TENDER DOCUMENTS AND TECHNICAL SPECIFICATIONS

PROJECT: ROOF REPLACEMENT OF CLEAN AIR BUILDING
6248 8TH LINE, EGBERT, ONTARIO

PREPARED FOR: ENVIRONMENT AND CLIMATE CHANGE CANADA

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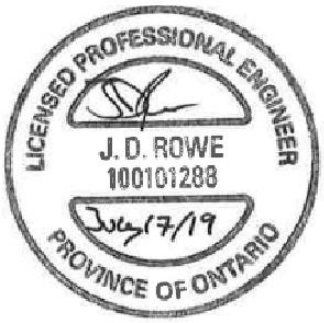
PROJECT NO.: CARE-007 (ID 2269)

DATE: SEPTEMBER 2019

Prime Consultant:

EXCLUDING STRUCTURAL & ELECTRICAL -->



STRUCTURAL ONLY -->

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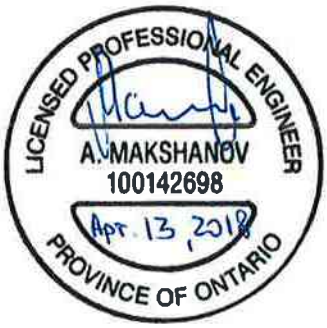

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PART 1 - GENERAL

1.1 WORK COVERED BY CONTRACT DOCUMENTS

.1 Work of this Contract comprises the removal and replacement of the existing roof assembly and platform of the building, located at 6248 8th Line, Egbert, Ontario; and further identified as the Care Facility. This includes the following:

.1 The installation and maintenance of hoarding, dust protection and construction signage around at grade areas of work as described in Section 01 56 00 – Temporary Barriers and Enclosures.

.2 Provide weekly schedule updates in addition to a daily log of on-site construction activity to the Departmental Representative as described in 01 31 16 – Project Management and Coordination.

.3 Removal and disposal of existing roof assembly (including existing structural wood deck) including all membrane, insulation, protection boards, rough carpentry, metal flashing and accessories.

.4 Removal and disposal of existing guardrail system and wood decking. Existing electrical services to removed back to existing panels unless otherwise indicated.

.5 Supply and install new 60 mil PVC roof assembly complete with plywood roof deck, self-adhered vapour barrier, insulation, exterior gypsum board cover board, PVC membrane, metal flashings and accessories.

.6 Structural reinforcement of existing structure as indicated. Repair all interior finishes to match existing condition which are affected by the Work as indicated.

.7 Fabricate, supply and install new raised equipment platform, guardrails and access staircase (including foundations and sidewalk extension) as indicated.

.8 Supply and install new electrical piers and guardrail mounted electrical receptacles as indicated.

.9 Remove and dispose of all ceiling tiles prior to roof replacement and supply and install new ceiling tiles within existing suspended ceiling after roof replacement.

.10 Localized replacement of deteriorated metal siding as directed by Departmental Representative. Contractor to carry a quantity of approximately fifty square meters (50 m^2)

.11 Wholesale replacement of exterior sealants around window and door perimeters.

.12 Repair all areas damaged by construction activity; specifically repair all damage resulting from the construction to the satisfaction of the Departmental Representative.

.13 Final cleaning of the structure, glazing, mobilization areas etc., and the disposal of all waste products and/or debris generated by the construction activity as well as any material present in the work area prior to the commencement of the Work. The areas requiring cleaning shall consist of all areas affected by the Work.

1.2 CONTRACT METHOD

.1 Construct Work under stipulated price contract.

1.3 WORK BY OTHERS

.1 Contractor selected will become the Constructor and is responsible for the coordination and safety of the sub-trades.

.2 Prior to the Work, the Departmental Representative will remove or identify abandoned equipment on the roof for removal and disposal by the Contractor as well as disconnect all equipment. Contractor responsible for removal, storage and replacement of all equipment within Work area. Once Work is complete and equipment placement complete, Departmental Representative to reconnect all equipment.

1.4 WORK SEQUENCE

.1 Provide minimum of two (2) weeks' notice prior to project commencement. All scientific equipment to be disconnected for duration of project.

.2 Co-ordinate Progress Schedule with Departmental Representative shutdown and protection of scientific equipment during construction.

.3 Maintain fire access/control.

1.5 CONTRACT USE OF PREMISES

.1 Unrestricted use of site until Substantial Performance which is to be within twenty (20) weeks of mobilization.

.2 No schedule extensions will be permitted. Contractor solely responsible for meeting the twenty (20) week schedule which is to include for reinstatement of all scientific equipment (excluding reconnections).

.3 Limit use of premises for Work, and for storage, to allow:

.1 Departmental Representative to store equipment within building within designated area.

.4 Co-ordinate use of premises under direction of Departmental Representative.

.5 Obtain and pay for use of additional storage or work areas needed for operations under this Contract.

.6 Remove or alter existing work to prevent injury or damage to portions of existing work which remain.

.7 Repair or replace portions of existing work which have been altered during construction operations to match existing or adjoining work, as directed by Departmental Representative.

.8 At completion of operations condition of existing work: equal to or better than that which existed before new work started.

1.6 DEPARTMENTAL REPRESENTATIVE OCCUPANCY

.1 Departmental Representative may occupy premises during entire construction period for storage of materials and occasional building entry. Make provisions within tender submission for interior protection as required during roof replacement project.

.2 Co-operate with Departmental Representative in scheduling operations to minimize conflict and to facilitate Departmental Representative usage.

1.7 ALTERATIONS, ADDITIONS OR REPAIRS TO

.1 Execute work with least possible interference or disturbance to occupants, building operations, public, and normal use of premises. Arrange with

EXISTING BUILDING

Departmental Representative to facilitate execution of work.

1.8 EXISTING SERVICES

.1 Notify, Departmental Representative and utility companies of intended interruption of services and obtain required permission.

.2 Where work involves breaking into or connecting to existing services, give Departmental Representative 48 hours' notice for necessary interruption of mechanical or electrical service throughout course of work. Minimize duration of interruptions. Carry out work at times as directed by governing authorities with minimum disturbance to tenant operations.

.3 Establish location and extent of service lines in area of work before starting work. Notify Departmental Representative of findings.

.4 Submit schedule to and obtain approval from Departmental Representative for any shut-down or closure of active service or facility including power and communications services. Adhere to approved schedule and provide notice to affected parties.

.5 Provide temporary services when directed by Departmental Representative to maintain critical building and tenant systems.

.6 Provide adequate bridging over trenches which cross sidewalks or roads to permit normal traffic.

.7 Where unknown services are encountered, immediately advise Departmental Representative and confirm findings in writing.

.8 Protect, relocate or maintain existing active services. When inactive services are encountered, cap off in manner approved by authorities having jurisdiction.

.9 Record locations of maintained, re-routed and abandoned service lines.

.10 Construct barriers in accordance with section 01 56 00 - temporary barriers and enclosures.

1.9 DEPARTMENTAL REPRESENTATIVE

.1 Departmental Representative provides field review only for the work shown on these drawings. This review is not a "full time" review but is a periodic review at the sole discretion of Departmental Representative in order to ascertain that the work is in general conformance with the plans and supporting documents prepared by Departmental Representative. Field review by Departmental Representative is not carried out for

the Contractor's benefit, nor does it make Departmental Representative guarantors of the Contractor's work. It remains the Contractor's responsibility to build the work in conformance with the documents. Departmental Representative shall not be responsible for the acts or omissions of the Contractor, sub-Contractor, or any other persons performing any of the work or for the failure of any of them to carry out the work in accordance with the contract documents. Departmental Representative will review shop drawings pertaining to work shown on Departmental Representative's drawings. The extent of this review is at the sole discretion of Departmental Representative and is for the sole purpose of ascertaining general conformance with the building envelope design concept. The review is not an approval of the design, details, and dimensions inherent in the shop drawings, responsibility for which shall remain with the Contractor submitting them. Such review shall not relieve the Contractor of his or her responsibility for errors and omissions in the shop drawings or for meeting all requirements of the contract documents.

.2 Provide 24 hours advance notice of each required field review. Field reviews shall be scheduled to be carried out during normal business hours unless special arrangements are made with Departmental Representative.

.3 Departmental Representative provides field review only for the work shown on these drawings. This review is not a "full time" review but is a periodic review at the sole.

.4 The Contractor must confirm the extent of existing site building perimeter features prior to bidding.

.5 Discrepancies, ambiguities or omissions in the drawings shall be brought to the attention of the Departmental Representative immediately.

.6 Do not scale from drawing or rely on any drawings as accurately reflecting the as-built condition.

.7 The Contractor will be required to undertake the work so as to maintain continuous operation of all entrances/exits to the building.

.8 The use of drawings is limited to that extent identified in the revisions column. Do not construct from these drawings unless marked "issued for construction" by Departmental Representative.

.9 All dimensions taken from the drawings shall be checked on site prior to start of work. The Contractor shall

be responsible for the correctness of such measurements and report to the Departmental Representative in writing all discrepancies between measurements at building and those shown on drawings prior to commencing work.

.10 The Contractor shall review all the drawings and check dimensions before construction. Report discrepancies between structural drawings and site condition to the Departmental Representative immediately.

.11 Do not cut or drill any openings in structural members without written permission from the Departmental Representative.

.12 The Departmental Representative's field services: the Departmental Representative will provide field service during the construction phase of the work to satisfy themselves, by means of a rational sampling procedure which they in their sole discretion consider necessary, to determine that the Contractor is carrying out that work in conformance with the contract documents. The field services provided apply only to that work shown on Departmental Representative's drawings. The performance of the contract is not the Departmental Representative’s responsibility nor are the field services rendered for the Contractor's benefit. The Contractor is solely responsible for quality control and performing the work in accordance with the contract documents.

.13 Contractor will be responsible to repair/restore all existing finishes damaged as a result of construction or removed in order to allow construction to be undertaken.

.14 Contractor to verify all dimensions on site.

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not used.

PART 3 - EXECUTION

3.1 NOT USED

.1 Not used.

PART 1 - GENERAL

1.1 ACCESS AND EGRESS

.1 Design, construct and maintain temporary "access to" and "egress from" work areas, including stairs, runways, ramps or ladders and scaffolding, independent of finished surfaces and in accordance with relevant municipal, provincial and other regulations.

1.2 USE OF SITE AND FACILITIES

.1 The building is to remain open throughout the course of the Work. The Contractor shall have complete and sole use and access to the designated work areas, unless otherwise stipulated by the Departmental Representative during the course of the Work.

.2 The Contractor shall co-ordinate their work schedule with the Departmental Representative so as to minimize disruptions of the site. No work shall be performed until approved by Departmental Representative.

.3 It is the Contractor’s responsibility to ensure the building remains operational (with exception of scientific equipment) at all times and to perform work as required to ensure that access to exits and entrances are available to the building users at all times.

.4 Provide signage of professional quality, barriers and hoarding necessary to protect the public from construction and Contractor operations, to secure the work area, and to route traffic through or around the work areas as designated. Refer to specification Section 01 56 00 - Temporary Barriers and Enclosures for a list and the locations of non-standard construction signage that must be supplied by the Contractor. These signage requirements are in addition to any standard signs required to control and/or reroute traffic or maintain public safety.

.5 Hoarding and dust protection is to be provided around each area of work in accordance with specification Section 01 56 00 - Temporary Barriers and Enclosures. Each phase of the work is to be sealed to prevent the release of construction dust into other areas.

.6 Contractor shall implement temporary measures to maintain interior air quality, temperature, and ventilation during performance of the Work.

.7 The use of all power plant and percussive equipment is to be in accordance with all local by-laws and ordinances.

.8 Do not unreasonably encumber site with materials or equipment.

.9 Do not overload roof areas with equipment or stored materials. Review all equipment weights and loading procedures with Departmental Representative prior to commencing work.

.10 Do not close or obstruct or store materials in roadways, sidewalks or passageways without prior approval from the Departmental Representative.

.11 Move stored products or equipment which interferes with operations of the building, Departmental Representative, or Tenants.

.12 General Contractor to obtain and pay for all necessary approvals to locate equipment or materials on city property excluding the building permit.

.13 Protect all existing light standards, walls, plants, finishes, windows, doors, etc.

.14 Protect all utilities, gas mains, electrical conduit, etc. that must remain in service throughout the construction period.

.15 During transportation of materials or equipment through occupied areas, ensure the public, property, and finishes are protected from damage. All damage caused by the Contractor is to be repaired or rectified at the Contractor’s expense.

.16 The Contractor shall make allowance in their price to cover all costs of temporary removal and replacement and/or relocation of existing electrical wiring and mechanical hardware required for completion of the work.

.17 Propane powered equipment is not permitted within interior areas.

.18 Temporary heat and ventilation used during construction -- including the cost of installation, fuel, operation, maintenance and removal of

equipment -- shall be paid for by the Contractor. The use of direct-fire heaters discharging waste products into work areas will not be permitted.

.19 The Contractor is required to use 8th Line for delivery and removal of material for duration of the project. Disposal bins, supply trucks, etc. are to be located on site where directed by Departmental Representative. Contractor to be responsible for all required permits.

.20 Maintain free access routes for ambulance, fire emergency vehicles, garbage trucks, etc.

.21 The contract documents are based on assumed as-built dimensions for the existing building structure and assumptions in accordance with detailing and placing practice. These assumptions may vary from the actual on-site conditions. The Contractor shall immediately inform the Departmental Representative of any actual variations from the assumed conditions.

.22 ensure that all necessary job dimensions are taken and all trades are coordinated for the proper execution of the work. The Contractor shall assume complete responsibility for the accuracy and completeness of such dimensions, and for coordination.

.23 prior to fabrication of any members, the Contractor shall complete this site review of critical "tie-in" dimensions and confirm all dimensions to ensure proper fit of new work to existing. Report any discrepancies to Departmental Representative prior to starting work.

.24 commencement of construction or any part thereof constitutes acceptance of existing conditions and means dimensions have been considered, verified and are acceptable.

.25 Any openings that are not shown or indicated on the drawings shall be reported to Departmental Representative for review. These openings may not be allowed, may have to be moved, or may require additional work and detailing. Do not proceed with these openings without written permission from Departmental Representative.

.26 Contractor to ensure that in-slab services are not damaged through demolition, sawcutting, or other construction activities. See specification for testing/ locating requirements.

.27 The Contractor is responsible for safety in and about the job site during construction, and the design and erection of all temporary structures, formwork, falsework, shoring, bracing, etc., required to complete the work (submit shoring drawings sealed by a specialty structural engineer).

1.3 ALTERATIONS, ADDITIONS OR REPAIRS TO EXISTING BUILDING

.1 Execute work with least possible interference or disturbance to building operations, public, occupants, and normal use of premises. Arrange with Departmental Representative to facilitate execution of work.

1.4 EXISTING SERVICES

.1 Notify, Departmental Representative and utility companies of intended interruption of services and obtain required permission.

.2 Where Work involves breaking into or connecting to existing services, give Departmental Representative 48 hours of notice for necessary interruption of mechanical or electrical service throughout course of work. Keep duration of interruptions minimum. Carry out interruptions after normal working hours of occupants, preferably on weekends.

1.5 SPECIAL REQUIREMENTS

.1 Carry out noise generating Work Monday to Saturday from 7:00 to 18:00 hours. No work to take place outside of these hours except with the advance written consent of the Departmental Representative.

.2 Submit schedule in accordance with 01 11 00 - Summary of work.

.3 Ensure Contractor's personnel employed on site become familiar with and obey regulations including safety, fire, traffic and security regulations.

.4 Keep within limits of work and avenues of ingress and egress.

1.6 BUILDING SMOKING ENVIROMENT

.1 Comply with smoking restrictions. Smoking is not permitted.

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not used.

PART 3 - EXECUTION

3.1 NOT USED .1 Not used.

PART 1 - GENERAL

1.1 REFERENCE STANDARDS

.1 Project Supplementary Conditions

1.2 ALLOWANCES

.1 Allowances include for the following:
- .1 Supply Products
- .2 Supply and Install Product
- .3 Installation by Contractor of Departmental Representative Supplied Products
- .4 Inspection and Testing

.2 Unless otherwise specified, amounts for each allowance includes:
- .1 Actual product cost
- .2 Applicable taxes and tariffs
- .3 Freight, handling, unloading, and storage
- .4 Contractor services
- .5 Labour for installation and finishing
- .6 Construction machinery and equipment
- .7 Authorized expenditures

.3 Value Added Taxes do not form a part of the allowances.

.4 Contractors overhead and profit to be included as follows:
- .1 Overhead and profit for each cash allowance will be included in Contract Price.
- .2 Overhead and profit for contingency allowance, as noted in Section 00 73 00, under Article 2.16.

.5 Contractor will provide the Departmental Representative with at least three (3) competitive prices for work of each allowance.

The Departmental Representative shall determine actual costs as specified in Paragraph 8.

.6 Additional expenditures not identified as part of the allowances will be submitted for review by the Departmental Representative and where deemed applicable authorized in writing by the Departmental Representative.

.7 Notification in writing by the Departmental Representative, is required prior to the Contractor executing work outlined under each allowance.

.8 The Departmental Representative will provide the Contractor with applicable documentation, equipment, and products within the time specified, or where such time is not specified, in sufficient time to permit the construction schedule to be maintained.

1.3 MATERIALS TESTING ALLOWANCE

.1 Include in Stipulated Sum, a materials testing allowance of $ 3,000 for required materials testing outlined in Section 03 30 00 - Cast-In-Place Concrete and confirmation of 98% compaction below sidewalk.

.2 Do not include in Contract Price, additional contingency allowances for products, installation, overhead or profit.

.3 Should material testing indicate that performance requirements have not been achieve, Contractor to bring into conformance and complete additional testing to verify at no additional cost to the Departmental Representative.

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not used.

PART 3 - EXECUTION

3.1 NOT USED

.1 Not used.

PART 1 - GENERAL

1.1 REQUIREMENTS

.1 Referenced specification Sections stipulate pertinent requirements for products and methods to achieve Work stipulated under each Alternative.

.2 Co-ordinate affected related Work and modify surrounding Work to integrate Work under each Alternative.

1.2 SUBSTITUTION OF MATERIALS PRIOR TO BID CLOSING

.1 Where products or systems have been specified by trade name, no substitution will be allowed except where alternatives have been approved prior to bid closing.

.2 Where a specified product or system is not available at the time of bid, the bidder must inform the Departmental Representative in writing so that they may advise all bidders of proposed changes. In the event that the Bidder fails to do so, the Departmental Representative will choose a substitute product suitable for the application at the time of construction.

1.3 REQUEST FOR APPROVAL OF ALTERNATIVES

.1 Contractors and suppliers of products or systems that have not been specified may apply for approval of their product or system as an "alternative".

.2 Requests for approval must reach the Departmental Representative at least seven (7) working days prior to the bid closing. The Departmental Representative will advise applicants of the status of their request three (3) working days prior to bid closing.

.3 Request for approval shall include sufficient information for the Departmental Representative to satisfactorily review the alternative. This may include the following:

.1 Project name and number.

.2 Specification sections to which the product or system applies.

.3 Description of proposed substitution, including manufacturer's material specifications, manufacturer's preparation and application requirements and manufacturer's warranties.

.4 Sample of product indicating surface finish and material thickness to be applied under this Contract.

.5 Installation history of proposed alternative including:
.1 projects and locations
.2 approximate value of contract
.3 approximate size of projects
.4 number of years in use
.5 type of usage
.6 name of Departmental Representative involved.

.4 When submitting alternatives to specified materials or equipment, Bidders shall include in their Bid any changes in the Work required to accommodate the alternatives. A later claim for an addition to the Contract Price due to changes in the Work that are necessitated by the use of the alternatives will not be considered.

1.4 APPROVAL OF ALTERNATIVES

.1 An addendum will be issued prior to bid closing if an alternative is approved. No alternative materials or equipment will be considered after bid closing.

.2 Products or systems that have been approved as alternatives may be substituted for specified products and systems as outlined in the addendum.

.3 When substitution of any proposed alternative into the work -- either in whole or in part -- affects other parts of the work, the Contractor shall assume full responsibility and bear the associated costs. The Contractor will also be responsible for paying for any drawing changes required as a result of the substitution.

.4 Cost savings arising from approved alternative products or systems are to be credited to the Contract and the Contract Price will be adjusted accordingly.

.5 The Departmental Representative reserves the right to reject any or all requests for approval.

.6 No substitutions will be permitted without the approval of the Departmental Representative in the form of an addendum.

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not used.

PART 3 - EXECUTION

3.1 NOT USED

.1 Not used.

PART 1 - GENERAL

1.1 WORK COVERED BY CONTRACT DOCUMENTS

.1 Coordination Work with all Sub Trades. The Contractor will become the Constructor as well as equipment connections and disconnections with the Departmental Representative.

1.2 DESCRIPTION

.1 Coordination of progress schedules, submittals, use of site, temporary utilities, construction facilities, and construction Work, with progress of Work of other contractors and Work by Departmental Representative, under instructions of Departmental Representative.

1.3 ON-SITE DOCUMENTS

.1 Maintain at job site, one copy of each of the following:

.1 Contract drawings.
.2 Specifications.
.3 Amendments.
.4 Reviewed shop drawings.
.5 Change orders.
.6 Other modifications to Contract.
.7 Field test reports.
.8 Copy of approved Work schedule.
.9 Manufacturers' installation and application instructions.
.10 Labour conditions and wage schedules.
.11 Material Safety Data Sheets.
.12 Labour and Material Bonds.
.13 All applicable Municipal Permits.
.14 Log of daily construction activity updated on a daily basis.

1.4 SCHEDULE

.1 Submit preliminary construction progress schedule in accordance with Section 01 32 00.

.2 After review, revise and resubmit schedule to comply with revised project schedule.

.3 During progress of Work, revise and resubmit on a weekly basis.

1.5 SUBMITTALS

.1 Make submittal to the Departmental Representative for review.

.2 Submit preliminary shop drawings, product data and samples in accordance with Section 01 33 00 for review for compliance with Contract

Documents; for field dimensions and clearances, for relation to available space, and for relation to Work of other contracts. After review, revise and resubmit for transmittal to Departmental Representative.

.3 Submit requests for payment for review, and for transmittal to the Departmental Representative.

.4 Submit requests for interpretation of Contract Documents, and obtain instructions through the Departmental Representative.

.5 Process substitutions through the Departmental Representative.

.6 Process change orders through the Departmental Representative.

.7 Deliver closeout submittals for review and preliminary inspections, for transmittal to the Departmental Representative.

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not used.

PART 3 - EXECUTION

3.1 NOT USED

.1 Not used.

PART 1 - GENERAL

1.1 ADMINISTRATIVE

.1 Schedule and administer project meetings throughout the progress of the work at the call of the Departmental Representative.

.2 The Departmental Representative shall preside at meetings.

.1 A representative of the Departmental Representative shall record the minutes, include significant proceedings and decisions, and identify "action by" parties.

.2 The Departmental Representative shall reproduce and distribute copies of the minutes to meeting participants, affected parties not in attendance, the Departmental Representative and Contractor.

.3 The Departmental Representative shall:

.1 Schedule and administer project meetings unless otherwise noted.

.2 Prepare agenda for meetings.

.3 Distribute written notice of each unscheduled meeting three (3) days in advance of meeting date to the Contractor and Departmental Representative. The Contractor is to notify relevant Subcontractors.

.4 The Contractor shall provide physical space and arrange for meetings on site.

.5 Representatives of Contractor, Subcontractors and suppliers attending meetings shall be qualified and authorized to act on behalf of the party each represents.

1.2 PRECONSTRUCTION MEETING

.1 After award of Contract, a meeting of all parties in the Contract shall be held to discuss and resolve administrative procedures and responsibilities.

.2 Representatives of the Departmental Representative, Departmental Representative, Contractor, major Subcontractors, and construction review personnel

will attend.

.3 The Departmental Representative shall establish a time and location of the meeting and shall notify concerned parties at least five (5) days before the meeting.

.4 Agenda to include the following:

.1 Appointment of official representatives of participants of the Work.

.2 Schedule of Work, progress scheduling.

.3 Shop drawings (if required) and schedule of shop drawing submissions.

.4 Requirements of temporary facilities, site signage, hoarding, dust protection, offices, storage sheds, utilities, fences.

.5 Delivery schedule of critical equipment.

.6 Site security.

.7 Contemplated change orders, procedures, approvals required.

.8 Take over procedures, acceptance, warranties.

.9 Monthly progress claims, administrative procedures, holdbacks.

.10 Appointment of inspection and testing agencies or firms.

.11 Insurance, transcript of policies.

1.3 PROGRESS MEETINGS

.1 During the course of Work, the Departmental Representative or the Contractor shall schedule progress meetings every two weeks. Further progress meetings may be scheduled by the Departmental Representative, Contractor, or Departmental Representative as required to expedite the Work.

.2 The Departmental Representative, Contractor, major Subcontractors involved in the Work, and Departmental Representative when required, are to attend.

.3 Agenda to include the following:

.1 Review, approval of minutes of previous meeting.

.2 Review of Work progress since previous meeting.

.3 Field observations, problems which impede construction schedule, conflicts.

.4 Progress, schedule during succeeding work period.

.5 Corrective measures and procedures to regain projected schedule.

.6 Revisions to construction schedule.

.7 Review of off-site fabrication delivery schedules.

.8 Review submittal schedules; expedite as required.

.9 Maintenance of quality standards.

.10 Pending changes and substitutions, Notices of Proposed Change, Change Orders.

.11 Review proposed changes effect on construction schedule and on completion date.

.12 Other business.

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not used.

PART 3 - EXECUTION

3.1 NOT USED

.1 Not used.

PART 1 - GENERAL

1.1 RELATED SECTIONS

.1 Section 01 77 00 – Closeout Procedures.

1.2 ELECTRONIC COPY OF CONSTRUCTION PHOTOGRAPHS

.1 Submit electronic colour digital photography in jpg format, standard resolution.

.2 Identification: name and number of project and date of exposure indicated.

.3 Number of viewpoints: Overview shots of progress including closer views of work in progress (roof replacement, stair installation, platform installation, etc.). All elevations of the building to be included.

.4 Frequency: weekly.

PART 2 – PRODUCTS

2.1 NOT USED

.1 Not used.

PART 3 – EXECUTION

3.1 NOT USED

.1 Not used.

PART 1 - GENERAL

1.1 DEFINITIONS

.1 Activity: element of Work performed during course of Project. Activity normally has expected duration, and expected costs and expected resource requirements. Activities can be subdivided into tasks.

.2 Actual Finish Date (AF): point in time that Work actually ended on activity.

.3 Actual Start Date (AS): point in time that Work actually started on activity.

.4 Bar chart (Gantt chart): graphic display of schedule-related information. In typical bar chart, activities or other Project elements are listed down left side of chart, dates are shown across top, and activity durations are shown as date-placed horizontal bars.

.5 Baseline: original approved plan (for Project, work package, or activity), plus or minus approved scope changes.

.6 Completion Milestones: they are firstly Certificate or Substantial Performance and secondly Certificate of Completion.

.7 Constraint: applicable restriction that will affect performance of Project. Factors that affect activities can be scheduled.

.8 Control: process of comparing actual performance with planned performance, analyzing variances, evaluating possible alternatives, and taking appropriate corrective action as needed.

.9 Critical Activity: any activity on a critical path. Most commonly determined by using critical path method.

.10 Critical Path: series of activities that determines duration of Project. In deterministic model, critical path is usually defined as those activities with float less than or equal to specified value, often zero. It is longest path through Project.

.11 Critical Path Method (CPM): network analysis technique used to predict Project duration by analyzing which sequence of activities (which path) has least amount of scheduling flexibility (least amount of float).

.12 Data Date (DD): date at which, or up to which, Project's reporting system has provided actual status and accomplishments.

.13 Duration (DU): number of work periods (not including holidays or other non-working periods) required to complete activity or other Project element. Usually expressed as workdays or work weeks.

.14 Early Finish Date (EF): in critical path method, earliest possible point in time on which uncompleted portions of activity (or Project) can finish, based on network logic and schedule constraints. Early finish dates can change as Project progresses and changes are made to Project plan.

.15 Early Start Date (ES): in critical path method, earliest possible point in time on which uncompleted portions of activity (or Project) can start, based on network logic and schedule constraints. Early start dates can change as Project progresses and changes are made to Project plan.

.16 Finish Date: point in time associated with activity's completion. Usually qualified by one of the following: actual, planned, estimated, scheduled, early, late, baseline, target, or current.

.17 Float: amount of time that activity may be delayed from its early start without delaying Project finish date. Float is mathematical calculation, and can change as Project progresses and changes are made to Project plan. This resource is available to both PWGSC and Contractor.

.18 Lag: modification of logical relationship that directs delay in successor task.

.19 Late Finish Date (LF): in critical path method, latest possible point in time that activity may be completed without delaying specified milestone (usually Project finish date).

.20 Late Start Date (LS): in critical path method,

latest possible point in time that activity may begin without delaying specified milestone (usually Project finish date).

.21 Lead: modification of logical relationship that allows acceleration of successor task.

.22 Logic Diagram: see Project network diagram.

.23 Master Plan: summary-level schedule that identifies major activities and key milestones.

.24 Milestone: significant even in Project, usually completion of major deliverable.

.25 Monitoring: capture, analysis, and reporting of Project performance, usually as compared to plan.

.26 Near-Critical Activity: activity that has low total float.

.27 Non-Critical Activities: activities which when delayed, do not affect specified Contract duration.

.28 Project Control System: fully computerized system utilizing commercially available software packages.

.29 Project Network Diagram: schematic display of logical relationships of Project activities. Always drawn from left to right to reflect Project chronology.

.30 Project Plan: formal, approved document used to guide both Project execution and Project control. Primary uses of Project plan are to document planning assumptions and decisions, facilitate communication among stakeholders, and document approved scope, cost, and schedule baselines. Project plan may be summary or detailed.

.31 Project Planning: development and maintenance of Project Plan.

.32 Project Planning, Monitoring and Control System: overall system operated by Departmental Representative to enable monitoring of Project Work in relation to established milestones.

.33 Project Schedule: planned dates for performing activities and planned dates for meeting milestones. Dynamic, detailed record of tasks or activities that must be accomplished to satisfy project objectives. Monitoring and control process involves using project schedule in executing and

controlling activities and is used as basis for decision making throughout project life cycle.

.34 Quantified days duration: working days based on 5 day work week, discounting statutory holidays.

.35 Risk: uncertain event or condition that, if it occurs, has positive or negative effect on Project's objectives.

.36 Scheduled Finish Date (SF): point in time that Work was schedule to finish on activity. Scheduled finish date is normally within range of dates delimited by early finish date and late finish date.

.37 Schedule Start Date (SS): point in time that Work was scheduled to start on activity. Scheduled start date is normally within range of dates delimited by early start date.

.38 Start Date: point in time associated with activity's start, usually qualified by one of following: actual, planned, estimated, schedule, early, late, target, baseline, or current.

.39 Work Breakdown Structure (WBS): deliverable-oriented grouping of project elements that organizes and defines total Work scope of Project. Each descending level represents increasingly detailed definition of Project Work.

1.2 SYSTEM DESCRIPTION

.1 Construction Progress Schedule (Project Time Management): describes processes required to ensure timely completion of Project. These processes ensure that various elements of Project are properly co-ordinated. It consists of planning, time estimating, scheduling, progress monitoring and control.

.2 Planning: this is most basic function of management, that of determining presentation of action and is essential.

.1 It involves focusing on objective consideration of future, and integrating forward thinking with analysis; therefore, in planning, implicit assumptions are made about future so that action can be taken today.

.2 Planned and scheduling facilitates accomplishment of objectives and should be considered continuous interactive process involving planning, review, scheduling,

analysis, monitoring and reporting.

.3 Ensure that planning process is iterative and results in generally top-down processing with more detail being developed as planning progresses, and decisions concerning options and alternatives are made. This implies progressively more reliability of scheduling data. Detail Project schedule is used for analysis and progress monitoring.

.4 Ensure project schedule efficiencies through monitoring.

.1 When activities begin on time and are performed according to estimated durations without interruptions, original Critical Path will remain accurate. Changes and delays will however, create an essential need for continual monitoring of Project activities.

.2 Monitor progress of Project in detail to ensure integrity of Critical Path, by comparing actual completions of individual activities with their scheduled completions, and review progress of activities that has started but are not yet completed.

.3 Monitoring should be done sufficiently often so that causes of delays are immediately identified and removed if possible.

.5 Project monitoring and reporting: as Project progresses, keep team aware of changes to schedule, and possible consequences. In addition to Bar Charts and CPM networks, use narrative reports to provide advice on seriousness of difficulties and measures to overcome them.

.1 Narrative reporting begins with statement on general status of Project followed by summarization of delays, potential problems, corrective measures and Project status criticality.

1.3 CPM REQUIREMENTS

.1 Ensure Master Plan and Detail Schedule are practical and remain within specified Contract duration.

.2 Master Plan and Detail Schedule deemed impractical by the Departmental Representative are revised and resubmitted for approval.

.3 Acceptance of Master Plan and Detail Schedule showing scheduled Contract duration shorter than specified Contract duration does not constitute

change to Contract. Duration of Contract may only be changed through bilateral Agreement.

.4 Consider Master Plan and Detail Schedule deemed practical by the Departmental Representative, showing Work completed in less than specified Contract duration, to have float.

.5 First Milestone on Master Plan and Detail Schedule will identify start Milestone with an “ES” constraint date equal to Award of Contract date.

.6 Calculate dates for completion milestones from Plan and Schedule using specified time periods for Contract.

.7 Certificate of Substantial Performance with “LF” constraint equal to calculated date.

.8 Calculations on updates to be such that if early finish of Certificate of Substantial Performance falls later than specified Contract duration then float calculation to reflect negative float.

.9 Delays to non-critical activities, those with float may not be basis for time extension.

.10 Do not use float suppression techniques such as software constraints, preferential sequencing, special lead/lag logic restraints, extended activity times or imposed dates other than required by Contract.

.11 Allow for and show Master Plan and Detail Schedule adverse weather conditions normally anticipated. Specified Contract duration has been predicated assuming normal amount of adverse weather conditions.

.12 Provide necessary crews and manpower to meet schedule requirements for performing Work within specified Contract duration. Simultaneous use of multiple crews on multiple fronts on multiple critical paths may be required.

.13 Arrange participation on and off site of subcontractors and suppliers, as required b the Departmental Representative, for purpose of network planning, scheduling, updating and progress monitoring. Reviews by the Departmental Representative of original networks and revisions do not relieve Contractor from duties and responsibilities required by Contract.

.14 Ensure that it is understood that Award of Contract or time of beginning, rate of progress, Certificate of Substantial Performance and Certificate of Completion as defined times of completion are of essence of this contract.

1.4 SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00.

.2 Submit to Departmental Representative Project Control System for planning, scheduling, monitoring and reporting of project progress.

.3 Submit Project Control System to the Departmental Representative for approval; failure to comply with each required submission, may result in progress payment being withheld in accordance with Federal Government's CG5 Terms of Payment.

.4 Include costs for execution, preparation and reproduction of schedule submittals in bid documents.

.5 Submit letter ensuring that schedule has been prepared in co-ordination with major sub-contractors.

.6 Refer to article "Progress monitoring and reporting" of this specification Section for frequency of Project control system submittals.

.7 Submit Project planning, monitoring and control system data as part of initial schedule submission and monthly status reporting.

.1 USB drive or CD file in original scheduling software containing schedule and cash flow information, labelled with data date, specific update, and person responsible for update.

.2 Master Plan Bar Chart.

.3 Construction Detail schedule bar Chart.

.4 Listing of project activities including milestones and logical connectors, networks (sub-networks) from Project start to end. Sort activities by activity identification number and accompany with descriptions. List early and late start and finish dates together with durations, codes and float.

.5 Critically report listing activities and milestones with negative and up to 5 days

total float used as first sort for ready identification of critical or near critical paths through entire project. List early and late starts and finishes dates, together with durations, codes and float for critical activities.

.6 Progress report in early start sequence, listing for each trade, activities due to start, underway, or finished within two months from monthly update date. List activity identification number, description and duration. Provide columns for entry of actual start and finish dates, duration remaining and remarks concerning action required.

1.5 QUALITY ASSURANCE

.1 Use experienced personnel, fully qualified in planning and scheduling to provide services from start of construction to Certificate of Completion, including Commissioning.

1.6 PROJECT MEETING

.1 Meet with the Departmental Representative within five (5) working days of Award of Contract date, to establish Work requirements and approach to project construction operations.

1.7 WORK BREAKDOWN STRUCTURE (WBS)

.1 Prepare construction Work Breakdown Structure (WBS) within five (5) working days of Award of Contract date. Develop WBS through at least five levels: Project, stage, element, sub-element and work package.

1.8 PROJECT MILSTONES

.1 Mandatory and recommended project milestones form targets for both Master Plan and Detail Schedule of CPM construction network system.

.1 Mandatory: roofing replacement completed within 10 working days of mobilization date.

.2 Mandatory: structural work completed within 20 working days of mobilization date.

.3 Mandatory: Certificate of Substantial Performance within 20 working days of mobilization date.

1.9 MASTER PLAN

.1 Structure and base CPM construction networks system on WBS coding in order to ensure consistency throughout Project.

.2 Prepare comprehensive construction Master Plan (CPM logic diagram) and dependent Cash Flow Projection within five (5) working days of finalizing Agreement to confirm validity or alternatives of

identified milestones.

.1 Master Plan will be used as baseline.

.1 Revise baseline as conditions dictate and as required by the Departmental Representative.

.2 The Departmental Representative will review and return revised baseline within five (5) work days.

.3 Reconcile revisions to Master Plan and Cash Flow Projections with previous baseline to provide continuous audit trail.

.4 Initial and subsequent Master Plans will include:

.1 USB drive or CD containing schedule and cash flow information, clearly labelled with data date, specific update, and person responsible for update.

.2 Bar chart identifying coding, activity durations, early/late and start/finish dates, total float, completion as percentile, current status and budget amounts.

.3 Network diagram showing coding, activity sequencing (logic), total float, early/late dates, current status and durations.

.4 Actual/projected monthly cash flow: expressed monthly and shown in both graphical and numerical form.

1.10 DETAIL SCHEDULE

.1 Provide detailed project schedule (CPM logic diagram) within five (5) working days of Award of Contract date showing activity sequencing, interdependencies and duration estimates. Include listed activities as follows:

.1 Shop drawings.
.2 Samples.
.3 Approvals.
.4 Procurement.
.5 Construction.
.6 Installation.
.7 Site works.
.8 Testing/
.9 Commissioning and acceptance.

.2 Detail CPM schedule to cover in detail the entire project beginning from Award of Contract date.

.1 Detail activities completely and comprehensively throughout duration of project.

.3 Relate Detail Schedule activities to basic activities and milestones developed and approved in Master Plan.

.4 Clearly show sequence and interdependence of construction activities and indicate:

.1 Start and completion of all items of Work, their major components, and interim milestone completion dates.

.2 Activities for procurement, delivery, installation and completion of each major piece of equipment, materials and other supplies, including:

.1 Time for submittals, resubmittals and review.

.2 Time for fabrication and delivery of manufactured products for Work.

.3 Interdependence of procurement and construction activities.

.3 Include sufficient detail to assure adequate planning and execution of Work.

.5 Provide level of detail for project activities such that sequence and interdependency of Contract tasks are demonstrated and allow co-ordination and control of project activities. Show continuous flow from left to right.

.6 Ensure activities with no float are calculated and clearly indicated on logical CPM construction network system as being, whenever possible, continuous series of activities throughout length of Project to form “Critical Path”. Increased number of critical activities is seen as indication of increased risk.

.7 Insert Change Orders in appropriate and logical location of Detail Schedule. After analysis, clearly state and report to Departmental Representative for review effects by insertion of new Change Order.

1.11 REVIEW OF THE CONSTRUCTION DETAIL SCHEDULE

.1 Allow 5 work days for review by the Departmental Representative of proposed construction Detail Schedule.

.2 Upon receipt of reviewed Detail Schedule make necessary revisions and resubmit to the Departmental Representative for review within (5) work days.

.3 Promptly provide additional information to validate practicability of Detail Schedule as required by Departmental Representative.

.4 Submittal of Detail Schedule indicates that it meets Contract requirements and will be executed generally in sequence.

1.12 COMPLIANCE WITH DETAIL SCHEDULE

.1 Comply with reviewed Detail Schedule.

.2 Proceed with significant changes and deviations from schedule sequence of activities that cause delay, only after written receipt of approval by Departmental Representative.

.3 Identify activities that are behind schedule and causing delay. Provide measures to regain slippage.

.1 Corrective measures may include:

.1 Increase of personnel on site for effected activities or work package.

.2 Increase in materials and equipment.

.3 Overtime work and additional work shifts.

.4 Submit to the Departmental Representative, justification, project schedule data and supporting evidence for approval of extension to Contract completion date or interim milestone date when required. Include as part of supporting evidence.

.1 Written submission of proof of delay based on revised activity logic, duration and costs, showing time impact analysis illustrating influence of each change or delay relative to approved contract schedule.

.2 Prepared schedule indicating how change will be incorporated into the overall logic diagram. Demonstrate perceived impact based on date of occurrence of change and include status of construction at that time.

.3 Other supporting evidence requested by Departmental Representative.

.4 Do not assume approval of Contract extension prior to receipt of written approval from Departmental Representative.

.5 In event of Contract extension, display in Detail Schedule that scheduled float time available for work involved has been used in full without jeopardizing earned float.

.1 The Departmental Representative will determine and advise Contractor number of allowable days for extension of Contract based on project schedule allowable days for extension of Contract based on project schedule updates for period in question, and other factual information.

.2 Construction delays affecting project schedule will not constitute justification for extension of contract completion date.

1.13 PROGRESS MONITORING AND REPORTING

.1 On ongoing basis, Detail Schedule on job site must show "Progress to Date". Arrange participation on and off site of subcontractors and suppliers, as, and when necessary, for purpose of network planning, scheduling, updating and progress monitoring. Inspect Work with the Departmental Representative at least once monthly to establish progress on each current activity shown on applicable networks.

.2 Update and reissue project Work Breakdown Structure and relevant coding structures as project develops and changes.

.3 Perform Detail Schedule update monthly with status dated (Data Date) on last working day of month. Update to reflect activities completed to date, activities in progress, logic and duration changes.

.4 Do not automatically update actual start and finish dates by using default mechanisms found in project management software.

.5 Submit to the Departmental Representative copies of updated Detail Schedule.

.6 Requirements for monthly progress monitoring and reporting are basis for progress payment request.

.7 Submit monthly written report based on Detail Schedule, showing Work to date performed, comparing Work progress to planned, and presenting current forecasts. Report must summarize progress, defining

problem areas and anticipated delays with respect to Work schedule, and critical paths. Explain alternatives for possible schedule recovery to mitigate any potential delay. Include in report:

.1 Description of progress made.

.2 Pending items and status of: shop drawings, Change Orders, possible time extensions, etc.

.3 Status of Contract completion date and milestones.

.4 Current and anticipated problem areas, potential delays and correction measures.

.5 Review of progress and status of Critical Path activities.

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not used.

PART 3 - EXECUTION

3.1 NOT USED

.1 Not used.

PART 1 - GENERAL

1.1 ADMINISTRATIVE

.1 Submit to the Departmental Representative submittals listed for review. Submit promptly and in orderly sequence to not cause delay in Work. Failure to submit 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.

.2 Do not proceed with Work affected by submittal until review is completed by the Departmental Representative.

.3 Present shop drawings, product data, samples and mock-ups in SI Metric units.

.4 Where items or information is not produced in SI Metric units converted values are acceptable.

.5 Review submittals prior to submission to Departmental Representative. This review represents that necessary requirements have been determined and verified, or will be, and that each submittal has been checked and co-ordinated with requirements of Work and Contract Documents. Submittals not stamped, signed, dated and identified as to specific project will be returned without being examined and considered rejected.

.6 Notify the Departmental Representative, in writing at time of submission, identifying deviations from requirements of Contract Documents stating reasons for deviations.

.7 Verify field measurements and affected adjacent Work are co-ordinated.

.8 Contractor’s responsibility for deviations from the requirements of the Contract Documents in submissions is not relieved by Departmental Representative’s review of the submissions unless Departmental Representative provides written acceptance of the identified deviations.

.9 Keep one reviewed copy of each submission on site.

.10 The Contractor is solely responsible for information pertaining to the fabrication process

techniques of construction and installation and for coordination of the work of all subtrades.

1.2 SUBMISSION REQUIREMENTS

.1 Coordinate each submission with requirements of work and Contract Documents. Individual submissions will not be reviewed until all related information is available.

.2 Submit electronic copies of product data, manufacture's catalogue sheets, brochures, literature, performance charts and diagrams.

.3 Comply with the following requirements in regard to submission of product data:

.1 Delete information not applicable to project.

.2 Supplement standard information to provide details applicable to project.

.3 Provide certification of compliance to applicable codes.

.4 Provide manufacture's certification as to current production.

.4 Allow 5 working days for Departmental Representative's review of each submission.

.5 Accompany submissions with an electronic transmittal letter that contains:

.1 Date.

.2 Project title and number.

.3 Contractor's name and address.

.4 Identification and quantity of each shop drawing, product data and sample.

.5 Other pertinent data.

.6 Submission shall include:

.1 Date and revision dates.

.2 Project title and 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 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.

.6 After Departmental Representative's review, distribute electronic copies to relevant affected subcontractors.

1.3 SHOP DRAWINGS AND PRODUCT DATA

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

.2 Submit drawings stamped and signed by professional engineer registered or licensed in Ontario, Canada.

.3 Indicate materials, methods of construction and attachment or anchorage, erection diagrams, connections, explanatory notes and other information necessary for completion of Work. Where articles or equipment attach or connect to other articles or equipment, indicate that such items have been co-ordinated, regardless of Section under which adjacent items will be supplied and installed. Indicate cross references to design drawings and specifications.

.4 Allow 48 hours for Departmental Representative's review of each submission.

.5 Make changes in shop drawings Departmental Representative may require, consistent with Contract Documents. When resubmitting, notify Departmental Representative in writing of revisions

other than those requested.

.6 Accompany submissions with transmittal letter, in duplicate, containing:

.1 Date.
.2 Project title and number.
.3 Contractor's name and address.
.4 Identification and quantity of each shop drawing, product data and sample.
.5 Other pertinent data.

.7 Submissions include:
.1 Date and revision dates.
.2 Project title and 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 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.

.8 After Departmental Representative's review, distribute copies.

.9 Submit electronic copy of shop drawings for each requirement requested in specification Sections and as Departmental Representative may reasonably request.

.10 Submit electronic copies of product data sheets or brochures for requirements requested in specification Sections and as requested by Departmental Representative where shop drawings will not be prepared due to standardized manufacture of product.

.11 Submit electronic copies of test reports for requirements requested in specification Sections and as requested by Departmental Representative.

.1 Report signed by authorized official of testing laboratory that material, product or system identical to material, product or system to be provided has been tested in accord with specified requirements.

.2 Testing must have been within 3 years of date of contract award for project.

.12 Submit electronic copies of certificates for requirements requested in specification Sections and as requested by Departmental Representative.

.1 Statements printed on manufacturer's letterhead and signed by responsible officials of manufacturer of product, system or material attesting that product, system or material meets specification requirements.

.2 Certificates must be dated after award of project contract complete with project name.

.13 Submit electronic copies of manufacturer’s instructions for requirements requested in specification Sections and as requested by the Departmental Representative.

.1 Pre-printed material describing installation of product, system or material, including special notices and Material Safety Data Sheets concerning impedances, hazards and safety precautions.

.14 Submit electronic copies of Manufacturer's Field Reports for requirements requested in specification Sections and as requested by Departmental Representative.

.15 Documentation of the testing and verification actions taken by manufacturer's representative to confirm compliance with manufacturer's standards or instructions.

.16 Submit electronic copies of Operation and Maintenance Data for requirements requested in specification Sections and as requested by Departmental Representative.

.17 Delete information not applicable to project.

.18 Supplement standard information to provide details applicable to project.

.19 If upon review by the Departmental Representative, no errors or omissions are discovered or if only minor corrections are made, copies will be returned and fabrication and installation of Work may proceed. If shop drawings are rejected, noted copy will be returned and resubmission of corrected shop drawings, through same procedure indicated above, must be performed before fabrication and installation of Work may proceed.

.20 As part of the Departmental Representative's field services, the Departmental Representative will review shop drawings pertaining to work shown on the Departmental Representative's drawings by means of an appropriate rational sampling procedure and will comment on the accuracy with which the Contractor prepared the shop drawings.

.21 Review of shop drawings is for the sole purpose of ascertaining conformance with the general design concept and is not an approval of the detail design inherent in the shop drawings. The design responsibility shall remain with the Contractor submitting the shop drawings.

.22 Review of shop drawings shall not relieve the Contractor of their responsibility for errors and omissions in the shop drawings or for meeting all requirements of the Contract Documents.

.23 The Contractor is solely responsible for information pertaining to the fabrication process, techniques of construction and installation, and for co-ordination of the work of all subcontractors.

.24 Cross-reference shop drawing information to applicable portions of Contract Documents.

.25 The review of shop drawings by Public Works and Government Services Canada (PSPC) is for sole purpose of ascertaining conformance with general concept.

.1 This review shall not mean that PSPC approves detail design inherent in 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 requirements of construction and Contract Documents.

.2 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 sub-trades.

1.4 SAMPLES

.1 Submit for review samples in duplicate as requested in respective specification Sections. Label samples with origin and intended use.

.2 Deliver samples prepaid to the Departmental Representative's office.

.3 Samples: examples of materials, equipment, quality, finishes, workmanship.

.4 Where colour, pattern or texture is criterion, submit full range of samples.

.5 Notify the Departmental Representative in writing, at time of submission of deviations in samples from requirements of Contract Documents.

.6 Where colour, pattern or texture is criterion, submit full range of samples.

.7 Make changes in samples which the Departmental Representative may require, consistent with Contract Documents.

.8 Reviewed and accepted samples will become standard of workmanship and material against which installed Work will be verified.

1.5 MOCK-UPS

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

1.6 PHOTOGRPAHIC DOCUMENTATION

.1 Submit electronic copy of colour digital photography in jpg format, standard resolution monthly with progress statement.

.2 Project identification: name and number of project and date of exposure indicated.

.3 Number of viewpoints: 4 locations.

.1 Viewpoints and their location as determined by Departmental Representative.

.4 Frequency of photographic documentation: weekly.

.1 Upon completion of: Work, before concealment, and as directed by the Departmental Representative.

1.7 CERTIFICATE AND TRANSCRIPTS

.1 Immediately after award of Contract, submit Workers' Compensation Board status.

.2 Submit transcription of insurance immediately after award of Contract.

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not used.

PART 3 - EXECUTION

3.1 NOT USED

.1 Not used.

PART 1 - GENERAL

1.1 REFERENCES

.1 Canadian Standards Association (CSA): Canada
- .1 CSA S350-M1980 (R2003), Code of Practice for Safety in Demolition of Structures.

.2 National Building Code 2010 (NBC):
- .1 NBC 2010, Division B, Part 8 Safety Measures at Construction and Demolition Sites.

.3 National Fire Code 2010 (NFC):
- .1 NFC 2010, Division B, Part 5 Hazardous Processes and Operations, subsection 5.6.1.3 Fire Safety Plan.

.4 Province of Ontario:
- .1 Occupational Health and Safety Act Revised Statutes of Ontario 1990, Chapter 0.1 as amended, and Regulations for Construction Projects, 0. Reg. 213/91 as amended.
- .2 O. Reg. 490/09, Designated Substances.
- .3 Workplace Safety and Insurance Act, 1997.
- .4 Municipal statutes and authorities.

.5 Treasury Board of Canada Secretariat (TBS):
- .1 Treasury Board, Fire Protection Standard April 1, 2010 www.tbs-sct.gc.ca/pol/doc-eng.aspx ?id-17316&section=text

1.2 SUBMITTALS

.1 Make submittals in accordance with Section 01 33 00.

.2 Submit site-specific Health and Safety Plan: Within 7 days after date of Notice to Proceed and prior to commencement of Work. Health and Safety Plan must include:

- .1 Results of site specific safety hazard assessment.
- .2 Results of safety and health risk or hazard analysis for site tasks and operations found in work plan.
- .3 Measures and controls to be implemented to address identified safety hazards and risks.
- .4 Provide a Fire Safety Plan, specific to the work location, in accordance with NBC, Division B, Article 8.1.1.3 prior to commencement of work. The plan shall be coordinated with, and integrated into, the

existing (Building, Facility, Tenant's) Emergency Procedures and Evacuation Plan in place at the site. Departmental Representative will provide (Building, Facility, Tenant's) Emergency Procedures and Evacuation Plan. Deliver two copies of the Fire Safety Plan to the Departmental Representative not later than 14 days before commencing work.

.5 Contractor's and Sub-contractor's Safety Communication Plan.

.6 Contingency and Emergency Response Plan addressing standard operating procedures specific to the project site to be implemented during emergency situations. Coordinate plan with existing Building, Facility, Tenant's Emergency Response requirements and procedures provided by Departmental Representative.

.3 Departmental Representative will review Contractor's site-specific Health and Safety Plan and provide comments to Contractor within 7 days after receipt of plan. Revise plan as appropriate and resubmit plan to Departmental Representative within 7 days after receipt of comments from Departmental Representative.

.4 Departmental Representative's review of Contractor's final Health and Safety plan should not be construed as approval and does not reduce the Contractor's overall responsibility for construction Health and Safety.

.5 Submit names of personnel and alternates responsible for site safety and health.

.6 Submit record of Contractor's Health and Safety meetings when requested.

.7 Submit 3 copies of Contractor's authorized representative's work site health and safety inspection reports to Departmental Representative when requested.

.8 Submit copies of orders, directions or reports issued by health and safety inspectors of the authorities having jurisdiction.

.9 Submit copies of incident and accident reports.

.10 Submit Material Safety Data Sheets (MSDS).

.11 Submit workplace Safety and Insurance Board (WSIB) – Experience Rating Report.

1.3 FILING OF NOTICE

.1 File Notice of Project with Provincial authorities prior to commencement of Work.

1.4 SAFETY ASSESSMENT

.1 Perform site specific safety hazard assessment related to project.

1.5 MEETINGS

.1 Schedule and administer Health and Safety meeting with Departmental Representative prior to commencement of Work.

1.6 REGULATORY REQUIREMENTS

.1 Schedule and administer Health and Safety meeting with Departmental Representative prior to commencement of Work.

1.7 GENERAL REQUIREMENTS

.1 Develop written site-specific Health and Safety Plan based on hazard assessment prior to beginning site Work and continue to implement, maintain, and enforce plan until final demobilization from site. Health and Safety Plan must address project specifications.

.2 Departmental Representative may respond in writing, where deficiencies or concerns are noted and may request re-submission with correction of deficiencies or concerns either accepting or requesting improvements.

1.8 COMPLIANCE REQUIREMENTS

.1 Comply with Ontario Occupational Health and Safety Act, R.S.O. 1990 Chapter 0.1, as amended.

1.9 RESPONSIBILITY

.1 Be responsible for health and safety of persons on site, safety of property on site and for protection of persons adjacent to site and environment to extent that they may be affected by conduct of Work.

.2 Comply with and enforce compliance by employees with safety requirements of Contract Documents, applicable federal, provincial, territorial and local statutes, regulations, and ordinances, and with site-specific Health and Safety Plan.

.3 Where applicable the Contractor shall be designated “Constructor”, as defined by Occupational Health and Safety Act for the Province of Ontario.

1.10 UNFORSEEN HAZARDS

.1 Should any unforeseen or peculiar safety-related factor, hazard, or condition become evident during performance of Work, immediately stop work and advise Departmental Representative verbally and in writing.

.2 Follow procedures in place for Employees Right to Refuse Work as specified in the Occupational Health

and Safety Act for the Province of Ontario.

1.11 HEALTH AND SAFETY CO-ORDINATOR

.1 Employ and assign to Work, competent and authorized representative as Health and Safety Co-ordinator. Health and Safety Co-ordinator must:

.1 Have site-related working experience specific to activities associated with hazardous materials.

.2 Have working knowledge of occupational safety and health regulations.

.3 Be responsible for completing Contractor's Health and Safety Training Sessions and ensuring that personnel not successfully completing required training are not permitted to enter site to perform Work.

.4 Be responsible for implementing, enforcing daily and monitoring site-specific Contractor's Health and Safety Plan.

1.12 POSTING OF DOCUMENTS

.1 Ensure applicable items, articles, notices and orders are posted in conspicuous location on site in accordance with Acts and Regulations of Province of Ontario, and in consultation with Departmental Representative.

.1 Contractor's Safety Policy.
.2 Constructor's Name.
.3 Notice of Project.
.4 Name, trade, and employer of Health and Safety Representative or Joint Health and Safety Committee members (if applicable).
.5 Ministry of Labour Orders and reports.
.6 Occupational Health and Safety Act and Regulations for Construction Projects for Province of Ontario.
.7 Address and phone number of nearest Ministry of Labour office.
.8 Material Safety Data Sheets.
.9 Written Emergency Response Plan.
.10 Site Specific Safety Plan.
.11 Valid certificate of first aider on duty.
.12 WSIB "In Case of Injury at Work" poster.
.13 Location of toilet and cleanup facilities.

1.13 CORRECTION OF NON-COMPLIANCE

.1 Immediately address health and safety non-compliance issues identified by authority having jurisdiction or by Departmental Representative.

.2 Provide Departmental Representative with written report of action taken to correct non-compliance of health and safety issues identified.

.3 Departmental Representative may stop Work if non-compliance of health and safety regulations is not corrected.

1.14 WORK STOPPAGE

.1 Give precedence to safety and health of public and site personnel and protection of environment over cost and schedule considerations for Work.

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not used.

PART 3 - EXECUTION

3.1 NOT USED

.1 Not used.

PART 1 - GENERAL

1.1 RELATED SECTIONS

.1 Section 01 35 29 – Health and Safety Requirements.

1.2 GENERAL

.1 This section specifies general requirements and procedures for fire safety. Additional requirements may be specified in individual sections elsewhere in specifications.

1.3 REPORTING FIRES

.1 The Departmental Representative will co-ordinate arrangements for the Contractor to be briefed at the pre-construction meeting concerning Building's fire safety protocol.

.2 Building Manager will supply a copy of "Fire Safety Emergency Evacuation Plan" in effect for this building. Contractor shall comply with outlined fire safety requirements.

.3 Know location of nearest fire alarm box and telephone, including emergency phone number.

.4 Report immediately all fire incidents to Fire Department as follows:
.1 activate nearest fire alarm box; or
.2 telephone.

.5 Person activating fire alarm box will remain at box to direct Fire Department to scene of fire.

.6 When reporting fire by telephone, give location of fire, name or number of building and be prepared to verify the location.

1.4 FIRE WATCH

.1 Appoint a Fire Watch at locations where welding and soldering, torching or roofing is to take place.

.2 A dedicated Fire Watch is not required. A competent person from the workforce on site may be assigned as Fire Watch for duration of work.

.3 Assign a person who is knowledgeable in the correct

use of fire extinguishers on the project.

.4 Have work inspected by the Fire Watch up to 1.5 hours after work stoppage for each work period.

1.5 INTERIOR AND EXTERIOR FIRE PROTECTION AND ALARM SYSTEMS

.1 Fire protection and alarm system will not be:
.1 obstructed;
.2 shut-off; or
.3 left inactive at end of working day or shift.

.2 Fire hydrants, standpipes and hose systems will not be used for other than fire-fighting purposes unless authorized by Departmental Representative.

.3 Provide and maintain free access to fire extinguishing equipment. Maintain exit facilities. Keep means of egress free from materials, equipment and obstructing.

1.6 FIRE EXTINGUISHERS

.1 Supply fire extinguishers, as necessary to protect work in progress and contractor's physical plant on site.

1.7 INSTALLATION AND/OR REPAIR OF ROOF TO INCLUDE CONTRACTORS PHYSICAL PLANT AT SITE

.1 Ensure personnel use and take precautions as follows:

.1 Use kettles equipped with thermometers or gauges in good working order.

.2 Locate kettles in safe place outside of building. Locate to avoid danger of igniting combustible material.

.3 Maintain continuous supervision while kettles are in operation and provide metal covers for kettles to smother any flames in case of fire. Fire extinguishers shall be provided as required in 1.5.

.4 Prior to start of work, demonstrate container capacities to Departmental Representative.

.5 Use only glass fibre roofing mops.

.6 Used roofing mops will not be left unattended on roof and shall be stored away from building and combustible materials.

.7 All roofing materials will be stored in location no closer than 3 m to any structures.

1.8 BLOCKAGE OF ROADWAYS

.1 Advise Departmental Representative of any work that would impede fire apparatus response. This includes violation of minimum required overhead clearance.

1.9 SMOKING PRECAUTIONS

.1 Smoking is not permitted within areas of work or site storage.

1.10 RUBBISH AND WASTE MATERIALS

.1 Rubbish and waste materials are to be kept to a minimum.

.2 Burning of rubbish is prohibited.

.3 Remove all rubbish from work site at end of work day or shift or as directed.

.4 Storage:

.1 Store oily waste in approved receptacles to ensure maximum cleanliness and safety.

.2 Deposit greasy or oily rags and materials subject to spontaneous combustion in approved receptacles and remove from site daily or at the end of each shift.

1.11 FLAMMABLE AND COMBUSTIBLE LIQUIDS

.1 Handling, storage and use of flammable and combustible liquids are to be governed by the current National Fire Code of Canada.

.2 Flammable and combustible liquids such as gasoline, kerosene and naphtha will be kept for ready use in quantities not exceeding 45 litres provided they are stored in approved safety cans bearing Underwriters' Laboratory of Canada or Factory Mutual seal of approval. Storage of quantities of flammable and combustible liquids exceeding 45 litres for work purposes requires permission of local Building Manager.

.3 Transfer of flammable and combustible liquids is prohibited within buildings or jetties.

.4 Transfer of flammable and combustible liquids will not be carried out in vicinity of open flames or

any type of heat-producing devices.

.5 Flammable liquids having a flash point below 38°C such as naphtha or gasoline will not be used as solvents or cleaning agents.

.6 Flammable and combustible waste liquids, for disposal, will be stored in approved containers located in a safe ventilated area. Quantities are to be kept to a minimum and Fire Department is to be notified when disposal is required.

1.12 HAZARDOUS SUBSTANCES

.1 Work entailing use of toxic or hazardous materials, chemicals and/or explosives, or otherwise creating hazard to life, safety or health, will be in accordance with National Fire Code of Canada.

.2 Obtain from local Building Manager a "Hot Work" permit for work involving welding, burning or use of blow torches and salamanders, in buildings or facilities.

.3 When Work is carried out in dangerous or hazardous areas involving use of heat, provide fire watchers equipped with sufficient fire extinguishers. Determination of dangerous or hazardous areas along with level of protection necessary for Fire Watch is at discretion of the local Building Manager. Contractors are responsible for providing fire watch service for work on a scale established and in conjunction with Building Manager at pre-construction meeting.

.4 Where flammable liquids, such as lacquers or urethanes are to be used, proper ventilation will be assured and all sources of ignition are to be eliminated. Building Manager is to be informed prior to and at cessation of such work.

1.13 WELDING, BURNING AND CUTTING

.1 Contractor performing work of this section must notify Departmental Representative in advance of commencing work.

.2 Use non-combustible shields for electric and gas welding or cutting executed within 3 m of combustible material or in occupied spaces.

.3 Place cylinders supplying gases as close to work as possible. Secure cylinders in upright position, free from exposure to sun or high temperature.

.4 Locate fire extinguishing equipment near all welding, cutting and soldering operations.

.5 Contractor's mechanics shall be properly equipped with required protective clothing, including goggles or welding hood or face mask, gloves, etc.

.6 Contractor is responsible for the protection of his work and the Departmental Representative's property.

.7 Provide Fire Watch on standby with approved fire extinguisher while burning or welding is in progress.

1.14 QUESTIONS AND/OR CLARIFICATIONS

.1 Direct any questions or clarification on Fire Safety in addition to above requirements to local Building Manager.

1.15 FIRE INSPECTION

.1 Site inspections by Building Manager will be coordinated through Departmental Representative.

.2 Allow local Building Manager unrestricted access to work site.

.3 Co-operate with Building Manager during routine fire safety inspection of work site.

.4 Immediately remedy all unsafe fire situations observed by Building Manager.

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not used.

PART 3 - EXECUTION

3.1 NOT USED

.1 Not used.

PART 1 - GENERAL

1.1 REFERENCE STANDARDS

.1 Canada Green Building Council (CaGBC)

.1 LEED Canada-NC Version 1.0-2004, LEED (Leadership in Energy and Environmental Design): Green Building Rating System Reference Package For New Construction and Major Renovations (including Addendum 2007).

.2 Rating System Addenda for New Construction and Major Renovations LEED Canada-NC Version 1.0-Addendum 2007.

.3 LEED Canada-CI Version 1.0-2007, LEED (Leadership in Energy and Environmental Design): Green Building Rating System Reference Guide For Commercial Interiors.

.4 LEED Canada 2009 for Design and Construction-2010, LEED Canada 2009 for Design and Construction Leadership in Energy and Environmental Design Green Building Rating System Reference Guide

.5 LEED Canada for Existing Buildings, Operations and Maintenance-2009, LEED Canada 2009 Leadership In Energy and Environmental Design Green Building Rating System Reference Guide.

.2 U.S. Environmental Protection Agency (EPA)/Office of Water

.1 EPA 832/R-92-005-92, Storm Water Management for Construction Activities, Chapter 3.

.2 EPA General Construction Permit (GCP) 2012.

1.2 DEFINITIONS

.1 Environmental Pollution and Damage: presence of chemical, physical, biological elements or agents which adversely affect human health and welfare; unfavourably alter ecological balances of importance to human life; affect other species of importance to humans; or degrade environment aesthetically, culturally and/or historically.

.2 Environmental Protection: prevention/control of pollution and habitat or environment disruption during construction.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:
- .1 Submit manufacturer's instructions, printed product literature and data sheets for all products used on site and include product characteristics, performance criteria, physical size, finish and limitations.
- .2 Submit copies of WHMIS MSDS in accordance with Section 01 35 43 - Environmental Procedures.

.3 Before commencing construction activities or delivery of materials to site, submit Environmental Protection Plan for review by the Departmental Representative.

.4 Environmental Protection Plan must include comprehensive overview of known or potential environmental issues to be addressed during construction.

.5 Address topics at level of detail commensurate with environmental issue and required construction tasks.

.6 Include in Environmental Protection Plan:
- .1 Names of persons responsible for ensuring adherence to Environmental Protection Plan.
- .2 Names and qualifications of persons responsible for manifesting hazardous waste to be removed from site.
- .3 Names and qualifications of persons responsible for training site personnel.
- .4 Descriptions of environmental protection personnel training program.
- .5 Traffic Control Plans including measures to reduce erosion of temporary roadbeds by construction traffic, especially during wet weather.
  - .1 Plans to include measures to minimize amount of material transported onto paved public roads by vehicles or runoff.
- .6 Work area plan showing proposed activity in each portion of area and identifying areas of limited use or non-use.
  - .1 Plan to include measures for marking limits of use areas and methods for protection of features to be preserved within authorized work

areas.

.7 Spill Control Plan to include procedures, instructions, and reports to be used in event of unforeseen spill of regulated substance.

.8 Non-Hazardous solid waste disposal plan identifying methods and locations for solid waste disposal including clearing debris.

.9 Air pollution control plan detailing provisions to assure that dust, debris, materials, and trash, are contained on project site.

.10 Contaminant Prevention Plan identifying potentially hazardous substances to be used on job site; intended actions to prevent introduction of such materials into air, water, or ground; and detailing provisions for compliance with Federal, Provincial, and Municipal laws and regulations for storage and handling of these materials.

.11 Waste Water Management Plan identifying methods and procedures for management of discharge of waste waters which are directly derived from construction activities, such as clean-up water.

.12 Historical, archaeological, cultural resources biological resources and wetlands plan that defines procedures for identifying and protecting historical, archaeological, cultural resources, biological resources and wetlands.

1.4 FIRES

.1 Fires and burning of rubbish on site is not permitted.

.2 Provide supervision, attendance and fire protection measures as directed.

1.5 DRAINAGE

.1 Storm Water Pollution Prevention Plan (SWPPP) to be substituted for erosion and sediment control plan.

.2 Provide temporary drainage and pumping required to keep excavations and site free from water.

.3 Ensure pumped water into waterways, sewer or drainage systems is free of suspended materials.

.4 Control disposal or runoff of water containing suspended materials or other harmful substances in accordance with local authority requirements.

1.6 SITE CLEARING AND

.1 Protect trees and plants on site and adjacent

PLANT PROTECTION

properties as indicated.

.2 Protect trees and shrubs adjacent to construction work, storage areas and trucking lanes, and encase with protective wood framework from grade level to height of [2] m minimum.

.3 Protect roots of designated trees to dripline during excavation and site grading to prevent disturbance or damage.

.1 Avoid unnecessary traffic, dumping and storage of materials over root zones.

.4 Minimize stripping of topsoil and vegetation.

.5 Restrict tree removal to areas designated by the Departmental Representative.

1.7 WORK ADJACENT TO WATERWAYS

.1 Construction equipment to be operated on land only.

.2 Waterways to be kept free of excavated fill, waste material and debris.

.3 Design and construct temporary crossings to minimize erosion to waterways.

.4 Do not skid logs or construction materials across waterways.

.5 Avoid indicated spawning beds when constructing temporary crossings of waterways.

1.8 POLLUTION CONTROL

.1 Maintain temporary erosion and pollution control features installed under this Contract.

.2 Control emissions from equipment and plant in accordance with local authorities' emission requirements.

.3 Prevent sandblasting and other extraneous materials from contaminating air and waterways beyond application area.

.4 Cover or wet down dry materials and rubbish to prevent blowing dust and debris. Provide dust control for temporary roads.

1.9 HISTORICAL/ARCHAEOLOGICAL CONTROL

.1 Provide historical, archaeological, cultural resources, biological resources, and wetlands plan that defines procedures for identifying and protecting historical, archaeological, cultural resources, biological resources and wetlands known to be on project site: and identifies procedures to be followed if historical

archaeological, cultural resources, biological resources and wetlands not previously known to be onsite or in area are discovered during construction.

.2 Plan: include methods to assure protection of known or discovered resources and identify lines of communication between Contractor personnel and Departmental Representative.

1.10 NOTIFICATION

.1 Departmental Representative will notify Contractor in writing of observed noncompliance with Federal, Provincial or Municipal environmental laws or regulations, permits, and other elements of Contractor's Environmental Protection plan.

.2 Contractor: after receipt of such notice, inform Departmental Representative of proposed corrective action and take such action for approval by Departmental Representative.
.1 Take action only after receipt of written approval by Departmental Representative.

.3 Departmental Representative will issue stop order of work until satisfactory corrective action has been taken.

.4 No time extensions granted or equitable adjustments allowed to Contractor for such suspensions.

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not used.

PART 3 - EXECUTION

3.1 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 00 - Cleaning.
.1 Leave Work area clean at end of each day.

.2 Ensure public waterways, storm and sanitary sewers remain free of waste and volatile materials disposal.

.3 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00 - Cleaning.

PART 1 - GENERAL

1.1 INSPECTION

.1 Allow Departmental Representative access to Work. If part of Work is in preparation at locations other than Place of Work, allow access to such Work whenever it is in progress.

.2 Give timely notice requesting inspection if Work is designated for special tests, inspections or approvals by Departmental Representative instructions, or law of Place of Work.

.3 If Contractor covers or permits to be covered Work that has been designated for special tests, inspections or approvals before such is made, uncover such Work, have inspections or tests satisfactorily completed and make good such Work.

.4 Departmental Representative will order part of Work to be examined if Work is suspected to be not in accordance with Contract Documents. If, upon examination such work is found not in accordance with Contract Documents, correct such Work and pay cost of examination and correction.

1.2 INDEPENDENT INSPECTION AGENCIES

.1 Independent Inspection/Testing Agencies may be engaged by the Contractor for purpose of inspecting and/or testing portions of Work. Cost of such services will be borne by the Departmental Representative.

.2 Provide equipment required for executing inspection and testing by appointed agencies.

.3 Employment of inspection/testing agencies does not relax responsibility to perform Work in accordance with Contract Documents.

.4 If defects are revealed during inspection and/or testing, appointed agency will request additional inspection and/or testing to ascertain full degree of defect. Correct defect and irregularities as advised by Departmental Representative at no additional cost to Departmental Representative. Pay costs for retesting and reinspection.

1.3 ACCESS TO WORK

.1 Allow inspection/testing agencies access to Work, off site manufacturing and fabrication plants.

.2 Co-operate to provide reasonable facilities for such access.

1.4 PROCEDURES

.1 Notify appropriate agency and Departmental Representative in advance of requirement for tests, in order that attendance arrangements can be made.

.2 Submit samples and/or materials required for testing, as specifically requested in specifications. Submit with reasonable promptness and in orderly sequence to not cause delays in Work.

.3 Provide labour and facilities to obtain and handle samples and materials on site. Provide sufficient space to store and cure test samples.

1.5 REJECTED WORK

.1 Remove defective Work, whether result of poor workmanship, use of defective products or damage and whether incorporated in Work or not, which has been rejected by Departmental Representative as failing to conform to Contract Documents. Replace or re-execute in accordance with Contract Documents.

.2 Make good other Contractor's work damaged by such removals or replacements promptly.

.3 If in opinion of the Departmental Representative it is not expedient to correct defective Work or Work not performed in accordance with Contract Documents, Departmental Representative will deduct from Contract Price difference in value between Work performed and that called for by Contract Documents, amount of which will be determined by the Departmental Representative.

1.6 REPORTS

.1 Submit copies of inspection and test reports to the Departmental Representative.

.2 Provide copies to manufacturer or fabricator of material being inspected or tested and to subcontractor of work being inspected or tested.

1.7 TESTS AND MIX DESIGNS

.1 Furnish test results and mix designs as requested.

.2 Cost of tests and mix designs beyond those called for in Contract Documents or beyond those required by law of Place of Work will be appraised by the Departmental Representative and may be authorized as recoverable.

1.8 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 the Departmental Representative.

.3 Prepare mock-ups for Departmental Representative's 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, the Departmental Representative will assist in preparing schedule fixing dates for preparation.

.6 Mock-ups may remain as part of Work.

1.9 MILL TESTS

.1 Submit mill test certificates as requested and required of specification Sections.

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not used.

PART 3 - EXECUTION

3.1 NOT USED

.1 Not used.

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 01 33 00 – Submittal Procedures.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

1.3 INSTALLATION AND REMOVAL

.1 Provide temporary utilities controls in order to execute work expeditiously.

.2 Remove from site all such work after use.

1.4 WATER SUPPLY

.1 Department Representative will provide continuous supply of potable water for construction use.

.2 Arrange for connection with appropriate utility company and pay costs for installation, maintenance and removal.

.3 Department Representative will pay for utility charges at prevailing rates.

1.5 TEMPORARY HEATING AND VENTILATION

.1 Provide temporary ventilation in enclosed areas as required to:
.1 Facilitate progress of Work.
.2 Provide adequate ventilation to meet health regulations for safe working environment.

.2 Ventilating:
.1 Prevent accumulations of dust, fumes, mists, vapours or gases in areas occupied during construction.
.2 Provide local exhaust ventilation to prevent harmful accumulation of hazardous substances into atmosphere of occupied areas. Vent to exterior through temporary ducting.
.3 Dispose of exhaust materials in manner that will not result in harmful exposure to persons.
.4 Ventilate storage spaces containing hazardous or volatile materials.
.5 Continue operation of ventilation and exhaust system for time after cessation of work process to assure removal of harmful contaminants.

.3 Permanent heating system of building will provide heating.

.4 Maintain strict supervision of operation of temporary ventilating equipment to:
- .1 Conform with applicable codes and standards.
- .2 Enforce safe practices.
- .3 Prevent abuse of services.
- .4 Prevent damage to finishes.
- .5 Vent to outside.

1.6 TEMPORARY POWER AND LIGHT

.1 Department Representative will pay for power utilized during construction; however, any modifications and reinstatement will be the responsibility of the Contractor at their cost. Discuss power availability with Department Representative prior to bidding.

.2 Arrange for connection with appropriate utility company. Pay costs for installation, maintenance and removal.

.3 Provide and maintain temporary lighting throughout project as required to maintain safe lighting levels, in accordance with Occupational Health and Safety requirements.

.4 Electrical power and lighting systems existing in building may be used for construction requirements. Make good damage to electrical system caused by use under this Contract.

1.7 TEMPORARY COMMUNICATION FACILITIES

.1 Provide and pay for mobile phone necessary for use of site foreman. Foreman to be reachable by telephone during performance of work.

1.8 FIRE PROTECTION

.1 Provide and maintain temporary fire protection equipment during performance of Work required by governing codes, regulations and bylaws.

.2 Burning rubbish and construction waste materials is not permitted on site.

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED

.1 Not Used.

PART 1 - GENERAL

1.1 REFERENCE STANDARDS

.1 Canadian Standards Association (CSA International)
- .1 CSA-0121-M1978 (R2003), Douglas Fir Plywood.
- .2 CAN/CSA-S269.2-M1987 (R2003), Access Scaffolding for Construction Purposes.
- .3 CAN/CSA-Z321-96 (R2001), Signs and Symbols for the Occupational Environment.

.2 U.S. Environmental Protection Agency (EPA) / Office of Water
- .1 EPA 832R92005, Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

1.3 INSTALLATION AND REMOVAL

.1 Prepare site plan indicating proposed location and dimensions of area to be fenced and used by Contractor, number of trailers to be used, avenues of ingress/egress to fenced area and details of fence installation.

.2 Identify areas which have to be gravelled to prevent tracking of mud.

.3 Indicate use of supplemental or other staging area.

.4 Provide construction facilities in order to execute work expeditiously.

.5 Remove from site all such work after use.

1.4 SCAFFOLDING

.1 Scaffolding in accordance with CAN/CSA-S269.2.

.2 Provide and maintain scaffolding, temporary stairs, ladders, and platforms as required to facilitate work.

1.5 HOISTING

.1 Provide, operate and maintain hoists required for moving of materials and equipment.

.2 Hoists to be operated by qualified operator.

1.6 SITE STORAGE/LOADING

.1 Confine work and operations of employees by Contract Documents. Do not unreasonably encumber premises with products.

.2 Do not load or permit to load any part of Work with weight or force that will endanger Work.

1.7 CONSTRUCTION PARKING

.1 Parking will be permitted on site provided it does not disrupt performance of Work.

.2 Provide and maintain adequate access to project site.

.3 Clean runways and taxi areas where used by Contractor's equipment.

1.8 SECURITY

.1 Departmental Representative will be providing security for the duration of the project.

1.9 OFFICES

.1 Provide meeting space within building at location designated by Departmental Representative. No external office is required.

.2 Provide marked and fully stocked first-aid case in a readily available location.

.3 Subcontractors to provide their own offices as necessary. Direct location of these offices.

1.10 EQUIPMENT, TOOL AND MATERIALS STORAGE

.1 Provide and maintain, in clean and orderly condition, lockable weatherproof sheds for storage of tools, equipment and materials.

.2 Locate materials not required to be stored in weatherproof sheds on site in manner to cause least interference with work activities.

1.11 SANITARY FACILITIES

.1 Provide temporary sanitary facilities at the time of initial mobilization and maintain them throughout the course of the work. An exception will be granted to this requirement only where Departmental Representative has confirmed in writing that on-site washrooms are available for Contractor use.

.1 Sanitary facility is to include an odourless flushing chemical type temporary toilet that is properly enclosed, weatherproof, and serviced periodically as

required.

.2 The building toilets and facilities shall not be used by the Contractor's forces unless approved by Departmental Representative.

1.12 CONSTRUCTION SIGNAGE

.1 Contractor shall provide all required signage necessary to protect the public from the construction, control the traffic flow around the area of work and to inform patrons that construction activity is in process.

.2 Additional signs may be required at the discretion of Departmental Representative or Departmental Representative as construction progresses. No extras will be entertained for signage requirements after tenders close.

All signage to be of professional quality and design.

.3 Indicate on sign, name of Departmental Representative, Departmental Representative, Contractor and Subcontractor, of design style established by the Departmental Representative.

.4 No other signs or advertisements, other than warning signs, are permitted on site.

.5 Signs and notices for safety and instruction in both official languages Graphic symbols to CAN/CSA-Z321.

.6 Maintain approved signs and notices in good condition for duration of project, and dispose of off site on completion of project or earlier if directed by Departmental Representative.

1.13 PROTECTION AND MAINTENANCE OF TRAFFIC

.1 Provide access and temporary relocated roads as necessary to maintain traffic.

.2 Maintain and protect traffic on affected roads during construction period except as otherwise specifically directed by the Departmental Representative.

.3 Provide measures for protection and diversion of traffic, including provision of watch-persons and flag-persons, erection of barricades, placing of lights around and in front of equipment and work, and erection and maintenance of adequate warning, danger, and direction signs.

.4 Protect travelling public from damage to person and property.

.5 Contractor's traffic on roads selected for hauling material to and from site to interfere as little as possible with public traffic.

.6 Verify adequacy of existing roads and allowable load limit on these roads. Contractor: responsible for repair of damage to roads caused by construction operations.

.7 Provide necessary lighting, signs, barricades, and distinctive markings for safe movement of traffic.

.8 Dust control: adequate to ensure safe operation at all times.

1.14 CLEAN-UP

.1 Remove construction debris, waste materials, packaging material from work site daily.

.2 Clean dirt or mud tracked onto paved or surfaced roadways.

.3 Store materials resulting from demolition activities that are salvageable.

.4 Stack stored new or salvaged material not in construction facilities.

1.15 Temporary Work

.1 The Contractor shall design, provide, erect, maintain, remove and assume full and sole responsibility for all temporary works required for the safe and complete execution of the works.

.2 In the execution of the temporary works and for the duration of the contract, the contractor shall make adequate provision for all likely construction loading and provide sufficient bracing and props to keep the works in plumb and alignment and free from excessive deflection.

.3 Access of heavy construction equipment and accumulation of construction materials on the floors are not permitted, unless such have been catered for in the contractor's temporary work design to the satisfaction of the engineer.

.4 Costs of all temporary works are to be included in the contract price.

.5 Submit shop drawings for all temporary works for review before fabrication commences. Shop drawings shall be sealed by a Professional Engineer registered in the province of Ontario.

PART 2 - PRODUCTS

2.1 NOT USED

PART 3 - EXECUTION

3.1 NOT USED

PART 1 - GENERAL

1.1 REFERENCE STANDARDS

.1 Canadian Standards Association (CSA International)
.1 CSA-O121-M1978 (R2003), Douglas Fir Plywood.

.2 Public Works Government Services Canada (PSPC) Standard Acquisition Clauses and Conditions (SACC)-ID: R0202D, Title: General Conditions 'C', In Effect as Of: May 14, 2004.

1.2 INSTALLATION AND REMOVAL

.1 Provide temporary controls in order to execute Work expeditiously.

.2 Remove from site all such work after use.

1.3 HOARDING

.1 Erect temporary site enclosure using new 1.2 m high snow fence wired to rolled steel "T" bar fence posts spaced at 2.4 m on centre around building. Provide one lockable truck gate as well as protected point of public access complete with overhead protection for duration of project. Maintain fence in good repair.

.2 Provide barriers around trees and plants designated to remain. Protect from damage by equipment and construction procedures.

.3 Hoarding, overhead and dust protection is required to protect public from falling debris. Overhead protection/covered walkways are to be provided as required in accordance with requirement of all by-laws, standards, occupational health and safety act, and as required by authorities and these specifications. This includes covered walkways at all entrances and exits to the building extending out from the building a minimum of 30 feet where any overhead lifting or work takes place.

.4 Contractor is to install signage advising public of work being undertaken.

1.4 ACCESS TO SITE

.1 Provide and maintain access roads, sidewalk crossings, ramps and construction runways as may be required for access to Work.

1.5 PUBLIC TRAFFIC FLOW

.1 Provide and maintain competent signal flag

operators, traffic signals, barricades and flares, lights, or lanterns as required to perform Work and protect public.

1.6 FIRE ROUTES

.1 Maintain access to property including overhead clearances for use by emergency response vehicles.

1.7 PROTECTION FOR OFF-SITE AND PUBLIC PROPERTY

.1 Protect surrounding private and public property from damage during performance of Work.

.2 Be responsible for damage incurred.

1.8 PROTECTION OF BUILDING FINISHES

.1 Provide protection for finished and partially finished building finishes and equipment during performance of Work.

.2 Provide necessary screens, covers, and hoardings.

.3 Confirm with Departmental Representative locations and installation schedule 3 days prior to installation.

.4 Be responsible for damage incurred due to lack of or improper protection.

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not used.

PART 3 - EXECUTION

3.1 NOT USED

.1 Not used.

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 01 33 00 – Submittal Procedures.

.2 Section 02 41 13 – Selective Site Demolition.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Submit written request in advance of cutting or alteration which affects:
.1 Structural integrity of elements of project.
.2 Integrity of weather-exposed or moisture-resistant elements.
.3 Efficiency, maintenance, or safety of operational elements.
.4 Visual qualities of sight-exposed elements.

.3 Include in request:
.1 Identification of project.
.2 Location and description of affected Work.
.3 Statement on necessity for cutting or alteration.
.4 Description of proposed Work, and products to be used.
.5 Alternatives to cutting and patching.
.6 Date and time work will be executed.

1.3 MATERIALS

.1 Required for original installation.

.2 Change in Materials: Submit request for substitution in accordance with Section 01 33 00 - Submittal Procedures.

1.4 PREPARATION

.1 Inspect existing conditions, including elements subject to damage or movement during cutting and patching.

.2 After uncovering, inspect conditions affecting performance of Work.

.3 Beginning of cutting or patching means acceptance of existing conditions.

.4 Provide supports to assure structural integrity of surroundings; provide devices and methods to protect other portions of project from damage.

.5 Provide protection from elements for areas which are to be exposed by uncovering work.

1.5 EXECUTION

.1 Execute cutting, fitting, and patching to complete Work.

.2 Fit several parts together, to integrate with other Work.

.3 Uncover Work to install ill-timed Work.

.4 Remove and replace defective and non-conforming Work.

.5 Remove samples of installed Work for testing.

.6 Provide openings in non-structural elements of Work for penetrations of mechanical and electrical Work.

.7 Execute Work by methods to avoid damage to other Work, and which will provide proper surfaces to receive patching and finishing.

.8 Employ original installer to perform cutting and patching for weather-exposed and moisture-resistant elements, and sight-exposed surfaces.

.9 Restore work with new products in accordance with requirements of Contract Documents.

.10 Fit Work airtight to pipes, sleeves, and other penetrations through surfaces.

.11 Refinish surfaces to match adjacent finishes: Refinish continuous surfaces to nearest intersection.

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED

.1 Not Used.

PART 1 - GENERAL

1.1 PROJECT CLEANLINESS

.1 Maintain Work in tidy condition, free from accumulation of waste products and debris, including that caused by Departmental Representative or other Contractors.

.2 Remove waste materials from site at daily regularly scheduled times or dispose of as directed by the Departmental Representative. Do not burn waste materials on site.

.3 Disposal of waste products to be performed in strict accordance with the product Manufacturer's Material Safety Data Sheet and in accordance with the provincial Waste Control Regulations.

.4 Clear snow and ice from access to building, bank/pile snow in designated areas only.

.5 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.

.6 Provide and use marked separate bins for recycling. Refer to Section 01 74 21 - Waste Management and Disposal.

.7 Dispose of waste materials and debris off site.

.8 Clean interior areas prior to start of finishing work, and maintain areas free of dust and other contaminants during finishing operations.

.9 Store volatile waste in covered metal containers, and remove from premises at end of each working day.

.10 Provide adequate ventilation during use of volatile or noxious substances. Use of building ventilation systems is not permitted for this purpose.

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

.12 Schedule cleaning operations so that resulting dust, debris and other contaminants will not fall

on wet, newly painted surfaces nor contaminate building systems.

.13 Cover drains as required to prevent debris or any other material from entering the drains. Ensure that drains continue to operate as required during construction.

1.2 FINAL CLEANING

.1 Prior to the work being considered Substantially Performed, the Contractor shall remove their surplus products, tools, construction machinery and equipment not required for the performance of the remaining work. Contractor shall also remove waste products and debris other than that caused by other Contractors or their employees not involved with the Work and leave the Site clean and suitable for occupancy by the Departmental Representatives unless otherwise specified.

.2 Prior to the Work being considered Totally Performed, the Contractor shall remove their remaining products, tools, construction machinery and equipment.

.3 Remove waste products and debris other than that caused by others, and leave Work clean and suitable for occupancy.

.4 Prior to final review remove surplus products, tools, construction machinery and equipment.

.5 Remove waste products and debris including that caused by Departmental Representative or other Contractors.

.6 Remove waste materials from site at regularly scheduled times or dispose of as directed by the Departmental Representative. Do not burn waste materials on site.

.7 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.

.8 Remove stains, spots, marks and dirt from decorative work, electrical and mechanical fixtures, furniture fitments, walls, and floors.

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

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

.11 Inspect finishes, fitments and equipment and

ensure specified workmanship and operation.

.12 Broom clean and wash exterior walks, steps and surfaces; rake clean other surfaces of grounds.

.13 Remove dirt and other disfiguration from exterior surfaces.

.14 Clean and sweep roofs, gutters, areaways, and sunken wells.

.15 Sweep and wash clean paved areas.

.16 Clean equipment and fixtures to sanitary condition; clean or replace filters of mechanical equipment.

.17 Clean roofs, downspouts, and drainage systems.

.18 Remove debris and surplus materials from crawl areas and other accessible concealed spaces.

.19 Remove snow and ice from access to building.

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not used.

PART 3 - EXECUTION

3.1 NOT USED

.1 Not used.

PART 1 - GENERAL

1.1 WASTE MANAGEMENT GOALS

.1 Prior to start of Work conduct meeting with Departmental Representative and Departmental Representative to review and discuss PSPC's waste management goal and Contractor's proposed Waste Reduction Workplan for Construction, Renovation and /or Demolition (CRD) waste to be project generated.

.2 Minimize amount of non-hazardous solid waste generated by project and accomplish maximum source reduction, reuse and recycling of solid waste produced by CRD activities.

.3 Protect environment and prevent environmental pollution damage.

1.2 RELATED REQUIREMENTS

.1 Section 01 74 00

1.3 REFERENCE STANDARDS

.1 Ontario Ministry of Environment
- .1 Ontario 3 R's Regulations (regulation 102/94) for waste management programs applicable to construction and demolition projects greater than 2,000 m2.
- .2 Ontario Environmental Protection Act (EPA)
  - .1 Regulation 102/94, Waste Audits and Waste Reduction Workplans.
  - .2 Regulation 103/94, Source Separation Programs.
- .3 Canadian Construction Association (CCA)
  - .1 CCA 81-2001: A Best Practices Guide to Solid Waste Reduction.
- .4 Public Works and Government Services Canada (PSPC)
  - .1 2002 National Construction, Renovation and Demolition Non-Hazardous Solid Waste Management Protocol.
  - .2 CRD Waste Management Market Research Report (available from PSPC's Environmental Services).
  - .3 Sustainable Development Strategy 2007-2009: Target 2.1 Environmentally Sustainable Use of Natural Resources.
    - .1 Real Property projects over $1 million and in communities where industrial recycling is

supported, implementation of CRD waste management practices will be completed, with waste materials being reused or recycled.

.2 Contractually ensure resources used in construction or maintenance are consumed and recovered in a sustainable manner.

1.4 DEFINITIONS

.1 Approved/Authorized recycling facility: waste recycler approved by applicable provincial authority or other users of material for recycling approved by Departmental Representative.

.2 Class III: non-hazardous waste - construction renovation and demolition waste.

.3 Construction, Renovation and/or Demolition (CRD) Waste: Class III solid, non-hazardous waste materials generated during construction, demolition, and/or renovation activities.

.4 Cost/Revenue Analysis Workplan (CRAW): based on information from Waste Reduction Workplan, and intended as financial tracking tool for determining economic status of waste management practices (Schedule E).

.5 Inert Fill: inert waste - exclusively asphalt and concrete.

.6 Waste Source Separation Program (WSSP): implementation and co-ordination of ongoing activities to ensure designated waste materials will be sorted into pre-defined categories and sent for recycling and reuse, maximizing diversion and potential to reduce disposal costs.

.7 Recyclable: ability of product or material to be recovered at end of its life cycle and re-manufactured into new product for reuse.

.8 Recycle: process by which waste and recyclable materials are transformed or collected for purpose of being transferred into new products.

.9 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.

.10 Reuse: repeated use of product in same form but

not necessarily for same purpose. Reuse includes:

.1 Salvaging reusable materials from re-modelling 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.

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

.12 Separate Condition: refers to waste sorted into individual types.

.13 Source Separation: act of keeping different types of waste materials separate beginning from the point they became waste.

.14 Execute Work with minimal interference and disturbance to normal use of premises.

.15 Maintain security measures established by facility provide temporary security measures approved by Departmental Representative and Departmental Representative.

1.5 WASTE PROCESSING SITES

.1 Contractor is responsible to research and locate waste diversion resources and service providers. Salvaged materials are to be transported off site to approved and/or authorized recycling facilities or to users of material for recycling.

1.6 STORAGE, HANDLING AND PROTECTION

.1 Store, materials to be reused, recycled and salvaged in locations as directed by Departmental Representative and Departmental Representative.

.2 Unless specified otherwise, materials for removal become Contractor's property.

.3 Protect, stockpile, store and catalogue salvaged items.

.4 Separate non-salvageable materials from salvaged items. Transport and deliver non-salvageable items to licensed disposal facility.

.5 Protect structural components not removed and salvaged materials from movement or damage.

.6 Support affected structures. If safety of building is endangered, cease operations and immediately notify Departmental Representative.

.7 Protect surface drainage, mechanical and

electrical from damage and blockage.

.8 Provide on-site facilities and containers for collection and storage of reusable and recyclable materials.

.9 Separate and store materials produced during project in designated areas.

.10 Prevent contamination of materials to be salvaged and recycled and handle materials in accordance with requirements for acceptance by designated processing facilities.
- .1 On-site source separation is recommended.
- .2 Remove co-mingled materials to off site processing facility for separation.
- .3 Obtain waybills, receipts and/or scale tickets for separated materials removed from site.
- .4 Materials reused on-site are considered to be diverted from landfill and as such are to be included in all reporting.

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not Used.

PART 3 - EXECUTION

3.1 APPLICATION

.1 Handle waste materials not reused, salvaged, or recycled in accordance with appropriate regulations and codes.

3.2 CLEANING

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

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

.3 Waste Management:
- .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.
- .2 Source separate materials to be reused/recycled into specified sort areas.

3.3 DIVERSION OF MATERIALS

.1 Separate recyclable and/or reusable materials from general waste stream and stockpile in separate piles or containers, as reviewed by Departmental Representative and Departmental Representative, and consistent with applicable fire regulations.
- .1 Mark containers or stockpile areas.

.2 Provide instruction on disposal practices.

PART 1 - GENERAL

1.1 ADMINISTRATIVE REQUIREMENTS

.1 Acceptance of Work Procedures:
- .1 Contractor's Inspection: conduct inspection of Work, identify deficiencies and defects, and repair as required to conform to Contract Documents.
  - .1 Notify Departmental Representative in writing of satisfactory completion of Contractor's inspection and submit verification that corrections have been made.
  - .2 Request Departmental Representative's review.

.2 Departmental Representative's Review:
- .1 Departmental Representative and Contractor to inspect Work and identify defects and deficiencies.
- .2 Contractor to correct Work as directed.

.3 Completion Tasks: submit written certificates in English that tasks have been performed as follows:
- .1 Work: completed and inspected for compliance with Contract Documents.
- .2 Defects: corrected and deficiencies completed.
- .3 Work: complete and ready for final inspection
- .

.4 Final Review:
- .1 When completion tasks are done, request final review of Work by Departmental Representative.
- .2 When Work incomplete according to the Departmental Representative, complete outstanding items and request re-inspection.

.5 Declaration of Substantial Performance: when Departmental Representative considers deficiencies and defects corrected and requirements of Contract substantially performed, make application for Certificate of Substantial Performance.

.6 Commencement of Lien and Warranty Periods: date of Departmental Representative's acceptance of

submitted declaration of Substantial Performance to be date for commencement for warranty period and commencement of lien period unless required otherwise by lien statute of Place of Work.

.7 Final Payment:
.1 When Departmental Representative considers final deficiencies and defects corrected and requirements of Contract met, make application for final payment.

.8 Payment of Holdback: after issuance of Certificate of Substantial Performance of Work, submit application for payment of holdback amount in accordance with contractual agreement.

1.2 FINAL CLEANING

.1 Clean in accordance with Section 01 74 00 - Cleaning.
.1 Remove surplus materials, excess materials, rubbish, tools and equipment.

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not used.

PART 3 - EXECUTION

3.1 NOT USED

.1 Not used.

PART 1 - GENERAL

1.1 ACTION AND INFORMATIONAL SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures and Section 01 32 00 – Construction Progress Documentation.

.2 Provide evidence, if requested, for type, source and quality of products supplied.

.3 Provide all warranties and guarantees.

1.2 CONTENTS - PROJECT RECORD DOCUMENTS

.1 Table of Contents for Each Volume: provide title of project;
- .1 Date of submission; names.
- .2 Addresses, and telephone numbers of Departmental Representative and Contractor with name of responsible parties.
- .3 Schedule of products and systems, indexed to content of volume.

.2 For each product or system:
- .1 List names, addresses and telephone numbers of subcontractors and suppliers, including local source of supplies and replacement parts.

.3 Product Data: mark each sheet to identify specific products and component parts, and data applicable to installation; delete inapplicable information.

.4 Drawings: supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams.

.5 Typewritten Text: as required to supplement product data.
- .1 Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions specified in Section 01 45 00 - Quality Control.

1.3 AS -BUILT DOCUMENTS AND SAMPLES

.1 Maintain, in addition to requirements in General Conditions, at site for Departmental Representative one record copy of:
- .1 Contract Drawings.
- .2 Specifications.
- .3 Addenda.
- .4 Change Orders and other modifications to

Contract.
.5 Reviewed shop drawings, product data, and samples.
.6 Field test records.
.7 Inspection certificates.
.8 Manufacturer's certificates.

.2 Store record documents and samples in field office apart from documents used for construction.
.1 Provide files, racks, and secure storage.

.3 Label record documents and file in accordance with Section number listings in List of Contents of this Project Manual.
.1 Label each document "PROJECT RECORD" in neat, large, printed letters.

.4 Maintain record documents in clean, dry and legible condition.
.1 Do not use record documents for construction purposes.

.5 Keep record documents and samples available for inspection by Departmental Representative.

1.4 RECORDING INFORMATION ON PROJECT RECORD DOCUMENTS

.1 Departmental Representative will provide Contractor two sets of white prints for record drawing purposes.

.2 The Contractor to maintain project record drawings and record accurately deviations from Contract documents.

.3 Record changes in red and mark on one set of prints.

.4 At completion of contract and prior to final review, neatly transfer "as-built" records to second set of white prints using a fine red marker. Neatly print lettering and numbers in size to match original. Lines may be drawn free-hand, but shall be neat and accurate. Add at each drawing title block note: "AS-BUILT RECORD". Circle on List of Drawings each title and number of drawings marked with "as-built" records.

.5 Submit both sets of "as-built record" drawings to Departmental Representative on completion of Contract and before the final payment.

.6 Record following information:
.1 Field changes of dimension and detail.
.2 Changes made by Change Order, Change Directive, or Supplemental Instruction.
.3 Deviation from electrical and mechanical

installations shown on drawings.

.4 Other significant deviations that are concealed in construction and cannot be identified by visual inspection.

.5 Type and location of structural repairs, delaminations, etc.

.6 Location of internal utilities and appurtenances concealed in construction referenced to visible and accessible features of structure

.7 Specifications: mark each item to record actual construction, including:

.1 Manufacturer, trade name, and catalogue number of each product actually installed, particularly optional items and substitute items.

.2 Changes made by Addenda and change orders.

.8 Make project record drawing available at all times for reference purposes and for inspection by the Departmental Representative. Provide reproducible prints to Departmental Representative at regular intervals but not less than once each month.

.9 If project is completed without significant deviations from contract drawings, declare this in writing and submit to Departmental Representative in lieu of project record drawings.

1.5 MATERIALS AND FINISHES

.1 Building products, applied materials, and finishes: include product data, with catalogue number, size, composition, and colour and texture designations.

.1 Provide information for re-ordering custom manufactured products.

.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.

1.6 WARRANTIES AND BONDS

.1 Develop warranty management plan to contain information relevant to Warranties.

.2 Submit warranty management plan, 30 days before planned pre-warranty conference, to Departmental Representative for review.

.3 Warranty management plan to include required actions and documents to assure that the Departmental Representative receives warranties to which it is entitled.

.4 Provide plan in narrative form and contain sufficient detail to make it suitable for use by future maintenance and repair personnel.

.5 Provide a three (3) year minimum warranty for all Work of the Contract, including a guaranty secured by Performance Bond for the first 2 years, commencing on the date of substantial performance.

.6 Remedial Work Under Warranty

.1 Perform any required warranty repair work for the duration of the warranty period at no extra cost.

.2 Notice will be provided to the Contractor during the warranty period within thirty (30) days of the discovery of any defect in the Work. The Contractor shall take necessary steps to protect the area against further damage immediately upon receipt of notice and shall take corrective action to make good any damage incurred. The Contractor shall schedule repair work with the Departmental Representative and shall make every attempt to make good the defects within three (3) weeks of notice.

.3 Remedy is to be at no cost to the Departmental Representative and is to include all labour, material, equipment, and supervision necessary to make good defective areas of the Work and any damages incurred to obtain access to defective areas.

.4 The Contractor must reimburse the Departmental Representative for any resulting assessment costs incurred to define the extent of the defect and for costs incurred to test the repaired defect to confirm acceptability of repairs.

.5 The Contractor must reimburse the Departmental Representative for all associated costs incurred due to closure of the areas requiring repair under warranty.

.6 Warranty periods for areas requiring repair are to be extended by the amount of time lapsed between issuance of notice and

completion of remedial work. The warranty/ guaranty period will then re-commence upon completion of the remedial work.

.7 Warranties are not to be deemed to restrict any liability of the Contractor arising out of any applicable law.

.7 Submit, warranty information made available during construction phase, to the Departmental Representative for approval prior to each monthly pay estimate.

.8 Assemble approved information in binder, submit upon acceptance of work and organize binder as follows:

.1 Separate each warranty or bond with index tab sheets keyed to Table of Contents listing.

.2 List subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal.

.3 Obtain warranties and bonds, executed in duplicate by subcontractors, suppliers, and manufacturers, within ten days after completion of applicable item of work.

.4 Verify that documents are in proper form, contain full information, and are notarized.

.5 Co-execute submittals when required.

.6 Retain warranties and bonds until time specified for submittal.

.9 Except for items put into use with Departmental Representative's permission, leave date of beginning of time of warranty until Date of Substantial Performance is determined.

.10 Conduct joint 4 month and 9 month warranty inspection, measured from time of acceptance, by Departmental Representative.

.11 Include information contained in warranty management plan as follows:

.1 Roles and responsibilities of personnel associated with warranty process, including points of contact and telephone numbers within the organizations of Contractors, subcontractors, manufacturers or suppliers involved.

.2 Listing and status of delivery of Certificates of Warranty for extended warranty items, to include roofs.

.3 Contractor's plans for attendance at 4 and 9 month post-construction warranty inspections.

.4 Procedure and status of tagging of equipment covered by extended warranties.

.5 Post copies of instructions near selected pieces of equipment where operation is

critical for warranty and/or safety reasons.

.12 Respond in timely manner to oral or written notification of required construction warranty repair work.

.13 Written verification to follow oral instructions.

.1 Failure to respond will be cause for the Departmental Representative to proceed with action against Contractor.

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED

.1 Not Used.

PART 1 - GENERAL

1.1 SUMMARY

.1 Section includes descriptions for demolishing, salvaging, recycling and removing site work items identified for removal in whole or in part, and for backfilling trenches and excavations resulting from site demolition activities.

1.2 REFERENCE STANDARDS

.1 Department of Justice Canada (Jus)
- .1 Canadian Environmental Assessment Act (CEAA), 2012
- .2 Canadian Environmental Protection Act (CEPA), 2012
  - .1 SOR/2003-2, On-Road Vehicle and Engine Emission Regulations
  - .2 SOR/2006-268, Regulations Amending the On-Road Vehicle and Engine Emission Regulations
  - .3 Transportation of Dangerous Goods Act (TDGA), 1992, c. 34
  - .4 Motor Vehicle Safety Act (MVSA), 1995
  - .5 Hazardous Materials Information Review Act, 1985

.2 Underwriters' Laboratories of Canada (ULC)
- .1 CAN/ULC-S660-08 , Standard for Nonmetallic Underground Piping for Flammable and Combustible Liquids
- .2 ULC/ORD-C58.15-1992, Overfill Protection Devices for Flammable Liquid Storage Tanks
- .3 ULC/ORD-C58.19-1992, Spill Containment Devices for Underground Flammable Liquid Storage Tanks

.3 U.S. Environmental Protection Agency (EPA)
- .1 EPA CFR 86.098-10, Emission standards for 1998 and later model year Otto-cycle heavy-duty engines and vehicles
- .2 EPA CFR 86.098-11, Emission standards for 1998 and later model year diesel heavy-duty engines and vehicles
  - .1 EPA 832/R-92-005, Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices.

1.3 DEFINITIONS

.1 Selective Demolition: Sequencing demolition activities to allow separation and sorting of

selected site materials.

.2 Hazardous Substances: dangerous substances, dangerous goods, hazardous commodities and hazardous products, including but not limited to: asbestos PCB's, CFC's, HCFC's poisons, corrosive agents, flammable substances, ammunition, explosives, radioactive substances, or other material that can endanger human health or wellbeing or environment if handled improperly.

.3 Draft Construction Waste Management Plan (Draft CWM Plan): Detailed inventory of materials in building indicating estimated quantities of reuse, recycling and landfill, prepared in accordance with Section 01 74 19- Construction Waste Management and Disposal and as follows:
.1 Involves quantifying by volume/weight amounts of materials and wastes generated during construction, demolition, deconstruction, or renovation project.

.4 Waste Management Coordinator (WMC): contractor’s representative responsible for supervising waste management activities as well as coordinating related, required submittal and reporting requirements.

.5 Construction Waste Management Plan (CWM Plan): Written plan addressing opportunities for reduction, reuse, or recycling of materials prepared in accordance with Section 01 74 21 - Waste Management and Disposal.

.6 Construction Waste Management Report (CWM Report): Written report identifying actual materials that formed CWM Plan for reduction, reuse, or recycling of materials prepared in accordance with Section 01 74 21 - Management and Disposal.

1.4 ADMINISTRATIVE REQUIREMENTS

.1 Coordination: Coordinate with Departmental Representative for the material Departmental Representativeship including the following:
.1 Except for items or materials indicated to be reused, salvaged, reinstalled, or otherwise indicated to remain Departmental Representative's property, demolished materials shall become Contractor’s property and shall be removed from Project site.
.2 Historic items, relics, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, antiques, and other items of

interest or value to Departmental Representative that may be encountered during demolition remain Departmental Representative's property:

.1 Carefully remove and salvage each item or object in a manner to prevent damage and deliver promptly to Departmental Representative.

.2 Coordinate with Departmental Representative's historical adviser, who will establish special procedures for removal and salvage operations.

.2 Pre-Demolition Meetings.

.1 As part of pre-construction meeting, convene pre-installation meeting 1 week before beginning work of this Section, with Departmental Representative in accordance with Section 01 31 19- Project Meetings to:

.1 Verify project requirements.

.2 Verify existing site conditions adjacent to demolition work

.3 Coordinate with other construction sub trades

.4 Examine existing site conditions adjacent to demolition work, prior to start of Work

.5 Waste reporting requirements

.2 Hold project meetings every two (2) weeks.

.3 Ensure key personnel, including but not limited to site supervisor, project manager, and subcontractor representatives attend.

.4 Contractor will provide written report on status of waste diversion activity at each meeting.

.5 Departmental Representative will provide written notification of change of meeting schedule established upon contract award 24 hours prior to scheduled meeting.

.6 Scheduling:

.1 Employ necessary means to meet project time lines without compromising specified minimum rates of material diversion.

.2 In event of unforeseen delay notify Departmental Representative in writing.

1.5 ACTION AND INFORMATIONAL SUBMITTALS

.1 Action Submittals: Provide the following submittals before starting any work of this Section:

.1 Construction Waste Management Plan (CWM Plan): Submit a plan of demolition area indicating extent of temporary facilities

and supports, methods of removal and demolition prepared by a professional engineer in accordance with requirements of Authority Having Jurisdiction.

.2 Proposed Dust Control and Noise Control Measures: Submit statement or drawing that indicates measures proposed for use, proposed locations, and proposed time frame for their operation.

.3 Inventory: Submit a list of items that have been removed and salvaged after selective site demolition is complete. These are to be safely stored for reinstatement.

.1 Landfill Records: Indicate receipt and acceptance of [hazardous wastes by a landfill facility licensed to accept hazardous wastes].

.2 Pre demolition Photographs: Submit photographsindicating existing conditions of adjoining construction and site improvements prior to starting Work. Include finish surfaces that may be misconstrued as damage caused by selective site demolition operations.

.2 Informational Submittals: Provide the following submittals when requested by the Departmental Representative:

.1 Qualification Data: Submit information for companies and personnel indicating their capabilities and experience to perform work of this Section including; but not limited to, lists of completed projects with project names and addresses, names and addresses of Departmental Representative for work of similar complexity and extent.

1.6 QUALITY ASSURANCE

.1 Regulatory Requirements: ensure Work is performed in compliance with applicable Provincial/Territorial regulations.

.2 Comply with hauling and disposal regulations of Authority Having Jurisdiction.

1.7 SITE CONDITIONS

.1 Environmental protection:

.1 Ensure Work is done in accordance with Section 01 35 43- Environmental Procedures.

.2 Ensure Work does not adversely affect adjacent watercourses, groundwater and wildlife, or contribute to excess air and noise pollution.

.3 Fires and burning of waste or materials is not permitted on site.

.4 Burying of rubbish waste materials is not

permitted.

.5 Disposal of waste of volatile materials including but not limited to, mineral spirits, oil, petroleum based lubricants, or toxic cleaning solutions into watercourses, storm or sanitary sewers, is not permitted.

.6 Ensure proper disposal procedures are maintained throughout the project.

.2 Pumping of water containing suspended materials into watercourses, storm or sanitary sewers or onto adjacent properties, is not permitted.

.3 Control disposal or runoff of water containing suspended materials or other harmful substances in accordance with authorities having jurisdiction.

.4 Protect trees, plants and foliage on site and adjacent properties where indicated.

.5 Prevent extraneous materials from contaminating air beyond application area, by providing temporary enclosures during demolition work.

.6 Cover or wet down dry materials and waste to prevent blowing dust and debris. Control dust on all temporary roads.

.7 Conduct selective site demolition so Departmental Representative's operations will not be disrupted:

.1 Provide not less than 72 hours' notice to Departmental Representative of activities that will affect operations.

.2 Maintain access to existing walkways, exits, and other adjacent occupied or used facilities:

.1 Closing or obstructing walkways, exits, or other occupied or used facilities without written permission from Departmental Representative is not permitted.

.8 Departmental Representative and Departmental Representative assume no responsibility for Selective Site elements being demolished:

.1 Conditions existing at time of inspection for bidding purpose will be maintained by Departmental Representative as far as practical.

.2 Before selective site demolition, remove, protect and store salvaged items as directed by Departmental Representative:

.1 Salvage items as identified by Departmental Representative.
.2 Deliver to Departmental Representative as directed.

1.8 EXISTING CONDITIONS

.1 Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work:
.1 Hazardous materials will be as defined in the Hazardous Materials Act.
.2 Hazardous materials will be removed by Departmental Representative before start of the Work.

.2 If materials suspected of containing hazardous materials are encountered, do not disturb; immediately notify Departmental Representative. Hazardous materials will be removed by Departmental Representative under a separate contract or as a change to the Work. Proceed only after receipt of written instructions have been received from Departmental Representative.

.3 Site elements that will be demolished are based on their condition on date that tender is accepted.

PART 2 - PRODUCTS

2.1 EQUIPMENT

.1 Equipment and Heavy Machinery:
.1 Machinery to be running only while in use, except where extreme temperatures prohibit shutting machinery down.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Visit and examine the site and note all characteristics and features affecting the Work of this Section.

.2 Ensure all services, whether buried; built-in or exposed are properly identified as to position, type of service, size, direction of flow.

.3 Departmental Representative does not guaranty that existing conditions are the same as those indicated in Project Record Documents.

.4 Inspect materials, equipment, components to be re-used or turned over to the Departmental Representative. Note their condition and advise the Departmental Representative in writing of any defects or conditions which would affect their removal and re-use.

.5 When unanticipated mechanical, electrical, or structural elements are encountered, investigate and measure the nature and extent of the element. Promptly submit a written report to Departmental Representative.

.6 Verify that hazardous materials have been remediated before proceeding with site demolition operations.

3.2 PREPARATION

.1 Prevent movement, settlement or damage of elements of the existing building which are to remain. Provide bracing, shoring and supports as required. Protect existing surfaces not to be restored from damage during removal procedures.

.2 Cut and/or cap existing services within the work area, if any, prior to start of Work as required, but do not affect the services of areas not under construction or essential to the ongoing operation of the building.

.3 In all cases, exercise all reasonable care during removal operations to avoid damaging items to be salvaged, re-used, or items that are not part of the Scope of Work.

.4 Seal off all work areas to prevent dust and debris from affecting other areas outside of work area. Prevent public access to areas being repaired.

.5 Tape and/ or seal and provide protection to all mechanical and electrical services and all fire alarm and security devices still functioning adjacent to the work areas to prevent damage resulting from dust, water, or impact.

.6 Cover roof drains as required to prevent debris or any other material from entering the drains. Ensure that all drains continue to operate as required during construction.

.7 Remove or protect in place all surface mounted or permanent fixtures not to be demolished from damage during demolition procedure.

.8 Apply filter cloth to all exhaust and ventilation vents within work area to prevent dust generated by the construction activity from escaping.

.1 Contractor shall clean, or replace filter cloth if the filter cloth becomes unsuitably dirty as determined by Departmental Representative.

.9 Provide proposed demolition sequence to the Departmental Representative for review prior to commencing work. Departmental Representative to disconnect and equipment prior to demolition commencement.

.10 Provide temporary lighting and ventilation as required to work areas. Departmental Representative shall provide 110 volt, 220 amp. service to work area for Contractor's use.

3.3 REMOVAL AND DEMOLITION OPERATIONS

.1 Remove and dispose of material and debris resulting from the removal of existing roofing assemblies. Departmental Representative to identify any abandoned rooftop equipment prior to project to be disposed of by the Contractor at no additional cost to the Departmental Representative.

.2 Remove and dispose of all material and debris resulting from the removal of existing platform, access stairs and guardrails including all existing electrical

.3 Remove and dispose of all ceiling tiles. Suspended ceiling framing to remain.

.4 Remove and dispose of localized interior finishes (interior gypsum board) as required to reinforce structure to facilitate work.

.5 Demolition procedures and equipment shall meet all applicable noise-control by-laws and regulations of the location of the work.

.6 The Contractor is to take care not to damage the surface of existing surfaces which are to remain through his removal operation. Where any such damage is done to sound material, it is to be repaired by the Contractor at his own expense to the approval of the Departmental Representative.

.7 All required re-painting due to damage, etc. is the Contractor's responsibility.

.8 At end of each day's work, leave work in safe condition so that no part is in danger of causing injury or damage.

3.4 REMOVAL FROM SITE

.1 Disposal of waste products and material is to be in strict accordance with the product manufacturer's material safety data sheets and in accordance with the governing waste control

regulations.

.2 The existing drainage system is not to be used to dispose of project wastes and / or materials

.3 Store volatile wastes or material in covered metal containers. All wastes which create hazardous conditions must be removed from the premises daily.

3.5 RESTORATION

.1 Restore areas and existing works outside areas of demolition to conditions that existed prior to beginning of Work.

3.6 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 00- Cleaning
- .1 Leave Work area clean at end of each day.
- .2 Remove debris, trim surfaces and leave work site clean, upon completion of Work
- .3 Use cleaning solutions and procedures which are not harmful to health, are not injurious to plants, and do not endanger wildlife, adjacent water courses or ground water.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00- Cleaning.

PART 1 - GENERAL

1.1 REFERENCE STANDARDS

.1 CSA Group
- .1 CSA-A23.1-14 /A23.2-14, Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete.
- .2 CAN/CSA-A23.3-14, Design of Concrete Structures.
- .3 CSA-G30.18-09 (R2014), Carbon Steel Bars for Concrete Reinforcement.

.2 Reinforcing Steel Institute of Canada (RSIC)
- .1 RSIC-2004, Reinforcing Steel Manual of Standard Practice.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Shop Drawings:
- .1 Submit drawings.
  - .1 Prepare reinforcement drawings in accordance with RSIC Manual of Standard Practice.
  - .2 Indicate placing of reinforcement and:
    - .1 Bar bending details.
    - .2 Lists.
    - .3 Quantities of reinforcement.
    - .4 Sizes, spacings, locations of reinforcement, with identifying code marks to permit correct placement without reference to structural drawings.

.3 Detail lap lengths and bar development lengths to CAN/CSA-A23.3.

1.3 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with this Section.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:
- .1 Store materials off ground and in accordance with manufacturer's recommendations.
- .2 Replace defective or damaged materials with new.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Reinforcing steel: billet steel, 10M and larger, grade 400 MPa to CSA-G30.18R.

.2 Welded Wire Reinforcement: grade 400 MPa to CSA-G30.5.

.3 Chairs, bolsters, bar supports, spacers: to CSA-A23.1/A23.2.

.4 Tie wire: 1.5 mm diameter annealed wire.

.5 Plain round bars: to CSA-G40.20/G40.21.

2.2 FABRICATION

.1 Fabricate reinforcing steel in accordance with Reinforcing Steel Manual of Standard Practice by the Reinforcing Steel Institute of Canada CSA-A23.1/A23.2.

.2 Ship bundles of bar reinforcement, clearly identified in accordance with bar bending details and lists.

2.3 SOURCE QUALITY CONTROL

.1 Upon request, provide with certified copy of mill test report of reinforcing steel, showing physical and chemical analysis, minimum 4 weeks prior to beginning reinforcing work.

PART 3 - EXECUTION

3.1 FIELD BENDING

.1 Do not field bend or field weld reinforcement except where indicated or authorized by Departmental Representative.

.2 When field bending authorized, bend without heat, applying slow and steady pressure.

.3 Replace bars, which develop cracks or splits.

3.2 PLACING REINFORCEMENT

.1 Place reinforcing steel as indicated on placing drawings in accordance with CSA-A23.1/A23.2.

.2 Prior to placing concrete, obtain Departmental Representative's review of reinforcing material and placement.

.3 Maintain cover to reinforcement during concrete

pour.

.1 Concrete cast against earth or ground: 50mm

.4 Do not substitute deformed wire for reinforcing bars without prior approval of RJC.

.5 Support reinforcing with chairs, accessories, or reinforcing bars are required. Bars used as support shall be considered as accessories.

.6 Provide sufficient support to maintain concrete cover as specified. All supports and bars must be tied together to maintain reinforcing steel securely in place during concrete placement.

3.3 FIELD QUALITY CONTROL

.1 Inspection by Departmental Representative not to augment or replace Contractor quality control nor relieve Contractor of contractual responsibility.

3.4 CLEANING

.1 Progress Cleaning:

.1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment.

.3 Waste Management: separate waste materials for recycling.

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

PART 1 - GENERAL

.1 CSA Group
- .1 CSA A23.1/A23.2-14, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
- .2 CSA A283-06-R2016, Qualification Code for Concrete Testing Laboratories.

1.2 ABBREVIATIONS AND ACRONYMS

.1 Portland Cement: hydraulic cement, blended hydraulic cement (XXb - b denotes blended) and Portland-limestone cement types:
- .1 GU, GUb and GUL - General use cement.
- .2 MS and MSb - Moderate sulphate-resistant cement.
- .3 MH, MHb and MHL - Moderate heat of hydration cement.
- .4 HE, HEb and HEL - High early-strength cement.
- .5 LH, LHb and LHL - Low heat of hydration cement.
- .6 HS and HSb - High sulphate-resistant cement.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:
- .1 Submit manufacturer's instructions, printed product literature and data sheets for proprietary materials used in Cast-In-Place Concrete and additives and include product characteristics, performance criteria, physical size, finish and limitations.
- .2 Submit copies of WHMIS MSDS in accordance with Section 01 35 29.06- Health and Safety Requirements.

.3 Mix Design:
- .1 The Contractor shall be responsible for mix designs as detailed in CSA A23.1-09 Table 11, Alternate 1. The minimum requirements are indicated on the drawings.

  The proposed mix designs shall be submitted to the Departmental Representative for review, a minimum of 2-weeks prior to placement. Do not proceed with concrete placement until

review is complete and mix design has been accepted by the Departmental Representative.

The mix designs shall note the constituents by weight, the properties required, and the structural elements for which the mix is to be used.

Provide concrete to meet the minimum structural design requirements and the minimum durability requirements indicated and as defined in CSA A23.1-09. The most severe exposure requirement governs over the design requirements and other less severe exposure conditions.

.4 Site Quality Control Submittals:
.1 Concrete hauling time: provide for review by Departmental Representative deviations exceeding maximum allowable time of 120 minutes for concrete delivered to site of Work and discharged after batching.

1.4 QUALITY ASSURANCE

.1 The concrete supplier shall be certified by the Ready Mix Concrete Association of Ontario.

.2 Provide Departmental Representative, minimum 2 weeks prior to starting concrete work, with valid and recognized certificate from plant delivering concrete.

.1 Provide test data and certification by qualified independent inspection and testing laboratory that materials and mix designs used in concrete mixture meet specified requirements.

.3 Minimum 2 weeks prior to starting concrete work, provide proposed quality control procedures for review by Departmental Representative on following items:
.1 Hot weather concrete.
.2 Cold weather concrete.
.3 Curing.
.4 Finishes.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Delivery and Acceptance Requirements:

.2 Concrete hauling time: deliver to site of Work and discharged within 120 minutes maximum after batching.
.1 Concrete delivery: ensure continuous concrete delivery from plant meets CSA

A23.1/A23.2.

1.6 SITE CONDITIONS

.1 Placing concrete during rain or weather events that could damage concrete is prohibited.

.2 Protect newly placed concrete from rain or weather events in accordance with CSA A23.1/A23.2.

.3 Cold weather protection:

.1 See also CAN/CSA-A23.1, clause 7.4.2.5, except the following minimum requirements must also be met.

.1 Forecasted air temperature at or below 5°C.

.1 The aggregate or mixing water shall be heated to maintain a minim concrete temperature of 10°C.

.2 Concrete shall not be placed on or against any surface which is at a temperature less than 5°C.

.3 Contractor shall be prepared to cover slab if unexpected drop in air temperature should occur.

.4 Concrete temperature shall be maintained above 10°C fir at least 7 days or until the concrete reaches 70% if specified strength.

.2 Forecasted air temperature below 2°C but not below -4°C.

.1 Forms and steel shall be free from ice and snow.

.2 The aggregate or mixing water shall be heated to maintain a minim concrete temperature of 10°C at point of pour.

.3 Concrete shall not be placed on or against any surface which is at a temperature less than 5°C.

.4 Slabs shall be covered with canvas or similar, kept a few inches clear of surface.

.5 In windy weather, storey below slab shall be enclosed.

.6 Protection shall be maintained for at least the specified.

.7 Concrete temperature shall be maintained above 10°C for at least the specified curing

period.

.3 Forecasted air temperature below below -4°C.

.1 Notes 1, 2, 3, 4 under point 2 above.

.2 Storey below shall be enclosed and artificial heat provided, heating to be started at least one hour ahead of pouring and maintained for a minimum of the specified curing period.

.3 Temperature of the concrete at all surfaces shall be kept at a minimum of 20°C for 3 days, or 10°C for 7 Days. Concrete shall be kept above freezing temperature until it reaches 70% of its specified strength.

.4 Enclosure must be constructed so that air can circulate outside the outer edges and members.

.5 Reinforcing to be covered and warmed to maintain its temperature at 0°C or higher at the time of concrete placement.

.4 Hot weather protection:

.1 Protect concrete from direct sunlight when ambient temperature above 27°C.

.2 Prevent forms of getting too hot before concrete placed. Apply accepted methods of cooling not to affect concrete adversely.

.5 Protect from drying.

PART 2 - PRODUCTS

2.1 DESIGN CRITERIA

.1 Quality Control Plan: ensure concrete supplier meets performance criteria of concrete as established by Departmental Representative and provide verification of compliance as described in PART 1 - QUALITY ASSURANCE.

2.2 MATERIALS

.1 Portland Cement: GU, unless noted otherwise.

.2 Blended hydraulic cement: Type GUb to CSA A3001.

.3 Portland-limestone cement: Type GUL to CSA A3001.

.4 Water: to CSA A23.1.

.5 Aggregates: to CSA A23.1/A23.2.

.6 Admixtures:
.1 Air entraining admixture: to ASTM C260.

2.3 MIXES

.1 Concrete is specified as per the "Performance" alternative as outlines in Table 5 of CAN/CSA A23.

.2 The General Contractor is responsible for working with the concrete supplier to ensure that the plastic and hardened mix properties meet site requirements for placing, finishing, and the owner's specified performance requirements. The General Contractor shall meet the documentation and quality control requirements outlines under the "Performance" alternate of Table 5 of CAN/CSA-A23.

.3 The Supplier shall meet all certification and documentation requirements as outlines under the "Performance" alternate of Table 5 of CAN/CSA-A23.

.4 Concrete shall have a unit weight of 145±5 pcf (23±1 kN/m^3) unless noted otherwise.

.5 Provide concrete mix to meet following hard state requirements:
.1 Durability and class of exposure F-2.
.2 Compressive strength at 28 days: 25 MPa minimum.

.6 Slump and aggregate size to be determined by the General Contractor and supplier to meet placement, and finishing requirements without segregation while meeting all owner specifications.

.7 Minimum water/cement ratio and air content to meet the requirements for exposure lass as outlines in Table 2, 4 and 20 of CAN/CSA-A23.

.8 At the request of the Owner, the Supplier will furnish test data results for each proposed mix design demonstrating that they meet the strength durability, and shrinkage requirements specified.

.9 Curing of the concrete to meet the requirements of the exposure class outlined in clause 2.4.5.1 above, as well as Table 2 and 20 of CAN/CSA-A23. Curing compounds are not permitted

for suspended parking slabs or exposure class C-X1 concrete parking slabs and reinforced slab on grades in parking areas to be cured for 7 days.

Ensure concrete supplier meets performance criteria as established below and provide verification of compliance as in Quality Control Plan.

Provide concrete mix to meet following plastic state requirements:

Workability: free of segregation.

No calcium chloride is permitted, in any form, in any concrete mix without the express written consent or RJC.

PART 3 - EXECUTION

3.1 PREPARATION

.1 Obtain Departmental Representative's written approval before placing concrete.
  .1 Provide 24 hours minimum notice to review reinforcing prior to placing of concrete.

.2 Place concrete reinforcing in accordance with Section 03 20 00- Concrete Reinforcing.

.3 During concreting operations:
  .1 Development of cold joints not allowed.
  .2 Ensure concrete delivery and handling facilitate placing with minimum of re-handling, and without damage to existing structure or Work.

.4 Disturbing reinforcement and inserts during concrete placement is prohibited.

.5 Prior to placing of concrete obtain Departmental Representative's approval of proposed method for protection of concrete during placing and curing.

.6 Protect previous Work from staining.

.7 Clean and remove stains prior to application for concrete finishes.

.8 Maintain accurate records of poured concrete items to indicate date, location of pour, quality, workability, air content, temperature and test samples taken.
  .1 Do not place load upon new concrete until authorized by Departmental Representative.

3.2 INSTALLATION/APPLICATION

.1 Do cast-in-place concrete work to CSA A23.1/A23.2.

.2 Concrete shall be machine mixed. Mixing and placing shall be in accordance with CSA Standard CSA-A23.1-09.

.3 Pre-wet formwork prior to concrete placement. Excess water (ponding or standing water) shall be removed from the formwork surface prior to concrete placement.

.4 Concrete shall be conveyed from the mixer to the place of deposit by methods that will ensure the required quality of concrete. Equipment for conveying the concrete shall be of such size and design as shall ensure a practically continuous flow of concrete at the delivery end without separation of materials.

.5 Concrete shall be deposited in the forms as nearly as practicable to its final position to avoid rehandling. The vertical height of free fall shall not exceed 3000mm unless special precautions approved by the Departmental Representative are utilized.

.6 Depositing shall be continuous throughout each division and the concrete shall be so placed and worked that a uniform texture will be produced.

.7 Depositing shall be continuous until the unit of operation as approved by the Departmental Representative is complete and sufficiently rapid to ensure the bonding of successive layers.

.8 No concrete shall be placed later than one half hour after leaving the mixer. No re-tempered concrete shall be permitted.

.9 Cement slurry used to prime a concrete pump shall be discarded and not placed into the structure.

.10 All concrete shall be thoroughly consolidated during and immediately after depositing, by internal vibration. Concrete shall be consolidated by means of sufficient vibrators of adequate size operated by competent workmen that have been instructed in their use.

.11 The use of vibrators to transport concrete shall not be permitted.

.12 Concrete shall be thoroughly worked around reinforcement, around embedded items and into corners of forms, eliminating all air or stone pockets that may cause honeycombing, pitting or planes of weakness.

.13 Anchor bolts:
- .1 Set anchor bolts to templates in co-ordination with appropriate trade prior to placing concrete.
- .2 Protect anchor bolt holes from water accumulations, snow and ice build-ups.

.14 Grout under base plates using procedures in accordance with manufacturer's recommendations which result in 100% contact over grouted area.

.15 Finishing and curing:
- .1 Finish concrete to CSA A23.1/A23.2.
- .2 Use procedures as reviewed by Departmental Representative. Ensure surface not damaged.

.16 Curing and protection of concrete for hot, cold or dry weather is to be as per clauses 7.4.1.8 and 7.4.2 if CAN/CSA-A23 as a minimum. See also clause 1.6.3 cold weather protection above.

3.3 FIELD QUALITY CONTROL

.1 Site tests: conduct tests as follows and submit report as described in PART 1 - ACTION AND INFORMATIONAL SUBMITTALS. Take at least 3 cylinders for each 60 cubic meters and of each type of concrete placed in any one day.
- .1 Concrete pours.
- .2 Slump.
- .3 Air content.
- .4 Compressive strength at 7 and 28 days.
- .5 Air and concrete temperature.

.2 Inspection and testing of concrete and concrete materials carried out by testing laboratory designated by Departmental Representative for review to CSA A23.1/A23.2.
- .1 Ensure testing laboratory certified to CSA A283.

.3 Non-Destructive Methods for Testing Concrete: to CSA A23.1/A23.2.

.4 Inspection or testing by Departmental Representative not to augment or replace Contractor quality control nor relieve Contractor of contractual responsibility.

3.4 CLEANING

.1 Clean in accordance with Section 01 74 00-Cleaning.

.2 Waste Management: separate waste materials for recycling.

- .1 Divert unused concrete materials from landfill.
- .2 Provide appropriate area on job site where concrete trucks and be safely washed.
- .3 Divert unused admixtures and additive materials (pigments, fibres) from landfill to official hazardous material collections site.
- .4 Disposal of unused admixtures and additive materials into sewer systems, into lakes, streams, onto ground or in other location to pose health or environmental hazard is prohibited.
- .5 Prevent admixtures and additive materials from entering drinking water supplies or streams.
- .6 Using appropriate safety precautions, collect liquid or solidify liquid with inert, noncombustible material and remove for disposal.
- .7 Dispose of waste in accordance with applicable local, Provincial/Territorial and National regulations.at appropriate facility.

PART 1 - GENERAL

1.1 REFERENCE STANDARDS

.1 ASTM International Inc.
- .1 ASTM A36/A36M-08, Standard Specification for Carbon Structural Steel.
- .2 ASTM A307-07b, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
- .3 ASTM A325-07a, Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.
- .4 ASTM A325M-08, Standard Specification for Structural Bolts, Steel, Heat Treated 830 MPa Minimum Tensile Strength Metric.
- .5 ASTM A490M-04ae, Standard Specification for High-Strength Steel Structural Bolts, Classes 10.9 and 10.9.3, for Structural Steel Joints Metric.

.2 Canadian General Standards Board (CGSB)
- .1 CAN/CGSB-85.10-99, Protective Coatings for Metals.

.3 Canadian Institute of Steel Construction (CISC)/Canadian Paint Manufacturers Association (CPMA).
- .1 Handbook of the Canadian Institute of Steel Construction.
- .2 CISC/CPMA Standard 2-75, Quick-Drying Primer for use on Structural Steel.

.4 Canadian Standards Association (CSA International)
- .1 CSA G40.20/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-S16-01 (R2007), Limit States Design of Steel Structures.
- .4 CSA W47.1-03, Certification of Companies for Fusion Welding of Steel.
- .5 CSA W48-06, Filler Metals and Allied Materials for Metal Arc Welding.
- .6 CSA W55.3-1965 (R2003), Resistance Welding Qualification Code for Fabricators of Structural Members Used in Buildings.
- .7 CSA W59-03, Welded Steel Construction (Metal Arc Welding).

.5 The Society for Protective Coatings (SSPC) and

National Association of Corrosion Engineers (NACE) International

.1 NACE No. 3/SSPC SP-6-06, Commercial Blast Cleaning.

1.2 QUALIFICATIONS

.1 The steel fabricators and erectors must be certified under the requirements of CSA W47.1 as required by CSA-S16-09.

.2 Welding procedures, welders and welding operations shall be qualified in accordance with the Canadian Welding Bureau Standards.

.3 All connections shall be designed by a C.I.S.C. approved Fabricator unless otherwise noted.

1.3 EXAMINATIONS

.1 All dimensions taken from the Drawings are to be confirmed on site prior to submission of shop drawings and steel fabrication. Contractor is to be responsible for the correctness of such measurements and report to the Departmental Representative in writing all discrepancies between measurements at building and those shown on drawings prior to commencing work. Verify location of anchor bolts, embedded steel, wood stud walls and ensure that work prepared by other trades is at a proper elevation, on-line, level, and true.

.2 Contractor to locate all mechanical/electrical openings required in structural members for existing systems prior to fabrication.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

.3 Submit manufacturer's instructions, printed product literature and data sheets for metal bar grating and include product characteristics, performance criteria, physical size, finish and limitations.

.4 Shop Drawings:

.1 Drawings, which accompany these specifications, are to be used for estimating purposes only, and show in general the type of construction that shall be followed, but must not be considered as fabrication drawings.

.2 Submit detailed erection and shop drawings prepared under the supervision of a Registered Professional Engineer in

accordance with the General Requirements. Where pre-engineered or fabricator designed elements are part of the shop drawings, the shop drawings shall be stamped by a Professional Engineer licensed in Ontario.

.3 The shop drawings shall clearly show all shop and erection details, including cuts, copes, connections, holes, threaded fasteners, splices and welds. All welds, both shop and field, shall be indicated by AWS welding Symbols as specified in CSA W59 Appendix D and E.

.4 Shop drawings shall be submitted in an orderly sequence and sufficiently in advance of the work proceeding so as to not affect the schedule of the Work. The Contractor and the Departmental Representative shall jointly determine the schedule for which the shop drawing submissions shall occur.

.5 The Departmental Representative’s review of the shop drawings is for general conformance only and does not relieve the Contractor of the responsibility for errors or omissions that may be present in the shop drawings.

.6 Upon request by the Departmental Representative, the Contractor shall revise and resubmit the shop drawings.

.7 Provide setting drawings, templates and directions for the installation of anchor bolts, plates and other devices.

.8 Structural drawings are not prepared to be used in sepia form as erection drawings.

.9 Shop drawings shall show complete details necessary for fabrication and erection of the component parts of the structure, including location, type, size and extent of all welds, as well as all mechanical/electrical openings required. Splices not shown on the shop drawings will not be accepted.

.10 Prior to starting erection work, submit a description of the methods, sequence of erection and type of equipment proposed for use in erecting structural steel.

.5 Fabricator Reports:

.1 Provide structural steel fabricator's affidavit stating that materials and products used in fabrication conform to applicable material and products standards specified and indicated.

1.5 INSPECTION AND TESTING

.1 The Departmental Representative will engage and pay for the services of a welding Engineer and a testing agency.

.2 Allow free access to all parts of the work area for the purposes of inspection at all times.

.3 Prior to commencement of work provide a schedule of shop fabrication.

.4 Submit certified results of testing in accordance with CSA-G40.20 properly correlated to the elements being fabricated.

.5 For the purpose of bidding, assume all welds will be examined by a non-destructive testing method.

.6 Testing of all connections and splices not indicated on the design drawings shall be undertaken by the Departmental Representative’s testing agency and will be to the Contractor’s account.

.7 The Contractor shall advise the testing agency of the scheduling of all shop and field work pertaining to this Project. The Contractor shall permit the testing agency full access to the fabrication shop and the site for the purpose of carrying out his work and he shall provide assistance required to aid in the performance of the inspection and testing.

.8 If more than 5% re-inspection is required due to faulty workmanship, the Contractor will be required to pay for this re-inspection.

.9 The Engineer may reject at any time during the progress of the work a piece of material for any member which he may find defective or not in accordance with the detailed drawings. This material may be rejected notwithstanding any previous acceptance and components so rejected shall be replaced at no expense to the Departmental Representative. In case of dispute, the decision of the Engineer shall be final.

1.6 DELIVERY, STORAGE AND HANDLING

.1 The Contractor shall be responsible for the protection of all steel work during fabrication, shipping, storage, and construction. All small bends and damage shall be reported to the Engineer for instruction. Steel work, which is bent, broken, or otherwise damaged, shall be replaced by the Contractor prior to erection, to the satisfaction of the Engineer, at no cost to the Departmental Representative.

.2 The Contractor shall be responsible for proper scheduling of delivery and erection for the structural steel, all in accordance with the construction schedule.

.3 Structural steel members shall be stored at the site above ground on platforms, skids, or other devices.

.4 Steel shall be protected from corrosion.

.5 Other material shall be stored in a weather tight and dry place until ready for use in the Work.

.6 Package materials shall be stored in their original unbroken packages or container.

PART 2 - PRODUCTS

2.1 DESIGN REQUIREMENTS

.1 Design details and connections in accordance with requirements of CAN/CSA-S16 to resist forces, moments, shears and allow for movements indicated. All Connections to be designed by fabricator unless noted otherwise. Al beam connections to be standard frame beam connections or equivalent, unless noted otherwise.

.2 Shear connections:

.1 Select framed beam shear connections from an industry accepted publication such as "Handbook of the Canadian Institute of Steel Construction" when connection for shear only (standard connection) is required.

.2 Select or design connections to support reaction from maximum uniformly distributed load that can be safely supported by beam in bending, provided no point loads act on beam, when shears are not indicated.

.3 Submit sketches and design calculations stamped and signed by qualified professional engineer licensed in Ontario, Canada for all connections.

2.2 MATERIALS

.1 Wide flange beams and WWF sections shall be to CSA-G40.21-350W.

.2 Miscellaneous rolled sections (expect wide flanges) sections shall be to CSA-G40.21-300W.

.3 Hollow structural sections shall be to CSA-G40.21-350W Class C.

.4 Rolled plates shall be to CSA-G40.21-300W.

.5 High strength bolts shall be to ASTM A325M.

.6 Structural steel anchor rods (U.N.O) shall be to ASTM F1554, Grade 36 minimum.

.7 Reinforcing bar anchor bolts shall be to CAN.CSA-G30.18R, grade 400.

.8 Welding material shall be in accordance with CSA W59.

.9 Anchor bolts and nuts to ASTM A307.

.10 Metal bar grating: to ANSI/NAAMM MBG 531 steel.

.11 Form steel grating treads and landings from metal bar grating to profile indicated on the Drawings and secure to stringers and supports. Form landings of steel grating and reinforce as required.

.12 Construct balusters and handrails from steel pipe. Cap and weld exposed ends of balusters and handrails.

.13 All structural steel (exterior exposure) not to receive shop or field paint shall be hot Dip galvanized to Z275 G90 designation. Hot dipped galvanizing with zinc coating 600 g/m2 to CAN/CSA-G164.

.14 Touch-up primers for exterior exposure not to receive a shop or field paint finish shall be zinc chromate Type - 1, conforming to CGSB 1-GP-40D.

2.3 FABRICATION

.1 Verify all dimensions and take necessary field measurements prior to submission of steel shop drawings and steel fabrication.

.2 All fabrication shall be to CAN3-S16-09.

.3 All welding shall be to CSA W59.

.4 All fabricated units shall be straight and true and without sharp kinks or bends.

.5 All hollow structural sections shall be closed airtight with end plates sealed with welds.

.6 All plates and shapes shall be inspected visually for laminations. Repair plates or shapes that contain laminations in a manner approved by the Departmental Representative.

.7 Provide punched holes for the convenience of other trades in attaching wood blocking or other materials. Co-ordinate with drawings of other disciplines for location and details.

.8 Obtain Departmental Representative’s approval for holes required through structural steel that are not shown on the drawings.

2.4 CLEANING AND PRIMING

.1 All steel shall be thoroughly cleaned of all loose mill scale, loose rust, oil, or dirt.

.2 All steel shall be primed (exterior exposure) except for steel to be encased in concrete, steel to be fireproofed, steel which will receive shear studs, and fraying surfaces of friction connections.

.3 Structural steel to be primed for exterior exposure or to receive a shop or field paint finish shall be cleaned in accordance with SSPC-SP6 “Commercial Blast Cleaning”.

.4 All primers shall be applied strictly in accordance with the Manufacturers instructions. Apply one (1) coat of primer thoroughly and evenly and work well into the joints and other open spaces.

.5 After erection and after connections are completed, provide a field touch up coat of primer to all surfaces that had no shop coat, or have been chipped or scraped.

PART 3 – EXECUTION

3.1 APPLICATION

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

3.2 GENERAL

.1 Structural steel work: in accordance with CAN/CSA-S16.

.2 Welding: in accordance with CSA W59.

.3 Companies to be certified under Division 1 or 2.1 of CSA W47.1 for fusion welding of steel structures and/or CSA W55.3 for resistance welding of structural components.

3.3 CONNECTION TO EXISTING WORK

.1 Verify dimensions and condition of existing work, report discrepancies and potential problem areas to Departmental Representative for direction before commencing fabrication.

3.4 MARKING

.1 Mark materials in accordance with CSA G40.20/G40.21. Do not use die stamping. When steel is to be left in unpainted condition, place marking at locations not visible from exterior after erection.

.2 Match marking: shop mark bearing assemblies and splices for fit and match.

3.5 COLUMNS AND BASES

.1 All flame cut steel columns shall have their ends milled. Steel base plates supporting columns shall be flat.

.2 Base plates and cap plates are to be seal welded to HSS columns.

3.6 CONNECTIONS

.1 Use connections of the type and detail shown on the Drawings. Modifications to the specified connection types and details will not be permitted without prior approval from the Departmental Representative.

.2 Connections designed by the fabricator shall be in accordance with CSA Standard CAN/CSA-S16.1 and stamped and sealed by a Professional Engineer registered in the Province of Ontario.

.3 All connections shall be designed to carry the loads specified on the Drawings. If loads are not given, the connection shall have the capacity not less than the members being connected.

.4 Column to beam and girder connections shall allow for a horizontal stability force in all directions equal to 2% of the design column axial load in addition to all other loads.

.5 Structural steel members spliced for ease of fabrication or transportation shall have splices designed to develop the full strength and stiffness of the member. Splices shall be subject to non-destructive testing as directed by the Departmental Representative. The cost for such testing shall be borne by the Contractor.

.6 Use standard connection types where possible.

.7 Provide stiffeners in beam webs at all locations of beam continuity. Unless noted otherwise web stiffeners shall be 12 mm minimum.

.8 All bolted connections may be snug tight.

.9 Connections for seismic lateral load resisting elements, bolts in tension and elements connected with oversize or slotted holes unless designed to accommodate movement may be bearing connections but shall be pretensioned.

3.7 PROTECTION

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

.2 Repair damage to adjacent materials caused by rough carpentry installation.

3.8 SEPARATORS AND MISCELLANEOUS SUPPORTS

.1 Provide separators for all double members in accordance with CSA-S16-09.

.2 Provide plates and / or angles for support of masonry where required.

3.9 ERECTION

.1 Supervise the setting of bases, anchor bolts, and other steel to concrete connections. Cutting of base plates to accommodate anchor bolts shall be cause for rejection of base plates.

.2 Install all temporary bracing that is required to stabilize the work against wind, earthquake, and construction loads. Keep structure true and plumb until completion of the building.

.3 As erection progresses, the work shall be securely bolted up to take care of all dead loads, wind, and erection stresses. Any failure to make proper and adequate provisions for stresses during erection shall be solely the responsibility of the Contractor.

.4 The structural steel erector shall be responsible for the design of all hooks, erection connections and handling gear.

.5 Whenever piles of materials, erection equipment, or other loads are carried during erection, proper provision shall be made to take care of stresses resulting from it.

.6 All structural steel shall be assembled and erected in accordance with the approved erection drawings and specified reference standards.

.7 Structural steel work shall be carefully located at the proper grade and rigidly secured in place, using steel shims. All spaces under the steel shall then be filled with non-shrink pre-mix grout.

.8 Plumb, level and align individual members of steel work as specified in the latest CSA S16-09.

.9 Structural steel frames shall be accurately assembled to the lines and elevations indicated within the specified tolerances.

.10 The various members forming parts of complete frame of structure after being assembled shall be aligned and adjusted accurately before being fastened.

.11 Bearing surfaces and surfaces that will be in permanent contact shall be cleaned before the members are assembled.

.12 Temporary bolts, clips and angles etc. used to facilitate the erection shall be removed unless noted otherwise on the drawing.

3.10 TEMPORARY FLOORING

.1 Provide all temporary flooring, planking and scaffolding necessary in connection with erection of structural steel, or support of erection machinery in accordance with governing regulations or by-laws.

3.11 COMPLETION

.1 The Registered Professional Engineer responsible for the shop drawings, or his representative shall visit to review in place connections and components designed by that Registered Professional Engineer as required to substantiate compliance with his sealed shop drawings. He shall then submit a letter of compliance provide a seal and signed letter to the Departmental Representative and Engineer.

.2 On completion of the work of this section, all protection erected in conjunction with the structural steel work shall be removed, all damage to this work and adjoining work shall be made good and all surplus materials and debris and all tools and equipment shall be removed from the site.

3.12 WELDING

.1 All welding shall be done by the shielded metal-arc method in accordance with the requirements CSA W59. The welding operators shall have passed within the preceding six (6) months, the qualifications test as set forth in CSA W47.1.

.2 Submit welding procedures prepared and sealed by a Professional Engineer registered in Ontario, and familiar with this discipline to the Departmental Representative for his examination and comments.

.3 Surface to be welded shall be free from loose scale, rust, paint, or other foreign matter. Where weld material is deposited in two or more layers, each layer shall be cleaned before the next layer is deposited. Care shall be taken to minimize stresses due to heat expansion, contraction and distortion by using proper sequence in welding and by approved methods.

.4 Welding consumables for all processes shall be fully approved by the Canadian Welding Bureau and certified by the manufactures as complying with the requirement of this specification. Such certificates shall be not more than two years old.

.5 Electrode strengths to be equal to E480XX (E70xx) or better.

.6 Embedment anchors, shear stubs and deformed bar anchors shall be automatically end welded with suitable stud welding in accordance to the manufacture’s recommendations. Fillet welding of anchors will be rejected.

3.13 FIELD QUALITY CONTROL

.1 Structural steel work (material and workmanship) shall be subject to review and tested by a testing agency retained by the Departmental Representative.

.2 Construction review by the testing agency or the Departmental Representative does not relieve the Contractor of his responsibility to furnish materials and workmanship in accordance with the

Drawings and Specifications.

PART 1 - GENERAL

1.1 REFERENCE STANDARDS

.1 American National Standards Institute/National Particleboard Association (ANSI/NPA)
- .1 ANSI/NPA A208.1-2009 Particleboard.

.2 ASTM International
- .1 ASTM A123/A123M-15, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
- .2 ASTM A153/A153M-09 Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
- .3 ASTM A307-14 Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60000 PSI Tensile Strength.
- .4 ASTM A653/A653M-15, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- .5 ASTM D 5055-13e1, Standard Specification for Establishing and Monitoring Structural Capacities of Prefabricated Wood I-Joists.
- .6 ASTM D 5456-14b, Standard Specification for Evaluation of Structural Composite Lumber Products.
- .7 ASTM F1667-13 Standard Specification for Driven Fasteners: Nails, Spikes and Staples.

.3 Canadian General Standards Board (CGSB)
- .1 CAN/CGSB-11.3-M87, Hardboard.
- .2 CAN/CGSB-71.26-M88, Adhesive for Field-Gluing Plywood to Lumber Framing for Floor Systems.

.4 Canadian Wood Council
- .1 Wood Design Manual 2010 (R2014) Edition
- .2 Engineering Guide for Wood Frame Construction 2014

.5 CSA International
- .1 CAN/CSA-A123.2-03 (R2013), Asphalt Coated Roofing Sheets.
- .2 CSA B111-1974 (R2003), Wire Nails, Spikes and Staples.
- .3 CSA O86-14 Engineered Design in Wood
- .4 CSA O112.9-10, Evaluation of Adhesives for Structural Wood Products (Exterior

Exposure).
.5 CSA O121-08 (R2013), Douglas Fir Plywood.
.6 CSA O141-05 (R2014), Softwood Lumber.
.7 CSA O151-09 (R2014), Canadian Softwood Plywood.
.8 CSA O153-13, Poplar Plywood.
.9 CSA O325-07 (R2012), Construction Sheathing.
.10 CAN/CSA-S406-92 (R2008), Construction of Preserved Wood Foundations.
.11 CAN/CSA-Z809-08, Sustainable Forest Management.

.6 Forest Stewardship Council (FSC)
.1 FSC-STD-01-001-2004, FSC Principle and Criteria for Forest Stewardship.

.7 National Lumber Grades Authority (NLGA)
.1 Standard Grading Rules for Canadian Lumber 2010.

.8 National Research Council Canada (NRC)

.1 National Building Code of Canada 2015 (NBC).

.9 Underwriters' Laboratories of Canada (ULC)
.1 CAN/ULC-S706-09, Standard for Wood Fibre Insulating Boards for Buildings.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for all wood products and accessories and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Shop Drawings:
.1 For structural applications, submit drawings stamped and signed by professional engineer registered or licensed in the Province of Ontario, Canada.
.1 Include on drawings:
.1 Design data in accordance with CAN/CSA-O86 and CWC Engineering Guide for Wood Frame Construction.

.2 Roof deck showing anchorage to structure and minimum slopes.

1.3 DELIVERY, STORAGE, AND HANDLING

.1 Deliver, store and handle materials in accordance with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:
- .1 Store materials in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
- .2 Store materials off ground with moisture barrier at both ground level and as a cover forming a well-ventilated enclosure, with drainage to prevent standing water.
- .3 Store wood I-beams and I-joists on edge.
- .4 Stack, lift, brace, cut and notch engineered lumber products in strict accordance with manufacturer’s instructions and recommendations.
- .5 Store and protect architecturally exposed lumber from nicks, scratches, and blemishes.
- .6 Replace defective or damaged materials with new.
- .7 Store separated reusable wood waste convenient to cutting station and work areas.

PART 2 - PRODUCTS

2.1 STRUCTURAL FRAMING

.1 Lumber: softwood, S4S, moisture content 19% (S-dry) or less in accordance with following standards:
- .1 CSA O141.
- .2 NLGA Standard Grading Rules for Canadian Lumber.

2.2 FURRING AND BLOCKING

.1 Furring, blocking, nailing strips, grounds, rough bucks, , curbs, fascia backing and sleepers:
- .1 Accepted lumber: S4S.
- .2 Board sizes: "Standard" or better grade.
- .3 Dimension sizes: "Standard" light framing or better grade.
- .4 Post and timbers sizes: "Standard" or better grade.

.2 Where indicated, provide pressure treated materials for furring, blocking, nailing strips, grounds, rough bucks, , curbs, fascia backing and sleepers.

2.3 PANEL MATERIALS AND APPLICATION

.1 Roof sheathing:
- .1 Plywood, DFP or CSP sheathing grade or PP standard sheathing grade, T&G edge, 19mm

thick.

2.4 ACCESSORIES

.1 General purpose adhesive: to CSA O112.9.

.2 Nails, spikes and staples: to ASTM F1667.

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

.4 Proprietary fasteners: toggle bolts, expansion shields and lag bolts, screws and lead or inorganic fibre plugs, recommended for purpose by manufacturer.

.5 Joist hangers, connectors and fasteners: in accordance with accepted shop drawings,Z275.

.6 Roof sheathing H-Clips: formed "H" shape, thickness to suit panel material, approved by Departmental Representative.

.7 Fastener Finishes:
- .1 Galvanizing: to ASTM A653, use galvanized fasteners for exterior work.
- .2 Proprietary corrosion resistant fasteners for pressure-treated lumber: as recommended by manufacturer for material and service conditions.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for product installation in accordance with manufacturer's written instructions.
- .1 Visually inspect substrate in presence of Departmental Representative.
- .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
- .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 SYSTEMS INTEGRATION

.1 Install air barrier and vapour retarder sheeting around framing members to ensure continuity of protection and to lap and seal to main sheets.

.2 Install insulation in exterior wall framing cavities that will not be accessible after completion of framing.

.3 Install sill plate gasket in continuous lengths between concrete surfaces and wood framing.

3.3 FRAMING INSTALLATION

.1 Install engineered framing and plant fabricated structural wood components, including all hangers, connectors and fasteners, to supplement existing in accordance with accepted shop drawings and manufacturers' instructions.

.2 Install members true to line, levels and elevations, square and plumb.

.3 Construct continuous members from pieces of longest practical length.

.4 Install spanning members with "crown-edge" up.

.5 Select exposed framing for appearance. Install lumber materials so that grade-marks and other defacing marks are concealed or are removed by sanding where materials are left exposed.

.6 Frame, anchor, fasten, tie and brace members to provide necessary strength and rigidity.

.7 Countersink bolts where necessary to provide clearance for other work.

.8 Install specified panel product for each application.

.9 Install roof sheathing in accordance with requirements of NBC and accepted shop drawings. Ensure specified slope is achieved and verify prior to membrane installation.

3.4 FURRING AND BLOCKING

.1 Install furring and blocking as required to space-out and support wall and ceiling finishes, facings, fascia, soffit, siding electrical equipment mounting boards, and other work as required.

.2 Install furring to support siding applied vertically where sheathing is not suitable for direct nailing.

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

.3 Install rough bucks, nailers and linings to rough openings as required to provide backing for frames and other work.

.4 Install wood cants, fascia backing, nailers, curbs and other wood supports as required and secure using galvanized steel fasteners.

.5 Install sleepers as indicated.

3.5 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 00 - Cleaning.
.1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00 - Cleaning.

3.6 WASTE MANAGEMENT

.1 Separate waste materials for recycling in accordance with Local regulations.

.2 Re-use scrap lumber to the greatest extent possible. Separate scrap lumber for use on site as accessory components, including: shims, bracing, and blocking.

.3 Do not leave any wood, shavings, sawdust, etc. on the ground or buried in fill. Prevent saw dust and wood shavings from entering the storm drainage system.

.4 Do not burn scrap lumber that has been pressure treated.

.5 Do not send lumber treated with pentachlorophenol, CCA, or ACA to co-generation facilities or “waste-to-energy” facilities.

3.7 PROTECTION

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

.2 Repair damage to adjacent materials caused by rough carpentry installation.

PART 1 - GENERAL

1.1 REFERENCE STANDARDS

.1 ASTM International
- .1 ASTM C726-05e1, Standard Specification for Mineral Fiber Roof Insulation Board.
- .2 ASTM C728-05, Standard Specification for Perlite Thermal Insulation Board.
- .3 ASTM C1002-07, Standard Specification for Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs.
- .4 ASTM C1177/C1177M-08, Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing.
- .5 ASTM C1396/C1396M-09, Standard Specification for Gypsum Board.
- .6 ASTM D4434-09, Standard for Poly(Vinyl Chloride) Sheet Roofing.

.2 Canadian General Standards Board (CGSB)
- .1 CAN/CGSB-51.34-M86, Vapour Barrier, Polyethylene Sheet for Use in Building Construction.

.3 Canadian Roofing Contractors Association (CRCA)
- .1 CRCA Roofing Specifications Manual-2013.

.4 CSA International
- .1 CSA A123.21-04 (R2009), Standard Test Method for the Dynamic Wind Uplift Resistance of Mechanically Attached Membrane-Roofing Systems
- .2 CSA A231.1-2006, Precast Concrete Paving Slabs/Precast Concrete Pavers.
- .3 CSA O121-08, Douglas Fir Plywood.
- .4 CSA O151-09, Canadian Softwood Plywood.

.5 Underwriters' Laboratories of Canada (ULC)
- .1 CAN/ULC-S70105, Standard for Thermal Insulation, Polystyrene, Boards and Pipe Covering.
- .2 CAN/ULC-S702-09, Standard for Thermal Insulation Mineral Fibre for Buildings.
- .3 CAN/ULC-S704-03, Standard for Thermal Insulation, Polyurethane and Polyisocyanurate, Boards, Faced.
- .4 CAN/ULC-S706-09, Standard Test Method for Determination of Long-Term Thermal

Resistance of Closed-Cell Thermal Insulating Foams.

1.2 ADMINISTRATIVE REQUIREMENTS

.1 Convene pre-installation meeting prior to beginning roofing on site installation, with Departmental Representative and roofing contractor's representative in accordance with Section 01 31 19 Project Meetings to:
- .1 Verify project requirements.
- .2 Review installation and substrate conditions.
- .3 Co-ordination with other building subtrades.
- .4 Review manufacturer's installation instructions and warranty requirements.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:
- .1 Provide copies of most recent technical roofing components datasheets describing materials' physical properties and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Submit copies of MSDS in accordance with Section 01 35 43 - Environmental Procedures and 01 35 29 - Health and Safety Requirements.

.4 Shop Drawings:
- .1 Provide shop drawings for review by Departmental Representative which provide the following:
  - .1 Indicate curbs, extent of platform, sloped insulation, roof slopes.
  - .2 Location of all roof penetrations and details for membrane transition to penetrations.

.5 Samples: submit samples of each primary component of the roof system.

.6 Manufacturer's Certificate: certify that product(s) meet or exceed specified requirements, are compatible and will achieve the specified warranty.

.7 Test and Evaluation Reports: submit laboratory test reports certifying compliance of roofing materials membrane with specification requirements.

.8 Manufacturer's Installation Instructions.

.9 Manufacturer's field report: Manufacturer to visit site minimum of two (2) times and provide written field report within five (5) days of field visit. Report to be in accordance with Section 01 45 00 - Quality Control.

1.4 QUALITY ASSURANCE

.1 Mock-ups:
- .1 Construct mock-up in accordance with Section 01 45 00 - Quality Control.
- .2 Construct mock-up 10 m2 minimum size showing typical lap joint, one aerosol penetration, one inside corner, and one outside corner. Accepted mock-up may form part of complete work.
- .3 Allow 24 hours for inspection of mock-up by Departmental Representative before proceeding with roofing work.
- .4 Upon acceptance, mock-up shall serve as a minimum standard of quality for the balance of the work of this Section.

1.5 DELIVERY, STORAGE, AND HANDLING

.1 Deliver, store and handle materials in accordance with manufacturer's written instructions.

.2 Storage and Handling Requirements:
- .1 Safety: comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of asphalt, sealing compounds, primers and caulking materials.
- .2 Provide and maintain dry, off-ground weatherproof storage.
- .3 Store rolls of PVC flat on cross supports.
- .4 Remove only in quantities required for same day use.
- .5 Store materials in accordance with manufacturer's written instructions.
- .6 Store insulation protected from weather and sunlight and deleterious materials.

.3 Packaging Waste Management: remove for reuse and return packing materials to manufacturer in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
- .1 Collect and separate plastic, paper packaging and corrugated cardboard in accordance with Waste Management Plan.
- .2 Fold up metal banding, flatten and place in designated area for recycling.

1.6 SITE CONDITIONS

.1 Ambient Conditions:
  .1 Temperature, relative humidity, moisture content.
    .1 Apply PVC membrane only when surfaces and ambient temperatures are within manufacturers' prescribed limits.
    .2 Do not install PVC membrane when temperature remains below 5 degrees C, or when wind chill gives equivalent cooling effect.
    .3 Install PVC membrane on dry substrate, free of snow and ice. Use only dry materials and apply only during weather that will not introduce moisture into system.

1.7 WARRANTY

.1 Remedy all defects in the PVC roofing and related membrane flashings installed hereunder which appear within the warranty period from the date of Substantial Performance of the Work.

.2 Upon successful completion of the work to the manufacturer’s satisfaction as determined from manufacturer’s inspection and receipt of final payment, the manufacturer’s standard warranty shall be issued.

.3 Make all necessary repairs and replacements within 48 hours of receipt of written notification.

.4 Provide a written warranty confirming above, issued on the corporate letterhead, signed and sealed by an authorized signing officer.

.5 Obtain from the membrane manufacturer a workmanship and labour/material warranty stating that the roofing membrane and membrane flashings shall be free of manufacturing defects and premature deterioration for the warranty period. The warranty is also to note that it was installed by a qualified applicator (noted on the warranty) and all defects associated with workmanship of the installation will also be covered for the warranty period. Ten (10) year warranty period.

.6 If the Drawings and Specifications differ from the manufacturer’s printed instructions to such a degree that the specified warranties may be affected, consult the Departmental Representative for written instructions.

PART 2 - PRODUCTS

2.1 PERFORMANCE CRITERIA

.1 Compatibility between components of roofing system is essential.
  .1 Provide written declaration to Departmental Representative stating that materials and components, as assembled in system, meet this requirement.

.2 Roofing System: to CSA A123.21 for wind uplift resistance.

2.2 ROOF SHEATHING

.1 Plywood:
  .1 As specified in Section 06 10 53 - Rough Carpentry.

2.3 VAPOUR RETARDER

.1 Single-ply self-adhered bituminous membrane consisting of:
  .1 Minimum 0.8 mm SBS modified bitumen with silicone release film intended for roofing applications.

2.4 POLYISOCYANURATE INSULATION

.1 To CAN/ULC-S704, Type 3, facing manufactured using HCFC-free blowing agent and integrally laminated to heavy, non-asphaltic, fiber reinforced, felt facers, flame spread classification: 50 mm thickness.

2.5 GYPSUM SHEATHING

.1 Gypsum Board Sheathing: minimum 12.7 mm (1/2”) thick; 1200 mm x 2400 mm (4’ x 8’) sheets; standard core; conform to CSA A82.27-M1977.

2.6 MEMBRANE

.1 Flexible polyvinyl chloride PVC sheet membrane: to ASTM D4434.
  .1 Class B, Type B (reinforced), 1.5 mm thick - fully adhered.
  .2 Colour: As selected by the Departmental Representative.

2.7 SEPARATION SHEET

.1 UV resistant, black woven water pervious polyolefin fabric for installation between insulation and stone ballast in protected membrane system. Fabric to meet approval of insulation manufacturer.
  .1 Product weight 93.5gm/m2.

.2 Unsaturated non-woven polyester felt, 400 g/m2.

.3 Protection mat between PVC and gravel.

2.8 ADHESIVE AND SOLVENTS

.1 Solvent-based adhesives: as recommended by membrane manufacturer.

.2 Solvent: as recommended by membrane manufacturer.

2.9 FASTENERS

.1 Covering to wood deck: No.10 flat head, self-tapping, Type A or AB, cadmium plated screws

to ASTM C1002.

.2 Membrane to substrate: fasteners and spacing as recommended by manufacturer.

2.10 DRAINS

.1 Not applicable

2.11 ACCESSORIES

.1 Vent Stack Flashing: to be a spun aluminum sleeve to fit over the vent stack with sufficient space to insulate. A spun aluminum cap to fit outside the sleeve and inside the vent stack. The cap is no to restrict the vent stack inside diameter. Flange to be PVC coated.

.1 At aerosol sampling locations, Contractor to install additional aluminum cap and sealants as indicated and coordinate with Department Representative for installation of bulkhead hardware.

.2 Metal Securing Strips: 25 mm wide, 0.67 mm galvanized steel, double hemmed.

.3 Insulation Adhesives: as recommended by manufacturer of materials being adhered, and for use under climatic conditions to be encountered.

.4 Prefabricated Pitch Pans: to be prefabricated metal pans, minimum 24 ga., to ASTM 526-75 with Z-275 zinc coating, in size to suit application.

.5 Goosenecks: For rigid pipe to consist of 2-piece Z-275 galvanized metal with soldered corners to make watertight enclosure. For flexible pipe to consist of spun aluminum with dimensions as indicated. Flanges to be PVC coated.

.5 Eavestroughs and Downpipes
- .1 Form eavestroughs and downpipes from aluminum.
- .2 Use standard sizes and profiles to match existing drainage system.
- .3 Provide goosenecks, outlets, strainer baskets and necessary fastenings.
- .4 Splash pads: precast concrete.

PART 3 - EXECUTION

3.1 QUALITY OF WORK

.1 Do examination, preparation and roofing Work in accordance with CRCA Roofing Specification Manual, particularly for fire safety precautions unless otherwise noted.

.2 The interface of the walls and roof assemblies will be fitted with durable rigid material

providing connection point for continuity of air barrier.

.3 Assembly, component and material connections will be made in consideration of appropriate design loads.

3.2 EXAMINATION OF ROOF DECKS

.1 Verification of Conditions: inspect with Departmental Representative deck conditions including parapets, construction joints, roof drains, plumbing vents and ventilation outlets to determine readiness to proceed.

.2 Evaluation and Assessment: prior to beginning of work ensure:

.1 Decks are firm, straight, smooth, dry, free of snow, ice or frost, and swept clean of dust and debris. Do not use calcium or salt for ice or snow removal.

.2 Curbs have been built.

.3 Roof decks are sloped as indicated in the drawings.

.4 Roof drains have been installed at proper elevations relative to finished roof surface.

.5 Plywood and lumber nailer plates have been installed to deck, walls and parapets as indicated.

.3 Do not install roofing materials during rain or snowfall.

3.3 PROTECTION OF IN-PLACE CONDITIONS

.1 Cover walls and adjacent work where materials hoisted or used.

.2 Use warning signs and barriers. Maintain in good order until completion of Work.

.3 Dispose of rain water away from face of building until drains or hoppers installed and connected.

.4 Protect from traffic and damage. Comply with precautions deemed necessary by Departmental Representative.

.5 At end of each day's work or when stoppage occurs due to inclement weather, provide protection for completed work and materials out of storage.

.6 Seal and protect exposed edges.

3.4 DECK SHEATHING

.1 All existing membrane and wood deck, as indicated in drawings, flashings and wood blocking shall be removed. Remove only the amount of roof and flashing which can be made watertight with new materials during a one-day period before the

onset of inclement weather.

.2 Mechanically fasten new plywood deck sheathing to existing joists new steel deck with screws to spaced 250 mm on centre.

.3 Plywood to be installed perpendicular to existing joists with ends resting on top of joists.

.4 Bring any deterioration of existing joists to attention of Departmental Representative. Deterioration to be addressed prior to installation of new roof deck.

.5 The roof deck and existing construction must be structurally sound to provide support for the new roof system.

.6 The substrate surface must be free from dust, loose material, excess moisture, and oil-based curing agents.

.7 Sharp ridges or other projects above the surface shall be removed before roofing.

.8 Shim new roof deck over existing joists as required to achieve specified 2% slope of exterior. Confirm slope prior to application of vapour retarder.

3.5 VAPOUR RETARDER

.1 Adhere vapour retarder using solvent based adhesive as per manufacturer's instructions.

.1 For Self-adhering vapour retarder.

.1 Prime deck as recommended by manufacturer.

.2 Install membrane with minimum 75mm (3”) side laps and 150mm (6”) end laps.

.3 Apply pressure to membrane surface to ensure adequate adhesion. Avoid fishmouths, buckles, or any other application defect. Stagger end laps by a minimum of 12” (300mm).

.4 Overhang vapour retarder at all edges to extend behind fascia board and extend up verticals as indicated. Wrap over ends of insulation boards at roof perimeter and penetrations.

Ensure that vapour retarder at roof edges and vertical building surfaces maintains, together with wall vapour retarder, integrity of vapour retarder system for the building.

3.6 INSULATION

.1 For cold adhesive attached insulation layers:

INSTALLATION

.1 Install insulation to meet thickness and R-Value as required in scope of work and indicated on the Drawings.

.2 In sump area around drain reduce base insulation by 25 mm. Chamfer transition between insulation boards as detailed.

.3 Stagger all joints in the boards. Embed in adhesive. Follow manufacturer's written instructions.

.4 Ensure that insulation fillers are completely adhered in place as specified.

.5 Cap all insulation as detailed on Drawings with an insulation overlay gypsum board, set into adhesive at rate specified by manufacturer to achieve desired wind uplift.

.6 Vapour retarder not to come in contact with membrane. All to be capped with insulation and cover board.

3.7 PVC MEMBRANE

.1 Over the properly installed and prepared substrate surface, apply adhesive using solvent resistant ¾ inch (19mm) nap paint rollers. When the adhesive on the substrate is completely dry, unroll the PVC membrane. Once in place, turn back one-half on the sheet's length and coat the underside with adhesive at a rate specified by the sheet's length and coat the underside with adhesive at a rate specified by the membrane manufacture. When the membrane adhesive has dried slightly such that strings are produced when touched with dry finger, roll the coated membrane using a dry foam-covered roller onto the previously coated substrate, being careful to avoid wrinkles. Do not allow adhesive on underside of PVC membrane to dry completely.

.2 Over the properly installed and prepared substrate surface, pour adhesive out of the pail and spread using notched ¼ x ¼ x ¼ inch (6 x 6 x 6 mm) squeegees. Do not allow formation of a film on the surface of the adhesive. Carefully unroll the membrane into the wet adhesive while the edges are overlapped. Roll the membrane using a dry foam-covered roller.

.3 Apply membrane adhesive at a rate required by manufacturer.

.4 Where necessary, patch PVC membrane with a minimum 450 mm (16") by 1000 mm (3 ft.) patches.

.5 Do not use PVC membrane rolls with wrinkled or deformed ends. Discarded prior to application.

.6 Remove splices in rolls of membrane. Cut back the roll 450 mm (16”) on both sides of the splices and remove prior to installation.

.7 Install securement discs around the perimeter of the building and along all membrane seams clamping the membrane to the insulation with a fastener installed into the structural deck. Overlap all fasteners with membrane and heat weld for water tightness. Extend membrane flashings at upturns 65mm beyond membrane fastener plates prior to heat welding. Type and spacing of perimeter fastener shall be determined by membrane manufacturer requirements.

3.8 HOT-AIR WELDING OF SEAM OVERLAPS

.1 General:

.1 Hot-air weld all seams. Seam overlaps shall be 75 mm wide when automatic machine-welding and 100 mm wide when hand-welding, except where approved by the Departmental Representative.

.2 Welding equipment shall be provided by or approved by membrane manufacturer. All mechanics using the equipment shall have successfully completed a training course provided by the manufacturer prior to welding. Proof of participation in training program to be provided upon request.

.3 All membrane to be welded shall be clean and dry.

.2 Hand-Welding:

.1 Complete hand-welded seams in two stages. Allow hot-air welding equipment to warm up for at least one minute prior to welding.

.2 Weld the back edge of the seam with a narrow but continuous weld to prevent loss of hot air during the final welding.

.3 Insert the nozzle into the seam at a 45 degree angle to the edge of the membrane. Once the proper welding temperature has been reached and the membrane begins to "flow”, position the hand roller perpendicular to the nozzle and roll lightly. For straight seams, use the 1-1/2 inch (40 mm) wide nozzle. For corners and compound connections, use the 3/4 inch (20 mm) wide nozzle.

.3 Machine Welding:

.1 Machine weld seams using manufacturer’s automatic welding equipment. Follow manufacturer’s instructions for use of this

equipment and comply with local codes for electric supply, grounding and over current protection. Use a dedicated circuit house power or a dedicated portable generator. Do not operate any other equipment simultaneously off the generator.

.2 Metal tracks may be used over the deck membrane and under the machine welder to minimize or eliminate wrinkles.

.1 Quality Control of Welded Seams:

.1 Check all welded seams for continuity using a rounded screwdriver. Visible evidence that welding is proceeding correctly is smoke during the welding operation, shiny membrane surfaces, and an uninterrupted flow of dark gray material from the underside of the top membrane. Make on-site evaluation of welded seams daily at locations as directed by the Departmental Representative or roof membrane manufacturer's representative. Take 25 mm wide cross-section samples of welded seams at least three times a day. Correct welds displaying failure from shearing of the membrane prior to separation of the weld. Patch each test cut.

3.9 MEMBRANE FLASHINGS

.1 Install all flashings concurrently with the roof membrane as the work progresses.

.2 Adhere flashings to compatible, dry, smooth and solvent-resistant surfaces.

.3 Plan PVC membrane flashing application so that laps are not superimposed over the laps on the underlying membrane.

.4 Install reinforcing gussets at all inside and outside corners in accordance with the manufacturer’s recommendations.

.5 Extend membrane 100 mm (4”) onto horizontal surface and 400 mm (16”) up verticals, or as indicated on the Drawings. Set membrane by adhering.

.6 Provide additional securement for all mechanically fastened flashings that exceed 460 mm (18”) in height in accordance with membrane

manufacturer's recommendations for securement methods.

.7 Provide additional securement for all fully adhered flashings that exceed 750 mm (30") in height, in accordance with membrane manufacturer's recommendations for securement methods.

.8 Apply adhesive and mechanical fasteners at rate specified by the manufacturer for the application.

.9 Secure all membrane flashings to verticals with continuous securement strips installed along the top edge of membrane flashings and fastened at 200 mm (8") o.c. Lap all strips to the selvage a minimum of 75 mm and seal the laps securely.

.10 At roof perimeter, lap and seal field PVC membrane over PVC coated metal drip flashing which is to extend minimum 75mm into eavestrough. All joints in drip flashing to be overlapped and sealed with separate pieces of PVC. Continuously weld PVC flashing overtop of metal drip flashing. No installation of membrane flashings.

3.10 VENT FLASHINGS

.1 Install spun aluminum vent stack covers at all existing vent pipes. Extend existing vent pipes as required to a minimum height of 400 mm (16") above the completed membrane surface. Provide sufficient allowance for pipe expansion or contraction.

.2 Centre over vent stack flange and heat weld onto PVC coated flange. Overlap and heat weld PVC membrane for reinforcement, to extend a minimum of 200 mm beyond flange. Complete installation with the application of the PVC membrane.

.3 Caulk as detailed on Drawings.

.4 Secure caps with self-tapping screws.

3.11 EAVES TROUGHS AND DOWNPIPES

.1 Install eaves troughs and secure to building at 750 mm on centre with eaves trough spikes through spacer ferrules.

- .1 Slope eaves troughs to downpipes as indicated.
- .2 Provide at least one downspout every 15 m.
- .3 Install downpipes and provide goosenecks back to wall. Secure downpipes to wall with straps at 1800 mm.
- .4 Solder and seal joints watertight.

.2 Install downpipes and provide goosenecks back to wall.
 .1 Secure downpipes to wall with straps at 1800 mm on centre; minimum two straps per downpipe.
 .2 Connect downpipes to drainage system and seal joint with plastic cement.

.3 Install splash pans as indicated.

3.12 FIELD QUALITY CONTROL

.1 Inspection:
 .1 Inspection and testing of PVC membrane application will be carried out by testing laboratory designated by Departmental Representative.
 .2 Inspection and testing of membrane application will be carried out by testing laboratory designated by Departmental Representative.

3.13 CLEANING

.1 Progress Cleaning: leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment.

.3 Waste Management: separate waste materials for reuse and recycling in accordance with local bylaws.

.4 Clean to Departmental Representative's approval, soiled surfaces, spatters, and damage caused by work of this Section.

.5 Check drains to ensure cleanliness and proper function, and remove debris, equipment and excess material from site.

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 07 54 19 – Polyvinyl Chloride Roofing

1.2 REFERENCE STANDARDS

.1 American National Standards Institute (ANSI)
- .1 ANSI/SPRI/FM 4435/ES-1, Wind Design Standard for Edge Systems Used with Low Slope Roofing Systems (2011).

.2 ASTM International
- .1 ASTM A 653/A 653M-[15e1], Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- .2 ASTM B32-[08 (2014)], Standard Specification for Solder Metal.
- .3 ASTM D 523-[14], Standard Test Method for Specular Gloss.
- .4 ASTM D4587-[11] Standard Practice for Fluorescent UV-Condensation Exposures of Paint and Related Coatings.
- .5 ASTM F1667-[15] Standard Specification for Driven Fasteners: Nails, Spikes and Staples.

.3 Canadian Roofing Contractors Association (CRCA)
- .1 Roofing Specifications Manual [2012].

.4 Canadian Sheet Steel Building Institute (CSSBI)
- .1 CSSBI S8-2008 Quality and Performance Specification for Prefinished Sheet Steel Used for Building Products.
- .2 CSSBI B17-2002 Barrier Series Prefinished Steel Sheet: Product Performance & Applications.
- .3 CSSBI Sheet Steel Facts #12 [2003] Fastener Guide for Sheet Steel Building Products.

.5 FM Global
- .1 Property Loss Prevention Data Sheets 1-49 Perimeter Flashing.

.6 Green Seal Environmental Standards
- .1 Standard GS-11-[2015], Paints, Coatings, Stains, and Sealers.
- .2 Standard GS-36-[2013], Adhesives for Commercial Use.

.7 Health Canada/Workplace Hazardous Materials

Information System (WHMIS)
.1 Material Safety Data Sheets (MSDS).

.8 Sheet Metal and Air Conditioning Contractors Association of North America (SMACNA)
.1 Architectural Sheet Metal Manual (2012)
.2 Residential Sheet Metal Guidelines (2001)

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:
.1 Submit manufacturer's printed product literature including product specifications and technical data sheets for sheet metal flashing fasteners and accessory materials. Include product characteristics, performance criteria, physical size, finish and limitations.
.2 Submit WHMIS MSDS - Material Safety Data Sheets in accordance with Section 01 35 29.06 - Health and Safety Requirements.

.3 Samples:
.1 Submit 50 x 50mm samples of each type of sheet metal material, finishes and colour.

1.4 PRE-INSTALLATION MEETING

.1 Include sheet metal flashing and trim on agenda of pre-installation meetings of affected sections.

1.5 MOCK-UPS

.1 Include flashings in mock-ups as specified for work of other affected sections.

1.6 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with manufacturer requirements.

.2 Handle and store flashing materials to prevent creasing, buckling, scratching, or other damage.

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

PART 2 - PRODUCTS

2.1 BASE SHEET METAL MATERIALS

.1 Provide sheet metal in base metal thickness specified. Where no thickness specified, provide base sheet metal in thickness recommended in SMACNA Architectural Sheet Metal Manual for type of item being fabricated, but not less than the thickness required by the authority having jurisdiction.

.2 Zinc coated steel sheet: 0.46mm thickness,

commercial quality to ASTM A653/A653M, with Z275 designation zinc coating. Coat with PVC where specified for future heat welding.

2.2 PREFINISHED STEEL SHEET

.1 Prefinished steel sheet with coating system consisting of base metal pre-treatment, primer, silicone modified polyester or polyester topcoat meeting requirements of CSSBI S8.
- .1 Finished one side with wash coat and primer on back.
- .2 Colour as selected by Departmental Representative from manufacturer's standard range.
- .3 Exposed coating thickness: dry film coating system thickness not less than 22 micrometres.

.2 Resistance to accelerated weathering for chalk rating of 8, colour fade 5 units or less and erosion rate less than 20 % to ASTM D45878 as follows:
- .1 Cycle #4 General Metal Coatings.
- .2 Exposure period: 2000 hours.

2.3 ACCESSORIES

.1 Isolation coating: alkali resistant bituminous paint.

.2 Sealants: In accordance with Section 07 92 00, in colour to match flashing finish colour.

.3 Cleats and hook strips: of same material, and temper as sheet metal, continuous and 50 mm wide. Thickness to be 1 gauge thicker than metal being secured.

.4 Nails: of same material as sheet metal, flat head roofing nails of length and thickness suitable for metal flashing application.

.5 Screws: of same material as sheet metal, Suitable for substrate and material being fastened. If concealed to be galvanized if exposed to have nylon head with neoprene washer colour matched to metal.

.6 Touch-up paint: as recommended by prefinished material manufacturer.

2.4 FABRICATION

.1 Fabricate sheet steel flashings and other sheet steel work in accordance with applicable CRCA 'FL' series details and SMACNA architectural details.

.2 Form pieces in 2400 mm maximum lengths.

.1 Make allowance for expansion at joints.

.4 Hem exposed edges on underside 12 mm.
.1 Mitre and seal corners with sealant.

.5 Form sections square, true and accurate to size, free from distortion and other defects detrimental to appearance or performance.

.6 Apply isolation coating to metal surfaces to be embedded in concrete or mortar.

2.5 METAL FLASHINGS

.1 Form flashings, copings and fascias to profiles indicated of minimum 0.46mm thick pre-finished galvanized steel.

2.6 EAVES TROUGHS AND DOWNPIPES

.1 Form eaves troughs and downpipes from aluminum pre-finished in colour as selected by Departmental Representative from manufacturer standard range.

.2 Sizes and profiles as indicated.

.3 Provide goosenecks, outlets, strainer baskets and necessary fastenings.

.4 Form 600 x 600 mm splash pans from vinyl on 450mm x 450mm x 50mm concrete paver.

PART 3 - EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 INSTALLATION

.1 Install sheet metal work as detailed and in accordance with CRCA FL series details.
.2 Use concealed fastenings except where approved before installation.
.3 Provide underlay under sheet metal as indicated. Underlay to be roof vapour barrier. Refer to Section 07 54 19.
.1 Secure in place and lap joints 100 mm.
.2 Provide self-adhesive membrane to tie into adjacent assemblies.
.4 Seal all joints, seams and terminations of underlayment with compatible sealant.
.5 Install sheet metal flashings in maximum possible length. Flat lock seams on horizontal surfaces.
.6 Heat weld PVC roof membrane over metal flashing minimum of 50mm. Seal remaining exposed metal seam with compatible sealant.
.7 Where flashing installed with mechanical fasteners, install fasteners in slots or oversize

holes to allow expansion and contraction of flashings.

.8 Provide isolation coating or impervious self-adhesive membrane to separate aluminum items from concrete and masonry.

3.3 EAVES TROUGHS AND DOWNPIPES

.1 Install eaves troughs and secure to building at 750 mm on centre with eaves trough spikes through spacer ferrules.

.1 Slope eaves troughs to downpipes which are to remain in existing locations.

.2 Solder joints watertight.

.3 Metal counter flashing to lap into new eaves trough as indicated.

.2 Install downpipes and provide goosenecks back to wall.

.1 Secure downpipes to wall with straps at 1800 mm on centre; minimum two straps per downpipe.

.3 Install splash pans below each downspout on concrete pavers.

3.4 CLEANING

.1 Proceed in accordance with Section 01 74 11 - Cleaning.

.2 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

.3 Leave work areas clean, free from grease, finger marks and stains.

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 07 62 00 – Metal Flashing and Trim

1.2 REFERENCE STANDARDS

.1 ASTM International
- .1 ASTM C919-[08], Standard Practice for Use of Sealants in Acoustical Applications.
- .2 ASTM C920 - Elastomeric Joint Sealants.

.2 Canadian General Standards Board (CGSB)
- .1 CGSB 19-GP-5M-[1984], Sealing Compound, One Component, Acrylic Base, Solvent Curing (Issue of 1976 reaffirmed, incorporating Amendment No. 1).
- .2 CAN/CGSB-19.13-[M87], Sealing Compound, One-component, Elastomeric, Chemical Curing.
- .3 CGSB 19-GP-14M-[1984], Sealing Compound, One Component, Butyl-Polyisobutylene Polymer Base, Solvent Curing (Reaffirmation of April 1976).
- .4 CAN/CGSB-19.17-[M90], One-Component Acrylic Emulsion Base Sealing Compound.
- .5 CAN/CGSB-19.24-[M90], Multi-component, Chemical Curing Sealing Compound.

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

.4 South Coast Air Quality Management District (SCAQMD), California State, Regulation XI. Source Specific Standards
- .1 SCAQMD Rule 1168-[A2005], Adhesives and Sealants Applications.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:
- .1 Submit manufacturer's instructions, printed product literature and data sheets for joint sealants and include product characteristics, performance criteria, physical size, finish and limitations.
- .2 Manufacturer's product to describe:

.1 Caulking compound.
.2 Primers.
.3 Sealing compound, each type, including compatibility when different sealants are in contact with each other.

.3 Submit 1 copy of WHMIS MSDS in accordance with Section 01 35 29 - Health and Safety Requirements

.3 Samples:
.1 Submit 2 samples of each type of material and colour.
.2 Cured samples of exposed sealants for each colour where required to match adjacent material.

.4 Manufacturer's Instructions:
.1 Submit instructions to include installation instructions for each product used.

1.4 CLOSEOUT SUBMITTALS

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

.2 Operation and Maintenance Data: submit operation and maintenance data for incorporation into manual.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:
.1 Store materials in dry location off ground and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
.2 Replace defective or damaged materials with new.

.4 Packaging Waste Management: remove for reuse by manufacturer and return along with pallets and crates as specified in Construction Waste Management Plan in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

1.6 SITE CONDITIONS

.1 Ambient Conditions:

.1 Proceed with installation of joint sealants only when:

.1 Ambient and substrate temperature conditions are within limits permitted by joint sealant manufacturer or are above 4.4 degrees C.
.2 Joint substrates are dry.
.3 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 Proceed with installation of joint sealants only where joint widths are within the range allowed by joint sealant manufacturer for applications indicated.

.3 Joint-Substrate Conditions:
.1 Proceed with installation of joint sealants only after contaminants capable of interfering with adhesion are removed from joint substrates.

1.7 ENVIRONMENTAL REQUIREMENTS

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

PART 2 - PRODUCTS

2.1 SEALANT MATERIALS

.1 Do not use caulking that emits strong odours, contains toxic chemicals or is not certified as mould resistant.

.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.

2.2 SEALANT MATERIAL DESIGNATIONS

.1 Type 1 - Silicones one part: to CAN/CGSB-19.13 and ASTM C920. Medium modulus. Class 50/50.

.2 Preformed compressible and non-compressible back-up materials:
.1 Extruded polyolefin closed cell foam backer rod. Oversize 30-50%.

.3 Bond breaker tape:
.1 Polyethylene bond breaker tape which will not bond to sealant.

2.3 SEALANT SELECTION

.1 Use Type 1 sealant at the following locations:
.1 All window and door perimeters
.2 At joints in metal flashing where specified.

2.4 JOINT CLEANER

.1 Non-corrosive and non-staining type, compatible with joint forming materials and sealant in accordance with sealant manufacturer's written recommendations.

.2 Primer: in accordance with sealant manufacturer's written recommendations.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for joint sealants installation in accordance with manufacturer's written instructions.
.1 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
.2 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

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 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.

3.6 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 00 - Cleaning.
- .1 Leave Work area clean at end of each day.
- .2 Clean adjacent surfaces immediately.
- .3 Remove excess and droppings, using recommended cleaners as work progresses.
- .4 Remove masking tape after initial set of sealant.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00 - Cleaning.

.3 Waste Management: separate waste materials for recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
- .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.7 PROTECTION

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

.2 Repair damage to adjacent materials caused by joint sealants installation.

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 09 91 23 – Interior Painting.

1.2 REFERENCE STANDARDS

.1 American Society for Testing and Materials (ASTM)
- .1 ASTM C475-02 (2015), Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board.
- .2 ASTM C514-04 (2014), Standard Specification for Nails for the Application of Gypsum Board.
- .3 ASTM C557-03 (2009), Standard Specification for Adhesives for Fastening Gypsum Wallboard to Wood Framing.
- .4 ASTM C840-16, Standard Specification for Application and Finishing of Gypsum Board.
- .5 ASTM C1047-14a, Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base.
- .6 ASTM C1396/C1396M-14a, Standard Specification for Gypsum board.

.2 Association of the Wall and Ceilings Industries International (AWCI)
- .1 AWCI Levels of Gypsum Board Finish-GA-214-2015.

.3 Canadian General Standards Board (CGSB)
- .1 CAN/CGSB-51.34-M86 (R1988), Vapour Barrier, Polyethylene Sheet for Use in Building Construction.

.4 Green Seal Environmental Standards (GS)
- .1 GS-11-2008, 2nd Edition, Paints and Coatings.

.5 South Coast Air Quality Management District (SCAQMD), California State, Regulation XI. Source Specific Standards
- .1 SCAQMD Rule 1113-A2007, Architectural Coatings.
- .2 SCAQMD Rule 1168-A2005, Adhesives and Sealants Applications.

.6 Underwriters' Laboratories of Canada (ULC)
- .1 CAN/ULC-S102-10, Standard Method of Test of Surface Burning Characteristics of Building Materials and Assemblies.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:
.1 Submit manufacturer's instructions, printed product literature and data sheets for gypsum board assemblies and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Certifications:
.1 Submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.

.4 Sustainable Design Submittals:
.1 Low-Emitting Materials:
.1 Submit listing of adhesives and sealants used in building, showing compliance with VOC and chemical component limits or restriction requirements.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address and applicable standard designation.

.3 Exercise care in unloading gypsum board materials shipment to prevent damage.

.4 Storage and Handling Requirements in accordance with ASTM C 840-16:
.1 Store gypsum board assemblies materials level flat off ground and indoors in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
.2 Store and protect gypsum board assemblies from nicks, scratches, and blemishes.
.3 Protect gypsum board from direct exposure to rain, snow, sunlight, or other excessive weather conditions.
.4 Protect ready mix joint compounds from freezing, exposure to extreme heat and direct sunlight.
.5 Protect from weather, elements and damage from construction operations.
.6 Handle gypsum boards to prevent damage to edges, ends or surfaces.

.7 Replace defective or damaged materials with new.

.5 Develop Construction Waste Management Plan related to Work of this Section and in accordance with Section 01 74 21 – Waste Management and Disposal.

1.5 AMBIENT CONDITIONS

.1 Include flashings in mock-ups as specified for work of other affected sections.

1.6 DELIVERY, STORAGE AND HANDLING

.1 Maintain temperature 10 °C minimum, 21 °C maximum for 48 hours prior to and during application of gypsum boards and joint treatment, and for 48 hours minimum after completion of joint treatment.

.2 Apply board and joint treatment to dry, clean, frost free surfaces.

.3 Ventilation: ventilate building spaces as required to remove excess moisture that would prevent drying of joint treatment material immediately after its application.

PART 2 – PRODUCTS

2.1 MATERIALS

.1 Standard board: to ASTM C1396/C1396M–14 regular, 12mm thickness, 1200 mm wide x maximum practical length, ends square cut, edges squared.

.2 Nails: to ASTM C514-14.

.3 Steel drill screws: to ASTM C1002-14.

.4 Laminating compound: as recommended by manufacturer, asbestos-free.

.5 Casing beads, corner beads, control joints and edge trim: to ASTM C1047, zinc-coated by electrolytic process, 0.5 mm base thickness, perforated flanges, one piece length per location.

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

.1 VOC limit 250 g/L maximum to SCAQMD Rule 1168.

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

.8 Insulation: Fibreglass batt insulation. Thickness and type to match existing.

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

.10 Paint and primer: Refer to Section 09 91 23 –

Interior Painting.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for gypsum board assemblies installation in accordance with manufacturer's written instructions.
- .1 Visually inspect substrate in presence of Departmental Representative.
- .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
- .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 ERECTION

.1 Do application and finishing of gypsum board to ASTM C840-16 except where specified otherwise.

.2 Do application of gypsum sheathing to ASTM C1280-13a.

.3 Existing gypsum board to be removed with existing polyethylene, insulation and studs to remain except where disturbed for installation of structural supports or relocation of electrical outlets.

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

.5 Existing wall framing to remain. Where missing or insufficient, install wall framing for gypsum board wall finishes to ASTM C840-16, except where specified otherwise.

3.3 APPLICATION

.1 Apply gypsum board after bucks, anchors, blocking, insulation, polyethylene, electrical and mechanical work have been approved.

.2 Apply single layer gypsum board to wood furring or framing using screw fasteners. Maximum spacing of screws 300 mm on centre.
- .1 Single-Layer Application:
  - .1 Apply gypsum board on walls to ASTM C840-16 prior to ceiling installation.
  - .2 Apply gypsum board on walls vertically or horizontally, providing sheet lengths that will minimize number of board edges or end joints.

.3 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, window framing where perimeter sealed with acoustic sealant.

.4 Install gypsum board on walls vertically to avoid end-butt joints.

.5 Install gypsum board with face side out.

.6 Do not install damaged or damp boards.

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

3.4 INSTALLATION

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

.2 Install casing beads around perimeter of suspended ceilings.

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

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

.6 Ensure that screws or nails are properly applied in process of attaching gypsum board to framing without damaging of gypsum board edges and ends.

.7 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.

.8 Gypsum Board Finish: finish gypsum board walls and ceilings to following levels in accordance with AWCI Levels of Gypsum Board Finish:

.1 Levels of finish:

.1 Level 3: embed tape for joints and interior angles in joint compound and apply two separate coats of joint

compound over joints, angles, fastener heads and accessories; surfaces smooth and free of tool marks and ridges.

.9 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.

.10 Fill screw head depressions with joint and taping compounds to bring flush with adjacent surface of gypsum board, invisible after surface finish is completed.

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

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

.13 Apply one coat of white primer sealer over surface to be textured. When dry apply textured finish in accordance with manufacturer's instructions.

.14 Mix joint compound slightly thinner than for joint taping.

.15 Apply thin coat to entire surface using trowel or drywall broad knife to fill surface texture differences, variations or tool marks.

.16 Allow skim coat to dry completely.

.17 Remove ridges by light sanding or wiping with damp cloth.

3.5 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 00 - Cleaning.
- .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00 - Cleaning.

.2 Waste Management: separate waste materials for recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
- .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.6 PROTECTION

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

.2 Repair damage to adjacent materials caused by gypsum board assemblies installation.

PART 1 - GENERAL

1.1 REFERENCE STANDARDS

.1 ASTM International

.1 ASTM C423-09, Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.

.2 ASTM E580/E580M-14 Standard Practice for Installation of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Subject to Earthquake Ground Motions.

.3 ASTM C635/C635M-13a, Standard Specifications for the Manufacture, Performance and Testing of Metal Suspension Systems for Acoustical Tile and Lay-In Panel Ceilings.

.4 ASTM C636/C636M-08, Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels.

.5 ASTM E1264-14, Standard Classification for Acoustical Ceiling Products.

.6 ASTM E1414/E1414M 11ae1 Standard Test Method for Sound Attenuation between Rooms Sharing a Common Ceiling Plenum.

.7 ASTM E1477-98a (2013), Standard Test Method for Luminous Reflectance Factor of Acoustical Materials by Use of Integrating-Sphere Reflectometers.

.8 ASTM F1667-15 Standard Specification for Driven Fasteners: Nails, Spikes and Staples.

.2 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-51.34-M86, Vapour Barrier, Polyethylene Sheet, for Use in Building Construction and Amendment No. 1 1988.

.3 Health Canada/Workplace Hazardous Materials Information System (WHMIS)

.1 Material Safety Data Sheets (MSDS).

.4 Underwriter's Laboratories of Canada (ULC)
.1 CAN/ULC-S102-2003, Surface Burning Characteristics of Building Materials and Assemblies.

1.2 COORDINATION

.1 Do not begin installation of ceiling tiles until all roof replacement, electrical and structural work is complete.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for acoustic tiles, and system accessories to match existing. Include product characteristics, performance criteria, physical size, finish and limitations.

.3 Samples:

.1 Submit for review and acceptance of each component specified or necessary for complete installation. Include technical descriptive data.
.2 Submit duplicate samples of each ceiling tile proposed for use in existing ceiling suspension system.
.3 Submit duplicate 150 mm x 100 mm samples of acoustical unit.

1.4 CLOSEOUT SUBMITTALS

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

.2 Submit operation and maintenance data for acoustical suspension for incorporation into manual.

.3 Submit ten (10) ceiling tiles in original packaging for future use by the Departmental Representative.

1.5 CERTIFICATIONS

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

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

requirements. Include certification of sustainable requirements.

1.6 MOCK-UPS

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

.2 Install one (1) ceiling tile for aesthetic comparison by Departmental Representative and Departmental Representative to existing ceiling panels in adjacent room.

.3 Construct mock-up where directed.

.4 Allow 24 hours for inspection of mock-up by Departmental Representative before proceeding with ceiling work.

.5 When accepted, mock-up will demonstrate minimum standard for this work. Mock-up may remain as part of the finished work.

1.7 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:

.1 Store materials in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
.2 Store and protect acoustical ceiling tiles suspension grid components from nicks, scratches, and blemishes.
.3 Replace defective or damaged materials with new.
.4 Store extra materials required for maintenance, where directed by Departmental Representative.

.4 Waste Management and Disposal:

.1 Separate waste materials for recycling, reuse or disposal in accordance with Section 01 74 21 - Waste Management and Disposal.

PART 2 - PRODUCTS

2.1 DESIGN CRITERIA

.1 Design Requirements:

.1 Light duty system to ASTM C 635/ASTM C635M.
.2 Maximum deflection: 1/360th of span to ASTM C 635/ASTM C635M deflection test.
.3 Above requirements are for localized replacement of damaged members. Existing suspension system to remain will new ceiling tiles added.
.4 Ceiling Tiles: To match existing in adjacent room to approval of Departmental Representative.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Verify conditions of substrates previously installed under other Sections or Contracts are acceptable for acoustical ceiling tile and track installation in accordance with manufacturer's written instructions.

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

3.2 INTERFACE WITH OTHER WORK

.1 Co-ordinate ceiling work to accommodate existing services and new penetrations, such as light fixtures, cable trays, electrical wiring, pipe penetrations etc. to be built into acoustical ceiling components.

3.3 CEILING TILE REPLACEMENT

.1 Comply with manufacturer's written installation instructions and recommendations, including product technical bulletins, product carton installation instructions, and data sheets.

.2 All ceiling tiles to be removed and disposed within Area of Work. Existing suspended ceiling framing to remain with localized repairs as required. Once roof is replaced, all new ceiling tiles to be installed within framing with new penetrations accommodated. Ceiling tiles to match existing.

.3 Install suspension system where removed to match existing.

.4 Finished ceiling system to be square with adjoining walls and level within 1:1000.

.5 Support at light fixtures and diffusers with

additional ceiling suspension hangers within 150 mm of each corner and at maximum 600 mm around perimeter of fixture.

.6 Attach cross member to main runner to provide rigid assembly.

.7 Frame at openings for all existing services and new penetrations.

3.4 SITE QUALITY CONTROL

.1 Arrange for periodic site visits by design professional responsible for delegated ceiling design work to review installed work for conformity to design.

.2 Arrange for periodic site visits by manufacturer's representative to review installed work for conformity to manufacturer's installation instructions and recommendations.

.3 Submit written site reports by designer to Departmental Representative within 3 days of visit.

3.5 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.

.1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00 - Cleaning.

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

3.6 PROTECTION

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

.2 Repair damage to adjacent materials caused by acoustical suspension installation.

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 09 21 16 – Gypsum Board Assemblies.

1.2 REFERENCE STANDARDS

.1 Environmental Protection Agency (EPA)
- .1 Test Method for Measuring Total Volatile Organic Compound Content of Consumer Products, EPA Method 24 - Surface Coatings.
- .2 SW-846, Test Methods for Evaluating Solid Waste: Physical/Chemical Methods.

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

.3 Master Painters Institute (MPI)
- .1 The Master Painters Institute (MPI)/Architectural Painting Specification Manual (ASM) - current edition.

.4 National Research Council Canada (NRC)
- .1 National Fire Code of Canada [2015] (NFC).

.5 Society for Protective Coatings (SSPC)
- .1 SSPC Painting Manual, Volume Two, 8th Edition, Systems and Specifications Manual.

1.3 ADMINISTRATIVE REQUIREMENTS

.1 Scheduling:
- .1 Submit work schedule for various stages of painting to Departmental Representative for review. Provide schedule minimum of 48 hours in advance of proposed operations.
- .2 Obtain written authorization from Departmental Representative for changes in work schedule.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:
- .1 Provide manufacturer's instructions, printed product literature and data sheets for paint and paint products and include product characteristics, performance criteria, physical size, finish and limitations.
- .2 Submit 1 copy of WHMIS MSDS in accordance with Section 01 35 29 - Health and Safety Requirements

.3 Confirm products to be used are in MPI's approved product list.

.3 Upon completion, provide records of products used. List products in relation to finish system and include the following:
.1 Product name, type and use.
.2 Manufacturer's product number.
.3 Colour numbers.
.4 Manufacturer's Material Safety Data Sheets (MSDS).
.5 MPI #.

.4 Samples:
.1 Submit full range colour sample chips to indicate where colour availability is restricted.

.5 Retain reviewed samples on-site to demonstrate acceptable standard of quality for appropriate on-site surface.

.6 Test reports: Provide certified test reports for paint from approved independent testing laboratories, indicating compliance with specifications for specified performance characteristics and physical properties.
.1 Lead, cadmium and chromium: presence of and amounts.
.2 Mercury: presence of and amounts.
.3 Organochlorines and PCBs: presence of and amounts.

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

.8 Low-Emitting Materials:
.1 Provide listing of paints and coatings used in building, showing compliance with VOC and chemical component limits or restriction requirements.

1.5 CLOSEOUT SUBMITTALS

.1 Provide in accordance with Section 01 78 00 - Closeout Submittals.

1.6 MAINTENANCE MATERIAL SUBMITTALS

.1 Extra Stock Materials:
.1 Provide maintenance materials in accordance with Section 01 78 00 - Closeout Submittals.
.2 Submit 1 four litre can of each type and colour of finish coating. Identify colour and paint type in relation to established

colour schedule and finish system.

1.7 QUALITY ASSURANCE

.1 Qualifications:
- .1 Qualified journeypersons as defined by local jurisdiction to be engaged in painting work.
- .2 Apprentices: may be employed provided they work under direct supervision of qualified journeyperson in accordance with trade regulations.
- .3 Conform to latest MPI requirements for exterior painting work including preparation and priming.
- .4 Materials: in accordance with MPI Painting Specification Manual "Approved Product" listing and from a single manufacturer for each system used.
- .5 Retain purchase orders, invoices and documents to prove conformance with noted MPI requirements when requested by Departmental Representative
- .6 Standard of Acceptance:
  - .1 Walls: no defects visible from a distance of 1000 mm at 90 degrees to surface.
  - .2 Final coat to exhibit uniformity of colour and uniformity of sheen across full surface area.

.2 Mock-Ups:
- .1 When requested by Departmental Representative prepare and paint designated surface, area, room or item to requirements specified herein, with specified paint or coating showing selected colours, number of coats, gloss/sheen, textures and quality of work to MPI Painting Specification Manual standards for review and approval.
- .2 Construct mock-ups in accordance with Section 01 45 00 - Quality Control.
  - .1 Provide 2400 mm x 1200 mm mock-up. Prepare and paint designated surface, area, room or item (in each colour scheme)to specified requirements, with specified paint or coating showing selected colours, gloss/sheen, textures.
  - .2 Mock-up will be used:
    - .1 To judge quality of work, substrate preparation, operation of equipment and material application and skill to MPI Architectural Painting Specification Manual standards.
- .3 Locate where directed.

.4 Allow 24 hours for inspection of mock-up before proceeding with Work.

.5 When accepted, mock-up will demonstrate minimum standard of quality required for this work. Approved mock-up may remain as part of finished work.

1.8 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.1 Labels: to indicate:

.1 Type of paint or coating.

.2 Compliance with applicable standard.

.3 Colour number in accordance with established colour schedule.

.3 Storage and Handling Requirements:

.1 Store materials indoors and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Observe manufacturer's recommendations for storage and handling.

.3 Store materials and supplies away from heat generating devices.

.4 Store materials and equipment in well ventilated area with temperature range 7 degrees C to 30 degrees C.

.5 Keep areas used for storage, cleaning and preparation, clean and orderly to approval of DCC Representative. After completion of operations, return areas to clean condition to approval of Departmental Representative

.6 Remove paint materials from storage only in quantities required for same day use.

.7 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling storage, and disposal of hazardous materials.

.8 Fire Safety Requirements:

.1 Provide one dry chemical fire extinguisher adjacent to storage area.

.2 Store oily rags, waste products, empty containers and materials subject to spontaneous combustion in ULC approved, sealed containers and remove from site on a daily basis.

.3 Handle, store, use and dispose of flammable and combustible materials in accordance with the National Fire Code of Canada (NFC).

1.9 SITE CONDITIONS

.1 Heating, Ventilation and Lighting:
- .1 Ventilate enclosed spaces in accordance with manufacturer fresh air requirements.
- .2 Provide heating facilities to maintain ambient air and substrate temperatures above 10 degrees C for 24 hours before, during and after paint application until paint has cured sufficiently.
- .3 Provide continuous ventilation for 7 days after completion of application of paint.
- .4 Co-ordinate use of existing ventilation system with Departmental Representative and ensure its operation during and after application of paint as required.
- .5 Provide temporary ventilating and heating equipment where permanent facilities are not available or supplemental ventilating and heating equipment if ventilation and heating from existing system is inadequate to meet minimum requirements.
- .6 Provide minimum lighting level of 323 Lux on surfaces to be painted.
- .7 Temperature, Humidity and Substrate Moisture Content Levels:
  - .1 Unless pre-approved written approval by product manufacturer, perform no painting when:
    - .1 Ambient air and substrate temperatures are below 10 degrees C.
    - .2 Substrate temperature is above 32 degrees C unless paint is specifically formulated for application at high temperatures.
    - .3 Substrate and ambient air temperatures are not expected to fall within MPI or paint manufacturer's prescribed limits.
    - .4 Rain or snow are forecast to occur before paint has thoroughly cured or when it is foggy, misty, raining or snowing at site.
    - .5 Ensure that conditions are within specified limits during drying or curing process, until newly applied coating can itself withstand 'normal' adverse environmental factors.

.2 Perform painting work when maximum moisture content of the substrate is below:

.1 12 % for plaster and gypsum board.

.3 Test for moisture using calibrated electronic Moisture Meter.

.4 Test concrete, masonry and plaster surfaces for alkalinity as required.

.5 Surface and Environmental Conditions:

.1 Apply paint finish in areas where dust is no longer being generated by related construction operations or when wind or ventilation conditions are such that airborne particles will not affect quality of finished surface.

.2 Apply paint to adequately prepared surfaces and to surfaces within moisture limits.

.3 Apply paint when previous coat of paint is dry or adequately cured.

.6 Additional interior application requirements:

.1 Apply paint finishes when temperature at location of installation can be satisfactorily maintained within manufacturer's recommendations.

PART 2 – PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

.1 Environmental Performance Requirements:

.2 Green Performance in accordance with MPI Standard GPS-2.

2.2 MATERIALS

.1 Only Paint materials listed in the MPI Approved Products List (APL) are acceptable for use on this project.

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

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

.4 Use MPI listed materials having minimum E3 rating where indoor air quality (odour) requirements exist.

.5 Paints, coatings, adhesives, solvents, cleaners, lubricants, and other fluids to be:

.1 Water soluble

.2 Be manufactured without compounds which contribute to ozone depletion in the upper atmosphere.

.3 Be manufactured without compounds which contribute to smog in the lower atmosphere.

.4 Do not contain methylene chloride, chlorinated hydrocarbons, toxic metal

pigments.

.8 Ensure manufacture and process of both water-borne surface coatings and recycled water-borne surface coatings does not release:
.1 Matter in undiluted production plant effluent generating 'Biochemical Oxygen Demand' (BOD) in excess of 15 mg/L to natural watercourse or sewage treatment facility lacking secondary treatment.
.2 Total Suspended Solids (TSS) in undiluted production plant effluent in excess of 15 mg/L to natural watercourse or a sewage treatment facility lacking secondary treatment.

2.3 COLOURS

.1 Submit proposed Colour Schedule to Departmental Representative for review.
.2 Colour schedule will be based upon selection of 3 base colours. 1 colour will be selected by Departmental Representative for entire wall.
.3 Selection of colours will be from manufacturers full range of colours.
.4 Second coat in three coat system to be tinted slightly lighter colour than top coat to show visible difference between coats, if requested by Departmental Representative.

2.4 MIXING AND TINTING

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

2.5 GLOSS/SHEEN RATINGS

.1 Paint gloss is defined as sheen rating of applied paint, in accordance with following values:
.2 Gloss level ratings of painted surfaces as noted on Finish Schedule.

2.6 INTERIOR PAINTING SYSTEMS

.1 Plaster and gypsum board: gypsum wallboard, drywall, "sheet rock type material", and textured finishes:
.1 INT 9.2A - Latex Gloss Level 5 finish (over

latex primer/sealer).

2.7 SOURCE QUALITY CONTROL

.1 Perform following tests on each batch of consolidated post-consumer material before surface coating is reformulated and canned. Testing by laboratory or facility which has been accredited by Standards Council of Canada.

.1 Lead, cadmium and chromium are to be determined using ICP-AES (Inductively Coupled Plasma - Atomic Emission Spectroscopy) technique no. 6010 as defined in EPA SW-846.

.2 Mercury is to be determined by Cold Vapour Atomic Absorption Spectroscopy using Technique no. 7471 as defined in EPA SW-846.

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

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

PART 3 - EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 GENERAL

.1 Perform preparation and operations for interior painting in accordance with MPI Architectural Painting Specifications Manual except where specified otherwise.

.2 Apply paint materials in accordance with paint manufacturer's written application instructions.

3.3 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable to be painted in accordance with manufacturer's written instructions.
- .1 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
- .2 Proceed with installation only after unacceptable conditions have been remedied [and after receipt of written approval to proceed from Departmental Representative.

.3 Conduct moisture testing of surfaces to be painted using properly calibrated electronic moisture meter. Do not proceed with work until conditions fall within acceptable range as recommended by manufacturer.

.4 Maximum moisture content as follows:
- .1 Stucco, plaster and gypsum board: 12 %.
- .2 Concrete: 12 %.
- .3 Clay and Concrete Block/Brick: 12 %.
- .4 Hard Wood: 15 %.
- .5 Soft Wood: 17 %.

3.4 PREPARATION

.1 Protection:
- .1 Protect existing building surfaces and adjacent structures from paint spatters, markings and other damage by suitable non-staining covers or masking. If damaged, clean and restore surfaces as directed by Departmental Representative.
- .2 Protect items that are permanently attached such as Fire Labels on doors and frames.
- .3 Protect factory finished products and equipment.

.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 Clean and prepare surfaces in accordance with MPI Architectural Painting Specification Manual requirements. Refer to MPI Manual in regard to specific requirements and as follows:

.1 Remove dust, dirt, and other surface debris by vacuuming, wiping with dry, clean cloths or compressed air.
.2 Wash surfaces with a biodegradable detergent and clean warm water using a stiff bristle brush to remove dirt, oil and other surface contaminants.
.3 Rinse scrubbed surfaces with clean water until foreign matter is flushed from surface.
.4 Allow surfaces to drain completely and allow to dry thoroughly.
.5 Prepare surfaces for water-based painting, water-based cleaners should be used in place of organic solvents.
.6 Use trigger operated spray nozzles for water hoses.
.7 Many water-based paints cannot be removed with water once dried. Minimize use of mineral spirits or organic solvents to clean up water-based paints.

.4 Prevent contamination of cleaned surfaces by salts, acids, alkalis, other corrosive chemicals, grease, oil and solvents before prime coat is applied and between applications of remaining coats. Apply primer, paint, or pretreatment as soon as possible after cleaning and before deterioration occurs.

.5 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.

.6 Carried out during shop priming: clean metal surfaces to be painted by removing rust, loose mill scale, welding slag, dirt, oil, grease and other foreign substances in accordance with MPI requirements. Remove traces of blast products from surfaces, pockets and corners to be painted by brushing with clean brushes or blowing with clean dry compressed air.

.7 Touch up of shop primers with primer as specified.

.8 Do not apply paint until prepared surfaces have been accepted by Departmental Representative.

3.5 APPLICATION

.1 Method of application to be as approved by Departmental Representative. To be roller unless otherwise agreed upon. Conform to manufacturer's application instructions unless specified otherwise.

.2 Brush and Roller Application:
- .1 Apply paint in uniform layer using brush and/or roller type suitable for application.
- .2 Work paint into cracks, crevices and corners.
- .3 Paint surfaces and corners not accessible to brush using spray, daubers and/or sheepskins. Paint surfaces and corners not accessible to roller using brush, daubers or sheepskins.
- .4 Brush and/or roll out runs and sags, and over-lap marks. Rolled surfaces free of roller tracking and heavy stipple.
- .5 Remove runs, sags and brush marks from finished work and repaint.

.3 Use dipping, sheepskins or daubers only when no other method is practical in places of difficult access.

.4 Apply coats of paint continuous film of uniform thickness. Repaint thin spots or bare areas before next coat of paint is applied.

.5 Allow surfaces to dry and properly cure after cleaning and between subsequent coats for minimum time period as recommended by manufacturer.

.6 Sand and dust between coats to remove visible defects.

.7 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.

3.6 FIELD QUALITY CONTROL

.1 Interior surfaces requiring painting to be generally reviewed by Departmental Representative.

.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 will provide as part of this work, certification of surfaces and conditions for specific paint or coating system application as well as on site supervision, inspection and approval of their paint or coating system application as required at no additional cost to Departmental Representative.

.3 Standard of Acceptance:
- .1 Walls: no defects visible from a distance of 1000 mm] at 90 degrees to surface.
- .2 Final coat to exhibit uniformity of colour and uniformity of sheen across full surface area.
- .3 Advise Departmental Representative when surfaces and applied coating is ready for inspection. Do not proceed with subsequent coats until previous coat has been approved.
- .4 Cooperate with inspection firm and provide access to areas of work.

3.7 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 00 - Cleaning.
- .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00 - Cleaning.
- .3 Waste Management: separate waste materials for in accordance with Section [01 74 21 - Construction/Demolition Waste Management and Disposal

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 Departmental Representative. Avoid scuffing newly applied paint.

.5 Restore areas used for storage, cleaning, mixing and handling of paint to clean condition as approved by Departmental Representative.

PART 1 - GENERAL

1.1 REFERENCES

.1 Canadian Standards Association (CSA International)
.1 CSA C22.1-12, Canadian Electrical Code, Part 1 (22nd Edition), Safety Standard for Electrical Installations.

.2 National Electrical Manufacturers Association (NEMA)

.3 Electrical and Electronic Manufacturer's Association of Canada (EEMAC)

.4 Institute of Electrical and Electronics (IEEE)/National Electrical Safety Code Product Line (NESC)
.1 IEEE SP1122-2000, The Authoritative Dictionary of IEEE Standards Terms, 7th Edition.

1.2 DEFINITIONS

.1 Electrical and electronic terms: unless otherwise specified or indicated, terms used in these specifications, and on drawings, are those defined by IEEE SP1122.

1.3 DESIGN REQUIREMENTS

.1 Operating voltages: to CAN3-C235.

.2 Motors, electric heating, control and distribution devices and equipment to operate satisfactorily at 60 Hz within normal operating limits established by above standard.
.1 Equipment to operate in extreme operating conditions established in above standard without damage to equipment.

.3 Language operating requirements: provide identification nameplates and labels for control items in English.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

.1 Shop drawings:
.1 Submit drawings stamped and signed by professional engineer registered or licensed in Province of Ontario, Canada.
.2 Submit wiring diagrams and installation details of equipment indicating proposed location, layout and arrangement, control panels, accessories, piping, ductwork, and other items that must be shown to ensure co-ordinated installation.
.3 Identify on wiring diagrams circuit terminals and indicate internal wiring for each item of equipment and interconnection between each item of equipment.
.4 Indicate of drawings clearances for operation, maintenance, and replacement of operating equipment devices.

.5 Submit 3 number of copies of 600 x 600 mm minimum size drawings and product data to authority having jurisdiction or inspection authorities.
.6 If changes are required, notify Departmental Representative of these changes before they are made.

.2 Quality Control:
.1 Provide CSA certified equipment and material.
.2 Where CSA certified equipment and material is not available, submit such equipment and material to authority having jurisdiction or inspection authorities for special approval before delivery to site.
.3 Submit test results of installed electrical systems and instrumentation.
.4 Permits and fees: in accordance with General Conditions of contract.
.5 Submit, upon completion of Work, load balance report as described in PART 3 - LOAD BALANCE.
.6 Submit certificate of acceptance from authority having jurisdiction upon completion of Work to Departmental Representative.

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

1.5 QUALITY ASSURANCE

.1 Quality Assurance according with Environment Canada or Departmental Representative.

.2 Qualifications: electrical Work to be carried out by qualified, licensed electricians who hold valid Master Electrical Contractor license or apprentices in accordance with authorities having jurisdiction.

.1 Employees registered in provincial apprentices program: permitted, under direct supervision of qualified licensed electrician, to perform specific tasks.
.2 Permitted activities: determined based on training level attained and demonstration of ability to perform specific duties.

.3 Site Meetings: Initial kick-off construction meeting; meetings at 40% and 80% of completion; and final site visit (after the contractor will provide reports confirming completion of all testing and commissioning).

.4 Health and Safety Requirements: according to standards of Environment Canada or Departmental Representative.

1.6 DELIVERY, STORAGE AND HANDLING

.1 Construction/Demolition Waste Management and Disposal: separate waste materials for reuse and recycling in accordance with standards of Environment Canada or Departmental Representative.

1.7 SYSTEM STARTUP

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

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

.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 will aspects of its care and operation.

1.8 OPERATING INSTRUCTIONS

.1 Provide for each system and principal item of equipment as specified in technical sections for use by operation and maintenance personnel.

.2 Operating instructions to include following:
.1 Wiring diagrams, control diagrams, and control sequence for each principal system and item of equipment.
.2 Start up, proper adjustment, operating, lubrication, and shutdown procedures.
.3 Safety precautions.
.4 Procedures to be followed in event of equipment failure.
.5 Other items of instruction as recommended by manufacturer of each system or item of equipment.

.3 Print or engrave operating instructions and frame under glass or in approved laminated plastic.

.4 Post instructions where directed.

.5 For operating instructions exposed to weather, provide weather-resistant materials or weatherproof enclosures.

.6 Ensure operating instructions will not fade when exposed to sunlight and are secured to prevent easy removal or peeling.

PART 2 - PRODUCTS

2.1 MATERIALS AND EQUIPMENT

.1 Provide material and equipment in accordance with design drawings.

.2 Material and equipment to be CSA certified. Where CSA certified material and equipment are not available, obtain special approval from authority having jurisdiction or inspection authorities before delivery to site and submit such approval as described in PART 1 - SUBMITTALS.

2.2 WIRING TERMINATIONS

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

2.3 EQUIPMENT IDENTIFICATION

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

.1 Nameplates: lamicoid 3 mm thick plastic engraving sheet, black finish face, white core, lettering accurately aligned and engraved into core, mechanically attached with self tapping screws.

.2 Sizes as follows:

NAMEPLATE SIZES			
Size 1	10 x 50 mm	1 line	3 mm high letters
Size 2	12 x 70 mm	1 line	5 mm high letters
Size 3	12 x 70 mm	2 lines	3 mm high letters
Size 4	20 x 90 mm	1 line	8 mm high letters
Size 5	20 x 90 mm	2 lines	5 mm high letters
Size 6	25 x 100 mm	1 line	12 mm high letters
Size 7	25 x 100 mm	2 lines	6 mm high letters

.2 Labels: embossed plastic labels with 6mm high letters unless specified otherwise.

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

.4 Allow for minimum of twenty-five (25) letters per nameplate and label.

.5 Nameplates for terminal cabinets and junction boxes to indicate system and/or voltage characteristics.

.6 Identify equipment with Size 3 labels engraved "ASSET INVENTORY NO. " as directed by Departmental Representative.

.7 Disconnects, starters and contactors: indicate

equipment being controlled and voltage.

.8 Terminal cabinets and pull boxes: indicate system and voltage.

.9 Transformers: indicate capacity, primary and secondary voltages.

2.4 WIRING IDENTIFICATION

.1 Identify wiring with permanent indelible identifying markings, numbered coloured plastic tapes, on both ends of phase conductors of feeders and branch circuit wiring.

.2 Maintain phase sequence and colour coding throughout.

.3 Colour coding: to CSA C22.1.

.4 Use colour coded wires in communication cables, matched throughout system.

2.5 CONDUIT AND CABLE IDENTIFICATION

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

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

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

	Prime	Auxiliary
up to 250 V	Yellow	
up to 600 V	Yellow	Green
up to 5 kV	Yellow	Blue
up to 15 kV	Yellow	Red
Telephone	Green	
Other Communication Systems	Green	Blue
Fire Alarm	Red	
Emergency Voice	Red	Blue
Other Security Systems	Red	Yellow

PART 3 - EXECUTION

3.1 INSTALLATION

.1 Do complete installation in accordance with CSA C22.1 except where specified otherwise.

.2 Do overhead and underground systems in accordance with CSA C22.3 No.1 except where specified otherwise.

3.2 NAMEPLATES AND LABELS

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

3.3 CO-ORDINATION OF PROTECTIVE DEVICES

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

3.4 FIELD QUALITY CONTROL

.1 Load Balance:

.1 Measure phase current to panelboards with normal loads (lighting) operating at time of acceptance; adjust branch circuit connections as required to obtain best balance of current between phases and record changes.
.2 Measure phase voltages at loads and adjust transformer taps to within 2% of rated voltage of equipment.
.3 Provide upon completion of work, load balance report as directed in PART 1 - SUBMITTALS: phase and neutral currents on panelboards, dry-core transformers and motor control centres, operating under normal load, as well as hour and date on which each load was measured, and voltage at time of test.

.2 Conduct following tests:
.1 Power distribution system including phasing, voltage, grounding and load balancing.
.2 Circuits originating from branch distribution panels.
.3 Motors, heaters and associated control equipment including sequenced operation of systems where applicable.
.4 Insulation resistance testing:
.1 Megger circuits, feeders and equipment up to 350 V with a 500 V instrument.
.2 Megger 350-600 V circuits, feeders and equipment with a 1000 V instrument.
.3 Check resistance to ground before energizing.

.3 Carry out tests in presence of Departmental Representative.

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

.5 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.
.2 Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.
.3 Schedule site visits, to review Work, as directed.

3.5 CLEANING

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

.2 Clean and prime exposed non-galvanized hangers, racks and fastenings to prevent rusting.

PART 1 - GENERAL

1.1 REFERENCES

.1 Canadian Standards Association (CSA International)
.1 CAN/CSA-C22.2 No.18-98, Outlet Boxes, Conduit Boxes, Fittings and Associated Hardware.
.2 CSA C22.2 No.65-93(R1999), Wire Connectors.

.2 Electrical and Electronic Manufacturers' Association of Canada (EEMAC)
.1 EEMAC 1Y-2, 1961 Bushing Stud Connectors and Aluminum Adapters (1200 Ampere Maximum Rating).

.3 National Electrical Manufacturers Association (NEMA)

1.2 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials in accordance with standards of Environment Canada or Departmental Representative.

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

.3 Collect and separate for disposal paper, plastic, polystyrene, corrugated cardboard packaging material in appropriate on-site bins for recycling in accordance with Environment Canada Waste Management Plan.

.4 Divert unused wiring materials from landfill to metal recycling facility as approved by Departmental Representative.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Pressure type wire connectors to: CSA C22.2 No.65, with current carrying parts of copper sized to fit copper conductors as required.

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

.3 Bushing stud connectors: to EEMAC 1Y-2 to consist of:
.1 Connector body and stud clamp for stranded round copper conductors.
.2 Clamp for stranded round copper conductors.
.3 Stud clamp bolts.
.4 Bolts for copper conductors.
.5 Sized for conductors as indicated.

.4 Clamps or connectors for armoured cable, aluminum sheathed cable, mineral insulated cable, flexible

conduit, non-metallic sheathed cable as required to: CAN/CSA-C22.2 No.18.

PART 3 - EXECUTION

3.1 INSTALLATION

.1 Remove insulation carefully from ends of conductors and:

.1 Apply coat of zinc joint compound on aluminum conductors prior to installation of connectors.

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

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

.4 Install bushing stud connectors in accordance with EEMAC 1Y-2.

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 26 05 00.

1.2 PRODUCT DATA

.1 Provide product data.

1.3 DELIVERY, STORAGE AND HANDLING

.1 Packaging Waste Management: remove for reuse and return of pallets, crates, padding and packaging materials in accordance with Environment Canada or Departmental Representative requirements.

PART 2 - PRODUCTS

2.1 BUILDING WIRES

.1 Copper conductors: size as indicated, with 600 V insulation of cross-linked thermosetting polyethylene material rated RW90 XLPE, Non Jacketted for 120/208V system or with 1000 V insulation of cross-linked thermosetting polyethylene material rated RW90 XLPE, Non Jacketted for 347/600V system.

PART 3 - EXECUTION

3.1 FIELD QUALITY CONTROL

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

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

.3 Perform tests before energizing electrical system.

3.2 GENERAL CABLE INSTALLATION

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

.2 Cable Colour Coding: to Section 26 05 00 Common Work Results for Electrical.

.3 Conductor length for parallel feeders to be identical.

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

.5 Provide numbered wire collars for control wiring. Numbers to correspond to control shop drawing

legend. Obtain wiring diagram for control wiring.

3.3 INSTALLATION OF BUILDING WIRES

.1 Install wiring as follows:

.1 In conduit systems in accordance with Section 26 05 34 - Conduits, Conduit Fastenings and Conduit Fittings.

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 26 05 00.

1.2 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials in accordance with Environment Canada or Departmental Representative standards.

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

.3 Collect and separate for disposal paper, plastic, polystyrene, corrugated cardboard packaging material in appropriate on-site bins for recycling in accordance with Environment Canada Waste Management Plan.

.4 Divert unused metal materials from landfill to metal recycling facility as approved by Departmental Representative.

.5 Fold up metal banding, flatten and place in designated area for recycling.

PART 2 - PRODUCTS

2.1 SUPPORT CHANNELS

.1 U shape, size 41 x 41 mm, 2.5 mm thick, surface mounted or suspended.

PART 3 - EXECUTION

3.1 INSTALLATION

.1 Secure equipment to solid masonry, tile and plaster surfaces with lead anchors or nylon shields.

.2 Secure equipment to poured concrete with expandable inserts.

.4 Support equipment, conduit or cables using clips, spring loaded bolts, cable clamps designed as accessories to basic channel members.

.5 Fasten exposed conduit or cables to building construction or support system using straps.
.1 One-hole malleable iron straps to secure surface conduits and cables 50 mm and smaller.
.2 Two-hole steel straps for conduits and cables larger than 50 mm.
.3 Beam clamps to secure conduit to exposed steel work.

.6 Suspended support systems.

.1 Support individual cable or conduit runs with 6 mm diameter threaded rods and spring clips.

.2 Support 2 or more cables or conduits on channels supported by 6 mm diameter threaded rod hangers where direct fastening to building construction is impractical.

.7 For surface mounting of two or more conduits use channels at 2 m on centre spacing.

.8 Provide metal brackets, frames, hangers, clamps and related types of support structures where indicated or as required to support conduit and cable runs.

.9 Ensure adequate support for raceways and cables dropped vertically to equipment where there is no wall support.

.10 Do not use wire lashing or perforated strap to support or secure raceways or cables.

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

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

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 26 05 00.

1.2 REFERENCES

.1 Canadian Standards Association (CSA International)
.1 CSA C22.1-2012, Canadian Electrical Code, Part 1, 22nd Edition.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Provide submittals.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Environment Canada or Departmental Representative standards.

.2 Waste Management and Disposal:
.1 Separate waste materials for reuse and recycling in accordance with Environment Canada or Departmental Representative standards.

PART 2 - PRODUCTS

2.1 OUTLET AND CONDUIT BOXES GENERAL

.1 Size boxes in accordance with CSA C22.1.

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

2.2 FITTINGS - GENERAL

.1 Bushing and connectors with nylon insulated throats.

.2 Knock-out fillers to prevent entry of debris.

.3 Double locknuts and insulated bushings on sheet metal boxes.

PART 3 - EXECUTION

3.1 INSTALLATION

.1 Support boxes independently of connecting conduits.

.2 Fill boxes with paper, sponges or foam or similar approved material to prevent entry of debris during construction. Remove upon completion of work.

.3 For flush installations mount outlets flush with finished wall using plaster rings to permit wall finish to come within 6 mm of opening.

.4 Provide correct size of openings in boxes for conduit, mineral insulated and armoured cable connections. Do not install reducing washers.

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

.6 Identify systems for outlet boxes as required.

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 26 05 00.

1.2 REFERENCES

.1 Canadian Standards Association (CSA International)
.1 CAN/CSA C22.2 No. 18-98(R2003), Outlet Boxes, Conduit Boxes, Fittings and Associated Hardware, A National Standard of Canada.
.2 CSA C22.2 No. 45-M1981(R2003), Rigid Metal Conduit.
.3 CSA C22.2 No. 56-04, Flexible Metal Conduit and Liquid-Tight Flexible Metal Conduit.
.4 CSA C22.2 No. 83-M1985(R2003), Electrical Metallic Tubing.
.5 CSA C22.2 No. 211.2-M1984(R2003), Rigid PVC (Unplasticized) Conduit.
.6 CAN/CSA C22.2 No. 227.3-05, Nonmetallic Mechanical Protection Tubing (NMPT), A National Standard of Canada (February 2006).

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Provide submittals.

.2 Provide product data.

.3 Product data: submit manufacturer's printed product literature, specifications and datasheets.
.1 Submit cable manufacturing data.

.4 Quality Control:

Quality assurance submittals:
.1 Test reports: submit certified test reports.
.2 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
.3 Instructions: submit manufacturer's installation instructions.

1.4 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for reuse and recycling in accordance with Environment Canada or Departmental Representative standards.

.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.

PART 2 - PRODUCTS

2.1 CABLES AND REELS

.1 Provide cables on reels or coils.

.1 Mark or tag each cable and outside of each reel or coil, to indicate cable length, voltage rating, conductor size, and manufacturer's lot number and reel number.

.2 Each coil or reel of cable to contain only one continuous cable without splices.

.3 Identify cables for exclusively dc applications.

2.2 CONDUITS

.1 Rigid metal conduit: to CSA C22.2 No. 45, hot dipped galvanized steel threaded.

.2 Epoxy coated conduit: to CSA C22.2 No. 45, with zinc coating and corrosion resistant epoxy finish inside and outside.

.3 Electrical metallic tubing (EMT): to CSA C22.2 No. 83, with couplings.

.4 Rigid PVC conduit: to CSA C22.2 No. 211.2.

.5 Flexible metal conduit: to CSA C22.2 No. 56, liquid-tight flexible metal.

2.3 CONDUIT FASTENINGS

.1 One hole malleable iron straps to secure surface conduits 50 mm and smaller.
.1 Two hole steel straps for conduits larger than 50 mm.

.2 Beam clamps to secure conduits to exposed steel work.

.3 Channel type supports for two or more conduits at 2 m on center.

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

2.4 CONDUIT FITTINGS

.1 Fittings: to CAN/CSA C22.2 No. 18, manufactured for use with conduit specified. Coating: same as conduit.

.2 Ensure factory "ells" where 90 degrees bends for 25 mm and larger conduits.

.3 Watertight connectors and couplings for EMT.
.1 Set-screws are not acceptable.

2.5 EXPANSION FITTINGS FOR RIGID CONDUIT

.1 Weatherproof expansion fittings with internal bonding assembly suitable for 100 mm linear expansion.

.2 Watertight expansion fittings with integral bonding jumper suitable for linear expansion and 19 mm deflection.

.3 Weatherproof expansion fittings for linear expansion at entry to panel.

2.6 FISH CORD

.1 Polypropylene.

PART 3 - EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 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 as approved.

.3 Surface mount conduits except in finished areas as approved.

.4 Use rigid hot dipped galvanized steel threaded conduit except where specified otherwise.

.5 Minimum conduit size for power circuits: 21 mm.

.6 Bend conduit cold:
.1 Replace conduit if kinked or flattened more than 1/10th of its original diameter.

.7 Mechanically bend steel conduit over 19 mm diameter.

.8 Field threads on rigid conduit must be of sufficient length to draw conduits up tight.

.9 Install fish cord in empty conduits.

.10 Dry conduits out before installing wire.

3.3 SURFACE CONDUITS

.1 Run parallel or perpendicular to building lines.

.2 Locate conduits behind infrared or gas fired heaters with 1.5 m clearance.

.3 Run conduits in flanged portion of structural steel.

.4 Group conduits wherever possible on suspended channels.

.5 Do not pass conduits through structural members except as indicated.

.6 Do not locate conduits less than 75 mm parallel to steam or hot water lines with minimum of 25 mm at crossovers.

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 26 05 00.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:
.1 Submit manufacturer's printed product literature, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Use deluxe outdoor power pedestals 'A. C. Dandy' Mod. #RT-DPP-44-SP c/w 4# 15A, 120V weatherproof GFI receptacles and heavy-duty weatherproof covers.

1.3 QUALITY ASSURANCE

.1 Quality assurance submittals: submit following in accordance with Section 01 45 00 - Quality Control.
.1 Manufacturer's Instructions: submit manufacturer's installation instructions and special handling criteria, installation sequence, and cleaning procedures.

1.4 DELIVERY, STORAGE, AND HANDLING

.1 Deliver, store and handle in accordance with Section 01 61 00 - Common Product Requirements.

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

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

PART 2 - PRODUCTS

2.1 POWER POLES

.1 Use deluxe outdoor power pedestals 'A. C. Dandy' Mod. #RT-DPP-44-SP c/w 4# 15A, 120V weatherproof GFI receptacles and heavy-duty weatherproof covers.

2.2 WIRING DEVICES

.1 Wiring devices: 15A, 120V GFI weatherproof outdoor receptacles c/w with extra-heavy duty while-in-use covers.

2.3 FITTINGS

.1 Elbows, tees, supports, connectors, couplings and fittings to make a complete installation.

PART 3 - EXECUTION

3.1 INSTALLATION

.1 Install multi-outlet assemblies and raceway system in accordance with manufacturer's instructions.

.2 Install supports, elbows, tees, connectors, fittings.

.3 Keep number of elbows, offsets and connections to minimum.

.4 Install barriers where required.

.5 Install surface raceway continuous around corners. Provide corner and vertical sections as required.

3.2 WIRING

.1 Install wiring after installation of raceway system is complete.

.2 Install receptacle harness as indicated.

.3 Fasten wiring with wire clips inside raceway.

.4 Install ground wire as required.

3.3 WIRING DEVICES

.1 Install outdoor rate wiring devices and heavy-duty while-in use weatherproof cover plates as indicated

.2 Install identification labels for all electrical outlets.

3.4 CLEANING

.1 Clean in accordance with Section 01 74 11 - Cleaning.

.2 Clean installed products in accordance to manufacturer's recommendation.

.3 Waste Management: separate waste materials for reuse and recycling in accordance with Section

01 74 21 - Construction/Demolition Waste Management and Disposal; 01 35 21 - LEED Requirements.

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 26 05 00.

1.2 REFERENCES

.1 Canadian Standards Association (CSA International)
.1 CSA-C22.2 No.42-99(R2002), General Use Receptacles, Attachment Plugs and Similar Devices.
.2 CSA-C22.2 No.42.1-00, Cover Plates for Flush-Mounted Wiring Devices (Bi-national standard, with UL 514D).
.3 CSA-C22.2 No.55-M1986(July 2001), Special Use Switches.
.4 CSA-C22.2 No.111-00, General-Use Snap Switches (Bi-national standard, with UL 20, twelfth edition).

1.3 SHOP DRAWINGS AND PRODUCT DATA

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

1.4 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials in accordance with Section 01 74 21 – Construction/Demolition Waste Management and Disposal.

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

.3 Collect and separate for disposal paper, plastic, polystyrene, corrugated cardboard packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.

.4 Divert unused metal and wiring materials from landfill to metal recycling facility as approved by Departmental Representative.

PART 2 - PRODUCTS

2.1 RECEPTACLES

.1 Duplex receptacles, CSA type 5-15 R, 125 V, 15 A, U ground, to: CSA-C22.2 No.42 with following features:
.1 Moulded housing.
.2 Suitable for No. 10 AWG for back and side wiring.
.3 Weatherproof GFI receptacles.
.4 Eight back wired entrances, four side wiring screws.
.5 Triple wipe contacts and rivetted grounding contacts.

2.4 COVER PLATES

.1 Cover plates for wiring devices to: CSA-C22.2 No.42.1.

.2 Cover plates from one manufacturer throughout project.

.3 Extra-heavy duty weatherproof while-in use metal covers "HUBBELL - TYMAC' bubble-type.

PART 3 - EXECUTION

3.1 INSTALLATION

.1 Receptacles:
.1 Install receptacles in gang type outlet box when more than one receptacle is required in one location.
.2 Mount receptacles at height in accordance with recommendations of Structural Engineer.

.2 Cover plates:
.1 Provide proper sealing of all outdoor weatherproof receptacles and covers.
.2 Provide cover plate suitable for application for interior receptacles.

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 26 05 00.

1.2 REFERENCES

.1 Canadian Standards Association (CSA International).
.1 CSA-C22.2 No. 5-02, Moulded-Case Circuit Breakers, Molded-Case Switches and Circuit-Breaker Enclosures (Tri-national standard with UL 489, tenth edition, and the second edition of NMX-J-266-ANCE).

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

1.4 WASTE MANAGEMENT AND DISPOSAL

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

.2 Collect and separate for disposal paper, plastic, polystyrene, corrugated cardboard packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.

.3 Separate for reuse and recycling and place in designated containers Steel, metal and plastic waste in accordance with Waste Management Plan.

PART 2 - PRODUCTS

2.1 BREAKERS GENERAL

.1 Moulded-case circuit breakers, Circuit breakers, and Ground-fault circuit-interrupters and Accessory high-fault protectors: to CSA C22.2 No. 5

.2 Bolt-on moulded case circuit breaker: quick- make, quick-break type, for manual and automatic operation with temperature compensation for 40 degrees C ambient.

.3 Common-trip breakers: with single handle for multi-pole applications.

.4 Magnetic instantaneous trip elements in circuit breakers to operate only when value of current reaches setting.
.1 Trip settings on breakers with adjustable trips to range from 3-8 times current rating.

.5 Circuit breakers to have minimum 25 KA symmetrical rms interrupting capacity rating.

2.2 THERMAL MAGNETIC BREAKERS DESIGN A

.1 Moulded case circuit breaker to operate automatically by means of thermal and magnetic tripping devices to provide inverse time current tripping and instantaneous tripping for short circuit protection.

2.3 MAGNETIC BREAKERS DESIGN B

.1 Moulded case circuit breaker to operate automatically by means of magnetic tripping devices to provide instantaneous tripping for short circuit protection.

PART 3 - EXECUTION

3.1 INSTALLATION

.1 Reuse the existing spare 15A, 1-pole circuit breaker of the existing panel 'LP-M1'. All spare circuit breakers shall be determined by the electrical contractor after demolition of the existing roof receptacles, as shown on the drawing.

.2 Provide new typed panel directories after modifications.

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 26 05 00.

1.2 PAYMENT

.1 Payment for field testing of ground fault equipment performed by Contractor and equipment manufacturer in accordance with Section 01 29 83 - Payment Procedures: Testing Laboratory Services.

1.3 REFERENCES

.1 Canadian Standards Association (CSA International)
.1 CAN/CSA-C22.2 NO. 144-M91 (R2011), Ground Fault Circuit Interrupters.

.2 National Electrical Manufacturers Association (NEMA)
.1 NEMA PB 2.2-1999 (R2004, R2009), Application Guide for Ground Fault Protection Devices for Equipment.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Submit product data and shop drawings.

.3 Submit test report for field testing of ground fault equipment to Departmental Representative, Consultant and a certificate that system as installed meets criteria specified herein.

1.5 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management And Disposal.

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

.3 Collect and separate for disposal paper, plastic, polystyrene, and corrugated cardboard packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.

.4 Divert unused metal and wiring materials from landfill to metal recycling facility approved by Departmental Representative.

.5 Fold up metal banding, flatten and place in designated area for recycling.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Equipment and components for ground fault circuit interrupters (GFCI): to [CAN/CSA-C22.2 No.144] [NEMA PG 2.2].

.2 Components comprising ground fault protective system to be of same manufacturer.

2.2 BREAKER TYPE GROUND FAULT INTERRUPTER

.1 Single or Two pole ground fault circuit interrupter for 15 and/or 20 A, 120 V, 1 phase circuit c/w test and reset facilities.

2.3 GROUND FAULT PROTECTOR UNIT

.1 Self-contained with 15 A, 120 V circuit interrupter and duplex receptacle complete with:
.1 Solid state ground sensing device.
.2 Facility for testing and reset.
.3 CSA Enclosure NEMA Type 1 for indoor installation and NEMA Type 4X for outdoor installation, surface and flush mounted with stainless steel face plate.

PART 3 - EXECUTION

3.1 INSTALLATION

.1 Do not ground neutral on load side of ground fault relay.

.2 Pass phase conductors including neutral through zero sequence transformers.

.3 Connect supply and load wiring to equipment in accordance with manufacturer's recommendations.

3.2 FIELD QUALITY CONTROL

.1 Perform tests in accordance with Section 26 05 00 - Common Work Results - Electrical and co-ordinate with Section 01 45 00 - Quality Control.

.2 Arrange for field testing of ground fault equipment by Contractor before commissioning service.

.3 Demonstrate simulated ground fault tests.