrangements; they are not intended to identify nor solve completely problems of thermal and structural movements, assembly framing, fixings and anchorages.
.2 Design work to withstand within acceptable deflection limitations, variations from plumb in vertical and horizontal lines, its own weight, forces applied by movements of building structure and attached adjacent components and maximum design loads due to pressure and suction of wind, snow, ice, rain and hail.
.3 Design load bearing structures to NBC requirements and provide miscellaneous steel supports and anchors to suit design. Conform to CAN/CSA-S16.1 and CAN/CSA-S136.

1.5 SUBMITTALS

.1 Product Data:
.1 Submit manufacturer's literature, data sheets for each type of material provided under this Section for Project. Data sheets shall provide all required information. Submit 3 copies of detailed instructions for maintaining, preserving and keeping materials in clean and safe conditions and give adequate warning of maintenance practices of materials detrimental to specified materials. Submit manufacturer's installation instructions.
.2 Material Safety Data Sheets:
.1 Submit MSDS for inclusion in Operation and Maintenance Manual without limitations for adhesives, sealants, patching and leveling compound, solid polymer and as designed by Consultant.
.3 Shop Drawings
.1 Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.
.2 In addition to minimum requirements indicated following:
.1 Large scale details of members, materials and connections.
.2 Joint details.
.3 Methods of setting, sealing, securing, anchorage.
.4 Field connections.
.5 Submit Shop Drawings for following work bearing the stamp of a Professional Engineer registered in the Province of Prince Edward Island.
.4 Samples:
.1 Extruded and formed metals: minimum 300 mm long.
.2 Metal sheet: minimum 300 mm square and of specified thickness.

1.6 QUALITY ASSURANCE

.1 Test Reports: Submit 6 copies of certified test reports showing compliance with specified performance characteristics and physical properties.

.2 Certificates: Submit 6 copies of product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

.3 Welding: Provide welding in accordance with CSA W59-m performed by a fabricator and mechanics fully approved by the Canadian Welding Bureau as specified herein.

.4 Structural Design and Inspection:

- .1 Employ a professional structural engineer carrying a minimum $2,000,000.00 professional liability insurance and is registered in the province of Prince Edward Island to:
  - .1 Design components of the work of this Section requiring structural performance.
  - .2 Be responsible for full assemblies and connections
  - .3 Be responsible for determining sizes, joint spacing to allow thermal movement and loading of components in accordance with applicable codes and regulations.
  - .4 Be responsible for production and review of Shop Drawings.
  - .5 Inspect work of this Section during fabrication and erection.
  - .6 Stamp and sign each shop drawing.
  - .7 Provide site administration and inspection of this part of the Work.
- .2 Design following:
  - .1 Stairs including landings and supports.
  - .2 Balustrades, handrails, railings.
- .3 Certification:
  - .1 Submit certification from registered professional structural Engineering registered in province of Prince Edward Island, who shall affix his/her seal and signature to certificate, stating structure is capable of supporting its own weight and specified live loads.
  - .2 Welders employed on this project may be asked by Consultant at any time for their welding certificate.

1.7 DELIVERY, STORAGE, AND HANDLING

.1 Coordinate deliveries to comply with construction schedule and arrange ahead for strategic off-the-ground, undercover storage locations. Do not load areas beyond the designed limits.

.2 Handle and store metal materials at job site in such a manner to prevent damage to other materials, (to existing buildings) or property.

.3 Handle components with care, and Provide protection for surfaces against marring or other damage. Ship and store members with cardboard or other resilient spacers between surfaces. Use lifting chokers of material which will not damage surface of steel members.

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.

2 Products

2.1 MATERIALS

.1 Steel sections and plates: New Material Conforming to CAN/CSA-G40.20/G40.21, Grade 300W.

.2 Hollow Structural Sections: New material conforming to CSA G40.20 and CSA G40.21, Grade 350W, Class H.

.3 Steel Pipe: ASTM A53, Type E or S, Grade A or B, Standard weight, Schedule 40.
.4 Stainless Steel:
  .1 Provide highest architectural quality in various forms, straight and true. Ensure there are no scratches, scars, creases, buckles, ripples or chatter marks. Provide finished surfaces suitable for polishing where required. Ensure finished surfaces exposed to view are free of pitting, seam marks, roller marks, oil-canning, stains, discolorations or other imperfections.
  .2 Stainless Steel Sheet, Strip, Plate, and Flat Bar: ASTM A167 or ASTM A666, Type 304 and Type 316 alloy with exposed surfaces having No. 4 polished finish. Sizes as required to meet design requirements.
  .3 Stainless Steel Tubing: ASTM A554, Grade MT 304.
  .4 Stainless Steel Exterior Tubing: ASTM A554, Grade MT 316.
  .5 Stainless Steel Pipe: ASTM A312M, Grade TP 304.
  .6 Stainless Steel Exterior Pipe: ASTM A312M, Grade TP 316.
  .7 Castings: ASTM A743M, Grade CF 8 or Grade CF 20. Type 304.
  .8 Castings: ASTM A743M, Grade CF 8M. Type 316.
  .9 Refer to Drawings for stainless steel work.
.5 Structural aluminum: to CSA HA series - M, Type 6061-T6, clear anodized.
.6 Welding Materials: Conforming to CSA W48.1-M and CSA W59-M.
.7 High Strength Bolts: Supply bolts, nuts and washers conforming with ASTM A 325M. Supply each type and size of bolt and nut of same manufacture and of same lot.
  .1 Bolts: Heavy, hexagon head high strength structural bolts, of standard size, of lengths required for thickness of members joined and for type of connection.
  .2 Nuts: Heavy hexagon semi-finished nuts.
  .3 Washers: For general use bolt, nut and stud application to provide increased bearing surfaces, spacing and to prevent galling. Flat and smooth hardened washers, quenched and tempered to suit applications and conforms to ASTM F844. Provide AISI Type 304 stainless steel washers at exterior locations.
  .4 Hardened Steel Washers: To suit applications and conforms to ASTM F436M.
  .5 Stainless Steel Bolts: To suit applications and conforms to ASTM F738M.
  .6 Stainless Steel Nuts: To suit applications and conforms to ASTM F836M.
  .7 Lock Washers: Helical spring type steel "lock" washers to suit applications and conforms to federal specification FF-W-84. Provide AISI Type 304 stainless steel lock washers at exterior locations.
  .8 Security Fasteners: Button head Torx® Plus R screw tamper resistant # 10, 25 mm long 2 per glass stop minimum stainless steel machine screws.
.8 Common or Ordinary Bolts and Anchor Bolts: Unfinished bolts conforming with ASTM A307, Grade A, with hexagon heads and nuts where exposed in the finish work. Supply common bolts of lengths required to suit thickness of material being joined, but not projecting more than 6 mm) beyond nut, without the sue of washers. Supply anchor bolts of lengths noted, but projecting not less than 13 mm beyond nut unless otherwise noted.
.9 Galvanized Primer Paint: Zinc rich conforming to CAN/CGSB-1.181 for new galvanized metal.
.10 High Performance Corrosion Protection for Perimeter Steel: 1 component, moisture cured, micaceous iron oxide/zinc filled primer, UL Classified in accordance with UL 263 (ASTM E119), corrosion protection in accordance with ASTM B117, meeting Class B Slip Certification in accordance with American Institute of Steel Construction (AISC) requirements for slip critical bolted connections, tested in accordance with ASTM E736 for its suitability for application of primer over steel to receive sprayed fireproofing "Series394, Perime Prime" by Tnemec Company Incorporated; www.tnemec.com.
.11 Steel Pipe Handrails: Conforming to ASTM A53M, Type "S", Schedule 40, Grade A steel pipe of sizes down.
.12 Steel Pipe Bollards: Conforming to ASTM A53M, Schedule 80 steel pipe of sizes shown.
.13 Galvanized: Hot dipped galvanized with minimum zinc coating of 600 g/m² to CAN/CSA-G164-M.
.14 Galvanized Sheet Steel: Supply 0.91 mm (20 ga) core thickness commercial quality to ASTM

A653M, CS Type A, with Z275 zinc coating designation to ASTM A653M.

.15 Perforated Sheet Steel: Commercial flattened sheet steel of thickness indicated, with machine die cut round holes of 3 mm dia. at 5.537 mm oc in 60° staggered pattern and similar to sheet stock manufactured by Greening Donald Co. Ltd., or by Unalloy WRC-a division of Samuel Manu-Tech Inc. or by Gerard Daniel Worldwide.

.16 Expanded Steel Mesh: Flattened, expanded, carbon steel mesh of 10 msg gauge thickness, weighing minimum 112 lbs/100 sq ft, style 1.330" SWD x 3.2000" LWD, 11-1/2" - No. 9 by Gerard Daniel Worldwide, Canadian Division, or Expanded Metal Corporation or Dramex International.

.17 Aluminum Extrusions: ASTM B209M, size accurately formed as shown on Drawings, extruded aluminum alloy AA-6063-T5 or T6 for aluminum. Ensure surfaces are free from defects impairing appearance, strength and durability.

.18 Aluminum Sheet: ASTM B221M, Minimum thickness 3 mm of type and characteristics to match finished extrusions; sheet which is not exposed shall be Utility Aluminum mill finished; for intricate forming with decorative finishes use AA 1100 and for siding and exposed panels use AA-3003 with specified finish.

.19 Handrail Wall Brackets: In accordance with OBC requirements and to meet design requirements indicated on Drawings.

.20 Grout

.1 Cementitious, non shrinking, non expanding grout: 'Sika Grout 212' by Sika Canada Inc., or 'Non Shrink Structural Grout - Dry Pack Grout' by Euclid Chemical Company or 'Sealtight CG 86 Construction Grout' by W.R. Meadows.

.2 Epoxy, non-shrinking, non expanding grout: 'Sika Anchor Fix.

2.2 FABRICATION

.1 Fabricate each item of work of this Section in accordance with following general requirements:

.1 Members square and straight.

.2 Members plumb and true.

.3 Joints accurately and tightly fitted.

.4 Intersecting members in true, finish planes.

.5 Fasteners concealed.

.2 Fabricate, fit and assemble work in shop where possible. Where shop fabrication is not possible, make trial assembly in shop.

.3 Provide hangers, rods, bars, bolts, anchors, brackets, rivets, bearing plate and bracing, fitting, drilling, stopping, soldering, as required for a complete assembly.

.4 Isolate dissimilar metals to prevent galvanic corrosion.

.5 Weld connections unless otherwise indicated.

.6 Shop Welding:

.1 Execute welding to avoid damage or distortion to work. Should there be, in the opinion of Consultant or Inspection Company, doubts as to adequacy of welds, they shall be tested for efficiency and any work not meeting Standards be removed and replaced with new work satisfactory to Consultant. Carry out welding in accordance with following standards:

.1 Fabricator shall be fully certified by Canadian Welding Bureau for fusion welding of steel structures to CSA W47.1 and for fusion welding of aluminum to CSA W47.2.

.2 CSA W48-M - for Electrodes (if rods are used, only coated rods are allowed).

.3 CSA W59-M - for design of connections and workmanship.

.4 CSA W117.2 - for safety.

.7 Thoroughly clean welded joints and steel exposed for a sufficient space to properly perform welding operation. Neatly finish welds. Ensure welds exposed to view and finish painted are continuous and ground smooth.

.8 Provide exposed metal fastenings and accessories of same material, texture, color and finish as base metal to which they are applied or fastened.

2.3 FINISHES

.1 Cleaning and Shop Painting:
- .1 Clean steel to SSPC SP6 and remove loose mill scale, weld flux and splatter.
- .2 Shop prime steel with 1 coat of primer paint to dry film thickness of 0.025 mm (1 mil). Paint on dry surfaces free from rust, scale, grease. Do not paint when temperature is lower than 7 deg C. Paint items under cover and leave under cover until primer is dry. Follow paint manufacturer's recommendations regarding application methods, equipment, temperature, and humidity conditions.
- .3 Shop prime non galvanized perimeter steel members and structural steel members to receive sprayed fire resistive materials with 1 coat of high performance corrosion protection primer to dry film thickness of 0.025 mm (1 mil). Paint on dry surfaces, free from rust, scale, grease. Do not paint when temperature is lower than 7 deg C. Paint items under cover and leave under cover until primer is dry. Follow paint manufacturer's recommendations regarding application methods, equipment, temperature, and humidity conditions.
- .4 Shop prime galvanized steel in accordance with CAN/CGSB-85.10.
- .5 Clean but do not paint surfaces being welded in the field and surfaces in contact after assembly.

.2 Hot Dip Galvanizing:
- .1 After fabrication, hot dip galvanize specific miscellaneous steel items noted on Drawings and/or called for herein. Plug relief vents air tight. After galvanizing, remove plugs, ream holes to proper size and re-tap threads. Straighten shapes and assemblies true to line and plane after galvanizing. Repair damaged galvanized surfaces with "Galvafroid" by W.R. Meadows in accordance with manufacturer's printed directions.
- .2 Galvanized members exposed to elements when in final location; members embedded in concrete; members specified in this Section or noted on Drawings.
- .3 Hot-dip galvanize members, in accordance with CAN/CSA-G164-M and the requirements of following ASTM standards, with minimum coating weights or thickness as specified:
  - .1 Rolled, Pressed and Forged Steel Shapes, Plates, Bars and Strips: ASTM A123M; average weight of zinc coating per sq/ft of actual surface, for 4.8 mm and less thickness members 2 ounces, for 6 mm and heavier members 2.3 ounces.
  - .2 Iron and Steel Hardware: ASTM A153M; minimum weight of zinc coating, in ounces per sq ft of surface shall be in accordance with Table 1 of ASTM A153M, for the various classes of materials used on the Project.
  - .3 Steel Sheet: ASTM A653M; weight of zinc coating, per sq ft on both sides of sheet. Coating designation Z275 (G90), minimized spangle and chemically treated.

.3 Color: to be selected by Consultant.

.4 Aluminum: Exposed aluminum surfaces shall have clear anodized coating (Architectural Class II). Pre-treat aluminum with caustic tech treatment prior to applying integral, clear, anodic oxide coating. Apply clear, anodic oxide coating in accordance with AAMA 611, 0.4 mils minimum coating thickness and also conforms to Aluminum Finish Designation AA-M12C22A31, Architectural Class II. Protect clear anodized coating with removable protective film.

.5 Zinc-rich primer: Ready, mixed, zinc-rich primer conforming to CAN/CGSB-1.181 Acceptable Products and manufacturers shall be Sealtight Galvafroid Zinc-Rich Coating by W.R. Meadows of Canada Limited, or Zinc Clad No. 7 Organic Zinc Rich Primer by Sherwin Williams Company of Canada Ltd., or other Product and manufacturer acceptable to Consultant.

.6 Isolation Coating: Bituminous paint, alkali-resistant bituminous paint or epoxy resin solution to provide dielectric separation which will dry to be tack-free and withstand high temperatures. Cold-applied asphalt mastic complying with SSPC-Paint 12, except containing no asbestos fibers. Carboline Bitumastic 50 by Carboline Canada, or Copper Creek Top Service 760 Black by Sherwin Williams Company, 410-02 by Bakor Inc. or other Product and manufacturer acceptable to Consultant.

2.4 ANGLE LINTELS

.1 Steel angles: galvanized, sizes indicated for masonry openings. Provide 200 mm minimum bearing at ends.
.2 Weld or bolt back-to-back angles to profiles as indicated.
.3 Refer to drawings.
.4 Finish: shop painted.
.5 Leave ready for painting by Section 09 91 00.

2.5 GRAB BAR SUPPORT FRAMING

.1 As required by fixture manufacturer's Specification.

2.6 MILLWORK MISC. METAL PLATES, ANGLES AND BENTS

.1 Provide all miscellaneous plates, angles and bents required for support of millwork as indicated and detailed on the drawings.

2.7 MISC. METAL PLATES, ANGLES AND BENTS

.1 Provide all miscellaneous plates, angles and bents required for support of aluminum glazing as indicated and detailed on the drawings.

2.8 PROCEDURE LIGHT SUPPORTS (CEILING MOUNTED)

.1 Provide as detailed.
.2 Finish: alkyd prime painted.

2.9 PROCEDURE LIGHT SUPPORTS (WALL MOUNTED)

.1 Provide as detailed.
.2 Finish: alkyd prime painted.

2.10 STEEL SUPPORTS WITHIN ARCHITECTURAL WOODWORK

.1 Provide miscellaneous steel items required as part of the work of Section 06 61 16, e.g.: valance supports, vanity support brackets.
.2 Finish: alkyd prime painted.

2.11 SWING-UP GRAB BAR SUPPORTS

.1 Refer to Shower Unit Specifications for requirements.

3 Execution

3.1 ERECTION

.1 Do welding work in accordance with CSA W59 unless specified otherwise.
.2 Erect metalwork square, plumb, straight, and true, accurately fitted, with tight joints and intersections.
.3 Provide suitable means of anchorage acceptable to Consultant such as dowels, anchor clips, bar anchors, expansion bolts and shields, and toggles.
.4 Exposed fastening devices to match finish and be compatible with material through which they pass.
.5 Provide components for building by other sections in accordance with shop drawings and schedule.

.6 Make field connections with bolts to CAN/CSA-S16.1, or weld.
.7 Hand items over for casting into concrete or building into masonry to appropriate trades together with setting templates.
.8 Touch-up rivets, field welds, bolts and burnt or scratched surfaces after completion of erection with primer.
.9 Touch-up galvanized surfaces with zinc rich primer where burned by field welding.

3.2 INSTALLATION

.1 Verify dimensions at the Place of the Work to ensure work of this Section fits to that of other parts of the Work.
.2 Erect the work of this Section plumb, square, true and level.
.3 Securely anchor work of this Section and rivet, weld or bolt to structural framing of the building. Where secured to concrete, Provide bolts for setting in concrete. Provide expansion bolt supports to masonry.
.4 Provide necessary fitting, setting and cutting required in connection with the fitting of work of this Section to other parts of the Work.
.5 Field Painting: Paint bolt heads, washers, nuts, field welds and previously unpainted items. Touch up with matching paint, shop primer damaged during transit and installation.
.6 Erect stair work to line, plumb, square, true and level, with runs of stairs registering level with floor levels.

3.3 CLEANING

.1 Perform cleaning after installation to remove construction and accumulated environmental dirt.
.2 Upon completion of installation, remove surplus materials, rubbish, tools and equipment barriers.
.3 On completion of installation, carefully clean metal work.

End of Section

1 General

1.1 REFERENCES

.1 Canadian Standards Association (CSA International)
- .1 CSA B111-1974(R1998), Wire Nails, Spikes and Staples.
- .2 CAN/CSA-G164-M92(R1998), Hot Dip Galvanizing of Irregularly Shaped Articles.
- .3 CSA O121-M1978(R1998), Douglas Fir Plywood.
- .4 CAN/CSA-O141-91(R1999), Softwood Lumber.
- .5 CSA O151-M1978(R1998), Canadian Softwood Plywood.
- .6 CAN/CSA-O325.0-92(R1998), Construction Sheathing. National Lumber Grades Authority (NLGA)
- .7 Standard Grading Rules for Canadian Lumber 2000.

1.2 QUALITY ASSURANCE

.1 Lumber identification: by grade stamp of an agency certified by Canadian Lumber Standards Accreditation Board.

.2 Plywood identification: by grade mark in accordance with applicable CSA standards.

2 Products

2.1 LUMBER MATERIAL

.1 Lumber: unless specified otherwise, softwood, S4S, moisture content 19% or less in accordance with following standards:
- .1 CAN/CSA-O141.
- .2 NLGA Standard Grading Rules for Canadian Lumber.

.2 Furring, blocking, nailing strips, grounds, rough bucks, cants, curbs, fascia backing and sleepers:
- .1 S2S is acceptable for miscellaneous furring.
- .2 Board sizes: "Standard" or better grade.
- .3 Dimension sizes: "Standard" light framing or better grade.

2.2 PANEL MATERIALS

.1 Douglas fir plywood (DFP): to CSA O121, standard construction.

.2 Canadian softwood plywood (CSP): to CSA O151, standard construction.

.3 Plywood, OSB and wood based composite panels: to CAN/CSA-O325.

2.3 ACCESSORIES

.1 Nails, spikes and staples: to CSA B111.

.2 Bolts: 12.5 mm diameter unless indicated otherwise, complete with nuts and washers.

.3 Proprietary fasteners: toggle bolts, expansion shields and lag bolts, screws and lead or inorganic fiber plugs, explosive actuated fastening devices, recommended for purpose by manufacturer.

3 Execution

3.1 INSTALLATION

.1 Comply with requirements of NBC, supplemented by the following paragraphs.

.2 Install furring and blocking as required to space-out and support miscellaneous work.

.3 Align and plumb faces of furring and blocking to tolerance of 1:600.

3.2 SCHEDULES

.1 Provide electrical equipment backboards for mounting electrical equipment as indicated. Use 19 mm thick plywood on 19 x 38 mm furring around spacing, perimeter and at maximum 300 intermediate.

End of Section

1 General

1.1 WORK INCLUDED

.1 Supply and install solid polymer fabrications as indicated and detailed on the Drawings and includes, but not limited to the following:
- .1 Shower trim.
- .2 Integral sink and counter with seamed bowls complete with tailpiece.
- .3 Architectural woodwork counter tops with sinks and cove backsplashes.

1.2 RELATED SECTIONS

.1 Section 01 33 00 - Submittal Procedures
.2 Section 01 45 00 - Quality Control.
.3 Section 07 92 00 - Joint Sealants.
.4 Division 22 & 23 - Plumbing Requirements
.5 Division 26 - Lighting Requirements.

1.3 REFERENCES

.1 ANSI A136.1-99(R2005), Specification for Organic Adhesives for the Installation of Ceramic Tile.
.2 ANSI A208.2-02, Medium Density Fiberboard.
.3 ANSI Z124.3-95, Plastic Lavatories - Solid Surface.
.4 ANSI Z124.6-97, Plastic Sinks - Solid Surface.
.5 ANSI/NEMA LD 3-05, High-Pressure Decorative Laminates.
.6 NSF/ANSI 51-02, Food Equipment Materials.
.7 ASTM C920-05, Specification for Elastomeric Joint Sealants.
.8 ASTM D256-06a, Standard Test Methods for Determining the Izod Pendulum Impact Resistance of Plastics.
.9 ASTM D570-98(05), Standard Test Method for Water Absorption of Plastics.
.10 ASTM D638-03, Standard Test Method for Tensile Properties of Plastics.
.11 ASTM D696-03, Standard Test Method for Coefficient of Linear Thermal Expansion of Plastics Between -30EC and 30EC With a Vitreous Silica Dilatometer.
.12 ASTM D790-07, Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulation Materials.
.13 ASTM D1499-05, Standard Practice for Operating Light- and Water Exposure Apparatus Carbon-Arc Type) for Exposure of Plastics.
.14 ASTM D2583-07, Standard Test Method for Indentation Hardness of Rigid Plastics by Means of a Barcol Impressor
.15 ASTM D5420-04, Standard Test Method for Impact Resistance of Flat, Rigid Plastic Specimen by means of a Striker Impacted by a Falling Weight (Gardner Impact).
.16 ASTM E84-08a, Standard Test Method for Surface Burning Characteristics of Building Materials.
.17 ASTM G21-96(02), Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi.
.18 GREENGUARD, Microbial Resistance Listing Program.
.19 O112 SERIES-M1977 - Standards for Wood Adhesive.
.20 CSA O121-M78 (R2003) - Douglas Fir Plywood.
.21 CAN/CSA-O141-05 - Softwood Lumber.
.22 CSA O151-04 - Canadian Softwood Plywood.
.23 CAN/ULC-S102-07 - Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies

1.4 DEFINITIONS

.1 Solid Surfacing (SPS): Nonporous, homogeneous material maintaining the same composition throughout the part with a composition of acrylic polymer, aluminum trihydrate filler and pigment.

1.5 SYSTEM DESCRIPTION

.1 Performance Requirements:

PROPERTY	REQUIREMENT (min or max)	TEST PROCEDURE
Tensile Strength	6000 psi min	ASTM D638
Tensile Modulus	1.5 x 10^{-6} psi min	ASTM D638
Flexural Strength	10,000 psi min	ASTM D790
Flexural Modulus	1.2 x 10^{-6} psi min	ASTM D790
Elongation	0.4% min.	ASTM D638
Hardness	>85-Rockwell "M" scale min.	ASTM D785
	52-Barcol Impresser min.	ASTM D2583
Thermal Expansion	3.02 x 10^{-5} in/in/deg C. max.	ASTM D696
	1.80 x 10-^{5} in/in/deg F. max.	
Color Stability	No change,100 hours min.	ANSI/NEMA LD3
Gloss (60^{0} Gardner)	5-75 (matte-highly polished)	ANSI Z124
Light Resistance	(Xenon Arc) No effect	NEMA LD 3-2000 Method 3.3
Wear and Cleanability	Passes	ANSI Z124.3 & ANSI Z124.6
Abrasion Resistance	No loss of pattern max.	ANSI/NEMA LD3
	weight loss (1000cycles) =0.9g.	ANSI Z124.3
Boiling water Surface Resistance	No Change	NEMA LD3 Method 3.5
High Temperature Resistance	No Change	NEMA LD3 Method 3.6
Impact Resistance:		
.1 Izod Impact Specimen)	0.24 ft.-lbs.min.	ASTM D256, Method A (Notched
.2 Gardner	9.0 ft-lbs min	ASTM D5420
Ball Impact Resistance Sheets:		NEMA LD3, Method 3.8
.1 6mm sheet	914mm min, 1/2 lb ball, no failure	
.2 13mm sheet	140" min, 1/2 lb ball, no failure	
.3 19mm sheet	200" min, 1/2 lb ball, no failure	
Bowls (point impact)	No cracks or chips	ANSI Z124.3 and 124.6
Stain Resistance	Passes	ANSI Z124.3
Weatherability	E^*_{94}<5 in 1,000 hrs (1000 hours)	ASTM D1499
Fungi and Bacteria	Does not support microbial growth	ASTM G21 & GREENGUARD Microbial Resistance Program
Specific Gravity	1.7 min	
Water Absorption		
.1 Weight	Long Term	ASTM D570
.2 (% max.)	0.4% (3/4")	
	0.6% (1/2")	
	0.8% (1/4")	
Flammability		ASTM E84, NFPA 255 & UL 723

Solid Colors	6mm	13mm	19mm
.1 Flame Spread	<25	<25	<25

.2	Smoke Developed	<25	<25	<25
.3	Class	1 and A	1and A	1 and A
Particulate Patterns		6mm	13mm	19mm
.1	Flame Spread	25 max	25 max	25 max
.2	Smoke Developed	30 max	30 max	30 max
.3	Class	1	1	1
Pittsburgh:				
Solids		99 Solid Colours		"LC50 Protocol Toxicity Test
Patterns		65 Pattern Colours		(as used by NY State)

1.6 SUBMITTALS

.1 Make submittals in accordance with Section 01 33 00 - Submittal Procedures.
.2 Product Data:
  .1 Indicate product description, fabrication information and compliance with specified performance requirements.
.3 Maintenance Data:
  .1 Submit manufacturer's care and maintenance data, including care, repair and cleaning instructions.
.4 Shop Drawings:
  .1 Indicate details of construction, profiles full size, details half full size jointing, fastening and other related details.
  .2 Indicate materials, thickness, finishes and hardware.
  .3 Indicate locations of service outlets in casework, typical and special installation conditions, and connections, attachments, anchorage and location of exposed fastenings.
.5 Samples:
  .1 Submit minimum 50mm by 50mm samples. Indicate full range of color and pattern variation. Approved samples will be retained as a standard for work.
  .2 Product Data: Indicate product description, fabrication information and compliance with specified performance requirements.
.6 Material Safety Data Sheets:
  .1 Submit MSDS for inclusion in Operation and Maintenance Manual without limitations for adhesives, sealants, patching and leveling compound, solid polymer and as designated later by Consultant.
.7 Mock-ups:
  .1 Prior to final approval of Shop Drawings, erect 1 full size Mock-up of each component at Project site demonstrating quality of materials and execution for Consultant review, particularly, counter top and window sills, minimum 900mm in length showing corners and edge detail.
  .2 Should Mock-up not be approved, rework or remake until approval is secured. Remove rejected units from Project site.
  .3 Approve Mock-up will be used as standard for acceptance of subsequent work.
  .4 Approved Mock-ups may remain as part of finished work.
.8 Test Reports:
  .1 Submit flammability test reports and food preparation zone test certifications confirming compliance with NSF / ANSI 51. Refer to www.nsf.org for latest compliance to NSF / ANSI 51 for food zone - all food types.

1.7 QUALITY ASSURANCE

.1 Installer Qualifications: Installation of Solid Polymer manufacturer shall be by a firm that is authorized by manufacturer to install solid polymer, and that can demonstrate five (5) years

successful experience in installing finished carpentry items similar in type and quality to those required for this project.

.2 Allowable Tolerances:
- .1 Variation in component size: 3mm
- .2 Location of openings: +/- 3mm indicated location.

1.8 DELIVERY, STORAGE AND HANDLING

.1 Deliver no components to project site until areas are ready for installation. Store indoors.

.2 Handle materials to prevent damage to finished surfaces. Provide protective coverings to prevent physical damage or staining following installation for duration of project.

1.9 WARRANTY

.1 Provide manufacturer's warranty against defects in materials, fabrication and installation, excluding damages caused by physical or chemical abuse or excessive heat. Warranty shall provide for replacement or repair of material and labor for a period of ten (10) years, beginning at Date of Substantial Completion.

.2 For fabrications with installed warranty coverage, identify by affixing manufacturer's fabrication/installation source plate.

.3 Maintain surfaces in accordance with manufacturer's care and maintenance instructions.

.4 Warranty shall be transferable to subsequent Owner.

1.10 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.

2 Products

2.1 SOLID POLYMER FABRICATORS

.1 Acceptable Materials:
- .1 "Avonite", manufactured by Avonite Inc., 1945 Highway 304, Belen, NM, 87002, USA
- .2 The caromastone collection by "Onyx & Marble Inc." Debert, NS. Telephone (902) 641-3111, E-Mail: PFOREST@dmaya.com.
- .3 Corian by DuPont; www.corian.com.
- .4 Samsung Chemical USA; www.staron.com.
- .5 Wilsonart Canada; www.wilsonart.com.

2.2 MATERIALS

.1 Solid Polymer Material:
- .1 Homogeneous sheet composed of blend of natural minerals and 100% acrylic resin; not coated, laminated or of composite construction; meeting ANSI Z124.3 & .6, Type 6 and Fed. Spec. WW-P-541E/GEN meeting following criteria:
  - .1 Flammability: Class A when tested to CAN/ULC-S102-M.
  - .2 Food Equipment Material Compliance: Food zone to NSF/ANSI 51.
- .2 Ensure material has minimum physical and performance properties specified under "System Description".
- .3 Ensure superficial damage to a depth of 0.25 mm is repairable by sanding and polishing.
- .4 Inlays: Fabricate using manufacturer's approved method. Route 3 mm deep maximum

groove for inlay to pattern indicated on Drawings. Fill groove using manufacturer's recommended method avoiding air bubbles and/or voids. Overfill inlay areas and allow it to cure fully. Sand smooth without overheating inlay areas while sanding. Finish and touch up to uniform appearance.

.2 Joint Adhesive:
- .1 Manufacturer's standard 2-part adhesive kit to create inconspicuous, non-porous joints, with a chemical bond.

.3 Panel Adhesive:
- .1 Manufacturer's recommended standard neoprene-based panel adhesive meeting ANSI A136.1, UL® listed.

.4 Sealant:
- .1 Manufacturer's standard mildew-resistant, FDA/UL® and NSF/ANSI 51 compliant in food zone area, recognized silicone sealant in color matching components or clear formulations.

.5 Conductive Tape:
- .1 Manufacturer's standard aluminum foil tape, with required thickness, for use with cutouts near heat sources.

.6 Insulating Felt Tape:
- .1 Manufacturer's standard for use with conductive tape in insulating solid surface material from adjacent heat source.

.7 Colors:
- .1 One color as selected by Consultant from manufacturer's standard range (color type and thickness to match countertop used in women's central washroom renovation).

.8 Edge Treatments:
- .1 To be fabricated as indicated on drawings.

2.3 COMPONENTS

.1 Counter Perimeter Frame:
- .1 19 mm thick, moisture resistant cores for counter tops in wet areas having sinks or lavs shall be 19 mm thick exterior grade plywood with waterproof adhesive, CSA O115-M (G/SO) Fir or Poplar plywood, veneer core only.
- .2 No added urea-formaldehyde during manufacturing process.

.2 Lavatory Tops with Integral Bowls:
- .1 Molded countertop of solid polymer material 560 mm, complete with integrally molded bowls of solid polymer material; edge details as indicated on Drawings.
- .2 Provide with radius backsplash, endsplashes and fascias as shown on Drawings.

2.4 FABRICATION

.1 Fabricate components in shop to greatest extent practical to sizes and shapes indicated, in accordance with approved Shop Drawings and solid polymer manufacturer requirements.

.2 Form joints between components using manufacturer's standard joint adhesive without conspicuous joints.

.3 Reinforce with strip of solid polymer material 50 mm wide.

.4 Provide factory cutouts for plumbing fittings and bath accessories as indicated on Drawings.

.5 Thermoform corners and edges to shapes and sizes indicated on Drawings, prior to seaming and joining.

.6 Cut components larger than finished dimensions and sand edges to remove nicks and scratches.

.7 Heat entire component uniformly prior to forming.

.8 Ensure no blistering, whitening and cracking of components during forming.

.9 Form backsplashes from solid surfacing material with radius cove where counter and backsplashes meet as indicated on Drawings.

.10 Form joints between components using manufacturer's standard joint adhesive.

.11 Joints shall be inconspicuous in appearance and without voids.

.12 Attach 100 mm wide reinforcing strip of solid polymer material under each joint.
.13 Provide holes and cutouts for plumbing and bath accessories as indicated on Drawings.
.14 Rout and finish component edges to a smooth, uniform finish.
.15 Rout cutouts, then sand edges smooth.
.16 Repair or reject defective or inaccurate work.
.17 Finish: Surfaces shall have uniform finish:
.1 Matte, with a gloss rating of 5 - 20.

3 Excecution

3.1 EXAMINATION

.1 Examine substrates and conditions, with fabricator present for compliance with requirements for installation tolerances and other conditions affecting performance of work.
.2 Proceed with installation only after unsatisfactory conditions have been corrected.
.3 Site Verification of Conditions:
.1 Verify actual site dimensions and location of adjacent materials prior to commencing work.
.4 Examine cabinets upon which counter tops are to be installed.
.5 Verify cabinets are level to within 3 mm in 3 m.
.6 Notify Consultant in writing of any conditions which would be detrimental to installation.
.7 Commencement of work implies acceptance of previously completed work.

3.2 INSTALLATION

.1 Install components plumb, level, rigid, scribed to adjacent finishes in accordance with reviewed Shop Drawings and Product installation details.
.2 Form field joints using manufacturer's recommended adhesive, with joints being inconspicuous in finished work.
.3 Exposed joints/seams are not permitted.
.4 Keep components and hands clean when making joints.
.5 Reinforce field joints with solid surface strips extending a minimum of 25 mm on either side of seam with strip being same thickness as top.
.6 Cut and finish component edges with clean, sharp returns.
.7 Route radii and contours to template.
.8 Anchor securely to base component or other supports.
.9 Align adjacent components and form seams to comply with manufacturer's written recommendations using adhesive in color to match work.
.10 Carefully dress joints smooth, remove surface scratches and clean entire surface.
.11 Install countertops with no more than 3 mm sag, bow or other variation from a straight line.
.12 Adhere undermount/submount/bevel mount sinks/bowls to countertops using manufacturer's recommended adhesive and mounting hardware.
.13 Adhere topmount sinks/bowls to countertops using manufacturer recommended adhesives and color-matched silicone sealant.
.14 Secure seam mount bowls and sinks to counter tops using colour matched joint adhesive.
.15 Seal between wall and components with joint sealant as specified herein and in Section 07 92 00 - Joint Sealants, as applicable.
.16 Provide backsplashes, endsplashes and fascias as indicated on Drawings.
.17 Adhere to countertops using manufacturer's standard color-matched silicone sealant.
.18 Adhere applied sidesplashes to countertops using manufacturer's standard color-matched silicone sealant.
.19 Provide coved backsplashes and sidesplashes at walls and adjacent millwork.
.20 Fabricate radius cove at intersection of counters with backsplashes to dimensions shown on reviewed Shop Drawings.

.21 Color Inlays:
- .1 Comply with Product data from manufacturer.
- .2 Route groove for inlay to straight edge or pattern indicated on Drawings.
- .3 Fill groove using material furnished by manufacturer.
- .4 Cure inlay, finish and touch up to uniform appearance.

.22 Keep components and hands clean during installation.
.23 Remove adhesives, sealants and other stains.
.24 Coordinate connections of plumbing fixtures with Division 22.
.25 Make plumbing connections to sinks in accordance with Division 22.

3.3 ADJUSTING AND CLEANING

.1 Replace damaged work which cannot be repaired to Consultant's satisfaction.
.2 Repair minor imperfections and cracked seams and replace areas of severely damaged surfaces in accordance with manufacturer's "Fabrication and Installation Manual".
.3 Remove excess adhesive and sealant from visible surfaces.
.4 Clean surfaces in accordance with manufacturer's "Care and Maintenance Instructions".

3.4 PROTECTION

.1 Provide suitable protection on counter and other solid polymer surfaces to protect the installation from damage until final acceptance.
.2 Place temporary covers over solid polymer to preclude their use for as work surfaces by other trades.

End of Section

1 General

1.1 RELATED SECTIONS

.1 Section 01 33 00 - Submittal Procedures.

1.2 RELATED WORK

.1 Fire stopping and smoke seals within mechanical assemblies (i.e inside ducts, dampers) and electrical assemblies (i.e. inside cable trays) are specified in Divisions 21, 22, 23 and 26 respectively.

1.3 REFERENCES

.1 Underwriter's Laboratories of Canada (ULC)
  .1 ULC-S115-Standard Method of Fire Tests of Firestop Systems.

1.4 SHOP DRAWINGS

.1 Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.
.2 Submit shop drawings indicating:
  .1 ULC listed firestop drawing for each anticipated distinct fire separation penetration and joint. Each ULC system firestop drawing must indicate the actual penetrating products used on site and the required fire stop materials and their proper installation.
  .2 Technical information for each material used in ULC system firestop drawing above.
  .3 Construction details should accurately reflect actual job conditions.

1.5 PRODUCT DATA

.1 Submit product data in accordance with Section 01 33 00 - Submittal Procedures.
.2 Submit manufacturer's product data for materials and prefabricated devices, providing descriptions are sufficient for identification at job site. Include manufacturer's printed instructions for installation.
.3 Material Safety Data Sheets:
  .1 Submit MSDS for inclusion in Operation and Maintenance Manual.

1.6 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.

2 Products

2.1 MATERIALS

.1 Floor to floor fire resistance rating, 2hrs.
.2 Fire stopping and smoke seal systems: in accordance with CAN/ULC-S115.
  .1 Asbestos-free materials and systems capable of maintaining an effective barrier against flame, smoke and gases in compliance with requirements of CAN/ULC-S115 and not to exceed opening sizes for which they are intended and conforming to special requirements specified in 3.5.
  .2 All penetrations of fire separations must be fire stopped as per CAN/ULC-S115 standard with F rating and similar for Fire Resistant Rating for closures.
  .3 All penetrations of a firewall must be fire stopped per CAN/ULC-S115 standard with FT

rating and similar for Fire Resistant Rating for the fire separation.
Acceptable Material:
.1 Tremco Fyre-Shield.
.2 A/D Fire Barrier Sealant.
.3 3M Fire Barrier Products.
.4 Hilti Firestops Products.
.5 DAP Fire Stop Fire-Rated Silicone Sealant.
.6 NUCO Inc. firestopping products.

.3 Service penetration assemblies: certified by ULC in accordance with ULC-S115 and listed in ULC Guide No.40 U19.
.4 Service penetration firestop components: certified by ULC in accordance with ULC-S115 and listed in ULC Guide No.40 U19.13 and ULC Guide No.40 U19.15 under the Label Service of ULC.
.5 Fire-resistance rating of installed fire stopping assembly in accordance with NBC.
.6 Fire stopping and smoke seals at openings intended for ease of re-entry such as cables: elastomeric seal.
.7 Fire stopping and smoke seals at openings around penetrations for pipes, ductwork and other mechanical items requiring sound and vibration control: elastomeric seal.
.8 Primers: to manufacturer's recommendation for specific material, substrate, and end use.
.9 Water (if applicable): potable, clean and free from injurious amounts of deleterious substances.
.10 Damming and backup materials, supports and anchoring devices: to manufacturer's recommendations, and in accordance with tested assembly being installed as acceptable to authorities having jurisdiction.
.11 Sealants for vertical joints: non-sagging.

3 Execution

3.1 PREPARATION

.1 Examine sizes and conditions of voids to be filled to establish correct thicknesses and installation of materials. Ensure that substrates and surfaces are clean, dry and frost free.
.2 Prepare surfaces in contact with fire stopping materials and smoke seals to manufacturer's instructions.
.3 Maintain insulation around pipes and ducts penetrating fire separation without interruption to vapour barrier.
.4 Mask where necessary to avoid spillage and over coating onto adjoining surfaces; remove stains on adjacent surfaces.

3.2 INSTALLATION

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

3.3 INSPECTION

.1 Notify Consultant when ready for inspection and prior to concealing or enclosing firestopping materials and service penetration assemblies.

3.4 SCHEDULE

.1 Firestop and smoke seal at all penetrations of or joints in fire resistive wall and floor assemblies, including but not limited to:
- .1 Penetrations through fire-resistance rated masonry, concrete, and gypsum board partitions and walls as shown on wall schedule.
- .2 Edge of floor slabs at curtain wall and precast concrete panels.
- .3 Top of fire-resistance rated masonry and gypsum board partitions.
- .4 Intersection of fire-resistance rated masonry and gypsum board partitions.
- .5 Control and sway joints in fire-resistance rated masonry and gypsum board partitions and walls.
- .6 Penetrations through fire-resistive floor slabs, ceilings and roofs.
- .7 Openings and sleeves installed for future use through fire separations.
- .8 Around mechanical and electrical assemblies penetrating fire separations.
- .9 Rigid ducts without fire damper: greater than 129 cm^2: fire stopping to consist of bead of fire sealant between retaining angle and fire separation and between retaining angle and duct, on each side of fire separation.

3.5 CLEAN UP

.1 Remove excess materials and debris and clean adjacent surfaces immediately after application.
.2 Remove temporary dams after initial set of fire stopping and smoke seal materials.

End of Section

1 General

1.1 RELATED SECTIONS

.1 Section 01 33 00 - Submittal Procedures.
.2 Section 01 45 00 - Quality Control.
.3 Section 01 61 00 - Common Product Requirements.
.4 Section 07 84 00 - Firestopping.
.5 Section 09 22 16 - Non-Structural Metal Framing.

1.2 REFERENCES

.1 American Society for Testing and Materials International, (ASTM)
  .1 ASTM C919-02, Standard Practice for Use of Sealants in Acoustical Applications.
  .2 ASTM C 834 latex Sealing Compounds.
  .3 ASTM C 920 Elastomeric Joint Sealants.
  .4 ASTM C 1184 Structural Silicone Sealants.
  .5 ASTM C 1311 Solvent Release Sealant.
  .6 ASTM C 1330 Cylindrical Sealant Backing for Use With Cold Liquid Applied Sealants.
  .7 ASTM C 1193 Use of Joint Sealants.
  .8 ASTM C 1299 Selection of liquid Applied Sealants
  .9 ASTM C 1472 Calculating movement and Other Effects when Establishing Sealant Joint Width.
.2 Canadian General Standards Board (CGSB)
  .1 CAN/CGSB-19.17-M90, One-Component Acrylic Emulsion Base Sealing Compound.
.3 Department of Justice Canada (Jus)
  .1 Canadian Environmental Protection Act, 1999 (CEPA).
.4 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
  .1 Material Safety Data Sheets (MSDS).

1.3 SUBMITTALS

.1 Submit product data in accordance with Section 01 33 00 - Submittal Procedures.
.2 Submit manufacturer's instructions in accordance with Section 01 33 00 - Submittal Procedures.
  .1 Instructions to include installation instructions for each product used.
.3 Before proceeding with work or ordering of material submit the following to the Consultant for review and acceptance:
  .1 Name and qualifications of applicator.
  .2 Confirmation by sealant manufacturer that applicator is an approved applicator.
  .3 Manufacturer's product data for sealants to be used.
.4 Manufacturer's recommended installation procedures.
.5 Material Safety Data Sheets:
  .1 Submit MSDS for inclusion in Operation and Maintenance Manual.

1.4 QUALITY ASSURANCE/MOCK-UP

.1 Construct mock-up in accordance with Section 01 45 00 - Quality Control.
.2 Construct mock-up to show location, size, shape and depth of joints complete with back-up material, primer, caulking and sealant.
.3 Mock-up will be used:
  .1 To judge workmanship, substrate preparation, operation of equipment and material application.

.4 Locate where directed.
.5 Allow 24 hours for inspection of mock-up by Consultant before proceeding with sealant work.
.6 When accepted, mock-up will demonstrate minimum standard of quality required for this Work.
.7 Approved mock-up may remain as part of finished Work.

1.5 WARRANTY

.1 Contractor hereby warrants that caulking work will not leak, crack, crumble, melt, shrink, run, lose adhesion or stain adjacent surfaces for 3 years.

1.6 DELIVERY, STORAGE, AND HANDLING

.1 Deliver, handle, store and protect materials in accordance with Section 01 61 00 - Common Product Requirements.
.2 Deliver and store materials in original wrappings and containers with manufacturer's seals and labels, intact. Protect from freezing, moisture, water and contact with ground or floor.

1.7 PROJECT CONDITIONS

.1 Environmental Limitations:
  .1 Conform to manufacturer's recommended temperatures, relative humidity, and substrate moisture content for application and curing of sealants including special conditions governing use.
.2 Joint-Width Conditions:
  .1 Do not proceed with installation of joint sealants where joint widths are less than those allowed by joint sealant manufacturer for applications indicated.
.3 Joint-Substrate Conditions:
  .1 Do not proceed with installation of joint sealants until contaminants capable of interfering with adhesion are removed from joint substrates.

1.8 ENVIRONMENTAL REQUIREMENTS

.1 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of hazardous materials; and regarding labeling and provision of Material Safety Data Sheets (MSDS) acceptable to Labour Canada.

1.9 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 Handle and dispose of hazardous materials in accordance with the CEPA, TDGA, Provincial and Municipal regulations.

2 Products

2.1 SEALANT MATERIALS

.1 Do not use caulking that emits strong odors, contains toxic chemicals or is not certified as mold resistant in air handling units.
.2 When low toxicity caulks are not possible, confine usage to areas which off gas to exterior, are contained behind air barriers, or are applied several months before occupancy to maximize off gas

time.
.3 Where sealants are qualified with primers use only these primers.
.4 Sealants acceptable for use on this project must be listed on CGSB Qualified Products List, issued by CGSB Qualification Board for Joint Sealants.

2.2 SEALANT MATERIAL DESIGNATIONS

.1 Sealants for vertical and horizontal non-traffic bearing joints, to Table 1, CGSB 19-GP-23.
.2 Multi-component, self leveling, chemical curing polyurethane.
  .1 Tremco "THC-900".
  .2 Sonneborn "ASL2".
.3 Urethanes One Part.
  .1 Non-Sag to CAN/CGSB-19.13, Type 2, MCG-2-25.
  .2 Acceptable material:
    .1 Tremco "Dymonic".
    .2 Sonneborn "NP-1".
.4 Silicones One Part.
  .1 To CAN/CGSB-19.13.
  .2 Acceptable Material:
    .1 Tremco "Proglaze".
    .2 Sonneborn "Omniplus"
.5 Acrylics One Part.
  .1 To CGSB 19-GP-5M.
  .2 Acceptable material:
    .1 Tremco "Mono 555".
    .2 Sonneborn "Multi-Purpose"
.6 Acrylic Latex One Part.
  .1 To CAN/CGSB-19.17.
  .2 Acceptable Material:
    .1 Tremco "Butyl 200"
    .2 Tremco "Acrylic Latex Caulk"
    .3 Sonneborn "Sonolac"
.7 Acoustical Sealant.
  .1 To CAN/CGSB 19.21 M87.
  .2 Acceptable Material:
    .1 Tremco Acoustical Sealant.
.8 Butyl.
  .1 To CGSB 19-GP-14M.
  .2 Acceptable material:
    .1 Tremco "Butyl 200"
    .2 Tremco "Acrylic Latex Caulk"
    .3 Sonneborn "Sonolac"
.9 Preformed Compressible and Non-Compressible back-up materials.
  .1 Polyethylene, Urethane, Neoprene or Vinyl Foam.
    .1 Extruded closed cell foam backer rod.
    .2 Size: oversize 30 to 50 %.
    .3 Hardness 20.
    .4 Tensile strength 3000 to 4000 lb/ft^2.
  .2 Neoprene or Butyl Rubber.
    .1 Round solid rod, Shore A hardness 70.
  .3 High Density Foam.
    .1 Extruded closed cell polyvinyl chloride (PVC), extruded polyethylene, closed cell, Shore A hardness 20, tensile strength 140 to 200 kPa, extruded polyolefin foam, 32 kg/m3 density, or neoprene foam backer, size as recommended by

manufacturer.

.4 Bond Breaker Tape.

.1 Polyethylene bond breaker tape which will not bond to sealant.

.10 Seam sealer: one component fast skinning elastomer to CAN2-19.13-M82.

.11 Color of sealants: to be selected by Consultant.

2.3 JOINT CLEANER

.1 Non-corrosive and non-staining type, compatible with joint forming materials and sealant recommended by sealant manufacturer.

.2 Primer: as recommended by manufacturer.

3 Execution

3.1 PROTECTION

.1 Protect installed Work of other trades from staining or contamination.

3.2 SURFACE PREPARATION

.1 Examine joint sizes and conditions to establish correct depth to width relationship for installation of backup materials and sealants.

.2 Clean bonding joint surfaces of harmful matter substances including dust, rust, oil grease, and other matter which may impair Work.

.3 Do not apply sealants to joint surfaces treated with sealer, curing compound, water repellent, or other coatings unless tests have been performed to ensure compatibility of materials. Remove coatings as required.

.4 Ensure joint surfaces are dry and frost free.

.5 Prepare surfaces in accordance with manufacturer's directions.

3.3 PRIMING

.1 Where necessary to prevent staining, mask adjacent surfaces prior to priming and caulking.

.2 Prime sides of joints in accordance with sealant manufacturer's instructions immediately prior to caulking.

3.4 BACKUP MATERIAL

.1 Apply bond breaker tape where required to manufacturer's instructions.

.2 Install joint filler to achieve correct joint depth and shape, with approximately 30% compression.

3.5 MIXING

.1 Mix materials in strict accordance with sealant manufacturer's instructions.

3.6 APPLICATION

.1 Sealant.

.1 Apply sealant in accordance with manufacturer's written instructions.

.2 Mask edges of joint where irregular surface or sensitive joint border exists to provide neat joint.

.3 Apply sealant in continuous beads.

.4 Apply sealant using gun with proper size nozzle.

.5 Use sufficient pressure to fill voids and joints solid.

.6 Form surface of sealant with full bead, smooth, free from ridges, wrinkles, sags, air pockets, embedded impurities.

.7 Tool exposed surfaces before skinning begins to give slightly concave shape.

.8 Remove excess compound promptly as work progresses and upon completion.

.2 Curing.

.1 Cure sealants in accordance with sealant manufacturer's instructions.

.2 Do not cover up sealants until proper curing has taken place.

.3 Cleanup.

.1 Clean adjacent surfaces immediately and leave Work neat and clean.

.2 Remove excess and droppings, using recommended cleaners as work progresses.

.3 Remove masking tape after initial set of sealant.

End of Section

1 General

1.1 WORK INCLUDED

.1 All hollow metal (HM) steel frames, and doors as per Door Schedule, and as detailed on Drawings.

1.2 RELATED SECTIONS

.1 Section 01 33 00 - Submittal Procedures.
.2 Section 07 92 00 - Joint Sealants.
.3 Section 08 71 00 - Door Hardware.
.4 Section 09 22 16 - Non-Structural Metal Framing.
.5 Section 09 91 00 - Painting
.6 Division 23 - Mechanical
.7 Division 26 Electrical: Wiring for electronic hardware.

1.3 REFERENCES

.1 Canadian Standards Association (CSA).
  .1 CSA A101-M1983, Thermal Insulation, Mineral Fibre, for Buildings.
  .2 CSA W59-M1989, Welded Steel Construction (Metal Arc Welding).
.2 Canadian General Standards Board (CGSB).
  .1 CAN/CGSB-1.181-92, Ready-Mixed Organic Zinc-Rich Coating.
  .2 CGSB 51-GP-21M-78, Thermal Insulation, Urethane and Isocyanurate, Unfaced.
.3 American Society for Testing and Materials (ASTM).
  .1 ASTM A 525M-91b, Specification for General Requirements for Steel Sheet Zinc-Coated (Galvanized) by the Hot-Dip Process Metric.
  .2 ASTM A 526M-90, Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Commercial Quality.
  .3 ASTM A 527M-90, Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Lock-Forming Quality.
  .4 ASTM B 29-92, Specification for Pig Lead.
  .5 ASTM B 749-85(1991), Specification for Lead and Lead Alloy Strip, Sheet and Plate Products.
.4 Underwriters' Laboratories of Canada (ULC).
  .1 CAN4-S104M-M80, Fire Tests of Door Assemblies.
  .2 CAN4-S105M-M85, Fire Door Frames.
.5 Canadian Steel Door and Frame Manufacturers' Association (CSDFMA).
  .1 CSDFMA, Specifications for Commercial Steel Doors and Frames, 1990.
  .2 CSDFMA, Recommended Selection and Usage Guide for Commercial Steel Doors, 1990.
.6 National Fire Protection Association (NFPA).
  .1 NFPA 80-1999, Fire Doors and Windows.
  .2 NFPA 252-1990, Door Assemblies, Fire Tests of.

1.4 DESIGN REQUIREMENTS

.1 Maximum deflection for interior steel entrance screens under wind load of 1.2 kPa not to exceed 1/175th of span.

1.5 SHOP DRAWINGS

.1 Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.
.2 Indicate each type of door, material, steel core thicknesses, mortises, reinforcements, location of exposed fasteners, openings, glazed, arrangement of hardware and and finishes.
.3 Indicate each type frame material, core thickness, reinforcements, glazing stops, location of

anchors and exposed fastenings and finishes.

.4 Include schedule identifying each unit, with door marks and numbers relating to numbering on drawings and door schedule.

.5 Submit test and engineering data, and installation instructions

1.6 REQUIREMENTS OF REGULATORY AGENCIES

.1 Steel fire rated doors and frames: labelled and listed by an organization accredited by Standards Council of Canada in conformance with CAN4-S104M and NFPA 252 for ratings specified or indicated.

.2 Provide fire labelled frame products for those openings requiring fire protection ratings, as scheduled. Test products in strict conformance with CAN4-S104, ASTM E 152 or NFPA 252 and list by nationally recognized agency having factory inspection service and construct as detailed in Follow-Up Service Procedures/Factory Inspection Manuals issued by listing agency to individual manufacturers.

1.7 OPENING SIZES

.1 Method of measuring sizes:

.2 Width - Width of openings shall be measured from inside to inside of frame jamb rabbets.

.3 Height - Heights of openings shall be measured from the level finished floor (exclusive of floor coverings to the head rabbet of the frame.

1.8 WASTE MANAGEMENT AND DISPOSAL

.1 Collect and separate waste material in appropriate on-site bins in accordance with Waste Management Plan.

.2 Divert unused paint and sealant materials from landfill to official hazardous material collections site.

.3 Do not dispose of unused paint and sealant materials into sewer systems, into lakes, streams, onto ground or in other locations where it will pose health or environmental hazard.

2 Products

2.1 MATERIALS

.1 Hot dipped galvanized steel sheet: to ASTM A 526M or ASTM A 527M coating designation to ASTM A 525M, ZF75, minimum base steel thickness in accordance with CSDFMA Table 1 - Thickness for Component Parts.

.2 Reinforcement channel: to CAN/CSA-G40.21, Type 44W, coating designation to ASTM A 525M, ZF75.

.3 Cast or rolled pure sheet lead: to ASTM B 29 or ASTM B 749, weight: 19.5 kg/m2, thickness 1.6 mm

.4 Composites: balance of core materials used in conjunction with lead: in accordance with manufacturers' proprietary design.

2.2 DOOR CORE MATERIALS

.1 Honeycomb construction:

.1 Structural small cell, 24.5 mm maximum kraft paper 'honeycomb', weight: 36.3 kg per ream minimum, density: 16.5 kg/m3 minimum sanded to required thickness.

2.3 DOOR CONSTRUCTION

.1 Form each face sheet for exterior doors from 18 gage sheet steel.

.2 Form each face sheet for interior doors from 18 gage sheet steel.

2.4 DOOR FABRICATION GENERAL

.1 Doors: swing type, flush, with provision for glass and/or louvre openings as indicated.
.2 Interior doors: honeycomb construction.
.3 Blank, reinforce, drill doors and tap for mortised, templated hardware and electronic hardware.
.4 Provide fire labelled doors for those openings requiring fire protection ratings, as scheduled. Test such products in strict conformance with CAN4-S104, ASTM E 152 or NFPA 252 and list by nationally recognized agency having factory inspection service and construct as detailed in Follow-Up Service Procedures/Factory Inspection Manuals issued by listing agency to individual manufacturers.
.5 Factory prepare holes 12.7 mm diameter and larger except mounting and through-bolt holes, on site, at time of hardware installation.
.6 Provide factory-applied touch-up primer at areas where zinc coating has been removed during fabrication.

2.5 ADHESIVES

.1 Honeycomb cores and steel components: heat resistant, spray grade, resin reinforced neoprene/rubber (polychloroprene) based, low viscosity, contact cement.
.2 Polystyrene and polyurethane cores: heat resistant, epoxy resin based, low viscosity, contact cement.
.3 Lock-seam doors: fire resistant, resin reinforced polychloroprene, high viscosity, sealant/adhesive.

2.6 PRIMERS

.1 Touch-up prime CAN/CGSB-1.181.

2.7 ACCESSORIES

.1 Door silencers: single stud rubber/neoprene type.

2.8 FRAMES: WELDED TYPE

.1 Welding in accordance with CSA W59.
.2 Accurately mitre or mechanically joint frame product and securely weld on inside of profile.
.3 Cope accurately and securely weld butt joints of mullions, transom bars, centre rails and sills.
.4 Grind welded joints and corners to a flat plane, fill with metallic paste and sand to uniform smooth finish.
.5 Securely attach floor anchors to inside of each jamb profile.
.6 Weld in 2 temporary jamb spreaders per frame to maintain proper alignment during shipment.
.7 When required due to site access or due to shipping limitations, frame products for large openings shall be fabricated in sections, with splice joints for field assembly by others.

2.9 HARDWARE PREPARATION

.1 Doors and frames shall be prepared to receive hardware.
.2 Unless otherwise shown on the drawings, locate hardware in accordance with the Recommended Locations For Architectural Hardware as published by the Door and Hardware Institute.
.3 Prepare doors and frames to receive electrified hardware. Frame preparation shall include the application of shallow back boxes suitable for EMT termination at all device locations. Back boxes shall be welded to frames and shall be provided for all electrified devices including door position indicators. Back boxes shall be of sufficient size allowing for wiring, connectors, and the device to be properly installed in the mortise.
.4 Door preparation shall include the installation of conduit or suitable wire raceway within door assemblies during fabrication.

2.10 ACCEPTABLE MATERIAL

.1 Only steel door and frame products supplied by the following CSDFMA members are eligible for use on this project:
- .1 Ambico Limited;
- .2 Apex Machine Works Limited;
- .3 Daybar Industries Limited;
- .4 S.W. Fleming Ltd.;
- .5 Coastal Door and Frame Ltd.

3 Execution

3.1 INSTALLATION GENERAL

.1 Install labeled steel fire rated doors and frames to NFPA 80 except where specified otherwise.
.2 Install doors and frames to CSDMA Installation Guide.

3.2 FRAME INSTALLATION

.1 Set frames plumb, square, level and at correct elevation.
.2 Secure anchorages and connections to adjacent construction.
.3 Brace frames rigidly in position while building-in. Install temporary horizontal wood spreader at third points of door opening to maintain frame width. Provide vertical support at center of head for openings over 1200 mm wide. Remove temporary spreaders after frames are built-in.
.4 Make allowances for deflection of structure to ensure structural loads are not transmitted to frames.
.5 Caulk perimeter of frames between frame and adjacent material.
.6 Maintain continuity of vapor barrier and air barrier.

3.3 DOOR INSTALLATION

.1 Install doors and hardware in accordance with hardware templates and manufacturer's instructions and Section 08 71 00 - Door Hardware.
.2 Provide even margins between doors and jambs and doors and finished floor and thresholds as follows.
- .1 Hinge side: 1.0 mm.
- .2 Latch side and head: 1.5 mm.
- .3 Finished floor, top of carpet: 13 mm.

.3 Adjust operable parts for correct function.
.4 Install louvers.

3.4 FINISH REPAIRS

.1 Touch up with primer finishes damaged during installation with zinc primer to CGSB 1-GP-181.
.2 Fill exposed frame anchors and with metallic paste filler and sand to a uniform smooth finish.

End of Section

1 General

1.1 SCOPE OF WORK

.1 Supply and deliver all finish hardware as specified in hardware sets for doors listed on door schedule. Hardware shall include all fasteners and devices necessary for the proper installation of hardware.

1.2 RELATED SECTIONS

.1 Division 01 - General Requirements.
.2 Section 01 33 00 - Submittal Procedures.
.3 Section 01 78 00 - Closeout Submittals.
.4 Section 08 11 13 - Hollow Metal Doors and Frames.

1.3 REFERENCES

.1 Canadian Steel Door and Frame Manufacturers' Association (CSDFMA).
  .1 CSDFMA Canadian Metric Guide for Steel Doors and Frames (Modular Construction) prepared by Canadian Steel Door and Frames Manufacturer's Association.
.2 Canadian General Standards Board (CGSB).
  .1 CAN/CGSB 69.17 M86(R1993), Bored and reassembled Locks and Latches.
  .2 CAN/CGSB 69.18 M90/ANSI/BHMA A156.1 1981, Butts and Hinges.
  .3 CAN/CGSB 69.19 93/ANSI/BHMA A156.3 1984, Exit Devices.
  .4 CAN/CGSB 69.20 M90/ANSI/BHMA A156.4 1986, Door Controls (Closers).
  .5 CAN/CGSB 69.21 M90/ANSI/BHMA A156.5 1984, Auxiliary Locks and Associated Products.
  .6 CAN/CGSB 69.22 M90/ANSI/BHMA A156.6 1986, Architectural Door Trim.
  .7 CAN/CGSB 69.24 M90/ANSI/BHMA A156.8 1982, Door Controls Overhead Holders.
  .8 CAN/CGSB 69.26 96/ANSI/BHMA A156.10 1991, Power operated Pedestrian Doors.
  .9 CAN/CGSB 69.28 M90/ANSI/BHMA A156.12 1986, Interconnected Locks and Latches.
  .10 CAN/CGSB 69.29 93/ANSI/BHMA A156.13 1987, Mortise Locks and Latches.
  .11 CAN/CGSB 69.30 93/ANSI/BHMA A156.14 1991, Sliding and Folding Door Hardware.
  .12 CAN/CGSB 69.31 M89/ANSI/BHMA A156.15 1981, Closer/Holder Release Device.
  .13 CAN/CGSB 69.32 M90/ANSI/BHMA A156.16 1981, Auxiliary Hardware.
  .14 CAN/CGSB 69.33 M90/ANSI/BHMA A156.17 1987, Self closing Hinges and Pivots.
  .15 CAN/CGSB 69.34 93/ANSI/BHMA A156.18 1987, Materials and Finishes.
  .16 CAN/CGSB 69.35 M89/ANSI/BHMA A156.19 1984, Power Assist and Low Energy Power Operated Doors.
  .17 CAN/CGSB 69.36 M90/ANSI/BHMA A156.20 1984, Strap and Tee Hinges and Hasps.
.3 All hardware shall comply with requirements of the National Building Code (2005).

1.4 REQUIREMENTS OF REGULATORY AGENCIES

.1 Use ULC listed and labeled hardware for doors in fire separations and where noted on Door Schedule (located at the end of this document in the Schedules section).

1.5 SUBMITTALS

.1 Product Data:
  .1 Submit manufacturer's printed product literature, specifications and data sheet in accordance with Section 01 33 00 - Submittal Procedures.
.2 Hardware List:
  .1 Submit eight (8) copies of Finish Hardware Schedule for approval. Schedule shall be written in accordance with DHI Sequence and Format for vertical hardware schedule

publication. Schedule shall reference item and door number to hardware set specified. Door index to be included referencing the door number to scheduled item number.

.2 Submit eight (8) copies of keying schedules for approval. Schedule shall be written in accordance with DHI Handbook Keying Schedule Systems and Nomenclature. Coordinate all keying in writing.

.3 Manufacturer's Instructions:

.1 Submit manufacturer's installation instructions.

.2 Provide template drawings as requested.

.4 Closeout Submittals

.1 Provide operation and maintenance data for door closers, lockets, door holders electrified hardware and fire exit hardware for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

.2 At completion of job, supply a maintenance manual. For each lockset, door closer, door holder and exit device the manual shall include:

.1 Catalogue pages.

.2 Parts lists.

.3 Manufacturers representative's name, address and telephone number.

.4 Maintenance instructions.

1.6 QUALITY ASSURANCE

.1 Hardware supplier must have on staff an Architectural Hardware Consultant or person of equivalent qualification and experience. Hardware supplier must have been in hardware supply for a minimum of two (2) years, have supplied similar type projects, and have adequate facilities to service project.

1.7 DELIVERY, STORAGE, AND HANDLING

.1 Trade Contractor to provide clean, dry locked room for storage of hardware on shelving.

.2 Each hardware item shall be delivered to site in manufacturers original packaging. Each item shall be labeled with door and item number to correspond with hardware schedule.

.3 All hardware will be delivered to one receiving are on site.

1.8 MAINTENANCE

.1 Extra Materials:

.1 Provide maintenance materials in accordance with Section 01 78 00 - Close Out Submittals.

1.9 WARRANTY

Furnish a one-year written warranty for all products with exceptions of door closers, Mortise locksets and latchsets which shall be warranted for ten (10) years, and exit devices and trim, overhead holders and stops which shall be warranted for five (5) years.

1.10 WASTE DISPOSAL AND MANAGEMENT

.1 Dispose of corrugated cardboard, polystyrene, and plastic packaging material in appropriate on site bin in accordance with site Waste Management Program.

2 Products

2.1 MANUFACTURERS

.1 Acceptable Material: Specified in Hardware Sets.

.1 Hinges:

.1 McKinney TA714/ TA314. (to match existing).
.2 Locksets:
.1 Thumb turn lock (to match existing).
.3 Push/Pull Set:
.1 To match existing.
.4 Door Operator:
.1 Easy access; Series 7100 surface operator with C4190 control (to match existing).

2.2 FINISH

.1 Finish for this project in general shall be 626 (Satin Chrome to match existing). Exceptions are as noted in hardware packages.

2.3 KEYING

.1 Keying Schedule to be reviewed by Consultant and Client prior to order and fabrication.
.2 All locks to be keyed alike with Clients existing keying system.
.3 Stamp keying code numbers on keys and cores as required.

2.4 FASTENINGS

.1 Use only fasteners provided by manufacturer. Failure to comply may void warranties and applicable licensed labels.
.2 Supply screws, bolts, expansion shields and other fastening devices required for satisfactory installation and operation of hardware.
.3 Exposed fastening devices to match finish of hardware.
.4 Where pull is scheduled on one side of door and push plate on other side, supply fastening devices, and install so pull can be secured through door from reverse side. Install push plate to cover fasteners.
.5 Use fasteners compatible with material through which they pass.

3 Excecution

3.1 MANUFACTURER'S INSTRUCTIONS

.1 Compliance: comply with manufacturer's written data, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and data sheets.
.2 Furnish metal door and frame manufacturers with complete instructions and templates for preparation of their work to receive hardware.
.3 Recommend mounting heights shall be in accordance with Canadian Metric Guide for Steel Doors and Frames (Modular Construction) prepared by Canadian Steel Door and Frame Manufacturer's Association.
.4 Furnish manufacturers' instructions for proper installation of each hardware component.

3.2 INSTALLATION

.1 Install hardware to standard hardware location dimensions in accordance with Canadian Metric Guide for Steel Doors and Frames (Modular Construction) prepared by Canadian Steel Door and Frame Manufacturers' Association.
.2 Where door stop contacts door pulls, mount stop to strike bottom of pull.
.3 Install key control cabinet.
.4 Use only manufacturer's supplied fasteners. Failure to comply may void manufacturer's warranties

and applicable licensed labels. Use of "quick" type fasteners, unless specifically supplied by manufacturer, is unacceptable.

.5 Remove construction cores when directed by Consultant; install permanent cores and check operation of locks.

3.3 ADJUSTING

.1 Adjust door hardware, operators, closures and controls for optimum, smooth operating condition, safety, weather tight closure and to provide tight fit at contact points with frames.

3.4 CLEANING

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

.2 Clean hardware with damp rag and approved non-abrasive cleaner, and polish hardware in accordance with manufacture's instructions.

.3 Remove protective material from hardware items where present.

3.5 PROTECTION

.1 Provide proper protection of all hardware items until Owner accepts project as complete.

End of Section

1 General

1.1 WORK INCLUDED

.1 All drywall work shown or implied on drawings and/or specifications. The work includes but is not necessarily limited to the following:
- .1 Supply and installation of gypsum wallboard to all steel stud partitions, ceilings and bulkheads, as indicated on the drawings including exterior walls framed under a separate contract.
- .2 Supply and installation of exterior gypsum board sheathing.
- .3 Supply and installation of fiberglass insulation and acoustic blankets in walls, as indicated on the drawings.
- .4 Installation of access panels in gypsum wallboard partitions and ceilings as supplied by Mechanical and Electrical trades.
- .5 Supply and installation of gypsum wallboard on metal strapping.
- .6 Allow openings for equipment installed in drywall construction by others.
- .7 Supply and installation of gypsum board column enclosure.

1.2 RELATED SECTIONS

.1 Section 01 33 00- Submittal Procedures.
.2 Section 05 50 00 - Metal Fabrications.
.3 Section 09 22 16 - Non-Structural Metal Framing.
.4 Section 09 91 00 - Painting.
.5 Division 23 - Mechanical - Supply of access doors.
.6 Division 26 - Electrical - Supply of access doors.

1.3 REFERENCES

.1 American Society for Testing and Materials International, (ASTM)
- .1 ASTM C36/C36M-01, Specification for Gypsum Wallboard.
- .2 ASTM C79/C79M-01, Standard Specification for Treated Core and Non-treated Core Gypsum Sheathing Board.
- .3 ASTM C442/C442M-01, Specification for Gypsum Backing Board, Gypsum Coreboard, and Gypsum Shaftliner Board.
- .4 ASTM C475-01, Specification for Joint Compound and Joint Tape for Finishing Gypsum Board.
- .5 ASTM C514-01, Specification for Nails for the Application of Gypsum Board.
- .6 ASTM C557-99, Specification for Adhesives for Fastening Gypsum Wallboard to Wood Framing.
- .7 ASTM C630/C630M-01, Specification for Water-Resistant Gypsum Backing Board.
- .8 ASTM C840-01, Specification for Application and Finishing of Gypsum Board.
- .9 ASTM C931/C931M-01, Specification for Exterior Gypsum Soffit Board.
- .10 ASTM C954-00, Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs From 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness.
- .11 ASTM C1002-01, Specification for Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs.
- .12 ASTM C1047-99, Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base.
- .13 ASTM C1280-99, Specification for Application of Gypsum Sheathing Board.
- .14 ASTM C1177-01, Specification for Glass Mat Gypsum Substrate for Use as Sheathing.
- .15 ASTM C1178/C1178M-01, Specification for Glass Mat Water-Resistant Gypsum Backing Board.

.2 Association of the Wall and Ceilings Industries International (AWEI)
.3 Canadian General Standards Board (CGSB)
  .1 CAN/CGSB-51.34-M86(R1988), Vapor Barrier, Polyethylene Sheet for Use in Building Construction.
  .2 CAN/CGSB-71.25-M88, Adhesive, for Bonding Drywall to Wood Framing and Metal Studs.
.4 Underwriters' Laboratories of Canada (ULC)
  .1 CAN/ULC-S102-1988(R2000), Surface Burning Characteristics of Building Materials and Assemblies.

1.4 ENVIRONMENTAL REQUIREMENTS

.1 Maintain temperature minimum 10°C, maximum 21°C for 48 hours prior to and during application of gypsum boards and joint treatment, and for at least 48 hours after completion of joint treatment.
.2 Ensure relative humidity in building is acceptable to material suppliers prior to commencement of installation.
.3 Apply board and joint treatment to dry, frost free surfaces.

1.5 PRODUCT DATA

.1 Submit product data in accordance with Section 01 33 00- Submittals Procedures.
.2 Indicate product composition, highlighting presence of Volatile Organic Compounds (VOC's) and conditions/lengths of time required for material to off-gas VOC's.

1.6 QUALITY ASSURANCE

.1 Execute Work of this section by a Contractor who has adequate plant, equipment and skilled tradesmen to perform it expeditiously and who has been responsible for satisfactory installations similar to that specified, during a period of at least the immediate past three years.

1.7 SITE ENVIRONMENTAL REQUIREMENTS

.1 Do not begin the Work of this Section until:
  .1 Mechanical and Electrical Work above the ceiling is complete.
  .2 Substrate and ambient temperature is above 10°C and below 21°C.
  .3 Relative humidity is below 80%.
  .4 Ventilation is adequate to remove excess moisture.
.2 Install temporary protection and facilities to maintain temperature above specified environmental requirements for 24 hours before, during, and 24 hours after installation of gypsum board, and for at least 48 hours after completion of joint treatment.

1.8 WASTE MANAGEMENT AND DISPOSAL

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

2 Products

2.1 MANUFACTURERS

.1 Products of following manufacturers are acceptable subject to conformance to requirements of Drawings, Schedules and Specifications:
  .1 Bailey Metal Products Ltd.; www.bmp-group.com
  .2 CertainTeed Gypsum Canada Inc.; www.certainteed.com
  .3 CGC Inc; www.cgcinc.com
  .4 Georgia-Pacific Canada, Inc.; www.gpgypsum.com
  .5 Gordon Incorporated.; www.gordongrid.com

.6 Roll Formed Specialty; www.rollformed.com

2.2 MATERIALS

.1 Sealants: in accordance with Section 07 92 00 - Joint Sealants.

.2 Standard board: To ASTM C 36. 15.9 thick, 1219 wide x maximum practical length, Ends square cut, edges tapered.

.1 Acceptable Materials:

.1 CGC Inc.

.2 CertainTeed Gypsum Canada.

.3 G-P Gypsum.

.4 Temple Island Fire Resistant Type X.

.3 Abuse Resistant Gypsum Board to CAN/CAS-A82.27, 16mm thick, 1219mm wide x maximum practical lengths to be used where indicated on finish schedule and:

.1 All corridors to 1219mm Above Finished Floor.

.2 All janitor closets to 1219mm Above Finished Floor (except sink area) to be moisture resistant.

.3 All soiled utility rooms to 1219mm Above Finished Floor (except sink areas) to be moisture resistant.

.4 Acceptable Materials:

.1 Sheetrock Abuse-Resistant Firecode Core Gypsum Panels as manufactured by CGC,

.2 ProRoc Type X Abuse Resistant Gypsum Board as manufactured by Certainteed,

.3 ToughRock Fireguard Type X Abuse Guard Gypsum Board as manufactured by Georgia Pacific,

.4 Abuse Board Gypsum Board as manufactured by Lafarge.

.4 Drywall furring channels: 0.5 mm (25 gauge) core thickness galvanized steel channels for screw attachment of gypsum board.

.5 Resilient drywall furring: 0.5 mm (25 gauge) base steel thickness galvanized steel for resilient attachment of gypsum board.

.6 Nails: to ASTM C 514.

.7 Steel drill screws: to ASTM C 1002.

.8 Acoustical/Fire insulation, thickness as indicated on drawings: Acceptable Materials:

.1 Thermafibre by CGC Inc.

.2 Noise Stop Blanket to Owens Corning Inc.

.3 AFB or Flexibatt by Roxul Inc.

.4 Fibrex Batt SAFB as manufactured by Fibrex Insulations Inc.

.5 Knauf EcoBatt Insulation.

.9 Polyethylene: to CAN/CGSB-51.34, Type 2.

.10 Insulating strip: rubberized, moisture resistant, 3 mm thick closed cell neoprene strip, 13mm wide, with self sticking permanent adhesive on one face, lengths as required.

.11 Plywood: 19 mm Douglas Fir Shop Grade.

.12 Laminating compound: to CSA A82-31 asbestos free.

.13 Joint Compound: Special setting type compound: chemically setting, sandable, to ASTM C475.

.1 Acceptable Material:

.1 Canadian Gypsum Company Sheetrock 90.

.2 CertainTeed ProRoc Moisture and Mould resistant 90 Setting Compound with M2Tech.

.3 Acadia Drywall Sandable 90.

.14 Taping compound: pre-mixed, to ASTM C475.

.1 Acceptable Materials:

.1 Canadian Gypsum Company All Purpose Ready-to-Use Joint Compound.

.2 CertainTeed ProRoc Moisture and Mould resistant 90 Setting Compound with M2Tech.

.3 Acadia Drywall Platinum Lite.

.15 Tape: 50mm wide x 0.25mm thick, perforated paper, with chamfered edges.

.16 Bonding adhesive: type for purpose intended and as recommended and approved by manufacturer (Lepage PL 200 or PL 400).

.17 Access doors: Supplied by other Sections for this installation as part of the Work of this Section.

.18 Metal Accessories:

.1 Corner Beads Minimum 0.40mm, Z180 zinc coated sheet steel to ASTM A525; beaded angle; flanges 32mm for 16mm board.

.2 Casing Beads: Minimum 0.40mm, Z180 zinc coated sheet steel to ASTM A525; "L" type; beaded angle or casing with one (1) side knurled for joint filling; suitable for 15.9mm wallboard, as specified.

.3 Casing Beads, corner beads, control joints and edge trim: to ASTMC 1047, Zinc metal, zinc-coated by hot-dip process zinc-coated by electrolytic process aluminum coated phosphatized, 0.5mm base thickness, perforated flanges, one piece length per location.

.4 Control joint strip: Roll formed from galvanized steel sheet, with a tape-protected recess, 6mm wide x 41mm deep.

.19 Water: Fresh clean potable water, free from deleterious matter, acids or alkalies.

.20 Fire Wall Identification:

.1 Paint to be ICI Dulux 14030 Interior Acrylic Low sheen eggshell.

.21 Shaft Walls:

.1 Materials: Materials and framing members listed by ULC or WHI for use as a component within tested design assemblies to provide the specified fire resistance rating.

.2 Stud and Track Components: Fabricated from steel meeting ASTM A446, Grade A, Z180 zinc coating to ASTM A525. Steel "I" or "CH" studs, "J" tracks. "T" splines, "L" runners with steel I and J tracks 100mm deep and 20 gauge thick and fasteners of design and gauge as used within tested assembly.

.3 Coreboard: 19mm or 25mm thick, Type "X" gypsum coreboard.

.4 Facing: 15mm UL labeled gypsum wallboard.

.5 Rating Required: Fire-resistance rating as shown on Drawings.

.6 Fire Resistive Sealant: Low modulus, high performance, one part silicone rubber sealant conforming to CAN2-19.13 and listed by ULC as firestop sealant when tested in accordance with CAN4-S115 and bearing FT rating.

.7 Acceptable Material:

.1 Westroc

.2 Georgia Pacific

.3 CGC

.8 Location: Fire rated vertical duct enclosures as shown on the Drawings.

3 Excecution

3.1 ERECTION

.1 Do application and finishing of gypsum board in accordance with CAN/CSA-A82.31 except where specified otherwise.

.2 Do application of gypsum sheathing in accordance with ASTM C 1280.

.3 Erect hangers and runner channels for suspended gypsum board ceilings in accordance with CAN/CSA-A82.31 except where specified otherwise.

.4 Support light fixtures by providing additional ceiling suspension hangers within 150 mm of each corner and at maximum 600 mm around perimeter of fixture.

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

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

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

track.

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

.9 Furr above suspended ceilings for gypsum board fire and sound stops and to form plenum areas as indicated.

.10 Install wall furring for gypsum board wall finishes in accordance with CAN/CSA-A82.31, except where specified otherwise.

.11 Furr openings and around built-in equipment, cabinets, and access panels, on four sides. Extend furring into reveals. Check clearances with equipment suppliers.

.12 Furr duct shafts, beams, columns, pipes and exposed services where indicated.

3.2 APPLICATION

.1 Do not apply gypsum board until bucks, anchors, blocking, sound attenuation, electrical and mechanical work are approved.

.2 Apply single layer gypsum board to framing using screw fasteners. Maximum spacing of screws 300 mm on center.

- .1 Single-Layer Application:
  - .1 Apply gypsum board on ceilings prior to application of walls in accordance with ASTM C840.
  - .2 Apply gypsum board vertically or horizontally, providing sheet lengths that will minimize end joints.
- .2 Double-Layer Application:
  - .1 Install gypsum board for base layer and exposed gypsum board for face layer.
  - .2 Apply base layer to ceilings prior to base layer application on walls; apply face layers in same sequence. Offset joints between layers at least 250 mm.
  - .3 Apply base layers at right angles to supports unless otherwise indicated.
  - .4 Apply base layer on walls and face layers vertically with joints of base layer over supports and face layer joints offset at least 250 mm with base layer joints.

.3 Apply single layer gypsum board to concrete or concrete block surfaces, where indicated, using laminating adhesive.

- .1 Comply with gypsum board manufacturer's recommendations.
- .2 Brace or fasten gypsum board until fastening adhesive has set.
- .3 Mechanically fasten gypsum board at top and bottom of each sheet.

.4 Exterior Soffits and Ceilings: Install exterior gypsum board perpendicular to supports; stagger end joints over supports. Install with 6 mm gap where boards abut other work.

.5 Apply water-resistant gypsum board where wall tiles to be applied. Apply water-resistant sealant to edges, ends, cut-outs which expose gypsum core and to fastener heads. Do not apply joint treatment on areas to receive tile finish.

.6 Apply 12 mm diameter bead of acoustic sealant continuously around periphery of each face of partitioning to seal gypsum board/structure junction where partitions abut fixed building components. Seal full perimeter of cut-outs around electrical boxes, ducts in partitions where perimeter sealed with acoustic sealant.

.7 Install ceiling boards in direction that will minimize number of end-butt joints. Stagger end joints at least 250 mm.

.8 Install gypsum board on walls vertically to avoid end-butt joints. At stairwells and similar high walls, install boards horizontally with end joints staggered over studs, except where local codes or fire-rated assemblies require vertical application.

.9 Install gypsum board with face side out.

.10 Do not install damaged or damp boards.

.11 Locate edge or end joints over supports. Stagger vertical joints over different studs on opposite sides of wall.

3.3 INSTALLATION

.1 Erect accessories straight, plumb or level, rigid and at proper plane. Use full length pieces where practical. Make joints tight, accurately aligned and rigidly secured. Miter and fit corners accurately, free from rough edges. Secure at 150 mm oc.

.2 Install casing beads around perimeter of suspended ceilings.

.3 Install casing beads where gypsum board butts against surfaces having no trim concealing junction and where indicated. Seal joints with sealant.

.4 Install insulating strips continuously at edges of gypsum board and casing beads abutting metal window and exterior door frames, to provide thermal break.

.5 Construct control joints of preformed units set in gypsum board facing and supported independently on both sides of joint.

.6 Provide continuous polyethylene dust barrier behind and across control joints.

.7 Locate control joints above door frame jambs, at changes in substrate construction, at approximate 10 m spacing on long corridor runs and at approximate 15 m spacing on ceilings, and as shown on drawings or as approved by Consultant.

.8 Install control joints straight and true.

.9 Construct expansion joints at building expansion and construction joints. Provide continuous dust barrier.

.10 Install expansion joint straight and true.

.11 Install access doors to electrical and mechanical fixtures and dampers specified in respective Sections and where fire rating is required, must meet code.

.1 Rigidly secure frames to furring or framing systems.

.12 Finish face panel joints and internal angles with joint system consisting of joint compound, joint tape and taping compound installed according to manufacturer's directions and feathered out onto panel faces.

.13 Finish corner beads, control joints and trim as required with two coats of joint compound and one coat of taping compound, feathered out onto panel faces.

.14 Fill screw head depressions with joint and taping compounds to bring flush with adjacent surface of gypsum board so as to be invisible after surface finish is completed.

.15 Sand lightly to remove burred edges and other imperfections. Avoid sanding adjacent surface of board.

.16 Completed installation to be smooth, level or plumb, free from waves and other defects and ready for surface finish.

.17 Install column enclosure.

.18 Install polyethylene vapour barrier as indicated. Seal to exterior air barrier with acoustical sealant.

.1 Do not apply gypsum board until bucks, anchors, blocking, electrical and mechanical work are approved.

.2 Apply single or double layer gypsum board to metal furring or framing using screw fasteners for first layer, and screw fasteners for second layer. Maximum spacing of screws 300 mm oc.

.3 Apply single or double layer gypsum board to concrete and concrete block surfaces, where indicated, using laminating adhesive.

.4 Apply water resistant gypsum board in areas where water is present (around janitor sinks, behind sinks, etc.). Apply water-resistant sealant to edges, ends, cut-outs which expose gypsum core and to fastener heads.

.19 Apply 12 mm diameter bead of acoustic sealant continuously around periphery of each face of partitioning to seal gypsum board/structure junction where partitions abut fixed building components. Caulking must not be exposed to view.

3.4 ACOUSTICAL SEALANT

.1 Install acoustical sealant to acoustically insulated partitions in accordance with manufacturer's written instructions and drawings.
  .1 Install acoustical sealant under floor runner track, at partition perimeter both sides and at openings, cutouts, and penetrations, concealed from view in the final installation.

3.5 WALL FURRING

.1 Furr above suspended ceilings for gypsum board fire and sound stops and to form plenum areas as indicated.
.2 Furr duct shafts, beams, columns, pipes and exposed services where indicated.
.3 Install wall furring for gypsum board wall finishes in accordance with ASTMC840, except where specified otherwise.

3.6 FIRE RATED ASSEMBLIES

.1 Construct fire rated assemblies where indicated.
  .1 2 hour fire rated partition assembly, ULI Design No. U411.
  .2 1 hour fire rated partition assembly, ULC Design No. W408.
  .3 1 hour fire rated floor/ceiling assembly, ULC Design No. G512.
.2 Install fire rated assemblies in accordance with applicable ULC tested and approved designs.
.3 Stiffen fire rated walls over 3660mm high, where linear length of wall is greater than 2440mm between perpendicular wall supports, with diagonal bracing above the ceiling extending perpendicular to wall at a 45° angle to structure above. Locate diagonal bracing at maximum 2440mm o/c.
.4 Where double layers of gypsum board are shown, and required for fire rating, screw first layer to studs and furring and laminate the second layer to the first using joint filler as an adhesive. Stagger joints between first and second layers.

3.7 ACOUSTICAL INSULATION

.1 Install acoustical insulation in partitions, between steel studs of exterior insulation and finish system, and as indicated on drawings and in accordance with the manufacturer's written instructions. Fill stud cavities to full heights of partitions and carefully cut and fit acoustic insulation around services and protrusions.

3.8 ACCESSORIES

.1 Erect accessories straight, plumb or level, rigid and at proper plane. Use full length pieces where practical. Make joints tight, accurately aligned and rigidly secured. Miter and fit corners accurately, free from rough edges. Secure at 150 mm o/c using contact adhesive for full length.
.2 Install casing beads where gypsum board butts against surfaces having no trim concealing junction and where indicated. Seal joints with sealant.
.3 Install cover plates, cell closures and flashings as detailed.

3.9 CONTROL JOINTS

.1 Construct control joints of preformed units set in gypsum board facing and supported independently on both sides of joint.
.2 Provide continuous polyethylene dust barrier behind and across control joints.
.3 Locate control joints above door frame jambs, at changes in substrate construction, at approximate 10 m spacing on long corridor runs, and at approximate 15 m spacing on ceilings, and as shown on drawings, or as approved by Consultant.
.4 Install control joints straight and true.

3.10 ACCESS DOORS

.1 Install access doors to electrical and mechanical fixtures specified in respective Sections as required by Divisions 23 and 26 to service concealed equipment and fixtures. Reflected Ceiling Plans are not definitive as to the location of all required access doors.
.2 Rigidly secure frames to furring or framing systems.
.3 Do not install access doors in 2184 mm AFF bulkheads or ceilings.
.4 Install access doors minimum 50 mm from wall/ceiling junction and 150 mm from wall/floor intersection.
.5 Install access doors only in previously approved locations.

3.11 TAPING AND FILLING

.1 Finish face panel joints, internal angles and existing plaster junctures with joint system consisting of joint compound, joint tape and taping compound installed according to manufacturer's directions and feathered out onto panel or existing plaster faces.
.2 Finish corner beads, control joints and trim as required with two coats of joint compound and one coat of taping compound, feathered out onto panel faces.
.3 Fill screw head depressions with joint and taping compounds installed according to manufacturer's directions to bring flush with adjacent surface of gypsum board or gypsum plaster so as to be invisible after surface finish is completed.
.4 Sand lightly to remove burred edges and other imperfections. Avoid sanding adjacent surface of board.
.5 Completed installation to be smooth, level or plumb, free from waves and other defects and ready for surface finish.

3.12 FIRE WALL IDENTIFICATION

.1 Following installation of gypsum board and painting. Provide identification on fire walls.
.2 Using two stencils cut out to read "1-Hour Fire Rated" and "2-Hour Fire Rated" in 75mm high letters.
.3 Using stencil and spray can of paint to transfer the information to the appropriate walls above the ceiling level at 3000mm o/c. on both sides of wall.

End of Section

1 General

1.1 WORK INCLUDED

.1 Supply and install non-load bearing steel stud systems, and furring systems for exterior perimeter and interior walls and drywall work included in Section 09 21 16 - Gypsum Board Assemblies, all as indicated in the contract documents.
.2 Supply and install suspension systems for drywall ceilings coves and bulkheads.
.3 Receive, unload and install all metal door and screen frames for building in steel stud walls.
.4 Supply and install metal blocking.
.5 Supply and install wind load bearing steel stud systems for exterior walls and drywall work included in Section 09 21 16 - Gypsum Board Assemblies, all as indicated in the contract documents.
.6 This Contractor is responsible for the following:
  .1 Provide all required scaffolding as may be required
  .2 Provide all required trade cleanup
  .3 Provide all required hoisting
  .4 Warranty
  .5 As-built drawings.
  .6 Guarantees
  .7 Delivery F.O.B. Jobsite
  .8 Provide protection of other trades; work from damage by this trade
  .9 For this Tender, include to provide all labour, materials, tools, equipment and supervision necessary to carry out the works required to complete the Work for the Project, in accordance with the Tender Documents, or Work that is reasonably inferable from the documents, and as listed in the above work included.

1.2 RELATED SECTIONS

.1 Section 05 41 00 - Structural Metal Stud Framing
.2 Section 06 08 99 - Rough Carpentry For Minor Works
.3 Section 08 11 13 - Hollow Metal Doors and Frames.
.4 Section 09 21 16 - Gypsum Board Assemblies
.5 Division 10 - Specialties
.6 Division 23 - Mechanical
.7 Division 26 - Electrical

1.3 REFERENCES

.1 American Society for Testing and Materials International, (ASTM).
  .1 ASTM C645-00, Specification for Nonstructural Steel Framing Members.
  .2 ASTM C754-00, Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products.

1.4 QUALITY ASSURANCE

.1 Execute Work of this section by a Contractor who has adequate plant, equipment and skilled tradesman to perform it expeditiously, and who has been responsible for satisfactory installations similar to that specified, during a period of at least the immediate past three (3) years.
.2 Attend pre-installation meeting to verify project requirements, manufacturer's installation instructions and manufacturer's warranty requirements.

1.5 WASTE MANAGEMENT AND DISPOSAL

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

2 Products

2.1 MATERIALS (NON-LOAD BEARING WALL FRAMING)

.1 Non-load bearing channel stud framing: to ASTM C645, stud sizes as noted on drawings, including 32, 64, 92 and 152mm stud sizes, roll formed from 0.84 mm (20 gauge) thickness hot dipped galvanized steel sheet, for screw attachment of gypsum board. Knock-out service holes at 460 mm centers.

.2 Deflection for interior stud walls to be L/240 maximum.

.3 Floor and ceiling tracks: to ASTM C645, in widths to suit stud sizes, 32 mm flange height.

.4 Metal channel stiffener: 13 x 38 mm size, 1.4 mm (18 gauge) thick cold rolled steel, coated with rust inhibitive coating.

.5 Acoustical sealant: to CAN/CGSB-19.21 to perimeter of walls with acoustic insulation.

.6 Insulating strip: rubberized, moisture resistant 3 mm thick foam strip, 12 mm wide, with self sticking adhesive on one face, lengths as required.

.7 Wall Reinforcement metal blocking: 14 ga. X 610 mm wide galvanized metal sheet reinforcement to ASTM A924 at locations including, but not limited to the following:

- .1 All washroom accessories.
- .2 Millwork.
- .3 Zone valve boxes, fire hose cabinets and fire extinguisher cabinets.
- .4 Lockers.
- .5 Wall-mounted door stops.
- .6 All other wall-mounted specialties, including Owner-supplied items.

3 Execution

3.1 ERECTION (NON-LOAD BEARING WALL FRAMING)

.1 Align partition tracks at floor and ceiling and secure at 600 mm o.c. maximum.

.2 Install dampproof course under stud shoe tracks of partitions on slabs on grade.

.3 Place studs vertically at 400 mm o.c. and not more than 50 mm from abutting walls, and at each side of openings and corners. Position studs in tracks at floor and ceiling. Cross brace steel studs as required to provide rigid installation to manufacturer's instructions.

.4 Erect metal studding to tolerance of 1:1000.

.5 Attach studs to bottom track using screws. Do not fix top of studs to ceiling track.

.6 Co-ordinate simultaneous erection of studs with installation of service lines. When erecting studs ensure web openings are aligned.

.7 Co-ordinate erection of studs with installation of door/window frames and special supports or anchorage for work specified in other Sections.

.8 Provide two studs extending from floor to ceiling at each side of openings wider than stud centers specified. Secure studs together, 50 mm apart using column clips or other approved means of fastening placed alongside frame anchor clips.

.9 Erect track at head of door/window openings and sills of sidelight/window openings to accommodate intermediate studs. Secure track to studs at each end, in accordance with manufacturer's instructions. Install intermediate studs above and below openings in same manner and spacing as wall studs. For door widths greater than 1219 mm, incorporate diagonal braced stud at head of opening.

.10 Frame openings and around built-in equipment, cabinets, access panels, on four sides. Extend framing into reveals. Check clearances with equipment suppliers.

.11 Install steel studs or furring channel between studs for attaching electrical and other boxes.

.12 Extend all partitions to underside of deck above except where noted otherwise on drawings. Where partitions occur under and parallel to ductwork, provide steel stud frames around ductwork

to secure partition head. Maintain 12 mm clearance between ductwork, piping or equipment which might transmit vibration to metal framing.

.13 Maintain 19 mm clearance under beams and structural slabs to avoid transmission of structural loads to studs. Use 88 mm leg ceiling tracks.

.14 Install continuous insulating strips to isolate studs from uninsulated surfaces.

.15 Install two lines of stiffeners in partitions up to 2440 mm high and three lines in partitions over 3660 mm high. Install stiffeners snugly in knock out service holes, extended horizontally across entire length of each braced partition and across two full stud spaces at each side of door and screen openings. Wire stiffeners at splices.

.16 Install metal blocking for the attachment of accessories and equipment as required by individual sections and drawings. Blocking to be sized to suit vertically a minimum of 150 mm higher, 150 mm lower than the attachment points and horizontally a minimum of one stud beyond attachment point each way.

.17 Provide and install 18ga wall reinforcement metal sheet on all washroom walls secured to 'flanges' of steel studs with sheet metal screws. Locate bottom of metal sheet at 600 mm AFF.

.18 Install 75mm X 75mm metal angle blocking vertically to all non-90° corners for full height to 150 mm above ceiling and to all corners designated to receive corner guards for height of guard.

.19 Conform to manufacturer recommendations for installation of fire dampers.

.20 Provide diagonal bracing at maximum 1220mm o.c. at large door and screen openings 1200mm and wider in interior partitions between top of frame and floor structure above.

3.2 CLEANING

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

End of Section

1 General

1.1 RELATED SECTIONS

.1 Section 01 33 00 - Submittal Procedures.
.2 Section 01 78 00 - Closeout Submittals.
.3 Section 09 21 16 - Gypsum Board Assemblies: Suspension systems for gypsum board ceilings.
.4 Division 23 - Trim for recessed mechanical fixtures.
.5 Section 26 50 00 - Lighting.

1.2 REFERENCES

.1 American Society for Testing and Materials (ASTM International)
  .1 ASTM C635-00, Specifications for the Manufacture, Performance and Testing of Metal Suspension Systems for Acoustical Tile and Lay-In Panel Ceilings.
  .2 ASTM C636-96, Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels.

1.3 DESIGN REQUIREMENTS

.1 Maximum deflection: 1/360th of span to ASTM C635 deflection test.

1.4 SAMPLES

.1 Submit samples in accordance with Section 01 33 00 - Submittal Procedures.
.2 Submit one representative model of each type ceiling suspension system.
.3 Ceiling system to show basic construction and assembly, treatment at walls, recessed fixtures, splicing, interlocking, finishes, acoustical unit installation.

1.5 SHOP DRAWINGS

.1 Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.
.2 Submit reflected ceiling plans for special grid patterns as indicated.
.3 Indicate lay-out, and acoustical unit support at ceiling fixture.

1.6 REGULATORY REQUIREMENTS

.1 Fire-resistance rated suspension system: certified by a Canadian Certification Organization accredited by Standards Council of Canada.

1.7 EXTRA MATERIAL

.1 Provide extra materials of acoustic units in accordance with Section 01 78 00 - Closeout Submittals.
.2 Provide minimum 2% of each type of grid and molding or one carton of proportionally assorted components, whichever is greater, required for project for maintenance use. Store where directed.
.3 Provide extra suspension system materials in unopened clearly marked cartons of 12 pieces each of 1220mm long tees and 610mm long tees.
.4 Maintenance material to be of same production run as installed material.

1.8 WASTE MANAGEMENT AND DISPOSAL

.1 Remove from site and dispose of packaging materials at appropriate recycling facilities.
.2 Dispose of waste material in appropriate on-site bins for recycling in accordance with site Waste Management Program.

2 Products

2.1 ACOUSTICAL CEILING SUSPENSION SYSTEM

.1 Intermediate duty system to ASTM C635 with 24mm wide tee.
.2 Basic materials for suspension system: commercial quality cold rolled steel.
.3 Suspension system:
  .1 Fire-rated two directional exposed tee bar grid. Use in the following areas:
    .1 Where ACT is indicated under "Ceiling Material" on the Finish Schedule.
  .2 Size:
    .1 610mm x 610mm
    .2 610mm x 1220mm
    .3 Imperial measure grid.
.4 Fire-resistance rated suspension system: certified for use in 1 hour, Certification Organizations Design No. floor/ceiling and roof/ceiling assembly, Certified two directional exposed tee bar grid.
.5 Exposed tee bar grid components: shop painted satin sheen. Components die cut. Main tee with double web, rectangular bulb and 24 mm rolled cap on exposed face. Cross tee with rectangular bulb; web extended to form positive interlock with main tee webs; lower flange extended and offset to provide flush intersection.
  .1 Exposed cap generally: factory painted satin sheen white.
    Acceptable Material:
    .1 Armstrong - Prelude 7300 series and XL 8300 Series fire rated.
    .2 CGC Interior - Donn DXL - Fire Rated.
.6 Perimeter trim:
  .1 Acceptable material:
    .1 Armstrong - 7800 Series
    .2 CGC-Compasso.
.7 Metal Ceiling Transition Piece:
  .1 Aluminum perimeter trim channel. Color as selected by Consultant from manufacturer STD Color Range.
    Acceptable Material:
    .1 Armstrong - Axiom Perimeter Trim.
  .2 CGC - Compasso
.8 Hanger wire: galvanized soft annealed steel wire.
  .1 3.6 mm diameter for access tile ceilings.
  .2 to ULC design requirements for fire rated assemblies.
  .3 2.6 mm diameter for other ceilings.
.9 Hanger inserts: purpose made.
.10 Carrying channels: 38 x 1.5 mm channel, of 1.5 mm thick painted steel.
.11 Accessories: splices, clips, wire ties, retainers and wall molding flush, to complement suspension system components, as recommended by system manufacturer and as required by ULC Design No. for fire-rated assemblies.

2.2 ACOUSTIC CEILING PANELS

.1 Acoustic Lay-in Panels:
  .1 CAN/CGSB-92.1-M, acoustical units, prefabricated, with white painted textured and/or smooth face, qualified for use in fire rated ceiling assembly;
  .2 ULC or cUL labelled and meeting following performance criteria as determined by CAN/ULC-S101-M and as specified:
    .1 Flame Spread Rating: 25 or under.
    .2 Smoke Developed: 50 or under.
    .3 Fuel Contributed: 25 or under.

.2 Acoustic Lay-In Panels (ACT1):
  .1 610mm X 1220mm X 16mm thick and 610mm X 610mm X 16mm thick.
  .2 VL RH-90 Fire Guard
  .3 Non perforated white (color and texture to match existing).

3 Execution

3.1 INSTALLATION

.1 Installation: in accordance with ASTM C636 except where specified otherwise.
.2 Install suspension system to manufacturer's instructions and Certification Organizations tested design requirements.
.3 Do not erect ceiling suspension system until work above ceiling has been inspected by Consultant.
.4 Secure hangers to overhead structure using attachment methods as indicated.
.5 Install hangers spaced at maximum 1200 mm centers and within 150 mm from ends of main tees.
.6 Lay out center line of ceiling both ways, to provide balanced borders at room perimeter.
.7 Ensure suspension system is co-ordinated with location of related components.
.8 Install wall molding to provide correct ceiling height.
.9 Completed suspension system to support super-imposed loads, such as lighting fixtures and speakers.
.10 Support at light fixtures with additional ceiling suspension hangers within 150 mm of each corner and at maximum 600 mm around perimeter of fixture.
.11 Interlock cross member to main runner to provide rigid assembly.
.12 Frame at openings for light fixtures, air diffusers, speakers and at changes in ceiling heights.
.13 Install access splines to provide 10 percent ceiling access.
.14 Finished ceiling system to be square with adjoining walls and level within 1:1000.
.15 Expansion joints.
  .1 Erect two main runners parallel, 25 mm apart, on building expansion joint line. Lay in strip of acoustic tile/board, painted black, 25% narrower than space between 2 'T' bars.
  .2 Supply and install "Z" shaped metal trim pieces at each side of expansion joint. Design to accommodate plus or minus 25 mm movement and maintain visual closure. Finish metal components to match adjacent exposed metal trim. Provide backing plates behind butt joints.

3.2 CLEANING

.1 Touch up scratches, abrasions, voids and other defects in painted surfaces.

End of Section

1 General

1.1 RELATED SECTIONS

.1 Section 01 33 00 - Submittal Procedures.
.2 Section 01 61 00 - Common Product Requirements.
.3 Section 01 77 00 - Closeout Procedures.
.4 Section 01 78 00 - Closeout Submittals.
.5 Section 07 92 00 - Joint Sealants.

1.2 REFERENCES

.1 American National Standards Institute (ANSI)/Ceramic Tile Institute (CTI)
  .1 ANSI/CTI A108.1-1999, Specification for the Installation of Ceramic Tile.
  .2 ANSI A108.1-1999, Installation of Ceramic Tile.
.2 Canadian Construction Materials Centre (CCMC)
.3 Canadian General Standards Board (CGSB)
  .1 CAN/CGSB-25.20-95, Surface Sealer for Floors.
  .2 CAN/CGSB-51.34-M86, Vapor Barrier, Polyethylene Sheet, for Use in Building Construction.
  .3 CGSB 71-GP-29M-79, Adhesive, Elastomeric, for Installation of Quarry Tiles.
  .4 CGSB 71-GP-30M-79, Adhesive, Epoxy and Modified Mortar Systems, for Installation of Quarry Tiles.
  .5 CAN/CGSB-75.1-M88, Tile, Ceramic.
.4 Terrazzo, Tile and Marble Association of Canada (TTMAC)
  .1 Tile Installation Manual 2000.

1.3 SUBMITTALS

.1 Make submittals in accordance with Section 01 33 00 - Submittal Procedures.
.2 Manufacturer's Instructions:
  .1 Provide to indicate special handling criteria, installation sequence, cleaning procedures.
.3 Samples:
  .1 Base tile: submit duplicate sample of each color, texture, size, and pattern of tile.
  .2 Floor tile: submit duplicate sample of each color, texture, size, and pattern of tile.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store, handle and protect materials in accordance with Section 01 61 00 - Common Product Requirements.
.2 Deliver, store and handle products in manner to avoid damage.
.3 Have materials delivered to job site just prior to installation.
.4 Deliver products to job site in manufacturer's unopened cartons with labels intact and legible.
.5 Keep cartons dry and protected from vandalism and away from heavy traffic areas.
.6 Store cartons in upright position.
.7 Handle resin mortar and grout with care and abide by safety labels found on each unit and product MSDS's.

1.5 EXTRA MATERIAL

.1 Provide maintenance materials in accordance with Section 01 78 00 - Closeout Submittals.
.2 Provide minimum 2% of each type and color of tile required for project for maintenance use.

1.6 ENVIRONMENTAL REQUIREMENTS

.1 Safety:
  .1 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of materials.
.2 Ventilation:
  .1 Provided continuously during and after installation. Run system 24 hours per day during installation; provide continuous ventilation for 7 days after completion of installation.
.3 Temperature:
  .1 Maintain air temperature and structural base temperature at ceramic tile installation area above 12 °C for 48 h before, during, and 48 h after, installation.
  .2 Do not install tiles at temperatures less than 12 °C or above 38 °C.
  .3 Do not apply epoxy mortar and grouts at temperatures below 15 °C or above 25 °C.

1.7 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.

2 Products

2.1 FLOOR TILE

.1 Porcelain Tile:
  .1 To CAN/CGSB 75.1, Type 4 , Class MR-2.
  .2 Size 300mm x 300mm x 10mm thick, slip-resistant, unglazed face, cushioned edges.
  .3 Porcelain tile bases: to match floor tile 300mm x 100mm high, toeless with rounded top.
  .4 Refer to plans for floor patterns.
  .5 Color selection:
    .1 Light grey.
    .2 Antracite.
  .6 Acceptable Material:
    .1 Centura - Arkitekt Dotti Series

2.2 WALL TILE

.1 Wall Tile:
  .1 New Serenity
    .1 Arctic White (matt) 200 x 400 mm
  .2 Now Excell:
    .1 White Gloss 100 x 200 mm
  .3 Maple Leaf:
    .1 Royal Blue 100 x 100 mm
    .2 Terra Cotta 100 x 100 mm
.2 Refer to plans for wall tile patterns.
.3 Acceptable Material:
  .1 Olympia

2.3 PATCHING AND LEVELING COMPOUND

.1 Portland cement base, acrylic polymer compound, manufactured specifically for resurfacing and leveling concrete floors. Products containing gypsum are not acceptable.
.2 Have not less than the following physical properties:
  .1 Compressive strength - 25 MPa.
  .2 Tensile strength - 7 MPa.
  .3 Flexural strength - 7 MPa.
  .4 Density - 1.9.
.3 Capable of being applied in layers up to 50 mm thick, being brought to feather edge, and being troweled to smooth finish.
.4 Ready for use in 48 hours after application.

2.4 MORTAR AND ADHESIVE

.1 Polymer modified dryset mortar to ASTM C627-10.
.2 Mix to manufacturers requirements.
.3 Acceptable Material:
  .1 Flextile 52 "Versatile"
  .2 Mapei "Ultraflex II"

2.5 GROUT

.1 Floor tile and base:
  .1 Polymer modified grout, color match existing womens central washroom.
  .2 Acceptable Material:
    .1 Flextile "Polymer Modified Floor Grout"
    .2 Mapei "Ultracolor"
.2 Grout Sealer:
  .1 Colorless, low viscosity, penetrating silicone sealer.
  .2 Acceptable Material
    .1 Flextile 49 silicone sealer.
    .2 Mapei "Ultracolor".

2.6 CONTROL JOINT SEALER

.1 Multi-component, self-leveling polyurethane.
.2 Acceptable Material:
  .1 Tremco "THC-900".

2.7 ACCESSORIES

.1 Floor sealer: to CAN/CGSB 25.20, Type 1.
.2 Protective coating: to tile and grout manufacturer's recommendations.

2.8 DIVIDER STRIPS

.1 Extruded or formed metal.
.2 PRT Tile to carpet. Schluter - Reno-Ambtk.

3 Execution

3.1 WORKMANSHIP

.1 Do tile work in accordance with TTMAC Tile Installation Manual 2000.
.2 Apply bond coat to clean and sound surfaces frost free.
.3 Fit tile units around corners, fitments, fixtures, drains and other built-in objects. Maintain uniform

joint appearance. Make cut edges smooth and even.
.4 Maximum surface tolerance: 1:800.
.5 Make joints between tiles uniform and approximately 6 mm wide, plumb, straight, true, even and with adjacent units flush. Align patterns.
.6 Lay out units so perimeter tiles are minimum 1/2 size.
.7 Sound tiles after setting and replace hollow sounding units to obtain full bond.
.8 Make internal angles square, external angles rounded.
.9 Install divider strips at junction of tile flooring and dissimilar material.
.10 Clean installed tile surfaces after installation cured.
.11 Keep building expansion joints free of mortar or grout.

3.2 SETTING SYSTEM

.1 Install tile and bases on substrate in accordance with TTMAC detail.

3.3 JOINT PATTERN

.1 Straight
.2 Staggered
.3 45 degree

3.4 CONTROL JOINTS

.1 Provide control joints 6 mm wide at 5000 mm intervals each way in all heated areas.
.2 Provide control joints around perimeter of large areas, around columns, in locations where area changes direction and where tile abuts other hard material. Place control joints directly over subfloor expansion/control joints.
.3 Provide control joints for all exterior areas at 3600 mm intervals each way. Minimum width of control joints 10 mm.
.4 Fill joints with sealant.

3.5 FLOOR SEALER AND PROTECTIVE COATING

.1 Apply 2 coats in accordance with manufacturer's printed instructions.

3.6 PROTECTION OF FINISHED WORK

.1 Protect new floors from time of final set of adhesive until application of final sealer and protective coating.
.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 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 900 x 900 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 18oC 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 oC 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 2% of net floor area/perimeter all length of each colour, pattern and type of carpeting.
.3 Extra materials to be from same production run as installed materials.
.4 Identify each package of carpet and each container of adhesive.
.5 Deliver to 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, (entry level black to match existing). Refer to drawings.

2.3 ACCESSORIES

.1 Base:
  .1 Carpet back, Glasbac RE
.2 Existing panel subfloor; provide adhesive as recommended by carpet manufacturer.

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.
.8 Section 05 50 00 - Metal Fabrications.
.9 Section 08 11 13 - Hollow Metal Doors and Frames.
.10 Section 09 21 16 - Gypsum Board Assemblies.

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.

[OR]

.4 Interior: (epoxy)

.1 PPG Aquapaon WB

.2 Devoe - Truguard 4406 series.

[OR]

.5 Interior Latex:

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

.2 CIL - 9490 Series.

.3 Glidden - 5800 Series.

.4 PPG - 6 Series

.6 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 two (2) base colors and two (2) accent colors. Allow for two (2) deep base colors for base and accent colors.
.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 Asphalt surfaces: zone/traffic marking of interior drive and parking areas:
  .1 INT 2.1A - Latex zone/traffic marking finish.
  .2 INT 2.1B - Alkyd zone/traffic marking finish.
.2 Concrete vertical surfaces: including horizontal soffits:
  .1 INT 3. 1A - Latex gloss level 3-egg shell finish (over sealer).
  .2 INT 3.1B - Latex stipple texture type aggregate/latex/ gloss level 5-semi-gloss finish.
  .3 INT 3.1C - High performance architectural latex gloss level 5-semi-gloss finish.
  .4 INT 3.1D - Alkyd gloss level 5-semi-gloss finish.
  .5 INT 3.1E - Latex gloss level 5-semi-gloss finish.
  .6 INT 3.1F - Epoxy (tile-like) finish for smooth concrete.
  .7 INT 3.1G - Waterborne epoxy (tile-like) finish for smooth concrete.
  .8 INT 3.1H - Multicolor finish.
  .9 INT 3.1J - Water repellent paintable finish.
  .10 INT 3.1K - Concrete stain finish.
  .11 INT 3.1M - Institutional low odor/low VOC gloss level 5-semi-gloss finish.
  .12 INT 3.1N - Latex gloss level 5-semi-gloss rough texture type aggregate coating.
.3 Concrete horizontal surfaces: floors and stairs:
  .1 INT 3.2A - Latex floor enamel gloss finish.
  .2 INT 3.2B - Alkyd floor enamel gloss finish.

.3 INT 3.2C - Epoxy finish.
.4 INT 3.2D - Pigmented polyurethane finish.
.5 INT 3.2E - Concrete stain finish.
.6 INT 3.2F - Concrete floor sealer.
.7 INT 3.2H - Latex zone/traffic marking finish for parking lines, etc..
.8 INT 3.2J - Alkyd zone/traffic marking finish for parking lines, etc..

.4 Concrete masonry units: smooth face block:
.1 INT 4.2A - Latex gloss level 3-egg shell finish (over latex sealer).
.2 INT 4.2B - Latex gloss level 5-semi-gloss smooth texture type aggregate coating.
.3 INT 4.2C - Alkyd gloss level 5-semi-gloss finish.
.4 INT 4.2D - High performance architectural latex gloss level 5-semi-gloss finish.
.5 INT 4.2E - Institutional low odor/low VOC gloss level 5-semi-gloss.
.6 INT 4.2F - Epoxy (tile-like) finish for dry environments.
.7 INT 4.2G - Epoxy (tile-like) finish for wet environments.
.8 INT 4.2H - Multicolor finish.
.9 INT 4.2L - Water repellent non-paintable finish do not use on light weight block.
.10 INT 4.2M - Water repellent paintable finish do not use on light weight block.
.11 INT 4.2N - Alkyd gloss level 5-semi-gloss finish (over latex sealer).

.5 Structural steel and metal fabrications:
.1 INT 5.1A - Quick dry enamel gloss finish.
.2 INT 5.1B - Waterborne light industrial gloss level 5-semi-gloss coating.
.3 INT 5.1C - Waterborne dry wall finish.
.4 INT 5.1CC - Waterborne dry wall finish (over quick dry shop primer) for dry locations only.
.5 INT 5.1D - Alkyd dry wall finish.
.6 INT 5.1DD - Alkyd dry wall finish (over quick dry shop primer) for dry locations only.
.7 INT 5.1E Alkyd - gloss level 5-semi-gloss finish.
.8 INT 5.1F - Pigmented polyurethane finish (over epoxy primer).
.9 INT 5.1G - Pigmented polyurethane finish (over high-build epoxy).
.10 INT 5.1H - Pigmented polyurethane finish (over epoxy and inorganic zinc).
.11 INT 5.1J - Pigmented polyurethane finish (over epoxy and epoxy zinc rich primer).
.12 INT 5.1K - Waterborne epoxy finish.
.13 INT 5.1L - Epoxy finish.
.14 INT 5.1M - Aluminum paint finish.
.15 INT 5.1N - Waterborne light industrial gloss level 5-semi-gloss coating (over epoxy primer).
.16 INT 5.1P - High build epoxy (over epoxy zinc rich primer).
.17 INT 5.1Q - Latex gloss level 5-semi-gloss finish (over alkyd primer).
.18 INT 5.1R - High performance architectural latex gloss level 5-semi-gloss finish.
.19 INT 5.1S - Institutional low odor/low VOC gloss level 5-semi-gloss finish.
.20 INT 5.1T - Alkyd gloss level 5-semi-gloss finish (over surface tolerant primer).
.21 INT 5.1U - Epoxy finish (over self-priming epoxy).
.22 INT 5.1V - Pigmented polyurethane finish (over self-priming epoxy).
.23 INT 5.1W - Alkyd gloss level finish (over quick dry shop primer) for dry locations only.
.24 INT 5.1X - Latex gloss level finish (over quick dry shop primer) for dry locations only.
.25 INT 5.1Z - Quick dry shop paint finish (for dry locations only) do not topcoat.

.6 Steel - high heat: (boilers, furnaces, heat exchangers, breeching, pipes, flues, stacks, etc., with temperature range as noted):
.1 INT 5.2A - Heat resistant enamel finish, maximum 205 degrees C.
.2 INT 5.2B - Heat resist ant aluminum paint finish, maximum 427 degrees C.
.3 INT 5.2C - Inorganic zinc rich coating, maximum 400 degrees C.
.4 INT 5.2D - High heat resistant coating, maximum 593 degrees C.

.7 Galvanized metal: doors, frames, railings, misc. steel, pipes, overhead decking, and ducts.
.1 INT 5.3A - Latex gloss level 5-semi-gloss finish.

.2 INT 5.3B - Waterborne light industrial gloss level 5-semi-gloss coating.
.3 INT 5.3C - Alkyd gloss level 5-semi-gloss finish (over cementitious primer).
.4 INT 5.3D - Epoxy finish (over epoxy primer).
.5 INT 5.3E - Epoxy finish (over vinyl wash primer and epoxy primer).
.6 INT 5.3F - Alkyd dry wall finish for use in low contact/low traffic areas only.
.7 INT 5.3G - Aluminum paint finish.
.8 INT 5.3J - Latex gloss level finish (over waterborne primer).
.9 INT 5.3K - Waterborne light industrial gloss level 5-semi-gloss coating (over waterborne primer).
.10 INT 5.3L - Alkyd gloss level 5-semi-gloss finish (over non-cementitious primer).
.11 INT 5.3M - High performance architectural latex gloss level 5-semi-gloss finish.
.12 INT 5.3N - Institutional low odor/low VOC gloss level 5-semi-gloss finish.

.8 Dimension lumber: columns, beams, exposed joists, underside of decking:
.1 INT 6.2A - Latex gloss level 2-velvet finish (over alkyd primer).
.2 INT 6.2B - High performance architectural latex gloss level finish.
.3 INT 6.2C - Alkyd gloss level 2-velvet finish.
.4 INT 6.2D - Latex gloss level 2-velvet finish (over latex primer).
.5 INT 6.2E - Multicolor finish.
.6 INT 6.2F - Pigmented fire retardant gloss level 2-velvet coating (ULC rated).
.7 INT 6.2G - Clear fire retardant gloss level 2-velvet coating (ULC rated).
.8 INT 6.2H - Polyurethane varnish gloss level 2-velvet finish.
.9 INT 6.2J - Polyurethane varnish gloss level finish 2-velvet (over stain).
.10 INT 6.2K - Alkyd varnish gloss level 2-velvet finish (over stain and sealer).
.11 INT 6.2L - Institutional low odor/low VOC gloss level 2-velvet finish.
.12 INT 6.2M - Waterborne clear acrylic gloss level 2-velvet finish (over stain).
.13 INT 6.2N - Clear moisture cured polyurethane gloss finish.
.14 INT 6.2P - Alkyd varnish gloss level 2-velvet finish.

.9 Dressed lumber: including doors, door and window frames, casings, moldings:
.1 INT 6.3A - High performance architectural latex gloss level finish.
.2 INT 6.3B - Alkyd gloss level finish.
.3 INT 6.3D - Alkyd varnish gloss level 5-semi-gloss finish (over stain).
.4 INT 6.3E - Polyurethane varnish gloss level 5-semi-gloss finish (over stain).
.5 INT 6.3F - Lacquer gloss level 5-semi-gloss finish (over stain).
.6 INT 6.3G - Pigmented lacquer gloss level 5-semi-gloss finish.
.7 INT 6.3H - Clear lacquer gloss level 5-semi-gloss finish.
.8 INT 6.3J - Alkyd varnish gloss level 5-semi-gloss finish.
.9 INT 6.3K - Polyurethane varnish gloss level 5-semi-gloss finish.
.10 INT 6.3L - Epoxy finish.
.11 INT 6.3M - Danish oil finish.
.12 INT 6.3N - Multicolor finish.
.13 INT 6.3P - Waterborne light industrial gloss level 5-semi-gloss coating.
.14 INT 6.3Q - Waterborne clear acrylic gloss level 5-semi-gloss finish.
.15 INT 6.3R - Pigmented fire retardant gloss level 5-semi-gloss finish (ULC rated).
.16 INT 6.3S - Clear fire retardant finish (ULC rated).
.17 INT 6.3T - Latex semi-gloss finish (over latex primer).
.18 INT 6.3U - Latex semi-gloss finish (over alkyd primer).
.19 INT 6.3V - Institutional low odor/low VOC gloss level 5-semi-gloss finish.
.20 INT 6.3W - Waterborne clear acrylic gloss level 5-semi-gloss finish (over stain).
.21 INT 6.3X - Clear moisture cured polyurethane gloss finish.
.22 INT 6.3Y - Clear moisture cured polyurethane gloss finish (over stain).
.23 INT 6.3Z - Clear (2 component) polyurethane finish.

.10 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 RELATED SECTIONS

.1 Section 01 33 00 - Submittal Procedures.

1.2 RELATED WORK

.1 Section 09 91 00 - Painting.

1.3 SUBMITTALS

.1 Make submittals in accordance with Section 01 33 00 - Submittal Procedures.
.2 Product Data:
  .1 Submit catalogue literature indicating materials and finishes of signs.
.3 Shop Drawings:
  .1 Submit separate drawings indicating overall dimensions of signs, dimensions and style of lettering, numerals and graphics as applicable, and layout of lettering, numerals and graphics for each sign type.
.4 Samples:
  .1 Submit duplicate samples of each type of signage of sufficient size to enable Consultant to review for construction, finish and other pertinent features.
  .2 Style and color of lettering will be selected by Consultant from manufacturer's standard range.

1.4 GENERAL STANDARDS

.1 Paint finish: where paint finish is indicated it shall be applied using the following procedures and materials.
  .1 Sand entire surface of anodized aluminum with fine sandpaper, roughening surface evenly, to ensure bond of primer coat.
  .2 Apply one (1) coat of aluminum primer.
  .3 Apply four (4) coats of automotive paint to color indicated, with "Gripguard" or "Gripeze", sanding between coats as required to ensure proper bond.
.2 Vinyl film: use cast vinyl only, calendered vinyl NOT acceptable.
.3 Aluminum: all aluminum architectural quality alloy 6063T5.

1.5 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.

2 Products

2.1 PUBLIC WASHROOM SYMBOLS

.1 250mm X 250mm X 3mm brushed stainless steel back plate with 15mm radiused corners.
.2 VHB tape for adhering back plates to wall.
.3 200mm high cast vinyl "male" and "female" silhouette symbols, 2 each at public washroom 72016 and 72017.

.4 200mm high cast vinyl "barrier free" silhouette symbols, 2 each at public washroom 72016 and 72017.
.5 Refer to Drawings for signage type and locations.
.6 All new signage to match existing.

3 Execution

3.1 INSTALLATION

.1 Confirm numbers and names with Consultant before application.
.2 Confirm all mounting heights and locations with Consultant before installing signage
.3 Ensure all signage is level and, where applicable, centered on door or wall panel, unless noted or directed otherwise.
.4 Mount all metal signage to walls using appropriate fastener/adhesive.
.5 Apply PVC signage to doors using adhesive as recommended by sign manufacturer.
.6 Apply vinyl names, in accordance with manufacturer's recommendations.

End of Section

1 General

1.1 RELATED SECTIONS

.1 Section 01 33 00 - Submittal Procedures.
.2 Section 05 50 00 - Metal Fabrications.
.3 Section 06 08 99 - Rough Carpentry For Minor Works.
.4 Section 10 28 13 - Toilet Accessories.

1.2 REFERENCES

.1 American Society for Testing and Materials International, (ASTM).
  .1 ASTM A167-99, Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.
  .2 ASTM A480/A480M-03, Specification for General Requirements for Flat-Rolled Stainless and Heat Resisting Steel Plate, Sheet, and Strip.
  .3 ASTM A653/A653M-02a, Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
.2 Canadian General Standards Board (CGSB).
  .1 CAN/CGSB-1.81-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-1.104M-91, Semigloss Alkyd, Air Drying and Baking Enamel.
.3 Canadian Standards Association (CSA International).
  .1 CSA Standards\CSA-B561-04, Barrier-Free Design.

1.3 SUBMITTALS

.1 Shop Drawings:
  .1 Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.
  .2 Indicate fabrication details, plans, elevations, hardware, and installation details.
.2 Manufacturer's Instructions:
  .1 Submit manufacturer's installation instructions.

1.4 QUALITY ASSURANCE

.1 Pre-Installation Meetings: conduct pre-installation meeting to verify project requirements, manufacturer's installation instructions and manufacturer's warranty requirements.

1.5 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.

2 Products

2.1 MATERIALS

.1 Metal toilet partitions.
.2 Sheet steel: commercial quality to ASTM A480 with ZF001 designation zinc coating.
.3 Minimum base steel thickness:
  .1 Panels and doors: 0.8 mm.
  .2 Pilasters: 1.0 mm.

.3 Reinforcement: 3.0 mm.
.4 Stainless steel sheet metal: to ASTM A167, Type 304, with BA finish.
.5 Headrails: clear anodized, extruded aluminum, anti grip design tubular steel, cast end socket brackets.
.6 Pilaster shoe: 0.8 mm stainless steel, 75 mm high.
.7 Attachment: stainless steel tamper proof type screws and bolts.

2.2 COMPONENTS

.1 Hinges:
.1 Heavy duty, non-lubricating.
.2 Material/finish: stainless steel casting.
.3 Swing: as shown on drawings
.4 Return movement: gravity, non-rising.
.5 Emergency access feature.
.2 Latch set: surface mounted, combination latch, combination door-stop, keeper and bumper, chrome plated non-ferrous,.
.3 Wall and connecting brackets: chrome plated non-ferrous extrusion or casting.
.4 Coat hook: combination hook and rubber door bumper, chrome plated non-ferrous.
.5 Door pull: Barrier-free "D" type suited for out swinging doors, chrome plated non-ferrous.

2.3 FABRICATION

.1 Doors, panels and screens: 25 mm thick, two steel sheets faces pressure bonded to honeycomb core, to sizes indicated.
.2 Pilasters: 32 mm thick, constructed same as door, to sizes indicated.
.3 Provide formed and closed edges for doors, panels and pilasters. Miter and weld corners and grind smooth.
.4 Provide internal reinforcement at areas of attached hardware and fittings. Temporarily mark location of reinforcement for tissue holders.
.5 Provide 0.8 mm thick type 316 stainless steel protective shields on urinal side of toilet partition panels next to urinals and on urinal screens. Make protective shields 1000 mm high with top of shield 1200 mm above finished floor. Make shields to full width of partition or screen panel. Fasten with stainless steel screws.

2.4 FINISHES

.1 Clean, degrease and neutralize steel components with phosphate or chromate treatment.
.2 Spray apply primer to CAN/CGSB-1.81, 1 coat.
.3 Spray apply finish enamel to CAN/CGSB-1.88, type 2 gloss, 2 coats and bake to smooth, hard finish 0.025 mm thick.
.4 Finish: doors and pilaster/panels same color as selected from manufacturer's standard colors, total 1 color for project to match existing washroom panels.

3 Execution

3.1 INSTALLATION

.1 Ensure supplementary anchorage, if required, is in place.
.2 Do work in accordance with CAN/CSA-B651.

3.2 ERECTION

.1 Partition erection.
- .1 Install partitions secure, plumb and square.
- .2 Leave 12 mm space between wall and panel or end pilaster.
- .3 Anchor mounting brackets to masonry/concrete surfaces using screws and shields: blocking/backing must be provided to hollow walls using bolts and toggle type anchors, to steel supports with threaded rods nuts and washers.
- .4 Attach panel and pilaster to brackets with self-drilling screws with through type sleeve bolt and nut.
- .5 Provide for adjustment of floor-braced pilasters variations with screw jack through steel saddles made integral with pilaster. Conceal floor fixings with stainless steel shoes.
- .6 Equip doors with hinges, latch set, and each stall with coat hook mounted on partition wall.
- .7 Equip out swinging doors with door pulls on inside of door in accordance with CAN/CSA-B651.
- .8 Install hardware grab bars.

3.3 ADJUSTING

.1 Adjust doors and locks for optimum, smooth operating condition.
.2 Lubricate hardware and other moving parts.

3.4 CLEANING

.1 Perform cleaning after installation to remove construction and accumulated environmental dirt.
.2 Clean surfaces after installation using manufacturer's recommended cleaning procedures.
.3 Clean aluminum with damp rag and approved non-abrasive cleaner.
.4 Clean and polish hardware and stainless components.
.5 Upon completion of installation, remove surplus materials, rubbish, tools and equipment barriers.

End of Section

1 General

1.1 SUMMARY

.1 Provide washroom accessories including but not limited to following:
- .1 Baby Change Station - BCS
- .2 Clothing Hook - CH
- .3 Grab Bar - GB
- .4 Mirror - MIR
- .5 Napkin/Tampon Disposal - ND
- .6 Mop Holders - MPH
- .7 Paper Towel Dispenser/Disposal - PTD/D
- .8 Shower Rod w/Curtain - SH.ROD/C
- .9 Shower Seat - SH.ST
- .10 Stainless Steel Shelf - SS-S
- .11 Tack Board - TB
- .12 Tilt Mirror - TMIR
- .13 Concealed sheet steel reinforcing by Section 05 50 00 - Metal Fabrications.

1.2 RELATED SECTIONS

.1 Section 01 33 00 - Submittal Procedures.
.2 Section 01 78 00 - Closeout Submittals.
.3 Section 05 50 00 - Metal Fabrications.
.4 Section 06 08 99 - Rough Carpentry For Minor Works.

1.3 REFERENCES

.1 American Society for Testing and Materials (ASTM)
- .1 ASTM A167-99, Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.
- .2 ASTM B456-95, Specification for Electrodeposited Coatings of Copper Plus Nickel Plus Chromium and Nickel Plus Chromium.
- .3 ASTM A653/A653M-99, Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- .4 ASTM A924/A924M-99, Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.
- .5 ASTM A666-03 - Specification for Annealed or Cold-Worked Austenitic Stainless Steel, Sheet, Strip, Plate, and Flat Bar.
- .6 ASTM B456-03 - Specification for Electrodeposited Coatings of Copper Plus Nickel Plus Chromium and Nickel Plus Chromium

.2 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 CGSB 31-GP-107Ma - Non-inhibited Phosphoric Acid Base Metal Conditioner and Rust Remover.
- .4 CAN/CSA-G164-M92 (R2003) - Hot Dip Galvanizing of Irregularly Shaped Articles.
- .5 CSA W59-03 - Welded Steel Construction (Metal Arc Welding)
- .6 CAN/CGSB-12.5-M86, Mirrors, Silvered.

.3 Canadian Standards Association (CSA)
- .1 CSA Standards\CSA-B561-04, Barrier-Free Design.

1.4 SHOP DRAWINGS

.1 Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.
.2 Product Data:
  .1 Submit manufacturer's literature, data sheets for each type of material provided under this Section.
  .2 Data sheets shall provide all required information.
  .3 Submit required copies of detailed instructions for maintaining, preserving and keeping materials in clean and safe conditions and give adequate warning of maintenance practices or materials detrimental to specified materials.
  .4 Submit manufacturer's installation instructions.
.3 Material Safety Data Sheets:
  .1 Submit MSDS for inclusion in Operation and Maintenance Manual.
.4 Shop Drawings:
  .1 Shop drawings shall be in the form of catalogue cuts and fully illustrate specified materials with description of components, surface finishes, hardware and securement devices.
  .2 Submit a full schedule of accessories and identify Contractor Supplied / Contractor Installed and Owner Supplied / Contractor Installed accessories.
.5 Samples:
  .1 Submit complete samples of each accessory and modular unit to Consultant for review of construction quality, materials and finish prior to delivery of required quantities of items.
  .2 Submit sample of each colour where applicable.
  .3 No trademark and/or labels shall be accepted on exposed finishes.
.6 Maintenance Instructions:
  .1 Submit an accessories schedule, keys and parts manual as part of project closeout documents.
  .2 Submit 2 sets of following items of manufacturer's literature:
    .1 Technical Data Sheets of each item used for the project.
    .2 Service and Parts Manuals.
  .3 Name of local representative to be contacted in the event of need of field service of consultation.
  .4 Indicate size and description of components, base material, surface finish inside and out, hardware and locks, attachment devices, description of rough-in-frame, building-in details of anchors for grab bars.

1.5 CLOSEOUT SUBMITTALS

.1 Provide maintenance data for toilet and bath accessories for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.
.2 Provide special tools required for accessing, assembly/disassembly or removal for toilet and bath accessories in accordance with requirements specified in Section 01 78 00 - Closeout Submittals.
.3 Deliver special tools to Owner.

1.6 EXTRA MATERIALS

.1 Provide special tools required for accessing, assembly/disassembly or removal for toilet and bath accessories in accordance with requirements specified in Section 01 78 00 - Closeout Submittals.
.2 Deliver special tools to Consultant.

1.7 WARRANTY

.1 Warrant work of this Section for period of 10 years against defects and/or deficiencies in accordance with General Conditions of the Contract.
.2 Promptly correct any defects or deficiencies which become apparent within warranty period, to satisfaction of Consultant and at no expense to Owner.
.3 Defects include but are not limited to; deterioration of mirror's silvering.

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.

2 Products

2.1 MATERIALS

.1 Sheet steel: commercial quality to ASTM A653/A653M with ZF001 designation zinc coating.
.2 Stainless steel sheet metal type 302 or 304: to ASTM A167, with #4 finish. minimum 0.8mm thick except where noted otherwise.
.3 Stainless steel tubing type 304: commercial grade, seamless welded, 1.2 mm wall thickness.
.4 Fasteners: concealed screws and bolts hot dip galvanized, exposed fasteners to match face of unit. Expansion shields fiber, lead or rubber as recommended by accessory manufacturer for component and its intended use.

2.2 BLOCKING

.1 Provide blocking for all accessories regardless of supply or installation responsibilities.

2.3 FINISHES

.1 Chrome and nickel plating: to ASTM B456-79 satin finish.
.2 Baked enamel: condition metal by applying one coat of metal conditioner to CGSB 1-GP-81M, apply one coat Type 2 primer to CGSB 1-GP-81M and bake, apply two coats Type 2 enamel to CGSB 1-GP-88M and bake to hard, durable finish. Sand between final coats. Color selected from standard range by Engineer.
.3 Manufacturer's or brand names on face of units not acceptable.

2.4 ACCESSORIES SCHEDULE

.1 Read Accessories Schedule in Appendix in conjunction with this Section.

2.5 SCHEDULE OF ACCESSORIES

.1 Supply and install each item in quantities as shown on Accessories Schedule.
.2 Contractor Supplied / Client Supplied; Contractor Installed for all.
.3 Washroom Accessories location and quantities as shown on Drawings.
.4 **Manufacturer and type to match existing accessories (verify on site).**
.5 Toilet Tissue Dispenser: Owner supplied.
.6 Mirror: Edgeless float glass mirror to match existing.
.7 Robe Hook: stainless steel with 75mm projection.
.8 Grab Bars: 32mm dia. x 1.6mm wall tubing of stainless steel, 38mm diameter wall flanges, concealed screw attachment, flanges welded to tubular bar, provided with steel back plates and all accessories. Knurl bar at area of hand grips. Grab bar material and anchorage to withstand downward pull of 2.2 kN.
.9 Soap Dispenser: Owner supplied.
.10 Paper Towel Dispenser: Owner supplied.
.11 Garbage Bin: Owner supplied.
.12 Feminine Napkin Disposal Bin: stainless steel 18ga. No. 304 unit, partition cubicle mounted, 1 per

2 w.c.'s, continuous hinged door, self closing, embossed with "napkin disposal", removable stainless steel receptacles fitted with spring clip for deodorizer block.

.13 Sanitary Napkin Vendor: Owner supplied.

.14 Needle Disposal Container: Owner supplied.

2.6 FABRICATION

.1 Weld and grind joints of fabricated components flush and smooth. Use mechanical fasteners only where approved.

.2 Wherever possible form exposed surfaces from one sheet of stock, free of joints.

.3 Brake form sheet metal work with 1.5 mm radius bends.

.4 Form surfaces flat without distortion. Maintain flat surfaces without scratches or dents.

.5 Back paint components where contact is made with building finishes to prevent electrolysis.

.6 Hot dip galvanize concealed ferrous metal anchors and fastening devices to CSA G164.

.7 Shop assemble components and package complete with anchors and fittings.

.8 Deliver inserts and rough-in frames to job site at appropriate time for building-in. Provide templates, details and instructions for building in anchors and inserts.

.9 Provide steel anchor plates and components for installation on studding and building framing.

3 Execution

3.1 INSTALLATION

.1 Install and secure all accessories rigidly in place as follows:

- .1 Stud walls: install wood blocking in stud space prior to plaster or drywall finish.
- .2 Hollow masonry units or existing plaster/drywall: use toggle bolts drilled into cell/wall cavity.
- .3 Solid masonry, marble, stone or concrete: use bolt with lead expansion sleeve set into drilled hole.

.2 Install grab bars on built-in anchors provided by bar manufacturer.

.3 Use tamper proof screws/bolts for fasteners.

.4 Fill contractor supplied units with necessary supplies shortly before final acceptance of building.

.5 Install Owner supplied washroom accessories.

.6 Install mirrors in accordance with manufacturers recommended fasteners suitable for specified wall type.

End of Section

1 General

1.1 RELATED SECTIONS

.1 Section 01 33 00 - Submittal Procedures.
.2 Section 01 61 00 - Common Product Requirements.
.3 Section 01 74 11 - Cleaning.
.4 Section 01 74 19 - Construction/Demolition Waste Management and Disposal.

1.2 SUMMARY

.1 Section Includes:
  .1 Materials and installation for reconfiguration of existing wet pipe fire protection and sprinkler systems for heated areas.

1.3 REFERENCES

.1 American National Standards Institute/National Fire Prevention Association (ANSI/NFPA)
ANSI/NFPA 13-2007, Installation of Sprinkler Systems.
  .1 ANSI/NFPA 24-2007, Installation of Private Fire Service Mains and Their Appurtenances.
  .2 ANSI/NFPA 25-2002, Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems.
.2 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
  .1 Material Safety Data Sheets (MSDS).
.3 Underwriter's Laboratories of Canada (ULC)
  .1 CAN4 S543-M984, Standard for Internal Lug Quick Connect Couplings for Fire Hose.

1.4 DESIGN REQUIREMENTS

.1 Reconfigure existing system in accordance with NFPA, local authorities and building fire safety plans in place.

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 Storage and Protection:
  .1 Store materials indoors.
  .2 Store and protect materials from exposure to harmful weather conditions and at temperature and humidity conditions recommended by manufacturer.
.3 Waste Management and Disposal:
  .1 Construction/Demolition Waste Management and Disposal: separate waste materials for reuse in accordance with Section 01 74 19 - Construction/Demolition Waste Management and Disposal.

2 Products

2.1 ABOVE GROUND PIPING SYSTEMS

2.2 PIPE, FITTINGS AND VALVES

.1 Pipe:
  .1 Ferrous: to ANSI/NFPA 13 to match existing.
.2 Fittings and joints to ANSI/NFPA 13:
  .1 To match existing for quality and material.
.3 Valves:
  .1 ULC listed for fire protection service.
  .2 To match existing.
.4 Pipe hangers:
  .1 ULC listed for fire protection services in accordance with NFPA.

2.3 SPRINKLER HEADS

.1 General: to ANSI/NFPA 13 and ULC listed for fire services.
.2 Sprinkler Head Type:
  .1 To match existing
  .2 Provide polished stainless steel ceiling plates sprinklers below suspended ceilings.
  .3 Provide corrosion-resistant sprinkler heads and sprinkler head guards in accordance with NFPA 13.
  .4 Deflector: not more than 75 mm below suspended ceilings.
  .5 Ceiling plates: not more than 25 mm deep.
  .6 Ceiling cups: not permitted.

2.4 ESCUTCHEON PLATES

.1 Provide one piece type metal plates for piping passing through walls, in exposed spaces.
.2 Provide polished stainless steel plates in finished spaces.
.3 Provide paint finish on metal plates in unfinished spaces.

3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 INSTALLATION

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

3.3 PIPE INSTALLATION

.1 Install piping straight and true to bear evenly on hangers and supports. Do not hang piping from plaster ceilings.
.2 Keep interior and ends of new piping and existing piping thoroughly cleaned of water and foreign matter.
.3 Keep piping systems clean during installation by means of plugs or other approved methods. When work is not in progress, securely close open ends of piping to prevent entry of water and

foreign matter.

.4 Inspect piping before placing into position.

3.4 DISINFECTION

.1 Disinfect new piping and existing piping.

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

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

.4 Obtain at least two consecutive satisfactory bacteriological samples from piping, analyzed by certified laboratory, and submit results prior to piping being placed into service.

3.5 CONNECTIONS TO EXISTING WATER SUPPLY SYSTEMS

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

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

.3 Bolt sleeves around main piping.

.4 Bolt valve to branch connection. Open valve, attach drilling machine, make tap, close valve, and remove drilling machine, without interruption of service.

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

3.6 FIELD PAINTING

.1 Clean, pretreat, prime, and paint new systems including valves, piping, conduit, hangers, supports, miscellaneous metalwork, and accessories.

.2 Apply coatings to clean, dry surfaces, using clean brushes.

.3 Clean surfaces to remove dust, dirt, rust, and loose mill scale.

.4 Immediately after cleaning, provide metal surfaces with 1 coat of pretreatment primer applied to minimum dry film thickness of 0.3 ml, and one coat of zinc chromate primer applied to minimum dry film thickness of 1.0 ml.

.5 Shield sprinkler heads with protective covering while painting is in progress.

.6 Upon completion of painting, remove protective covering from sprinkler heads.

.7 Remove sprinkler heads which have been painted and replace with new sprinkler heads. Provide primed surfaces with following:

- .1 Piping in Finished Areas:
  - .1 Provide primed surfaces with 2 coats of paint to match adjacent surfaces.
  - .2 Provide valves and operating accessories with 1 coat of red alkyd gloss enamel applied to minimum dry film thickness of 1.0 mil.
  - .3 Provide piping with 50 mm wide red enamel bands spaced at maximum of 6 m intervals throughout piping systems.
- .2 Piping in Unfinished Areas:
  - .1 Provide primed surfaces with one coat of red alkyd gloss enamel applied to minimum dry film thickness of 1.0 mil in attic spaces,.
  - .2 Provide piping with 50 mm wide red enamel bands spaced at maximum of 6 m intervals.

3.7 FIELD QUALITY CONTROL

.1 Site Test, Inspection:
- .1 Perform test to determine compliance with specified requirements in presence of Departmental Representative.
- .2 Test, inspect, and approve piping before covering or concealing.
- .3 Preliminary Tests:
  - .1 Hydrostatically test each system at 200 psig for a 2 hour period with no leakage or reduction in pressure.
  - .2 Flush piping with potable water in accordance with NFPA 13.
  - .3 Piping above suspended ceilings: tested, inspected, and approved before installation of ceilings.
  - .4 Test alarms and other devices.
  - .5 Test water flow alarms by flowing water through inspector's test connection. When tests have been completed and corrections made, submit signed and dated certificate in accordance with NFPA 13.
- .4 Formal Tests and Inspections:
  - .1 Do not submit request for formal test and inspection until preliminary test and corrections are completed and approved.
  - .2 Submit written request for formal inspection at least 15 days prior to inspection date.
  - .3 Repeat required tests as directed.
  - .4 Correct defects and make additional tests until systems comply with contract requirements.
  - .5 Furnish appliances, for tests.
  - .6 Authority of Jurisdiction, will witness formal tests and approve systems before they are accepted.

.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 Section 01 33 00 - Submittal Procedures. 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.
- .2 Schedule site visits, to review Work, as directed in Section 01 45 00 - Quality Control.

.3 Site Tests:
- .1 Field test each fire pump, driver and controllers in accordance with ANSI/NFPA 20. Testing shall include:
  - .1 Verification of proper installation.
  - .2 Verification of the sequence of operations.
- .2 Testing to be witnessed by authority having jurisdiction.
- .3 Develop, with Departmental Representative assistance, detailed instructions for O & M of this installation.

.4 Cleaning: Proceed in accordance with Section 01 74 11 - Cleaning.

.5 Upon completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

End of Section

1 General

1.1 SECTION INCLUDES

.1 Materials and installation for copper domestic water service used in the following:
- .1 Copper incoming domestic water service, up to NPS 2 1/2.
- .2 Hard drawn copper domestic hot and cold water services inside building.

1.2 RELATED SECTIONS

.1 Section 01 33 00 - Submittal Procedures.
.2 Section 01 35 28 - Health and Safety Requirements.
.3 Section 01 74 19 - Construction/Demolition Waste Management and Disposal.
.4 Section 01 78 00 - Closeout Submittals.
.5 Section 01 91 13 - General Commissioning Requirements
.6 Section 23 05 22 - Valves - Bronze.
.7 Section 23 05 93 - Testing, Adjusting and Balancing for HVAC.

1.3 REFERENCES

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

.2 American Society for Testing and Materials International, (ASTM).
- .1 ASTM A307, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
- .2 ASTM B88M, Standard Specification for Seamless Copper Water Tube (Metric).
- .3 ASTM F492, Standard Specification for Propylene and Polypropylene (PP) Plastic-Lined Ferrous Metal Pipe and Fittings.

.3 American Water Works Association (AWWA).
- .1 AWWA C111, Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.

.4 Canadian Standards Association (CSA International).
- .1 CSA B242, Groove and Shoulder Type Mechanical Pipe Couplings.

.5 Department of Justice Canada (Jus).
- .1 Canadian Environmental Protection Act, 1999, c. 33 (CEPA).

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

.7 Manufacturer's Standardization Society of the Valve and Fittings Industry (MSS).
- .1 MSS-SP-67, Butterfly Valves.
- .2 MSS-SP-70, Cast Iron Gate Valves, Flanged and Threaded Ends.
- .3 MSS-SP-71, Cast Iron Swing Check Valves, Flanged and Threaded Ends.
- .4 MSS-SP-80, Bronze Gate, Globe, Angle and Check Valves.

.8 National Research Council (NRC)/Institute for Research in Construction.
- .1 NRCC 38728, National Plumbing Code of Canada (NPC).

.9 Transport Canada (TC).
- .1 Transportation of Dangerous Goods Act, 1992, c. 34 (TDGA).

1.4 SUBMITTALS

.1 Submittals in accordance with Section 01 33 00 - Submittal Procedures.
.2 Submit product data for following: piping, fittings, valves.
.3 Submit WHMIS MSDS - Material Safety Data Sheets in accordance with Section 01 33 00 - Submittal Procedures.
.4 Provide maintenance data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

1.5 HEALTH AND SAFETY

.1 Do construction occupational health and safety in accordance with Section 01 35 28 - Health and Safety Requirements.

1.6 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for reuse in accordance with Section 01 74 19 - Construction/Demolition Waste Management And Disposal.
.2 Remove from site and dispose of packaging materials at appropriate recycling facilities.
.3 Separate for reuse and recycling and place in designated containers Steel waste 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 and local or municipal regulations.
.6 Fold up metal banding, flatten and place in designated area for recycling.

2 Products

2.1 PIPING

.1 Domestic hot, cold and recirculation systems, within building.
  .1 Above ground:
    .1 Copper tube, hard drawn, type L: to ASTM B88M.
    .2 Cross-linked Polyethylene (PEX), non-air barrier type: to ASTM F 876 and ASTM F 877.
  .2 Buried or embedded:
    .1 Copper tube, soft annealed, type K: to ASTM B88M, in long lengths and with no buried joints.
    .2 Cross-linked Polyethylene (PEX), non-air barrier type: to ASTM F 876 and ASTM F 877 with no buried joints.

2.2 FITTINGS

.1 Bronze pipe flanges and flanged fittings, Class 150: to ANSI/ASME B16.24.
.2 Cast bronze threaded fittings, Class 125: to ANSI/ASME B16.15.
.3 Cast copper, solder type: to ANSI/ASME B16.18.
.4 Wrought copper and copper alloy, solder type: to ANSI/ASME B16.22.
.5 NPS 2 and larger: roll grooved to CSA B242.
.6 PEX fittings to ASTM F 877, ASTM F 1807 and/or ASTM F 1960, as appropriate.
.7 Polypropylene fittings: to ASTM 2389.
.8 Copper and copper alloy press fittings: to ASME B16.18 or ASME B16.22.

2.3 JOINTS

.1 Rubber gaskets, 1.6 mm thick: to AWWA C111.
.2 Bolts, nuts, hex head and washers: to ASTM A307, heavy series.
.3 Solder: 95/5 lead free.
.4 Teflon tape: for threaded joints.
.5 Grooved couplings: designed with angle bolt pads to provide rigid joint, complete with EPDM flush seal gasket.
.6 Dielectric connections between dissimilar metals: dielectric fitting to ASTM F492, complete with thermoplastic liner.

2.4 GATE VALVES

.1 NPS 2 and under, soldered:
  .1 Rising stem: to MSS-SP-80, Class 125, 860 kPa, bronze body, screw-in bonnet, solid wedge disc as specified Section 23 05 22 - Valves - Bronze
.2 NPS 2 and under, screwed:
  .1 Rising stem: to MSS-SP-80, Class 125, 860 kPa, bronze body, screw-in bonnet, solid wedge disc as specified Section 23 05 22 - Valves - Bronze

2.5 GLOBE VALVES

.1 NPS2 and under, soldered:
  .1 To MSS-SP-80, Class 125, 860 kPa, bronze body, renewable composition disc, screwed over bonnet as specified Section 23 05 22 - Valves - Bronze
  .2 Lockshield handles: as indicated.
.2 NPS 2 and under, screwed:
  .1 To MSS-SP-80, Class 150, 1 MPa, bronze body, screwed over bonnet, renewable composition disc as specified Section 23 05 22 - Valves - Bronze
  .2 Lockshield handles: as indicated.

2.6 SWING CHECK VALVES

.1 NPS 2 and under, soldered:
  .1 To MSS-SP-80, Class 125, 860 kPa, bronze body, bronze swing disc, screw in cap, regrindable seat as specified Section 23 05 22 - Valves - Bronze.
.2 NPS 2 and under, screwed:
  .1 To MSS-SP-80, Class 125, 860 kPa, bronze body, bronze swing disc, screw in cap, regrindable seat as specified Section 23 05 22 - Valves - Bronze.

2.7 BALL VALVES

.1 NPS 2 and under, screwed:
  .1 Class 150.
  .2 Bronze body, chrome plated brass ball, PTFE adjustable packing, brass gland and PTFE seat, steel lever handle as specified Section 23 05 22 - Valves - Bronze.
.2 NPS 2 and under, soldered:
  .1 To ANSI/ASME B16.18, Class 150.
  .2 Bronze body, chrome plated brass ball, PTFE adjustable packing, brass gland and PTFE seat, steel lever handle, with NPT to copper adaptors as specified Section 23 05 22 - Valves - Bronze.

3 Execution

3.1 INSTALLATION

.1 Install in accordance with NPC (latest edition) and local authority having jurisdiction.
.2 Assemble piping using fittings manufactured to ANSI standards.
.3 Install CWS piping below and away from HWS and HWC and other hot piping so as to maintain temperature of cold water as low as possible.
.4 Connect to fixtures and equipment in accordance with manufacturer's written instructions unless otherwise indicated.

3.2 VALVES

.1 Isolate equipment, fixtures and branches with butterfly or ball valves.
.2 Balance recirculation system using lockshield globe valves. Mark settings and record on as-built drawings on completion.

3.3 PRESSURE TESTS

.1 Test pressure: greater of 1 times maximum system operating pressure or 860 kPa.

3.4 FLUSHING AND CLEANING

.1 Flush entire system for 8 h. Ensure outlets flushed for 2 h. Let stand for 24 h, then draw one sample off longest run. Submit to testing laboratory to verify that system is clean. Let system flush for additional 2 h, then draw off another sample for testing.

3.5 PRE-START-UP INSPECTIONS

.1 Systems to be complete, prior to flushing, testing and start-up.
.2 Verify that system can be completely drained.
.3 Ensure that pressure booster systems are operating properly.
.4 Ensure that air chambers, expansion compensators are installed properly.

3.6 DISINFECTION

.1 Flush out, disinfect and rinse system to requirements of authority having jurisdiction.
.2 Upon completion, provide laboratory test reports on water quality for Consultant approval.

3.7 START-UP

.1 Timing: Start up after:
  .1 Pressure tests have been completed.
  .2 Disinfection procedures have been completed.
  .3 Certificate of static completion has been issued.
  .4 Water treatment systems operational.
.2 Provide continuous supervision during start-up.
.3 Start-up procedures:
  .1 Establish circulation and ensure that air is eliminated.
  .2 Check pressurization to ensure proper operation and to prevent water hammer, flashing and/or cavitation.
  .3 Bring HWS storage tank up to design temperature slowly.
  .4 Monitor piping HWS and HWC piping systems for freedom of movement, pipe expansion as designed.
  .5 Check control, limit, safety devices for normal and safe operation.
.4 Rectify start-up deficiencies.

3.8 PERFORMANCE VERIFICATION

.1 Timing:
- .1 After pressure and leakage tests and disinfection completed, and certificate of completion has been issued by authority having jurisdiction.

.2 Procedures:
- .1 Verify that flow rate and pressure meet Design Criteria.
- .2 TAB HWC in accordance with Section 23 05 93 - Testing, Adjusting and Balancing for HVAC.
- .3 Adjust pressure regulating valves while withdrawal is maximum and inlet pressure is minimum.
- .4 Sterilize HWS and HWC systems for Legionella control.
- .5 Verify performance of temperature controls.
- .6 Verify compliance with safety and health requirements.
- .7 Check for proper operation of water hammer arrestors. Run one outlet for 10 seconds, then shut of water immediately. If water hammer occurs, replace water hammer arrestor or re-charge air chambers. Repeat for outlets and flush valves.
- .8 Confirm water quality consistent with supply standards, verifying that no residuals remain as a result of flushing and/or cleaning.

End of Section

1 General

1.1 RELATED SECTIONS

.1 Section 01 35 28 - Health and Safety Requirements.

1.2 REFERENCES

.1 American Society for Testing and Materials International, (ASTM).
- .1 ASTM B32, Specification for Solder Metal.
- .2 ASTM B306, Specification for Copper Drainage Tube (DWV).
- .3 ASTM C564, Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings.

.2 Canadian Standards Association (CSA International).
- .1 CSA B67, Lead Service Pipe, Waste Pipe, Traps, Bends and Accessories.
- .2 CAN/CSA-B70, Cast Iron Soil Pipe, Fittings and Means of Joining.
- .3 CAN/CSA-B125, Plumbing Fittings.

1.3 QUALITY ASSURANCE

.1 Health and Safety:
- .1 Do construction occupational health and safety in accordance with Section 01 35 28 - Health and Safety Requirements.

1.4 DELIVERY STORAGE AND DISPOSAL

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

2 Products

2.1 COPPER TUBE AND FITTINGS

.1 Above ground sanitary, storm and vent Type DWV to: ASTM B306.
- .1 Fittings.
  - .1 Cast brass: to CAN/CSA-B125.
  - .2 Wrought copper: to CAN/CSA-B125.
- .2 Solder: lead free, 95:5 antimonial tin solder, type TA, to ASTM B32.

2.2 CAST IRON PIPING AND FITTINGS

.1 Buried sanitary, storm and vent minimum NPS 3, to: CAN/CSA-B70, with one layer of protective coating of bitumous.
- .1 Joints.
  - .1 Mechanical joints.
    - .1 Neoprene or butyl rubber compression gaskets: to ASTM C564 or CAN/CSA-B70.
    - .2 Stainless steel clamps.
  - .2 Hub and spigot.
    - .1 Caulking lead: to CSA B67.
    - .2 Cold caulking compounds.

.2 Above ground sanitary, storm and vent: to CAN/CSA-B70.
- .1 Joints.

.1 Mechanical joints.
.1 Neoprene or butyl rubber compression gaskets with stainless steel clamps.

3 Execution

3.1 INSTALLATION

.1 Install in accordance with Canadian Plumbing Code, latest edition and local authorities having jurisdiction.

3.2 TESTING

.1 Pressure test buried systems before backfilling.
.2 Hydraulically test to verify grades and freedom from obstructions.

3.3 PERFORMANCE VERIFICATION

.1 Cleanouts:
.1 Ensure accessible and that access doors are correctly located.
.2 Open, cover with linseed oil and re-seal.
.3 Verify that cleanout rods can probe as far as the next cleanout, at least.
.2 Test to ensure traps are fully and permanently primed.
.3 Storm water drainage:
.1 Verify domes are secure.
.2 Ensure weirs are correctly sized and installed correctly.
.3 Verify provisions for movement of roof system.
.4 Ensure that fixtures are properly anchored, connected to system and effectively vented.
.5 Affix applicable label (storm, sanitary, vent, pump discharge etc.) c/w directional arrows every floor or 4.5 m (whichever is less).

End of Section

1 General

1.1 REFERENCES

.1 American Society for Testing and Materials International, (ASTM).
- .1 ASTM D2235, Specification for Solvent Cement for Acrylonitrille-Butadiene-Styrene (ABS) Plastic Pipe and Fittings.
- .2 ASTM D2564, Specification for Solvent Cements for Poly(Vinyl-Chloride) (PVC) Plastic Piping Systems.

.2 Canadian Standards Association (CSA International).
- .1 CSA-Series B1800, Plastic Nonpressure Pipe Compendium.
- .2 CSA-B181.2, PVC Drain, Waste and Vent Pipe and Pipe Fittings.
- .3 CSA-B182.1, Plastic Drain and Sewer Pipe and Pipe Fittings.

1.2 WASTE MANAGEMENT AND DISPOSAL

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

2 Products

2.1 PIPING AND FITTINGS

.1 For buried and above ground DWV piping to
- .1 CSA-B181.1,
- .2 CSA-B181.2, and
- .3 CSA-B182.1.

2.2 JOINTS

.1 Solvent weld for PVC: to ASTM D2564.
.2 Solvent weld for ABS: to ASTM D2235.

3 Execution

3.1 INSTALLATION

.1 Install in accordance with Canadian Plumbing Code, latest edition and the local authority having jurisdiction.

3.2 TESTING

.1 Pressure test buried systems before backfilling.
.2 Hydraulically test to verify grades and freedom from obstructions.

3.3 PERFORMANCE VERIFICATION

.1 Cleanouts:
- .1 Ensure accessible and that access doors are correctly located.
- .2 Open, cover with linseed oil and re-seal.
- .3 Verify cleanout rods can probe as far as the next cleanout, at least.

.2 Test to ensure traps are fully and permanently primed.
.3 Storm water drainage:
- .1 Verify domes are secure.
- .2 Ensure weirs are correctly sized and installed correctly.

.3 Verify provisions for movement of roof system.

.4 Ensure fixtures are properly anchored, connected to system and effectively vented.

.5 Affix applicable label (storm, sanitary, vent, pump discharge etc.) c/w directional arrows every floor or 4.5 m (whichever is less).

End of Section

1 General

1.1 RELATED SECTIONS

.1 Related Sections:
- .1 Section 01 33 00 - Submittal Procedures.
- .2 Section 01 35 28 - Health and Safety Requirements.
- .3 Section 01 45 00 - Quality Control.
- .4 Section 01 74 19 - Construction/Demolition Waste Management and Disposal.
- .5 Section 01 78 00 - Closeout Submittals.
- .6 Section 01 91 13 - General Commissioning Requirements.

1.2 REFERENCES

.1 American Society for Testing and Materials International (ASTM).
- .1 ASTM A126, Specification for Gray Iron Castings for Valves, Flanges and Pipe Fittings.
- .2 ASTM B62, Specification for Composition Bronze or Ounce Metal Castings.

.2 American Water Works Association (AWWA).
- .1 AWWA C700, Cold Water Meters-Displacement Type, Bronze Main Case.
- .2 AWWA C701, Cold Water Meters-Turbine Type for Customer Service.
- .3 AWWA C702-1, Cold Water Meters-Compound Type.

.3 Canadian Standards Association (CSA International).
- .1 CSA-B64 Series, Backflow Preventers and Vacuum Breakers.
- .2 CSA-B79, Floor, Area and Shower Drains, and Cleanouts for Residential Construction.
- .3 CSA-B356, Water Pressure Reducing Valves for Domestic Water Supply Systems.

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

.5 Plumbing and Drainage Institute (PDI).
- .1 PDI-G101, Testing and Rating Procedure for Grease Interceptors with Appendix of Sizing and Installation Data.
- .2 PDI-WH201, Water Hammer Arresters Standard.

1.3 SUBMITTALS

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

.2 Product Data:
- .1 Submit manufacturer's printed product literature, specifications and datasheet for fixtures and equipment.
- .2 Indicate dimensions, construction details and materials for specified items.
- .3 Submit WHMIS MSDS in accordance with Section 01 33 00 - Submittal Procedures. Indicate VOC's for adhesive and solvents during application and curing.

.3 Instructions: submit manufacturer's installation instructions.

.4 Manufacturers' Field Reports: manufacturers' field reports specified.

.5 Closeout submittals: submit maintenance and engineering data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals, include:
- .1 Description of plumbing specialties and accessories, giving manufacturers name, type, model, year and capacity.
- .2 Details of operation, servicing and maintenance.
- .3 Recommended spare parts list.

1.4 QUALITY ASSURANCE

.1 Health and Safety:
- .1 Do construction occupational health and safety in accordance with Section 01 35 28 - Health and Safety Requirements.

1.5 WASTE MANAGEMENT AND DISPOSAL

.1 Waste Management and Disposal:
- .1 Separate waste materials for reuse in accordance with Section 01 74 19 - Construction/Demolition Waste Management and Disposal.
- .2 Remove from site and dispose of packaging materials at appropriate recycling facilities.
- .3 Collect and separate for disposal paper packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.
- .4 Divert unused metal materials from landfill to metal recycling facility as approved by Consultant.
- .5 Fold up metal banding, flatten and place in designated area for recycling.

2 Products

2.1 FLOOR DRAINS

.1 Floor Drains and Trench Drains: to CSA B79.

.2 Type 1: general duty; cast iron body round, adjustable head, 125 mm, nickel bronze strainer, integral seepage pan and trap primer connection.
- .1 Acceptable Material: Zurn ZN-211-B-P, J.R. Smith, Mifab, Watts, or approved equal.

2.2 CLEANOUTS

.1 Cleanout Plugs: heavy cast iron male ferrule with brass screws and threaded brass or bronze plug. Sealing-caulked lead seat or neoprene gasket.
- .1 Acceptable Material: Zurn, J.R. Smith, Mifab, Watts, or approved equal.

.2 Access Covers:
- .1 Wall Access: face or wall type, stainless steel square or round cover with flush head securing screws, bevelled edge frame complete with anchoring lugs.
- .2 Floor Access: cast iron body and frame with adjustable secured nickel bronze top and:
  - .1 Plugs: bolted bronze with neoprene gasket.
  - .2 Cover for Unfinished Concrete Floors: cast iron round, gasket, vandal-proof screws.
  - .3 Cover for Terrazzo Finish: polished nickel bronze with recessed cover for filling with terrazzo, vandal-proof locking screws.
  - .4 Cover for Tile and Linoleum Floors: polished nickel bronze with recessed cover for linoleum or tile infill, complete with vandal-proof locking screws.
  - .5 Cover for Carpeted Floors: polished nickel bronze with deep flange cover for carpet infill, complete with carpet retainer vandal-proof locking screws.

2.3 WATER HAMMER ARRESTORS

.1 Stainless steel or copper construction, bellows or piston type: to PDI-WH201.
- .1 Acceptable Material: Zurn, J.R. Smith, Mifab, Precision Plumbing Products.

2.4 TRAP SEAL PRIMERS

.1 For single fixtures only: Brass, with integral vacuum breaker, NPS1/2 solder ends, NPS1/2 drip line connection.

.2 Up to four fixtures: Metered water quantity from distribution unit. Locate maximum 3 m from fixture.

.3 Up to 12 fixtures: Electronic trap priming manifold with:
- .1 Vacuum breaker
- .2 Pre-set 24 hour time clock
- .3 Manual override switch

.4 120V solenoid valve
.5 120V or 3-wire connection
.6 NPS 3/4 inlet connection
.7 Calibrated manifold
.8 Water hammer arrestor
.9 Mounted in steel cabinet
.10 Compression outlet fittings
.11 Inlet shutoff valve
.12 Supplies minimum 59 ml at 138 kPa.

2.5 STRAINERS

.1 860 kPa, Y type with 20 mesh, monel, bronze or stainless steel removable screen.
.2 NPS2 and under, bronze body, screwed ends, with brass cap, tapped blow-off connection and plug.
.3 NPS2 1/2 and over, cast iron body, flanged ends, with bolted cap and tapped blow-off connection with bronze ball valve.

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 INSTALLATION

.1 Install in accordance with National Plumbing Code of Canada, latest edition, and
.2 Install in accordance with manufacturer's instructions and as specified.

3.3 CLEANOUTS

.1 Install cleanouts at base of soil and waste stacks, and rainwater leaders, at locations required code, and as indicated.
.2 Bring cleanouts to wall or finished floor unless serviceable from below floor.
.3 Building drain cleanout and stack base cleanouts: line size to maximum NPS4.

3.4 WATER HAMMER ARRESTORS

.1 Install on branch supplies to fixtures or group of fixtures where indicated.

3.5 TRAP SEAL PRIMERS

.1 Install for floor drains and elsewhere, as indicated.
.2 Install on cold water supply to nearest frequently used plumbing fixture, in concealed space, to approval of Consultant.
.3 Install PEX piping to floor drain or fixture.

3.6 STRAINERS

.1 Install with sufficient room to remove basket.

3.7 START-UP

.1 General:
- .1 In accordance with Section 01 91 13 - General Commissioning Requirements: General Requirements, supplemented as specified herein.

.2 Timing: start-up only after:
- .1 Pressure tests have been completed.
- .2 Disinfection procedures have been completed.
- .3 Certificate of static completion has been issued.
- .4 Water treatment systems operational.

.3 Provide continuous supervision during start-up.

3.8 TESTING AND ADJUSTING

.1 General:
- .1 In accordance with Section 01 91 13- General Commissioning Requirements : General Requirements, supplemented as specified.

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

.3 Application tolerances:
- .1 Pressure at fixtures: +/- 70kPa.
- .2 Flow rate at fixtures: +/- 20%.

.4 Adjustments:
- .1 Verify that flow rate and pressure meet design criteria.
- .2 Make adjustments while flow rate or withdrawal is (1) maximum and (2) 25% of maximum and while pressure is (1) maximum and (2) minimum.

.5 Floor drains:
- .1 Verify operation of trap seal primer.
- .2 Prime, using trap primer. Adjust flow rate to suit site conditions.
- .3 Check operations of flushing features.
- .4 Check security, accessibility, removeability of strainer.
- .5 Clean out baskets.

.6 Access doors:
- .1 Verify size and location relative to items to be accessed.

.7 Cleanouts:
- .1 Verify covers are gas-tight, secure, yet readily removable.

.8 Water hammer arrestors:
- .1 Verify proper installation of correct type of water hammer arrester.

.9 Strainers:
- .1 Clean out repeatedly until clear.
- .2 Verify accessibility of cleanout plug and basket.
- .3 Verify that cleanout plug does not leak.

.10 Commissioning Reports:
- .1 In accordance with Section 01 91 13 - General Commissioning Requirements: Reports, supplemented as specified.

.11 Training:
- .1 In accordance with Section 01 91 13 - General Commissioning Requirements: Training of O&M Personnel, supplemented as specified.
- .2 Demonstrate full compliance with Design Criteria.

End of Section

1 General

1.1 SUMMARY

.1 Section Includes:
- .1 The Supply and Installation of Washroom Fixtures and Trim.

.2 Products Installed but not Supplied Under this Section:
- .1 Install rough-in for equipment supplied by others, complete with valves on hot and cold water supplies, waste and vent.
- .2 Equipment installed by others:
  - .1 Connect with unions.
- .3 Equipment not installed:
  - .1 Capped for future connection by others.

.3 Related Sections:
- .1 Section 01 33 00 - Submittal Procedures.
- .2 Section 01 35 28 - Health and Safety Requirements.
- .3 Section 01 74 19 - Construction/Demolition Waste Management and Disposal.
- .4 Section 01 78 00 - Closeout Submittals.

1.2 REFERENCES

.1 Canadian Standards Association (CSA International).
- .1 CAN/CSA-B45 Series-02, Plumbing Fixtures.
- .2 CAN/CSA-B125-01, Plumbing Fittings.
- .3 CSA Standards\CSA-B561-04, Barrier-Free Design.

1.3 SUBMITTALS

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

.2 Product Data: submit WHMIS MSDS - Material Safety Data Sheets in accordance with Section 01 33 00 - Submittal Procedures.

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

.4 Indicate fixtures and trim:
- .1 Dimensions, construction details, roughing-in dimensions.
- .2 Factory-set water consumption per flush at recommended pressure.
- .3 (For water closets, urinals): minimum pressure required for flushing.

.5 Closeout Submittals:
- .1 Provide maintenance data including monitoring requirements for incorporation into manuals specified in Section 01 78 00 - Closeout Submittals.
- .2 Include:
  - .1 Description of fixtures and trim, giving manufacturer's name, type, model, year, capacity.
  - .2 Details of operation, servicing, maintenance.
  - .3 List of recommended spare parts.

1.4 QUALITY ASSURANCE

.1 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 DISPOSAL

.1 Waste Management and Disposal:
- .1 Separate waste materials for reuse in accordance with Section 01 74 19 - Construction Waste Management And Disposal.
- .2 Collect and separate for disposal paper packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.
- .3 Fold up metal banding, flatten and place in designated area for recycling.

2 Products

2.1 MANUFACTURED UNITS

.1 Fixtures: manufacture in accordance with CAN/CSA-B45 series.
.2 Trim, fittings: manufacture in accordance with CAN/CSA-B125.
.3 Exposed plumbing brass to be chrome plated.
.4 Number, locations: architectural drawings to govern.
.5 Fixtures in any one location to be product of one manufacturer and of same type.
.6 Trim in any one location to be product of one manufacturer and of same type.
.7 Water closets:
- .1 WC-1 : Wall-mounted, for exposed flush valve, top spud with maximum 6 litres/flush.
  - .1 Bowl: vitreous china, syphon jet, elongated rim, Kohler "Kingston" #K-4325, or approved equal.
  - .2 Seat: white, elongated, open front, moulded solid plastic, less cover, stainless steel check hinges, stainless steel insert post. Kohler "LUSTRA" #K-4670-C, or approved equal.
  - .3 Electronic Flush Valve: Exposed handwire operated 1-1/2" top inlet closet valve with sensor on valve, chrome-plated vandal resistant metal cover, overide button, field adjustable from 4.8LP7.25LPF 24VAC to 6VDC convertor. Delta # 81T2Ø1HWA, or approved equal.
- .2 WC-2 : Existing WC. Fixture to remain. Retrofit the existing flush valve with electronic flush valve retrofit test, Delta #81T2Ø1HWA. Provide proper kit to suit existing valve. Valve to be field adjustable from 4.8L to 25LPF.

.8 Washroom Lavatories:
- .1 L-1 : Under Mount Bowl:
  - .1 Vitreous china, s/w overflow. Size: 432 x 356 mm. Kohler "Caxton" K-2210, or equal with single hole.
  - .2 Washroom Lavatory Electronic Trim:
    - .1 Barrier-free electronic faucet:
      - .1 Delta Model #591TPØ250 c/w 0.5 GPM aerator, adjustable sensing range and all accessories for hard wire installation (120V to 24V transformer by others).

.9 Fixture piping:
- .1 Hot and cold water supplies to fixtures:
  - .1 Chrome plated flexible supply pipes with 1/4 turn angle supply stops, c/w reducers and escutcheon as required. Dahl or Brass Craft.
- .2 Waste:
  - .1 Brass P trap with clean out on fixtures not having integral trap.
  - .2 Chrome plated in exposed places.
- .3 Offset waste for barrier-free fiction installations.

.10 Chair carriers:
- .1 Factory manufactured floor-mounted carrier systems for wall-mounted fixtures.

3 Execution

3.1 INSTALLATION

.1 Mounting heights:
- .1 Standard: to comply with manufacturer's recommendations unless otherwise indicated or specified.
- .2 Wall-hung fixtures: as indicated, measured from finished floor.
- .3 Physically handicapped: to comply with most stringent of either NBCC (latest edition) or CAN/CSA B651.

3.2 ADJUSTING

.1 Conform to water conservation requirements specified this section.

.2 Adjustments:
- .1 Adjust water flow rate to design flow rates.
- .2 Adjust pressure to fixtures to ensure no splashing at maximum pressures.
- .3 Adjust flush valves to suit actual site conditions.
- .4 Adjust urinal flush timing mechanisms.
- .5 Automatic flush valves for WC's and urinals: set controls to prevent unnecessary flush cycles during silent hours.

.3 Checks:
- .1 Water closets, urinals: flushing action.
- .2 Aerators: operation, cleanliness.
- .3 Vacuum breakers, backflow preventers: operation under all conditions.

.4 Thermostatic controls:
- .1 Verify temperature settings, operation of control, limit and safety controls.

End of Section

1 General

1.1 SUMMARY

.1 Section Includes:
- .1 Bronze - valves.

.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 28 - Health and Safety Requirements.
- .4 Section 01 78 00 - Closeout Submittals.

1.2 REFERENCES

.1 American National Standards Institute (ANSI)/ American Society of Mechanical Engineers (ASME).
- .1 ANSI/ASME B1.20.1-1983(R2001), Pipe Threads, General Purpose (Inch).
- .2 ANSI/ASME B16.18-2001, Cast Copper Alloy Solder Joint Pressure Fittings.

.2 American Society for Testing and Materials International, (ASTM).
- .1 ASTM A276-04, Specification for Stainless Steel Bars and Shapes.
- .2 ASTM B62-02, Specification for Composition Bronze or Ounce Metal Castings.
- .3 ASTM B283-99a, Specification for Copper and Copper Alloy Die Forgings (Hot-Pressed).
- .4 ASTM B505/B505M-02, Specification for Copper-Base Alloy Continuous Castings.

.3 Manufacturers Standardization Society of the Valve and Fittings Industry, Inc. (MSS).
- .1 MSS-SP-25-1998, Standard Marking System for Valves, Fittings, Flanges and Unions.
- .2 MSS-SP-80-2003, Bronze Gate Globe, Angle and Check Valves.
- .3 MSS-SP-110-1996, Ball Valves, Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends.

1.3 SUBMITTALS

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

.2 Product Data: submit WHMIS MSDS - Material Safety Data Sheets in accordance with Section 01 33 00 - Submittal Procedures.
- .1 Submit shop drawings and product data in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit data for valves specified in this section.

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

1.4 QUALITY ASSURANCE

.1 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 DISPOSAL

.1 Waste Management and Disposal:
.2 Separate and recycle waste materials in accordance with Section 01 74 19 - Construction/Demolition Waste Management And Disposal.
.3 Collect and separate for disposal paper packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.

2 Products

2.1 MATERIALS

.1 Valves:
  .1 Except for specialty valves, to be single manufacturer.
  .2 All products to have CRN registration numbers.
.2 End Connections:
  .1 Connection into adjacent piping/tubing:
    .1 Steel pipe systems: Screwed ends to ANSI/ASME B1.20.1.
    .2 Copper tube systems: Solder ends to ANSI/ASME B16.18.
.3 Lockshield Keys:
  .1 Where lockshield valves are specified, provide 10 keys of each size: malleable iron cadmium plated.
.4 Ball Valves:
  .1 NPS 2 and under:
    .1 Body and cap: cast high tensile bronze to ASTM B62.
    .2 Pressure rating: Class125, 860 kPa steam.
    .3 Connections: Screwed ends to ANSI B1.20.1 and with hexagonal shoulders.
    .4 Stem: tamperproof ball drive.
    .5 Stem packing nut: external to body.
    .6 Ball and seat: replaceable stainless steel solid ball and teflon seats.
    .7 Stem seal: TFE with external packing nut.
    .8 Operator: removable lever handle.

3 Execution

3.1 INSTALLATION

.1 Install rising stem valves in upright position with stem above horizontal.
.2 Remove internal parts before soldering.
.3 Install valves with unions at each piece of equipment arranged to allow servicing, maintenance, and equipment removal.

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 61 00 - Common Product Requirements.
.4 Section 01 74 11 - Cleaning.
.5 Section 01 74 19 - Construction/Demolition Waste Management and Disposal.
.6 Section 09 91 00 - Painting.

1.2 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.

1.3 REFERENCES

.1 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.
.2 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.

1.4 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.

1.5 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 28 - Health and Safety Requirements.

1.6 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/Demolition 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

.2 Use maximum of 25 letters/numbers per line.

.4 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 Sprinklers: to NFPA 13.

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 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:

Contents	Background colour marking	Legend
Domestic hot water supply	Green	DOM. HW SUPPLY
Dom. HWS recirculation	Green	DOM. HW CIRC
Domestic cold water supply	Green	DOM. CWS
Sanitary	Green	SAN
Plumbing vent	Green	SAN. VENT

Fire protection water	Red	FIRE PROT. WTR
Sprinklers	Red	SPRINKLERS

2.6 IDENTIFICATION DUCTWORK SYSTEMS

.1 50 mm high stenciled 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 specified Section 09 91 00 - 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 11 - Cleaning.
.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 TAB is used throughout this Section to describe the process, methods and requirements of testing, adjusting and balancing for HVAC.

.2 TAB means to test, adjust and balance to perform in accordance with requirements of Contract Documents and to do other work as specified in this section.

.3 TAB work to include:

.1 Balance EF-16 and EF-17 system after work of this project is completed. The drawings indicate the airflow changes required by the renovations included herein. Airflows for any grille or diffuser that is unchanged by the work of this project is to be brought back to the pre-work TAB results.

1.2 QUALIFICATIONS OF TAB PERSONNEL

.1 Submit names of personnel to perform TAB to Departmental Representative within 90 days of award of contract.

.2 Provide documentation confirming qualifications, successful experience.

.3 TAB: performed in accordance with the requirements of standard under which TAB Firm's qualifications are approved:

.1 Associated Air Balance Council, (AABC) National Standards for Total System Balance, MN-1.

.2 National Environmental Balancing Bureau (NEBB) TABES, Procedural Standards for Testing, Adjusting, Balancing of Environmental Systems.

.3 Sheet Metal and Air Conditioning Contractors' National Association (SMACNA), HVAC TAB HVAC Systems - Testing, Adjusting and Balancing.

.4 Recommendations and suggested practices contained in the TAB Standard: mandatory.

.5 Use TAB Standard provisions, including checklists, and report forms to satisfy Contract requirements.

.6 Use TAB Standard for TAB, including qualifications for TAB Firm and Specialist and calibration of TAB instruments.

.7 Where instrument manufacturer calibration recommendations are more stringent than those listed in TAB Standard, use manufacturer's recommendations.

.8 TAB Standard quality assurance provisions such as performance guarantees form part of this contract.

.1 For systems or system components not covered in TAB Standard, use TAB procedures developed by TAB Specialist.

.2 Where new procedures, and requirements, are applicable to Contract requirements have been published or adopted by body responsible for TAB Standard used (AABC, NEBB, or TABB), requirements and recommendations contained in these procedures and requirements are mandatory.

1.3 PURPOSE OF TAB

.1 Test to verify proper and safe operation, determine actual point of performance, evaluate qualitative and quantitative performance of equipment, systems and controls at design, average and low loads using actual or simulated loads

.2 Adjust and regulate equipment and systems to meet specified performance requirements and to achieve specified interaction with other related systems under normal and emergency loads and

operating conditions.

.3 Balance systems and equipment to regulate flow rates to match load requirements over full operating ranges.

1.4 CO-ORDINATION

.1 Schedule time required for TAB (including repairs, re-testing) into project construction and completion schedule to ensure completion before acceptance of project.

.2 Do TAB of each system independently and subsequently, where interlocked with other systems, in unison with those systems.

1.5 PRE-TAB REVIEW

.1 Review contract documents before project construction is started. Confirm in writing to Departmental Representative adequacy of provisions for TAB and other aspects of design and installation pertinent to success of TAB.

.2 Review specified standards and report to Departmental Representative in writing proposed procedures which vary from standard.

.3 During construction, co-ordinate location and installation of TAB devices, equipment, accessories, measurement ports and fittings.

1.6 START-UP

.1 Follow start-up procedures as recommended by equipment manufacturer unless specified otherwise.

.2 Follow special start-up procedures specified elsewhere in Division 23.

1.7 OPERATION OF SYSTEMS DURING TAB

.1 Operate systems for length of time required for TAB and as required by Departmental Representative for verification of TAB reports.

1.8 START OF TAB

.1 Notify Departmental Representative 7 days prior to start of TAB.

.2 Start TAB when building is essentially completed, including:

- .1 Installation of ceilings, doors, windows, other construction affecting TAB.
- .2 Application of weatherstripping, sealing, and caulking.
- .3 Pressure, leakage, other tests specified elsewhere Division 23.
- .4 Provisions for TAB installed and operational.
- .5 Start-up, verification for proper, normal and safe operation of mechanical and associated electrical and control systems affecting TAB including but not limited to:
  - .1 Proper thermal overload protection in place for electrical equipment.
  - .2 Air systems:
    - .1 Filters in place, clean.
    - .2 Duct systems clean.
    - .3 Ducts, air shafts, ceiling plenums are airtight to within specified tolerances.
    - .4 Correct fan rotation.
    - .5 Fire, smoke, volume control dampers installed and open.
    - .6 Coil fins combed, clean.
    - .7 Access doors, installed, closed.
    - .8 Outlets installed, volume control dampers open.

1.9 APPLICATION TOLERANCES

.1 Do TAB to following tolerances of design values:
  .1 HVAC systems: plus 5 %, minus 5 %.

1.10 ACCURACY TOLERANCES

.1 Measured values accurate to within plus or minus 2 % of actual values.

1.11 INSTRUMENTS

.1 Prior to TAB, submit to Departmental Representative list of instruments used together with serial numbers.
.2 Calibrate in accordance with requirements of most stringent of referenced standard for either applicable system or HVAC system.
.3 Calibrate within 3 months of TAB. Provide certificate of calibration to Departmental Representative.

1.12 SUBMITTALS

.1 Submit, prior to commencement of TAB:
.2 Proposed methodology and procedures for performing TAB if different from referenced standard.

1.13 PRELIMINARY TAB REPORT

.1 Submit for checking and approval of Departmental Representative, prior to submission of formal TAB report, sample of rough TAB sheets. Include:
  .1 Details of instruments used.
  .2 Details of TAB procedures employed.
  .3 Calculations procedures.
  .4 Summaries.

1.14 TAB REPORT

.1 Format in accordance with referenced standard.
.2 TAB report to show results in SI units and to include:
  .1 Project record drawings.
  .2 System schematics.
.3 Submit 6 copies of TAB Report to Departmental Representative for verification and approval, in English in D-ring binders, complete with index tabs.

1.15 VERIFICATION

.1 Reported results subject to verification by Departmental Representative and/or Consultant.
.2 Provide personnel and instrumentation to verify up to 30 % of reported results.
.3 Number and location of verified results as directed by Departmental Representative.
.4 Pay costs to repeat TAB as required to satisfaction of Departmental Representative.

1.16 SETTINGS

.1 After TAB is completed to satisfaction of Departmental Representative, replace drive guards, close access doors, lock devices in set positions, ensure sensors are at required settings.
.2 Permanently mark settings to allow restoration at any time during life of facility. Do not eradicate or cover markings.

1.17 COMPLETION OF TAB

.1 TAB considered complete when final TAB Report received and approved by Departmental Representative.

1.18 AIR SYSTEMS

.1 Standard: TAB to most stringent of this section or TAB standards of AABC, SMACNA or ASHRAE.
.2 Do TAB of systems, equipment, components, controls specified Division 23.
.3 Qualifications: personnel performing TAB current member in good standing of AABC or NEBB.
.4 Quality assurance: perform TAB under direction of supervisor qualified to standards of AABC or NEBB.
.5 Measurements: to include as appropriate for systems, equipment, components, controls: air velocity, static pressure, flow rate, pressure drop (or loss), temperatures (dry bulb, wet bulb, dewpoint), duct cross-sectional area, RPM, electrical power, voltage, noise, vibration.
.6 Locations of equipment measurements: to include as appropriate:
    .1 Inlet and outlet of dampers, filter, coil, humidifier, fan, other equipment causing changes in conditions.
    .2 At controllers, controlled device.
.7 Locations of systems measurements to include as appropriate: main ducts, main branch, sub-branch, run-out (or grille, register or diffuser).

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 RELATED SECTIONS

.1 Section 01 91 13 - General Commissioning Requirements.

1.2 POTABLE WATER SYSTEMS

.1 When cleaning is completed and system filled:
  .1 Verify performance of equipment and systems as specified elsewhere in Division 23.
  .2 Check for proper operation of water hammer arrestors. Run one outlet for 10 seconds, then shut of water immediately. If water hammer occurs, replace water hammer arrestor or recharge air chambers. Repeat for each outlet and flush valve.
  .3 Confirm water quality consistent with supply standards, verifying that no residuals remain resulting from flushing and/or cleaning.

1.3 WET AND DRY PIPE SPRINKLER SYSTEM, STANDPIPE AND HOSE SYSTEMS

.1 Cleaning, testing, start-up, performance verification of equipment, systems, components, and devices is specified elsewhere in Division 23.
.2 Verification of controls, detection devices, alarm devices is specified Division 26.
.3 Demonstrate that fire hose will reach to most remote location regardless of partitions, and obstructions.
.4 Verify operation of interlocks between HVAC systems and fire alarm systems.

1.4 SANITARY AND STORM DRAINAGE SYSTEMS

.1 Buried systems: perform tests prior to back-filling. Perform hydraulic tests to verify grades and freedom from obstructions.
.2 Ensure that traps are fully and permanently primed.
.3 Ensure that fixtures are properly anchored, connected to system.
.4 Operate flush valves, tank and operate each fixture to verify drainage and no leakage.
.5 Roof drains:
  .1 Remove caps as required.

1.5 REPORTS

.1 In accordance with Section 01 91 13 - General Commissioning Requirements: Reports, supplemented as specified herein.

1.6 TRAINING

.1 In accordance with Section 01 91 13 - General Commissioning Requirements: Training of O&M Personnel, supplemented as specified herein.

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 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 28 - Health and Safety Requirements.
  .3 Section 01 74 19 - Construction/Demolition Waste Management and Disposal.

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-03c, Standard Specification for General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet and Strip.
  .2 ASTM A635/A635M-02, Standard Specification for Steel, Sheet and Strip, Heavy-Thickness Coils, Carbon, Hot Rolled.
  .3 ASTM A653/A653M-03, Standard Specification for Steel Sheet, Zinc Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by the Hot-Dip Process.
.3 Department of Justice Canada (Jus).
  .1 Canadian Environmental Protection Act (CEPA), 1999, c. 33 .
.4 Health Canada/Workplace Hazardous Materials Information System (WHMIS).
  .1 Material Safety Data Sheets (MSDS).
.5 National Fire Protection Association (NFPA).
  .1 NFPA 90A-02, Standard for the Installation of Air-Conditioning and Ventilating Systems.
  .2 NFPA 90B-02, Standard for the Installation of Warm Air Heating and Air-Conditioning Systems.
  .3 NFPA 96-01, Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations.
.6 Sheet Metal and Air Conditioning Contractors' National Association (SMACNA).
  .1 SMACNA HVAC Duct Construction Standards - Metal and Flexible, 2nd Edition 1995 and Addendum No. 1, 1997.
  .2 SMACNA HVAC Air Duct Leakage Test Manual, 1985, 1st Edition.
  .3 IAQ Guideline for Occupied Buildings Under Construction 1995, 1st Edition.
.7 Transport Canada (TC).
  .1 Transportation of Dangerous Goods Act (TDGA), 1992, c. 34.

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 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/Demolition Waste Management and Disposal.
- .2 Remove from site and dispose of packaging materials at appropriate recycling facilities.
- .3 Collect and separate for disposal paper 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.

1.6 MATERIALS

.1 All materials are to be approved by the Engineer.

.2 Ductwork:
- .1 Galvanized sheet metal used for patches on ductwork shall be as per industry standard specifications.
- .2 Sheet metal screws, fibre tape, and duct sealer shall be used to secure the patches in place.
- .3 Patches shall be sealed as per industry standard specifications.

.3 Cleaning Unit:
- .1 Equipment shall be a truck mounted vacuum unit capable of supplying 3775 L/S of vacuum air flow per minute through a 250mm flexible vacuum hose at a velocity of 90 m/s. The truck shall be equipped to hold the dust and debris collected and shall be disposed of by the Contractor.

1.7 METHOD OF WORK

.1 General Description:
- .1 The Contractor shall provide all labour, materials and equipment required to clean, all supply ductwork, return ductwork, exhaust ductwork, run outs, trunks, grilles, registers, diffusers and air handling units including coils, dampers, louvres and plenums.

.2 Access panel shall be cut in the ductwork to facilitate inspection. Size of access panels shall be determined on site and shall meet requirements for access panels specified.

.3 The Contractor shall be responsible for repairing any and all damage caused by movement of equipment or materials during execution of the work.
.4 The Contractor shall keep the job site clean and tidy at all times and thoroughly cleanup and remove all debris daily.

1.8 INSPECTION

.1 All work shall be subject to inspection at any and all times by the Engineer. It shall be the Contractor's responsibility to notify the Engineer of any problems that arise during work under this contract.

1.9 CLEANUP

.1 Upon completion of the work under this contract, all surplus materials, tools, equipment, dust and debris shall be removed and the site left in a clean and tidy condition to the complete satisfaction of the Engineer.

2 Products

2.1 SEAL CLASSIFICATION

.1 Classification as follows:
.2 Maximum Pressure Pa SMACNA Seal Class

500	C
250	C
125	C
125	Unsealed

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

2.2 SEALANT

.1 Sealant: oil resistant, water borne, 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 five-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, G90 zinc coating.

.2 Thickness, fabrication and reinforcement: to SMACNA.

.3 Joints: to SMACNA. 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 SMACNA and ASHRAE Standards and Guidelines, or as noted herein, whichever is more stringent.

- .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: galvanized steel angle with black steel rods to ASHRAE and SMACNA:

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

- .4 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.
.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 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 WATERTIGHT DUCT

.1 Provide watertight duct for:
  .1 Fresh air intake.
  .2 Minimum 3000 mm from duct mounted humidifier in all directions.
  .3 As indicated.
.2 Form bottom of horizontal duct without longitudinal seams.
  .1 Solder joints of bottom and side sheets.
  .2 Seal other joints with duct sealer.
.3 Slope horizontal branch ductwork down towards fume hoods served.
  .1 Slope header ducts down toward risers.
.4 Fit base of riser with 150 mm deep drain sump and 32 mm drain connected, with deep seal trap and valve and discharging to open funnel drain.

3.4 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.

3.5 LEAKAGE TESTS

.1 System leakage tolerances specified are stated as percentage of total flow rate handled by system. Pro-rate specified system leakage tolerances. Leakage for sections of duct systems: not to exceed total allowable leakage.
.2 Leakage tests on following systems not to exceed specified leakage rates.
  .1 Small duct systems up to 250 Pa: leakage 1%.
  .2 VAV box and duct on downstream side of VAV box: leakage 1%.
  .3 Large low pressure duct systems up to 500 Pa: leakage 1%.

.4 HP duct systems up to 1000 Pa pressure classification, including upstream side of VAV boxes: leakage 1%.
.5 Exterior duct systems utilizing self-adhesive weather barrier membranes: leakage 0%.

.3 Evaluation of test results to use surface area of duct and pressure in duct as basic parameters.
.4 In accordance with SMACNA HVAC Duct Leakage Test Manual.
.5 Do leakage tests in sections.
.6 Make trial leakage tests as instructed to demonstrate workmanship.
.7 Do not install additional ductwork until trial test has been passed.
.8 Test section minimum of 30 m long with not less than three branch takeoffs and two 90 degrees elbows.
.9 Complete test before performance insulation or concealment Work.

End of Section

1 General

1.1 SUMMARY

.1 Related Sections:
- .1 Section 01 33 00 - Submittal Procedures.
- .2 Section 01 35 28 - Health and Safety Requirements.
- .3 Section 01 45 00 - Quality Control.
- .4 Section 01 74 19 - Construction/Demolition Waste Management and Disposal.
- .5 Section 01 78 00 - Closeout Submittals.

1.2 REFERENCES

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

.2 Sheet Metal and Air Conditioning Contractors' National Association (SMACNA).
- .1 SMACNA - HVAC Duct Construction Standards - Metal and Flexible, 95.

1.3 SUBMITTALS

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

.2 Product Data:
- .1 Submit manufacturer's printed product literature, specifications and data sheet. Indicate the following:
  - .1 Flexible connections.
  - .2 Duct access doors.
  - .3 Turning vanes.
  - .4 Instrument test ports.
- .2 Submit WHMIS MSDS sheets. Indicate VOC's for adhesive and solvents during application and curing.

.3 Test Reports: submit certified test reports from approved independent testing laboratories indicating compliance with specifications for specified performance characteristics and physical properties.
- .1 Certification of ratings: catalogue or published ratings to be those obtained from tests carried out by manufacturer or independent testing agency signifying adherence to codes and standards.

.4 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.

.5 Instructions: submit manufacturer's installation instructions.

.6 Manufacturer's Field Reports: manufacturer's field reports specified.

.7 Closeout submittals: submit maintenance and engineering data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

1.4 QUALITY ASSURANCE

.1 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 Waste Management and Disposal:
- .1 Separate waste materials for reuse in accordance with Section 01 74 19 - Construction/Demolition Waste Management and Disposal.
- .2 Remove from site and dispose of packaging materials at appropriate recycling facilities.
- .3 Collect and separate for disposal paper packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan (WMP).
- .4 Separate for reuse and place in designated containers Steel waste in accordance with Waste Management Plan (WMP).
- .5 Divert unused metal materials from landfill to metal recycling facility as approved by Departmental Representative.

2 Products

2.1 GENERAL

.1 Manufacture in accordance with SMACNA - HVAC Duct Construction Standards.

2.2 FLEXIBLE CONNECTIONS

.1 Frame: galvanized sheet metal frame 0.66 mm thick with fabric clenched by means of double locked seams.

.2 Material:
- .1 Fire resistant, self extinguishing, neoprene coated glass fabric, temperature rated at minus 40 degrees C to plus 90 degrees C, density of 1.3 kg/m2.

2.3 ACCESS DOORS IN DUCTS

.1 Non-Insulated Ducts: sandwich construction of same material as duct, one sheet metal thickness heavier, minimum 0.6 mm thick complete with sheet metal angle frame.

.2 Insulated Ducts: sandwich construction of same material as duct, one sheet metal thickness heavier, minimum 0.6 mm thick complete with sheet metal angle frame and 25 mm thick rigid glass fibre insulation.

.3 Gaskets: neoprene.

.4 Hardware:
- .1 Up to 300 x 300 mm: two sash locks complete with safety chain.
- .2 301 to 450 mm: four sash locks complete with safety chain.
- .3 451 to 1000 mm: piano hinge and minimum two sash locks.
- .4 Doors over 1000 mm: piano hinge and two handles operable from both sides.
- .5 Hold open devices.
- .6 300 x 300 mm glass viewing panels.

2.4 TURNING VANES

.1 Factory or shop fabricated double thickness with trailing edge, to recommendations of SMACNA and as indicated.

2.5 INSTRUMENT TEST

.1 1.6 mm thick steel zinc plated after manufacture.
.2 Cam lock handles with neoprene expansion plug and handle chain.
.3 28 mm minimum inside diameter. Length to suit insulation thickness.
.4 Neoprene mounting gasket.

2.6 SPIN-IN COLLARS

.1 Conical galvanized sheet metal spin-in collars with lockable butterfly damper.
.2 Sheet metal thickness to co-responding round duct standards.

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 INSTALLATION

.1 Flexible Connections:
  .1 Install in following locations:
    .1 Inlets and outlets to supply air units and fans.
    .2 Inlets and outlets of exhaust and return air fans.
    .3 As indicated.
  .2 Length of connection: 100mm.
  .3 Minimum distance between metal parts when system in operation: 75 mm.
  .4 Install in accordance with recommendations of SMACNA.
  .5 When fan is running:
    .1 Ducting on sides of flexible connection to be in alignment.
    .2 Ensure slack material in flexible connection.
.2 Access Doors and Viewing Panels:
  .1 Size:
    .1 600 x 600 mm for person size entry.
    .2 450 x 450 mm for servicing entry.
    .3 300 x 300 mm for viewing.
    .4 As indicated.
  .2 Locations:
    .1 Fire and smoke dampers.
    .2 Control dampers.
    .3 Devices requiring maintenance.
    .4 Required by code.
    .5 Reheat coils.
    .6 Elsewhere as indicated.
.3 Instrument Test Ports:
  .1 General:
    .1 Install in accordance with recommendations of SMACNA and in accordance with manufacturer's instructions.
  .2 Locate to permit easy manipulation of instruments.
  .3 Install insulation port extensions as required.
  .4 Locations:

.1 For traverse readings:
  .1 Ducted inlets to roof and wall exhausters.
  .2 Inlets and outlets of other fan systems.
  .3 Main and sub-main ducts.
  .4 And as indicated.
.2 For temperature readings:
  .1 At outside air intakes.
  .2 In mixed air applications in locations as approved by Departmental Representative.
  .3 At inlet and outlet of coils.
  .4 Downstream of junctions of two converging air streams of different temperatures.
  .5 And as indicated.

.4 Turning vanes:
  .1 Install in accordance with recommendations of SMACNA and as indicated.

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 74 19 - Construction/Demolition Waste Management and Disposal.

1.2 REFERENCES

.1 Sheet Metal and Air Conditioning National Association (SMACNA)
  .1 SMACNA HVAC Duct Construction Standards, Metal and Flexible-1985.
.2 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
  .1 Material Safety Data Sheets (MSDS).

1.3 SUBMITTALS

.1 Product Data:
  .1 Submit manufacturer's printed product literature, specifications and datasheet in accordance with Section 01 33 00 - Submittal Procedures. Include product characteristics, performance criteria, and limitations.
    .1 Submit two copies of Workplace Hazardous Materials Information System (WHMIS) Material Safety Data Sheets (MSDS) in accordance with Section 01 33 00 - Submittal Procedures.
.2 Quality assurance submittals: submit following in accordance with Section 01 33 00 - Submittal Procedures .
  .1 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
  .2 Instructions: submit manufacturer's installation instructions.
    .1 Departmental Representative will make available 1 copy of systems supplier's installation instructions.

1.4 QUALITY ASSURANCE

.1 Health and Safety Requirements:
  .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 Packing, shipping, handling and unloading:
  .1 Deliver, store and handle in accordance with Section 01 61 00 - Common Product Requirements.
.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/Demolition Waste Management and Disposal.

2 Products

2.1 GENERAL

.1 Manufacture to SMACNA standards.

2.2 SPLITTER DAMPERS

.1 Fabricate from same material as duct but one sheet metal thickness heavier, with appropriate stiffening.
.2 Single thickness construction.
.3 Control rod with locking device and position indicator.
.4 Rod configuration to prevent end from entering duct.
.5 Pivot: piano hinge.
.6 Folded leading edge.

2.3 SINGLE BLADE DAMPERS

.1 Fabricate from same material as duct, but one sheet metal thickness heavier. V-groove stiffened.
.2 Size and configuration to recommendations of SMACNA, except maximum height 100 mm.
.3 Locking quadrant with shaft extension to accommodate insulation thickness.
.4 Inside and outside nylon end bearings.
.5 Channel frame of same material as adjacent duct, complete with angle stop.

2.4 MULTI-BLADED DAMPERS

.1 Factory manufactured of material compatible with duct.
.2 Opposed blade: configuration, metal thickness and construction to recommendations of SMACNA.
.3 Maximum blade height: 100mm.
.4 Bearings: pin in bronze bushings.
.5 Linkage: shaft extension with locking quadrant.
.6 Channel frame of same material as adjacent duct, complete with angle stop.
.7 Maximum leakage: 1% at 500Pa.

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 where indicated.
.2 Install in accordance with recommendations of SMACNA and in accordance with manufacturer's instructions.
.3 Locate balancing dampers in each branch duct, for supply, return and exhaust systems.
.4 Runouts to registers and diffusers: install single blade damper located as close as possible to main ducts.
.5 Dampers: vibration free.

.6 Ensure damper operators are observable and accessible.
.7 Corrections and adjustments conducted by Engineer.

End of Section

1 General

1.1 SUMMARY

.1 Related Sections:
- .1 Section 01 33 00 - Submittal Procedures.
- .2 Section 01 35 28 - Health and Safety Requirements.
- .3 Section 01 74 19 - Construction/Demolition Waste Management and Disposal.

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-02, Standard for the Installation of Air-Conditioning and Ventilating Systems.
- .2 NFPA 90B-02, 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, 95 (Addendum No.1, November 1997).
- .2 SMACNA IAQ Guideline for Occupied Buildings under Construction, 1st Edition 1995.

.6 Underwriters' Laboratories Inc. (UL).
- .1 UL 181-96, Standard for Factory-Made Air Ducts and Air Connectors.

.7 Underwriters' Laboratories of Canada (ULC).
- .1 CAN/ULC-S110-1986(R2001), 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 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 19 - Construction/Demolition Waste Management and Disposal.
  .2 Remove from site and dispose of packaging materials at appropriate recycling facilities.
  .3 Collect and separate for disposal paper 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 Develop and implement an Indoor Air Quality (IAQ) Management Plan in accordance for construction and preoccupancy phases of building.
.2 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 jacket, as indicated.
.2 Performance:
  .1 Factory tested to 1 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 1 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, 25 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 1 kPa without leakage.

.2 Maximum relative pressure drop coefficient: 3.

.3 Thermal loss/gain: 1.3 W/m2. degrees C mean.

2.6 METALLIC ACOUSTIC INSULATED - MEDIUM PRESSURE

.1 Type 5: Spiral wound, flexible perforated aluminum with factory applied 37 mm thick flexible mineral fibre thermal insulation and sleeved by aluminum foil/mylar laminate vapour barrier, as indicated.

.2 Performance:

.1 Factory tested to 3 kPa without leakage.

.2 Maximum relative pressure drop coefficient: 3.

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

	Frequency (Hz)				
Duct Diam:	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

2.7 NON-METALLIC - ACOUSTIC INSULATED

.1 Type 7: 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:

	Frequency (Hz)				
Duct Diam:	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.

End of Section

1 General

1.1 RELATED SECTIONS

.1 Section 01 74 11 - Cleaning.
.2 Section 01 78 00 - Closeout Submittals.
.3 Section 26 27 26 - Wiring Devices.

1.2 REFERENCE STANDARDS

.1 CSA 22.1, Canadian Electrical Code part one, Safety Standards for Electrical Installations (2012)
.2 CANS-C235, preferred voltage levels for AC systems, 0 to 50, 000V.

1.3 OPERATION AND MAINTENANCE DATA

.1 Division 01, General Instructions, is a part of this Section and shall apply as if repeated here.
.2 This Section 26 05 00 shall apply to and govern the Work of all Sections of this Division 26 Specification.

2 Products

2.1 MATERIALS

.1 The specification complements the drawings in describing the supply and installation of a complete electrical system. This system shall include but not necessarily be limited to the following:
  .1 Small power system including wiring devices;
  .2 Lighting system including luminaries, including wiring;
  .3 Exit and emergency lighting including wiring;

3 Execution

3.1 INSTALLATION

.1 The specification together with the drawings are intended to provide a description of a complete electrical system and therefore there shall be no omission of the items necessary or required to make a finished, workmanlike, first class installation, even though each and every item of labour and material may not be mentioned in the specification or shown on the drawings.
.2 Items indicated on floor plans and not on riser diagrams, or vice versa, shall be considered fully covered by both.
.3 Runs of conduit and outlet locations indicated on the drawings are diagrammatic and exact locations must be determined by this contract as the work proceeds, with due regard to the structure and the work of other trades. This contract shall make any changes dictated by structural requirements, or conflicts with other trades, without charge.
.4 Apparent errors or omissions shall be referred to the Architect/Engineer whose decision shall be final.
.5 Building dimensions shall not be scaled from the electrical drawings but shall be obtained from the architectural and/or structural drawings. Any discrepancy between the drawings and building shall be questioned before proceeding with the installation.

3.2 CODES AND STANDARDS

.1 As a minimum standard perform all work in accordance with the requirements of the Provincial Department of Labour, Canadian Electrical Code C22.1-2012 Part 1, National Building Code, and CAN/ULC - S524. These standards together with all local or municipal rules, regulations, and ordinances shall be considered as the latest approved editions at the time of tender closing. In no instance, shall the standard established in these contract documents, be reduced by any codes.

.2 Abbreviations for electrical terms: to CSA Z85.

3.3 INSPECTIONS, PERMITS AND FEES

.1 Obtain all inspections and permits required by all laws, ordinances, rules and regulations by the public authority having jurisdiction at the place of this building for work and obtain certificates of such inspections and submit same and pay all charges in connection therewith. The final certificate of inspection shall be obtained before final payment for work shall be considered due.

3.4 SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

.1 Submit shop drawings, product data and samples in accordance with Section 01 33 00. Provide all shop drawings within 30 days after contract has been awarded. Failure to do so will delay progress payments.

.2 Indicate details of construction, dimensions, capacities, weights and electrical performance characteristics of equipment or material.

.3 Where applicable, include wiring, single line and schematic diagrams.

.4 Include wiring drawings or diagrams showing interconnection with work of other Sections.

.5 Keep one copy of shop drawings and product data on site, available for reference at all times.

3.5 OPERATION AND MAINTENANCE DATA

.1 Provide operation and maintenance data for incorporation into Operation and Maintenance Manuals as specified in Section 01 78 00.

.2 Include in the operation and maintenance data:

- .1 Details of design elements, construction features, component function, and maintenance requirements to permit effective start up, operation, maintenance, repair, modification, extension, and expansion of any portion or feature of installation.
- .2 Technical data, product data, supplemented by bulletins, component illustrations, exploded views, technical description of items and parts lists. Advertising or sales literature not acceptable.
- .3 Wiring and schematic diagrams and performance curves.
- .4 Names and addresses of local suppliers for items included in maintenance manuals.
- .5 Copy of reviewed shop drawings.
- .6 Signed receipt for all spare parts.

.3 Approvals:

- .1 Submit one 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.
- .4 Provide two (2) final bound copies of Operation and Maintenance Manuals to Owner and one (1) bound copy to Engineer.

3.6 PROJECT RECORD DOCUMENTS

.1 Provide Project Record Documents in accordance with Section 01 78 00.
.2 Submit record drawings to Architect/Engineer showing changes of wire sizes, circuit numbering and location of raceways, fittings, fixtures, panels and equipment, and their sizes, the location of which has changed or deviated during the work.
.3 Submit sepia or reproducible of record drawings after record drawings have been approved by the Engineer. Originals shall be made available by the Engineer for the making of sepia or reproducible of the contract drawings. All changes reflected on record drawings are to be indicated on these sepia or reproducible.

3.7 MAINTENANCE MATERIALS

.1 Provide maintenance materials in accordance with Section 01 78 00.

3.8 CARE, OPERATION AND START UP

.1 Instruct operating personnel in the operation, care and maintenance of the equipment.
.2 Arrange and pay for services of the manufacturer's service Engineer to supervise start-up and to check, adjust, balance and calibrate components.
.3 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 aspects of its care and operation.

3.9 VOLTAGE RATINGS

.1 Operating voltages to meet requirements of CAN3-C235.
.2 Motors, control and distribution equipment to operate satisfactorily at 60 Hz within normal operating limits established by the above standard. Equipment to operate in extreme operating conditions established in the above standard without damage to the equipment.

3.10 MATERIALS AND EQUIPMENT

.1 Equipment and materials to be CSA certified, and manufactured to standard quoted.
.2 Where there is no alternative to supplying equipment which is not CSA certified, obtain special approval from CSA.
.3 Factory assemble control panels and component assemblies.
.4 For the purposes of uniformity similar materials shall be of one manufacturer (i.e. all panels; all motor control equipment; all fixtures in as much as is possible, etc.).
.5 To avoid the possibility of the work being delayed, order all materials as soon as the shop drawings are reviewed, and report at once to the Architect/Engineer any delays in the delivery of materials which would hold up the completion of the job.

3.11 GROUNDING

.1 All equipment and exposed non-current carrying metal, conduits and parts shall be permanently and effectively grounded to meet minimum requirements of the CEC Section 10, and as indicated on the drawings and further specified. Standards set either by drawings or specifications which are above those covered by CEC Section 10, shall not be reduced under any circumstances.

3.12 EQUIPMENT IDENTIFICATION

.1 Install directories on the back of each door of panel boards, neatly arranged and mounted in frame under transparent cover. Directories shall be typed and shall show system voltage, which outlets are on each circuit and any special information, such as sizes of fuses, etc., necessary for the proper operation and maintenance of the system. Provide updated typewritten directories for all panelboards modified by the renovations.
.2 Size of identification shall be suitable for equipment and importance of information.

.3 Lettering shall be of sufficient size to be readable from normal viewing distance and the information required on the nameplates shall dictate the physical size of plates.
.4 Nameplates shall have white lettering on black background except for equipment connection to emergency power source, which shall have white lettering on red background.
.5 All "D" and "E" boxes 200 x 200 x 100" or larger and "C" and "T" cabinets shall have lamacoid plates affixed indicating voltages and/or systems housed within.
.6 Nameplates:
.1 Lamicoid 3 mm thick plastic engraving sheet.

.1	Size 1 10mm x 50mm	1 line	high letters
.2	Size 2 13mm x 69mm	1 line	high letters
.3	Size 3 13mm x 69mm	2 lines	high letters
.4	Size 4 19mm x 91mm	1 line	high letters
.5	Size 5 19mm x 91mm	2 lines	high letters
.6	Size 6 25mm x 100mm	1 line	high letters
.7	Size 7 25mm x 100mm	2 lines	high letters

.7 Labels:
.1 Embossed plastic labels with 6.5mm high letters unless specified otherwise.
.8 Wording on nameplates and labels to be approved by the Engineer prior to manufacture.
.9 Allow for average of twenty-five (25) letters per nameplate and label.
.10 Identification to be English.

3.13 WIRING IDENTIFICATION

.1 Identify wiring with coloured plastic tapes, on both ends of phase conductors for feeders.
.2 Maintain phase sequence and colour coding throughout.
.3 Colour code to meet requirements of CSA C22.1.
.4 Use color coded wires in branch circuit wiring, systems wiring and communication cables.

3.14 CONDUIT AND CABLE IDENTIFICATION

.1 Identify conduit and metallic sheathed cable runs for the various systems with 25mm coloured bands placed on conduit run every 3 metres of length and at least one should appear in each room and at points where conduit or cable enters wall, ceiling or floor.
.2

System		Colour
.1	600/347V Lighting	Orange
.2	120/208V Lighting & Power	Yellow
.3	Telephone / Data	Black
.4	Grounding	Green
.5	Low Voltage	White

3.15 WIRING TERMINATIONS

.1 Lugs, terminals, screws used for termination of wiring to be suitable for either copper or aluminum conductors as indicated.

3.16 MANUFACTURERS AND CSA LABELS

.1 Manufacturers and CSA labels shall be visible and legible after equipment is installed.

3.17 WARNING SIGNS

.1 Provide warning signs, as specified and/or to meet the requirements of the Department of Labour Inspection Department.
.2 Use decal signs, minimum 175mm x 250mm size.

3.18 LOCATION OF OUTLETS

.1 Locate outlets in accordance with Section 26 27 26.
.2 Do not install outlets back-to-back in wall; allow minimum 150mm horizontal clearance between boxes.
.3 Change location of outlets at no extra cost or credit providing distance does not exceed 3 metres and information is given before installation.
.4 Locate light switches on latch side of doors and safety switches in mechanical rooms on latch side of door where possible.
.5 Coordinate on site the location of outlets with respect to counters, heating cabinets, etc., before work is to start.

3.19 MOUNTING HEIGHTS

.1 Mounting heights of equipment is from finished floor to centre line of equipment unless specified or indicated otherwise.
.2 If mounting height of equipment is not indicated verify before proceeding with installation.
.3 Install electrical equipment at the following heights unless indicated otherwise.

.1	Local switches:		1200mm
.2	Wall receptacles:		
	.1	General:	400mm
	.2	Above top of counters or splash back:	375mm
.3	Data/Telephone outlets:		400mm
.4	Luminaries:	as indicated on drawings	
.5	Emergency lighting equipment:		2100mm

3.20 PROTECTION

.1 Protect exposed live equipment during construction for personnel safety.
.2 Shield and mark 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 electrician.

3.21 CONDUIT AND CABLE INSTALLATION

.1 Install conduit, and sleeves, prior to pouring of concrete. Sleeves through concrete shall be constructed of sheet metal, sized for free passage of conduit, and protruding 50mm.
.2 Install cables, conduits, and fittings to be embedded neatly and close to building structure so furring can be kept to minimum.

3.22 FIRE STOPPING AND SMOKE SEALS

.1 All fire stopping and smoke seals required to properly accommodate the work of this Division shall be the financial responsibility of Division 26, and carried out by trades to the applicable ULC approved system of one of the approved Manufacturers provided in this document. Trades personnel must be trained by the manufacturer and provide documentation stating same.
.2 Where material pass through fire rated walls, floors and partitions, an ULC approved fire stopping and smoke seal system shall be used to maintain or exceed the fire separations rating.
.3 Provide ULC drawings for each site-specific penetration.
.4 Work must be performed by a company with experience in the application of fire stopping and smoke seals to ULC requirements.
.5 Standard of Acceptance: Hilti and Tremco

3.23 TESTS

.1 Conduct and pay for tests of the following:
  .1 Circuits originating from branch distribution panels.
  .2 Lighting and its control.
  .3 All other Miscellaneous Systems.
.2 Furnish manufacturer's certificate or letter confirming that entire installation as it pertains to each system has been installed to manufacturers instructions.
.3 Carry out tests in presence of Architect and/or Engineer. Notify Architect and/or Engineer seven (7) days in advance of time testing will take place.
.4 Provide instruments, meters, equipment and personnel required to conduct tests during and at conclusion of project.
.5 The Architect and/or Engineer reserves the right to use any piece of electrical equipment, device, or material installed under this contract for such reasonable lengths of time and at such times as he may require to make a complete and thorough test of the same, before the final completion and acceptance of the work.
.6 Such tests shall not be construed as acceptance of any part of the work.
.7 Submit test results for Architect's and/or Engineer's review.

3.24 INSULATION RESISTANCE TESTING

.1 Test all wiring, included in the work to ensure that there are no shorts and/or grounds are present on phase conductors for feeders or branch circuits and that insulation values are as required by the Canadian Electrical Code.
.2 All testing of conductors to be done prior to energization of conductors with 600 volt and 1000 volt meggers as required by the Canadian Electrical Code.
.3 Capacitive leakage testing of all phases and neutral feeder conductors at various systems originating points, are to be recorded for each individual feeder with test results to be submitted to Architect and/or Engineer for approval.
.4 Systems are to be tested for capacitive leakage.
.5 Check resistance to ground before energizing. Ensure resistance to ground is not less than 50 megohms.
.6 Submit test results for Architect's and/or Engineer's review. Test results shall include time of test, feeder tested, and instrument readings.

3.25 COORDINATION OF PROTECTIVE DEVICES

.1 Ensure circuit protective devices such as over-current trips, relays, fuses, are installed to values and settings as indicated.

3.26 CLEANING

.1 Do final cleaning in accordance with Section 01 74 11.
.2 At time of final cleaning, clean lighting reflectors, lenses and other lighting surfaces that have been exposed to construction dust and dirt.
.3 On completion of work, remove debris resulting from work of this Division and leave the site neat and tidy. Equipment shall be checked for proper fitting and alignment, adjusted, cleaned, repainted where necessary, and left in first class condition.
.4 This section shall be responsible for the removal of spatters, droppings, soil, labels, and debris from finished surfaces and from surfaces to receive finishes, before the set up. Work and adjacent finished work shall be left in new condition.
.5 Only cleaning materials which are recommended for the purpose by both the manufacturer of the surface to be cleaned and of the cleaning material shall be used.
.6 Immediately before and during finishing work shall be made "broom clean". Interior areas shall be "vacuum cleaned" immediately before finish painting commences.
.7 Material at site cannot be burned or buried except where approved by Architect and/or Engineer.

Removal shall be as often as required to avoid accumulation in order to ensure site is maintained clean.

.8 Volatile fluid wastes cannot be disposed of in storm or sanitary sewers or in open drain courses.

.9 Lowering of materials shall be controlled and shall not be dropped or thrown from stories above grade.

3.27 COORDINATION

.1 Cooperate and investigate with other trades to make maximum use of the spaces. Avoid conflicts with pipes, ducts, etc. Prepare shop drawings indicating the route of main conduits and ducts for submission to the Architect and/or Engineer for approval.

.2 Cooperate with other trades on the site and carry out the work, in such a way, as not to hinder or hold up the work of other trades.

.3 Consult with other trades, where their respective installations conflict and re-route conduits, ducts, outlets, equipment, etc., as required, subject to the approval of the Architect and/or Engineer.

.4 Obtain from the mechanical and other trades complete detailed wiring diagrams of equipment requiring connections and be responsible for pointing out any discrepancies or the reason why they cannot be adhered to.

.5 Locate all light fixtures, speakers, etc. using Architect's reflected ceiling plan as a guide.

3.28 SUPERVISION

.1 Provide supervision and sufficiently qualified foreman for work of this Contract to ensure that the work proceeds in proper and efficient manner to its completion. If in the opinion of the Architect and or Engineer, such personnel are not competent to carry out the work, replace these men immediately upon written request of the Architect and/or Engineer.

3.29 COMMISSIONING OF ELECTRICAL SYSTEMS

.1 Upon receipt of written verification from the Contractor that:

- .1 All systems are complete and operational in all respects.
- .2 All specified reports and documents have been submitted and approved.
- .3 All demonstrations have been completed and documented, the Engineer will commence a systems' commissioning period.

.2 During this period of not more than 20 working days, the Engineer will verify the operation of all systems. The commissioning process may involve real or simulated conditions to determine the systems full operational capabilities. Copies of all specified reports and documents are to be available on site during the commissioning period.

.3 During the commissioning process, the on-site foreman of the electrical subtrade involved in the supervision of the work plus one electrician is to be on site providing full-time assistance to the Engineer. In addition, systems' suppliers' representatives are to be available to be on site providing full-time assistance to the Engineer within 48 hour's notice to assist in the verification of their respective systems.

.4 All necessary equipment such as meters, load banks, et cetera required to fully commission the systems are to be made available to the Engineer.

.5 Deficiencies or discrepancies discovered during the commissioning process are to be immediately rectified. Exceptional arrangements for labour and materials will be required to correct deficiencies, which prevent the satisfactory completion of the commissioning process.

3.30 ACCESS DOORS

.1 Access hatches are to be provided and installed by others. Coordinate location of access hatches on site with General Contractor and other trades to ensure sufficient access to electrical equipment located in the ceiling space.

3.31 UTILITY SERVICES

.1 Not Applicable.

3.32 Copy of 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 Contractor responsible for erecting walls or ceilings. Provide ULC rated doors in fire rated construction.

.2 Access doors shall be flush mounted size 300 x 300mm for hand entry or 600 x 600mm for body entry as required. Doors shall open 180° and have rounded safety corners, concealed hinges, screwdriver latches anchor straps and steel shall be prime coated.

.3 Provide stainless steel access doors for tiled, marble or terrazzo surfaces or special surfaces.

.4 Provide cam type locking devices with hand or key lock when located in public corridors and washrooms complete with master keys.

.5 Acceptable Product: Zurn, Enpoco, Williams WB.

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.
  .2 Existing obsolete power and communication system conduit and wire/cabling.
.2 All removal or alteration work of electrical construction to be done in accordance with the safety standards outlined in the Canadian Electrical Code.
.3 Relocation of existing electrical equipment designated for reuse.

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 Consultant at that time.

2 Products

2.1 NOT APPLICABLE

.1 Not Applicable.

3 Excecution

3.1 GENERAL REMOVALS

.1 Where indicated remove all obsolete or abandoned equipment or electrical services including wire and conduit to the source.
.2 Coordinate work of this Section with other trades.
.3 Schedule all removal work with the Owner. 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 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 Consultant 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 RELATED SECTIONS

.1 Section 01 33 00 - Submittal Procedures.
.2 Section 26 05 00 - Electrical General Instructions.
.3 Section 26 05 17 - Wire and box Connectors, 0-1000V.
.4 Section 26 05 32 - Conduits, Conduit Fastenings and Conduit Fittings.

1.2 REFERENCE STANDARDS

.1 CSA C22.2 No. 38 - Thermoset insulated Wires and Cables.
.2 CSA C22.2 No. 51 - Armoured cables.
.3 Wire and cable shall conform to the latest specification of the Canadian Standards Association (CSA), Electrical and Electronic Manufacturers Association of Canada (EEMAC), the Insulated Power Cable Engineers Association (IPCEA), and the American Society of Testing Materials (ASTM).

1.3 SHOP DRAWINGS AND PRODUCT DATA

.1 Submit product data in accordance with Section 01 33 00.

1.4 OPERATION AND MAINTENANCE DATA

.1 Not Applicable

2 Products

2.1 BUILDING WIRES

.1 Conductors: Copper, soft drawn stranded, at least 98% conductivity for #10 AWG and larger. Insulation shall be chemically cross-linked thermosetting polyethylene rated 600 volts on all RW90 conductors and 1000 volts for RWU-90 for incoming service. Size as indicated on drawings and schedules. Conductor insulation shall be colour coded as follows:
.2 Phase A - Red
.3 Phase B - Black
.4 Phase C - Blue
.5 Neutral - White
.6 Ground - Green
.7 Isolated Power - as indicated hereinafter.
.8 Where extra colours are required for three-way switches, etc., they shall be yellow.
.9 Approved color coded tape is acceptable for color coding phase conductors #1 AWG and larger and for neutral and ground conductors #4/0 and larger.

2.2 CONTROL CABLES

.1 600 V Type: 2 stranded copper conductors, 95% conductivity, full size AWG gauge, sizes as indicated with PVC insulation Type TW with shielding of magnetic tape wire braid over each pair of conductors and overall covering of thermoplastic jacket. Colour code shall be orange and brown.

2.3 ARMOURED CABLES

.1 Conductors: insulated, copper, size as indicated.
.2 Type: AC90.
.3 Armour: interlocking type fabricated from aluminum strip.
.4 Connectors: to manufacturer's recommendations.

2.4 TECK CABLE

.1 Cable: to CAN/CSA-C22.2 No. 131.
.2 Conductors:
  .1 Grounding conductor: copper.
  .2 Circuit conductors: copper and ACM alloy, size as indicated.
.3 Insulation:
  .1 Cross-linked polyethylene XLPE, rating - 600 V.
.4 Inner jacket: polyvinyl chloride material.
.5 Armour: interlocking aluminum, compliant to applicable Building Code classification for this project.
.6 Overall covering: thermoplastic polyvinyl chloride material.
.7 Fastenings:
  .1 One hole steel straps to secure surface cables 50 mm and smaller. Two hole steel straps for cables larger than 50 mm.
  .2 Channel type supports for two or more cables at 1500 mm centers.
  .3 Threaded rods: 6 mm dia. to support suspended channels.
.8 Connectors:
  .1 Watertight and/or type approved for TECK cable, as indicated.

2.5 SYSTEM WIRING

.1 Wiring for auxiliary systems will be as indicated in specification or on drawings and/or as recommended by Manufacturer of the system.

2.6 MANUFACTURERS

.1 Acceptable Material: Nexans or approved equal.

3 Execution

3.1 INSTALLATION OF BUILDING WIRES

.1 Install all building wiring as follows:
  .1 In conduit systems in accordance with Section 26 05 32.
  .2 In surface and lighting fixture raceways in accordance with Section 26 05 32.
.2 Terminate wires in accordance with section 26 05 00.

3.2 INSTALLATION OF CONTROL CABLES

.1 Install control cables in conduit.
.2 Ground control cable shield.

3.3 INSTALLATION OF ARMOURED CABLES

.1 Group cables wherever possible.
.2 Terminate cables in accordance with Section 26 05 17.
.3 Flexible type conduit c/w RW90 conductors sized as noted and or flexible armoured cable AC90 (BX) complete with separate grounding conductor shall be used for all bench or counter wiring of receptacles or other devices.
.4 AC90 cable is to be used for fixture drops, receptacle drops, and fixture switching unless otherwise noted on Drawings. Total length of any individual AC-90 cable or flex c/w RW90 runs not to exceed 4500mm in length.
.5 These fixture drops to be run from the junction box in respective rooms and not run to fixtures in any other adjacent rooms.
.6 All flex c/w RW90 or AC-90 cables used for fixture drops are to be secured within 300mm of the junction box.

.7 Where application of AC-90 cables and/or other types of pliable cables are to be used, they shall be installed parallel or perpendicular to the building lines unless otherwise noted.

.8 Support and securing of type AC-90 cables not to be derived from either suspended ceiling support wires or directly laying atop of the ceiling grid system.

3.4 INSTALLATION - GENERAL

.1 Where pulling wires and cables, the use of an approved lubricant only will be permitted. No wires or cables shall be pulled in conduits until such conduits are free from moisture and in no case shall wires be pulled until approval of the Architect and/or Engineer is obtained.

.2 All stranded conductors prior to terminating under device bolts such as circuit breakers, light switches, receptacles, etc., to be twisted together to form a single conductor to ensure a reliable mechanical connection.

.3 Labelling of all branch circuit wiring including phase conductors, neutrals, ground and/or bonding conductors to be done on both ends of all circuit wires plus in any junction and/or pull boxes located in between using "Panduit" write-on, self laminating labels Nos. PDL-1 and PDL-2 as required.

.4 The following wiring methods are designed to enhance the ability to perform capacitive leakage tests:

.1 All circuit conductors are to be individually tie wrapped to their corresponding labelled neutral conductor in all panelboards, pullboxes and junction boxes. Enough slack conductor length should be left to enable the ability to clamp the ground detector around the individually tie-wrapped circuit conductor and its corresponding labelled neutral. This wiring method is to be neat and of good workmanship quality.

.2 The tie wrapping of the neutral with its respective phase conductors is to be made at the closest point of entry into panelboards, pullboxes and junction boxes.

.3 After all electrical wiring has been completed by the Electrical Sub-Contractor, he is to test the grounded electrical distribution system to ensure there are not ground shorts and capacitive leakage in the system.

.4 All feeders or branch circuits which do not have neutral conductors are to have their respective phase conductors tie-wrapped together in accordance to the methods described previously.

.5 Run all circuits so that the voltage drop in no case exceeds 3% of the line volts. The neutral wire, wherever it is run, shall be continuous with no fuses, switches, or breaks of any kind.

.6 For 15 amp, 120 volt circuits the following table shall be used to determine the minimum conductor sizes required to compensate for voltage drop.

.7 Find below the branch circuit maximum lengths (120 volt one way length from panelboard to load including vertical drops. Do as to limit voltage drop to 3%.

.1 From 0.3m to 24m #12 Wire
.2 From 24m to 37m #10 Wire
.3 From 37m to 55m #8 Wire

.8 Increased wire sizes where required shall not be decreased in size in any portion of length of run between panelboard and the wiring device itself.

.9 All wire shall be color coded as per Code requirements and/or as specified herein.

End of Section

1 General

1.1 REFERENCE STANDARDS

.1 CSA C22.2 No. 18 - Clamps and connectors.
.2 CSA C22.2 No. 65 Wire Connectors.

1.2 RELATED WORK

.1 Not Applicable

1.3 SHOP DRAWINGS AND PRODUCT DATA

.1 Not Applicable

1.4 OPERATION AND MAINTENANCE DATA

.1 Not Applicable

2 Products

2.1 MATERIALS

.1 All connections shall be made electrically and mechanically secure. Sizes of connectors shall be according to manufacturer's recommendations for each size and combination of wires.
.2 Joints required in branch wiring #10 AWG and smaller shall be made using fixture twist-on type connectors with current carrying parts made of copper.
  .1 Standard of Acceptance: Marrette #31, #33 or #35 as required.
.3 Joints for wiring #8 AWG and larger shall be made using pressure type colour keyed compression connectors with current carrying parts made of copper using compression tools.
  .1 Standard of Acceptance: 54000 series.
.4 Clamps or connectors for armoured cable and flexible conduit as required.

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 shall meet secureness tests in accordance with CSA C22.2 No. 65.
  .2 Install fixture type connectors and tighten. Replace insulating cap.
.2 All connections shall be made electrically and mechanically secure. Sizes of connectors shall be according to manufacturer's recommendations for each wire size and combination of wires. Twist wires together before installing connectors. All stranded conductors shall be twisted together prior to connection around terminal.

End of Section

1 General

1.1 REFERENCE STANDARDS

.1 CSA C22.2 No. 41 - Grounding and Bonding Equipment.

1.2 RELATED SECTIONS

.1 Section 26 05 00 - Electrical General Instructions:
.2 Section 26 05 16 - Wires and Cables, 0 to 1000V:

1.3 SHOP DRAWINGS AND PRODUCT DATA

.1 Not Applicable

1.4 OPERATION AND MAINTENANCE DATA

.1 Not Applicable

2 Products

2.1 EQUIPMENT

.1 System and circuit, equipment, grounding conductors, bare stranded copper, un-tinned, soft annealed, un-armoured, size as indicated.
.2 Insulated grounding conductors to Section 26 05 16.
.3 Non-corroding accessories necessary for grounding system, type, size, material as indicated, including but not necessarily limited to:
  .1 Grounding and bonding bushings.
  .2 Protective type clamps.
  .3 Bolted type conductor connectors.
  .4 Bonding jumpers, straps.
  .5 Pressure wire connectors.

2.2 MANUFACTURERS

.1 Acceptable Material: Thomas & Betts.
.2 Other approved manufacturers: Burndy, McGraw Edison.

3 Execution

3.1 INSTALLATION GENERAL

.1 Install complete permanent, continuous, system and circuit, equipment, grounding systems including, conductors, connectors, accessories, as indicated, to conform to requirements of Engineer, and local authority having jurisdiction over installation.
.2 Install connectors in accordance with manufacturer's instructions.
.3 Protect exposed grounding conductors from mechanical injury.
.4 Use mechanical connectors for grounding connections to equipment provided with lugs.
.5 Soldered joints not permitted.
.6 Install bonding wire for flexible conduit, connected at both ends to grounding bushing, solderless lug, clamp or cup washer and screw. Neatly cleat bonding wire to exterior of flexible conduit.
.7 Make grounding connections in radial configuration only, with connections terminating at single grounding point. Avoid loop connections.

3.2 SYSTEM AND CIRCUIT GROUNDING

.1 Install system and circuit grounding connections to the neutral of the electrical systems as required.

3.3 EQUIPMENT GROUNDING

.1 Install grounding connections to typical equipment included in, but not necessarily limited to following list: transformers, duct systems, frames of motors, starters, control panels and distribution panels.

3.4 TESTS

.1 Perform tests in accordance with Section 26 05 00.
.2 Perform ground continuity and resistance tests using method appropriate to site conditions and to approval of Engineer and local authority having jurisdiction over installation.
.3 Perform tests before energizing electrical system.
.4 Submit test results for Engineer's review.

End of Section

1 General

1.1 REFERENCE STANDARDS

.1 Not Applicable

1.2 RELATED SECTIONS

.1 Section 01 33 00 - Submittal Procedures.

1.3 SHOP DRAWINGS AND PRODUCT DATA

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

1.4 OPERATION AND MAINTENANCE DATA

.1 Not Applicable

2 Products

2.1 SUPPORT DEVICES

.1 U shape, size 41mm x 41mm, 2.5mm thick, surface mounted or suspended as required.
.2 Supply and install all necessary inserts, rods, channels, brackets, etc., to form a support system capable of carrying at least twice the weight of the equipment supported.
.3 In concrete, use cast-in threaded inserts wherever possible. Should additional inserts be required use a "red head" type of insert capable of carrying at least 45 kgs.
.4 All hanger rods shall be 10mm diameter continuous threaded rod cut to required lengths.
.5 All conduits not installed on unistrut or approved equal type support channels to be supported as follows:
  .1 13mm up to and including 50mm conduits - one hole steel straps.
  .2 50mm and larger sizes - two hole steel straps.
.6 Beam clamps to secure conduit to exposed steel work.
.7 All trays, wireways, and multiple conduits, shall be supported by a steel channel support system with all components, hangers, wall supports, cable clamps, etc., specifically manufactured and approved for their application.
.8 Fastening devices for cabinets, boxes, supports, etc., shall be nut and bolt, ramset, expansion shields, wedge anchors, or toggle bolts, size and number to suit the application or as detailed on the drawings. Toggle bolts shall not be used in gypsum wallboard construction.
.9 Fastening devices for outlet boxes shall be nut and bolt, ramset, expansion shields, wedge anchors or caddy clips, size and number to suit the application or as detailed on the drawings.

2.2 MANUFACTURERS

.1 Acceptable Material: Burndy.
.2 Other approved manufacturers: Erico, Electrovert, Pursley, Unistrut.

3 Execution

3.1 INSTALLATION

.1 Secure equipment to hollow or solid masonry tile and plaster surfaces with lead anchors.
.2 Secure equipment to poured concrete with expandable inserts.
.3 Secure equipment to hollow masonry wall, or suspended ceilings with toggle bolts.
.4 Support equipment, conduit or cables using clips, spring loaded bolts, cable clamps designed as

accessories to basic channel members.

.5 Suspended support systems.
  .1 Support individual cable or conduit runs with 10mm dia threaded rods and spring clips.
  .2 Support 2 or more cables or conduits on channels supported by 10mm dia threaded rod hangers where direct fastening to building construction is impractical.

.6 For surface mounting of two or more conduits use channels at 1.5m on center spacing.

.7 Provide metal brackets, frames, hangers, clamps and related types of support structures where indicated or as required to support conduit and cable runs.

.8 Ensure adequate support for raceways and cables dropped vertically to equipment where there is no wall support.

.9 Do not use wire lashing or perforated strap to support or secure raceways or cables.

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

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

.12 Coordinate the location of any insert to miss concrete reinforcement and obtain approval of Architect and/or Engineer prior to installing.

.13 Secure all equipment in a manner, so as not to distort or cause undue stress on any components.

.14 Support of any equipment shall not rely on the strength of plaster, or gypsum board construction.

End of Section

1 General

1.1 REFERENCE STANDARDS

.1 CAN/CSA C22.2 No. 18 Outlet Boxes, Conduit Boxes, and Fittings and Associated Hardware.
.2 CSA C22.2 No. 56 Flexible Metal Conduit and Liquid-Tight Flexible Metal Conduit.
.3 CSA C22.2 No. 83 Electrical Metallic Tubing.

1.2 RELATED WORK

.1 Not Applicable

1.3 SHOP DRAWINGS AND RELATED DATA

.1 Not Applicable.

1.4 OPERATIONS AND MAINTENANCE DATA

.1 Not Applicable.

2 Products

2.1 CONDUITS

.1 Thin wall type electrical metallic tubing EMT with steel set screw couplings, galvanized, size as indicated.
.2 Flexible metal conduit and liquid-tight flexible metal conduit, galvanized, size as indicated.

2.2 COUPLINGS AND CONNECTIONS

.1 Couplings and connectors for thin wall type EMT shall be set screw type, galvanized steel. Locknuts shall be case hardened steel.
.2 Connectors for flexible conduit and cable shall be set screw, galvanized steel. Locknuts shall be cased hardened.
.3 Connectors for liquid tight flexible conduit shall be watertight, compression type galvanized steel such as manufactured by Thomas & Betts. Locknuts shall be case hardened.

2.3 CONDUIT FASTENINGS

.1 One-hole steel straps to secure surface conduits 50mm and smaller. Two hole steel straps for conduits larger than 50mm.
.2 Beam clamps to secure conduits to exposed steel work.
.3 Channel type supports for two or more conduits spaced at 3 metres on centre.
.4 Use 6.5mm diameter threaded rods to support suspended channels.

2.4 CONDUIT FITTINGS

.1 Fittings: manufactured for use with conduit specified. Coating same as conduit.
.2 Factory "ells" where 90°C bends are required for 25mm and larger conduits.

2.5 FISH CORD

.1 Polypropylene with a minimum of 6.5mm diameter and a tensile strength of 5kn.

2.6 MANUFACTURERS

.1 Standard of Acceptance: Scepter

3 Execution

3.1 INSTALLATION

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

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

.3 Bend conduit cold. Mechanically bend steel conduit over 19mm diameter. Replace conduit if kinked or flattened more than 1/10 of its original diameter.

.4 Field threads on conduit must be of sufficient length to draw conduits up tight.

.5 Install fish cord in empty conduits.

.6 Unless noted otherwise all branch circuits and feeders to panels, switchboard, motor control centres, etc., shall be run in EMT conduit, and in addition to phase and neutral conductors a separate green insulating bonding conductor is to be included in the feeder, and the size of the conduit is to be increased accordingly. The ground conductor shall be based on Table 16 of the Canadian Electrical Code.

.7 All concealed and exposed conduit shall be kept parallel to building lines. All conduits shall be securely held in CEC Section 12. All conduits shall be installed to avoid proximity to steam and hot water pipes by 150mm. Conduits shall run through ceiling spaces and down in walls. No conduit shall run in or under floor slabs unless specifically indicated and approved by Architect and/or Engineer.

.8 Flexible conduit, not smaller than 10mm inside diameter, or flexible armoured cable AC90 (BX) with separate grounding conductor, and complete with insulating anti-shorts, shall be used for connection to motors in dry locations, recessed lighting fixtures without a pre-wired outlet box, connections to surface or recessed fluorescent fixtures and where rigid or EMT conduit cannot be used, such as in cabinet work.

.9 Use liquid tight flexible metallic conduit not smaller than 10mm inside diameter for connections to all motors and equipment in damp, or wet locations and where indicated. Adaptation to rigid or EMT conduit shall be made in an outlet box or fitting and a separate green insulted grounding conductor shall be included in the flexible conduit. Bonding conductor shall be sized in accordance with Table 16 of the Canadian Electrical Code, and the size of the flexible conduit increased accordingly.

.10 Where conduits pass through a waterproof membrane, an oversized sleeve shall be installed and caulking applied to maintain the waterproof properties of the membrane. A cold cure mastic shall then be applied between sleeve and conduit.

.11 Upon installation of all conduits, terminate in boxes, cabinets, and fittings or install suitable plugs or caps, to prevent the entrance of foreign materials. Conduit shall be dry before conductors are pulled in. Swab out using a drag, consisting of tight fitting rubber washers. Where conduits become blocked, remove and replace blocked section.

.12 Conduit shall not pass through structural members without the permission of the Architect and/or Engineer.

.13 A sufficient number of pull boxes or other fittings shall be used to permit easy pulling of wires. Conduits shall be continuous, and shall be electrically and mechanically secure throughout.

.14 All feeder conduit 25mm and larger where exposed to view and in spaces accessible for servicing shall be identified with19mm coloured bands, placed on average every 3 metres length of conduit, and at least, one shall appear in each room. Colour coding shall be as for various system voltages and shall be as specified for pull and junction boxes.

.15 Support of electrical system raceways are to be independent of any other type of suspended ceiling support rods, hangers, etc. and of all mechanical ductwork and piping systems.

.16 EMT conduit shall be installed as a complete system and be securely supported in place within 1

metre of each outlet box, junction box, pull box, cabinets, fittings, etc. with spacing of supports not to exceed the following as per CEC Rule 12-1010.

.1 1500mm for 16mm and 21mm conduits.
.2 2000mm for 27 mm and 35mm conduits.
.3 3000mm for 41mm and larger conduits.

3.2 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 surface channels.
.4 Do not pass conduits through structural members except as indicated.
.5 Do not locate conduits less than 75mm parallel to steam or hot water lines with a minimum of 25mm at crossovers.

3.3 CONCEALED CONDUITS

.1 Do not install horizontal runs in masonry walls.
.2 Do not install conduits in terrazzo or concrete toppings.

3.4 COUPLINGS AND CONNECTORS

.1 Thin wall type EMT couplings shall be securely tightened.
.2 Connectors for thin wall type EMT, liquid tight and flexible conduit or cable shall terminate at boxes and cabinets with one case hardened locknut. Painted area shall be scraped clean, and locknut screwed tight to ensure ground continuity.

End of Section

1 General

1.1 REFERENCE STANDARDS

.1 CSA C22.2 No. 18 - Outlet boxes, conduit boxes and fittings.

1.2 RELATED WORK

.1 Not Applicable

1.3 SHOP DRAWINGS AND PROJECT DATA

.1 Not Applicable

1.4 OPERATION AND MAINTENANCE MANUAL

.1 Not Applicable

2 Products

2.1 OUTLET AND CONDUIT BOXES GENERAL

.1 Size boxes in accordance with Canadian Electrical Code, Part 1.
.2 100mm square or larger outlet boxes as required for special devices.
.3 Gang boxes where wiring devices are grouped.
.4 Blank cover plates for boxes without wiring devices.
.5 Combination boxes with CSA approved barriers where outlets for more than one system are grouped.
.6 Outlet boxes for concealed use in frame construction shall be sectional, galvanized, pressed steel; these shall be restricted for use with flexible conduit AC-90 cable (where indicated) or other pliable type cable. The installation of any type of rigid type conduit in sectional boxes is prohibited. Where wire fill dictates larger boxes for outlets, use suitably sized square boxes, with raised "tile ring" style extension.

2.2 SHEET STEEL OUTLET BOXES

.1 Electro-galvanized steel single and multi-gang flush device boxes for flush installation, minimum size 75 x 50 x 63mm or as indicated.
  .1 Standard of Acceptance: Commander 1104 Series. 100mm 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 100 x 63 x 50mm.
  .1 Standard of Acceptance: Commander 1110 Series.
.3 100 mm square or octagonal outlet boxes for lighting fixtures.
  .1 Standard of Acceptance: Commander 22171 and 24171 Series.
.4 100mm square outlet boxes with extension and plaster rings for flush mounting special devices in finished plaster or tile walls.
  .1 Standard of Acceptance: Commander 22171 Series.

2.3 MASONRY BOXES

.1 Electro-galvanized steel masonry boxes single and multi gang for devices flush mounted in exposed block walls.
  .1 Standard of Acceptance: Commander "M85" & "M80" Series.

2.4 MULTI-OUTLET BOXES

.1 Electro-galvanized steel barrier pre-ganged multi-outlet boxes for devices with different sources of voltage in the same box.
.2 The barrier of sheet steel shall not be less than (No. 16 MSG) thick used to divide the space into separate compartments for the conductors of each system. The barrier shall be fastened rigidly to the box.

2.5 FITTINGS-GENERAL

.1 Bushing and connectors with nylon insulated throats.
.2 Knock-out fillers to prevent entry of foreign materials.
.3 Conduit outlet bodies for conduit up to 32mm and pull boxes for larger conduits.
.4 Double locknuts and insulated bushings on sheet metal boxes.

2.6 CONDUIT SUPPORTS

.1 In steel stud framing construction provide for boxes a metal stud clip (Caddy MSF) and a far side support (Caddy 766) or a separate quick mount support (Caddy "H" Series).
.2 Use adjustable screws gun brackets (caddy "TS" series) where box requires mounting between steel studs.
.3 Other support system will be accepted only after review by Engineer.

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 construction material.
.3 For flush installations mount outlets flush with finished wall using plaster rings to permit wall finish to come within 65mm of opening.
.4 Provide correct size of openings in boxes for conduit and armoured cable connections. Reducing washers not allowed.
.5 At each local switch, receptacle, ceiling or wall fixture, continuous row of fixtures, or system unit (i.e. fire alarm, T.V., etc.) provide and install a standard or twin filler or barrier pressed steel outlet box, unless specifically noted otherwise. All outlet boxes shall be fabricated of galvanized sheet steel and set flush with finished surfaces. They shall be rigidly and securely set.
.6 All flexible conduit fixture feeds shall originate from the side of the outlet box and not from the box cover.
.7 In locating outlets, take care to allow for radiation, pipes, ducts, etc., and for the variation in arrangement and thickness of finishes, etc. Failure to comply with this will not relieve Division 26 Contractor from the cost of necessary alterations.
.8 Allow for the relocation of an outlet up to a dimension of 3m from that indicated on drawings, provided notice is given before roughing-in has been completed.

End of Section

1 General

1.1 REFERENCE STANDARDS

.1 CSA C22.2 No. 76 - Splitters.
.2 CSA C22.2 No. 40 - Junction and pull boxes.

1.2 RELATED WORK

.1 Not Applicable

1.3 SHOP DRAWINGS AND PRODUCT DATA

.1 Not Applicable.

1.4 OPPERATION AND MAINTENANCE DATA

.1 Not Applicable

2 Products

2.1 SPLITTERS

.1 Not Applicable.

2.2 JUNCTION AND PULL BOXES

.1 Pull and junction boxes, where larger than standard switch boxes, shall be sized according to CEC Section 12-3038.
.2 Welded steel construction with screw-on flat covers for surface mounting.
.3 Covers with 25mm minimum extension all around, for flush-mounted pull and junction boxes.

2.3 CABINETS

.1 Not Applicable.

2.4 MANUFACTURERS

.1 Acceptable Material: Bel
.2 Other approved manufactures: Hammond, Hoffman.

3 Execution

3.1 JUNCTION AND PULL BOXES INSTALLATION

.1 Install pull boxes in inconspicuous but accessible locations.
.2 Only main junction and pull boxes are indicated. Install pull boxes so as not to exceed 30m of conduit run between pull boxes.
.3 In no case shall a pull or junction box be installed in a ceiling space that is not considered accessible unless provision is made for access to the box as approved by Architect and/or Engineer. Boxes and plates exposed to view and in suspended ceilings shall be colour coded (brush painted only) as specified below:

.4 System		Colour
.1	600/347V Lighting	Orange
.2	120/208V Lighting and Power	Yellow
.3	Grounding	Green

.4 Low Voltage White

.5 Colour codes will be permitted to change only upon permission from Architect and/or Engineer

.6 Tiles or access hatches or doors for locating boxes shall be identified with approved type locating indicators and not tacks.

.7 Coverplates for junction and/or pull boxes located above concealed accessible ceilings housing branch circuits for 600/347/4 wire and 208/120V/4 wire systems to have branch circuit breaker numbers neatly identified on plate, felt marker will suffice, boxes housing 5 circuits or less.

.8 All branch conductors to be identified in all junction and/or pull boxes with "Panduit" write-on, self-laminating label Nos. PLD-1 and PLD-2 as required or approved equal by Thomas & Betts.

.9 All junction boxes containing six or more branch circuits shall be installed in type "E" box c/w terminal strip. Minimum size of box to be 300mm x 300mm x 100mm.

.10 All "E" box coverplates to have "Lamicoid" nameplates identifying designated panel letter and/or number affixed via pop rivet method.

.11 All pull and junction boxes 150mm x 150mm and larger having auxiliary systems housed within shall be identified with "Lamicoid" nameplates permanently affixed.

3.2 IDENTIFICATION

.1 Provide equipment identification in accordance with Section 26 05 00.

.2 Install size 2 identification labels indicating system name, voltage, and phase.

End of Section

1 General

1.1 REFERENCE STANDARDS

.1 CSA C22.2 No. 111 - General Use Switches.
.2 CSA C22.2 No. 42 - General Use Receptacles, Attachment Plugs and Similar Wiring Devices.

1.2 RELATED WORK

.1 Not Applicable.

1.3 SHOP DRAWINGS AND PRODUCT DATA

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

1.4 OPERATION AND MAINTENANCE DATA

.1 Not Applicable

2 Products

2.1 SWITCHES

.1 Not Applicable.

2.2 LOW VOLTAGE SWITCHING

.1 Not Applicable.

2.3 AUTOMATIC MOTION CONTROL

.1 Ceiling mounted ultrasonic and motion sensor rated 24 VDC for 1000 square foot coverage c/w external powerpack.
  .1 Standard of Acceptance: Watt Stopper # W-1000A; Lutron, Cooper.
.2 Power pack, 347VAC with secondary voltage of 24 VCD, 150 mA.
  .1 Standard of Acceptance: Watt Stopper #WN-100; Lutron, Cooper.

2.4 POWER AND COMMUNICATION POLES (PAC)

.1 Not Applicable.

2.5 MANUAL MOTOR SWITCHES

.1 Manual switch, 1, 2 or 3 poles as required. Mounted in CSA type 1 enclosure with quick-make, quick-break toggle switch.
.2 Rated for 30A.
.3 Shielded toggle with provision to be padlocked in ON or OFF positions.
.4 Acceptable manufacturer or approved equal:
  .1 Hubbell No. 7832/7810-UD.
  .2 Leviton MS & N Series.

2.6 RECEPTACLES

.1 Duplex receptacles (NEMA 5-15R) shall be rated for 15 amp, 125 volt, Receptacles shall be specification grade
  .1 Standard of Acceptance Hubbell CR5252-I ivory
.2 Duplex receptacles (NEMA 5-20RA) shall be rated for 20 amp, 125 volt, with a T-slot. Receptacles shall be specification grade

.1 Standard of Acceptance Hubbell CR5352-I ivory.

.3 GFCI Duplex Receptacles (NEMA 5-15R) shall be rated for 15 amp, 125 volt. Receptacles shall be specification grade
.1 Standard of Acceptance Hubbell GFR5252-I.

.4 All receptacles shall be flush mounted, except in unfinished areas, which may be, surface mounted and installed 450 mm above the finished floor unless noted otherwise

.5 Receptacles of one manufacturer throughout project whenever possible.

2.7 COVER PLATES

.1 Coverplates for all non-weatherproof specified receptacles shall be nylon with colour to match existing.

.2 Cover plates from one manufacturer throughout project.

2.8 MANUFACTURERS

.1 Acceptable Material: Hubbell, Leviton, Watt Stopper.

3 Execution

3.1 INSTALLATION

.1 Switches:
.1 Mount switches at height specified in Section 26 05 00 or as indicated.
.2 All switches and their wall plates, shall be installed plumb, with switch handle in the "up" position when switch is closed.
.3 Group switches under one wall plate in gang type box where more than one switch is shown at one location and when more than three are grouped.
.4 Where light switches, thermostats, receptacles, etc., are located in close proximity with one another, they are to be located on the same vertical centerline at their respective heights.

.2 Receptacles:
.1 Mount receptacles at height specified in Section 26 05 00 or as indicated.
.2 Install a green insulated ground conductor, between the grounding terminal of the receptacle and the grounding screw and stud of the outlet box. Minimum size of ground and/or bonding cables are to be #12 AWG.
.3 Group receptacles under one wall plate in gang type box, where more than one outlet is shown at one location. The use of sectional boxes whether single or multi-ganged shall be restricted for use with flexible conduits, cables or other types of pliable cables.
.4 Receptacles above counters shall be installed above the splashback to a height as indicated on the drawings and coordinated on the site.
.5 Receptacles installed on raceways to be fitted with raceway cut outs and fittings.

.3 Coverplates:
.1 Coverplates to be installed plumb and have stainless steel screws.
.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.

End of Section

1 General

1.1 REFERENCES

.1 CSA C22.2 No. 9-1968 - General Requirements for Luminaires.
.2 ANSI C78 series - Fluorescent lamps.
.3 CSA C22.2 No. 74 - Ballasts. Equipment for use with Electric Discharge Lamps.
.4 CSA C22.2 No. 8 - Radio interference suppressor. Electromagnetic Interference (EMI) Fitters.

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 45 00 - Quality Control.

1.3 SHOP DRAWINGS AND PRODUCT DATA

.1 Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.
.2 Submit complete photometric data prepared by independent testing laboratory for luminaires where specified, for approval by Engineer.
.3 Photometric data to include: VCP Table.

1.4 JOB MOCK-UP

.1 Not Applicable

1.5 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials in accordance with Section 01 74 19 - Construction/Demolition Waste Management And Disposal.
.2 Place materials defined as hazardous or toxic waste in designated containers.
.3 Ensure emptied containers are sealed and stored safely for disposal away from children.
.4 Disposal of fluorescent lamps.
.5 Disposal of old PCB filled ballasts (if still existing) on renovation jobs.

1.6 GUARANTEE

.1 Replace:
  .1 Fluorescent lamps burning out within 12 months of takeover.
  .2 Ballasts that fail or exceed their original noise level rating within 12 months of takeover.

2 Products

2.1 LAMPS

.1 Standard of Acceptance: GE
.2 Other approved manufacturer: Philips, OSRAM.

2.2 BALLASTS

.1 Fluorescent ballast: CBM and CSA certified, energy efficient type, IC electronic design.
  .1 Rating: 347V, 60 Hz.
  .2 RFI/EMI suppression circuit to: FCC (CFR47) Part 18, sub-part C, Class A and Part 15, sub-part B, Class B.
  .3 Totally encased and designed for 40 °C ambient temperature.
  .4 Power factor: minimum 95 % with 95% of rated lamp lumens.
  .5 Crest factor: 1.5 maximum current, 2.0 maximum voltage.

.6 Capacitor: thermally protected.
.7 Thermal protection: non-resettable on coil.
.8 Harmonics: 10 % maximum THD.
.9 Operating frequency of electronic ballast: 21 khz minimum.
.10 Ballast Factor: greater than 0.90.
.11 Sound rated: Class A.
.12 Mounting: As noted on drawings.

2.3 FINISHES

.1 Baked enamel finish:
- .1 Conditioning of metal before painting:
  - .1 For corrosion resistance conversion coating to ASTM F1137.
  - .2 For paint base, conversion coating to ASTM F1137.
- .2 Metal surfaces of luminaire housing and reflectors finished with high gloss baked enamel to give smooth, uniform appearance, free from pinholes or defects.
- .3 Reflector and other inside surfaces finished as follows:
  - .1 White, minimum reflection factor 85%.
  - .2 Colour fastness: yellowness factor not above 0.02 and after 250 hours exposure in Atlas fade-ometer not to exceed 0.05.
  - .3 Film thickness, not less than 0.03 mm average and in no areas less than 0.025 mm.
  - .4 Gloss not less than 80 units as measured with Gardner 60 gloss meter.
  - .5 Flexibility: withstand bending over 12 mm mandrel without showing signs of cracking or flaking under 10 times magnification.
  - .6 Adhesion: 24 mm square lattice made of 3 mm squares cut through film to metal with sharp razor blade. Adhesive cellulose tape applied over lattice and pulled. Adhesion satisfactory if no coating removed.

2.4 LUMINAIRES

.1 Fixture Schedule
- .1 Type A - Wall mounted fluorescent strip fixture, 100mm x 1220mm, 2-32 watt T8 lamps, CRI of 80, 3500k, 347 volt ballast.
  - .1 Standard of Acceptance: CFI# SB248; Lithonia # C232, Metalux #SSF232, Peerless #LS4232

3 Execution

3.1 INSTALLATION

.1 Locate and install luminaires as indicated.

3.2 WIRING

.1 Connect luminaires to lighting circuits:
- .1 As noted on drawings.

3.3 LUMINAIRE SUPPORTS

.1 For suspended ceiling installations support luminaires independently of ceiling.

3.4 LUMINAIRE ALIGNMENT

.1 Align luminaires mounted in continuous rows to form straight uninterrupted line.
.2 Align luminaires mounted individually parallel or perpendicular to building grid lines.

End of Section

1 General

1.1 REFERENCE STANDARDS

.1 Unit equipment for emergency lighting to CSA C22.2 No. 141

1.2 RELATED SECTIONS

.1 Section 01 33 00 - Submittal Procedures.
.2 Section 01 78 00 - Closeout Submittals.
.3 Section 26 05 00 - Electrical General Instructions.

1.3 SHOP DRAWINGS AND PRODUCT DATA

.1 Submit shop drawings and product data in accordance with Section 01 33 00.
.2 Data to indicate system components, mounting method, source of power and special attachments.

1.4 OPERATION AND MAINTENANCE DATA

.1 Provide data for Maintenance Manual as specified in Sections 01 78 00 and 26 05 00.

2 Products

2.1 UNIT EQUIPMENT

.1 Emergency Battery Powered Units
  .1 The unit shall be 347VAC /12VDC, as noted, self powered unit c/w a charger, sealed battery, automatic transfer switch. A charge monitor light direct connected.
  .2 The batteries shall be a sealed lead acid battery with a 10-year life and shall be maintenance free.
  .3 Housing, head and shield: The cabinet housing to be constructed of cold rolled steel cabinet. Illumination is to be provided by two 9-watt lamps with 36 watt capacity for 30 minutes
  .4 Mounting: the unit shall be mountable on walls, or ceilings.
  .5 Complete with Test Switch.
  .6 Manufacturers:
    .1 Standard of Acceptance: Lumacell; RG12-72QB with RSQB Remote
    .2 Other Approved Manufacturers: Aim-Lite Cooper, Dual-Lite, Hubbell and Lithonia

2.2 CONDUCTORS

.1 347V AC supply: Use minimum #12 AWG conductor in minimum 16mm EMT.

2.3 MANUFACTURERS

.1 Standard of Acceptance: Lumacell
.2 Other Approved Manufacturer: Cooper Group, Dual-Lite, Beghelli, Ready Lite, Stanpro.

3 Excecution

3.1 INSTALLATION

.1 Install unit equipment for emergency lighting in accordance with CSA C22.1-2012.
.2 Install unit equipment 2100mm above finished floor or on ceiling as indicated.
.3 Direct heads as indicated to provide adequate emergency illumination, in accordance with NBC (2010).

3.2 TESTS

.1 Perform tests in accordance with Section 26 05 00.
.2 Test system for operation and adjust heads if necessary for best coverage. Do test for 30 minutes on battery power.

End of Section