SPECIFICATION MANUAL

INNISFAIL PDSTC

LUNCHROOM EXPANSION
Innisfail, Alberta

Issued for Tender
Project Number: NCCA 17-0028
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SPECIFICATIONS GROUP

GENERAL REQUIREMENTS SUBGROUP

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1.1 WORK COVERED BY CONTRACT DOCUMENTS

.1 Work of this Contract comprises Lunchroom Expansion and related work for Innisfail PDSTC, Innisfail, Alberta.

1.2 CONTRACT METHOD

.1 Construct Work under single stipulated price contract.

1.3 WORK SEQUENCE

.1 Construct Work in stages to accommodate Owner's continued use of premises during construction.

.2 Co-ordinate Progress Schedule and co-ordinate with Owner Occupancy during construction.

.3 Maintain fire access/control.

1.4 CONTRACTOR USE OF PREMISES

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

.1 Owner occupancy.

.2 Public usage.

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

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

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

.5 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.

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

1.5 OWNER OCCUPANCY

.1 Owner will occupy premises during entire construction period for execution of normal operations.

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

1.6 ALTERATIONS, ADDITIONS OR REPAIRS TO EXISTING BUILDING

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

.2 Accept liability for damage, safety of equipment and overloading of existing equipment.

1.7 EXISTING SERVICES

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

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

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

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

1.8 DOCUMENTS REQUIRED

.1 Maintain at job site, one copy each document as follows:

- .1 Contract Drawings.
- .2 Specifications.
- .3 Addenda.
- .4 Reviewed Shop Drawings.
- .5 List of Outstanding Shop Drawings.
- .6 Change Orders.
- .7 Other Modifications to Contract.
- .8 Field Test Reports.
- .9 Copy of Approved Work Schedule.
- .10 Health and Safety Plan and Other Safety Related Documents.
- .11 Other documents as specified.

END OF SECTION

1.1 USE OF SITE AND FACILITIES

.1 Execute work with least possible interference or disturbance to normal use of premises. Arrange with Departmental Representative to facilitate work as stated.

.2 Maintain existing services to building and provide for personnel and vehicle access.

.3 Where security is reduced by work provide temporary means to maintain security.

1.2 SPECIAL REQUIREMENTS

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

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

.3 Deliver materials as approved by Departmental Representative.

1.3 SECURITY

.1 Where security has been reduced by Work of Contract, provide temporary means to maintain security.

.2 Security clearances:

.1 Personnel employed on this project will be subject to security check. Obtain clearance, as instructed, for each individual who will require to enter premises.

.2 Obtain requisite clearance, as instructed, for each individual required to enter premises.

.3 Personnel who do not require access to interior of building, do not require a pass. Personnel entering the building will require and security pass and if not cleared, an escort. Pass must be returned at end of work shift and personnel checked out.

1.4 BUILDING SMOKING ENVIRONMENT

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

END OF SECTION

1.1 ADMINISTRATIVE

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

.2 Prepare agenda for meetings.

.3 Distribute written notice of each meeting four days in advance of meeting date to Departmental Representative.

.4 Provide physical space and make arrangements for meetings.

.5 Preside at meetings.

.6 Record the meeting minutes. Include significant proceedings and decisions. Identify actions by parties.

.7 Reproduce and distribute copies of minutes within three days after meetings and transmit to meeting participants and affected parties not in attendance..

.8 Representative of Contractor, Subcontractor and suppliers attending meetings will be qualified and authorized to act on behalf of party each represents.

1.2 PRECONSTRUCTION MEETING

.1 Within 15 days after award of Contract, request a meeting of parties in contract to discuss and resolve administrative procedures and responsibilities.

.2 Departmental Representative, Consultant, Contractor, major Subcontractors, field inspectors and supervisors will be in attendance.

.3 Establish time and location of meeting and notify parties concerned minimum 5 days before meeting.

.4 Incorporate mutually agreed variations to Contract Documents into Agreement, prior to signing.

.5 Agenda to include:

.1 Appointment of official representative of participants in the Work.

.2 Schedule of Work: in accordance with Section 01 32 16.07 - Construction Progress Schedules - Bar (GANTT) Chart.

.3 Schedule of submission of shop drawings, samples, colour chips. Submit submittals in accordance with Section 01 33 00 - Submittal Procedures.

.4 Requirements for temporary facilities, site sign, offices, storage sheds, utilities, fences in accordance with Section 01 52 00 - Construction Facilities.

.5 Delivery schedule of specified equipment.

.6 Site security.

.7 Proposed changes, change orders, procedures, approvals required, mark-up percentages permitted, time extensions, overtime, administrative requirements.

.8 Owner provided products.

.9 Record drawings in accordance with Section 01 33 00 - Submittal Procedures.

.10 Take-over procedures, acceptance, warranties in accordance with Section 01 78 00 - Closeout Submittals.

.11 Monthly progress claims, administrative procedures, photographs, hold backs.

.12 Appointment of inspection and testing agencies or firms.

.13 Insurances, transcript of policies.

1.3 PROGRESS MEETINGS

.1 During course of Work schedule bi-weekly progress meetings.

.2 Contractor, major Subcontractors involved in Work Departmental Representative, Consultant are to be in attendance.

.3 Notify parties minimum 5 days prior to meetings.

.4 Record minutes of meetings and circulate to attending parties and affected parties not in attendance within 48 hours after meeting.

.5 Agenda to include the following:

.1 Review and approval of minutes of previous meeting.

.2 Review of Work progress since previous meeting.

.3 Field observations, problems, conflicts.

.4 Problems which impede construction schedule.

.5 Review of off-site fabrication delivery schedules.

.6 Corrective measures and procedures to regain projected schedule.

.7 Revision to construction schedule.

.8 Progress schedule, during succeeding work period.

.9 Review submittal schedules: expedite as required.

.10 Maintenance of quality standards.

.11 Review proposed changes for affect on construction schedule and on completion date.

.12 Other business.

END OF SECTION

1.1 DEFINITIONS

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

.2 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. Bar Chart should be derived from commercially available computerized project management system.

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

.4 Construction Work Week: Monday to Friday, inclusive, will provide five day work week and define schedule calendar working days as part of Bar (GANTT) Chart submission.

.5 Duration: number of work periods (not including holidays or other nonworking periods) required to complete activity or other project element. Usually expressed as workdays or workweeks.

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

.7 Milestone: significant event in project, usually completion of major deliverable.

.8 Project Schedule: planned dates for performing activities and the 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.

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

1.2 REQUIREMENTS

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

.2 Plan to complete Work in accordance with prescribed milestones and time frame.

.3 Limit activity durations to maximum of approximately 10 working days, to allow for progress reporting.

.4 Ensure that it is understood that Award of Contract or time of beginning, rate of progress, Interim Certificate and Final Certificate as defined times of completion are of essence of this contract.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Submit to Departmental Representative within 10 working days of Award of Contract Bar (GANTT) Chart as Master Plan for planning, monitoring and reporting of project progress.

.3 Submit Project Schedule to Departmental Representative within 5 working days of receipt of acceptance of Master Plan.

1.4 MASTER PLAN

.1 Structure schedule to allow orderly planning, organizing and execution of Work as Bar Chart (GANTT).

.2 Departmental Representative will review and return revised schedules within 5 working days.

.3 Revise impractical schedule and resubmit within 5 working days.

.4 Accepted revised schedule will become Master Plan and be used as baseline for updates.

1.5 PROJECT SCHEDULE

.1 Develop detailed Project Schedule derived from Master Plan.

.2 Ensure detailed Project Schedule includes as minimum milestone and activity types as follows:

.1 Award.
.2 Shop Drawings, Samples.
.3 Permits.
.4 Mobilization.
.5 Selective Demolition.
.6 Roofing.
.7 Re-roofing of existing areas.
.8 Re-installation of existing mechanical units.

1.6 PROJECT SCHEDULE REPORTING

.1 Update Project Schedule on [weekly] basis reflecting activity changes and completions, as well as activities in progress.

.2 Include as part of Project Schedule, narrative report identifying Work status to date, comparing current progress to baseline, presenting current forecasts, defining problem areas, anticipated delays and impact with possible mitigation.

1.7 PROJECT MEETINGS

.1 Discuss Project Schedule at regular site meetings, identify activities that are behind schedule and provide measures to regain slippage. Activities considered behind schedule are those with projected start or completion dates later than current approved dates shown on baseline schedule.

.2 Weather related delays with their remedial measures will be discussed and negotiated.

END OF SECTION

1.1 ADMINISTRATIVE

.1 Submit to 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 complete.

.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 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 errors and omissions in submission is not relieved by Departmental Representative’s review of submittals.

.9 Contractor's responsibility for deviations in submission from requirements of Contract Documents is not relieved by Departmental Representative’s review.

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

1.2 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 the Province of Alberta, 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 10 days for Departmental Representative's review of each submission.

.5 Adjustments made on shop drawings by Departmental Representative are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Departmental Representative prior to proceeding with Work.

.6 Make changes in shop drawings as Departmental Representative may require, consistent with Contract Documents. When resubmitting, notify Departmental Representative in writing of revisions other than those requested.

.7 Accompany submissions with transmittal letter 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.

.8 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.

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

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

.11 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.

.12 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.

.13 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.

.14 Submit electronic copies of manufacturers instructions for requirements requested in specification Sections and as requested by 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.

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

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

.17 Delete information not applicable to project.

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

.19 If upon review by Departmental Representative, no errors or omissions are discovered or if only minor corrections are made, electronic 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.

1.3 PHOTOGRAPHIC DOCUMENTATION

.1 Submit electronic copy of colour digital photography in jpg format, fine 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.

1.4 CERTIFICATES AND TRANSCRIPTS

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

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

END OF SECTION

1.1 REFERENCES AND CODES

.1 Perform Work in accordance with National Building Code (NBC) including amendments up to tender closing date and other codes of provincial or local application provided that in case of conflict or discrepancy, more stringent requirements apply.

.2 Carry out installation/decommissioning in accordance to the Storage Tank Systems for Petroleum Products and Allied Petroleum Products Regulation, as well as the CCME Environmental Code of Practice for Aboveground and Underground Storage Tank Systems Containing Petroleum and Allied Petroleum Products and National Fire Code.

.3 Meet or exceed requirements of:

.1 Contract documents.

.2 Specified standards, codes and referenced documents.

1.2 BUILDING SMOKING ENVIRONMENT

.1 Comply with smoking restrictions and municipal by-laws.

END OF SECTION

1.1 WATER SUPPLY

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

.2 Departmental Representative will pay for utility charges at prevailing rates.

1.2 TEMPORARY HEATING AND VENTILATION

.1 Provide temporary heating required during construction period, including attendance, maintenance and fuel.

.2 Provide temporary heat and ventilation in enclosed areas as required to:

- .1 Facilitate progress of Work.
- .2 Protect Work and products against dampness and cold.
- .3 Prevent moisture condensation on surfaces.
- .4 Provide ambient temperatures and humidity levels for storage, installation and curing of materials.
- .5 Provide adequate ventilation to meet health regulations for safe working environment.

.3 Maintain temperatures of minimum 10 degrees C in areas where construction is in progress.

.4 Ventilating:

- .1 Prevent accumulations of dust, fumes, mists, vapours or gases in areas occupied during construction.
- .2 Provide local exhaust ventilation to prevent harmful accumulation of hazardous substances into atmosphere of occupied areas.
- .3 Dispose of exhaust materials in manner that will not result in harmful exposure to persons.
- .4 Continue operation of ventilation and exhaust system for time after cessation of work process to assure removal of harmful contaminants.

.5 Maintain strict supervision of operation of temporary heating and 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 direct-fired combustion units to outside.

.6 Be responsible for damage to Work due to failure in providing adequate heat and protection during construction.

1.3 TEMPORARY POWER AND LIGHT

.1 Departmental Representative will provide for temporary power during construction for operating of power tools.

1.4 TEMPORARY COMMUNICATION FACILITIES

.1 Provide and pay for temporary telephone necessary for own use.

1.5 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.

END OF SECTION

1.1 REFERENCES

.1 Canadian Standards Association (CSA International)

.1 CAN/CSA-S269.2, Access Scaffolding for Construction Purposes.

.2 CAN/CSA-Z321, Signs and Symbols for the Occupational Environment.

1.2 SCAFFOLDING

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

.2 Provide and maintain scaffolding, swing staging and platforms.

1.3 HOISTING

.1 Provide, operate and maintain hoists required for moving of materials and equipment. Make financial arrangements with Subcontractors for their use of hoists.

.2 Hoists to be operated by qualified operator.

1.4 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.

1.5 CONSTRUCTION PARKING

.1 Parking will be permitted on site provided it does not disrupt Owners use of building.

1.6 OFFICES

.1 Provide office heated to 22 degrees C, lighted 750 lx and ventilated, of sufficient size to accommodate site meetings and furnished with drawing laydown table.

.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.

1.7 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.

1.8 SANITARY FACILITIES

.1 Departmental Representative will designate sanitary facilities for use by work force.

1.9 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.

END OF SECTION

1.1 REFERENCES

.1 Within text of each specifications section, reference may be made to reference standards.

.2 Conform to these reference standards, in whole or in part as specifically requested in specifications.

.3 If there is question as to whether products or systems are in conformance with applicable standards, Departmental Representative reserves right to have such products or systems tested to prove or disprove conformance.

.4 Cost for such testing will be born by Departmental Representative in event of conformance with Contract Documents or by Contractor in event of non-conformance.

1.2 QUALITY

.1 Products, materials, equipment and articles incorporated in Work shall be new, not damaged or defective, and of best quality for purpose intended. If requested, furnish evidence as to type, source and quality of products provided.

.2 Procurement policy is to acquire, in cost effective manner, items containing highest percentage of recycled and recovered materials practicable consistent with maintaining satisfactory levels of competition. Make reasonable efforts to use recycled and recovered materials and in otherwise utilizing recycled and recovered materials in execution of work.

.3 Defective products, whenever identified prior to completion of Work, will be rejected, regardless of previous inspections. Inspection does not relieve responsibility, but is precaution against oversight or error. Remove and replace defective products at own expense and be responsible for delays and expenses caused by rejection.

.4 Should disputes arise as to quality or fitness of products, decision rests strictly with Departmental Representative based upon requirements of Contract Documents.

.5 Unless otherwise indicated in specifications, maintain uniformity of manufacture for any particular or like item throughout building.

.6 Permanent labels, trademarks and nameplates on products are not acceptable in prominent locations, except where required for operating instructions, or when located in mechanical or electrical rooms.

1.3 AVAILABILITY

.1 Immediately upon signing Contract, review product delivery requirements and anticipate foreseeable supply delays for items. If delays in supply of products are foreseeable, notify Departmental Representative of such, in order that substitutions or other remedial action may be authorized in ample time to prevent delay in performance of Work.

.2 In event of failure to notify Departmental Representative at commencement of Work and should it subsequently appear that Work may be delayed for such reason, reserves right to substitute more readily available products of similar character, at no increase in Contract Price or Contract Time.

1.4 STORAGE, HANDLING AND PROTECTION

.1 Handle and store products in manner to prevent damage, adulteration, deterioration and soiling and in accordance with manufacturer's instructions when applicable.

.2 Store packaged or bundled products in original and undamaged condition with manufacturer's seal and labels intact. Do not remove from packaging or bundling until required in Work.

.3 Store products subject to damage from weather in weatherproof enclosures.

.4 Store cementitious products clear of earth or concrete floors, and away from walls.

.5 Keep sand, when used for grout or mortar materials, clean and dry. Store sand on wooden platforms and cover with waterproof tarpaulins during inclement weather.

.6 Store sheet materials, lumber on flat, solid supports and keep clear of ground. Slope to shed moisture.

.7 Remove and replace damaged products at own expense and to satisfaction of Departmental Representative.

.8 Touch-up damaged factory finished surfaces to Departmental Representative's satisfaction. Use touch-up materials to match original. Do not paint over name plates.

1.5 TRANSPORTATION

.1 Pay costs of transportation of products required in performance of Work.

1.6 MANUFACTURER'S INSTRUCTIONS

.1 Unless otherwise indicated in specifications, install or erect products in accordance with manufacturer's instructions. Do not rely on labels or enclosures provided with products. Obtain written instructions directly from manufacturers.

.2 Notify Departmental Representative in writing, of conflicts between specifications and manufacturer's instructions, so that Departmental Representative can establish course of action.

.3 Improper installation or erection of products, due to failure in complying with these requirements, authorizes Departmental Representative to require removal and re-installation at no increase in Contract Price or Contract Time.

1.7 QUALITY OF WORK

.1 Ensure Quality of Work is of highest standard, executed by workers experienced and skilled in respective duties for which they are employed. Immediately notify Departmental Representative if required Work is such as to make it impractical to produce required results.

.2 Do not employ anyone unskilled in their required duties. Departmental Representative reserves right to require dismissal from site, workers deemed incompetent or careless.

.3 Decisions as to standard or fitness of Quality of Work in cases of dispute rest solely with Departmental Representative, whose decision is final.

1.8 CO-ORDINATION

.1 Ensure co-operation of workers in laying out Work. Maintain efficient and continuous supervision.

.2 Be responsible for coordination and placement of openings, sleeves and accessories.

1.9 REMEDIAL WORK

.1 Perform remedial work required to repair or replace parts or portions of Work identified as defective or unacceptable. Co-ordinate adjacent affected Work as required.

.2 Perform remedial work by specialists familiar with materials affected. Perform in a manner to neither damage nor put at risk any portion of Work.

1.10 FASTENINGS

.1 Provide metal fastenings and accessories in same texture, colour and finish as adjacent materials, unless indicated otherwise.

.2 Prevent electrolytic action between dissimilar metals and materials.

.3 Use non-corrosive hot dip galvanized steel fasteners and anchors for securing exterior work, unless stainless steel or other material is specifically requested in affected specification Section.

.4 Space anchors within individual load limit or shear capacity and ensure they provide positive permanent anchorage. Wood, or any other organic material plugs are not acceptable.

.5 Keep exposed fastenings to a minimum, space evenly and install neatly.

.6 Fastenings which cause spalling or cracking of material to which anchorage is made are not acceptable.

1.11 FASTENINGS - EQUIPMENT

.1 Use fastenings of standard commercial sizes and patterns with material and finish suitable for service.

.2 Use heavy hexagon heads, semi-finished unless otherwise specified. Use No. 304 stainless steel for exterior areas.

.3 Bolts may not project more than one diameter beyond nuts.

.4 Use plain type washers on equipment, sheet metal and soft gasket lock type washers where vibrations occur. Use resilient washers with stainless steel.

END OF SECTION

1.1 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 Effect on Work of Owner or separate contractor.
- .7 Written permission of affected separate contractor.
- .8 Date and time work will be executed.

1.2 MATERIALS

.1 Required for original installation.

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

1.3 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; maintain excavations free of water.

1.4 EXECUTION

.1 Execute cutting, fitting, and patching [including excavation and fill,] 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 Provide openings in non-structural elements of Work for penetrations of mechanical and electrical Work.

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

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

.8 Cut rigid materials using masonry saw or core drill. Pneumatic or impact tools not allowed on masonry work without prior approval.

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

1.5 WASTE MANAGEMENT AND DISPOSAL

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

END OF SECTION

1.1 PROJECT CLEANLINESS

.1 Maintain Work in tidy condition, free from accumulation of waste products and debris.

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

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

.4 Provide on-site containers for collection of waste materials and debris.

.5 Provide and use marked separate bins for recycling. Refer to Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

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

.7 Provide adequate ventilation during use of volatile or noxious substances..

1.2 FINAL CLEANING

.1 When Work is Substantially Performed remove surplus products, tools, construction machinery and equipment not required for performance of remaining Work.

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

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

.4 Remove waste products and debris.

.5 Remove dirt and other disfiguration from exterior surfaces.

.6 Clean roofs, downspouts, and drainage systems.

END OF SECTION

1.1 WASTE MANAGEMENT

.1 This Project shall generate the least amount of waste possible and that processes shall be employed that ensure the generation of as little waste as possible including prevention of damage due to error, poor planning, breakage, mishandling, improper storage, contamination, inadequate protection or other factors as well as minimizing over-packaging and poor quantity estimating, consistent with “Built-Green” or recognized sustainability practices.

.2 Of the inevitable waste that is generated, the waste materials designated in this specification shall be salvaged for reuse and/or recycling. Waste disposal in landfills or incinerators shall be minimized. This means careful recycling of job site waste. On demolition projects this also means careful removal or salvage of materials.

.3 Minimize waste disposal to landfills.

.4 Subcontractors shall cooperate with Contractor and comply with his Construction Waste Management Plan in order to ensure conformance with Sustainability Certification requirements.

END OF SECTION

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 inspection and submit verification that corrections have been made.

.2 Request Departmental Representative inspection.

.2 Departmental Representative Inspection:

.1 Departmental Representative, Consultant 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.

.4 Final Inspection:

.1 When completion tasks are done, request final inspection of Work by Departmental Representative.

.2 When Work incomplete according to 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.

1.2 FINAL CLEANING

.1 Clean in accordance with Section 01 74 11 - Cleaning.

.2 Remove surplus materials, excess materials, rubbish, tools and equipment.

END OF SECTION

1.1 ADMINISTRATIVE REQUIREMENTS

.1 Pre-warranty Meeting:

.1 Convene meeting one week prior to contract completion with Departmental Representative, in accordance with Section 01 31 19 - Project Meetings to:

.1 Verify Project requirements.

.2 Review warranty requirements.

.2 Departmental Representative to establish communication procedures for:

.1 Notifying construction warranty defects.

.2 Determine priorities for type of defects.

.3 Determine reasonable response time.

.3 Contact information for bonded and licensed company for warranty work action: provide name, telephone number and address of company authorized for construction warranty work action.

.4 Ensure contact is located within local service area of warranted construction, is continuously available, and is responsive to inquiries for warranty work action.

1.2 AS -BUILT DOCUMENTS AND SAMPLES

.1 Maintain at site one record copy of:

.1 Contract Drawings for use as “As Built 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.

1.3 RECORDING INFORMATION ON PROJECT RECORD DOCUMENTS

.1 Record information on set of blue line opaque drawings provided by Departmental Representative. As-built drawings should meet the requirements under STR (i.e., outline of tanks, centerline of piping, centerline of underground electrical and monitor sensor conduits, building foundation lines, property lines, and secondary containment systems).

.2 Use felt tip marking pens, maintaining separate colours for each major system, for recording information.

.3 Record information concurrently with construction progress.

.1 Do not conceal Work until required information is recorded.

.4 Contract Drawings and shop drawings: mark each item to record actual construction, including:

.1 Measured depths of elements of foundation in relation to finish first floor datum.

.2 Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.

.3 Measured locations of internal utilities and appurtenances, referenced to visible and accessible features of construction.

.4 Field changes of dimension and detail.

.5 Changes made by change orders.

.6 Details not on original Contract Drawings.

.7 References to related shop drawings and modifications.

.5 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.

.6 Other Documents: maintain manufacturer's certifications, inspection certifications, field test records, required by individual specifications sections.

.7 Provide digital photos, if requested, for site records.

1.4 WARRANTIES AND BONDS

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

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

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

END OF SECTION

1 GENERAL

1.01 SUMMARY

.1 This Section includes the following:
- .1 Demolition and removal of selected portions of exterior building components or structural elements.
- .2 Demolition of mechanical and electrical equipment.
- .3 Demolition and removal of selected site elements.
- .4 Repair procedures for selective demolition operations.

.2 This section does not include the following:
- .1 Removal of hazardous materials or asbestos abatement.
- .2 Demolition of interior building components and finishes.

.3 Choice of all exterior landscape materials will be determined by the Departmental Representative, and materials not re used at other locations will be turned over to the local municipality tree re planting program.

.4 Drawings contain details that suggest directions for solving some of the major demolition and removal requirements for this project; Contractor is required to develop these details further by submitting a demolition plan prepared by a professional engineer employed by the Contractor.

1.02 REFERENCE STANDARDS

- .1 American National Standards Institute (ANSI)
- .2 ANSI A10.8 2011, Safety Requirements for Scaffolding

.2 Canadian Green Building Council (CaGBC)
- .1 LEED© Reference Guide for Building Design and Construction, Version 4

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

.4 National Research Council Canada (NRC)
- .1 National Building Code of Canada 2015 (NBC).

.5 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

.6 National Fire Protection Association (NFPA)
- .1 NFPA 241 13, Standard for Safeguarding Construction, Alteration, and Demolition Operations

1.03 DEFINITIONS

.1 Demolish: Detach items from existing construction and legally dispose of them off site, unless indicated to be removed and salvaged or removed and reinstalled.

.2 Remove and Salvage: Detach items from existing construction and deliver them to Departmental Representative ready for reuse.

.3 Remove and Reinstall: Detach items from existing construction, prepare them for reuse, and reinstall them where indicated.

.4 Existing to Remain: Existing items of construction that are not removed and that are not otherwise indicated as being removed, removed and salvaged, or removed and reinstalled.

.5 Hazardous Substances: Dangerous substances, dangerous goods, hazardous commodities and hazardous products may include asbestos, mercury and lead, PCB's, poisons, corrosive agents, flammable substances, radioactive substances, or other material that can endanger human health or wellbeing or environment if handled improperly as defined by the Federal Hazardous Products Act (RSC 1985) including latest amendments.

1.04 ADMINISTRATIVE REQUIREMENTS

.1 Coordination: Coordinate selective demolition work so that work of this Section adheres to aesthetic criteria established by the Drawings and specified dimensions with all elements in planes as drawn, maintaining their relationships with all other building elements.

.2 Coordination: Coordinate with Departmental Representative for the material ownership as follows:

- .1 Except for items or materials indicated to be reused, salvaged, reinstalled, or otherwise indicated to remain Departmental Representative Owner'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 selective 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 Representative Owner.
  - .2 Coordinate with Representative Owner's archaeologist historical adviser, who will establish special procedures for removal and salvage.

.3 Pre Demolition Meeting: Conduct a pre demolition meeting at Project site in accordance with requirements listed in Section 01 31 19 - Project Meetings to confirm extent of salvaged and demolished materials; and to review Contractor's demolition plan prepared by a professional engineer.

1.05 ACTION AND INFORMATION SUBMITTALS

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

.1 Schedule of Selective Demolition Activities: Coordinate with Section 01 32 16.06 - Construction Progress Schedule, and indicate the following:

.1 Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity.

.2 Coordinate with Representative Owner's building manager and user group ongoing site operations, and limit the number of interruptions during regular business hours.

.3 Interruption of utility services.

.4 Coordination for shutoff, capping, and continuation of utility services.

.5 Use of elevator and stairs.

.6 Locations of temporary partitions and means of egress, including for others affected by selective demolition operations.

.7 Coordination with Departmental Representative 's continuing occupancy of portions of existing building and of Departmental Representative 's partial occupancy of completed Work.

.2 Demolition 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, and as follows:

.1 Proposed Dust Control and Noise Control Measures: Submit statement or drawing that indicates the measures proposed for use, proposed locations, and proposed time frame for their operation. Departmental Representative reserves the right to make modifications where proposed methods interfere with the Departmental Representative 's ongoing operation

.2 Inventory: Submit a list of items that have been removed and salvaged after selective demolition is complete.

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

.4 Pre demolition Photographs or Videotape: Submit photographs or videotape indicating existing conditions of adjoining construction and site improvements prior to starting Work. Include finish surfaces that may be misconstrued as damage caused by selective 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 architects and owners, for work of similar complexity and extent.

1.06 QUALITY ASSURANCE

.1 Regulatory Requirements: Comply with governing environmental notification requirements and regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction and in accordance with the following:
- .1 Federal Workers' Compensation Service Provincial/Territorial Workers' Compensation Boards/Commissions.
- .2 Government of Canada, Labour Program: Workplace Safety Provincial/Territorial Occupational Health and Safety Standards and Programs.

.2 Demolition Firm Qualifications: An experienced firm that has specialized in demolition work similar in material and extent to that indicated for this Project:
- .1 Conform to the provincial Occupational Health and Safety Act and Regulations.
- .2 Conform to provincial Workers' Compensation Board Regulations.
- .3 Conform to the local municipal bylaws and regulations governing this type of work.

1.07 SITE CONDITIONS

.1 Departmental Representative will occupy portions of building immediately adjacent to selective demolition area:
- .1 Conduct selective demolition so that Departmental Representative's operations will not be disrupted.
- .2 Provide not less than 72 hours notice to Departmental Representative of activities that will affect Representative Owner's operations.

.2 Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities and as follows:
- .1 Do not close or obstruct walkways, corridors, or other occupied or used facilities without written permission from authorities having jurisdiction.

.3 Departmental Representative assumes no responsibility for condition of areas to be selectively demolished:
- .1 Conditions existing at time of Pre Bid Site Review will be maintained by Departmental Representative as far as practical.

.4 Discovery of Hazardous Substances: It is not expected that Hazardous Substances will be encountered in the Work; immediately notify Departmental Representative if materials suspected of containing hazardous substances are encountered and perform the following activities:
- .1 Refer to Section 01 41 00 - Regulatory Requirements for directives associated with specific material types.
- .2 Hazardous materials will be as defined in the Hazardous Materials Act.
- .3 Hazardous materials will be removed by Departmental Representative before start of the Work.
- .4 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.

.5 Storage or sale of removed items or materials on site will not be permitted.

.6 Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.

.7 Maintain fire protection facilities in service during selective demolition operations.

2 PRODUCTS

2.01 MATERIALS

.1 Temporary Support Structures: Design temporary support structures required for demolition work and underpinning and other foundation supports necessary for the project using a qualified professional engineer registered or licensed in province of the Work.

.2 Repair Materials: Use repair materials identical to existing materials:
- .1 If identical materials are unavailable or cannot be used for exposed surfaces, use materials that visually match existing adjacent surfaces to the fullest extent possible.
- .2 Use materials whose installed performance equal or surpasses that of existing materials.
- .3 Comply with material and installation requirements specified in individual technical specification Sections.

3 EXECUTION

3.01 EXAMINATION

.1 Verify that utilities have been disconnected and capped.

.2 Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.

.3 Inventory and record the condition of items to be removed and reinstalled and items to be removed and salvaged.

.4 Notify the Departmental Representative where existing mechanical, electrical, or structural elements conflict with intended function or design:
- .1 Investigate and measure the nature and extent of conflict and submit a written report to Departmental Representative .
- .2 Departmental Representative will issue additional instructions or revise drawings as required to correct conflict.

.5 Engage a professional engineer to survey condition of building when removing elements that may result in structural deficiency or unplanned collapse of any portion of structure or adjacent structures during selective demolition operations.

.6 Perform surveys as the Work progresses to detect hazards resulting from selective demolition activities.

3.02 UTILITY SERVICES

.1 Coordinate existing services indicated to remain and protect them against damage during selective demolition operations in accordance with Section 01 35 16.

.2 Locate, identify, disconnect, and seal or cap off indicated utilities serving areas to be selectively demolished.
- .1 Arrange to shut off affected utilities with utility companies.
- .2 If utility services are required to be removed, relocated, or abandoned, before proceeding with selective demolition provide temporary utilities that bypass area of selective demolition and that maintain continuity of service to other parts of building.
- .3 Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit after bypassing.
- .4 Cut off pipe or conduit to a minimum of 25 mm below slab, and remove concrete mound.

.3 Coordinate with Mechanical and Electrical Divisions for shutting off, disconnecting, removing, and sealing or capping utilities.

.4 Do not start selective demolition work until utility disconnecting and sealing have been completed and verified in writing.

3.03 PREPARATION

.1 Drain, purge, or otherwise remove, collect, and dispose of chemicals, gases, explosives, acids, flammables, or other dangerous materials before proceeding with selective demolition operations.

.2 Conduct selective demolition and debris removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities:
- .1 Do not close or obstruct streets, walks, walkways, or other adjacent occupied or used facilities without permission from Departmental Representative and authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by governing regulations.
- .2 Erect temporary protection, such as walks, fences, railings, canopies, and covered passageways, where required by authorities having jurisdiction.
- .3 Protect existing site improvements, appurtenances, and landscaping to remain.
- .4 Erect a plainly visible fence around drip line of individual trees or around perimeter drip line of groups of trees to remain.

.3 Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain in accordance with Section 01 51 00, and as follows:
- .1 Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
- .2 Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and

interior areas.

.3 Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.

.4 Cover and protect furniture, furnishings, and equipment that have not been removed.

.4 Provide temporary enclosures for protection of existing building and construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities in accordance with Section 01 52 00 - Construction Facilities.

.1 Provide temporary weather tight enclosure for building exterior.

.2 Where heating or cooling is needed and permanent enclosure is not complete, provide insulated temporary enclosures.

.3 Coordinate enclosure with ventilating and material drying or curing requirements to avoid dangerous conditions and effects.

.5 Erect and maintain dustproof partitions and temporary enclosures to limit dust and dirt migration and to separate areas from fumes and noise in accordance with Section 01 51 00.

.6 Provide and maintain shoring, bracing, or structural support to preserve stability and prevent movement, settlement, or collapse of construction to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished:

.1 Strengthen or add new supports when required during progress of selective demolition.

3.04 POLLUTION CONTROLS

.1 Dust Control: Provide water mist, temporary enclosures or other suitable methods reviewed and accepted by the Departmental Representative to limit spread of dust and dirt. Comply with governing environmental protection regulations, and as limited below:

.1 Do not use water when it may damage existing construction or create hazardous or objectionable conditions, such as ice, flooding, and pollution.

.2 Wet mop floors to eliminate tracking of dirt, wipe down walls and doors of demolition enclosure. Vacuum carpeted areas.

.2 Remove and transport debris to prevent spillage on adjacent surfaces and areas.

.3 Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.

.4 Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

3.05 SELECTIVE DEMOLITION

.1 Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:

.1 Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition operations above each floor or tier before disturbing supporting members on the next lower level.
.2 Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping, to minimize disturbance of adjacent surfaces. Temporarily cover openings to remain.
.3 Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
.4 Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame cutting operations. Maintain fire watch and portable fire suppression devices during flame cutting operations.
.5 Maintain adequate ventilation when using cutting torches.
.6 Remove decayed, vermin infested, or otherwise dangerous or unsuitable materials and promptly dispose of off site.
.7 Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
.8 Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
.9 Dispose of demolished items and materials promptly.
.10 Return elements of construction and surfaces that are to remain to condition existing before selective demolition operations began.

.2 Removed and Reinstalled Items:
.1 Clean and repair items to functional condition adequate for intended re use. Paint equipment to match new equipment
.2 Pack or crate items after cleaning and repairing
.3 Identify contents of containers
.4 Protect items from damage during transport and storage
.5 Reinstall items in locations indicated
.6 Comply with installation requirements for new materials and equipment
.7 Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated

.3 Existing Items to Remain:
.1 Protect construction indicated to remain against damage and soiling during selective demolition
.2 Items may be removed to a suitable, protected storage location during selective demolition and cleaned and reinstalled in their original locations after selective demolition operations are complete

.4 Concrete:
.1 Demolish in small sections
.2 Cut concrete to a depth of at least 19 mm at junctures with construction to remain, using power driven saw. Cut concrete full depth at junctures with construction to remain and at regular intervals, using power driven saw, then remove concrete between saw cuts.

.3 Dislodge concrete from reinforcement at perimeter of areas being demolished, cut reinforcement, and then remove remainder of concrete indicated for selective demolition

.4 Neatly trim openings to dimensions indicated

.5 Concrete Slab Reinforcing:

.1 Locate location of reinforcing steel in concrete slabs prior to cutting or coring using non destructive, non ionizing radio frequency locators.

.2 Core concrete slabs to avoid reinforcing steel, electrical conduit or water pipes; adjust core location and coordinate with Representative Consultant where slab features interfere with core drilling.

.3 Notify the Representative Consultant immediately for further instructions where coring or cutting will damage existing slab features.

.6 Concrete Slabs on Grade: Saw cut perimeter of area to be demolished, then break up and remove.

.7 Below Grade Construction: Demolish foundation walls and other below grade construction including; but not limited to, the following:

.1 Basements

.2 Foundation walls

.3 Footings

.8 Roofing: Remove no more existing roofing than can be covered in one day by new roofing. Refer to Section Applicable Division 7 Section for new roofing requirements.

.9 Air Conditioning Equipment: Remove equipment without releasing refrigerants.

3.06 CLOSEOUT ACTIVITIES

.1 Patching and Repairs: Promptly repair damage to adjacent construction caused by selective demolition operations and as follows:

.1 Patch to produce surfaces suitable for new materials where repairs to existing surfaces are required,

.2 Completely fill holes and depressions in remaining existing masonry walls remain with an approved masonry patching material applied according to manufacturer's written recommendations.

.3 Restore exposed finishes of patched areas and extend restoration into adjoining construction in a manner that eliminates evidence of patching and refinishing in accordance with Section 02 41 19.23.

.2 Demolition Waste Disposal: Arrange for legal disposal and remove demolished materials to accredited provincial landfill site or alternative disposal site (recycle centre) except where explicitly noted otherwise for materials being salvaged for re use in new construction in accordance with Section 02 42 00 and as follows:

.1 Promptly dispose of demolished materials.

.2 Do not allow demolished materials to accumulate onsite.

.3 Do not burn demolished materials.

END OF SECTION

1 GENERAL

1.01 SUMMARY

.1 This Section includes the following:
- .1 Demolition and removal of selected portions of interior building components and finishes.
- .2 Repair procedures for selective demolition operations.

.2 This section does not include the following:
- .1 Removal of hazardous materials or asbestos abatement.
- .2 Demolition of exterior building components or structural elements.
- .3 Mechanical or electrical equipment, except as required to make minor modifications to allow the work to be completed.

.3 Drawings contain details that suggest directions for solving some of the major demolition and removal requirements for this project; Contractor is required to develop these details further by submitting a demolition plan prepared by a professional engineer employed by the Contractor.

1.02 REFERENCE STANDARDS

.1 American National Standards Institute (ANSI)
- .1 ANSI A10.8 2011, Safety Requirements for Scaffolding

.2 American Society for Testing and Materials (ASTM):
- .1 ASTM C 475/C 475M-15, Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board

.3 National Fire Protection Association (NFPA)
- .1 NFPA 241 13, Standard for Safeguarding Construction, Alteration, and Demolition Operations

1.03 DEFINITIONS

.1 Demolish: Detach items from existing construction and legally dispose of them off site, unless indicated to be removed and salvaged or removed and reinstalled.

.2 Remove and Salvage: Detach items from existing construction and deliver them to Representative Owner ready for reuse.

.3 Remove and Reinstall: Detach items from existing construction, prepare them for reuse, and reinstall them where indicated.

.4 Existing to Remain: Existing items of construction that are not removed and that are not otherwise indicated as being removed, removed and salvaged, or removed and reinstalled.

1.04 ADMINISTRATIVE REQUIREMENTS

.1 Coordination: Coordinate with Departmental Representative for the material ownership as follows:
- .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 Coordinate selective demolition work so that work of this Section adheres to aesthetic criteria established by the Drawings and specified dimensions with all elements in planes as drawn, maintaining their relationships with all other building elements.

.2 Pre Demolition Meeting: Convene pre-installation meeting 1 week prior to beginning work of this Section and on-site installation, with Contractor and Departmental Representative Consultant in accordance with Section 01 31 19 - Project Meetings to:
- .1 Confirm extent of salvaged and demolished materials
- .2 Review Contractor's demolition plan
  - .1 Verify existing site conditions adjacent to demolition work
  - .2 Coordination with other construction sub trades

.3 Hold project meetings every week month.

.4 Ensure key personnel site supervisor project manager subcontractor representatives attend.

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

1.05 ACTION AND INFORMATION SUBMITTALS

.1 Action Submittals: Provide the following submittals before starting any work of this Section:
- .1 Schedule of Selective Demolition Activities: Coordinate with Section 01 32 16.06 - Construction Progress Schedule, and indicate the following:
  - .1 Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity.
  - .2 Coordinate with Departmental Representative 's ongoing site operations, and limit the number of interruptions during regular business hours.
  - .3 Interruption of utility services.
  - .4 Coordination for shutoff, capping, and continuation of utility services.
  - .5 Use of elevator and stairs.
  - .6 Locations of temporary partitions and means of egress, including for others affected by selective demolition operations.
  - .7 Coordination with Departmental Representative 's continuing occupancy of portions of existing building.
- .2 Demolition 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, and as follows:

.1 Proposed Dust Control and Noise Control Measures: Submit statement or drawing that indicates the measures proposed for use, proposed locations, and proposed time frame for their operation. Departmental Representative reserves the right to make modifications where proposed methods interfere with the Departmental Representative 's ongoing operation

.2 Inventory: Submit a list of items that have been removed and salvaged after selective demolition is complete.

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

.4 Pre demolition Photographs: Submit photographs indicating existing conditions of adjoining construction and site improvements prior to starting Work. Include finish surfaces that may be misconstrued as damage caused by selective 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 architects and owners, for work of similar complexity and extent.

1.06 QUALITY ASSURANCE

.1 Regulatory Requirements: Perform work as follows; use most restrictive requirements where differences occur between the municipal, provincial and federal jurisdictions:

.1 Provincial and Federal Requirements: Perform work in accordance with governing environmental notification requirements and regulations of the Authority Having Jurisdiction.

.2 Municipal Requirements: Perform hauling and disposal operations in accordance with regulations of Authority Having Jurisdiction.

.2 Qualifications: Provide proof of qualifications when requested by Departmental Representative:

.1 Demolition Firm Qualifications: An experienced firm that has specialized in demolition work similar in material and extent to that indicated for this Project:

.1 Conform to the provincial Occupational Health and Safety Act and Regulation.

.2 Conform to Workers' Compensation Board Regulations.

.3 Conform to City of local municipal bylaws and regulations governing this type of work.

1.07 SITE CONDITIONS

.1 Representative Owner will occupy portions of building immediately adjacent to selective demolition area:
- .1 Conduct selective demolition so that building operations will not be disrupted.
- .2 Provide not less than 72 hours notice to Departmental Representative of activities that will affect building operations.

.2 Maintain access to existing means of egress, walkways, corridors, exits, and other adjacent occupied or used facilities in accordance with Section 01 35 16:
- .1 Do not close or obstruct means of egress, walkways, corridors, exits, or other occupied or used facilities without written acceptance from authorities having jurisdiction.

.3 Departmental Representative assumes no responsibility for condition of areas to be selectively demolished:
- .1 Conditions existing at time of Pre Bid Site Review will be maintained by Departmental Representative as far as practical.

.4 Discovery of Hazardous Substances: It is not expected that Hazardous Substances will be encountered in the Work; immediately notify Representative Consultant if materials suspected of containing hazardous substances are encountered and perform the following activities:
- .1 Refer to Section 01 41 00 - Regulatory Requirements for directives associated with specific material types.
- .2 Hazardous materials will be as defined in the Hazardous Materials Act.
- .3 Hazardous materials will be removed by Representative Owner before start of the Work.
- .4 If materials suspected of containing hazardous materials are encountered, do not disturb; immediately notify Representative Owner. Hazardous materials will be removed by Representative Owner under a separate contract or as a change to the Work.

2 PRODUCTS

2.01 TEMPORARY SUPPORT STRUCTURES

.1 Design temporary support structures required for demolition work and underpinning and other foundation supports necessary for the project using a qualified professional engineer registered or licensed in province of the Work.

2.02 DESCRIPTION

.1 This section of the Work includes, but is not necessarily limited to, the following:
- .1 Demolition, removal completely from site, and disposal of all identified components, materials, equipment and debris
- .2 Selective demolition to allow new walls, bulkheads, ceilings and other materials to meet existing construction as indicated
- .3 All material from demolition shall be removed from site immediately with no salvage, selling, sorting or burning permitted on site
- .4 Retain items indicated on drawings for re use in new construction

2.03 DEBRIS

.1 Make all arrangements for transport and disposal of all demolished materials from the site.

2.04 EQUIPMENT

.1 Provide all equipment required for safe and proper demolition of the building interiors indicated.

2.05 REPAIR MATERIALS

.1 Use repair materials identical to existing materials:
- .1 If identical materials are unavailable or cannot be used for exposed surfaces, use materials that visually match existing adjacent surfaces to the fullest extent possible.
- .2 Use a material whose installed performance equals or surpasses that of existing material.
- .3 Comply with material and installation requirements specified in individual Specification Sections.

.2 Floor Patching and Levelling Compounds: Cement based, trowelable, self levelling compounds compatible with specified floor finishes; gypsum based products are not acceptable for work of this Section.

.3 Concrete Unit Masonry: Lightweight concrete masonry units, and mortar, cut and trimmed to fit existing opening to be filled. Provide standard hollow core units, square end units and bond beam units as indicated on drawings.

.4 Prefinished Sheet Steel: Prefinished sheet steel, colour to match existing radiation cabinets, bent and profiled to match existing radiation cabinets.

.5 Gypsum Board Patching Compounds: Joint compound to ASTM C 475/C 475M, bedding and finishing types thinned to provide skim coat consistency to patch and prepare existing gypsum board walls ready for new finishes in accordance with Section 09 21 16 - Gypsum Board Systems.

3 EXECUTION

3.01 EXAMINATION

.1 Verify that utilities have been disconnected and capped.

.2 Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.

.3 Inventory and record the condition of items to be removed and reinstalled and items to be removed and salvaged.

.4 Notify the Departmental Representative where existing mechanical, electrical, or structural elements conflict with intended function or design:
- .1 Investigate and measure the nature and extent of conflict and submit a written report to Representative Consultant.
- .2 Representative Consultant will issue additional instructions or revise drawings as required to correct conflict.

.5 Perform surveys as the work progresses to detect hazards resulting from selective demolition activities.

3.02 UTILITY SERVICES

.1 Coordinate existing services indicated to remain and protect them against damage during selective demolition operations.

.2 Locate, identify, disconnect, and seal or cap off indicated utilities serving areas to be selectively demolished.
- .1 Arrange to shut off affected utilities with utility companies.
- .2 If utility services are required to be removed, relocated, or abandoned, before proceeding with selective demolition provide temporary utilities that bypass area of selective demolition and that maintain continuity of service to other parts of building.
- .3 Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit after bypassing.
- .4 Cut off pipe or conduit to a minimum of 25 mm below slab, and remove concrete mound. Patch concrete using cementitious grout.

.3 Coordinate with Mechanical and Electrical Divisions for shutting off, disconnecting, removing, and sealing or capping utilities.

.4 Do not start selective demolition work until utility disconnecting and sealing have been completed and verified in writing.

3.03 PREPARATION

.1 Identify and mark all equipment and materials identified to be retained by Departmental Representative or to be re used in subsequent construction. Separate and store items to be retained in an area away from area of demolition and protect from accidental disposal.

.2 Post warning signs on electrical lines and equipment that must remain energized to serve other areas during period of demolition.

.3 Confirm that all electrical and telephone service lines entering buildings are not disconnected.

.4 Do not disrupt active or energized utilities crossing the demolition site.

.5 Provide and maintain barricades, warning signs, protection for workmen and the public during the full extent of the Work. Read drawings carefully to ascertain extent of protection required.

.6 Mark all materials required to be re used, store in a safe place until ready for re installation.

.7 Adjust all junction boxes, receptacles and switch boxes flush with new wall construction where additional layers to existing construction are indicated.

.8 Remove permanent marker lines used or found on exposed surfaces and at surfaces indicated for subsequent finish materials. Mechanically remove permanent marker lines and associated substrates where permanent marker lines occur and patch surface. Sealing or priming over permanent marker lines is not acceptable.

3.04 CONCRETE SLAB REINFORCING

.1 Locate location of reinforcing steel in concrete slabs prior to cutting or coring using non destructive, non ionizing radio frequency locators.

.2 Core concrete slabs to avoid reinforcing steel, electrical conduit or water pipes; adjust core location and coordinate with Engineer where slab features interfere with core drilling.

.3 Notify the Departmental Representative immediately for further instructions where coring or cutting will damage existing slab features.

3.05 SELECTIVE DEMOLITION

.1 Demolish and dismantle work in a neat and orderly manner and in strict accordance with all regulations.

.2 At end of each day's work, leave Work in safe condition so that no part is in danger of toppling or falling.

.3 Demolish in a manner to minimize dusting and to prevent migration of dust.

.4 Selling or burning of materials on the site is not permitted.

.5 Remove concrete bases by cutting and chipping, take precautions against slab cracking and degradation. Grind edges smooth, fill and make level with self levelling grout.

.6 Fill all openings in concrete block walls with concrete masonry units, coursing to match existing, prepare ready to receive new finishes to match existing.

- .1 Provide bond beams in new openings cut into existing concrete masonry unit walls.
- .2 Provide finished end masonry units to patch and repair for new jamb sections in existing concrete masonry unit walls.

.7 Fill all openings in gypsum board walls with gypsum board and steel framing to match existing, skim coat to make wall smooth and even.

.8 Remove all wall coverings scheduled for demolition. Patch and repair wall surfaces with skim coat of gypsum board joint compound leaving wall surfaces smooth and even ready for new wall finishes.

.9 Patch and repair all walls, floor and ceilings damaged during demolition with material matching adjacent walls, prepare ready for new finishes.

.10 Patch and repair all radiation cabinets, mechanical equipment and electrical fixtures damaged or exposed during demolition to match adjacent finished surfaces.

3.06 PATCHING AND REPAIRING

.1 Floors and Walls:
.2 Where walls or partitions that are demolished extend from one finished area into another, patch and repair floor and wall surfaces in the new space.
.3 Provide a level and smooth surface having uniform finish colour, texture, and appearance.
.4 Remove existing floor and wall coverings and replace with new materials, if necessary, to achieve uniform colour and appearance.
.5 Patch with durable seams that are as invisible as possible.
.6 Provide materials and comply with installation requirements specified in other Sections of these Specifications.
.7 Where patching occurs in a painted surface, apply primer and intermediate paint coats over patch and apply final paint coat over entire unbroken surface containing patch. Provide additional coats until patch blends with adjacent surfaces.
.8 Where feasible, test and inspect patched areas after completion to demonstrate integrity of installation.

.2 Ceilings: patch, repair, or re hang existing ceilings as necessary to provide an even plane surface of uniform appearance.

3.07 PROTECTION

.1 Prevent debris from blocking drainage inlets and systems and ground draining, and protect material and electrical systems and services that must remain in operation.

.2 Arrange demolition and shoring work so that interference with the use of adjoining areas by the Representative Owner and users is minimized.

.3 Maintain safe access to and egress from occupied areas adjoining.

.4 Provide and maintain fire prevention equipment and alarms accessible during demolition.

3.08 CLEANING

.1 Develop Construction Waste Management Plan related to Work of this Section and in accordance and Section 01 74 19 - Waste Management and Disposal.

.2 Waste Management: Separate waste materials for reuse and recycling in accordance with Section 01 74 19 - Waste Management and Disposal, and as follows:
.1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

.3 Divert excess materials from landfill to site approved Representative Consultant.

.4 Promptly as the Work progresses, and on completion, clean up and remove from the site all rubbish and surplus material. Remove rubbish resulting from demolition work daily.

.5 Maintain access to exits clean and free of obstruction during removal of debris.

.6 Keep surrounding and adjoining roads, lanes, sidewalks, municipal rights of way clean and free of dirt, soil or debris that may be a hazard to vehicles or persons.

END OF SECTION

1 GENERAL

1.01 REFERENCE STANDARDS

.1 ASTM International
- .1 ASTM A 53/A 53M-12, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.
- .2 ASTM A 269M-15a, Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service.
- .3 ASTM A 307-14, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.

.2 CSA Group
- .1 CSA G40.20-13/G40.21-13, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
- .2 CAN/CSA G164-M92(R2003), Hot Dip Galvanizing of Irregularly Shaped Articles.
- .3 CSA S16-14, Design of Steel Structures.
- .4 CSA W48-14, Filler Metals and Allied Materials for Metal Arc Welding (Developed in co-operation with the Canadian Welding Bureau).
- .5 CSA W59-13, Welded Steel Construction (Metal Arc Welding) Metric.

.3 The Master Painters Institute (MPI)
- .1 Architectural Painting Specification Manual - current edition.

.4 ULC Standards
- .1 UL 2768-2011, Architectural Surface Coatings.
- .2 UL 2760-2011, Surface Coatings - Recycled Water-borne.

1.02 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:
- .1 Submit manufacturer's instructions, printed product literature and data sheets for sections plates pipe tubing bolts and include product characteristics, performance criteria, physical size, finish and limitations.
- .2 Submit two copies of WHMIS MSDS in accordance with Section 01 35 29.06 - Health and Safety Requirements.

.3 Shop Drawings:
- .1 Submit drawings stamped and signed by professional engineer registered or licensed in Province Territory, Canada.
- .2 Indicate materials, core thicknesses, finishes, connections, joints, method of anchorage, number of anchors, supports, reinforcement, details, and accessories.

1.03 QUALITY ASSURANCE

.1 Test Reports: submit certified test reports showing compliance with specified performance characteristics and physical properties.

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

1.04 DELIVERY, STORAGE AND HANDLING

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

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:
- .1 Store materials in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
- .2 Replace defective or damaged materials with new.

.4 Packaging Waste Management: remove for reuse and return by manufacturer of pallets, crates, padding, and packaging materials in accordance with Section 01 74 19 - Waste Management and Disposal.

2 PRODUCTS

2.01 MATERIALS

.1 Steel sections and plates: to CSA G40.20/G40.21, Grade 300W 350W.

.2 Steel pipe: to ASTM A 53/A 53M standard weight extra strong double extra strong, black galvanized finish.

.3 Welding materials: to CSA W59.

.4 Welding electrodes: to CSA W48 Series.

.5 Bolts and anchor bolts: to ASTM A 307.

.6 Stainless steel tubing: to ASTM A 269, Type 302 commercial grade seamless welded with AISI No. 4 finish.

.7 Grout: non-shrink, non-metallic, flowable, 15 MPa at 24 hours.

2.02 FABRICATION

.1 Fabricate work square, true, straight and accurate to required size, with joints closely fitted and properly secured.

.2 Use self-tapping shake-proof flat round oval headed screws on items requiring assembly by screws or as indicated.

.3 Where possible, fit and shop assemble work, ready for erection.

.4 Exposed welds continuous for length of each joint. File or grind exposed welds smooth and flush.

2.03 FINISHES

.1 Galvanizing: hot dipped galvanizing with zinc coating 600 g/m² to CAN/CSA-G164.

.2 Shop coat primer: MPI- INT EXT 5.1A MPI- INT EXT 5.1B in accordance with chemical component limits and restrictions requirements and VOC limits of UL 2768 UL 2760 GS-11.

.3 Zinc primer: zinc rich, ready mix to MPI-INT EXT 5.2C in accordance with chemical component limits and restrictions requirements and VOC limits of CCD-047a CCD-048 GS-11.

2.04 ISOLATION COATING

.1 Isolate aluminum from following components, by means of bituminous paint:
- .1 Dissimilar metals except stainless steel, zinc, or white bronze of small area.
- .2 Concrete, mortar and masonry.
- .3 Wood.

2.05 SHOP PAINTING

.1 Primer: VOC limit 250 g/L maximum to GS-11 UL 2768 UL 2760.

.2 Apply one shop coat of primer to metal items, with exception of galvanized or concrete encased items.

.3 Use primer unadulterated, as prepared by manufacturer. Paint on dry surfaces, free from rust, scale, grease. Paint when temperature minimum 7 degrees C.

.4 Clean surfaces to be field welded; do not paint.

2.06 ANGLE LINTELS

.1 Steel angles: galvanized prime painted, sizes indicated for openings. Provide 150 mm minimum bearing at ends.

.2 Weld or bolt back-to-back angles to profiles as indicated.

.3 Finish: shop painted.

2.07 PIPE RAILINGS

.1 Steel pipe: 50 mm nominal outside diameter, formed to shapes and sizes as indicated.

.2 Galvanize exterior interior pipe railings after fabrication. Shop coat prime interior railings after fabrication.

2.08 CORNER GUARDS

.1 Steel angle: x x mm thick x mm high, with 3 anchors each guard.

.2 Galvanized finish for exterior, prime paint for interior.
- .1 Primer: maximum VOC limit 250 g/L to GS-11 when applied onsite.

2.09 CHANNEL FRAMES

.1 Fabricate frames from steel, sizes of channel and opening as indicated.

.2 Weld channels together to form continuous frame for jambs and head of openings, sizes as indicated.

.3 Weld x x mm thick steel strap anchors to channel jamb frame at mm on centre.

.4 Finish: galvanized prime coat painted.

3 EXECUTION

3.01 EXAMINATION

.1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts acceptable for metal fabrications installation in accordance with manufacturer's written instructions.
- .1 Visually inspect substrate in presence of Departmental Representative.
- .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
- .3 Proceed with installation only after unacceptable conditions remedied and after receipt of written approval to proceed from Departmental Representative.

3.02 ERECTION - GENERAL

.1 Do welding work in accordance with CSA W59 unless specified otherwise.

.2 Erect metalwork square, plumb, straight, and true, accurately fitted, with tight joints and intersections.

.3 Provide suitable means of anchorage acceptable to Departmental Representative DCC Representative Consultant such as dowels, anchor clips, bar anchors, expansion bolts and shields, and toggles.

.4 Exposed fastening devices to match finish and be compatible with material through which they pass.

.5 Supply components for work by other trades in accordance with shop drawings and schedule.

.6 Make field connections with bolts to CSA S16 orWeld field connection.

.7 Deliver items over for casting into concrete and building into masonry together with setting templates to appropriate location and construction personnel.

.8 Touch-up rivets, field welds, bolts and burnt or scratched surfaces with primer after completion of:
.1 Primer: maximum VOC limit 250 g/L to GS-11.

.9 Touch-up galvanized surfaces with zinc rich primer where burned by field welding.
.1 Primer: maximum VOC limit 250 g/L to GS-11.

3.03 CLEANING

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

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

.3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 19 - Waste Management and Disposal.
.1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.04 PROTECTION

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

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

END OF SECTION

1. General

1.1 DEFINITIONS

.1 For the purposes of this project the following definitions shall apply:

.2 Structural Light Framing: All horizontal and vertical load bearing framing including members indicated as “Studs” on the drawings shall be considered to be No.2 Grade and better and shall be used through out unless prior approval is provided by the Departmental Representative.

.3 Stud Framing: Vertical framing members of non-load bearing wall systems may be considered as No.3 or Stud Grade and may only be used where prior approval is given by the Departmental Representative. Use of No.3 and Stud grade framing material will not be allowed for any horizontal applications.

.4 Metal rain screen framing to exterior sheathing.

1.2 REFERENCE STANDARDS

.1 American Society for Testing and Materials (ASTM):

.1. ASTM A307-04e1, Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength

.2. ASTM C954-00, Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs From 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness

.3. ASTM D60-07-02 Standard Test Method for Determining Formaldehyde Concentration in Air from Wood Products Using a Small Scale Chamber

.4. ASTM D6330-98(2003) Standard Practice for Determination of Volatile Organic Compounds (Excluding Formaldehyde) Emissions from Wood-Based Panels Using Small Environmental Chambers Under Defined Test Conditions

.5. ASTM E1333-96(2002) Standard Test Method for Determining Formaldehyde Concentrations in Air and Emission Rates from Wood Products Using a Large Chamber

.2 American Wood Preservers Association: AWPA Book of Standards, 2011

.3 CAN/CGSB 71.26M88, Standard for Adhesives for Field gluing Plywood to Lumber Framing for Floor Systems.

.4 CAN/CGSB 51.32M77, Sheathing, Membrane, Breather Type.

.5 Canadian Standards Association (CSA):

.1. CSA G164M92 (R2003), Hot Dip Galvanizing of Irregularly Shaped Articles

.2. CAN/CSA O80 Series97 (R2002), Wood Preservation

.3. CSA O8601, Engineering Design in Wood

.4. CSA O112 SeriesM1977(R2001), Adhesives for Wood

.5. CSA O121M1978 (R2003), Douglas Fir Plywood

.6. CAN/CSAO141M91(R1999), Softwood Lumber.

.7. CSA O151M1978(R2003), Canadian Softwood Plywood.

.8. CSA O325.092(R2003), Construction Sheathing

.9. CSA O437 Series 93 (R2003) OSB and Waferboard

.10. CSA S1601, Limit States Design of Steel Structures.

.6 National Lumber Grading Association (NLGA):

.1. NLGA SPS2-2000 Special Products Standards on Machine StressRated Lumber.

.2. NLGA Canadian Lumber Grading Rules

.7 Alberta Roofing Contractors Association (ARCA):

.1. Roofing Application Standards Manual

.8 Underwriters Laboratories Canada (ALC)

.1. CAN/ULC S10-203, Method of Test for Surface Burning Characteristics of Building Materials and Assemblies

.2. CAN/ULCS70-101, Thermal Insulation, Polystyrene Boards and Pipe Covering.

.9 Forest Stewardship Council (FSC)

1.3 SUBMITTALS

.1 Comply with requirements of Section 01 33 00.

.2 Product data: Unless otherwise indicated, submit the following for each type of product provided under work of this Section.

.1. Recycled Content:

.1. Engineered Wood Products: Indicate recycled content; indicate percentage of pre-consumer and post-consumer recycled content per unit of product. Indicate relative dollar value of recycled content product to total dollar value of product included in project.

.2. Salvaged Lumber: Provide documentation certifying products are from salvaged lumber sources.

.3. Recovered Lumber: Provide documentation certifying products are from recovered lumber sources.

.2. Local/Regional Materials:

.1. Indicate location of manufacturing facility; indicate distance between manufacturing facility and the project site.

.2. Indicate location of extraction, harvesting, and recovery; indicate distance between extraction, harvesting, and recovery and the project site.

.3. Indicate relative dollar value of local/regional materials to total dollar value of product included in project.

.3. VOC data:

.1. Adhesives:

1. Submit manufacturer's product data for adhesives. Indicate VOC limits of the product. Submit MSDS highlighting VOC limits.
2. Submit Green Seal Certification to GS-36 and description of the basis for certification.
3. Submit manufacturer's certification that products comply with SCAQMD #1168.

.3 Engineered Wood Products: Provide documentation that composite wood and agrifibre products are third-party certified as meeting the following ANSI standard requirements for formaldehyde emissions.

.1. ANSI A208.1

.4 Letter of Certification(s) for Sustainable Forestry:

.1. Forest Stewardship Council (FSC): Provide letter of certification signed by lumber supplier. Indicate compliance with FSC "Principles for Natural Forest Management" and identify certifying organization.

.1. Submit FSC certification numbers; identify each certified product on a line-item basis.

.2. Submit copies of invoices bearing the FSC certification numbers.

.5 Sustainable Forestry Board: Provide letter of certification signed by lumber supplier. Indicate compliance with the Sustainable Forestry Board's "Sustainable Forestry Initiative" (SFI) and identify certifying organization.

.1. Submit SFI certification numbers; identify each certified product on a line-item basis.

.2. Submit copies of invoices bearing the SFI certification numbers.

.2. Canadian Standards Association (CSA): Provide letter of certification signed by lumber supplier. Indicate compliance with the CSA and identify certifying organization.

.1. Submit CSA certification numbers; identify each certified product on a line-item basis.

.2. Submit copies of invoices bearing the CSA certification numbers.

1.4 QUALITY ASSURANCE

.1 Identify all lumber by grade stamp of an agency certified by Canadian Lumber Standards Accreditation Board.

.2 Sustainably Harvested Wood: Certification Organizations shall be accredited by the Forest Stewardship Council.

.3 Engineering Wood Products:

.1. Determine formaldehyde concentrations in air from wood products under test conditions of temperature and relative humidity in accordance with ASTM D6007 or ASTM E1333.

.2. Determine Volatile Organic Compounds (VOC), excluding formaldehyde, emitted from manufactured wood-based panels in accordance with ASTM D6330.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Protect materials from weather in transit and on the job site.

.2 Store materials a minimum of 150 mm off the ground on framework or blocking and cover with protective waterproof covering, providing for air circulation and ventilation under the covering.

.3 Do not store seasoned materials under conditions that will cause their moisture content to increase.

.4 Protect edges and corners of sheet materials from damage during handling and storage.

.5 Store preservative treated materials under cover, off the ground and protected from moisture.

1.6 CERTIFICATES

.1 For products treated with preservative or fire retardant by pressure impregnation submit following information certified by authorized signing officer of treatment plant:

.1. Information listed in AWPA M2 applicable to specified treatment.

.2. Moisture content after drying following treatment with waterborne preservative or fire retardant.

.3. Indicate acceptable types of paint, stain, and clear finishes that may be used over treated materials to be finished after treatment.

1.7 PRE-CONSTRUCTION MEETING

.1 A pre-construction will be held prior to starting structural framing and framing of sound rated partition walls.

.2 Construction of these wall assemblies requires a detailed knowledge of specific installation techniques. No work shall proceed until meeting has been completed.

.3 Attendees of meeting will include, but not be limited to, the Departmental Representative, Construction Manager, the Trade Contractor and their personnel.

2. Products

2.1 SUSTAINABLE PRODUCTS

.1 Fabricate all load bearing beams and columns from engineered lumber.

.2 Stud framing must consist of minimum 10% engineered lumber.

.3 Provide dimensional lumber from a third-party certified sustainable harvested source for floor,roof and wall framing.

2.2 GRADES

.1 Use CLS grade marked lumber conforming to the Standard Grading Rules for Canadian Lumber published by the National Lumber Grades Authority.

2.3 LUMBER

.1 Resource Management:

.1. Virgin Lumber: Lumber fabricated from old growth timber is not permitted. Provide sustainably harvested; certified or labelled in accordance with FSC guidelines.

.2 Engineered Wood Products:

.1. Toxicity/IEQ: Products shall contain no added urea-formaldehyde.

.3 Lumber: Structural Light Framing, and Structural Joists and Planks, meeting the following requirements:

.1. Maximum moisture content at time of installation; 8%.

.2. Maximum moisture content when used for attachment of drywall; 8%.

.3. Conforming to CAN/CSAO141 & NLGA Rules.

.4. Meeting requirements of the Building Code.

.5. Consisting of species group D (SPF); No. 2 grade or better and having the following minimum properties:

.1. Sizes: 38 mm or 89 mm wide by depth as indicated on drawings.

.2. Bending at extreme fibre (Fb): 11.8 MPa

.3. Longitudinal shear (Fv): 1.0 MPa

.4. Compression parallel to grain (Fc): 11.5 MPa

.5. Compression perpendicular to grain (Fcp): 4.6 MPa

.6. Tension parallel to grain (Ft): 5.5 MPa

.7. Modulus of elasticity (E/ EO5): 9500/6500

.4 Lumber: Light Framing, meeting the following requirements:

.1. Maximum moisture content at time of installation; 8%.

.2. Maximum moisture content when used for attachment of drywall; 8%.

.3. Conforming to CAN/CSAO141 & NLGA Rules.

.4. Meeting requirements of the Building Code.

.5. Consisting of species group D (SPF); Construction Grade or better and having the following minimum properties:

.1. Sizes: 38 mm maximum width by 89 mm maximum depth.

.2. Bending at extreme fibre (Fb): 15.3 MPa

.3. Longitudinal shear (Fv): 1.7 MPa

.4. Compression parallel to grain (Fc): 13.1 MPa

.5. Compression perpendicular to grain (Fcp): 5.3 MPa

.6. Tension parallel to grain (Ft): 6.2 MPa

.7. Modulus of elasticity (E/ EO5): 9000/5500 MPa

.5 Lumber: Stud Grade Materials, meeting the following requirements:

.1. Maximum moisture content at time of installation; 8%.

.2. Maximum moisture content when used for attachment of drywall; 8%.

.3. Conforming to CAN/CSAO141 & NLGA Rules.

.4. Meeting requirements of the Building Code.

.5. Consisting of species group D (SPF); Stud (No. 3) Grade or better and having the following minimum properties:

.1. Sizes: 38 mm or 89 mm wide by maximum 140 mm depth as noted on drawings.

.2. Bending at extreme fibre (Fb): 7.0 MPa

.3. Longitudinal shear (Fv): 1.0 MPa

.4. Compression parallel to grain (Fc): 7.0 MPa

.5. Compression perpendicular to grain (Fcp): 5.3 MPa

.6. Tension parallel to grain (Ft): 3.2 MPa

.7. Modulus of elasticity (E/ EO5): 9000/5500 MPa

.8. Finger jointed material will not be acceptable without written acceptance from the Departmental Representative.

2.4 SHEATHING MATERIALS

.1 Exterior Sheathing: [Oriented Strand Board (OSB) to CSA O437] [Douglas Fir or Western Softwood, Sheathing Grade, to CSA O121 or O151], thickness as indicated on drawings.

.2 Sheathing for structural shear walls and diaphragms:

.1. Plywood: Douglas Fir or Western Softwood, Sheathing Grade, to CSA O121 or O151, thickness as indicated on drawings.

.3 Other sheathing:

.1. FSC-Certified Sheathing: Douglas-fir sheathing plywood, thickness as indicated on drawings

.2. Use exterior grade, pressure preservative treated sheathing for all balcony decks, provide grade stamp or certification as noted for preservative pressure treated lumber.

.3. All sheathing used throughout for interior use shall be ULC labelled fire resistant, provide grade stamp or certification as noted for fire retardant pressure treated lumber.

.4. All plywood used in subfloor assembly shall be T&G Un-sanded Sheathing Grade Phenolic Bonded Douglas Fir Plywood with staggered joints.

.4 Underlayment:

.1. Plywood to CSA O325, 10 mm thick S1S, with no knot fillers detrimental to areas to receive finish floor products specified in Section 09 65 00 – Resilient Floor meeting the requirements of ASTM F148294 Wood Underlayment Products Available for Use Under Resilient Flooring.

.5 Pressure Preservative Treated Materials

.1. Pressure Preservative Treated Lumber: Lumber graded and stamped in accordance with specified grading rules and standards in accordance with CAN/CSA O80.20M and APWA Standard U1, and as follows:

.1. Wood Species: Pine or Pine-Fir, Spruce is not acceptable

.2. Grade: No.2 or better structural lumber; pieces grade stamped or shipment certified by letter of compliance

.3. Material having twisted grain or structural defects affecting integrity of lumber will not be acceptable for this project

.4. Use only material with radius edges, minimum 6 mm

.5. Kiln dry lumber materials to 19% moisture content or less after treatment

.6. Grading Authority: NLGA, AFPA, CLMA, or COFI

.7. Use Category: UC3B – Exterior Construction, Above Ground, Uncoated or Poor Water Run-Off

.8. Treatment: Waterborne, Alkaline Copper Quaternary (ACQ) with water repellent additive; containing no arsenic or chromium

.9. Retention: 6.4 kg/m3

.10. End Cut Preservative: Material type and name acceptable to ACQ preservative manufacturer

.2. Pressure Preservative Treated Plywood: Treated in accordance with CAN/CSA O80.9M using waterborne preservative to obtain minimum net retention of 4 kg/m³ of wood. Plywood or laminated materials shall be manufactured with exterior grade adhesives. After treatment, plywood shall be kiln dried to moisture content of 8% or less.

.6 Pressure Fire Retardant Treated Materials

.1. Treat by pressure impregnation with fire retardant chemicals in accordance with CAN/CSA O80.9M, CAN/CSA O80.20M and CAN/CSA O80.27M to provide classification for flame spread of not more than 25, smoke developed of not more than 75 in accordance with CAN4 S102.

.2. All fire retardant wood must comply with the requirements in AWPA Standard C20 for lumber and C27 for plywood.

.1. AWPA C20: Structural Lumber, FireRetardant Pressure Treatment, lumber materials shall only be of species listed. After treatment, lumber 50 mm or less in thickness shall be kiln dried to moisture content of 8% or less.

.2. AWPA C27: Plywood, FireRetardant Pressure Treatment, plywood or laminated materials shall be manufactured with exterior grade adhesives. After treatment, plywood shall be kiln dried to moisture content of 8% or less.

.3. All species to comply with CAN4 S102 for surface burning characteristics and shall bear identification showing classification and type of fire retardant.

.3. Each piece or bundle of fire retardant treated material or panel to bear ULC inspection label or stamp attesting to FRS rating indicating flame spread, smoke developed, and fuel contributed classification meeting AWPA standard C20 and C27 for Type A Use.

.4. Fire retardant chemicals used to treat lumber must comply with FR1 of AWPA Standard P17 and shall be free of halogens, sulphates and ammonium phosphate.

.5. Carbon steel, galvanized steel, aluminum, copper and red brass in contact with the fire retardant treated wood must exhibit corrosion rates less than one mil per year.

.6. Surface applied fire retardant treatments are not acceptable for structural applications.

2.5 METAL FRAMING CONNECTORS AND HANGERS

.1 Fabricated zinc coated steel products tested or designed in accordance with CSA O86.1 and CSA S16.1. Types and products as indicated on drawings.

.2 Acceptable materials:

.1. Simpson StrongTie Company Inc.

2.6 MISCELLANEOUS MATERIALS

.1 Nails: hot dipped galvanized for exterior work and pressure preservative or fire retardant treated materials.

.2 Surface Applied Wood Preservative:

.1. Containing minimum 5% clear pentachlorophenol in accordance with CAN/CSAO80 SeriesM89.

.2. Apply minimum of 2 coats applied in accordance with manufacturers written instructions.

.3 Screws for Fastening to Cold-Formed Metal Framing: ASTM C 954, except with wafer heads and reamer wings, length as recommended by screw manufacturer for material being fastened.

.4 Rough Hardware (bolts, nuts, washers, etc.): Hot dip galvanized in conformity to CSA G164 or Grade A low carbon steel, conforming to ASTM A307.

.5 Sill Gaskets: Adhesive backed, closed cell polyethylene or glass fibre strips that allow fastener penetration without displacement, 6 mm thick; width to suit plate size

.6 Air Seal: closed cell polyurethane or polyethylene.

.7 Adhesive:

.1. Toxicity/IEQ: Comply with applicable regulations regarding toxic and hazardous materials, GS-36 for Commercial Adhesive, South Coast Air Quality Management District Rule 1168, and as specified.

.8 Sealant: non-hardening butyl sealant as specified in Section 07 92 00 – Sealant.

3. Execution

3.1 ROUGH CARPENTRY WORK

.1 Accurately frame and properly assemble rough carpentry work. Include all necessary nails or other connectors.

3.2 WOOD FRAME CONSTRUCTION

.1 Space framing members at 406 mm O/C, or as indicated otherwise on drawings. Construct members of continuous pieces of longest possible length.

.2 Provide 38 x 89 mm blocking at 610 mm O/C between engineered floor joists for lateral support of wall plates where walls run parallel to joists.

.3 Make allowance for erection stresses. Securely brace members in place to maintain plumb and true until permanently fixed and held to structure.

.4 Install fire blocking as detailed.

.5 Fabricate wood frame construction to the requirements of the Building Code, Part 9, except where more stringent requirements are indicated on the drawings.

.6 Minimum sizes and spacing of members, thickness of materials, allowable species and lumber grades, shall meet the requirements of the above noted standards, unless indicated or specified otherwise.

.7 Minimize cutting of framing members for pipes, etc. by prior consultation with other trades. Cutting limitations in accordance with Part 9 of the Building Code.

.8 Construct framing as necessary to accommodate the work of other trades.

.9 Install sill gaskets to all top and bottom plates of exterior wood stud walls and seal all gaps with air seal.

.10 Install two stud corner framing utilizing gypsum board clips or scrap lumber for gypsum board backing in lieu of studs.

.11 Eliminate headers at non-load bearing interior and exterior openings.

3.3 FASTENINGS AND ROUGH HARDWARE

.1 Unless indicated otherwise, fasten to hollow masonry units with toggle bolts; to solid masonry or concrete surfaces with expansion shields and bolts.

.2 Where screws are required use lead or inorganic fibre plugs. Wood or organic plugs not permitted.

.3 Powder actuated fasteners may be used in lieu of bolts if approved by the Departmental Representative in writing prior to materials arriving on site.

.4 Provide all rough hardware such as nails, bolts, nuts, washers, screws, clips and strap metal.

3.4 BLOCKS, PLATES, STRAPPING AND FURRING

.1 Install wood plates where indicated. Erect plumb and true. Rigidly support and securely anchor to masonry, concrete, and metal stud framing, as required.

.2 Provide and install wood strapping or furring indicated on drawings or as required.

.3 Strapping: Shimmed out plumb, square and true to line. Use 19 mm x 64 mm at 406 mm o.c., unless indicated otherwise.

.4 Furring: As indicated.

.5 Install at least one row of solid blocking to wood stud walls not more than 2440 mm high, two rows if over 2440 mm high.

.6 Install blocking behind all sheathing and wallboard joints, and where required for items to be fixed to walls.

.7 Provide steel “z” girts for rainscreen as detailed on drawings. Materials utilized for rainscreen shall contain minimum 60% recycled content.

3.5 SHEATHING INSTALLATION

.1 Wall Sheathing:

.1. Install wall sheathing horizontally to wood framing using minimum 50 mm long coated nails at 150 mm along edges and 305 mm along vertical members in the middle of the sheets.

.2. Leave 2 mm to 3 mm between sheets to allow for shrinkage of wood framing.

.2 Shear Wall Sheathing:

.1. Refer to drawings for nailing patterns and installation details.

.2. Install blocking behind all sheathing joints at shearwalls. Refer to Structural drawings for details.

.3 Roof Sheathing:

.1. Install roof sheathing with length perpendicular to roof framing using 50 mm coated nails at 150 mm along edges and 305 mm along roof framing in the middle of the sheets.

.2. Nail size and pattern noted in .1 above is a minimum requirement. Where more stringent nailing pattern is indicated on drawings for diaphragm construction, the more stringent nailing pattern shall take precedence.

.3. Butt joints tightly together, support all edges of non tongue and grooved sheathing with 38 x 89 mm framing.

.4 Floor Sheathing:

.1. Install subfloor sheathing with length (direction of face orientation at right angles to floor framing, offset joints parallel to the floor joists. Panels shall be continuous over two or more supports.

.2. Use continuous bead of adhesive along each floor framing member and screw fasten at 150 mm along edges and 305 mm along floor framing in middle of sheathing.

.3. Nail size and pattern noted in .2 above is a minimum requirement. Where more stringent nailing pattern is indicated on drawings for diaphragm construction, the more stringent nailing pattern shall take precedence

.4. Butt joints tightly together, support all edges of plywood with 38 mm x 89 mm framing under nontongue and grooved joints of floor sheathing.

.5. Support all edges of tongue and grooved plywood with 38 mm x 89 mm framing where indicated for diaphragm construction.

.6. Leave a minimum 3 mm gap between subfloor sheathing panels where panels will be covered with underlayment. Butt panels into light contact for combined subfloor and underlayment sheathing.

.7. Drill holes in subfloor sheathing in ponded areas where flooding has occurred to allow standing water to drain from floor. Repair holes in combined subfloor and underlayment sheathing prior to installation of floor finish materials.

.5 Floor Underlayment:

.1. Install plywood underlayment using adhesive and nail fastened at 150 mm O/C through out entire piece of underlayment.

.2. Run sheets perpendicular to subfloor underlayment sheathing.

.3. Offset underlayment joints by a minimum of one joist space from sheathing joints, stagger end joints of underlayment.

.4. Butt end and edge joints into light contact to form a smooth and uniform surface ready for installation of floor finish materials.

.5. Maintain a minimum 6 mm space around room perimeters

.6. Install underlayment immediately prior to installation of flooring materials. Coordinate with Section 09 65 00 – Resilient Flooring and 09 68 00 – Carpets.

.7. Countersink all nails.

3.6 ROOF FRAMING, PARAPETS, AND PLATES

.1 Wood exposed to weather and water shall be pressure preservative treated. Wood in contact with roofing membranes shall not be pressure preservative treated.

.2 Construct wooden roof curbs around openings in the roof for vents, ducts, and flues. Curbs to be of height that will provide a minimum projection of 200 mm above the roof membrane. Ensure base for curb is same thickness as insulation.

.3 Form sloped tops to all wood parapet plates and wood up-stands more than 38 mm wide to roofs that receive metal flashings. Tops shall slope not less than 1 in 12. If details are at variance notify the Departmental Representative prior to construction for further instructions.

.4 Provide continuous wood backing for flashings.

.5 Provide solid wood or plywood sheathing and backing, a to receive membrane and metal flashings, all to roofer's requirements conforming to ARCA Manual. Fasten plywood sheathing securely to the walls of parapets with mechanical fasteners, nails will not be acceptable.

.6 Construct framing and blocking for membrane control joints generally as detailed, conforming to the RCABC Manual.

3.7 MISCELLANEOUS

.1 Install wood stud framing for temporary weather closure and cladding. Construct to resist wind pressures.

.2 Install bracing to masonry walls and piers during construction until structure provides sufficient lateral support.

.3 Install support for masonry lintels.

.4 Install plywood shims at window openings.

3.8 EXTERIOR CARPENTRY WORK

.1 Construct exterior work using galvanized nails, screws or bolts. Bolts, nuts and washers shall be hot dip galvanized.

.2 Plane all sides and backs; sand exposed faces and surfaces, round all edges to prevent checking of edges.

.3 Assemble as indicated, bolting wood strips together with rigid PVC spacers between each strip and through bolted.

.4 Countersink bolts and washers, fill holes with matching wood plugs.

.5 Apply two liberal coats of clear surface applied wood preservative, allowing the first coat to soak in completely prior to applying second coat in accordance with manufacturers instructions.

3.9 PRESSURE PRESERVATIVE TREATED WOOD INSTALLATION

.1 Comply with AWPA M4.

.2 Retreat surfaces exposed by cutting, trimming or boring with liberal brush application of preservative before installation. Allow first coating to fully soak into grain before applying second coating in accordance with manufacturer's instructions.

.3 Remove with fine sandpaper, chemical deposits on treated wood to receive applied finish.

.4 Use only hot dipped galvanized, corrosion resistant nail or screw fasteners. Staples are not acceptable for installation of preservative treated materials.

.5 Use waterborne preservative treated wood for:

.1. Wood in contact with masonry or concrete,

.2. Wood within 450 mm of grade,

.3. Wood decking and fence boards,

.4. Wood in contact with flashings

.5. Wood in contact with waterproofing membranes, confirm compatibility with membrane manufacturer prior to application.

.6 Use oil borne preservative treated wood for:

.1. Wood in contact with the ground,

.2. Wood in contact with freshwater,

.3. Landscaping timbers,

.4. Retaining walls,

.5. Piers or docks,

.6. Pilings,

.7. Bases of utility poles,

.8. Bases of fence posts.

3.10 PRESSURE FIRE RETARDANT TREATED WOOD INSTALLATION

.1 Field Cuts:

.1. Do not rip, mill or conduct extensive surfacing of fire retardant treated lumber, label will be voided.

.2. Only end cuts, drilling holes and joining cuts are permitted.

.3. All cuts on plywood will be considered end cuts.

.4. Fire retardant lumber and plywood can be given a light sanding for cosmetic cleaning after treatment.

.5. Pre-cut to the greatest extent possible before treating.

.2 Fire retardant treated plywood used in structural applications shall be graded or span-rated material.

.3 Use only hot dipped galvanized, corrosion resistant nail or screw fasteners. Staples are not acceptable for installation of fire resistant treated materials.

.4 Where humidity conditions are such that moisture may condense between hardware and treated wood, hardware shall be back primed with a corrosive inhibitive paint.

3.11 TELECOMMUNICATIONS AND DATA PANEL BOARDS

.1 Install 19 mm fir plywood boards on all walls in telephone and data rooms receiving wiring and equipment; minimum 1220 mm x 2440 mm panels on periphery walls over 300 mm wide, mounted 150 mm off of finished floor; coordinate installation and locations with Electrical. Finish with intumescent paint.

END OF SECTION

1 GENERAL

1.01 REFERENCE STANDARDS

.1 American National Standards Institute (ANSI)
- .1 ANSI/ASME 18.6.1 1981 (R2012) Wood Screws (Inch Series).
- .2 ANSI/BHMA A156.9-2010, Cabinet Hardware.
- .3 ANSI/BHMA A156.11-2014, Cabinet Locks.
- .4 ANSI/BHMA A156.16-2013, Auxiliary Hardware.
- .5 ANSI/BHMA A156.18-2012, Materials and Finishes.
- .6 ANSI/BHMA A156.20-2006, Strap and Tee Hinges and Hasps.
- .7 ANSI A208.1-09, Particleboard.
- .8 ANSI A208.2-09, Medium Density Fiberboard (MDF) for Interior Applications.
- .9 ANSI/HPVA HP-1-10, Standard for Hardwood and Decorative Plywood.

.2 Architectural Woodwork Manufacturers Association of Canada (AWMAC)
- .1 Architectural Woodwork Standards-31. (AWMAC AWS), 2017.

.3 ASTM International
- .1 ASTM A 153/A 153M-16, Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
- .2 ASTM E 1333-14, Standard Test Method for Determining Formaldehyde Concentrations in Air and Emission Rates From Wood Products Using a Large Chamber.
- .3 ASTM F 1667-13 Standard Specification for Driven Fasteners: Nails, Spikes and Staples.

.4 Canadian General Standards Board (CGSB)
- .1 CAN/CGSB-11.3-M87, Hardboard.
- .2 CAN/CGSB-71.20-M88, Adhesive, Contact, Brushable.
- .3 CAN/CGSB-71.19-M88, Adhesive, Contact, Sprayable.

.5 CSA International
- .1 CSA O112-M Series 1977 (R2006) Standards for Wood Adhesives.
- .2 CSA O121-08(R2013), Douglas Fir Plywood.
- .3 CSA O141-05 (R2014), Softwood Lumber.
- .4 CSA O151-14, Canadian Softwood Plywood.
- .5 CSA O153-M1980 (R2014), Poplar Plywood.
- .6 CAN/CSA-Z809-08(R2013), Sustainable Forest Management.

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

.7 National Electrical Manufacturers Association (NEMA)
- .1 ANSI/NEMA LD-3-05, High-Pressure Decorative Laminates (HPDL).

1.02 PRE-INSTALLATION MEETING

.1 Prior to enclosing framing, convene a meeting of contractor, casework fabricator, casework installer, framing subcontractor and Consultant.
- .1 Review locations of backing required for casework installation as shown on shop drawings and as necessary for installation.
- .2 Review method of attachment for backing to wall system.
- .3 Review coordination with other affected sections.

1.03 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:
- .1 Prepare and submit material list in accordance with AWMAC AWS, cross-referenced to specifications.
- .2 Include manufacturer's instructions, printed product literature, data sheets and catalogue pages for all materials and products to be incorporated into architectural wood casework and include product characteristics, performance criteria, dimensions and profiles, finish and limitations on use.
- .3 Submit two copies of WHMIS MSDS in accordance with Section 01 35 29.06 - Health and Safety Requirements 01 35 43 - Environmental Procedures.

.3 Hardware List:
- .1 Submit hardware list cross-referenced to specifications.
- .2 Include manufacturer's specification sheets indicating name, model, material, function, finish, BHMA designations and other pertinent information.

.4 Shop Drawings:
- .1 Prepare and submit shop drawings in accordance with AWMAC AWS and as follows.
- .2 Submit two sets of shop drawings for initial review in accordance with requirements of Division 01. Revise as directed, submit six copies for final acceptance and distribution.
- .3 Indicate details of construction, profiles, jointing, fastening and other related details.
  - .1 Scales: profiles full size, details half full size.
- .4 Indicate materials, thicknesses, finishes and hardware.
- .5 Indicate locations of service outlets in casework, typical and special installation conditions, and connections, attachments, anchorage and location of exposed fastenings.
- .6 Show location on casework elevations of backing required in supporting structure for attachment of casework.
- .7 Indicate AWMAC AWS quality grade where different from predominant grade specified.
- .8 Include color schedule of all casework items, including all countertop, exposed, and semi-exposed cabinet finishes, finish material manufacturer, pattern, and color.

.5 Samples:
- .1 Prepare and submit samples in accordance with AWMAC AWS and as follows.
- .2 Apply sample finishes to specified substrate or core material minimum 300 x 300 mm to match designer sample. For veneers with transparent finish submit three samples to illustrate range and colour of grain expected.
- .3 Shop applied coatings:
  - .1 For transparent finish, submit triplicate samples of each species and cut of wood to be used, finished to match project sample as specified.
  - .2 For opaque finish, submit triplicate samples for each colour selection, finished to match project sample as specified.
- .4 Submit duplicate samples of laminated plastic for each specified colour selection.
- .5 Submit duplicate samples of laminated plastic joints, edging, cutouts and post-formed profiles.
- .6 Furnish four samples of each lumber and composite panel material to Contractor for preparation of field applied finish samples in accordance with Section 09 91 23 Interior Painting.
- .7 Certifications: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
- .8 Submit statement of experience and qualifications of architectural wood casework fabricator.

1.04 QUALITY ASSURANCE

.1 Perform Work of this Section by single architectural wood casework fabricator with minimum 5 years of current architectural casework production experience and having completed minimum one project in the past 5 years with value within 20% of the cost of the work of this Section.

1.05 DELIVERY, STORAGE AND HANDLING

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

.2 Deliver wood casework only when area of work is enclosed, plaster and concrete work is dry, and area is broom clean and site environmental conditions are acceptable for installation.

.3 Protect millwork against dampness and damage during and after delivery.

.4 Store millwork in ventilated areas, protected from extreme changes of temperature and humidity, and within range recommended by AWMAC AWS for location of project.

.5 Store materials indoors in dry location in clean, dry, well-ventilated area.

.6 Protect architectural woodwork and hardware from nicks, scratches, and

blemishes.

.7 Replace defective or damaged materials with new.

.8 Waste Management: for packaging and materials, in accordance with Section 01 74 19 - Waste Management and Disposal.

2 PRODUCTS

2.01 QUALITY GRADE

.1 Provide all materials and perform all fabrication in accordance with AWMAC AWS Custom Grade and as follows, except where specified otherwise:

.2 In case of conflict between Contract Documents and AWMAC AWS grade requirements, Contract Documents govern.

2.02 LUMBER

.1 Softwood and Hardwood Lumber: Sound lumber to specified AWMAC AWS quality grade requirements, kiln-dried to moisture content recommended by AWMAC AWS for location of the Work.

.2 Machine stress-rated lumber is acceptable for all purposes.

.3 Face framing, pulls, trims, molding, edge-banding in profiles indicated.

2.03 PANEL MATERIALS

.1 Interior mat-formed wood particleboard: to ANSI/NPA A208.1, industrial grade M-2 or M-3, medium density (640-800 kg/m3), thickness 19 mm unless indicated otherwise.

.1 Use moisture resistant grade 2-M-2 or 2-M-3 for countertops and splash-backs to receive plumbing fixtures.

.2 MDF (medium density fibreboard) core: to ANSI A208.2, density 769 kg/mì, Grade , 19 mm thick unless indicated otherwise

.1 Use moisture resistant MR grade for countertops and splash-backs to receive plumbing fixtures.

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

.4 Hardwood plywood: to CHPA grading rules ANSI/HPVA HP-1.

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

.6 Poplar plywood (PP): to CSA O153, standard construction.

.7 Hardboard: To CAN/CGSB-11.3.

2.04 LAMINATED PLASTIC MATERIALS

.1 Laminated plastic for flatwork: to NEMA LD3.
- .1 High pressure decorative laminated (HPDL) plastic.
  - .1 Type: GP (general purpose).
  - .2 Horizontal Surfaces: HGS HGL to suit application, 1.0 1.2 mm thick.
  - .3 Vertical Surfaces: VDS VGL to suit application, 0.5 0.71 mm thick.
  - .4 Colour: integral colour throughout , multilayered.
  - .5 Pattern: solid woodgrain printed pattern metallic.
  - .6 Finish: gloss satin furniture matt textured embossed.
- .2 Laminated plastic for postforming work: to NEMA LD3.
  - .1 Type: postforming.
  - .2 Grade: HGP VGP.
  - .3 Size: 0.7 1.0 mm thick.
  - .4 Colour: integral colour throughout , multilayered.
  - .5 Pattern: solid woodgrain printed pattern metallic.
  - .6 Finish: gloss satin furniture matt textured embossed.
- .3 Laminated plastic for backing sheet:
  - .1 Type: backer.
  - .2 Grade: BKH BKM BKV BKL.
  - .3 Thickness: not less than 0.5 mm thick or same thickness as face laminate.
  - .4 Colour: same colour as face laminate.
- .4 Laminated plastic liner sheet: CLS grade, mm thick, white almond colour.
- .5 Thermofused Melamine: to NEMA LD3 Grade LPDL, .
  - .1 High wear resistant thermofused melamine: equal or exceed 400 cycles (Minimum standard for HPL abrasion test).
- .6 Laminated plastic fire retardant: to NEMA LD3.
  - .1 Type: flame retardant.
  - .2 Grade: SGF HGF VGF.
  - .3 Size: 0.76 1.016 1.27 mm thick.
  - .4 Colour: integral colour throughout , multilayered.
  - .5 Pattern: solid woodgrain printed pattern metallic.
  - .6 Finish: gloss satin furniture matt textured embossed.
- .7 Edge finishing for doors, drawer fronts, shelves and false fronts:
  - .1 HPDL to match face.
  - .2 PVC ABS: solid colour to match face , mm thick.
  - .3 Matching melamine and polyester overlay edge strip with thermoplastic adhesive.
  - .4 Edges dadoed or saw kerfed to take plastic "T" moulding in width and colour to match face.
- .8 Laminated plastic adhesive:
  - .1 Adhesive: , urea resin adhesive to CSA O112 contact adhesive to CAN/CGSB-71.20 resorcinol resin adhesive to CSA O112.10 polyvinyl adhesive to CSA O112-M two component epoxy thermosetting adhesive.

2.05 CASEWORK FABRICATION - GENERAL

.1 Fabricate casework of specified core and surface finish materials to specified AWMAC AWS quality grade.
- .1 Construction type: frameless face frame.
- .2 Door-cabinet interface: flush overlay reveal overlay with mm gap lipped flush flush inset.

.2 Set nails and countersink screws apply stained plain wood filler to indentations, sand smooth and leave ready to receive finish.

.3 Shop install cabinet hardware for doors, shelves and drawers. Recess shelf standards unless noted otherwise.

.4 Shelving to cabinetwork to be adjustable unless otherwise noted.

.5 Provide cutouts for plumbing fixtures, inserts, appliances, outlet boxes and other fixtures.

.6 Shop assemble work for delivery to site in size easily handled and to ensure passage through building openings.

.7 Obtain governing dimensions before fabricating items which are to accommodate or abut appliances, equipment and other materials.

2.06 LAMINATED PLASTIC CASEWORK FABRICATION

.1 Do laminated plastic fabrication in compliance with NEMA LD3, Annex A and specified AWMAC AWS quality grade.

.2 Ensure adjacent parts of continuous laminate work match in colour and pattern.

.3 Veneer laminated plastic to core material in accordance with adhesive manufacturer's instructions. Ensure core and laminate profiles coincide to provide continuous support and bond over entire surface. Use continuous lengths up to 2400 3000 mm. Keep joints 600 mm from sink cutouts.

.4 Form shaped profiles and bends as indicated, using post-forming grade laminate to laminate manufacturer's instructions.

.5 Use straight self-edging laminate strip for flatwork to cover exposed edge of core material. Chamfer exposed edges uniformly at approximately 20 degrees. Do not mitre laminate edges.

.6 Apply laminate backing sheet to reverse side of core of plastic laminate work.

.7 Apply laminated plastic liner sheet to interior of cabinetry where indicated.

.8 Drawer Construction:
- .1 Sides:
  - .1 Custom grade: LPDL (melamine) or HPDL on particleboard MDF, thickness 12 16 mm.

.2 Premium grade: 7-ply veneer core with HPDL faces.

.2 Bottoms: Tempered hardboard MDF with melamine surfaces Hardwood plywood of same species as drawer sides, thickness 6 mm.

.3 Joinery: Meeting requirements of AWMAC for Grade specified.

.1 Sides, front and back: Miter fold Doweled Dowel screwed Nailed lock joints Biscuit splined Multiple dovetailed.

.4 Drawer bottoms held in place with drawer hardware to sides and mechanically fastened to back and sub front fully housed into sides and sub front and mechanically fastened to back or plowed into back

2.07 WOOD CASEWORK FABRICATION

.1 Fabricate casework bodies of specified veneered plywood panel materials of specified veneers laid up as specified in accordance with AWMAC AWS requirements for grade specified and as follows.

.1 Exposed interior surfaces: Veneer of same species and cut and grade as exposed exterior surfaces.

.2 Semi-exposed surfaces: Veneer of same species as exposed exterior surfaces low pressure melamine overlay in solid woodgrain colour.

.2 Fabricate door, drawer and panel surfaces of specified veneered plywood panel materials of specified veneers laid up as specified.

.3 Drawer construction:

.1 Sides:

.1 AWMAC AWS Custom grade: solid wood of manufacturer's species option LPDL melamine surface.

.2 AWMAC AWS Premium grade: prefinished seven or nine ply hardwood veneer core with no internal voids prefinished solid hardwood, 12 16 thickness.

.2 Bottoms: Tempered hardboard MDF with melamine surfaces Hardwood plywood of same species as drawer sides, 6 mm thick.

.3 Joinery: Meeting requirements of AWMAC AWS for Grade specified.

.1 Sides, front and back: Miter fold Doweled Dowel screwed Nailed lock joints Biscuit splined Multiple dovetailed

.2 Drawer bottoms held in place with drawer hardware to sides and mechanically fastened to back and sub front fully housed into sides and sub front and mechanically fastened to back or plowed into back.

2.08 CABINET HARDWARE

.1 Cabinet hardware: to AWMAC AWS quality grade specified and to ANSI/BHMA A156.9, designated by letter B and numeral identifiers as listed below.

.2 Finish:

.1 Exposed hardware: .

.2 Semi-exposed hardware: Manufacturer's standard finish .

.3 Casework door hinges: five knuckle Grade 1 hinges concealed European style Grade II hinges minimum 120§ 170° opening type ,

.4 Other hinges: butt concealed continuous full surface olive knuckle pivot self-closing semi-concealed hinge, type , .

.5 Pulls: back mounted surface mounted flush pull, type , design (describe), with back plate, type B02191, finished to .

.6 Knobs: back mounted surface mounted knob, type , design (describe), with back plate, type B02181, finished to .

.7 Latches: elbow thumb bar turn child resistant touch or secret panel latch, type , finished to .

.8 Catches: friction roller spring magnetic touch or secret panel catch, type , finished to .

.9 Shelf rests and standards: shelf rest installed in holes drilled, type B04013 adjustable shelf standards, type , with open closed shelf rests, type , finished to .

.10 Shelf brackets and standards: ornamental shelf support, design (describe), type vertical slotted shelf standard, type , with shelf brackets, type , for mm wide shelves, finished to .

.11 Drawer slides:
- .1 Slide type: bottom edge mounted bottom center mounted center top mounted side mounted drawer slides, type .
- .2 Extension and capacity: ó extension full extension over extension meeting requirements of AWMAC AWS for type and size of drawer.
- .3 File drawer slides: full extension.

.12 Rotating shelves: full round notched rotating shelves, type , size, with 180-degree rotatable shelf mechanism, type .

.13 Pull up shelf supports: adjustable tension, lock in up position self supports, type B06033.

.14 Track and guides for sliding panels: surface or recessed mounted with anti-friction inserts, type .

.15 Sliding glass door hardware: Top-hung Bottom rollers.

2.09 CABINET LOCKS

.1 Provide locks as shown on elevations at all cabinet doors and drawers.

.2 Cabinet locks: to ANSI/BHMA A156.11, designated by letter E and numeral identifiers as listed below.
- .1 Door or drawer locks: surface mounted half mortised into back of door or drawer, type , grade .
- .2 Sliding door locks: type , grade .
- .3 Glass door locks: type , grade .
- .4 Elbow catches: at all double doors with locks.

.3 Keying: All locks keyed alike Each room keyed alike Keyed as scheduled.
- .1 Provide keys per lock.
- .2 Provide master keys.
- .3 Stamp keying code numbers on keys and cylinders.

2.10 ACCESSORIES

.1 Wood screws: copper brass stainless steel steel plain, type and size to suit application.

.2 Nails and staples: to CSA B111 and ASTM F 1667.

.3 Splines: wood plastic metal.

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

2.11 LAMINATED PLASTIC COUNTERTOPS

- .1 Laminated plastic for flatwork: to NEMA LD3.
- .2 Type: general purpose.
- .3 Grade: HGS HGL.
- .4 Size: 1.0 1.2 mm thick.
- .5 Colour: integral colour throughout, multilayered.
- .6 Pattern: solid woodgrain printed pattern metallic.
- .7 Finish: gloss satin furniture matt textured embossed.

.2 Laminated plastic for post-forming work: to NEMA LD3.
- .1 Type: post-forming.
- .2 Grade: HGS HGL.
- .3 Size: 0.76 1.016 mm thick.
- .4 Colour: integral colour throughout, multilayered.
- .5 Pattern: solid woodgrain printed pattern metallic.
- .6 Finish: gloss satin furniture matt textured embossed.

.3 Core material: particleboard MDF exterior grade hardwood plywood with a non-telegraphing grain.
- .1 Countertops to receive plumbing fixtures: Water resistant particle board Water resistant MDF Veneer core plywood with type II adhesive.

.4 Back splashes: butt joint cove per drawings, mm high.

.5 Front edges: self-edge no drip bullnose edge waterfall edge no drip tilt edge 3 mm PVC edge wood edge As shown on plans.

3 EXECUTION

3.01 EXAMINATION

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

.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.

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

3.02 INSTALLATION

.1 Install architectural wood casework in accordance with AWMAC AWS grade for respective items.

.2 In case of conflict between Contract Documents and AWMAC AWS grade requirements, Contract Documents govern.

.3 Install prefinished millwork at locations shown on drawings.
.1 Position accurately, level, plumb straight.

.4 Fasten and anchor millwork securely.
.1 Supply and install heavy duty fixture attachments for wall mounted cabinets.

.5 Countersink mechanical fasteners at exposed and semi-exposed surfaces, excluding installation attachment screws and screws securing cabinets end to end.

.6 Use draw bolts in countertop joints.

.7 Scribe and cut as required to fit abutting walls and to fit properly into recesses and to accommodate piping, columns, fixtures, outlets or other projecting, intersecting or penetrating objects.

.8 At junction of plastic laminate counter back splash and adjacent wall finish, apply small bead of sealant in accordance with Section 07 92 00 - Joint Sealants.

.9 Apply moisture barrier between wood framing members and masonry or cementitious construction.

.10 Fit hardware accurately and securely in accordance with manufacturer's written instructions.

.11 Make cutouts for inset equipment and fixtures using templates provided.

3.03 CLEANING

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

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.
.1 Clean millwork and cabinet work inside cupboards and drawers and outside surfaces.
.2 Remove excess glue, pencil and ink marks from surfaces.

.3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 19 - Waste Management and Disposal.

3.04 PROTECTION

.1 Protect millwork and cabinet work from damage until final inspection.

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

.3 Repair damage to adjacent materials caused by architectural woodwork installation.

END OF SECTION

1 GENERAL

1.01 REFERENCE STANDARDS

.1 ASTM International
- .1 ASTM C 208-12, Standard Specification for Cellulosic Fiber Insulating Board.
- .2 ASTM C 612-14, Standard Specification for Mineral Fibre Block and Board Thermal Insulation.
- .3 ASTM E 96/E 96M-13, Standard Test Methods for Water Vapour Transmission of Materials.

.2 Canadian General Standards Board (CGSB)
- .1 CGSB 71-GP-24M-AMEND-77(R1983), Adhesive, Flexible, for Bonding Cellular polystyrene Insulation.

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

.4 Underwriters Laboratories of Canada (ULC)
- .1 CAN/ULC-S701-11, Standard for Thermal Insulation, Polystyrene, Boards and Pipe Coverings.
- .2 CAN/ULC-S702-2012, Standard for Mineral Fibre Insulation for Buildings.

1.02 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 board insulation and include product characteristics, performance criteria, physical size, finish and limitations.
- .2 Submit 2 copies of WHMIS MSDS in accordance with Section 01 35 29.06 - Health and Safety Requirements.

.3 Manufacturer's Instructions:
- .1 Submit manufacturer's installation instructions.

1.03 DELIVERY, STORAGE AND HANDLING

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

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:
- .1 Store materials off ground indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
- .2 Store and protect specified materials from nicks, scratches, and

blemishes.

.3 Replace defective or damaged materials with new.

.4 Packaging Waste Management: remove for reuse and return by manufacturer of pallets, crates, padding, and packaging materials in accordance with Section 01 74 19 - Waste Management and Disposal.

2 PRODUCTS

2.01 INSULATION

.1 Extruded polystyrene (XPS)Expanded polystyrene (EPS): to CAN/ULC-S701.
- .1 Type: 2 4.
- .2 Compressive strength: .
- .3 Thickness: mm as indicated.
- .4 Size: .
- .5 Edges: square shiplappedvented.

.2 Mineral fibre board: to CAN/ULC-S702 ASTM C 726 ASTM C 612.
- .1 Type: 1 2 3.
- .2 Density: 48 72 112 kg/m³.
- .3 Surfaces: unsurfaced asphalt and fibre glass scrim reinforcement and kraft paper kraft paper foil.
- .4 Thickness: mm as indicated.
- .5 Size: .
- .6 Breather membrane for type 2: minimum permeance 300 ng/(Pa.s.m²).
- .7 Vapour barrier for type 3: maximum permeance 60 ng/(Pa.s.m²).

.3 Adhesive (for polystyrene): to CGSB 71-GP-24M.
- .1 Type: .
- .2 Class: .
- .3 VOC emission: .

2.02 ACCESSORIES

.1 Insulation clips: impale type, perforated 50 x 50 mm cold rolled carbon steel 0.8 mm thick, adhesive back, spindle of 2.5 mm diameter annealed steel, length to suit insulation, 25 mm diameter washers of self locking type.

3 EXECUTION

3.01 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for board insulation application 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.

3.02 INSTALLATION

.1 Install insulation after building substrate materials are dry.

.2 Install insulation to maintain continuity of thermal protection to building elements and spaces.

.3 Fit insulation tight around electrical boxes, plumbing and heating pipes and ducts, around exterior doors and windows and other protrusions.

.4 Keep insulation minimum 75 mm from heat emitting devices such as recessed light fixtures, and minimum 50 mm from sidewalls of CAN/ULC-S604 type A chimneys and CSA B149.1 and CSA B149.2 type B and L vents.

.5 Cut and trim insulation neatly to fit spaces. Butt joints tightly, offset vertical joints. Use only insulation boards free from chipped or broken edges. Use largest possible dimensions to reduce number of joints.

.6 Offset both vertical and horizontal joints in multiple layer applications.

.7 Do not enclose insulation until it has been inspected and approved by Departmental Representative.

3.03 RIGID INSULATION INSTALLATION

.1 Apply Type adhesive to polystyrene urethane mineral fibre insulation board substrate at rate of L/m² by notched trowel in accordance with manufacturer's recommendations.

.2 Imbed insulation boards into vapour barrier type adhesive, applied as specified, prior to skinning of adhesive.

.3 In addition to adhesive, install mineral fibre insulation boards with insulation clips and disk, 2 per 600 x 1200 mm board minimum, fit boards tight, cut off fastener spindle 3 mm beyond disk.

.4 Leave insulation board joints unbonded over line of expansion and control joints. Bond a continuous 150 mm wide 0.15 mm modified bituminous membrane over expansion and control joints using compatible adhesive and primer before application of insulation.

3.04 PERIMETER FOUNDATION INSULATION

.1 Interior application: extend boards mm vertically below bottom of finish floor slab as indicated, installed on inside face of perimeter foundation walls.

.2 Exterior application: extend boards mm minimum below finish grade as indicated to top of footing. Install on exterior face of perimeter foundation wall with adhesive.

.3 Under slab application: extend boards mm in from perimeter foundation wall as indicated. Lay boards on level compacted fill.

.4 Perimeter heating duct application: compact walls of heating duct trench to form solid backing. Attach insulation boards to perimeter foundation wall extending from underside of finish floor to 100 mm below bottom of heating duct. Lay insulation boards in bottom of heating duct trench, extend to 150 mm beyond heating duct 600 mm minimum from inside face of perimeter foundation wall. Secure insulation in place to prevent displacement.

3.05 CAVITY WALL INSTALLATION

.1 Install polystyrene urethane mineral fibre insulation boards on outer surface of inner wythe of wall cavity over impaling clips on bed of adhesive.

3.06 CLEANING

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

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

.3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 19 - Waste Management and Disposal.

END OF SECTION

1 General

1.01 INTENT

.1 Foam-in-place insulation to exterior metal door frames and window frames.

.2 Foam-in-place insulation around protrusions through the exterior wall envelope and juncture of different cladding materials.

1.02 REFERENCES

.1 American Society for Testing and Materials (ASTM):

.1 ASTM C273-00e1, Standard test method for shear properties of sandwich core materials
.2 ASTM D1622-03, Standard test methods for apparent density of rigid cellular plastics
.3 ASTM D1621-04, Standard test methods for compressive properties of rigid cellular plastics
.4 ASTM D1623-03, Standard test methods for tensile and tensile adhesion properties of rigid cellular plastics
.5 ASTM D2842-01, Standard test methods for water absorption of rigid cellular plastics
.6 ASTM E96-00e1, Standard test method for water vapour transmission of materials

1.03 QUALITY ASSURANCE

.1 Cooperate and coordinate with the requirements of other units of work specified in other sections.

1.04 PROJECT CONDITIONS

.1 Apply foam-in-place insulation only when substrate and ambient temperatures are within the prescribed limits.

.2 Ensure that temperature is maintained throughout the curing period.

2 Products

2.01 MATERIALS

.1 Insulation: One component rigid urethane foam with the following physical properties:

Density (ASTM D1622):	30.3 kg/m³
Compressive Strength (ASTM D1621):	57.5 kPa
Compressive Modulus (10% deflection):	848 kPa
Tensile Strength (ASTM D1623):	133.5 kPa
Flatwise Shear (ASTM C273):	58.5 kPa
Thermal Resistance:	1.41 RSI/25 mm thickness
Water Absorption (ASTM D2842):	3.0 kg/H20/m²
Water Vapour Transmission (ASTM E96):	2.327 perms

3 Execution

3.01 SURFACE PREPARATION/EXISTING CONDITIONS

.1 Clean spaces that are to receive insulation, of dirt, dust, grease, loose material or other foreign matter that may inhibit adhesion.

.2 Provide sufficient ventilation during and until insulation has cured, to ensure safe working conditions. Introduce fresh air and exhaust air continuously during the 24-hour period after application.

.3 Protect adjacent surfaces from overspray and dusting.

.4 Prior to application, slightly moisten surfaces to which foam-in-place insulation is being applied, to accelerate curing.

.5 Temporarily brace frames as may be required to prevent possible bowing of frames due to over expansion of the foam-in-place insulation.

3.02 INSTALLATION STEEL DOOR FRAMES

.1 Fill exterior hollow metal door frames 75% full with foam-in-place insulation prior to installation of frames. Fill the remainder of the frame after installation, through the gap between the frame and the wall construction.

3.03 INSTALLATION/AIR SEAL AROUND EXTERIOR WINDOW AND DOOR FRAMES

.1 Install foam-in-place insulation around all exterior window frames to maintain continuity of the thermal barrier, after air barrier has been installed and sealed to window frames.

.2 Ensure that foam completely fills spaces, without voids, and that voids, and that foam is continuous at corners.

3.04 INSTALLATION/AROUND PROTRUSIONS THROUGH AIR SEAL

.1 Install foam-in-place insulation around all protrusions through the exterior building envelope to achieve and maintain continuity of air/vapour seal.

3.05 CLEAN UP

.1 Cut back excess foam-in-place insulation once cured, flush with surrounding surfaces, or recess back for application of sealant as specified in Section 07 92 00.

.2 Upon completion of foam-in-place insulation work, clean adjacent surfaces of overspray and dusting to the satisfaction of the Consultant.

END OF SECTION

1 GENERAL

1.01 REFERENCE STANDARDS

.1 Canadian General Standards Board (CGSB)
- .1 CAN/CGSB-19.13M-M87, Sealing Compound, One Component, Elastomeric Chemical Curing.
- .2 CAN/CGSB-19.24M-M90, Multi-Component, Chemical Curing Sealing Compound.
- .3 CGSB 19-GP-14M-84, Sealing Compound, One Component, Butyl-Polyisobutylene Polymer Base, Solvent Curing.

.2 Sealant and Waterproofer's Institute - Sealant and Caulking Guide Specification.

1.02 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.
- .2 Submit WHMIS MSDS - Material Safety Data Sheets

.3 Quality Assurance Submittals: submit following in accordance with Section 01 45 00 - Quality Control.
- .1 Existing Substrate Condition: report deviations, as described in PART 3 - EXAMINATION in writing to Departmental Representative.
- .2 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
- .3 Manufacturer's Instructions: submit manufacturer's installation instructions and special handling criteria, installation sequence and cleaning procedures

1.03 QUALITY ASSURANCE

.1 Qualifications:
- .1 Applicator: company specializing in performing work of this section.
  - .1 Completed installation must be approved by the material manufacturer.

1.04 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.

.2 Deliver, store and handle materials in accordance with manufacturer's written instructions.

.3 Avoid spillage: immediately notify Departmental Representative if spillage occurs and start clean up procedures.

.4 Clean spills and leave area as it was prior to spill.

1.05 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for reuse and recycling in accordance with Section 01 74 19 - Waste Management and Disposal.

.2 Place materials defined as hazardous or toxic waste in designated containers.

.3 Ensure emptied containers are sealed and stored safely for disposal away from children.

1.06 AMBIENT CONDITIONS

.1 Install solvent curing sealants and vapour release adhesive materials in open spaces with ventilation.

.2 Ventilate enclosed spaces in accordance with Section 01 51 00 - Temporary Utilities.

.3 Maintain temperature and humidity recommended by materials manufactures before, during and after installation.

1.07 SEQUENCING

.1 Sequence work in accordance with Section 01 32 16.06 - Construction Progress Schedule - Critical Path Method (CPM) Section 01 32 16.07 - Construction Progress Schedules - Bar (GANTT) Charts.

.2 Sequence work to permit installation of materials in conjunction with related materials and seals.

2 PRODUCTS

2.01 SHEET MEMBRANE AIR BARRIER – VAPOUR IMPERMEABLE

.1 Sheet Seal: Self-Adhesive bitumen laminated to high-density polyethylene film, nominal total thickness of 1.0 mm conforming to the following physical properties:

.1	Application	min 5˚C
.2	Service Temperature	-40˚C to 70˚
.3	Elongation	min 200%
.4	Tensile strength	min 2.4 Mpa
.5	Puncture Resistance	min 178 N
.6	Water vapour transmission	2.8mg/Pa.s.m² (0.05 perms)
.7	Moisture Absorption	0.1%
.8	Air Leakage at 75 Pa	0.02L/Sm²
.9	Air Leakage at 3000 Pa	No change

2.02 SHEET MEMBRANE AIR BARRIER – Vapour Permeable

.1 Self-adhering reinforced modified polyolefin tri-laminate water resistive, vapour permeable, air barrier membrane conforming to the following properties:

.1	Weight:	160 g/m^2
.2	Water Vapour Transmission:	202 g/m^2
.3	Tensile Strength:	182N MD and 129N CD
.4	Water Vapour Permeance:	1658 ng/Pa.m2.s
.5	Air Leakage:	<0.02 L/s/m2
.6	Average Dry Breaking Force:	565N MD and 405N CD

2.03 ACCESSORIES

.1 Sealants in accordance with Section 07 92 00.

.2 Primer: recommended by sealant manufacturer.

.3 Primer for Vapour Permeable Air Barrier: quick setting, synthetic rubber based adhesive aerosol.

3 EXECUTION

3.01 MANUFACTURER'S INSTRUCTIONS

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

3.02 EXAMINATION

.1 Verify that surfaces and conditions are ready to accept the Work of this section.

.2 Ensure all surfaces are clean, dry, sound, smooth, continuous and comply with air barrier manufacturer’s requirements.

.3 Report any unsatisfactory conditions to the Departmental Representative in writing.

.4 Do not start work until deficiencies have been corrected.

3.03 PREPARATION

.1 Remove loose or foreign matter which might impair adhesion of materials.

.2 Ensure all substrates are clean of oil or excess dust; all masonry joints struck flush, and open joints filled; and all concrete surfaces free of large voids, spalled areas or sharp protrusions.

.3 Ensure all substrates are free of surface moisture prior to application of membrane and primer.

.4 Ensure metal closures are free of sharp edges and burrs.

.5 Prime substrate surfaces to receive adhesive and sealants in accordance with manufacturer's instructions.

3.04 INSTALLATION (SHEET MEMBRANE)

.1 Install materials in accordance with manufacturer's instructions. Refer to Drawings for locations of non-permeable and vapour permeable membranes.

.2 Over the properly prepared substrate surface apply primer, as per manufacturer’s recommendations, with a roller and allow drying to a tacky surface. Prime only area to be covered in a working day. Re-prime area not covered with membrane within 24 hours.

.3 After primer has dried, using a hand roller firmly press the entire membrane onto the primed surface, in strict accordance with membrane manufacturer’s written instructions.

.4 Ensure complete coverage of and adhesion of all substrates to receive membrane, including wall penetrations. Co-operate with other trades to ensure continuity of membrane.

.5 Overlap membrane 50mm and carefully smooth out with a roller to ensure full continuous bond throughout overlaps without fissures or fish mouthing.

.6 It is important that a complete air seal be achieved. Be responsible for the completeness of membrane wherever it is not specifically detailed. Consult with Departmental Representative if there is any doubt as to the integrity of membrane, whether detailed or not.

.7 In order to ensure a complete seal, seal membrane to all penetrations in an approved manner.

.8 Apply a trowelled bead of mastic to all terminations of the membrane at the end of a day's work.

.9 Do not enclose membrane until it has been inspected and approved by Departmental Representative. Inform Departmental Representative two (2) working days prior to required inspection.

3.05 PROTECTION OF WORK

.1 Do not permit adjacent work to damage work of this section.

.2 Ensure finished Work is protected from climatic conditions.

3.06 INSPECTION

.1 Carefully inspect for continuity of air barrier prior to placement of insulation.

.2 Repair all deficient membrane areas.

.3 Misaligned or inadequately lapped seams, punctures or other damage must be repaired with a patch of air barrier membrane extending 50mm in all directions from edge of damaged areas.

.4 Cover membrane immediately after Departmental Representative's inspection to protect from damage by other trades.

END OF SECTION

1 GENERAL

1.01 REFERENCE STANDARDS

.1 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 C 1186-08(2012) Standard Specification for Flat Fiber-Cement Sheets

.2 British Standards Institution (BSI)
- .1 BS EN 12467:2012 Fibre-cement flat sheets. Product specification and test methods.

.3 Canadian Standards Association (CSA)
- .1 CAN/CSA-S136-12 - North American Specification for The Design of Cold-Formed Steel Structural Members

.4 Green Seal Environmental Standards (GS)
- .1 GS-11-11, Standard for Paints and Coatings.
- .2 GS-36-2013, Standard for Commercial Adhesives.

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

.6 National Research Council Canada (NRC)
- .1 National Building Code of Canada 2015 (NBC).

.7 South Coast Air Quality Management District (SCAQMD), California State, Regulation XI. Source Specific Standards
- .1 SCAQMD Rule 1113-A2013, Architectural Coatings.
- .2 SCAQMD Rule 1168-A2005, Adhesives and Sealants Applications.

.8 Underwriters Laboratories' of Canada (ULC)
- .1 CAN/ULC-S102-10 Test for Surface Burning Characteristics of Building Materials and Assemblies.
- .2 CAN/ULC-S114-05 Standard Method of Test for determination of Non-Combustibility in Building Materials.

1.02 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 cementitious materials, support system, fasteners, adhesives and accessories. Include product characteristics, performance criteria, physical size, finish and limitations.

.3 Samples:
.1 Submit duplicate 300mm long samples of siding system including, support system and securement, representative of materials and all components, finishes and colours.

1.03 DELIVERY, STORAGE AND HANDLING

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

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:
.1 Store materials off ground and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
.2 Store and protect cementitious siding from nicks, scratches, and blemishes.
.3 Replace defective or damaged materials with new.

.4 Separate, store and dispose of waste materials in accordance with Section 01 74 19 - Waste Management and Disposal and Section 01 35 21 - LEED Requirements.

.5 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of hazardous materials; and regarding labelling and provision of material safety data sheets (MSDS) acceptable to Labour Canada.

2 PRODUCTS

2.01 DESIGN REQUIREMENTS

.1 Include expansion joints to accommodate movement in wall system and between wall system and building structure, caused by structural movements, without permanent distortion, damage to panels, supports or anchors, or racking of joints.

.2 Design members to withstand dead load and wind loads as calculated in accordance with National Building Code of Canada (NBC) and applicable Municipal/Territorial regulations, to maximum allowable deflection of 1/180 of span.

.3 Provide assembled system with cavity vented and drained to exterior in accordance with NRC "Rain Screen Principles".

.4 Design wall system to accommodate specified erection tolerances of structure.

.5 Siding to be supported by exposed fasteners.

2.02 CLADDING SYSTEM COMPONENTS

.1 Siding: Fibre-reinforced cementitious siding produced by proprietary manufacturing process to BS EN 12467 or ASTM C 1186, having the following minimum characteristics:
- .1 Composition: Portland cement, fine aggregates and organic glass mineral fibre reinforcing, asbestos free.
- .2 Panel thickness: 13 mm +/- 1 mm thickness tolerance.
- .3 Panel maximum size: as indicated on Drawings.
- .4 Colour: surface coloured: factory applied opaque . paint coating
- .5 Panel density: 2.0 - 2.5 g/m3.

.2 Aluminum support clips: structural extruded aluminum section, alloy AA 6063-T5 AA 6060 , thermally broken adjustable.

2.03 ACCESSORY COMPONENTS

.1 Trim: Aluminum extrusions of Aluminum Association alloy AA 6063-T5 AA 6060 to manufacturer's standard profiles indicated.

.2 Exposed flashings and closures: Section 07 62 00.

.3 Fasteners: cadmium plated steel steel, colour matched heads, self-tapping, type and material as recommended by manufacturer for service and substrate.

.4 Adhesive: purpose made, waterproof, type as recommended by panel manufacturer for exposure and service conditions.
- .1 Adhesives: VOC limit 30 70 250 g/L maximum to SCAQMD Rule 1168 GS-36.

.5 Isolation coating: alkali resistant paint .
- .1 Coating: VOC limit 250 g/L maximum to SCAQMD Rule 1113 GS-11.

2.04 FABRICATION

.1 Fabricate support grid in accordance with accepted shop drawings.

.2 Brake form metal flashings to profile required, in maximum practical lengths in accordance with Section 07 62 00.

.3 Special Techniques:
- .1 Worker protection: ensure workers wear gloves respirators dust masks long sleeved clothing eye protection protective clothing when cutting or drilling cementitious panels.
- .2 Equip saws with dust collection attachment.

3 EXECUTION

3.01 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed

under other Sections or Contracts are acceptable 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.

3.02 INSTALLATION

.1 Protect surface of metals in contact with concrete, mortar, plaster or other cementitious surface with isolation coating.

.2 Install framing members.

.1 Secure to building framing system with screws. Install sub-girt supports at panel joints.

.2 Ensure flatness and alignment to specified tolerances.

.3 Install venting and drainage tracks, head and sill flashings, edge trim, cap pieces and fillers.

.4 Installed panels shall be level and plumb, in accordance with the following installation tolerances:

.1 Maximum variation from plane or location shown on accepted shop drawings: 2 mm per 3 m of length vertically and horizontally and 3 mm 3 m maximum diagonally across face of panel.

.2 Maximum offset from true alignment between two adjacent members abutting end to end, in line: 0.75 mm.

3.03 CLEANING AND WASTE MANAGEMENT

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.

.1 Wash down exposed exterior surfaces using solution of mild domestic detergent in warm water, applied with soft clean wiping cloths.

.2 Leave Work area clean at end of each day.

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

.3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 19 - Waste Management and Disposal.

3.04 PROTECTION

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

.2 Repair damage to adjacent materials caused by mineral fibre reinforced panel installation.

END OF SECTION

1. General

1.1 REFERENCES

.1 ASTM International Inc.

.1 ASTM C726-12, Standard Specification for Mineral Fiber Roof Insulation Board.

.2 ASTM C728-16, Standard Specification for Perlite Thermal Insulation Board.

.3 ASTM C1177/C1177M-13, Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing.

.4 ASTM C1396/C1396M-14a, Standard Specification for Gypsum Board.

.5 ASTM D41-[05], Standard Specification for Asphalt Primer Used in Roofing, Dampproofing, and Waterproofing.

.6 ASTM D312/D312M-16a, Standard Specification for Asphalt Used in Roofing.

.7 ASTM D448-12, Standard Classification for Sizes of Aggregate for Road and Bridge Construction.

.8 ASTM D2178/D2178M-15a, Standard Specification for Asphalt Glass Felt Used in Roofing and Waterproofing.

.9 ASTM D6162/D6162M-16, Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using a Combination of Polyester and Glass Fibre Reinforcements.

.10 ASTM D6163/D6163M-16, Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using Glass Fibre Reinforcements.

.11 ASTM D6164/D6164M-16, Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using Polyester Reinforcements.

.12 ASTM D6222/D6222M-16, Standard Specification for Atactic Polypropylene (APP) Modified Bituminous Sheet Materials Using Polyester Reinforcement.

.13 ASTM D6223/D6223M-16, Standard Specification for Atactic Polypropylene (APP) Modified Bituminous Sheet Materials Using a Combination of Polyester and Glass Fiber Reinforcement.

.14 ASTM D6509/D6509M-16, Standard Specification for Atactic Polypropylene (APP) Modified Bituminous Sheet Materials Using Glass Fiber Reinforcement.

.2 Alberta Roofing Contractors Association (ARCA)

.1 ARCA Roofing Specifications Manual.

.3 Canadian Standards Association (CSA International)

.1 CSA A123.21-14, Standard Test Method for the Dynamic Wind Uplift Resistance of Mechanically Attached Membrane-Roofing Systems

.2 CSA-A123.3-05 (R2105), Asphalt Saturated Organic Roofing Felt.

.3 CSA-A123.4-04 (r2013), Asphalt for Constructing Built-Up Roof Coverings and Waterproofing Systems.

.4 CSA A231.1/A231.2:2014, Precast Concrete Paving Slabs/Precast Concrete Pavers.

.5 CSA O121-08 9R2013), Douglas Fir Plywood.

.6 CSA O151-09 (R2014), Canadian Softwood Plywood.

.4 Factory Mutual (FM Global)

.1 FM Approvals - Roofing Products.

.5 Health Canada / Workplace Hazardous Materials Information System (WHMIS)

.1 Material Safety Data Sheets (MSDS).

.6 Underwriters Laboratories' of Canada (ULC)

.1 CAN/ULC-S701-11, Standard for Thermal Insulation, Polystyrene, Boards and Pipe Covering.

.2 CAN/ULC-S702.2-10, Standard for Mineral Fibre Thermal Insulation for Buildings.

.3 CAN/ULC-S704-11, Standard for Thermal Insulation, Polyurethane and Polyisocyanurate Boards, Faced.

.4 CAN/ULC-S706-09, Standard for Wood Fibre Thermal Insulation for Buildings.

1.2 ADMINISTRATIVE REQUIREMENTS

.1 Convene pre-installation meeting one week prior to beginning roofing Work, with roofing contractor's representative, general contractor’s representative, Departmental Representative present, to:

.1 Verify project requirements.

.2 Review installation and substrate conditions.

.3 Co-ordination with other building sub-trades.

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

1.3 SUBMITTALS

.1 Comply with requirements of Section 01 30 00.

.2 Product Data:

.1 Provide [two] copies of most recent technical roofing components data sheets describing materials' physical properties and include product characteristics, performance criteria, physical size, finish and limitations.

.1 Primers.

.2 Asphalt.

.3 Sealers.

.4 Filter fabric.

.3 Provide shop drawings:

.1 Indicate [flashing,] [control joints,] [tapered insulation] details.

.2 Provide layout for tapered insulation.

.4 Manufacturer's Certificate: certify that [products] meet or exceed [specified requirements].

.5 Manufacturer's Installation Instructions: indicate special precautions required for seaming the membrane.

1.4 QUALITY ASSURANCE

.1 Installer qualifications: company or person specializing in application of modified bituminous roofing systems approved by manufacturer.

1.5 FIRE PROTECTION

.1 Fire Extinguishers:

.1 Maintain one stored pressure rechargeable type with hose and shut-off nozzle,

.2 ULC labelled for A, B and C class protection.

.2 Maintain fire watch for 1 hour after each day's roofing operations cease.

1.6 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 felt and membrane in upright position. Store membrane rolls with salvage edge up.

.4 Remove only in quantities required for same day use.

.5 Place plywood runways over completed Work to enable movement of material and other traffic.

.6 Store sealants at +5 degrees C minimum.

.7 Store insulation protected from daylight, weather and deleterious materials.

1.7 SITE CONDITIONS

.1 Ambient Conditions

.1 Do not install roofing when temperature remains below -18 degrees C for torch application, or -5 degrees C for mop application.

.2 Minimum temperature for solvent-based adhesive is -5 degrees C.

.2 Install roofing on dry deck, free of snow and ice, use only dry materials and apply only during weather that will not introduce moisture into roofing system.

1.8 WARRANTY

.1 If roofing system has been constructed by a member of the ARCA, Contractor shall obtain, on behalf of the Departmental Representative, an ARCA ten Year Certificate of Assurance for the performance of Contractor's obligations under the extended warranty.

OR

.2 Provide a manufacturer's written and signed document in Departmental Representative's name, certifying all product performance properties for a period of ten (10) years, starting from the date of substantial performance of the Work.

.3 This warranty will cover the removal and replacement of defective roof membrane products, and or defective workmanship including labour.

.4 Warranty must remain a full warranty for the duration of the period specified.

.5 Scope of this warranty must not be limited by other system components manufactured or distributed by membrane manufacturer.

.6 Letters amending the manufacturer's standard warranty will not be accepted and the warranty certificate must reflect these requirements.

2. Products

2.1 PERFORMANCE CRITERIA

.1 Compatibility between components of roofing system is essential. 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 DECK PRIMER

.1 Asphalt primer: to ASTM D41.

2.3 VAPOUR RETARDER

.1 Self adhering "peel and stick" air/vapour barrier composed of Styrene-Butadiene-Styrene (SBS) modified bitumen reinforced with high density polyethylene film, anti slip surface, minimum thickness 1.0 mm.

2.4 MEMBRANE

.1 Base Sheet: to CGSB-37.56-M, Styrene-Butadiene-Styrene (SBS) elastomeric polymer, prefabricated sheet, non woven, polyester reinforcement, weighing 180 g/m ^{2}.

.1 Type 2, fully adhered.

.2 Class P-plain surfaced.

.3 Grade 2.

.4 Top and bottom surfaces:
.1 Polyethylene/polyethylene.
.5 Base sheet membrane properties:
.1 Strain energy (longitudinal/transversal): 9.0/7.0 kN/m.
.2 Breaking strength (longitudinal/transversal): 17.0/12.5 N/5 cm.
.3 Ultimate elongation (longitudinal/transversal): 60/65 %.
.4 Tear resistance: 60 N.
.5 Cold bending at -30 degrees C : no cracking.
.6 Static puncture resistance: > 400.
.7 Dimensional Stability: -0.3 / 0.3 %.
.6 ULC certification: Class A.

.2 Cap sheet: to CGSB-37.56-M, Styrene-Butadiene-Styrene (SBS) elastomeric polymer, prefabricated sheet, glass, polyester reinforcement, weighing 250 g/m^2.
.1 Type 2, fully adhered.
.2 Class G-granule surfaced.
.3 Grade 2.
.4 Bottom surface polyethylene.
.5 Colour to be light grey unless otherwise indicated.
.6 Cap sheet membrane properties:
.1 Strain energy (longitudinal/transversal): 10.0/10.0 kN/m.
.2 Breaking strength (longitudinal/transversal): 18.0/10.0 kN/m.
.3 Ultimate elongation (longitudinal/transversal): 60/65 %.
.4 Tear resistance: 75 N.
.5 Cold bending at -30 degrees C: No cracking.
.6 Static puncture resistance: > 420.
.7 Dimensional Stability: -0.8 / -0.2 %.
.7 ULC certification: Class [A] [B].

2.5 ADHESIVE

.1 Adhesive for securing overlay board and insulation: asphalt extended vulcanized adhesive, two component unit, consisting of two liquids mixed on site to produce pourable adhesive].

2.6 OVERLAY BOARD

.1 Overlay Board: 12.7 thick asphalt based recovery board with non-woven glass facers, as recommended by the membrane manufacture.

2.7 BITUMEN

.1 Asphalt: to CAN/CSA A123.4, Type 2.

2.8 INSULATION

.1 For flat roof decks or roof structures, provide custom designed tapered insulation with minimum slope of 2.0 mm in 100 mm (2%). Taper insulation to drain, minimum RSI value at drain to be 1.3.

.2 Expanded Polystyrene Insulation (EPS), Cover Board and Asphalt Recover Board:

.1 Expanded Polystyrene Insulation (EPS):

.1 To CAN/ULC-S701, Type 1, square edged.

.2 Insulation value thickness per cm based on values listed in the latest edition of NRC - Evaluation Listings.

.3 Provide two layers of insulation installed with staggered joints.

.3 Extruded Polystyrene Insulation (XPS) and two layers of Asphalt Recover Board:

.1 Extruded Polystyrene Insulation (XPS):

.1 To CAN/ULC-S701, Type 2, square edged.

.2 Insulation value thickness per cm based on values listed in the latest edition of NRC - Evaluation Listings.

.3 Provide two layers of insulation installed with staggered joints.

.4 Polyisocyanurate Insulation and Asphalt Recover Board:

.1 Polyisocyanurate Insulation:

.1 To CAN/ULC-S704, glass reinforced felt facers, square edged and containing no CFC.

.2 Insulation value thickness per cm based on values listed in the latest edition of NRC - Evaluation Listings.

.3 Provide two layers of insulation installed with staggered joints.

2.9 SEALERS

.1 mastic made with synthetic rubbers, plasticized with bitumen and solvent with aluminum pigments to provide grater resistance to U.V.

2.10 CARPENTRY

.1 Refer to Section 06 11 00 – Rough Carpentry.

2.11 FASTENERS

.1 Covering to steel deck: No. 10 flat head, self tapping, Type A or AB, cadmium plated screws. Recommend FM Approved screw and plate assemblies.

.2 Insulation to deck: coated insulation fasteners and galvanized plates must meet FM Approval for wind uplift and corrosion resistance, as recommended by insulation manufacturer.

.3 Mechanical Pipe Supports: purpose made 100% recycled rubber; minimum 100mm high x 150mm wide x length to suit; complete with galvanized open ended channel support.

3. Execution

3.1 QUALITY OF WORK

.1 Do examination, preparation and roofing Work in accordance with Roofing Manufacturer's Specification Manual.

.2 Do priming in accordance with manufacturers written recommendations.

.3 The interface of the walls and roof assemblies will be fitted with durable rigid material providing connection point for continuity of air barrier.

.4 Assembly, component and material connections will be made in consideration of appropriate design loads.

3.2 EXAMINATION OF ROOF DECKS

.1 Verification of Conditions:

.1 Inspect with Departmental Representative and Departmental Representative deck conditions including parapets, construction joints, roof drains, plumbing vents and ventilation outlets to determine readiness to proceed.

.2 Evaluation and Assessment:

.1 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 drains have been installed at proper elevations relative to finished roof surface.

.4 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, walks and adjacent work where materials hoisted or used.

.2 Use warning signs and barriers. Maintain in good order until completion of Work.

.3 Clean off drips and smears of bituminous material immediately.

.4 Dispose of rain water off roof and away from face of building until roof drains or hoppers installed and connected.

.5 Protect roof from traffic and damage. Comply with precautions deemed necessary by Departmental Representative and Departmental Representative.

.6 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.

.7 Metal connectors and decking will be treated with rust proofing or galvanization.

3.4 PRIMING DECK

.1 Apply deck primer to roofing substrate at the rate recommended by manufacturer.

3.5 VAPOUR RETARDER INSTALLATION

.1 Adhere air/vapour retarder in accordance with manufacturer's instructions.

3.6 (EXPOSED) CONVENTIONAL MEMBRANE ROOFING (CMR) APPLICATION

.1 Insulation: fully adhered, adhesive application:

.1 Adhere insulation to [steel deck] [laminated vapour barrier] using solvent-based adhesive.

.2 Place boards in parallel rows with ends staggered, and in firm contact with one another.

.3 Cut end pieces to suit.

.4 Apply adhesive in continuous ribbons at 300 mm on centre.

.5 Separate the membrane and insulation with a drainage layer or slipsheet.

.2 Insulation: fully adhered, bitumen application:

.1 Embed insulation in 1 to 1.5 kg/m^2 mopping of bitumen.

.2 Place boards in parallel rows with ends staggered, and in firm contact with one another.

.3 Cut end pieces to suit.

.3 Insulation: mechanically fastened application:

.1 Mechanically fasten insulation using screws and pressure distribution plates.

.2 Fasten insulation as per manufacturer's written recommendations.

.3 Number and pattern of screws per board to meet Factory Mutual requirements.

.4 Place boards in parallel rows with ends staggered, and in firm contact with one another.

.5 Cut end boards to suit.

.4 Tapered insulation application:

.1 Mop insulation to vapour retarder [and top layer of insulation to bottom layer] with hot asphalt at rate of 1 kg/m^2.

.2 Install tapered insulation in accordance with shop drawings. Stagger joints between layers 150 mm minimum.

.5 Overlay Board: adhesive application:

.1 Adhere overlay board to insulation with vulcanized adhesive at the rate of one litre per m^2.

.2 Place boards in parallel rows with end joints staggered. Cap joints approximately 25 mm.

.3 Cut ends to suit and apply adhesive in continuous ribbons at 300 mm on centre.

.6 Base sheet application:

.1 Starting at low point of roof, perpendicular to slope, unroll base sheet, align and reroll from both ends.

.2 Unroll and embed base sheet in uniform coating of asphalt applied at rate of 1.2 kg/m^2, at 230 degrees C.

.3 Unroll and torch base sheet onto substrate taking care not to burn membrane or its reinforcement or substrate.

.4 Lap sheets 75 mm minimum for side and 150 mm minimum for end laps.

.5 Application to be free of blisters, wrinkles and fishmouths.

.7 Cap sheet application:

.1 Starting at low point on roof, perpendicular to slope, unroll cap sheet, align and reroll from both ends.

.2 Unroll and embed cap sheet in uniform coating of asphalt applied at rate of 1.2 kg/m^2, EVT at point of contact.

.3 Unroll and torch cap sheet onto base sheet taking care not to burn membrane or its reinforcement.

.4 Lap sheets 75 mm minimum for side laps and 150 mm minimum for end laps. Offset joints in cap sheet 300 mm minimum from those in base sheet.

.5 Application to be free of blisters, fishmouths and wrinkles.

.6 Do membrane application in accordance with manufacturer's recommendations.

.8 Flashings:

.1 Complete installation of flashing base sheet stripping prior to installing membrane cap sheet.

.2 Lap flashing base sheet to membrane base sheet minimum 150 mm and seal by mopping or torch welding.

.3 Lap flashing cap sheet to membrane cap sheet 250 mm minimum and torch weld.

.4 Provide 75 mm minimum side lap and seal.

.5 Properly secure flashings to their support, without sags, blisters, fishmouths or wrinkles.

.6 Do work in accordance with Section 07 62 00 - Sheet Metal Flashing and Trim.

.9 Roof penetrations:

.1 Install roof drain pans, vent stack covers and other roof penetration flashings and seal to membrane in accordance with [manufacturer's recommendations and details] [Section].

.2 Install rubber mechanical pipe supports in accordance with manufacturer’s instructions. Spaced as required to adequately support pipes.

3.7 FIELD QUALITY CONTROL

.1 Inspection and testing of roofing application will be carried out by testing agency designated and paid for by Departmental Representative.

3.8 CLEANING

.1 Remove bituminous markings from finished surfaces.

.2 In areas where finished surfaces are soiled caused by work of this section, consult manufacturer of surfaces for cleaning advice and complying with their instructions.

.3 Repair or replace defaced or disfigured finishes caused by work of this section.

END OF SECTION

1 GENERAL

1.01 REFERENCE STANDARDS

.1 The Aluminum Association Inc. (AAI)
- .1 AA Aluminum Design Manual 2015 Part VIII Guidelines for Aluminum Sheet Metal Work in Building Construction.
- .2 AAI DAF45-2003(R2009), Designation System for Aluminum Finishes.

.2 American Architectural Manufacturers Association (AAMA)
- .1 AAMA 611-14 Voluntary Specifications for Anodized Architectural Aluminum.
- .2 AAMA 621-02 Voluntary Specifications for High Performance Organic Coatings on Coil Coated Architectural Hot Dipped Galvanized (HDG) and Zinc-Aluminum Coated Substrates.
- .3 AAMA 2603-15, Voluntary Specification, Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels.
- .4 AAMA 2604-13 Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels.
- .5 AAMA 2605-13 Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels.

.3 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.

.4 ASTM International
- .1 ASTM A 240/A 240M-16, Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.
- .2 ASTM A 606/A 606M-15, Standard Specification for Steel, Sheet and Strip, High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled, with Improved Atmospheric Corrosion Resistance.
- .3 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.
- .4 ASTM A 755/A 755M-16e1 Standard Specification for Steel Sheet, Metallic coated by the Hot-Dip Process and Prepainted by the Coil-Coating Process for Exterior Exposed Building Products.
- .5 ASTM A 792/A 792M-10(2015), Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.
- .6 ASTM B 32-08(2014), Standard Specification for Solder Metal.
- .7 ASTM B 209-14 Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
- .8 ASTM B 370-12, Standard Specification for Copper Sheet and Strip for Building Construction.
- .9 ASTM D 523-14, Standard Test Method for Specular Gloss.
- .10 ASTM D 1970/D 1970M-15a Standard Specification for Self-Adhering

Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection.
.11 ASTM D 4587-11 Standard Practice for Fluorescent UV-Condensation Exposures of Paint and Related Coatings.
.12 ASTM F 1667-15 Standard Specification for Driven Fasteners: Nails, Spikes and Staples.

.5 Canadian General Standards Board (CGSB)
.1 CAN/CGSB-51.32-M77, Sheathing, Membrane, Breather Type.

.6 Alberta Roofing Contractors Association (ARCA)
.1 Roofing Specifications Manual.

.7 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.

.8 CSA Group
.1 CSA A123.3-05(2015), Asphalt Saturated Organic Roofing Felt.
.2 CSA A123.22-08(2013) Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection.

.9 FM Global
.1 Property Loss Prevention Data Sheets 1-49 Perimeter Flashing.

.10 Green Seal Environmental Standards
.1 Standard GS-11-2015, Paints, Coatings, Stains, and Sealers.
.2 Standard GS-36-2013, Adhesives for Commercial Use.

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

.12 Sheet Metal and Air Conditioning Contractors Association of North America (SMACNA)
.1 Architectural Sheet Metal Manual (2012)
.2 Residential Sheet Metal Guidelines (2001)

1.02 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 two copies WHMIS MSDS - Material Safety Data Sheets in accordance with Section 01 35 29.06 - Health and Safety Requirements

1.03 PRE-INSTALLATION MEETING

.1 Include sheet metal flashing and trim on agenda of pre-installation meetings of affected sections.

1.04 MOCK-UPS

.1 Include flashings in mock-ups as specified for work of other affected sections.

1.05 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product 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 reuse and recycling in accordance with Section 01 74 19 - Waste Management and Disposal.

2 PRODUCTS

2.01 SUSTAINABILITY CHARACTERISTICS

2.02 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: 0.45mm thickness, commercial quality to ASTM A 653/A 653M, with Z275 designation zinc coating.

2.03 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 colour finished on both sides.
- .2 colour selected by Departmental Representative from manufacturer's standard range.
- .3 Exposed coating thickness: dry film coating system thickness not less than 22 micrometres.

2.04 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, minimum 50 mm wide one-third width of secured flashing continuous. Thickness mm same as sheet metal being secured.
.1 Provide continuous hook strip at outside of parapets.

.4 Nails: of same material as sheet metal, ring thread 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, galvanized coloured nylon head, neoprene washer.

.6 Solder: to ASTM B 32, alloy composition Sn .

.7 Flux: rosin, cut hydrochloric acid, or commercial preparation suitable for materials to be soldered.

.8 Touch-up paint: as recommended by prefinished material manufacturer.
.1 Maximum VOC limit 50 150 g/L to Standard GS-11 to SCAQMD Rule 1113.

2.05 FABRICATION

.1 Fabricate sheet steel flashings and other sheet steel work in accordance with applicable ARCA details and SMACNA architectural residential details as indicated.

.2 Fabricate aluminum flashings and other sheet aluminum work in accordance with

.3 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.

3 EXECUTION

3.01 MANUFACTURER'S INSTRUCTIONS

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

3.02 INSTALLATION

.1 Install sheet metal work in accordance with ARCA details.

.2 Use concealed fastenings except where approved before installation.

.3 Lock end joints and caulk with sealant.

.4 Where flashing installed with mechanical fasteners, install fasteners in slots or oversize holes to allow expansion and contraction of flashings.

.5 Provide isolation coating or impervious self-adhesive membrane to separate aluminum items from concrete and masonry.

3.03 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.

END OF SECTION

1 GENERAL

1.01 REFERENCE STANDARDS

.1 ASTM International
- .1 ASTM C 919-08, Standard Practice for Use of Sealants in Acoustical Applications.

.2 Canadian General Standards Board (CGSB)
- .1 CGSB 19-GP-5M-1984, Sealing Compound, One Component, Acrylic Base, Solvent Curing (Issue of 1976 reaffirmed, incorporating Amendment No. 1).
- .2 CAN/CGSB-19.13-M87, Sealing Compound, One-component, Elastomeric, Chemical Curing.
- .3 CGSB 19-GP-14M-1984, Sealing Compound, One Component, Butyl-Polyisobutylene Polymer Base, Solvent Curing (Reaffirmation of April 1976).
- .4 CAN/CGSB-19.17-M90, One-Component Acrylic Emulsion Base Sealing Compound.
- .5 CAN/CGSB-19.24-M90, Multi-component, Chemical Curing Sealing Compound.

.3 General Services Administration (GSA) - Federal Specifications (FS)
- .1 FS-SS-S-200-E(2)1993, Sealants, Joint, Two-Component, Jet-Blast-Resistant, Cold Applied, for Portland Cement Concrete Pavement.

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

1.02 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 2 copies of WHMIS MSDS in accordance with Section 01 35 29.06 - Health and Safety Requirements 01 35 43 - Environmental Procedures.

.3 Manufacturer's Instructions:
- .1 Submit instructions to include installation instructions for each product used.

1.03 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.

1.04 DELIVERY, STORAGE AND HANDLING

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

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:
- .1 Store materials off ground indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
- .2 Store and protect joint sealants from nicks, scratches, and blemishes.
- .3 Replace defective or damaged materials with new.

.4 Packaging Waste Management: remove for reuse and return by manufacturer of pallets, crates, padding, and packaging materials in accordance with Section 01 74 19 - Waste Management and Disposal.

1.05 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 more than those 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.

1.06 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.

.2 Departmental Representative will arrange for ventilation system to be operated on maximum outdoor air and exhaust during installation of caulking and sealants.

2 PRODUCTS

2.01 SEALANT MATERIAL DESIGNATIONS

.1 Polysulfide one part, self-levelling: to CAN/CGSB-19.13, MC-1-40-B-N, colour to match adjacent surfaces

.2 Preformed compressible and non-compressible back-up materials:

.1 Polyethylene, urethane, neoprene or vinyl foam:

.1 Extruded closed cell foam backer rod.

.2 Size: oversize 30 to 50 %.

.2 Neoprene or butyl rubber:

.1 Round solid rod, Shore A hardness 70.

.3 High density foam:

.1 Extruded closed cell polyvinyl chloride (PVC), extruded polyethylene, closed cell, Shore A hardness 20, tensile strength 140 to 200 kPa, extruded polyolefin foam, 32 kg/m^3 density, or neoprene foam backer, size as recommended by manufacturer.

.4 Bond breaker tape:

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

2.02 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.

3 EXECUTION

3.01 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 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.

3.02 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.

3.03 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.

3.04 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.

3.05 MIXING

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

3.06 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.

3.07 CLEANING

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

.3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 19 - Waste Management and Disposal.
- .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.08 PROTECTION

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

.2 Repair damage to adjacent materials caused by joint sealants installation.

END OF SECTION

1 GENERAL

1.01 REFERENCE STANDARDS

.1 American Society for Testing and Materials International (ASTM)
- .1 ASTM A 653/A 653M-06a, Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- .2 ASTM B 29-03, Standard Specification for Refined Lead.
- .3 ASTM B 749-03, Standard Specification for Lead and Lead Alloy Strip, Sheet and Plate Products.

.2 CSA Group (CSA)
- .1 CSA-G40.20-04/G40.21-04, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
- .2 CSA W59-03, Welded Steel Construction (Metal Arc Welding).

.3 Canadian Steel Door Manufacturers' Association (CSDMA)
- .1 CSDMA, Recommended Specifications for Commercial Steel Doors and Frames, 2000.
- .2 CSDMA, Selection and Usage Guide for Commercial Steel Doors, 1990.

.4 National Fire Protection Association (NFPA)
- .1 NFPA 80-99, Standard for Fire Doors and Fire Windows.
- .2 NFPA 252-03, Standard Methods of Fire Tests of Door Assemblies.

.5 Underwriters' Laboratories of Canada (ULC)
- .1 CAN/ULC-S701-01, Standard for Thermal Insulation, Polystyrene, Boards and Pipe Covering.
- .2 CAN/ULC-S702-97, Standard for Thermal Insulation, Mineral Fibre, for Buildings.
- .3 CAN/ULC-S704-03, Standard for Thermal Insulation, Polyurethane and Polyisocyanurate Boards, Faced.
- .4 CAN4-S104-M80, Standard Method for Fire Tests of Door Assemblies.
- .5 CAN4-S105-M85, Standard Specification for Fire Door Frames Meeting the Performance Required by CAN4-S104.

1.02 SYSTEM DESCRIPTION

.1 Design Requirements:
- .1 Design exterior frame assembly to accommodate to expansion and contraction when subjected to minimum and maximum surface temperature of -35 degrees C to 35 degrees C.
- .2 Maximum deflection for exterior steel entrance screens under wind load of 1.2 kPa not to exceed 1/175th of span.
- .3 Steel fire rated doors and frames: labelled and listed by an organization accredited by Standards Council of Canada in conformance with CAN4-S104 NFPA 252 for ratings specified or indicated.

.4 Provide fire labelled frames for openings requiring fire protection ratings. Test products in conformance with CAN4-S104, ASTM E 152 or NFPA 252 and listed by nationally recognized agency having factory inspection services.

1.03 ACTION AND INFORMATIONAL SUBMITTALS

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

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

.3 Provide shop drawings: in accordance with Section 01 33 00 - Submittal Procedures.
- .1 Submit drawings stamped and signed by professional engineer registered or licensed in Province Territory, Canada.
- .2 Indicate each type of door, material, steel core thicknesses, mortises, reinforcements, location of exposed fasteners, openings, glazed louvred, arrangement of hardware and fire rating and finishes.
- .3 Indicate each type frame material, core thickness, reinforcements, glazing stops, location of anchors and exposed fastenings and reinforcing fire rating finishes.
- .4 Include schedule identifying each unit, with door marks and numbers relating to numbering on drawings and door schedule.

1.04 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.

.2 Waste Management and Disposal:
- .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 19 - Waste Management and Disposal.

2 PRODUCTS

2.01 MATERIALS

.1 Hot dipped galvanized steel sheet: to ASTM A 653M, ZF75, minimum base steel thickness in accordance with CSDMA Table 1 - Thickness for Component Parts.

.2 Reinforcement channel: to CSA G40.20/G40.21, Type 44W, coating designation to ASTM A 653M, ZF75.

2.02 DOOR CORE MATERIALS

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

.2 Stiffened: face sheets , honeycomb uninsulated core.

.3 Temperature rise rated (TRR): core composition to limit temperature rise on unexposed side of door to 250 degrees C at 30 60 minutes. Core to be tested as part of a complete door assembly, in accordance with CAN4-S104, ASTM E 152 or NFPA 252, covering Standard Method of Tests of Door Assemblies and listed by nationally recognized testing agency having factory inspection service.

2.03 ADHESIVES

.1 Honeycomb cores and steel components: heat resistant, spray grade, resin reinforced neoprene/rubber (polychloroprene) based, low viscosity, contact cement.

.2 Polystyrene and polyurethane cores: heat resistant, epoxy resin based, low viscosity, contact cement.

.3 Lock-seam doors: fire resistant, resin reinforced polychloroprene, high viscosity, sealant/adhesive.

2.04 ACCESSORIES

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

.2 Exterior and interior top caps: rigid polyvinylchloride extrusion conforming to CGSB 41-GP-19Ma steel.

.3 Fabricate glazing stops as formed channel, minimum 16 mm height, accurately fitted, butted at corners and fastened to frame sections with counter-sunk oval head sheet metal screws.

.4 Metallic paste filler: to manufacturer's standard.

.5 Fire labels: metal rivited.

2.05 FRAMES FABRICATION GENERAL

.1 Fabricate frames in accordance with CSDMA specifications.

.2 Fabricate frames to profiles and maximum face sizes as indicated.

.3 Interior frames: 1.2 mm welded type construction.

.4 Blank, reinforce, drill and tap frames for mortised, templated hardware, and electronic hardware using templates provided by finish hardware supplier. Reinforce frames for surface mounted hardware.

.5 Protect mortised cutouts with steel guard boxes.

.6 Prepare frame for door silencers, 3 for single door, 2 at head for double door.

.7 Manufacturer's nameplates on frames and screens are not permitted.

.8 Conceal fastenings except where exposed fastenings are indicated.

.9 Provide factory-applied touch up primer at areas where zinc coating has been removed during fabrication.

2.06 FRAME ANCHORAGE

.1 Provide appropriate anchorage to floor and wall construction.

.2 Locate each wall anchor immediately above or below each hinge reinforcement on hinge jamb and directly opposite on strike jamb.

.3 Provide 2 anchors for rebate opening heights up to 1520 mm and 1 additional anchor for each additional 760 mm of height or fraction thereof.

.4 Locate anchors for frames in existing openings not more than 150 mm from top and bottom of each jambs and intermediate at 660 mm on centre maximum.

2.07 FRAMES: WELDED TYPE

.1 Welding in accordance with CSA W59.

.2 Accurately mitre or mechanically joint frame product and securely weld on inside of profile.

.3 Cope accurately and securely weld butt joints of mullions, transom bars, centre rails and sills.

.4 Grind welded joints and corners to a flat plane, fill with metallic paste and sand to uniform smooth finish.

.5 Securely attach floor anchors to inside of each jamb profile.

.6 Weld in 2 temporary jamb spreaders per frame to maintain proper alignment during shipment.

.7 Fabricate frame products for openings in sections, x mm, splice joints for field assembly.

.8 Securely attach lead to inside of frame profile from return to jamb soffit (inclusive) on door side of frame only.

2.08 DOOR FABRICATION GENERAL

.1 Doors: swing type, flush, with provision for glass and/or louvre openings as indicated.

.2 Fabricate doors with longitudinal edges locked seam locked seamed, adhesive assisted welded. Seams: visible grind welded joints to a flat plane, fill with metallic paste filler and sand to a uniform smooth finish.

.3 Doors: manufacturers' proprietary construction, tested and/or engineered as part of a fully operable assembly, including door, frame, gasketting and hardware in

accordance with ASTM E 330 to provide blast resistance of .

.4 Blank, reinforce, drill doors and tap for mortised, templated hardware and electronic hardware.

.5 Factory prepare holes 12.7 mm diameter and larger except mounting and through-bolt holes, on site, at time of hardware installation.

.6 Reinforce doors where required, for surface mounted hardware. Provide flush PVC steel top caps to exterior doors. Provide inverted, recessed, spot welded channels to top and bottom of interior doors.

.7 Provide factory-applied touch-up primer at areas where zinc coating has been removed during fabrication.

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

.9 Manufacturer's nameplates on doors are not permitted.

2.09 DOORS: HONEYCOMB CORE CONSTRUCTION

.1 Form face sheets for exterior doors from 1.6 1.2 1.0 mm sheet steel with honeycomb polystyrene polyurethane core laminated under pressure to face sheets.

.2 Form face sheets for interior doors from 1.6 1.2 1.0 mm sheet steel with honeycomb temperature rise rated core laminated under pressure to face sheets.

2.10 THERMALLY BROKEN DOORS AND FRAMES

.1 Fabricate thermally broken doors by using insulated core and separating exterior parts from interior parts with continuous interlocking thermal break.

.2 Thermal break: rigid polyvinylchloride extrusion conforming to CGSB 41-GP-19Ma.

.3 Fabricate thermally broken frames separating exterior parts form interior parts with continuous interlocking thermal break.

.4 Apply insulation.

3 EXECUTION

3.01 MANUFACTURER'S INSTRUCTIONS

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

3.02 INSTALLATION GENERAL

.1 Install labelled steel fire rated doors and frames to NFPA 80 except where specified otherwise.

.2 Install doors and frames to CSDMA Installation Guide.

3.03 FRAME INSTALLATION

.1 Set frames plumb, square, level and at correct elevation.

.2 Secure anchorages and connections to adjacent construction.

.3 Brace frames rigidly in position while building-in. Install temporary horizontal wood spreader at third points of door opening to maintain frame width. Provide vertical support at centre of head for openings over 1200 mm wide. Remove temporary spreaders after frames are built-in.

.4 Make allowances for deflection of structure to ensure structural loads are not transmitted to frames.

.5 Caulk perimeter of frames between frame and adjacent material.

.6 Maintain continuity of air barrier and vapour retarder.

3.04 DOOR INSTALLATION

.1 Install doors and hardware in accordance with hardware templates and manufacturer's instructions and Section 08 71 00 - Door Hardware.

.2 Provide even margins between doors and jambs and doors and finished floorand thresholds as follows.
- .1 Hinge side: 1.0 mm.
- .2 Latchside and head: 1.5 mm.
- .3 Finished floor, top of carpet noncombustible sill and thresholds: 13 mm.

.3 Adjust operable parts for correct function.

.4 Install louvres.

3.05 FINISH REPAIRS

.1 Touch up with primer finishes damaged during installation.

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

END OF SECTION

1 GENERAL

1.01 REFERENCE STANDARDS

.1 Aluminum Association (AA)
- .1 AA DAF 45OL-03(R2009), Designation System for Aluminum Finishes.

.2 ASTM International (ASTM)
- .1 ASTM A 123/A 123M-15, Standard Specification for Zinc (Hot-Dip galvanized) Coatings on Iron and Steel Products.
- .2 ASTM E 1748-95(2009), Standard Test Method for Evaluating the Engagement Between Windows and Insect Screens as an Integral System.

.3 CSA Group (CSA)
- .1 AAMA/WDMA/CSA 101/I.S.2/A440-11(R2016), NAFS - North American Fenestration Standard for Windows, Doors, and Skylights.
- .2 CSA A440S1-09, Canadian Supplement to AAMA/WDMA/CSA 101/1.S.2/A440, NAFS - North American Fenestration Standard for Windows, Doors, and Skylights.
- .3 CAN/CSA-A440.2-14/A440.3-14, Fenestration energy performance/User guide to CSA A440.2, Fenestration energy performance.
- .4 CAN/CSA-A440.4-07(R2016), Window, Door, and Skylight Installation
- .5 CAN/CSA-Z91-02(R2013), Health and Safety Code for Suspended Equipment Operations.
- .6 CAN/CSA-Z809-08, Sustainable Forest Management.

1.02 ADMINISTRATIVE REQUIREMENTS

.1 Pre-Installation Meetings:
- .1 Convene pre-installation meeting 1 week prior to beginning work of this Section and on-site installation, with Contractor's Representative and Departmental 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 construction subtrades.
  - .4 Review manufacturer's written installation instructions and warranty requirements.

1.03 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 windows and include product characteristics, performance criteria, physical size, finish and limitations.
- .2 Submit 2 copies of WHMIS MSDS in accordance with Section 01 35 29.06 - Health and Safety Requirements.

.3 Shop Drawings:
- .1 Indicate materials and details in full size scale for head, jamb and sill, profiles of components, interior and exterior trim junction between combination units elevations of unit, anchorage details, location of isolation coating, description of related components and exposed finishes fasteners, and caulking. Indicate location of manufacturer's nameplates.
- .2 Indicate locations, dimensions, openings and requirements of related work.

.4 Samples:
- .1 Submit for review and acceptance of each unit.
- .2 Samples returned for inclusion into work.
- .3 Submit one representative model complete full size window sample of each type window.
- .4 Include frame, sash, sill, glazing and weatherproofing method, insect screens, surface finish and hardware. Show location of manufacturer's nameplates.
- .5 Include 150 mm long samples of head, jamb, sill, meeting rail mullions to indicate profile.

.5 Test and Evaluation Reports:
- .1 Submit test reports from approved independent testing laboratories, certifying compliance with specifications.
- .2 All test reports that reference the NAFS must include, on the first page, a summary of the results including, at minimum:
  - .1 The product manufacturer.
  - .2 The type of product.
  - .3 The model number/series number.
  - .4 The primary product designation.
  - .5 The secondary product designation.
    - .1 Positive design pressure.
    - .2 Negative design pressure.
    - .3 Water penetration resistance test pressure.
    - .4 Canadian air infiltration and exfiltration levels.
  - .6 The test completion date.
- .3 The report will also contain the following information:
  - .1 Test dates.
  - .2 Report preparation dates.
  - .3 Test information retention period.
  - .4 Location of testing facilities.
  - .5 Full description of test samples, including:
    - .1 AnodizedEnamelled finish, weathering characteristics wood preservative.
    - .2 Condensation resistance.
    - .3 Safety drop - vertical sliding windows only.
    - .4 Block operation - sliding windows only.
    - .5 Sash strength and stiffness - operable casement projecting.
    - .6 Sash pull-off - vinyl windows.
    - .7 Forced entry resistance.
    - .8 Mullian deflection - combination and composite windows.
  - .6 Complete description of amendments, as applicable.

.7 Conclusion.
.8 Drawings signed by the testing laboratory, if provided.

1.04 CLOSEOUT SUBMITTALS

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

.2 Operation and Maintenance Data: submit operation and maintenance data for windows for incorporation into manual.

1.05 QUALITY ASSURANCE

.1 Test and Evaluation Reports:
.2 Submit test reports from approved independent testing laboratories, certifying compliance with specifications.
.3 Test reports that reference the NAFS include, on the first page, a summary of the results including, at minimum:
  .1 Product manufacturer.
  .2 Type of product.
  .3 Model number/series number.
  .4 Primary product designation.
  .5 Secondary product designation.
    .1 Positive design pressure.
    .2 Negative design pressure.
    .3 Water penetration resistance test pressure.
    .4 Canadian air infiltration and exfiltration levels.
  .6 Test completion date.
.4 Report to contain the following information:
  .1 Test dates.
  .2 Report preparation dates.
  .3 Test information retention period.
  .4 Location of testing facilities.
  .5 Full description of test samples, including:
    .1 Anodized finish, weathering characteristics wood preservative.
    .2 Condensation resistance.
    .3 Safety drop - vertical sliding windows only.
    .4 Block operation - sliding windows only.
    .5 Sash strength and stiffness - operable casement projecting.
    .6 Sash pull-off - vinyl windows.
    .7 Forced entry resistance.
    .8 Mullian deflection - combination and composite windows.
  .6 Complete description of amendments, as applicable.
  .7 Conclusion.
  .8 Drawings signed by the testing laboratory, if provided.

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

1.06 DELIVERY, STORAGE AND HANDLING

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

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:
- .1 Store materials off ground indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
- .2 Store and protect windows from nicks, scratches, and blemishes.
- .3 Replace defective or damaged materials with new.

.4 Packaging Waste Management: remove for reuse and return by manufacturer of pallets, crates, padding, and packaging materials in accordance with Section 01 74 19 - Waste Management and Disposal.

2 PRODUCTS

2.01 MATERIALS

.1 Sheet aluminum: Alloy 1100, F temper, 1.5 mm ($^{3}/_{16}$") or 3 mm ($^{1}/_{8}$") minimum thickness, exposed sheet finished to match frames as specified above

.2 Glass: Clear or Tinted, as indicated in window schedule, sealed glass units as specified under Section 08 80 00 Glazing

.3 Fasteners: To ASTM A167, stainless steel, type 304 selected to prevent galvanic action with the components fastened, of suitable size to sustain imposed loads

.4 Gaskets: Neoprene or EPDM with dimensional tolerances and durometer hardness and of suitable size and shape to meet the requirements of the specifications and their specific application. Gaskets shall be virgin material as manufactured by Tremco Ltd., Tremco Ltd. Gaskets shall conform to Tremco Information Bulletins:

For EPDM - TDB-460-1
For Neoprene - TDB-270-1

.5 Supporting angles, plates, bars, rods, and other steel accessories: Mild steel CAN3-G40.20/G40.21, shop painted with zinc chromate primer, thickness as required to sustain imposed loads and in no case less than 5 mm ($^{3}/_{16}$") thick

.6 Sealant: Including primer, joint filler, as specified in Section 07 92 00

.7 Dielectric separator: Bituminous paint

.8 Thermal separator: Polyvinylchloride, 50 Shore A durometer hardness +5

.9 Glazing Tape: Refer to Section 08 80 00 Glazing

.10 Metal air seal/vapour barrier (by window supplier) to be bonded to window frame and extend behind mounting frame. Seal all corners to maintain air sea/vapour retarder. Install flexible flashing with continuous metal retaining strip to lap to interior wall assembly.

.11 Coordinate materials of this section with materials specified in Section 08 41 13 Aluminum Entrance Doors and Framing

.12 Exterior Fixed Window Frame: To profiles indicated and as required to fulfill performance requirements, nominal thickness 2.5 mm (0.098"), suitable alloy and proper temper for extruding and adequate structural characteristics; and suitable for finishing as specified

2.02 FABRICATION

.1 Fabricate in accordance with AAMA/WDMA/CSA 101/I.S.2/A440 supplemented as follows:

.2 Fabricate units square and true with maximum tolerance of plus or minus 1.5 mm for units with a diagonal measurement of 1800 mm or less, and plus or minus 3 mm for units with a diagonal measurement over 1800 mm.

.3 Face dimensions detailed maximum permissible sizes.

.4 Brace frames to maintain squareness and rigidity during shipment and installation.

.5 Finish steel clips and reinforcement with shop coat primer to MPI #79 380 g/m² zinc coating to ASTM A 123/A 123M.

2.03 ALUMINUM FINISHES

.1 Refer to drawings for required aluminum finishes.

.2 Paint ungalvanized steel clips, supports and reinforcing steel with steel primer or bituminous paint.

.3 Non-exposed surfaces may be left natural.

2.04 GLAZING

.1 Glaze windows in accordance with AAMA/WDMA/CSA 101/I.S.2/A440.

2.05 AIR BARRIER AND VAPOUR RETARDER

.1 Equip window frames with factory site installed air barrier and vapour retarder material for sealing to building air barrier and vapour retarder as follows:
- .1 Material: identical to, or compatible with, building air barrier and vapour retarder materials to provide required air tightness and vapour diffusion control throughout exterior envelope assembly.
- .2 Material width: adequate to provide required air tightness and vapour diffusion control to building air barrier and vapour retarder from interior.

3 EXECUTION

3.01 EXAMINATION

.1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts 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.

3.02 INSTALLATION

.1 Window installation:
- .1 Install in accordance with AAMA/WDMA/CSA 101/I.S.2/A440.
- .2 Arrange components to prevent abrupt variation in colour.

.2 Sill installation:
- .1 Install metal sills with uniform wash to exterior, level in length, straight in alignment with plumb upstands and faces. Use one piece mm lengths at each location.
- .2 Cut sills to fit mm longer than window opening.
- .3 Secure sills in place with anchoring devices located at ends joints of continuous sills and evenly spaced 600 mm on centre in between.
- .4 Fasten expansion joint cover plates and drip deflectors with self tapping stainless steel screws.
- .5 Maintain 6 to 9 mm space between butt ends of continuous sills. For sills over 1200 mm in length, maintain 3 to 6 mm space at each end.

.3 Caulking:
- .1 Seal joints between windows and window sills with sealant. Bed sill expansion joint cover plates and drip deflectors in bedding compound. Caulk between sill upstand and window-frame. Caulk butt joints in continuous sills.
- .2 Apply sealant in accordance with Section 07 92 00 - Joint Sealants. Conceal sealant within window units except where exposed use is permitted by Departmental Representative.

3.03 FIELD QUALITY CONTROL

.1 Have manufacturer of products supplied under this Section review Work involved in handling, installation/application, protection and cleaning of its products, and submit written reports in acceptable format to verify compliance of Work with Contract.

.2 Manufacturer's field services: 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 at stages listed:

.1 After delivery and storage of products, and when preparatory Work on which Work of this Section depends completed, but before installation begins.
.2 Twice during progress of Work at 25% and 60% complete.
.3 Upon completion of Work, after cleaning carried out.

.4 Obtain reports within 3 days of review and submit.

3.04 CLEANING

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

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

.3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 19 - Waste Management and Disposal.

3.05 PROTECTION

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

.2 Repair damage to adjacent materials caused by window installation.

END OF SECTION

1 GENERAL

1.01 REFERENCE STANDARDS

.1 American National Standards Institute (ANSI) / Builders Hardware Manufacturers Association (BHMA)
- .1 ANSI/BHMA A156.1-2000, American National Standard for Butts and Hinges.
- .2 ANSI/BHMA A156.2-2003, Bored and Preassembled Locks and Latches.
- .3 ANSI/BHMA A156.3-2001, Exit Devices.
- .4 ANSI/BHMA A156.4-2000, Door Controls - Closers.
- .5 ANSI/BHMA A156.5-2001, Auxiliary Locks and Associated Products.
- .6 ANSI/BHMA A156.6-2005, Architectural Door Trim.
- .7 ANSI/BHMA A156.8-2005, Door Controls - Overhead Stops and Holders.
- .8 ANSI/BHMA A156.12-2005, Interconnected Locks and Latches.
- .9 ANSI/BHMA A156.13-2002, Mortise Locks and Latches Series 1000.
- .10 ANSI/BHMA A156.15-2006, Release Devices - Closer Holder, Electromagnetic and Electromechanical.
- .11 ANSI/BHMA A156.16-2002, Auxiliary Hardware.
- .12 ANSI/BHMA A156.18-2006, Materials and Finishes.
- .13 ANSI/BHMA A156.19-2002, Power Assist and Low Energy Power - Operated Doors.

.2 Canadian Steel Door and Frame Manufacturers' Association (CSDMA)
- .1 CSDMA Recommended Dimensional Standards for Commercial Steel Doors and Frames - 2009.

1.02 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 door hardware and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Samples:
- .1 Submit for review and acceptance of each unit.
- .2 Samples will be returned for inclusion into work.
- .3 Identify each sample by label indicating applicable specification paragraph number, brand name and number, finish and hardware package number.
- .4 After approval samples will be returned for incorporation in Work.

.4 Hardware List:
- .1 Submit contract hardware list.
- .2 Indicate specified hardware, including make, model, material, function, size, finish and other pertinent information.

.5 Test Reports: certified test reports showing compliance with specified

performance characteristics and physical properties.

.6 Manufacturer's Instructions: submit manufacturer's installation instructions.

1.03 CLOSEOUT SUBMITTALS

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

.2 Operation and Maintenance Data: submit operation and maintenance data for door hardware for incorporation into manual.

1.04 MAINTENANCE MATERIAL SUBMITTALS

.1 Extra Stock Materials:

.2 Supply maintenance materials in accordance with Section 01 78 00 - Closeout Submittals.

.3 Tools:

.1 Supply 2 sets of wrenches for door closers locksets and fire exit hardware.

1.05 QUALITY ASSURANCE

.1 Regulatory Requirements:

.1 Hardware for doors in fire separations and exit doors certified by a Canadian Certification Organization accredited by Standards Council of Canada.

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

1.06 DELIVERY, STORAGE AND HANDLING

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

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Package items of hardware including fastenings, separately or in like groups of hardware, label each package as to item definition and location.

.4 Storage and Handling Requirements:

.1 Store materials off ground indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Store and protect door hardware from nicks, scratches, and blemishes.

.3 Protect prefinished surfaces with wrapping strippable coating.

.4 Replace defective or damaged materials with new.

.5 Packaging Waste Management: remove for reuse and return by manufacturer of pallets, crates, padding, and packaging materials in accordance with Section 01 74 19 - Waste Management and Disposal.

2 PRODUCTS

2.01 HARDWARE ITEMS

.1 Use one manufacturer's products only for similar items.

2.02 DOOR HARDWARE

.1 Locks and latches:
- .1 Bored and preassembled locks and latches: to ANSI/BHMA A156.2, series 2000 preassembled lock, grade 1 series 4000 bored lock, grade 1 2 3, designed for function and keyed as stated in Hardware Schedule.
- .2 Interconnected locks and latches: to ANSI/BHMA A156.12, series 5000 interconnected lock, grade 1 2 3, designed for function and keyed as stated in Hardware Schedule.
- .3 Mortise locks and latches: to ANSI/BHMA A156.13, series 1000 mortise lock, grade 1 2 3 4, designed for function and keyed as stated in Hardware Schedule.
- .4 KnobsLever handles: plain special (describe) design.
- .5 RosesEscutcheons: round square.
- .6 Normal strikes: box type, lip projection not beyond jamb.
- .7 Cylinders: key into keying system as noted as directed.
- .8 Finished to .

.2 Butts and hinges:
- .1 Butts and hinges: to ANSI/BHMA A156.1, designated by letter A and numeral identifiers, followed by size and finish, listed in Hardware Schedule.
- .2 Self-closing hinges and pivots: to ANSI/BHMA A156.17, designated by letter K and numeral identifiers listed in Hardware Schedule, with suffix letter F indicating listed for used on fire doors, finished to .
- .3 Strap and tee hinges and hasps: to ANSI/BHMA A156.20, designated by letter A and numeral identifiers listed in Hardware Schedule, size listed in Hardware Schedule in accordance with ANSI/BHMA A156.20, table I, finished to 602 (cadmium plated) or 603 (zinc plated).

.3 Exit devices: to ANSI/BHMA A156.3, type , function , grade 1 2, conventional modern modern-narrow stile special (describe) design, finished to .
- .1 Auxiliary items: door co-ordinator, type 21, for pairs of doors with overlapping astragals.

.4 Door Closers and Accessories:
- .1 Door controls (closers): to ANSI/BHMA A156.4, designated by letter C and numeral identifiers listed in Hardware Schedule, size in accordance with ANSI/BHMA A156.4, table A1, finished to .
- .2 Door controls - overhead holders: to ANSI/BHMA A156.8, designated by letter C and numeral identifiers listed in Hardware Schedule, finished to .
- .3 Closer/holder release devices: to ANSI/BHMA A156.15, designated by letter C and numeral identifiers listed in hardware schedule, finished to .
- .4 Door co-ordinator: surface concealed for pairs of doors with overlapping astragal.

.5 Door Operators:
- .1 Power-operated pedestrian doors: to ANSI/BHMA A156.10.
- .2 Power assist and low energy power operated doors: to ANSI/BHMA A156.19.

.6 Auxiliary locks and associated products: to ANSI/BHMA A156.5, designated by letter E and numeral identifiers listed in Hardware Schedule as listed below, finished to .
- .1 Latch boltDead bolt, type , finished to . Key into keying system as notedas directed.
- .2 Cylinders: type , finished to , for installation in deadlocks provided with special doors as listed in Hardware Schedule. Key into keying system as noted as directed.

.7 Architectural door trim: to ANSI/BHMA A156.6, designated by letter J and numeral identifiers listed in Hardware Schedule as listed below, finished to .
- .1 Door protection plates: kick plate type , 1.27 mm thick aluminum brass stainless steel 3.2 mm thick solid plastic laminated plastic, 1 edges, size, finished to .
- .2 Push plates: type , 1.27 mm thick aluminum brass stainless steel 3.2 mm thick solid plastic laminated plastic, 1 edge, size, finished to .
- .3 Push/Pull units: type , combination aluminum brass stainless steel wood plastic stone, size, finished to .

.8 Sliding and folding door hardware: to ANSI/BHMA A156.14, designated by letter D and numeral identifiers listed in Hardware Schedule as listed below, finished to .
- .1 Heavy sliding doors (over 91 kg): box track, hanger and single double triple sidewall overhead style track supports, as listed in above standard for door weight.
- .2 Bi-passing sliding door hardware: double leg steel or aluminum tack without with fascia and hangers, as listed in above standard for door weight.
- .3 Bi-folding hardware: steel or aluminum track, surface mounted components top and bottom hung mounted components, as listed in above standard for door weight.
- .4 Multiple folding door hardware: .
- .5 Pocket sliding door hardware: .
- .6 All sets packed complete with hinges and fasteners as required.
- .7 Surface bolts: cane cremone spring (chain) foot bolt: type , finished to .
- .8 Accessory item: door pulls handles stops guides latch type .

.9 Auxiliary hardware: to ANSI/BHMA A156.16, designated by letter L and numeral identifiers listed in Hardware Schedule as listed below, finished to .
- .1 Combinationmagneticchainstopand holder, wallfloordoor mounted: type , finished to .
- .2 Surface boltslever extension flush bolt cremone bolt, type , finish to .
- .3 Door silencer: type .
- .4 Chain door guard: type .
- .5 Door knockers: type .
- .6 Door viewer: type , listed or labelled for fire doors.

.7 Roller latch: type .
.8 Automatic flush bolts: type .

.10 Door bottom seal: heavy duty, door seal of extruded aluminum frame and solid hollow closed cell neoprene weather seal, recessed in door bottom surface mounted with drip cap recessed in door face, closed ends, adjustable automatic retract mechanism when door is open, clear anodized finish.

.11 Thresholds: mm wide x full width of door opening, extruded aluminum bronze stainless steel mill finish, plain serrated surface, with thermal break of rigid PVC, with lip and vinyl door seal insert.

.12 Weatherstripping:
.1 Head and jamb seal:
.1 Extruded aluminum frame and solid hollow closed cell neoprene nylon brush pile vinyl insert, clear anodized finish.
.2 Adhesive backed neoprene vinyl covered foam material.
.2 Door bottom seal:
.1 Extruded aluminum frame and closed cell neoprene nylon brush vinyl sweep, clear anodized finish.

.13 Astragal: adjustable compensating overlapping, extruded aluminum frame with vinyl pile insert, finished to match doors.

.14 Barrier Free Pneumatic Door Operator:
.1 Heavy duty pneumatically assisted door closer, capable of multi-door operation, complete with actuators, control boxes, pneumatic tubing and compressed air source.
.2 Self contained control box/compressor combination for independent operation of two door leaves.
.3 Control boxes: complete with electric strike relay.
.4 Mount operators on either push or pull sides of doors as required to place them inside rooms.
.5 Actuation of operators by card readers motion detectors.
.6 Electrical box and actuator: Hardwired low voltage actuator with stainless steel 114 mm round plate, engraved blue filled with handicap symbol. Box 51 mm wide x 102 mm high x 50 mm deep single gang electrical box, flush mounted in wall, locations indicated.
.7 Supply switched line voltage to control box. Locate switch adjacent to box.
.8 Supply low voltage wiring to each actuator and 6 mm diameter air tubing to each operator.
.9 Mount control box in location as directed by Departmental Representative DCC RepresentativeConsultant.

2.03 MISCELLANEOUS HARDWARE

.1 Indexed key control system: to ANSI/BHMA A156.5, designated by letter E and numeral identifiers, wall mounted multiple drawer portable system, type , colour enamel paint finish.

.2 Padlocks: size, finish to .

2.04 FASTENINGS

.1 Use only fasteners provided by manufacturer. Failure to comply may void warranties and applicable licensed labels.

.2 Supply screws, bolts, expansion shields and other fastening devices required for satisfactory installation and operation of hardware.

.3 Exposed fastening devices to match finish of hardware.

.4 Where pull is scheduled on one side of door and push plate on other side, supply fastening devices, and install so pull can be secured through door from reverse side. Install push plate to cover fasteners.

.5 Use fasteners compatible with material through which they pass.

2.05 KEYING

.1 Doors, padlocks and cabinet locks to be keyed differently keyed alike keyed alike in groups master keyed grand master keyed great grand master keyed great great grand master keyed as noted in Hardware Schedule as directed. Prepare detailed keying schedule in conjunction with Departmental Representative DCC Representative Consultant.

.2 Supply keys in duplicate for every lock in this Contract.

.3 Supply 3 master keys for each master key or grand master key group.

.4 Stamp keying code numbers on keys and cylinders.

.5 Supply construction cores.

.6 Hand over permanent cores and keys to Departmental Representative DCC RepresentativeConsultant.

3 EXECUTION

3.01 INSTALLATION

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

.2 Supply metal door and frame manufacturers with complete instructions and templates for preparation of their work to receive hardware.

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

.4 Install hardware to standard hardware location dimensions in accordance with

CSDFMA Canadian Metric Guide for Steel Doors and Frames (Modular Construction).

.5 Where door stop contacts door pulls, mount stop to strike bottom of pull.

.6 Install key control cabinet.

.7 Use only manufacturer's supplied fasteners.
- .1 Use of "quick" type fasteners, unless specifically supplied by manufacturer, is unacceptable.

.8 Remove construction cores locks when directed by Departmental Representative DCC Representative Consultant.
- .1 Install permanent cores and ensure locks operate correctly.

3.02 ADJUSTING

.1 Adjust door hardware, operators, closures and controls for optimum, smooth operating condition, safety and for weather tight closure.

.2 Lubricate hardware, operating equipment and other moving parts.

.3 Adjust door hardware to ensure tight fit at contact points with frames.

3.03 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
- .1 Leave Work area clean at end of each day.
- .2 Clean hardware with damp rag and approved non-abrasive cleaner, and polish hardware in accordance with manufacturer's instructions.
- .3 Remove protective material from hardware items where present.
- .4 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

3.04 DEMONSTRATION

.1 Keying System Setup and Cabinet:
- .1 Set up key control system with file key tags, duplicate key tags, numerical index, alphabetical index and key change index, label shields, control book and key receipt cards.
- .2 Place file keys and duplicate keys in key cabinet on their respective hooks.
- .3 Lock key cabinet and turn over key to Departmental Representative.

.2 Maintenance Staff Briefing:
- .1 Brief maintenance staff regarding:
  - .1 Proper care, cleaning, and general maintenance of projects complete hardware.
  - .2 Description, use, handling, and storage of keys.
  - .3 Use, application and storage of wrenches for door closers locksets and fire exit hardware.

.3 Demonstrate operation, operating components, adjustment features, and lubrication requirements.

3.05 PROTECTION

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

.2 Repair damage to adjacent materials caused by door hardware installation.

3.06 SCHEDULE

END OF SECTION

1 GENERAL

1.01 REFERENCE STANDARDS

.1 ASTM International
- .1 ASTM C 542, Standard Specification for Lock-Strip Gaskets.
- .2 ASTM D 790, Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.
- .3 ASTM C1036, Standard Specification for Flat Glass.
- .4 ASTM D 2240, Standard Test Method for Rubber Property - Durometer Hardness.
- .5 ASTM E 84, Standard Test Method for Surface Burning Characteristics of Building Materials.
- .6 ASTM E 330, Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference.
- .7 ASTM F 1233, Standard Test Method for Security Glazing Materials and Systems.

.2 Canadian General Standards Board (CGSB)
- .1 CAN/CGSB-12.1-2017, Tempered or Laminated Safety Glass.
- .2 CAN/CGSB-12.2-M91 (R2017), Flat, Clear Sheet Glass.
- .3 CAN/CGSB-12.3-M91 (R2017), Flat, Clear Float Glass.
- .4 CAN/CGSB-12.4-M91 (R2017), Heat Absorbing Glass.

.3 Glass Association of North American (GANA)
- .1 GANA Glazing Manual - 2008.
- .2 GANA Laminated Glazing Reference Manual - 2009.

1.02 ADMINISTRATIVE REQUIREMENTS

.1 Pre-Installation Meetings:
- .1 Convene pre-installation meeting 1 week prior to beginning work of this Section and on-site installation, with Contractor's Representative and Departmental 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 written installation instructions and warranty requirements.

.2 Arrange for site visit with Departmental Representative prior to start of Work to examine existing site conditions adjacent to demolition Work.

.3 Hold project meetings every week month.

.4 Ensure key personnel site supervisor project manager subcontractor representatives attend.

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

1.03 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:
- .1 Submit manufacturer's instructions, printed product literature and data sheets for glass, sealants, and glazing accessories and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Samples:
- .1 Submit for review and acceptance of each unit.
- .2 Samples will be returned for inclusion into work.
- .3 Submit duplicate mm size samples of and sealant material.

.4 Certificates: submit product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

1.04 CLOSEOUT SUBMITTALS

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

.2 Operation and Maintenance Data: submit operation and maintenance data for glazing for incorporation into manual.

1.05 QUALITY ASSURANCE

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

1.06 DELIVERY, STORAGE AND HANDLING

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

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:
- .1 Store materials off ground indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
- .2 Store and protect glazing and frames from nicks, scratches, and blemishes.
- .3 Protect prefinished aluminum surfaces with wrapping strippable coating.
- .4 Replace defective or damaged materials with new.

.4 Packaging Waste Management: remove for reuse and return by manufacturer of pallets, crates, padding, and packaging materials in accordance with Section 01 74 19 - Waste Management and Disposal.

1.07 AMBIENT CONDITIONS

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

2 PRODUCTS

2.01 MATERIALS

.1 Design Criteria:
- .1 Ensure continuity of building enclosure vapour and air barrier using glass and glazing materials as follow:
  - .1 Utilize inner light of multiple light sealed units for continuity of air and vapour seal.
- .2 Size glass to withstand wind loads, dead loads and positive and negative live loads to ASTM E330.
- .3 Limit glass deflection to 1/200 with full recovery of glazing materials.

.2 Flat Glass:
- .1 Safety glass: to CAN/CGSB-12.1, transparent, 6mm thick unless noted otherwise on Drawings.
  - .1 Type 2-tempered.
  - .2 Class B-float.
  - .3 Category 1.
- .2 Float glass: to CAN/CGSB-12.3, glazing quality, 6mm thick unless noted otherwise on Drawings.
- .3 Spandrel glass: Tempered spandrel glass conforming with DD-G-1403, Grade B, Style II, colour as indicated on Drawings, 6mm thick unless noted otherwise on Drawings.
- .4 Clear Wire Glass: clear rolled glass conforming to ASTM C-1036, Type II (flat), Class I, Form 1 (wired and polished both faces), wired with welded polished wires, 13 mm x 13 mm square pattern, 6mm thick unless noted otherwise on Drawings..
- .5 Low emissivity (LOW E) glass, metallic coating: soft, sputtered, 6mm thick unless noted otherwise on Drawings.

.3 Insulating Glass Units:
- .1 Manufacturer and Unit Fabrication: By a member of the Sealed Insulating Glass Manufacturers Assn. (SIGMA) and fabricated in accordance with SIGMA recommendations, except where more stringent requirements are indicated.
- .2 Class: "CBA" and certified as such by the Insulating Glass Certification Council (IGCC).

.3 Construction: organic elastomeric sealed edge (no metal edges permitted) consisting of a polyisobutylene primary seal and a silicone secondary seal, with the interior air space hermetically sealed and provided with a concealed desiccant agent. Secondary seals other than silicone shall not be used.

.4 Sealant: in accordance with Section 07 92 00.

2.02 ACCESSORIES

.1 Setting blocks: neoprene or EPDM, 80-90 Shore A durometer hardness to ASTM D2240, size to suit glazing method, glass light weight and area.

.2 Spacer shims: neoprene, 50-60 Shore A durometer hardness to ASTM D2240, 75 mm long x one half height of glazing stop x thickness to suit application. Self adhesive on one face.

.3 Glazing tape:
- .1 Preformed butyl compound with integral resilient tube spacing device, 10-15 Shore A durometer hardness to ASTM D2240; coiled on release paper; black colour.
- .2 Closed cell polyvinyl chloride foam, coiled on release paper over adhesive on two sides, maximum water absorption by volume 2 %, designed for compression of 25 %, to effect an air and vapour seal.

.4 Glazing splines: resilient silicone, extruded shape to suit glazing channel retaining slot, colour as selected.

.5 Glazing clips: manufacturer's standard type.

.6 Lock-strip gaskets: to ASTM C542.

3 EXECUTION

3.01 EXAMINATION

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

3.02 PREPARATION

.1 Clean contact surfaces with solvent and wipe dry.

.2 Seal porous glazing channels or recesses with substrate compatible primer or sealer.

.3 Prime surfaces scheduled to receive sealant.

3.03 INSTALLATION: EXTERIOR WET/DRY METHOD (PREFORMED TAPE AND SEALANT)

.1 Perform work in accordance with GANA Glazing Manual and GANA Laminated Glazing Reference Manual for glazing installation methods.

.2 Cut glazing tape to length and set against permanent stops, 6 mm below sight line. Seal corners by butting tape and dabbing with sealant.

.3 Apply heel bead of sealant along intersection of permanent stop with frame ensuring full perimeter seal between glass and frame to complete continuity of air and vapour seal.

.4 Place setting blocks at 1/4 1/3 points, with edge block maximum 150 mm from corners.

.5 Rest glazing on setting blocks and push against tape and heel head of sealant with sufficient pressure to attain full contact at perimeter of light or glass unit.

.6 Install removable stops with spacer strips inserted between glazing and applied stops 6 mm below sight line. Place glazing tape on glazing light or unit with tape flush with 16 mm below sight line.

.7 Fill gap between glazing and stop with sealant to depth equal to bite of frame on glazing, maximum 9 mm below sight line.

.8 Apply cap head of sealant along void between stop and glazing, to uniform line, flush with sight line. Tool or wipe sealant surface smooth.

3.04 INSTALLATION: INTERIOR WET/DRY METHOD (TAPE AND SEALANT)

.1 Perform work in accordance with GANA Glazing Manual and GANA Laminated Glazing Reference Manual for glazing installation methods.

.2 Cut glazing tape to length and install against permanent stops, projecting 1.6 mm above sight line.

.3 Place setting blocks at 1/4 1/3 points, with edge block maximum 150 mm from corners.

.4 Rest glazing on setting blocks and push against tape to ensure full contact at perimeter of light or unit.

.5 Install removable stops, with spacer shims inserted between glazing and applied stops at 600 mm intervals, 6 mm below sight line.

.6 Fill gaps between light and applied stop with sealant to depth equal to bite on glazing, to uniform and level line.

.7 Trim protruding tape edge.

3.05 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
- .1 Leave Work area clean at end of each day.
  - .1 Remove traces of primer, caulking.
  - .2 Remove glazing materials from finish surfaces.
  - .3 Remove labels.
  - .4 Clean glass and mirrors using approved non-abrasive cleaner in accordance with manufacturer's instructions.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

3.06 PROTECTION

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

.2 After installation, mark each light with an "X" by using removable plastic tape or paste.
- .1 Do not mark heat absorbing or reflective glass units.

.3 Repair damage to adjacent materials caused by glazing installation.

END OF SECTION

1. General

1.01 SUMMARY

.1 This Section includes the following:

.1 Interior gypsum board for walls, ceilings and bulkheads

1.02 REFERENCES

.1 American Society for Testing and Materials (ASTM):

.1 ASTM A653/A653M04a Steel Sheet, ZincCoated (Galvanized) or ZincIron AlloyCoated (Galvannealed) by the HotDip Process, General Requirements
.2 ASTM C1103d Standard Terminology Relating to Gypsum and Related Building Materials and Systems
.3 ASTM C47504 Joint Compound and Joint Tape for Finishing Gypsum Board
.4 ASTM C104799 (2004) Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base

.5 ASTM C1396/C1396M04 Standard Specification for Gypsum Board

.2 Canadian General Standards Board (CGSB):

.1 CAN/CGSB19.21M87 Sealing and Bedding Compound for Acoustic Purposes

.3 Northwest Wall and Ceiling Bureau (NWCB):

.1 Specification Standards Manual

.4 Underwriters Laboratories of Canada (ULC):

.1 CAN/ULC S10104 Fire Endurance Tests of Building Construction and Materials
.2 CAN/ULCS10203 Surface Burning Characteristics of Building Materials and Assemblies
.3 CAN/ULC S1141980 (R1997) Test for Determination of NonCombustibility in Building Materials
.4 CAN/ULC S70297 Mineral Fibre Thermal Building Insulation
.5 List of Equipment and Materials

1.03 DEFINITIONS

.1 **Levels of Finish:** Standard levels of finish defined by NWCB Manual apply to products of this Section as follows, and are used in Section 09 99 10 Room Finish Schedule to designate required finish levels for indicated areas:

.1 **L0 – Level 0:** No tape or joint compound in joints.

.2 **L1 – Level 1:** Embed tape at joints in ceiling plenum areas, concealed areas, unless a higher level of finish is required for fire resistance rated assemblies and sound rated assemblies.

.3 **L2 – Level 2:** Embed tape and apply separate first coat of joint compound to tape, fasteners, and trim flanges where panels are substrate for tile.

.4 **L4 – Level 4:** Embed tape and apply separate first, fill, and finish coats of joint compound to tape, fasteners, and trim flanges at panel surfaces that will be exposed to view.

.2 Refer to ASTM C11 for definitions of terms for gypsum board assemblies not defined in this Section or in other referenced standards.

1.04 QUALITY ASSURANCE

.1 Install gypsum board in accordance with the Northwest Wall and Ceiling Bureau (NWCB), except as specified otherwise herein.

.2 Conform to product manufacturer's written instruction and ULC Design Requirements to provide STC and fire ratings indicated.

1.05 SITE SUPERVISION

.1 Site supervision for work of this section shall be full time. Supervisor shall be directly employed by the installer and shall have the authority to receive, represent and make decisions on behalf of the Trade Contractor.

1.06 DELIVERY, STORAGE AND HANDLING

.1 Comply with requirements of Section 01 65 00.

.2 Deliver materials in undamaged, original factory wrappings with labels and seals intact, and stored on job site in a dry, weatherproof, heated area.

.3 Store metal furring and accessories flat and protected from moisture and damage.

.4 Store boards flat, in piles, without overhanging boards, protected from moisture and physical damage.

.5 Waste Management and Disposal: separate waste materials for re-use and recycling in accordance with Section 01 35 41.

1.07 ENVIRONMENTAL CONDITIONS

.1 Maintain room, surface and material between 15°C and 21°C for a period of at least 72 hours before and during application, and continuously after.

1.08 SUPERIMPOSED LOADS

.1 Determine the superimposed loads which will be applied to suspended ceiling systems and ensure that adequate hangers are installed to safely support the additional loads in conjunction with the normal loads of the system.

2. Products

2.01 GYPSUM BOARD MATERIALS

.1 Gypsum Board: meeting the requirements of ASTM C1396/C1396M and as follows:

.1. Panel Size: Provide in maximum lengths and widths available that will minimize joints in each area and correspond with support system as indicated on drawings.

.2. Regular Gypsum Board:

.1. Thickness: As indicated.

.2. Long Edges: Tapered.

.3. Location: Vertical surfaces, unless otherwise indicated.

.2 Fire Resistant Type (Type C or X):

.1. Thickness: As indicated, 16 mm minimum.

.2. Long Edges: Tapered.

.3. Location: Where required for fire resistance rated assembly.

.3 Joint Tape: To ASTM C475, perforated paper with tapered edges as recommended by gypsum board manufacturer, or glass fibre mesh tape

.4 Joint Compound: To ASTM C475, bedding and finishing types recommended by gypsum board manufacturer; casein, vinyl or latex base.

.5 Corner and Casing Beads, Edge Trim: To ASTM 1047, Minimum 0.455 mm metal core thickness (0.017") (26 gauge) galvanized sheet steel with Z275 zinc finish to ASTM A525M86, type with perforated flanges, of type to be finished with joint compound

.6 Control/Expansion Joints: To ASTM C1047, 3 m (10 foot) lengths, roll formed zinc with a tape protected 6 mm (¼") opening, 11 mm ($^{7}/_{16}$") deep

.7 Adhesive: Type as recommended by gypsum board manufacturers

.8 Acoustic Insulation: To ULC S702, mineral fibre sound control batts, steel stud friction fit insulation (un faced), thickness 76 mm (3"), density 40 kg/m^3 minimum STC 50 for wall assembly. Acceptable material: Roxul AFB, substitutions shall submit product data to the Consultant prior to close of bid with all supporting information

.9 Sealant (acoustic purposes only): To CAN/CGSB19.21, non-skinning, non-hardening as specified in Section 07 90 00

.10 Sealant (fire rated for rated walls): ULC labelled, as specified in Section 07 90 00

.11 Insulating Strip: Rubberized, moisture resistant 3 mm thick closed cell neoprene strip 90 mm wide with self sticking permanent adhesive on one face lengths as required

PART 3 Execution

3.1 INSPECTION AND PREPARATION

.1 Inspect areas and surfaces and ensure all required metal backing for equipment is in place before commencing gypsum board application.

.2 Verify stud framing securely and rigidly erected, all services, lines, outlets and insulation.

.3 Prepare existing walls with wall metal backing ready for installation of new or relocated cabinet as indicated on drawings. Coordinate with Section 06 40 00 Architectural Wood work for backing requirements.

.4 Inspect all pressed steel frames and correct out-of-plumb frames for true alignment.

3.2 RESTORATION AND REPAIRS

.1 Skim coat all existing affected gypsum board walls and columns to make ready for new finishes. Repair all dents and gouges to provide smooth and even appearance. Cut and repair any gypsum board that has broken front and backer face.

.2 Repair existing drywall surfaces where existing abutting partitions have been removed. Review conditions on site during bid period.

3.3 CONTROL JOINTS

.1 Erect control joints at maximum 7.5 metre (25 feet) centres to divide large ceiling and wall areas into panels, over junction of structural members and non structural members where gypsum board is continuous, over control joints in masonry walls, at junction of ceilings and partitions with furred exterior wall.

.2 Control joints shall be laid out to coincide as far as possible with metal door, window or screen frames, but not necessarily to occur at every individual frame. Obtain Architect's approval for location, prior to installation.

3.4 ACCESSORIES

.1 Secure corner beads rigidly at all external angles of walls and ceilings.

.2 Install casing beads where gypsum board terminates against surface having no trim concealing the junction or where junction is not taped.

.3 Install casing beads where gypsum board butts to windows, frames or where interior partitions butt to exterior walls.

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

3.5 GYPSUM BOARD APPLICATION

.1 Erect gypsum board and tape joints to NWCB except where specified otherwise herein.

.2 Kerf cut gypsum board at curved walls follows by plaster fill system to present smooth even curve showing no faceting and blending smoothly into adjacent straight wall sections.

.3 Install fire rated and labelled gypsum board at all locations indicated on Drawings, utilizing type “C” or “X” as indicated by ULC rating for assembly and as required by authority having jurisdiction. Continue fire and smoke rated wall construction behind and around fire hose cabinet recesses and other recessed items larger than a double gang switch box to maintain wall fire rating.

.4 Stop gypsum board 25 mm (1”) from underside of roof deck. Attach gypsum board to vertical studs, not to ceiling track, to allow for deflection.

3.6 SEALANT SOUND RATINGS

.1 Caulk sound rated partitions strictly in accordance with gypsum board manufacturer's instructions for the specific sound rating requirements. Locate sealant to ensure it is covered at completion of partition when finishes applied. Seal top and bottom tracks, and seal studs where they abut adjacent wall construction to ensure that no sound flanking occurs.

.2 Seal around mechanical and electrical work and other work in walls to ensure proper sound ratings. Provide gaskets where partitions abut a finished surface or material as per details and where partitions meet exterior wall furring.

.3 Build in all door, borrowed light frames and equipment to best practice to provide a neat, cleanly finished system.

.4 In fire rated partitions install fire stopping sealant before installing acoustic sealant.

3.7 INSULATION ACOUSTIC

.1 Install insulation within metal stud space to top of wall construction as indicated for sound or fire rating. Insulation to extend full height of partitions. Fill behind electrical outlet boxes, fire hose cabinets, washroom accessories and other openings with at least 150 mm (6”) lap around perimeter of opening, packed tight in layers (to approximately 50% of nominal thickness).

.2 Coordinate with Electrical and Mechanical Subcontractors to ensure that no back-to-back openings are formed, whether or not so indicated on drawings. All electrical and mechanical openings shall be separated by one stud space and lined all around with gypsum board and sealed with acoustic sealant.

.3 Installation to comply with manufacturer's current written recommendations.

3.8 SEALANT FIRE RATINGS

.1 Coordinate requirements for fire sealants with General Contractor.

.2 Caulking and sealing of fire and smoke rated partitions and separations specified under Section 07 84 00 Fire stopping and Smoke Seals.

3.9 CEILINGS AND SOFFITS

.1 Apply no-sag gypsum board to ceiling suspension system with end joints occurring over supports. Allow 1.5 mm (1/16") to 3 mm (1/8") space between butting ends.

.2 Cut board to fit within 6 mm (¼”) of fixtures and other surfaces.

.3 Screw attach to furring channels at spacing recommended by gypsum board manufacturer but in no case less than 150 mm (6”) on centre.

.4 Coordinate cutouts, trim and opening details and location with mechanical and electrical subcontractors.

.5 Finish gypsum board to heights and profiles indicated. Trim all corners and edges with proper corner and casing beads.

.6 Install moisture resistant gypsum board ceiling in washrooms and housekeeping rooms.

.7 Build bulkheads for drop ceilings as detailed. Carry gypsum board a minimum 50 mm (2”) above finished acoustic board ceiling. Provide furring behind for attachment of acoustic board perimeter track.

.8 Maintain surface flatness and level of ceiling within 3 mm (1/8”) in 3 metres (10 feet).

3.10 FINISHING

.1 Finish gypsum wallboard in accordance with the Northwest Wall and Ceiling Bureau (NWCB), Section 9.6 Part 3, Item 12.2, Levels of Finish No. 4.

3.11 ACCESS DOORS

.1 Install flush mounted access doors in locations as indicated on drawings in accordance with manufacturers instructions. Ensure that installation occurs prior to taping and finishing of gypsum board surfaces.

.2 Install all access doors provided by other trades. Exact locations of these doors will be verified on site.

3.12 CLEAN UP

.1 All gypsum board debris and dust shall be cleaned up and disposed of daily.

.2 Cleaning shall consist of brushing down wall and ceiling and sweeping floors daily.

.3 As areas are completed, thoroughly vacuum ceilings, walls and floors of all dust.

END OF SECTION

1 GENERAL

1.01 REFERENCE STANDARDS

.1 ASTM International
- .1 ASTM C 423-09, Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method
- .2 ASTM E 580/E 580M-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 C 635/C 635M-13a, Standard Specifications for the Manufacture, Performance and Testing of Metal Suspension Systems for Acoustical Tile and Lay-In Panel Ceilings.
- .4 ASTM C 636/C 636M-08, Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels.
- .5 ASTM E 1264-14, Standard Classification for Acoustical Ceiling Products.
- .6 ASTM E 1414/E 1414M 11ae1 Standard Test Method for Sound Attenuation between Rooms Sharing a Common Ceiling Plenum.
- .7 ASTM E 1477-98a(2013), Standard Test Method for Luminous Reflectance Factor of Acoustical Materials by Use of Integrating-Sphere Reflectometers.
- .8 ASTM F 1667-15Standard 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.

1.02 COORDINATION

.1 Do not begin erection of ceiling suspension system until work above ceiling has been inspected by Departmental Representative .

1.03 PRE-INSTALLATION MEETING

.1 Convene pre-installation meeting one week prior to beginning work of this Section and on-site installation, with contractor's representative and Departmental Representative other affected trades in accordance with Section 01 32 16.07 - Construction Progress Schedule - Bar (GANTT) Chart to:
- .1 Verify project requirements.
- .2 Review installation and substrate conditions.
- .3 Co-ordination with work of other sections.
- .4 Review manufacturer's installation instructions and warranty requirements.

.5 Review accepted shop drawings for installation requirements.

1.04 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 acoustical suspension, acoustic panels, acoustic tiles, and system accessories. Include product characteristics, performance criteria, physical size, finish and limitations.

.3 Shop Drawings:
- .1 Submit reflected ceiling plans for special grid patterns as indicated.
- .2 Indicate lay-out, insert and hanger spacing and fastening details, splicing method for main and cross runners, location of access splines change in level details, access door dimensions, and locations and acoustical unit support at ceiling fixture lateral bracing and accessories.

.4 Delegated Design Submittals:
- .1 Submit delegated design shop drawings stamped and signed by professional engineer registered or licensed in Province of , Canada.
- .2 Indicate components and installation methods to conform to specified seismic design and construction requirements of Contract Documents and in general accordance with ASTM E 580/E 580M.
- .3 Include supporting details, treatment of cross runners, main runners, and wall closures at terminal ends, suspension wire, lateral force bracing, light fixtures and services within the ceiling, seismic isolation joints and partition bracing.

.5 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 component proposed for use in each type of ceiling suspension system.
- .3 Submit duplicate full size 150 mm x 100 mm samples of each type of acoustical unit.

.6 Sustainable Design Submittals:
- .1 Submit in accordance with Section 01 35 21 - LEED Requirements and project Waste Management Plan Waste Reduction Workplan.

1.05 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 final certificate from design professional responsible for delegated detail design of ceiling indicating conformity with accepted shop drawings.

1.06 MAINTENANCE MATERIALS

.1 Provide extra acoustical units in accordance with Section 01 78 00 - Closeout Submittals.

.2 Provide acoustical units amounting to 2% of gross ceiling area for each pattern and type of acoustical panel or tile, suspension system and trim required for project, minimum 1 complete factory-sealed package of each.

.3 Ensure extra materials are from same production run as installed materials.

.4 Deliver extra materials for each type of acoustical unit in original unopened packages clearly identified, including colour and texture.

.5 Deliver to Departmental Representative , upon completion of the work of this section.

1.07 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.

1.08 DELIVERY, STORAGE AND HANDLING

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

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:
- .1 Store materials flat, off ground indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
- .2 Store and protect acoustical ceiling panels 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 reuse and recycling or disposal in accordance with Section 01 74 19 - Construction /Demolition Waste Management and Disposal.

1.09 ENVIRONMENTAL REQUIREMENTS

.1 Permit wet work to dry before beginning to install.

.2 Maintain uniform minimum temperature of 15 degrees C and humidity of 20-40% before and during installation.

.3 Store materials in work area 48 hours prior to installation.

2 PRODUCTS

2.01 DESIGN CRITERIA

.1 Design Requirements:
- .1 Intermediate duty system to ASTM C 635/ASTM C635M.
- .2 Maximum deflection: 1/360th of span to ASTM C 635/ASTM C635M deflection test.

2.02 ACOUSTICAL CEILING SUSPENSION

.1 Acoustical Ceiling Suspension system non fire rated, made up as follows:
- .1 1 directional exposed tee bar grid.
- .2 1 directional concealed tee spline.
- .3 Concealed tee access spline.
- .4 Concealed tongue and groove runner.
- .5 Concealed H runner, tee spline and flat steel spline.
- .6 Concealed zee runner and flat steel spline.
- .7 Metal pan special tee system.

.2 Fire-resistance rated suspension system ACS- : certified floor/ceiling

.3 Basic materials for suspension system: commercial quality cold rolled steel mill finished.

.4 Exposed tee bar grid components: shop painted satin sheen white colour c. Components die cut. Main tee with double web, rectangular bulb and 25 mm rolled cap on exposed face. Cross tee with rectangular bulb; web extended to form positive interlock with main tee webs; lower flange extended and offset to provide flush intersection.

.5 Hanger wire: galvanized soft annealed steel wire:
- .1 3.6 mm diameter for access tile ceilings.

.6 Hanger inserts: purpose made.

.7 Accessories: splices, clips, wire ties, retainers and wall moulding flush , to complement suspension system components, as recommended by system manufacturer.

2.03 ACOUSTICAL CEILING PANELS

.1 Acoustical Panel: to ASTM E 1264 and as follows.
- .1 Type and Pattern: to match exisitng.
- .2 Fire Classification: Class A.
  - .1 Flame spread rating of or less in accordance with CAN/ULC-S102.
  - .2 Smoke developed or less in accordance with CAN/ULC-S102.

3 EXECUTION

3.01 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 t.
- .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 .

3.02 INTERFACE WITH OTHER WORK

.1 Co-ordinate ceiling work to accommodate components of other sections, such as light fixtures, diffusers, speakers, sprinkler heads, to be built into acoustical ceiling components.

3.03 SUSPENSION SYSTEM INSTALLATION

.1 Comply with manufacturer's written installation instructions and recommendations, including product technical bulletins, product carton installation instructions, and data sheets.

.2 Install suspension system in accordance with accepted shop drawings, Certification Organizations tested design requirements and ASTM C 636/C 636M except where specified otherwise.

.3 Lay out centre line of ceiling both ways, to provide balanced borders at room perimeter with border units not less than 50% of standard unit width system according to reflected ceiling plan.

.4 Finished ceiling system to be square with adjoining walls and level within 1:1000.

.5 Secure hangers to overhead structure using attachment methods as indicated acceptable to Departmental Representative .

.6 Install hangers spaced at maximum 1200 mm centres and within 150 mm from ends of main tees.

.7 Ensure suspension system is coordinated with location of related components. Provide carrying channels as necessary to bridge at unavoidable interference between suspension system and other work above ceiling.

.8 Install wall moulding to provide correct ceiling height.

.9 Completed suspension system to support super-imposed loads, such as lighting fixtures diffusers grilles and speakers .

.10 Support at light fixtures diffusers with additional ceiling suspension hangers within 150 mm of each corner and at maximum 600 mm around perimeter of fixture.

.11 Attach cross member to main runner to provide rigid assembly.

.12 Frame at openings for light fixtures, air diffusers, speakers and at changes in ceiling heights.

3.04 ACOUSTICAL CEILING PANEL INSTALLATION

.1 Install lay-in acoustical panels in ceiling suspension system in accordance with manufacturer's instructions and as indicated.

.2 Install fibrous acoustical media and spacers over entire area above suspended metal panels.

.3 In fire rated ceiling systems, secure lay-in panels with hold-down clips and protect over light fixtures, diffusers, air return grilles and other appurtenances according to Certification Organizations design requirements.

3.05 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 DCC Representative Consultant within 3 days of visit.

3.06 CLEANING

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

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.
.1 Touch up scratches, abrasions, voids and other defects in painted surfaces.

3.07 PROTECTION

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

.2 Repair damage to adjacent materials caused by acoustical suspension installation.

END OF SECTION

1 GENERAL

1.01 RELATED REQUIREMENTS

.1 Section .

1.02 REFERENCE STANDARDS

.1 ASTM International
- .1 ASTM F 1303-04(2014), Standard Specification for Sheet Vinyl Floor Covering with Backing.

1.03 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 resilient sheet flooring and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Samples:
- .1 Submit duplicate 300 x 300 mm sample pieces of sheet material, 300 mm long base,nosing,feature strips,treads,edg e strips.

1.04 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirementsandwith manufacturer's written instructions.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:
- .1 Store materials off groundindoorsin dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
- .2 Store and protect specified materials from nicks, scratches, and blemishes.
- .3 Replace defective or damaged materials with new.

.4 Packaging Waste Management: remove for reuse and returnby manufacturer of pallets,crates,padding,andpackaging materials as specified in Construction Waste Management PlanWaste Reduction Workplan in accordance with Section 01 74 19 - Waste Management and Disposal.

1.05 SITE CONDITIONS

.1 Ambient Conditions:
- .1 Maintain air temperature and structural base temperature at flooring installation area above 20 degrees for 48 hours before, during and 48

hours after installation.

2 PRODUCTS

2.01 MATERIALS

.1 Sheet vinyl with backing: to ASTM F 1303, commercial.
- .1 Type:I - PVC binder content 90%.
- .2 Grade: 2.
- .3 Backing: A-fibrous (Non-asbestos formulated) .
- .4 Pattern: embossed.
- .5 Texture: printed to simulate tilebrickflagstonemarble.
- .6 Colour: to match exisitng.

.2 Resilient base: continuous, top set, complete with premoulded end stops and external corners:
- .1 Type: rubber.
- .2 Style: cove.
- .3 Thickness: 2.36 mm.
- .4 Height: 101.6 mm.
- .5 Lengths: cut lengths minimum 2400 mm.
- .6 Colour: to match exisitng.

.3 Primers and adhesives: of types recommended by resilient flooring manufacturer for specific material on applicable substrate, above, on or below grade.
- .1 Rubber floor adhesives:
  - .1 Adhesive: maximum VOC limit 60 g/L to SCAQMD Rule 1168.
- .2 Cove base adhesives:
  - .1 Adhesive: maximum VOC limit 50 g/L to SCAQMD Rule 1168.

.4 Metal edge strips:
- .1 Aluminum extruded, smooth, mill finishpolished stainless steel with lip to extend under floor finish, shoulder flush with top of adjacent floor finish.

3 EXECUTION

3.01 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for resilient sheet flooring installation in accordance with manufacturer's written instructions.
- .1 Visually inspect substrate in presence of Departmental Representative t.
- .2 Inform Departmental Representative t 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 .

3.02 SITE VERIFICATION OF CONDITIONS

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

3.03 PREPARATION

.1 Remove existing resilient flooring.

.2 Remove or treat old adhesives to prevent residual, old flooring adhesives from bleeding through to new flooring and/or interfering with the bonding of new adhesives.

.3 Clean floor and apply filler; trowel and float to leave smooth, flat hard surface. Prohibit traffic until filler cured and dry.

.4 Remove sub-floor ridges and bumps. Fill low spots, cracks, joints, holes and other defects with sub-floor filler.

.5 PrimeSealconcrete slabplywood sub-floor to resilient flooring manufacturer's printed instructions.

3.04 APPLICATION: FLOORING

.1 Provide high ventilation rate, with maximum outside air, during installation, and for to 72 hours after installation. If possible, vent directly to outside. Do not let contaminated air recirculate through district or whole building air distribution system. Maintain extra ventilation for at least 1 month following building occupation.

.2 Apply adhesive uniformly using recommended trowel. Do not spread more adhesive than can be covered by flooring before initial set takes place.

.3 Lay flooring with seams parallel to building lines to produce a minimum number of seams. Border widths minimum 1/3 width of full material.

.4 Run sheets in direction of traffic. Double cut sheet jointsand continuously sealheat weld according to manufacturer's printed instructions.

.5 Heat weld seams of linoleum sheet flooring in accordance with manufacturer's printed instructions.

.6 As installation progresses, and after installation roll flooring with 45 kg minimum roller to ensure full adhesion.

.7 Cut flooring around fixed objects.

.8 Install feature strips and floor markings where indicated. Fit joints tightly.

.9 Install flooring in pan type floor access covers. Maintain floor pattern.

.10 Continue flooring over areas which will be under built-in furniture.

.11 Continue flooring through areas to receive movable type partitions without interrupting floor pattern.

.12 Terminate flooring at centreline of door in openings where adjacent floor finish or colour is dissimilar.

.13 Install metal edge strips at unprotected or exposed edges where flooring terminates.

3.05 APPLICATION: BASE

.1 Lay out base to keep number of joints at minimum.

.2 Clean substrate and prime with one coat of adhesive.

.3 Apply adhesive to back of base.

.4 Set base against wall and floor surfaces tightly by using 3 kg hand roller.

.5 Install straight and level to variation of 1:1000.

.6 Scribe and fit to door frames and other obstructions. Use premoulded end pieces at flush door frames.

.7 Cope internal corners. Use premoulded corner units for right angle external corners. Use formed straight base material for external corners of other angles.

.8 Use toeless type base where floor finish will be carpet, coved type elsewhere.

.9 Install toeless type base before installation of carpet on floors.

.10 Heat weld base in accordance with manufacturer's printed instructions.

3.06 CLEANING

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

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.
  .1 Clean flooring andbase surfaces to flooring manufacturer's printed instructions.

3.07 PROTECTION

.1 Protect new floors from time of final set of adhesiveafter initial waxing until final waxingfinal inspection.

.2 Prohibit traffic on floor for 48 hours after installation.

.3 Use only water-based coating for linoleum.

END OF SECTION

1 GENERAL

1.01 REFERENCE STANDARDS

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

.2 Master Painters Institute (MPI)
- .1 Architectural Painting Specification Manual - current edition.
- .2 Standard GPS-1-12, MPI Green Performance Standard.
- .3 Standard GPS-2-12, MPI Green Performance Standard.

.3 National Research Council Canada (NRC)
- .1 National Fire Code of Canada 2015 (NFC).

.4 Society for Protective Coatings (SSPC)
- .1 Systems and Specifications, SSPC Painting Manual 2011.

1.02 ADMINISTRATIVE REQUIREMENTS

- .1 Scheduling
- .2 Provide work schedule for various stages of painting to Departmental Representative for approval. Provide schedule minimum of 48 hours in advance of proposed operations.
- .3 Obtain written authorization from Departmental Representative for changes in work schedule.
- .4 Schedule new additions to existing building coordinate painting operations with other trades.

1.03 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 2 copies of WHMIS MSDS in accordance with Section 01 35 29.06 - Health and Safety Requirements 01 35 43 - Environmental Procedures.
- .3 Confirm products to be used are in MPI's approved product list.
- .4 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 MPI Environmentally Friendly classification system rating.
  - .5 Manufacturer's Material Safety Data Sheets (MSDS).
  - .6 MPI # .

.3 Samples:

.1 Provide duplicate 200 x 300 mm sample panels of each paint stain clear coating special finish with specified paint or coating in colours, gloss/sheen and textures required to MPI Architectural Painting Specification Manual standards submitted on following substrate materials:
  .1 3 mm plate steel for finishes over metal surfaces.
  .2 13 mmbirch plywood for finishes over wood surfaces.
  .3 50 mm concrete block for finishes over concrete or concrete masonry surfaces.
  .4 13 mm gypsum board for finishes over gypsum board and other smooth surfaces.
  .5 10 mm cedar hardboardsiding plywood for finishes over wood surfaces.
.2 When approved, samples shall become acceptable standard of quality for appropriate on-site surface with one of each sample retained on-site.
.3 Provide full range of available colours where colour availability is restricted.

1.04 CLOSEOUT SUBMITTALS

.1 Provide in accordance with Section 01 78 00 - Closeout Submittals.

.2 Operation and Maintenance Data: Provide operation and maintenance data for painting materials for incorporation into manual.

.3 Include :
  .1 Product name, type and use.
  .2 Manufacturer's product number.
  .3 Colour numbers.
  .4 MPI Environmentally Friendly classification system rating.

1.05 QUALITY ASSURANCE

.1 Qualifications:
.2 Contractor: to have a minimum of 5 years proven satisfactory experience. When requested, provide list of last 3 comparable jobs including, job name and location, specifying authority, and project manager.
.3 Qualified journeypersons as defined by local jurisdiction to be engaged in painting work
.4 Apprentices: may be employed provided they work under direct supervision of qualified journeyperson in accordance with trade regulations.
.5 Conform to latest MPI requirements for exterior painting work including preparation and priming.
.6 Materials: in accordance with MPI Painting Specification Manual "Approved Product" listing and from a single manufacturer for each system used.
.7 Retain purchase orders, invoices and documents to prove conformance with noted MPI requirements when requested by Departmental Representative DCC Representative Consultant.
.8 Standard of Acceptance:
  .1 Walls: no defects visible from a distance of 1000 mmat 90

degrees to surface.
.2 Soffits: no defects visible from floor at 45 degrees to surface when viewed using final lighting source.
.3 Final coat to exhibit uniformity of colour and uniformity of sheen across full surface area.

1.06 DELIVERY, STORAGE AND HANDLING

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

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
.1 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 off ground indoors in dry location 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 Departmental Representative. After completion of operations, return areas to clean condition to approval of Departmental Representative t.
.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 9 kg Type ABC dry chemical fire extinguisher adjacent to storage area.
.2 Store oily rags, waste products, empty containers and materials subject to spontaneous combustion in ULC approved, sealed containers and remove from site on a daily basis.
.3 Handle, store, use and dispose of flammable and combustible materials in accordance with the National Fire Code of Canada (NFC).
.9 Replace defective or damaged materials with new.

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

.5 Packaging Waste Management: remove for reuse and return by manufacturer of pallets, crates,padding, and packaging materials as specified in

1.07 SITE CONDITIONS

.1 Ambient Conditions:
- .1 Heating, Ventilation and Lighting:
  - .1 Do not perform painting work unless adequate and continuous ventilation and sufficient heating facilities are in place 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.
  - .2 Where required, provide continuous ventilation for seven days after completion of application of paint.
  - .3 Co-ordinate use of existing ventilation system with Owner General Contractor Departmental Representative DCC Representative Consultant and ensure its operation during and after application of paint as required.
  - .4 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.
  - .5 Perform no painting work unless a minimum lighting level of 323 Lux is provided on surfaces to be painted. Adequate lighting facilities to be provided by General Contractor.
- .2 Temperature, Humidity and Substrate Moisture Content Levels:
  - .1 Unless specifically pre-approved by specifying body, Paint Inspection Agency and, applied product manufacturer, perform no painting work when:
    - .1 Ambient air and substrate temperatures are below 10 degrees C.
    - .2 Substrate temperature is over 32 degrees C unless paint is specifically formulated for application at high temperatures.
    - .3 Substrate and ambient air temperatures are expected to fall outside MPI or paint manufacturer's prescribed limits.
    - .4 Relative humidity is above 85 % or when dew point is less than 3 degrees C variance between air/surface temperature.
    - .5 Rain or snow are forecast to occur before paint has thoroughly cured or when it is foggy, misty, raining or snowing at site.
  - .2 Perform no painting work when maximum moisture content of substrate exceeds:
    - .1 12% for concrete and masonry (clay and concrete brick/block).
    - .2 15% for hard wood.
    - .3 17% for soft wood.
    - .4 12% for plaster and gypsum board.
  - .3 Conduct moisture tests using a properly calibrated electronic Moisture Meter, except test concrete floors for moisture using a simple "cover patch test".
  - .4 Test concrete, masonry and plaster surfaces for alkalinity as required.

.3 Application Requirements:
- .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 noted herein.
- .3 Apply paint when previous coat of paint is dry or adequately cured.
- .4 Apply paint finishes when conditions forecast for entire period of application fall within manufacturer's recommendations.
- .5 Do not apply paint when:
  - .1 Temperature is expected to drop below 10 degrees C before paint has thoroughly cured.
  - .2 Substrate and ambient air temperatures are expected to fall outside MPI or paint manufacturer's limits.
  - .3 Surface to be painted is wet, damp or frosted.
- .6 Provide and maintain cover when paint must be applied in damp or cold weather. Heat substrates and surrounding air to comply with temperature and humidity conditions specified by manufacturer. Protect until paint is dry or until weather conditions are suitable.
- .7 Schedule painting operations such that surfaces exposed to direct, intense sunlight are scheduled for completion during early morning.
- .8 Remove paint from areas which have been exposed to freezing, excess humidity, rain, snow or condensation. Prepare surface again and repaint.
- .9 Paint occupied facilities in accordance with approved schedule only. Schedule operations to approval of Departmental Representative DCC Representative Consultant Owner such that painted surfaces will have dried and cured sufficiently before occupants are affected.

2 PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

.1 Environmental Performance Requirements:

.2 Provide paint products meeting MPI "Environmentally Friendly" E1 E2 E3 ratings based on VOC (EPA Method 24) content levels.

.3 Green Performance in accordance with MPI Standard GPS-1 GPS-2.

2.02 MATERIALS

.1 Only paint materials listed in latest edition of MPI Approved Products List (APL) are acceptable for use on this project.

.2 Paint materials for paint systems: to be products of single manufacturer.

.3 Only qualified products with E2 E3 "Environmentally Friendly" ratings are

acceptable for use on this project.

.4 Use only MPI listed L rated materials.

.5 Paints, coatings, adhesives, solvents, cleaners, lubricants, and other fluids, to be as follows:
- .1 Be water-based water soluble water clean-up.
- .2 Be non-flammable biodegradable.
- .3 Be manufactured without compounds which contribute to ozone depletion in upper atmosphere.
- .4 Be manufactured without compounds which contribute to smog in the lower atmosphere.
- .5 Do not contain methylene chloride, chlorinated hydrocarbons, toxic metal pigments.

.6 Water-borne surface coatings must be manufactured and transported in a manner that steps of processes, including disposal of waste products arising there from, will meet requirements of applicable governmental acts, by-laws and regulations including, for facilities located in Canada, Fisheries Act and Canadian Environmental Protection Act (CEPA).

.7 Water-borne surface coatings must not be formulated or manufactured with aromatic solvents, formaldehyde, halogenated solvents, mercury, lead, cadmium, hexavelant chromium or their compounds.

.8 Water-borne surface coatings and recycled water-borne surface coatings must have flash point of 61.0 degrees C or greater.

.9 Both water-borne surface coatings and recycled water-borne surface coatings must be made by a process that does not release:
- .1 Matter in undiluted production plant effluent generating a 'Biochemical Oxygen Demand' (BOD) in excess of 15 mg/L to a natural watercourse or a sewage treatment facility lacking secondary treatment.
- .2 Total Suspended Solids (TSS) in undiluted production plant effluent in excess of 15 mg/L to a natural watercourse or a sewage treatment facility lacking secondary treatment.

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

2.03 COLOURS

.1 In General colours are to match existing.

.2 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 DCC Representative Consultant.

.3 For deep and ultra deep colours 4 coats may be required.

2.04 MIXING AND TINTING

.1 Perform colour tinting operations prior to delivery of paint to site. On-site tinting of painting materials is allowed only with Departmental Representative's DCC Representative's Consultant's written permission.

.2 Mix paste, powder or catalyzed paint mixes in accordance with manufacturer's written instructions.

.3 Add thinner to paint manufacturer's recommendations. Do not use kerosene or organic solvents to thin water-based paints.

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

.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.

.6 Deep and ultra deep colors; 4 coats may be required.

2.05 GLOSS/SHEEN RATINGS

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

Gloss Level Category/	Units @ 60 Degrees/	Units @ 85 Degrees/
G1 - matte finish	0 to 5	max. 10
G2 - velvet finish	0 to 10	10 to 35
G3 - eggshell finish	10 to 25	10 to 35
G4 - satin finish	20 to 35	min. 35
G5 - semi-gloss finish	35 to 70	
G6 - gloss finish	70 to 85	
G7 - high gloss finish	> 85	

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

2.06 EXTERIOR PAINTING SYSTEMS

.1 Structural Steel and Metal Fabrications:
  .1 EXT 5.1A - Quick dry enamel semi-gloss (over q.d. primer) finish.

.2 Galvanized Metal: not chromate passivated
  .1 EXT 5.3A - Latex semi-gloss (over cementitious primer) finish.

.3 Dimension Lumber: columns, beams, exposed joists, underside of decking, siding, fencing, etc.
  .1 EXT 6.2A - Latex semi-gloss l finish (over alkyd/oil primer).

.4 Dressed Lumber: doors, door and window frames, casings, battens, smooth facias, etc.

.1 EXT 6.3A - Latex semi-gloss finish (over alkyd/oil primer). do not use flat finish on doors.

2.07 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.

3 EXECUTION

3.01 MANUFACTURER'S INSTRUCTIONS

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

3.02 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.

3.03 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 Visually inspect substrate in presence of Departmental Representative DCC Representative Consultant.
- .2 Inform Departmental Representative DCC Representative Consultant 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 DCC Representative Consultant.

.2 Exterior repainting work: inspected by MPI Accredited Paint Inspection Agency (inspector) acceptable to specifying authority and local Painting Contractor's Association. Painting contractor to notify Paint Inspection Agency minimum of one week prior to commencement of work and provide copy of project repainting specification and Finish Schedule.

.3 Exterior surfaces requiring repainting: inspected by both painting contractor and Paint Inspection Agency who will notify Departmental Representative DCC Representative Consultant in writing of defects or problems, prior to commencing repainting work, or after surface preparation if unseen substrate damage is discovered.

.4 Where assessed degree of surface degradation of DSD-1 to DSD-3 before preparation of surfaces for repainting is revealed to be DSD-4 after preparation, repair or replacement of such unforeseen defects discovered are to be corrected, as mutually agreed, before repainting is started.

.5 Where "special" repainting or recoating system applications (i.e. elastomeric coatings) or non-MPI listed products or systems are to be used, paint or coating manufacturer to provide as part of 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 DCC Representative Consultant.

3.04 PREPARATION

.1 Perform preparation and operations for exterior painting in accordance with MPI Maintenance Repainting Manual except where specified otherwise.

.2 Apply paint materials in accordance with paint manufacturer's written application instructions.

.3 Clean and prepare exterior surfaces to be repainted in accordance with MPI Maintenance Repainting Manual requirements. Refer to the MPI Manual in regard to specific requirements and as follows:

- .1 Remove dust, dirt, and surface debris by vacuuming, wiping with dry, clean cloths or compressed air.
- .2 Wash surfaces with a biodegradable detergent and bleach where applicable and clean warm water using a stiff bristle brush to remove dirt, oil and other surface contaminants.
- .3 Rinse scrubbed surfaces with clean water until foreign matter is flushed from surface.
- .4 Allow surfaces to drain completely and allow to dry thoroughly. Allow sufficient drying time and test surfaces using electronic moisture meter before commencing work.
- .5 Use water-based cleaners in place of organic solvents where surfaces will be repainted using water based paints.
- .6 Many water-based paints cannot be removed with water once dried. Minimize use of kerosene or such organic solvents to clean up water-based paints.

.4 Clean metal surfaces to be repainted by removing rust, dirt, oil, grease and foreign substances in accordance with MPI requirements. Remove such contaminates from surfaces, pockets and corners to be repainted by brushing with clean brushes, blowing with clean dry compressed air, or brushing/vacuum cleaning as required.

.5 Prevent contamination of cleaned surfaces by salts, acids, alkalis, other corrosive chemicals, grease, oil and solvents before priming and between applications of remaining coats. Touch-up, spot prime, and apply primer, paint, or pretreatment as soon as possible after cleaning and before deterioration occurs.

.6 Do not apply paint until prepared surfaces have been accepted by Departmental Representative DCC Representative Consultant.

.7 Sand and dust between coats as required to provide adequate adhesion for next coat and to remove defects visible from a distance up to 1000 mm.

3.05 EXISTING CONDITIONS

.1 Conduct moisture testing of surfaces to be painted using a properly calibrated electronic moisture meter, except test concrete floors for moisture using a simple "cover patch test" and report findings to Departmental Representative DCC Representative Consultant. Do not proceed with work until conditions fall within acceptable range as recommended by manufacturer.

.2 Maximum moisture content as follows:
- .1 Stucco: 12%.
- .2 Concrete: 12%.
- .3 Clay and Concrete Block/Brick: 12%.
- .4 Hard Wood: 15%.
- .5 Soft Wood: 17%

3.06 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 such surfaces as directed by Departmental Representative DCC Representative Consultant.

.2 Protect items that are permanently attached such as Fire Labels on doors and frames.

.3 Protect factory finished products and equipment.

.4 Protect passing pedestrians, building occupants and general public in and about building.

.5 Remove light fixtures, surface hardware on doors, and other surface mounted equipment, fittings and fastenings prior to undertaking painting operations.Store items and re-install after painting is completed.

.6 Move and cover exterior furniture and portable equipment as necessary to carry out painting operations. Replace as painting operations progress.

.7 As painting operations progress, place "WET PAINT" signs in pedestrian and vehicle traffic areas to approval of Departmental Representative.

3.07 APPLICATION

.1 Method of application to be as approved by Departmental Representative. Apply paint by brush roller air sprayer airless sprayer. Conform to manufacturer's application instructions unless specified otherwise.

.2 Brush and Roller Application:
- .1 Apply paint in a uniform layer using brush and/or roller of types 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 to be free of roller tracking and heavy stipple unless approved by Departmental Representative DCC Representative Consultant.
- .5 Remove runs, sags and brush marks from finished work and repaint.

.3 Spray Application:
- .1 Provide and maintain equipment that is suitable for intended purpose, capable of properly atomizing paint to be applied, and equipped with suitable pressure regulators and gauges.
- .2 Keep paint ingredients properly mixed in containers during paint application either by continuous mechanical agitation or by intermittent agitation as frequently as necessary.
- .3 Apply paint in a uniform layer, with overlapping at edges of spray pattern.
- .4 Brush out immediately runs and sags.
- .5 Use brushes to work paint into cracks, crevices and places which are not adequately painted by spray.
- .6 Wood, stucco, concrete, cement masonry units CMU's and brick; if sprayed, must be back rolled.

.4 Use dipping, sheepskins or daubers when no other method is practical in places of difficult access and when specifically authorized by Departmental Representative.

.5 Apply coats of paint as continuous film of uniform thickness. Repaint thin spots or bare areas before next coat of paint is applied.

.6 Allow surfaces to dry and properly cure after cleaning and between subsequent coats for minimum time period as recommended by manufacturer.

.7 Sand and dust between coats to remove visible defects.

.8 Finish surfaces both above and below sight lines as specified for surrounding surfaces, including such surfaces as projecting ledges.

.9 Finish top, bottom, edges and cutouts of doors after fitting as specified for door surfaces.

3.08 MECHANICAL/ ELECTRICAL EQUIPMENT

.1 Unless otherwise specified, paint exterior exposed conduits, piping, hangers, duct work and other mechanical and electrical equipment with colour and finish to match adjacent surfaces, except as noted otherwise.

.2 Do not paint over nameplates.

.3 Paint fire protection piping red.

.4 Paint natural gas piping yellow.

.5 Paint steel electrical light standards. Do not paint outdoor transformers and substation equipment.

3.09 FIELD QUALITY CONTROL

.1 Exterior painting and decorating work to be inspected by MPI Accredited Paint Inspection Agency (inspector) acceptable to specifying authority and local Painting Contractor's Association. Painting contractor will notify Paint Inspection Agency a minimum of one week prior to commencement of work and provide a copy of project painting specification, plans and elevation drawings (including pertinent details) as well as Finish Schedule.

.2 Exterior surfaces requiring painting to be inspected by Paint Inspection Agency who will notify Departmental Representative DCC Representative Consultant and General Contractor in writing of defects or problems, prior to commencing painting work, or after prime coat shows defects in substrate.

.3 Standard of Acceptance:

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

.4 Field inspection of painting operations to be carried out by independent inspection firm as designated by Departmental Representative.

.5 Advise Departmental Representative when surfaces and applied coating is ready for inspection. Do not proceed with subsequent coats until previous coat has been approved.

.6 Cooperate with inspection firm and provide access to areas of work.

.7 Retain purchase orders, invoices and other documents to prove conformance with noted MPI requirements when requested by Departmental Representative.

3.10 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.

3.11 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.

END OF SECTION

1 GENERAL

1.01 REFERENCE STANDARDS

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

.2 Master Painters Institute (MPI)
- .1 The Master Painters Institute (MPI)/Architectural Painting Specification Manual (ASM) - current edition.
- .2 Standard GPS-1-12, MPI Green Performance Standard.
- .3 Standard GPS-2-12, MPI Green Performance Standard.

.3 National Research Council Canada (NRC)
- .1 National Fire Code of Canada 2015 (NFC).

.4 Society for Protective Coatings (SSPC)
- .1 SSPC Painting Manual, Volume Two, 8th Edition, Systems and Specifications Manual.

1.02 ADMINISTRATIVE REQUIREMENTS

- .1 Scheduling:
- .2 Submit work schedule for various stages of painting to Departmental Representative t for review. Provide schedule minimum of 48 hours in advance of proposed operations.
- .3 Obtain written authorization from Departmental Representative for changes in work schedule.
- .4 Schedule new additions to existing building coordinate painting operations with other trades.

1.03 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 2 copies of WHMIS MSDS in accordance with Section 01 35 29.06 - Health and Safety Requirements 01 35 43 - Environmental Procedures.
- .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 MPI Environmentally Friendly classification system rating.
- .5 Manufacturer's Material Safety Data Sheets (MSDS).

.4 Samples:
- .1 Submit full range colour sample chips to indicate where colour availability is restricted.
- .2 Submit duplicate 200 x 300 mm sample panels of each paint stain clear coating special finish with specified paint or coating in colours, gloss/sheen and textures required to MPI Architectural Painting Specification Manual standards submitted on following substrate materials:
  - .1 3 mm plate steel for finishes over metal surfaces.
  - .2 13 mm birch plywood for finishes over wood surfaces.
  - .3 50 mm concrete block for finishes over concrete or concrete masonry surfaces.
  - .4 13 mm gypsum board for finishes over gypsum board and other smooth surfaces.
  - .5 10 mm cedar hardboard siding plywood for finishes over wood surfaces.
- .3 Retain reviewed samples on-site to demonstrate acceptable standard of quality for appropriate on-site surface.

.5 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.

.6 Certificates: Provide certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties. MPI Gateway #.

.7 Manufacturer's Instructions:
- .1 Provide manufacturer's installation and application instructions.

1.04 CLOSEOUT SUBMITTALS

.1 Provide in accordance with Section 01 78 00 - Closeout Submittals.

.2 Operation and Maintenance Data: Provide operation and maintenance data for painting materials for incorporation into manual.

.3 Include:
- .1 Product name, type and use.
- .2 Manufacturer's product number.
- .3 Colour numbers.
- .4 MPI Environmentally Friendly classification system rating.

1.05 QUALITY ASSURANCE

- .1 Qualifications:
- .2 Contractor: to have a minimum of 5 years proven satisfactory experience. When requested, provide list of last 3 comparable jobs including, job name and location, specifying authority, and project manager.
- .3 Qualified journeypersons as defined by local jurisdiction to be engaged in

painting work.

.4 Apprentices: may be employed provided they work under direct supervision of qualified journeyperson in accordance with trade regulations.

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

.6 Materials: in accordance with MPI Painting Specification Manual "Approved Product" listing and from a single manufacturer for each system used.

.7 Retain purchase orders, invoices and documents to prove conformance with noted MPI requirements when requested by Departmental Representative .

.8 Standard of Acceptance:

.1 Walls: no defects visible from a distance of 1000 mm at 90 degrees to surface.

.2 Soffits: no defects visible from floor at 45 degrees to surface when viewed using final lighting source.

.3 Final coat to exhibit uniformity of colour and uniformity of sheen across full surface area.

1.06 DELIVERY, STORAGE AND HANDLING

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

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.1 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 off ground indoors in dry location 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 Departmental Representative . After completion of operations, return areas to clean condition to approval of Departmental Representative t.

.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 9 kg Type ABC dry chemical fire extinguisher adjacent to storage area.

.2 Store oily rags, waste products, empty containers and materials

subject to spontaneous combustion in ULC approved, sealed containers and remove from site on a daily basis.

.3 Handle, store, use and dispose of flammable and combustible materials in accordance with the National Fire Code of Canada (NFC).

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

1.07 SITE CONDITIONS

.1 Ambient Conditions:

.1 Heating, Ventilation and Lighting:

.1 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.

.2 Provide continuous ventilation for 7 days after completion of application of paint.

.3 Co-ordinate use of existing ventilation system with Departmental Representative DCC Representative Consultant and ensure its operation during and after application of paint as required.

.4 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.

.5 Provide minimum lighting level of 323 Lux on surfaces to be painted.

.6 Temperature, Humidity and Substrate Moisture Content Levels:

.1 Unless pre-approved written approval by Specifying body Paint Inspection Agency Authority and product manufacturer, perform no painting when:

.1 Ambient air and substrate temperatures are below 10 degrees C.

.2 Substrate temperature is above 32 degrees C unless paint is specifically formulated for application at high temperatures.

.3 Substrate and ambient air temperatures are not expected to fall within MPI or paint manufacturer's prescribed limits.

.4 The relative humidity is under 85% or when the dew point is more than 3 degrees C variance between the air/surface temperature. Paint should not be applied if the dew point is less than 3 degrees C below the ambient or surface temperature. Use sling psychrometer to establish the relative humidity before beginning paint work.

.5 Rain or snow are forecast to occur before paint has thoroughly cured or when it is foggy, misty, raining or snowing at site.

.6 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 concrete and masonry (clay and concrete brick/block). Allow new concrete and masonry to cure minimum of 28 days.
- .2 15% for hard wood.
- .3 17% for soft wood.
- .4 12% for plaster and gypsum board.

.3 Test for moisture using calibrated electronic Moisture Meter. Test concrete floors for moisture using "cover patch test".

.4 Test concrete, masonry and plaster surfaces for alkalinity as required.

.7 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.

.8 Additional interior application requirements:
- .1 Apply paint finishes when temperature at location of installation can be satisfactorily maintained within manufacturer's recommendations.
- .2 Apply paint in occupied facilities during silent hours only. Schedule operations to approval of Departmental Representative such that painted surfaces will have dried and cured sufficiently before occupants are affected.

2 PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

.1 Environmental Performance Requirements:

.2 Provide paint products meeting MPI "Environmentally Friendly" E1 E2 E3 ratings based on VOC (EPA Method 24) content levels.

.3 Green Performance in accordance with MPI Standard GPS-1 GPS-2.

2.02 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 Only qualified products with E2 E3 "Environmentally Friendly" rating are acceptable for use on this project.

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

.5 Provide paint products meeting MPI "Environmentally Friendly" E1, E2 E3 ratings based on VOC (EPA Method 24) content levels.

.6 Use MPI listed materials having minimum E2 E3 rating where indoor air quality (odour) requirements exist.

.7 Paints, coatings, adhesives, solvents, cleaners, lubricants, and other fluids to be:
- .1 Be Water-based Water soluble Water clean-up.
- .2 Be non-flammable biodegradable.
- .3 Be manufactured without compounds which contribute to ozone depletion in the upper atmosphere.
- .4 Be manufactured without compounds which contribute to smog in the lower atmosphere.
- .5 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.

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

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

.11 Recycled water-borne surface coatings must not contain:
- .1 Lead in excess of 600.0 ppm weight/weight total solids.
- .2 Mercury in excess of 50.0 ppm weight/weight total product.
- .3 Cadmium in excess of 1.0 ppm weight/weight total product.
- .4 Hexavelant chromium in excess of 3.0 ppm weight/weight total product.
- .5 Organochlorines or polychlorinated biphenyls (PCBS) in excess of 1.0 ppm weight/weight total product.

2.03 COLOURS

.1 In general paint colours are to match existing.

.2 Where specific products are available in restricted range of colours, selection based on limited range.

.3 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

.4 For deep and ultra deep colours; 4 coats may be required.

2.04 MIXING AND TINTING

.1 Perform colour tinting operations prior to delivery of paint to site. Obtain written approval from Departmental Representative for tinting of painting materials.

.2 Mix paste, powder or catalyzed paint mixes in accordance with manufacturer's written instructions.

.3 Use and add thinner in accordance with paint manufacturer's recommendations. Do not use kerosene or similar organic solvents to thin water-based paints.

.4 Thin paint for spraying in accordance with paint manufacturer's instructions.

.5 Re-mix paint in containers prior to and during application to ensure break-up of lumps, complete dispersion of settled pigment, and colour and gloss uniformity. Strain as necessary.

2.05 GLOSS/SHEEN RATINGS

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

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

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

2.06 INTERIOR PAINTING SYSTEMS

.1 Galvanized metal: doors, frames, railings, misc. steel, pipes, overhead decking, and ducts.
- .1 INT 5.3A - Latex semi-glossl (over cementitious primer) finish.

.2 Dressed lumber: including doors, door and window frames, casings, mouldings:
- .1 INT 6.3A - High performance architectural latex semi-gloss (over latex primer) finish.

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

.1 INT 9.2A - Latex semi-glossl finish (over latex primer/sealer).

2.07 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.

3 EXECUTION

3.01 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.

3.02 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.

3.03 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 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.

.2 Interior repainting work: inspected by MPI Accredited Paint Inspection Agency (inspector) acceptable to specifying authority and local Painting Contractor's Association. Painting contractor to notify Paint Inspection Agency minimum of one week prior to commencement of work and provide copy of project repainting specification and Finish Schedule.

.3 Interior surfaces requiring repainting: inspected by both painting contractor and Paint Inspection Agency who will notify Departmental Representative in writing of defects or problems, prior to commencing repainting work, or after surface

preparation if unseen substrate damage is discovered.

.4 Conduct moisture testing of surfaces to be painted using properly calibrated electronic moisture meter, except test concrete floors for moisture using simple "cover patch test". Do not proceed with work until conditions fall within acceptable range as recommended by manufacturer.

.5 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%.

3.04 PREPARATION

.1 Protection (not applicable to new painting work):
- .1 Protect existing building surfaces and adjacent structures from paint spatters, markings and other damage by suitable non-staining covers or masking. If damaged, clean and restore surfaces as directed by Departmental Representative.
- .2 Protect items that are permanently attached such as Fire Labels on doors and frames.
- .3 Protect factory finished products and equipment.
- .4 Protect passing pedestrians, building occupants and general public in and about the building.

.2 Surface Preparation (not applicable to new painting work):
- .1 Remove electrical cover plates, light fixtures, surface hardware on doors, bath accessories and other surface mounted equipment, fittings and fastenings prior to undertaking painting operations. Identify and store items in secure location and re-installed after painting is completed.
- .2 Move and cover furniture and portable equipment as necessary to carry out painting operations. Replace as painting operations progress.
- .3 Place "WET PAINT" signs in occupied areas as painting operations progress. Signs to approval of Departmental Representative.

.3 Clean and prepare surfaces in accordance with MPI Architectural Painting Specification Manual requirements. Refer to MPI Manual in regard to specific requirements and as follows:
- .1 Remove dust, dirt, and other surface debris by vacuuming, wiping with dry, clean cloths or compressed air.
- .2 Wash surfaces with a biodegradable detergent and bleach where applicable and clean warm water using a stiff bristle brush to remove dirt, oil and other surface contaminants.
- .3 Rinse scrubbed surfaces with clean water until foreign matter is flushed from surface.
- .4 Allow surfaces to drain completely and allow to dry thoroughly.
- .5 Prepare surfaces for water-based painting, water-based cleaners should be used in place of organic solvents.
- .6 Use trigger operated spray nozzles for water hoses.
- .7 Many water-based paints cannot be removed with water once dried. Minimize use of mineral spirits or organic solvents to clean up water-

based paints.

.4 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 Where possible, prime non-exposed surfaces of new wood surfaces before installation. Use same primers as specified for exposed surfaces.
- .1 Apply sealer to MPI #36 over knots, pitch, sap and resinous areas.
- .2 Apply wood filler to nail holes and cracks.
- .3 Tint filler to match stains for stained woodwork.

.6 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.

.7 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 blowing with clean dry compressed air or vacuum cleaning.

.8 Touch up of shop primers with primer as specified.

.9 Do not apply paint until prepared surfaces have been accepted by Departmental Representative.

3.05 EXISTING CONDITIONS

.1 Conduct moisture testing of surfaces to be painted using properly calibrated electronic moisture meter, except test concrete floors for moisture using simple "cover patch test" and report findings to Departmental Representative. Do not proceed with work until conditions fall within acceptable range as recommended by manufacturer.

.2 Maximum moisture content as follows:
- .1 Stucco: 12%.
- .2 Concrete: 12%.
- .3 Clay and Concrete Block/Brick: 12%.
- .4 Hard Wood: 15%.
- .5 Soft Wood: 17%.

3.06 APPLICATION

.1 Method of application to be as approved by Departmental Representative. Apply paint by brush roller air sprayer airless sprayer. Conform to manufacturer's application instructions unless specified otherwise.

.2 Brush and Roller Application:
- .1 Apply paint in uniform layer using brush and/or roller type suitable for application.
- .2 Work paint into cracks, crevices and corners.
- .3 Paint surfaces and corners not accessible to brush using spray, daubers

and/or sheepskins. Paint surfaces and corners not accessible to roller using brush, daubers or sheepskins.

.4 Brush and/or roll out runs and sags, and over-lap marks. Rolled surfaces free of roller tracking and heavy stipple.

.5 Remove runs, sags and brush marks from finished work and repaint.

.3 Spray application:

.1 Provide and maintain equipment that is suitable for intended purpose, capable of atomizing paint to be applied, and equipped with suitable pressure regulators and gauges.

.2 Keep paint ingredients properly mixed in containers during paint application either by continuous mechanical agitation or by intermittent agitation as frequently as necessary.

.3 Apply paint in uniform layer, with overlapping at edges of spray pattern. Back roll first coat application.

.4 Brush out immediately all runs and sags.

.5 Use brushes and rollers to work paint into cracks, crevices and places which are not adequately painted by spray.

.4 Use dipping, sheepskins or daubers only when no other method is practical in places of difficult access.

.5 Apply coats of paint continuous film of uniform thickness. Repaint thin spots or bare areas before next coat of paint is applied.

.6 Allow surfaces to dry and properly cure after cleaning and between subsequent coats for minimum time period as recommended by manufacturer.

.7 Sand and dust between coats to remove visible defects.

.8 Finish surfaces both above and below sight lines as specified for surrounding surfaces, including such surfaces as tops of interior cupboards and cabinets and projecting ledges.

.9 Finish inside of cupboards and cabinets as specified for outside surfaces.

.10 Finish closets and alcoves as specified for adjoining rooms.

.11 Finish top, bottom, edges and cutouts of doors after fitting as specified for door surfaces.

.12 Wood, drywall, plaster, stucco, concrete, concrete masonry units and brick; if sprayed, must be back rolled.

3.07 MECHANICAL/ ELECTRICAL EQUIPMENT

.1 Paint finished area exposed conduits, piping, hangers, ductwork and other mechanical and electrical equipment with colour and finish to match adjacent surfaces, except as indicated.

.2 Boiler room, mechanical and electrical rooms: paint exposed conduits, piping, hangers, ductwork and other mechanical and electrical equipment.

.3 Other unfinished areas: leave exposed conduits, piping, hangers, ductwork and

other mechanical and electrical equipment in original finish and touch up scratches and marks.

.4 Do not paint over nameplates.

.5 Keep sprinkler heads free of paint.

.6 Paint inside of ductwork where visible behind grilles, registers and diffusers with primer and one coat of matt black paint.

.7 Paint fire protection piping red.

.8 Paint disconnect switches for fire alarm system and exit light systems in red enamel.

.9 Paint natural gas piping yellow.

.10 Paint both sides and edges of backboards for telephone and electrical equipment before installation. Leave equipment in original finish except for touch-up as required, and paint conduits, mounting accessories and other unfinished items.

.11 Do not paint interior transformers and substation equipment.

3.08 SITE TOLERANCES

.1 Walls: no defects visible from a distance of 1000 mm at 90 degrees to surface.

.2 Ceilings: no defects visible from floor at 45 degrees to surface when viewed using final lighting source.

.3 Final coat to exhibit uniformity of colour and uniformity of sheen across full surface area.

3.09 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.

3.10 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.

END OF SECTION

1 General

1.1 SUMMARY

.1 This Section includes the following:

.1 Excavating and backfilling for site demolition and preparation

.2 Excavating and backfilling for utility trenches

.3 Excavation and backfilling for structures

.4 Excavating and backfilling trenches for buried mechanical and electrical utilities and pits for buried utility structures

1.2 REFERENCES

.1 American Society for Testing and Materials (ASTM):

.1 ASTM D69800ae1 Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ftlbf/ft^3 (600 kNm/m^3))

.2 ASTM C11704 Test Method for Material Finer Than: 0.075 mm Sieve in Mineral Aggregates by Washing.

.3 ASTM C13604 Method for Sieve Analysis of Fine and Coarse Aggregates

.4 ASTM D155702e1 Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ftlbf/ft^3(2,700 kNm/m^3))

.2 Canadian General Standards Board (CGSB):

.1 CAN/CGSB 8.188 Sieves Testing, Woven Wire, Inch Series

.2 CAN/CGSB 8.2M88 Sieves, Testing, Woven Wire, Metric

.3 Canadian Standards Association (CSA):

.1 CSAA23.1/A23.200 Concrete Materials and Methods of Concrete Construction/Methods of Tests for Concrete

1.3 DEFINITIONS

.1 Backfill: Soil material or controlled low strength material used to fill an excavation

.1 Initial Backfill: Backfill placed beside and over pipe in a trench, including haunches to support sides of pipe

.2 Final Backfill: Backfill placed over initial backfill to fill a trench

.2 Bedding Course: Course placed over the excavated subgrade in a trench before laying pipe

.3 Borrow Soil: Satisfactory soil imported from off site for use as fill or backfill

.4 Excavation: Removal of material encountered above subgrade elevations and to lines and dimensions indicated

.5 Authorized Additional Excavation:

.1 Excavation below subgrade elevations or beyond indicated lines and dimensions as directed by geotechnical consultant

.2 Authorized additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work

.6 Unauthorized Excavation:

.1 Excavation below subgrade elevations or beyond indicated lines and dimensions without direction by geotechnical consultant

.2 Unauthorized excavation, as well as remedial work directed by geotechnical consultant, shall be without additional compensation

.7 Common Excavation: Excavation of materials of whatever nature, which can be ripped and excavated with heavy construction equipment

.8 Rock Excavation: Excavation of material from solid masses of igneous, sedimentary of metamorphic rock which, prior to its removal, was integral with its parent mass, and boulders or rock fragments having individual volume in excess of 1 m^3

.9 Fill: Soil materials used to raise existing grades

.10 Geotechnical Consultant: A professional who is not the Consultant for the project. The geotechnical consultant will be hired directly by the Owner to undertake ongoing soils investigations, testing and recommendations on behalf of the Owner. Reports and recommendations will be forwarded to the Owner, Consultant and Trade Contractor responsible for this portion of the Work.

.11 Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man made stationary features constructed above or below the ground surface

.12 Subgrade: Surface or elevation remaining after completing excavation, or top surface of a fill or backfill

.13 Topsoil: Material capable of supporting good vegetative growth and suitable for use in top dressing, landscaping and seeding

.14 Utilities: On site underground pipes, conduits, ducts, and cables, as well as underground services within buildings

1.4 SUBMITTALS

.1 Comply with requirements of Section 01 33 00.

.2 Submit drawings indicating all required shoring and related work. Drawings must bear the seal of the Professional Engineer responsible for the shoring design.

.3 Submit a drawing indicating required underpinning, construction methods and sequences. The drawing must bear the seal of a Professional Engineer responsible for the underpinning design.

.4 Submit soil density test results and soil engineer reports before placing footings or slab on grade.

.5 Samples: At least 2 weeks prior to commencing work, inform Consultant of proposed source of fill materials and provide access for sampling; provide testing agency with 70 kg samples of type of fill specified.

1.5 QUALITY ASSURANCE

.1 An independent testing agency qualified to conduct geotechnical testing and observation will be retained by the Owner to conduct and document conditions of soil materials, and to provide geotechnical recommendations.

.2 Soil testing and inspection will be paid for directly by the Owner, and done by a firm selected by the Owner.

.3 Testing to be done under the supervision of a registered professional engineer.

.4 Arrange in advance for services of an approved soil engineer to make such services available when needed. Inspect footing excavations before placing footings, and provide soil density testing as required.

.5 Prior to the placement of backfill, the testing laboratory shall as a minimum confirm that the subbase has been prepared properly to accept backfill.

.6 It is the Contractor's responsibility to coordinate with the Testing Agency and to ensure that the specified number of tests are provided at the appropriate time. All costs associated with retesting for areas that did not meet the specified results are to be borne by the Contractor.

.7 Frequency of compaction tests shall be as follows:

.1 Exterior side of perimeter walls: One test / 40 lineal m (130 lineal feet) / compacted lift of backfill

.2 Within building area under basement and subbasement floating slabsongrade: One test / 1,000 m² (10,764 ft^2) / compacted lift of backfill

.3 Within building area under main floor structural slabs on grade: One test / 40 m² (430 ft^2) / compacted lift of backfill

.4 Under exterior floating concrete slabs: One test / 1,000 m² (10,764 ft^2) / compacted lift of backfill

.5 Under exterior structural slabs: One test / 40 m² (430 ft^2) / compacted lift of backfill

.6 Retaining walls: One test / 100 lineal m (328 lineal feet) / compacted lift of backfill

.7 Asphalt pavement subbase: One test / 1000 m² (10,764 ft^2) / compacted lift of backfill or recompacted lift of native material

.8 Asphalt pavement granular base: One test / 1000 m² (10,764 ft^2) / compacted lift of backfill

.9 Trenches more than 15 m (49 feet) in length 2 density tests per 600 mm (24”) of trench depth per 100 m (328 feet) of trench length

.10 Trenches 15 m (49 feet) or less in length: MInimum of 3 density test evenly spaced through the depth and length of trench

.11 Landscaped areas: One test / 40 m² (430 ft^2) / compacted lift of backfill

1.6 PROJECT CONDITIONS

.1 A geotechnical report will been prepared for this Project and made available for viewing under the following conditions:

.1 The opinions expressed in this report are those of geotechnical engineer and represent interpretations of subsoil conditions, tests, and results of analyses conducted by geotechnical engineer.

.2 Owner will not be responsible for interpretations or conclusions drawn from the report.

.3 Consultant has used the information for their own design purposes, and will not be responsible for further interpretations or conclusions drawn from the report.

.4 Make additional test borings and conduct other exploratory operations necessary for excavation support and protection.

.2 Do not interrupt utilities serving facilities occupied by Owner or others unless permitted in writing by Consultant and then only after arranging to provide temporary utility services according to requirements indicated.

.3 Size, depth and location of existing utilities and structures as indicted are for guidance only. Completeness and accuracy are not guaranteed.

.4 Prior to commencing any excavation work, notify Consultant, establish location and state of use of buried utilities including existing communication and security lines and structures. Clearly mark such locations to prevent disturbance during work. Immediate restoration and replacement of any damaged equipment or lines will be imposed at the Contractor's expense.

.5 Confirm locations to buried utilities by careful test excavations.

.6 When directed, reroute existing lines in area of excavation. Pay costs for such work.

.7 Record location of maintained, rerouted and abandoned underground lines.

.8 Conduct, with Consultant, condition survey of existing buildings, trees and other plants, lawns, fencing, service poles, wires, rail tracts and paving, survey benchmarks and monuments which may be affected by work.

.9 Protect existing buildings and surface features which may be affected by work from damage while work is in progress and repair damage resulting from work.

.10 Where the excavation necessitates root or branch cutting, do so only as approved by Consultant.

1.7 WARRANTY

.1 The Contractor will be responsible for all reinstatement of surface paving, slabs, etc. due to settlement for 2 years from date of Substantial Performance.

2 Products

2.1 SOIL MATERIALS

.1 General:

.1 Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations.

.2 Coordinate with geotechnical consultant for types of fill materials required for the Project.

.2 SiteExcavated Material:

.1 Site excavated soil, where approved as backfill and fill material, is to be free of debris, organic matter, snow and ice. Do not use frozen soil for fill.

.2 Site excavated soil is to include only site material removed by required excavation and grading.

.3 Granular Backfill and Fill Material:

.1 Where backfill or fill material is required to be pitrun gravel, crushed gravel, or sand, it is to be a clean natural stone. Do not exceed 2% organic content; gradation is to be within the specified limits.

.4 PitRun Gravel A:

Sieve Size (mm)	Percent Passing By Weight	
100	100	
75	60 100	Total Sample
25	60 80	
2.36	25 45	Material Passing
1.18	16 25	75 mm Sieve
0.60	8 18	
0.150	4 10	
0.075	2 6	

.5 PitRun Gravel B:

Sieve Size (mm)	Percent Passing By Weight
80	100
50	55 100
25	38 100
16	32 85
5	20 65
0.35	6 30
0.080	2 15

.6 Crushed Gravel A:

Sieve Size (mm)	Percent Passing By Weight
25	100
20	95 100
10	60 80
4.75	40 60
2.36	28 48
0.60	13 29
0.15	6 15
0.075	4 10

.7 Crushed Gravel B:

Sieve Size (mm)	Percent Passing By Weight
25	100
20	100
12.5	60 92
5	37 62
2	26 44
0.40	12 27
0.16	7 18
0.08	2 8

.8 Coarse Gravel:

Sieve Size (mm)	Percent Passing By Weight
50	100
40	90 100
20	35 70
10	10 30
4.75	0 5

.9 Sand A:

Sieve Size (mm)	Percent Passing By Weight
10	100
4.75	95 100
1.18	50 85
0.60	25 60
0.30	10 30
0.15	2 10

.10 Sand B:

Sieve Size (mm)	Percent Passing By Weight
10	65 100
5.0	50 90
2.0	35 75
0.4	10 45
0.15	0 20
0.080	0 10

3 Execution

3.1 PREPARATION

.1 Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.

.2 Preparation of sub-grade for earthwork operations including removal of vegetation, topsoil, debris, obstructions, and deleterious materials from ground surface.

.3 Protect and maintain erosion and sedimentation controls during earthwork operations.

.4 Protect sub-grade from softening, undermining, washout, and damage by rain or water accumulation as follows:

.1 Reroute surface water runoff away from excavated areas

.2 Do not allow water to accumulate in excavations

.3 Do not use excavated trenches as temporary drainage ditches

.4 Maintain until dewatering until it is no longer required

3.2 GENERAL EXCAVATION

.1 It is not expected that any unclassified excavated materials will be encountered during excavation operations:

.1 Unclassified excavated materials may include rock, soil materials not reported in geotechnical investigation, and sub-grade obstructions not indicated on drawings or in specifications.

.2 Excavate to sub-grade elevations indicated on drawings including foundation elements and building obstructions resulting from demolition of existing building and site features to a tolerance of ± 25 mm (1”).

.3 Extend excavations a sufficient distance from structures for placing and removing concrete formwork, for installing services and other construction, and for inspections.

.4 Support excavations having an angle of repose greater than that allowable for the soil types in accordance with requirements.

3.3 EXCAVATION FOR UTILITY TRENCHES

.1 Excavate trenches to indicated gradients, lines, depths, and elevations.

.2 Excavate trenches to allow installation of top of pipe below frost line, where they occur beyond building perimeter.

.3 Excavate trenches to uniform widths to provide the following clearance on each side of pipe or conduit:

.1 Excavate trench walls vertically from trench bottom to 305 mm (12”) higher than top of pipe or conduit

.2 Clearance: 305 mm (12”) each side of pipe or conduit.

.4 Trench Bottoms:

.1 Excavate and shape trench bottoms to provide uniform bearing and support of pipes and conduit.

.2 Shape sub-grade to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.

.3 Remove projecting stones and sharp objects along trench sub-grade.

.4 Hand excavate trench bottoms for pipes and conduit, and flat bottomed and multiple duct conduit units < 150 mm (6”) Ø nominal, and support pipe and conduit on an undisturbed sub-grade.

.5 Shape bottom of trench to support bottom 90 degrees of pipe circumference for pipes and conduit 〈150 mm (6”) Ø nominal and fill depressions with tamped sand backfill.

3.4 STRUCTURE EXCAVATION

.1 Excavate to elevations and dimensions indicated on Drawings within a tolerance of ±50 mm, and extending a sufficient distance from footings and foundation walls to permit placing and removal of concrete formwork, installation of services, other required construction, and for inspection.

.2 In excavating for footings and foundations, take care not to disturb bottom of excavation. Excavate by hand to final grade just before concrete reinforcement is placed.

.3 Protect bottom of excavations and soil around and beneath footings from frost and ingress of water.

3.5 SUB-GRADE INSPECTION

.1 Notify geotechnical consultant and Consultant when excavations have reached required sub-grade.

.2 Continue excavation and replace with compacted backfill or fill material as directed where geotechnical consultant determines that unsatisfactory soil is present.

.3 Proof roll sub-grade below the building slabs and pavements with heavy pneumatic tired equipment to identify soft pockets and areas of excess yielding using equipment acceptable to the geotechnical consultant; do not proof roll wet or saturated sub-grade, and as follows:

.1 Proof roll in direction and speed as directed by geotechnical consultant.

.2 Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by geotechnical consultant, and replace with compacted backfill or fill as directed.

.4 Authorized additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.

.5 Reconstruct sub-grade damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by geotechnical consultant, without additional compensation.

3.6 UNAUTHORIZED EXCAVATION

.1 Fill unauthorized excavation under foundations or wall footings by extending bottom elevation of concrete foundation or footing to excavation bottom, without altering top elevation or other method as directed by the geotechnical consultant.

.2 Fill unauthorized excavations under other construction or utility pipe as directed by geotechnical consultant.

3.7 STORAGE OF SOIL MATERIALS

.1 Stockpile topsoil and other acceptable fill materials in locations as directed by Consultant.

3.8 UTILITY TRENCH BACKFILL

.1 Place backfill on sub-grade free of mud, frost, snow, or ice.

.2 Place and compact bedding course on trench bottoms and where indicated.

.3 Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.

.4 Backfill trenches excavated under footings and within 450 mm (18”) of bottom of footings with satisfactory soil; fill with concrete to elevation of bottom of footings.

.5 Provide 100 mm (4”) thick, concrete base slab support for piping or conduit less than 762 mm (30”) below surface of roadways, followed by complete enclosure of piping or conduit in a minimum of 100 mm (4”) of concrete after installation and testing and before backfilling or placing roadway sub-base.

.6 Place and compact initial backfill of satisfactory soil, free of particles larger than 25 mm (1”) in any dimension, to a height of 305 mm (12”) over the utility pipe or conduit, and as follows:

.1 Carefully compact initial backfill under pipe haunches and compact evenly up on both sides and along the full length of utility piping or conduit to avoid damage or displacement of piping or conduit.

.2 Coordinate backfilling with utilities testing.

.7 Backfill voids with satisfactory soil while installing and removing shoring and bracing.

.8 Place and compact final backfill of satisfactory soil to final sub-grade elevation.

3.9 SOIL MOISTURE CONTROL

.1 Uniformly moisten or aerate sub-grade and each subsequent fill or backfill soil layer before compaction to within 2% of optimum moisture content, and as follows:

.1 Do not place backfill or fill soil material on surfaces that are muddy, frozen, or contain frost or ice.

.2 Remove and replace, or scarify and air dry otherwise satisfactory soil material that exceeds optimum moisture content by 2% and is too wet to compact to specified dry unit weight.

3.10 COMPACTION OF SOIL BACKFILLS AND FILLS

.1 Place backfill and fill soil materials in layers not more than 203 mm (8”) in loose depth for material compacted by heavy compaction equipment, and not more than 100 mm (4”) in loose depth for material compacted by hand operated tampers.

.2 Place backfill and fill soil materials evenly on all sides of structures to required elevations, and uniformly along the full length of each structure.

.3 Compact soil materials to not less than the following percentages of maximum dry unit weight according to ASTM D698:

.1 Under structures, building slabs, steps, and pavements, scarify and recompact top 305 mm (12”) of existing subgrade and each layer of backfill or fill soil material at 100%.

.2 Under walkways, scarify and recompact top 150 mm (6”) below subgrade and compact each layer of backfill or fill soil material at 100%.

.3 Under lawn or unpaved areas, scarify and recompact top 150 mm (6”) below subgrade and compact each layer of backfill or fill soil material at 95%.

.4 For utility trenches, compact each layer of initial and final backfill soil material at 98%.

3.11 GRADING

.1 Uniformly grade areas to a smooth surface, free of irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated, and as follows:

.1 Provide a smooth transition between adjacent existing grades and new grades.

.2 Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.

.2 Site Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrade to required elevations within the following tolerances:

.1 Lawn or Unpaved Areas: ±25 mm (1”)

.2 Walks: ±25 mm (1”)

.3 Pavements: ±13 mm (½”)

.3 Grading inside Building Lines: Finish subgrade to a tolerance of 13 mm (½”) when measured against a 3050 mm (10’0”) straightedge.

3.12 FIELD QUALITY CONTROL

.1 Owner will engage a qualified independent geotechnical engineering testing agency to perform field quality control testing.

.2 Allow testing agency to inspect and test sub-grade and each fill or backfill layer.

.3 Proceed with subsequent earthwork only after test results for previously completed work complies with requirements.

.4 When testing agency reports that sub-grade, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil to depth required; re-compact and retest until specified compaction is obtained.

.5 Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.

.6 Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions as follows:

.1 Scarify or remove and replace soil material to depth as directed by geotechnical consultant; reshape and re-compact.

.7 Remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing where settling occurs before Project correction period elapses as follows:

.1 Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

3.13 DISPOSAL OF SURPLUS AND WASTE MATERIALS

.1 Disposal: Remove surplus satisfactory soil and waste material, including unsatisfactory soil, trash, and debris, and legally dispose of it off Owner's property.

3.14 RESTORATION AND CLEAN UP

.1 Upon completion of work, remove surplus materials and debris, trim slopes, and correct defects noted by Consultant.

.2 Replace topsoil as indicated.

.3 Reinstate pavement, sidewalks, and landscaping to condition and elevation that existed before excavation.

.4 Clean and reinstate areas affected by work as directed by Consultant.

END OF SECTION