

PROJECT TITLE Roof Replacement
 Laura Secord Building,
 32 Church Street, St. Catharines, Ontario

PROJECT NUMBER Number R.076458.002

PROJECT DATE 2016-06-30



Architect



Structural Engineer



END OF SECTION

Division 0 – Procurement and Contracting Requirements

Section 00 01 07 - PROFESSIONAL SEALS PAGE 1

Division 1 - General Requirements

Section 01 11 00 - SUMMARY OF WORK 2
Section 01 14 00 - WORK RESTRICTIONS 3
Section 01 29 83 - PAYMENT PROCEDURES FOR 2
Section 01 31 19 - PROJECT MEETINGS 3
Section 01 32 00 - CONSTRUCTION PROGRESS DOCUMENTATION 2
Section 01 32 16 - CONSTRUCTION PROGRESS SCHEDULE BAR (GANTT) CHART..... 3
Section 01 33 00 - SUBMITTAL PROCEDURES 5
Section 01 35 29 - HEALTH AND SAFETY REQUIREMENTS 5
Section 01 35 36 – FIRE SAFETY REQUIREMENTS 4
Section 01 41 00 - REGULATORY REQUIREMENTS 1
Section 01 42 13 – ABBREVIATIONS AND ACRONYMS 13
Section 01 45 00 - QUALITY CONTROL..... 2
Section 01 56 00 - TEMPORARY BARRIERS AND ENCLOSURES 2
Section 01 61 00 - COMMON PRODUCT REQUIREMENTS 5
Section 01 73 00 - EXECUTION 2
Section 01 74 11 - CLEANING..... 2
Section 01 74 20 - CONSTRUCTION/DEMOLITION 2
Section 01 77 00 - CLOSEOUT PROCEDURES 1
Section 01 78 00 - CLOSEOUT SUBMITTALS 5
Section 01 91 51 - BUILDING MANAGEMENT MANUAL..... 3

Division 2 - Existing Conditions

Section 02 41 99 – DEMOLITION..... 3

Division 3 - Concrete

Section 03 52 16 – LIGHTWEIGHT INSULATING ONCRETE 7

Division 6 - Wood, Plastics and Composites

Section 06 10 00 - ROUGH CARPENTRY 3

Division 7 - Thermal and Moisture Protection

Section 07 52 00 – MODIFIED BITUMINOUS MEMBRANE ROOFING 13
Section 07 62 00 - SHEET METAL FLASHING AND TRIM..... 5
Section 07 71 00 – ROOF SPECIALTIES 4

END OF TABLE OF CONTENTS

Part 1 GENERAL

1.1 SECTION INCLUDES

- .1 Title and description of Work.
- .2 Contract Method.
- .3 Work sequence.
- .4 Contractor use of premises.
- .5 Owner occupancy.
- .6 Alterations to existing building.

1.2 SUMMARY

- .1 Work under this Contract comprises the roof replacement for the Laura Secord Building, located at 32 Church Street, St. Catharines, Ontario.
- .2 Work of this Contract comprises the removal of the existing roof membrane, curbing, roof flashings and drains as well as the temporary relocation or uncoupling of existing mechanical and electrical equipment on the roof as well as;
 - .1 A sloped lightweight insulating concrete substrate and modified bitumen membrane roof system consisting of a vapour retarder membrane, lightweight insulating concrete with expanded polystyrene insulation and modified bitumen base sheet and granulated cap sheet, as well as metal flashings.
 - .2 The building is occupied and the work must be scheduled to allow continuous operation of the building at all times.

1.3 PRECEDENCE

- .1 For Federal Government projects, Division 01 Sections take precedence over technical specification sections in other Divisions of this Project Manual.

1.4 CONTRACT METHOD

- .1 Construct Work under single, stipulated price contract.
- .2 Construct work under lump sum contract.

1.5 WORK SEQUENCE

- .1 Construct Work in stages to provide for continuous public usage. Do not close off public usage of facilities until use of one stage of Work will provide alternate usage.
- .2 Maintain fire access/control.

1.6 CONTRACTOR USE OF PREMISES

- .1 Contractor shall limit use of premises for Work, storage, and access, to allow;
 - .1 Owner occupancy.
 - .2 Public usage.

- .2 Coordinate 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.

1.7 OWNER OCCUPANCY

- .1 Owner will occupy premises during entire construction period for execution of normal operations.
- .2 Cooperate with Owner in scheduling operations to minimize conflict and to facilitate Owner usage.

1.8 ALTERATIONS TO EXISTING BUILDING

- .1 Remove and recycle, compost, anaerobically digest, dispose of:
 - .1 Metal Flashing.
 - .2 Metal roof accessories.
- .2 Remove and dispose of:
 - .1 Roofing Membrane.
 - .2 Insulation.
- .3 Block in openings where items removed with material and finish to match existing adjoining construction.

Part 2 PRODUCTS

2.1 NOT USED

- .1 Not used.

Part 3 EXECUTION

3.1 NOT USED

- .1 Not used.

END OF SECTION

Part 1 GENERAL

1.1 ACCESS AND EGRESS

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

1.2 USE OF SITE AND FACILITIES

- .1 Execute work with least possible interference or disturbance to normal use of premises. Make arrangements 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.
- .4 Contractor shall provide sanitary facilities for their own personnel. Contractor may use existing facilities if approved by Departmental Representative. Keep facilities clean.
- .5 Closures: protect work temporarily until permanent enclosures are completed.

1.3 ALTERATIONS, ADDITIONS OR REPAIRS TO EXISTING BUILDING

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

1.4 EXISTING SERVICES

- .1 Notify, Departmental Representative utility companies of intended interruption of services and obtain required permission.
- .2 Where Work involves breaking into or connecting to existing services, give Departmental Representative 48 hours of notice for necessary interruption of mechanical or electrical service throughout course of work. Keep duration of interruptions minimum. Carry out interruptions after normal working hours of occupants, preferably on weekends.
- .3 Provide for personnel traffic.
- .4 Construct barriers in accordance with Section 01 56 00.

1.5 SPECIAL REQUIREMENTS

- .1 Where construction activities are likely to create a disturbance to the building occupants, carry out Work during from 18:00 to 07:00 hours and on Saturdays, Sundays and statutory holidays. A disturbance is caused by disruptive work creating vibrations, impacts, noise, dust, fumes, or unsightly condition, perceptible to building occupants. Contractor may be required to cease work for limited periods of time.
 - .2 Submit schedule in accordance with Section 01 32 16.
 - .3 Ensure Contractor's personnel employed on site become familiar with and obey regulations including safety, fire, traffic and security regulations.
 - .4 Keep within limits of work and avenues of ingress and egress.
-

- .5 Ingress and egress of Contractor vehicles at site is limited. Coordinate access with Departmental Representative.
- .6 Use of Highway (Street) Permits:
 - .1 City of St. Catharines By-Laws requires application for and issuance of a Road Occupancy Permit prior to any work affecting traffic flow on any City of St. Catharines streets.
 - .2 Do not stage vehicles and equipment on City of St. Catharines streets without obtaining a Permit. Any costs associated with Road Occupancy Permit are to be included in the Bid Amount.
- .7 Temporary Closures of Sidewalks during Construction:
 - .1 Temporary sidewalk closures due to construction activities will require pedestrian and/or traffic barricades and Niagara Regional Police Services presence for traffic duties as well as Road and Sidewalk Occupancy Permits from the City of St. Catharines. Any costs associated with Road and Sidewalk Occupancy Permit and temporary measures for sidewalk closures due to construction activities are to be included in the Bid Amount.
- .8 Deliver materials outside of peak traffic hours between 09:30 to 15:00 unless otherwise approved by Departmental Representative. Deliveries to site or removals from site involving occupation of City of St. Catharines streets shall not take place without a valid Use of Highway Permit.
- .9 All Work requiring a crane or other heavy lifting equipment to be done during weekends.
- .10 Public access to main entrance and loading dock must be maintained during normal operating hours (07:30 to 17:30). Public access to fire exit stairs must be maintained at all times.

1.6 SECURITY

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

1.7 BUILDING SMOKING ENVIRONMENT

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

Part 2 PRODUCTS

2.1 NOT USED

- .1 Not Used.

Part 3 EXECUTION

3.1 NOT USED

- .1 Not Used.

END OF SECTION

Part 1 GENERAL

1.1 RELATED REQUIREMENTS

- .1 Section 01 45 00 – Quality Control.
- .2 Particular requirements for inspection and testing to be carried out by testing laboratory designated by Departmental Representative are specified under sections as follows:
 - .1 Section 03 52 16 – Lightweight Insulating Concrete.
 - .2 Section 07 52 00 – Modified Bituminous Membrane Roofing.
 - .3 Section 07 62 00 – Sheet Metal Flashing and Trim.
 - .4 Section 07 71 00 – Roofing Specialties.

1.2 APPOINTMENT AND PAYMENT

- .1 Departmental Representative will appoint and pay for services of testing laboratory except as follows:
 - .1 Inspection and testing required by laws, ordinances, rules, regulations or orders of public authorities.
 - .2 Inspection and testing performed exclusively for Contractor's convenience.
 - .3 Testing, adjustment and balancing of conveying systems, mechanical and electrical equipment and systems.
 - .4 Mill tests and certificates of compliance.
 - .5 Tests specified to be carried out by Contractor under supervision of Departmental Representative.
- .2 Where tests or inspections by designated testing laboratory reveal Work not in accordance with contract requirements, pay costs for additional tests or inspections as required by Departmental Representative to verify acceptability of corrected work.

1.3 CONTRACTOR'S RESPONSIBILITIES

- .1 Provide labour, equipment and facilities to:
 - .1 Provide access to Work for inspection and testing.
 - .2 Facilitate inspections and tests.
 - .3 Make good Work disturbed by inspection and test.
 - .4 Provide storage on site for laboratory's exclusive use to store equipment and cure test samples.
- .2 Notify Departmental Representative 72 hours minimum sufficiently in advance of operations to allow for assignment of laboratory personnel and scheduling of test.
- .3 Where materials are specified to be tested, deliver representative samples in required quantity to testing laboratory.
- .4 Pay costs for uncovering and making good Work that is covered before required inspection or testing is completed and approved by Departmental Representative.

Part 2 PRODUCTS

2.1 NOT USED

.1 Not Used.

Part 3 EXECUTION

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 GENERAL

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 4 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 Departmental Representative, 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, 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.
 - .3 Schedule of submission of shop drawings, samples, mock-ups, colour chips. Submit submittals in accordance with Section 01 33 00.
 - .4 Requirements for temporary facilities, site sign, offices, storage sheds, utilities, fences in accordance with Section 01 52 00.
 - .5 Site security in accordance with Section 01 56 00.
 - .6 Health and safety in accordance with Section 01 35 29.
 - .7 Proposed changes, change orders, procedures, approvals required, mark-up percentages permitted, time extensions, overtime, administrative requirements.
-

- .8 Record drawings and specifications in accordance with Sections 01 33 00 and 01 78 00.
- .9 Maintenance manuals in accordance with Section 01 78 00.
- .10 Take-over procedures, acceptance, warranties in accordance with Section 01 78 00.
- .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 PRE-INSTALLATION MEETINGS

- .1 Schedule pre-installation meetings required by technical specification Sections making reference to this Section a minimum of 1 week before starting affected work.
- .2 Purpose: to discuss coordination and installation requirements for materials and assemblies installed by different Sections of the Work, and to confirm rough-ins, special installation requirements, clearances, material compatibility, protection of installed materials or assemblies, and similar issues.
- .3 Location: Contractor's site offices.
- .4 Minutes: Departmental Representative will record minutes, will chair the meeting and distribute minutes to parties of record prior to the next scheduled meeting.
- .5 Attendees:
 - .1 Contractor's Representatives: Contractor's project manager, site superintendent, representatives of Subcontractors affecting construction, and others as necessary.
 - .2 Departmental Representative.
- .6 Agenda:
 - .1 Introduction of supplier's, manufacturer's, Subcontractor's or other affected individual's concerns for constructability, compatibility or coordination.
 - .2 Review of proposed materials and methods of construction to address stated concerns, specification and drawing requirements, and any requirements for mock-ups or sample assemblies.

1.4 PROGRESS MEETINGS

- .1 During course of Work and 2 weeks prior to project completion, schedule progress meetings monthly.
 - .2 Contractor, major Subcontractors involved in Work and Departmental Representative are to be in attendance.
 - .3 Notify parties minimum 4 days prior to meetings.
 - .4 Minutes: Departmental Representative will record minutes, chair the meeting and distribute minutes to parties of record prior to the next scheduled meeting.
-

- .5 Agenda to include the following:
 - .1 Review, approval of minutes of previous meeting.
 - .2 Review of Work progress since previous meeting.
 - .3 Field observations, problems, 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.

Part 2 PRODUCTS

2.1 NOT USED

- .1 Not Used.

Part 3 EXECUTION

3.1 NOT USED

- .1 Not Used.

END OF SECTION

Part 1 GENERAL

1.1 RELATED SECTIONS

- .1 Section 01 77 00 - Closeout Procedures.

1.2 PROGRESS PHOTOGRAPHS

- .1 Sizes: Prints 200 x 300 mm.
- .2 Type: glossy colour with binding margin at one end.
- .3 Paper: single weight, unmounted.
- .4 Number of prints required: 3 sets.
- .5 Identification: typewritten name and number of project and date of exposure on 25 x 50 mm white patch in upper right hand corner on reverse side.
- .6 Viewpoints: interior and exterior locations: viewpoints determined by Departmental Representative.
- .7 Frequency: monthly with progress statement.

1.3 ELECTRONIC COPY

- .1 Submit electronic and hard copy of colour digital photography in jpg format, fine resolution.
- .2 Identification: name and number of project and date of exposure indicated.
- .3 Number of viewpoints: 36. Locations of viewpoints determined by Departmental Representative.
- .4 Frequency: Weekly.

1.4 ROOF PROGRESS DOCUMENTATION AND REPORTS

- .1 Keep written records as follows:
 - .1 Record examinations and findings.
 - .2 For progress of work.
 - .3 Records and reports: Compile lists of materials used and approved at various stages; type, amount and reason for rejection of materials, as well as new material ordered to replace those rejected; and, extra/new material ordered because of unknown conditions, as approved by the Departmental Representative.
- .2 Prepare as-built documents that illustrate monthly progress of work activities.
- .3 Prepare weekly reports as follows:
 - .1 Report must be an illustrated narrative of weekly activities.
 - .2 Record of daily observations activities.
 - .3 Record all variations from contract documents.

- .4 Record of maximum and minimum temperatures during each period.
- .5 Photographs showing representative sampling of work during that period.
- .6 All photographs included in report must be captioned to identify location of work illustrated.
- .4 Prior to commencement of roof placement work, document with archival photographic documentation the following:
 - .1 Overall work areas.
 - .2 Details of design elements, patterns, and ornamental features.
 - .3 Submit photographs for areas of existing roof to be dismantled and replaced. Record all sides and entire faces and arrange as a montage.
 - .4 Document condition of existing roof parapet and skylight curb to be treated.
 - .5 Clearly illustrate position of new roof drain location.
 - .6 Coordinate requirements with related Sections.
 - .7 Provide two sets of black and white photographs, 227 x 184 mm in archival mountings in hard cover binders. Include copy of photographs on portable digital storage media.
- .5 On completion of work, photograph areas for final comparison.
- .6 Photograph quality: well-illuminated, proper exposure, on professional quality film and printed on archival quality photographic paper. Submit sample to Departmental Representative for approval, prior to commencement of Work.
- .7 Refer to the Drawings for the schedule/list of all masonry sculptural elements on the building. Refer to the Drawings for information regarding the restoration and conservation procedures for each of the elements.

Part 2 PRODUCTS

2.1 NOT USED

- .1 Not Used.

Part 3 EXECUTION

3.1 NOT USED

- .1 Not Used.

END OF SECTION

Part 1 GENERAL

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. Generally 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, Certificate of Substantial Performance and Certificate of Completion as defined times of completion are of essence of this contract.

1.3 SUBMITTALS

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

- .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 Roofing.
 - .6 Testing and Commissioning.

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.
- .3 Submit a 2-week look ahead schedule at every weekly construction meeting for review and acceptance by all parties. The look ahead schedule shall be a detailed Gantt chart outlining hour-by-hour activities to be conducted in the work period. Include an outline of all work which will have an impact on the occupants as noted in Section 01 14 00.

1.7 PROJECT MEETINGS

- .1 Discuss Project Schedule at regular site meetings specified in Section 01 31 19, 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.
-

Part 2 PRODUCTS

2.1 NOT USED

.1 Not used.

Part 3 EXECUTION

3.1 NOT USED

.1 Not used.

END OF SECTION

Part 1 GENERAL

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 review.
- .10 Keep one reviewed copy of each submission on site.
- .11 Submit number of hard copies specified for each type and format of submittal and also submit in electronic format as pdf files. Forward pdf, MS Word, MS Excel, MS Project and AutoCAD .dwg files on USB compatible with PWGSC encryption requirements or through email or alternate electronic file sharing service such as ftp, as directed by Departmental Representative.

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 Province of Ontario of 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 coordinated, regardless of Section under which adjacent items will be supplied and installed. Indicate cross references to design drawings and specifications.
- .4 Allow 5 working days for Departmental Representative's review of each submission.
- .5 Adjustments made on shop drawings by Departmental Representative are not intended to change Contract Amount. 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, in duplicate, containing:
 - .1 Date.
 - .2 Project title and number.
 - .3 Contractor's name and address.
 - .4 Identification and quantity of each shop drawing, product data and sample.
 - .5 Other pertinent data.
- .8 Submissions shall include:
 - .1 Date and revision dates.
 - .2 Project title and number.
 - .3 Name and address of:
 - .1 Subcontractor.
 - .2 Supplier.
 - .3 Manufacturer.
 - .4 Contractor's stamp, signed by Contractor's authorized representative certifying approval of submissions, verification of field measurements and compliance with Contract Documents.
 - .5 Details of appropriate portions of Work as applicable:
 - .1 Fabrication.
 - .2 Layout, showing dimensions, including identified field dimensions, and clearances.
 - .3 Setting or erection details.
 - .4 Capacities.
 - .5 Performance characteristics.
 - .6 Standards.
 - .7 Operating weight.
 - .8 Wiring diagrams.
 - .9 Single line and schematic diagrams.
 - .10 Relationship to adjacent work.

- .9 After Departmental Representative's review, distribute copies.
 - .10 Submit three hard copies and one electronic copy of product data sheets or brochures for requirements requested in specification Sections and as requested by Departmental Representative where shop drawings will not be prepared due to standardized manufacture of product.
 - .11 Submit three hard copies and one electronic copy of test reports for requirements requested in specification Sections and as requested by Departmental Representative.
 - .1 Report signed by authorized official of testing laboratory that material, product or system identical to material, product or system to be provided has been tested in accord with specified requirements.
 - .2 Testing must have been within 3 years of date of contract award for project.
 - .12 Submit three hard copies and one electronic copy of certificates for requirements requested in specification Sections and as requested by Departmental Representative.
 - .1 Statements printed on manufacturer's letterhead and signed by responsible officials of manufacturer of product, system or material attesting that product, system or material meets specification requirements.
 - .2 Certificates must be dated after award of project contract complete with project name.
 - .13 Submit three hard copies and one electronic copy of manufacturer's 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.
 - .14 Submit three hard copies and one electronic copy of Manufacturer's Field Reports for requirements requested in specification Sections and as requested by Departmental Representative.
 - .15 Documentation of the testing and verification actions taken by manufacturer's representative to confirm compliance with manufacturer's standards or instructions.
 - .16 Submit three hard copies and one electronic copy of Operation and Maintenance Data for requirements requested in specification Sections and as requested by Departmental Representative.
 - .17 Delete information not applicable to project.
 - .18 Supplement standard information to provide details applicable to project.
 - .19 If upon review by Departmental Representative, no errors or omissions are discovered or if only minor corrections are made, transparency will be returned and fabrication and installation of Work may proceed. If shop drawings are rejected, noted copy will be returned and resubmission of corrected shop drawings, through same procedure indicated above, must be performed before fabrication and installation of Work may proceed.
-

- .20 The review of shop drawings by Public Works and Government Services Canada (PWGSC) is for sole purpose of ascertaining conformance with general concept.
- .1 This review shall not mean that PWGSC approves detail design inherent in shop drawings, responsibility for which shall remain with Contractor submitting same, and such review shall not relieve Contractor of responsibility for errors or omissions in shop drawings or of responsibility for meeting requirements of construction and Contract Documents.
- .2 Without restricting generality of foregoing, Contractor is responsible for dimensions to be confirmed and correlated at job site, for information that pertains solely to fabrication processes or to techniques of construction and installation and for co-ordination of Work of sub-trades.

1.3 SAMPLES

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

1.4 CERTIFICATES AND TRANSCRIPTS

- .1 Immediately after award of Contract, submit Workers' Safety and Insurance Board Experience Report.

1.5 FEES, PERMITS AND CERTIFICATES

- .1 Provide authorities having jurisdiction with information requested.
- .2 Pay fees and obtain certificates and permits required.
- .3 Furnish certificates and permits.

Part 2 PRODUCTS

2.1 NOT USED

- .1 Not Used.

Part 3 EXECUTION

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 GENERAL

1.1 REFERENCES

- .1 Canadian Standards Association (CSA): Canada
 - .1 CSA S350-M1980 (R2003), Code of Practice for Safety in Demolition of Structures.
- .2 National Building Code 2010 (NBC):
 - .1 NBC 2015, Division B, Part 8 Safety Measures at Construction and Demolition Sites.
- .3 National Fire Code 2015 (NFC):
 - .1 NFC 2015, Division B, Part 5 Hazardous Processes and Operations, subsection 5.6.1.3 Fire Safety Plan.
- .4 Province of Ontario:
 - .1 Occupational Health and Safety Act Revised Statutes of Ontario 1990, Chapter O.1 as amended, and Regulations for Construction Projects, O. Reg. 213/91 as amended.
 - .2 O. Reg. 490/09, Designated Substances.
 - .3 Workplace Safety and Insurance Act, 1997.
 - .4 Municipal statutes and authorities.
 - .5 Ministry of Labour (MOL):
 - .1 Ontario Regulation 490/09: Designated Substances, as amended (O. Reg. 490/09).
 - .2 Regulations for Construction Projects, Regulation 1991/231.
 - .3 Occupational Health and Safety Act, 1990 (OH&S).
 - .4 Guideline for Silica on Construction Projects, September 2004, revised April 2011.
 - .5 Ontario Regulation 860: Workplace Hazardous Materials Information System (WHMIS).
 - .6 Ministry of Environment (MOE):
 - .1 Ontario Regulation 347/90: General – Waste Management, as amended (R.R.O. 1990, O. Reg. 347/90).
 - .2 Environmental Protection Act of Ontario R.S.O., 1990
- .5 Treasury Board of Canada Secretariat (TBS):
 - .1 Treasury Board, Fire Protection Standard April 1, 2010 www.tbs-sct.gc.ca/pol/doc-eng.aspx?id=17316§ion=text.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00.
- .2 Submit site-specific Health and Safety Plan: Within 7 days after date of Notice to Proceed and prior to commencement of Work. Health and Safety Plan must include:
 - .1 Results of site specific safety hazard assessment.
 - .2 Results of safety and health risk or hazard analysis for site tasks and operation found in work plan.
 - .3 Measures and controls to be implemented to address identified safety hazards and risks.
 - .4 Provide a Fire Safety Plan, specific to the work location, in accordance with NBC, Division B, Article 8.1.1.3 prior to commencement of work. The plan shall be coordinated with, and integrated into, the existing Building, Facility, Tenant's Emergency Procedures and Evacuation Plan in place at the site. Departmental Representative will provide Building, Facility, Tenant's Emergency Procedures and Evacuation Plan. Deliver two copies of the Fire Safety Plan to the Departmental Representative not later than 14 days before commencing work.
 - .5 Contractor's and Sub-contractors' Safety Communication Plan.
 - .6 Contingency and Emergency Response Plan addressing standard operating procedures specific to the project site to be implemented during emergency situations. Coordinate plan with existing Building, Facility, Tenant's Emergency Response requirements and procedures provided by Departmental Representative.
- .3 Departmental Representative will review Contractor's site-specific Health and Safety Plan and provide comments to Contractor within 10 days after receipt of plan. Revise plan as appropriate and resubmit plan to Departmental Representative within 10 days after receipt of comments from Departmental Representative.
- .4 Departmental Representative's review of Contractor's final Health and Safety plan should not be construed as approval and does not reduce the Contractor's overall responsibility for construction Health and Safety.
- .5 Submit names of personnel and alternates responsible for site safety and health.
- .6 Submit records of Contractor's Health and Safety meetings when requested.
- .7 Submit 2 copies of Contractor's authorized representative's work site health and safety inspection reports to Departmental Representative weekly.
- .8 Submit copies of orders, directions or reports issued by health and safety inspectors of the authorities having jurisdiction.
- .9 Submit copies of incident and accident reports.
- .10 Submit Material Safety Data Sheets (MSDS).
- .11 Submit Workplace Safety and Insurance Board (WSIB)- Experience Rating Report.

1.3 FILING OF NOTICE

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

1.4 WORK PERMIT

- .1 Obtain building permits related to project prior to commencement of Work.
- .2 Obtain Hot Work Permit from Departmental Representative.

1.5 SAFETY ASSESSMENT

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

1.6 MEETINGS

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

1.7 REGULATORY REQUIREMENTS

- .1 Comply with the Acts and regulations of the Province of Ontario.
- .2 Comply with specified standards and regulations to ensure safe operations at site.

1.8 PROJECT/SITE CONDITIONS

- .1 Work at site will involve contact with:
 - .1 Silica in concrete.
 - .2 Lead in paint, flashing, roof panels, solder in electronic equipment, solder caulking in ball fittings of cast iron pipes, vent and pipe flashings.
 - .3 Guano in on roof parapet/cap flashing.
 - .4 Vinyl chloride in pipes, and conduits.

1.9 GENERAL REQUIREMENTS

- .1 Develop written site-specific Health and Safety Plan based on hazard assessment prior to beginning site Work and continue to implement, maintain, and enforce plan until final demobilization from site. Health and Safety Plan must address project specifications.
- .2 Departmental Representative may respond in writing, where deficiencies or concerns are noted and may request re-submission with correction of deficiencies or concerns either accepting or requesting improvements.
- .3 Relief from or substitution for any portion or provision of minimum Health and Safety standards specified herein or reviewed site-specific Health and Safety Plan shall be submitted to Departmental Representative in writing.

1.10 COMPLIANCE REQUIREMENTS

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

1.11 RESPONSIBILITY

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

- .2 Comply with and enforce compliance by employees with safety requirements of Contract Documents, applicable federal, provincial, territorial and local statutes, regulations, and ordinances, and with site-specific Health and Safety Plan.
- .3 Where applicable the Contractor shall be designated "Constructor", as defined by Occupational Health and Safety Act and Regulations for Construction Projects for the Province of Ontario.

1.12 UNFORSEEN HAZARDS

- .1 Should any unforeseen or peculiar safety-related factor, hazard, or condition become evident during performance of Work, immediately stop work and advise Departmental Representative verbally and in writing.
- .2 Follow procedures in place for Employees Right to Refuse Work as specified in the Occupational Health and Safety Act for the Province of Ontario.

1.13 HEALTH AND SAFETY COORDINATOR

- .1 Employ and assign to Work, competent and authorized representative as Health and Safety Coordinator. Health and Safety Coordinator must:
 - .1 Have working knowledge of occupational safety and health regulations.
 - .2 Be responsible for completing Contractor's Health and Safety Training Sessions and ensuring that personnel not successfully completing required training are not permitted to enter site to perform Work.
 - .3 Be responsible for implementing, enforcing daily and monitoring site-specific Contractor's Health and Safety Plan.
 - .4 Be on site during execution of Work and report directly to and be under direction of Registered Occupational Hygienist or site supervisor.

1.14 POSTING OF DOCUMENTS

- .1 Ensure applicable items, articles, notices and orders are posted in conspicuous location on site in accordance with Acts and Regulations of Province of Ontario, and in consultation with Departmental Representative.
 - .1 Contractor's Safety Policy.
 - .2 Constructor's Name.
 - .3 Notice of Project.
 - .4 Name, trade, and employer of Health and Safety Representative or Joint Health and Safety Committee members (if applicable).
 - .5 Ministry of Labour Orders and reports.
 - .6 Occupational Health and Safety Act and Regulations for Construction Projects for Province of Ontario.
 - .7 Address and phone number of nearest Ministry of Labour office.
 - .8 Material Safety Data Sheets.
 - .9 Written Emergency Response Plan.
 - .10 Site Specific Safety Plan.
 - .11 Valid certificate of first aider on duty.

- .12 WSIB "In Case of Injury At Work" poster.
- .13 Location of toilet and cleanup facilities.

1.15 CORRECTION OF NON-COMPLIANCE

- .1 Immediately address health and safety non-compliance issues identified by authority having jurisdiction or by Departmental Representative.
- .2 Provide Departmental Representative with written report of action taken to correct non-compliance of health and safety issues identified.
- .3 Departmental Representative may stop Work if non-compliance of health and safety regulations is not corrected.

1.16 BLASTING

- .1 Blasting or other use of explosives is not permitted.

1.17 POWDER ACTUATED DEVICES

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

1.18 WORK STOPPAGE

- .1 Give precedence to safety and health of public and site personnel and protection of environment over cost and schedule considerations for Work.
- .2 Assign responsibility and obligation to Health and Safety Coordinator to stop or start Work when, at Competent Supervisor's discretion, it is necessary or advisable for reasons of health or safety. Departmental Representative may also stop Work for health and safety considerations.

Part 2 PRODUCTS

2.1 NOT USED

- .1 Not used.

Part 3 EXECUTION

3.1 NOT USED

- .1 Not used.

END OF SECTION

Part 1 GENERAL

1.1 GENERAL

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

1.2 REPORTING FIRES

- .1 The Departmental Representative will co-ordinate arrangements for the Contractor to be briefed at the pre-construction meeting concerning Building's fire safety protocol.
- .2 Building Manager will supply a copy of "Fire Safety Emergency Evacuation Plan" in effect for this building. Contractor shall comply with outlined fire safety requirements.
- .3 Know location of nearest fire alarm box and telephone, including emergency phone number.
- .4 Report immediately all fire incidents to Fire Department as follows:
 - .1 activate nearest fire alarm box; or
 - .2 telephone.
- .5 Person activating fire alarm box will remain at box to direct Fire Department to scene of fire.
- .6 When reporting fire by telephone, give location of fire, name or number of building and be prepared to verify the location.

1.3 FIRE WATCH

- .1 Appoint a Fire Watch at locations where welding and soldering, torching or roofing is to take place.
- .2 A dedicated Fire Watch is not required. A competent person from the workforce on site may be assigned as Fire Watch for duration of work.
- .3 Assign a person who is knowledgeable in the correct use of fire extinguishers on the project.
- .4 Have work inspected by the Fire Watch up to 1.5 hours after work stoppage for each work period.

1.4 INTERIOR AND EXTERIOR FIRE PROTECTION AND ALARM SYSTEMS

- .1 Fire protection and alarm system will not be:
 - .1 obstructed;
 - .2 shut-off; or
 - .3 left inactive at end of working day or shift.
 - .2 Fire hydrants, standpipes and hose systems will not be used for other than fire-fighting purposes unless authorized by Departmental Representative.
-

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

1.5 FIRE EXTINGUISHERS

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

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

- .1 Ensure personnel use and take precautions as follows:
 - .1 Use kettles equipped with thermometers or gauges in good working order.
 - .2 Locate kettles in safe place outside of building. Locate to avoid danger of igniting combustible material.
 - .3 Maintain continuous supervision while kettles are in operation and provide metal covers for kettles to smother any flames in case of fire. Fire extinguishers shall be provided as required in 1.5.
 - .4 Prior to start of work, demonstrate container capacities to Departmental Representative.
 - .5 Use only glass fibre roofing mops.
 - .6 Used roofing mops will not be left unattended on roof and shall be stored away from building and combustible materials.
 - .7 All roofing materials will be stored in location no closer than 3 m to any structures.

1.7 BLOCKAGE OF ROADWAYS

- .1 Advise Departmental Representative of any work that would impede fire apparatus response. This includes violation of minimum required overhead clearance and coordinate with City of St. Catharines.

1.8 SMOKING PRECAUTIONS

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

1.9 RUBBISH AND WASTE MATERIALS

- .1 Rubbish and waste materials are to be kept to a minimum.
- .2 Burning of rubbish is prohibited.
- .3 Remove all rubbish from work site at end of work day or shift or as directed.
- .4 Storage:
 - .1 Store oily waste in approved receptacles to ensure maximum cleanliness and safety.
 - .2 Deposit greasy or oily rags and materials subject to spontaneous combustion in approved receptacles and remove from site daily or at the end of each shift.

1.10 FLAMMABLE AND COMBUSTIBLE LIQUIDS

- .1 Handling, storage and use of flammable and combustible liquids are to be governed by the current National Fire Code of Canada.
- .2 Flammable and combustible liquids such as gasoline, kerosene and naphtha will be kept for ready use in quantities not exceeding 45 litres provided they are stored in approved safety cans bearing Underwriters' Laboratory of Canada or Factory Mutual seal of approval. Storage of quantities of flammable and combustible liquids exceeding 45 litres for work purposes requires permission of local Building Manager.
- .3 Transfer of flammable and combustible liquids is prohibited within buildings or jetties.
- .4 Transfer of flammable and combustible liquids will not be carried out in vicinity of open flames or any type of heat-producing devices.
- .5 Flammable liquids having a flash point below 38°C such as naphtha or gasoline will not be used as solvents or cleaning agents.
- .6 Flammable and combustible waste liquids, for disposal, will be stored in approved containers located in a safe ventilated area. Quantities are to be kept to a minimum and Fire Department is to be notified when disposal is required.

1.11 HAZARDOUS SUBSTANCES

- .1 Work entailing use of toxic or hazardous materials, chemicals and/or explosives, or otherwise creating hazard to life, safety or health, will be in accordance with National Fire Code of Canada.
- .2 Obtain from local Building Manager a "Hot Work" permit for work involving welding, burning or use of blow torches and salamanders, in buildings or facilities.
- .3 When Work is carried out in dangerous or hazardous areas involving use of heat, provide fire watchers equipped with sufficient fire extinguishers. Determination of dangerous or hazardous areas along with level of protection necessary for Fire Watch is at discretion of the local Building Manager. Contractors are responsible for providing fire watch service for work on a scale established and in conjunction with Building Manager at pre-construction meeting.
- .4 Where flammable liquids, such as lacquers or urethanes are to be used, proper ventilation will be assured and all sources of ignition are to be eliminated. Building Manager is to be informed prior to and at cessation of such work.

1.12 WELDING, BURNING AND CUTTING

- .1 Contractor performing work of this section must notify Departmental Representative in advance of commencing work.
 - .2 Use non-combustible shields for electric and gas welding or cutting executed within 3 m of combustible material or in occupied spaces.
 - .3 Place cylinders supplying gases as close to work as possible. Secure cylinders in upright position, free from exposure to sun or high temperature.
 - .4 Locate fire extinguishing equipment near all welding, cutting and soldering operations.
-

- .5 Contractor's mechanics shall be properly equipped with required protective clothing, including goggles or welding hood or face mask, gloves, etc.
- .6 Contractor is responsible for the protection of his work and the Departmental Representative's property.
- .7 Provide Fire Watch on standby with approved fire extinguisher while burning or welding is in progress.

1.13 QUESTIONS AND/OR CLARIFICATIONS

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

1.14 FIRE INSPECTION

- .1 Site inspections by Building Manager will be coordinated through Departmental Representative and PWGSC Fire Protection Engineer.
- .2 Allow local Building Manager unrestricted access to work site.
- .3 Co-operate with Building Manager during routine fire safety inspection of work site.
- .4 Immediately remedy all unsafe fire situations observed by Building Manager.

Part 2 PRODUCTS

2.1 NOT USED

- .1 Not used.

Part 3 EXECUTION

3.1 NOT USED

- .1 Not used.

END OF SECTION

Part 1 GENERAL

1.1 REFERENCES AND CODES

- .1 Perform Work in accordance with National Building Code of Canada (NBC) 2015, National Fire Code of Canada (NFC) 2015 and Ontario Building Code (OBC) 2012, including all amendments up to bid closing date and other codes of provincial or local application provided that in case of conflict or discrepancy, more stringent requirements apply as directed by the Departmental Representative.
- .2 Meet or exceed requirements of:
 - .1 Contract documents.
 - .2 Specified standards, codes and referenced documents.

1.2 HAZARDOUS MATERIAL DISCOVERY

- .1 Stop work immediately and notify Departmental Representative if materials which may contain designated substances or PCB's, other than those identified in Section 01 35 29 are discovered in course of work.

1.3 BUILDING SMOKING ENVIRONMENT

- .1 Comply with smoking restrictions.

1.4 IAQ - INDOOR AIR QUALITY

- .1 Comply with CSA-Z204-94(R1999), Guideline for Managing Indoor Air Quality in Office Buildings and CSA B651-12 including Annex A.

1.5 TAXES

- .1 Pay applicable Federal, Provincial and Municipal taxes.

1.6 EXAMINATION

- .1 Examine existing conditions and determine conditions affecting work.

Part 2 PRODUCTS

2.1 NOT USED

- .1 Not Used.

Part 3 EXECUTION

3.1 NOT USED

- .1 Not Used.

END OF SECTION

Part 1 GENERAL

1.1 ABBREVIATIONS AND ACRONYMS

- .1 The abbreviations and acronyms are commonly found in the Project Manual and represent the associated organizations or terms.

1.2 MATERIALS, EQUIPMENT AND METHODS

- .1 A:
- .1 AB: anchor bolt.
 - .2 AC: acoustic.
 - .3 AC PAN: acoustic panel.
 - .4 ACU: acoustic unit ceiling.
 - .5 AFF: above finished floor.
 - .6 AC PLAS: acoustic plaster.
 - .7 ACT: acoustic tile.
 - .8 ACR CU LVR: acrylic cube louvre.
 - .9 ADH: adhesive.
 - .10 ADJ: adjustable.
 - .11 A/C: air conditioner.
 - .12 AHU: air handling unit.
 - .13 AL: aluminum.
 - .14 ANOD: anodized.
 - .15 APPROX: approximate.
 - .16 ARCH: architecture.
 - .17 ARCH BLK: architectural block.
 - .18 AVB: air vapour barrier.
- .2 B:
- .1 B: base.
 - .2 BEAST: benthic assessment of sediment.
 - .3 BH: bore hole.
 - .4 BHP: brake horse power.
 - .5 BL: bottom layer.
 - .6 BLK: block.
 - .7 BLKD: bulkhead.
 - .8 BM: beam.
 - .9 BOT: bottom.
 - .10 BMP: best management practice.
 - .11 B PL: base plate.
-

- .12 BRG: bearing.
- .13 BRK: brick.
- .14 BSMT: basement.
- .15 BTEX: benzene, toluene, ethylbenzene and xylenes.
- .16 BUR: built-up roof.
- .3 C:
- .1 CAL: caliper.
- .2 CANTIL: cantilever.
- .3 CB: catch basin.
- .4 CC: centre to centre.
- .5 CCN: contemplated change notice.
- .6 CDF: controlled density fill.
- .7 CEC: Canadian Electrical Code.
- .8 CF: chair fabric.
- .9 CHAN: channel.
- .10 CHS: Canadian hydrographic service.
- .11 CJ: construction joint.
- .12 CL: centreline.
- .13 CK: cork.
- .14 CLG: ceiling.
- .15 CLR: clear.
- .16 COL: column.
- .17 CONC: concrete.
- .18 CONC BLK: concrete block.
- .19 CONC BRK: concrete brick.
- .20 CONT: continuous.
- .21 CONT J: control joint.
- .22 COMPL: complete.
- .23 CM: centimetre. (Nursery stock).
- .24 CP: circulating pump.
- .25 CPL: cement plaster.
- .26 CPM: critical path method.
- .27 CPT: carpet.
- .28 CPTT: carpet tile.
- .29 CT: ceramic tile.
- .30 CTE: connect to existing.
- .31 CV: control valve.
- .32 CVT: conductive vinyl tile.
- .33 C/W: complete with.
-

-
- .4 D:
- .1 D: deep.
 - .2 dB: decibels.
 - .3 DB: dry-bulb.
 - .4 DD: dutch door.
 - .5 DEG: degree.
 - .6 DF: drinking fountain.
 - .7 DIA: diameter.
 - .8 DIM: dimension.
 - .9 DL: dead load.
 - .10 DMNT: demountable.
 - .11 DP: dampproofing.
 - .12 DR: door.
 - .13 DRP: drapery.
 - .14 DWL: dowel.
- .5 E:
- .1 EA: each.
 - .2 EC: epoxy coating.
 - .3 ECF: engineered containment facility.
 - .4 EE: each end.
 - .5 EF: each face (architectural/structural).
 - .6 EF: exhaust fan (mechanical/electrical).
 - .7 EL: elevation.
 - .8 ELEC: electric.
 - .9 ELEV: elevator.
 - .10 EM: expanded metal.
 - .11 ENCL: enclosure.
 - .12 EQ: equal.
 - .13 ET: expansion tank.
 - .14 EXH: exhaust.
 - .15 EXIST: existing.
 - .16 EXPJ: expansion joint.
 - .17 EXP STRUCT: exposed structure.
 - .18 EXT: exterior.
 - .19 EW: each way.
 - .20 EWT: entering water temperature.
- .6 F:
- .1 FC: fuel contributed.
 - .2 FD: floor drain.
-

- .3 FDN: foundation.
 - .4 FEAT W: feature wall.
 - .5 FEXT: fire extinguisher.
 - .6 FH: fire hose.
 - .7 FHC: fire hose cabinet.
 - .8 FHR: fire hose rack.
 - .9 FIN: finish.
 - .10 FIP: federal identity program.
 - .11 FL: floor.
 - .12 FLD: field.
 - .13 FLUOR: fluorescent.
 - .14 FR: frame.
 - .15 FRR: fire resistance rating.
 - .16 FTG: footing.
 - .7 G:
 - .1 GALV: galvanized steel.
 - .2 GB: grab bar.
 - .3 GBD: gypsum board.
 - .4 GC: General Conditions.
 - .5 GF: ground floor.
 - .6 GFCI: ground fault circuit interrupter.
 - .7 GL: glass or glazing.
 - .8 GL BLK: glass block.
 - .9 GPC: gypsum plaster ceiling.
 - .10 GPW: gypsum plaster wall.
 - .11 GT: glass tile.
 - .8 H:
 - .1 HB: hose bib.
 - .2 HC: hollow core.
 - .3 HCWD: hollow core wood door.
 - .4 HD: hand dryer.
 - .5 HDW: hardware.
 - .6 HDWD: hardwood.
 - .7 HEX: heat exchanger.
 - .8 HM: hollow metal.
 - .9 HOR: horizontal.
 - .10 HOR EF: horizontal each face.
 - .11 HP: hydro pole.
 - .12 HPA: Hamilton Port Authority.
-

- .13 HR: hour.
 - .14 HRV: heat recovery ventilator.
 - .15 HT: height.
 - .16 HTR: heater.
 - .17 HUM: humidifier.
 - .18 HWT: hot water tank.
 - .19 HYD: hydrant.
 - .20 HZ: Hertz frequency, cycles per second.
 - .9 I:
 - .1 ICF: insulated concrete formwork.
 - .2 ID: inside diameter.
 - .3 INS: insulation.
 - .4 INTLK: interlock.
 - .10 J:
 - .1 JT: joint.
 - .11 K:
 - .1 KPL: kick plate.
 - .12 L:
 - .1 LAT: leaving air temperature.
 - .2 LAV: lavatory.
 - .3 LDG: landing.
 - .4 LG: long.
 - .5 LINO: linoleum.
 - .6 LL: live load.
 - .7 LT: light.
 - .8 LWT: leaving water temperature.
 - .13 M:
 - .1 MAS: masonry.
 - .2 MAS FL: masonry flashing.
 - .3 MAX: maximum.
 - .4 MBG: metal bar grating.
 - .5 MCL: metal cube louvre.
 - .6 MECH: mechanical.
 - .7 MET: metal.
 - .8 MET DK: metal deck.
 - .9 MET FL: metal flashing.
 - .10 MET GRID CLG: metal grid ceiling.
 - .11 MET GRTG: metal grating.
-

- .12 MET LIN CLG: metal linear ceiling.
 - .13 MET T PTN: metal toilet partition.
 - .14 MH: maintenance hole.
 - .15 MIN: minimum.
 - .16 MLP: metal lath and plaster.
 - .17 MO: masonry opening.
 - .18 MR: marble.
 - .19 MT: metal threshold.
 - .20 MWP: membrane waterproofing.

 - .14 N:
 - .1 NBC: national building code.
 - .2 NC: normally closed.
 - .3 NF: near face.
 - .4 NFC: national fire code.
 - .5 NIC: not in contract.
 - .6 NO: number.
 - .7 NRC: noise reduction coefficient.
 - .8 NRP: non removable pin.
 - .9 NTS: not to scale.

 - .15 O:
 - .1 OA: outside air.
 - .2 OBC: Ontario building code.
 - .3 OC: on centre.
 - .4 OD: outside diameter.
 - .5 OPNG: opening.
 - .6 OPR: operator.
 - .7 OVHD: overhead.
 - .8 OWSJ: open web steel joist.

 - .16 P:
 - .1 P: prefinished.
 - .2 PAH: polynuclear aromatic hydrocarbons.
 - .3 PARG: parging.
 - .4 PCC: precast concrete.
 - .5 PCT: porcelain ceramic tile.
 - .6 PED ACS FLG: pedestal access flooring.
 - .7 PF: panel fabric.
 - .8 PH: phase.
 - .9 PL: plate.
 - .10 PLAM: plastic laminate.
-

- .11 PLAS: plaster.
 - .12 PLYWD: plywood.
 - .13 PR: pair.
 - .14 PREFAB: prefabricated.
 - .15 PREFIN: prefinished.
 - .16 PRESS: pressure.
 - .17 PRFL: profile.
 - .18 PRV: pressure regulating valve.
 - .19 PT: paint.
 - .20 PTD: paper towel dispenser.
 - .21 PTN: partition.
 - .22 PVC: polyvinyl chloride.

 - .17 Q:
 - .1 QTB: quarry tile base.
 - .2 QTF: quarry tile floor.
 - .3 QTR: quarry tile roof.

 - .18 R:
 - .1 R: radius.
 - .2 RA: return air.
 - .3 RAD: return air damper.
 - .4 RB: resilient base.
 - .5 RC: reinforced concrete.
 - .6 RCPT: receptacle.
 - .7 RD: roof drain.
 - .8 REINF: reinforced/reinforcing.
 - .9 REQD: required.
 - .10 REQT: requirement.
 - .11 RFT: rubber floor tile.
 - .12 RM: room.
 - .13 RO: rough opening.
 - .14 RP: radiant panel.
 - .15 RRS: recycled rubber sheet.
 - .16 RRT: recycled rubber tile.
 - .17 RSD: rolling steel door.
 - .18 RSF: rubber sheet flooring.
 - .19 RT: rubber tile.
 - .20 RTU: roof top unit.
 - .21 RWL: rain water leader.
-

- .19 S:
- .1 SA: supply air.
 - .2 SAN SEW: sanitary sewer.
 - .3 SCHED: schedule.
 - .4 SC: solid core.
 - .5 SCRN: screen.
 - .6 SCWD: solid core wood door.
 - .7 SD: smoke developed.
 - .8 SDT: static dissipative tile.
 - .9 SECT: section.
 - .10 SH: sill height.
 - .11 SIM: similar.
 - .12 SL: sliding.
 - .13 SLR: sealer.
 - .14 SPEC: specification.
 - .15 SS: stainless steel.
 - .16 STD: standard.
 - .17 STL: steel.
 - .18 STL BM: steel beam.
 - .19 STC: sound transmission class.
 - .20 STL FL DK: steel floor deck.
 - .21 STL PL: steel plate.
 - .22 STN: stone.
 - .23 STR: structure or structural.
 - .24 ST SEW: storm sewer.
 - .25 S&U: stain and urethane.
 - .26 S&V: stain and varnish.
 - .27 SVT: solid vinyl tile.
- .20 T:
- .1 T: top.
 - .2 T&B: top and bottom.
 - .3 TCB: turbidity control plan.
 - .4 TEL: telephone.
 - .5 TER: terrazzo.
 - .6 TERT: terrazzo tile.
 - .7 THKNS: thickness.
 - .8 THR: threshold.
 - .9 TMPD: tempered.
 - .10 TOPG: topping.
-

- .11 TRANSV: transverse.
 - .12 TYP: typical.
 - .21 U:
 - .1 U: urethane.
 - .2 U/C: undercut.
 - .3 UGRD: underground.
 - .4 UNO: unless noted otherwise.
 - .5 UOS: unless otherwise specified.
 - .6 U/S: underside.
 - .7 UR: urinal.
 - .22 V:
 - .1 V: volt.
 - .2 VCF: vinyl coated fabric.
 - .3 VCT: vinyl composition tile.
 - .4 VEL: velocity.
 - .5 VERT: vertical.
 - .6 VERT B: vertical blinds.
 - .7 VERT EF: vertical each face.
 - .8 VSF: vinyl sheet flooring.
 - .9 VPT: vinyl plank flooring.
 - .10 VT: vinyl tile.
 - .11 VWC: vinyl wall covering.
 - .23 W:
 - .1 WB: wet-bulb.
 - .2 WC: water closet.
 - .3 W-C: wall connectors.
 - .4 WD: wood.
 - .5 WDV: wood veneer.
 - .6 WG: water gauge.
 - .7 WH: wall hydrant.
 - .8 WHMIS: workplace hazardous materials information system.
 - .9 WP: waterproofing.
 - .10 WR: washroom.
 - .11 WSIB: workplace safety and insurance board.
 - .12 WT: weight.
 - .13 WTP: water treatment plant.
-

1.3 STANDARDS ORGANIZATIONS

- .1 Standards writing organizations:
 - .1 AA - Aluminum Association.
 - .2 ACPA - American Concrete Pipe Association.
 - .3 ANSI - American National Standards Institute.
 - .4 ASHRAE - American Society of Heating and Refrigerating and Air-Conditioning Engineers.
 - .5 ASTM - American Society for Testing and Materials.
 - .6 AWI/AWMAC - Architectural Woodwork Institute/Architectural Woodwork Manufacturers Association of Canada.
 - .7 AWPA - American Wood Preservers' Association.
 - .8 AWWA - American Water Works Association.
 - .9 BHMA - Builders Hardware Manufacturers Association.
 - .10 CCDC - Canadian Construction Documents Committee.
 - .11 CCMPA - Canadian Concrete Masonry Producers Association.
 - .12 CGSB - Canadian General Standards Board.
 - .13 CNTA - Canadian Nursery Trades Association.
 - .14 CPCA - Canadian Painting Contractors Association.
 - .15 CRCA - Canadian Roofing Contractors Association.
 - .16 CSA - Canadian Standards Association.
 - .17 CSC - Construction Specifications Canada.
 - .18 CSDMA - Canadian Steel Door Manufacturers Association.
 - .19 CSI - Construction Specifications Institute.
 - .20 CSSBI - Canadian Sheet Steel Building Institute.
 - .21 CRCA - Canadian Roofing Contractors Association.
 - .22 DHI - Door and Hardware Institute.
 - .23 EEMAC - Electrical and Electronic Manufacturer's Association of Canada.
 - .24 ESA - Electrical Safety Authority.
 - .25 FCC - Fire Commissioner of Canada.
 - .26 FSC - Forest Stewardship Council.
 - .27 GANA - Glass Association of North America.
 - .28 HMMA - Hollow Metal Manufacturers Association.
 - .29 IEEE - Institute of Electrical and Electronics Engineers Inc.
 - .30 ISO - International Organization for Standardization.
 - .31 IWFA - International Window Film Association.
 - .32 LEED - LEED Canada, Leadership in Energy and Environmental Design.
 - .33 MPI - Master Painters Institute.
 - .34 NAAMM - National Association of Architectural Metal Manufacturers.
 - .35 NCPI - National Clay Pipe Institute.
 - .36 NEMA - National Electrical Manufacturers Association.

- .37 NFPA - National Fire Protection Association.
- .38 OPSD - Ontario Provincial Standard Drawings.
- .39 OPSS - Ontario Provincial Standard Specifications.
- .40 PPI - Plastics Pipe Institute.
- .41 SDI - Steel Door Institute.
- .42 SCAQMD - South Coast Air Quality Management District.
- .43 TIA - Telecommunications Industry Association.
- .44 TIAC - Thermal Insulation Association of Canada.
- .45 TTMAC - Terrazzo Tile and Marble Association of Canada.
- .46 UL - Underwriters Laboratories.
- .47 ULC - Underwriters Laboratories of Canada.
- .48 US EPA - United States Environmental Protection Agency.
- .49 WH - Warnock Hersey.

1.4 FEDERAL GOVERNMENT DEPARTMENTS AND AGENCIES

- .1 Departments, agencies and crown corporations.
 - .1 CEAA - Canadian Environmental Assessment Agency.
 - .2 CSC - Correctional Service Canada.
 - .3 CRA - Canada Revenue Agency.
 - .4 DND - Department of National Defence.
 - .5 EC - Environment Canada.
 - .6 FHBRO - Federal Heritage Buildings Review Office.
 - .7 HC - Health Canada.
 - .8 HCD - Heritage Conservation Directorate.
 - .9 LC - Labour Canada.
 - .10 PC - Parks Canada.
 - .11 PWGSC - Public Works and Government Services Canada.
 - .12 RCMP - Royal Canadian Mounted Police.
 - .13 TBS - Treasury Board Secretariat.
 - .14 TC - Transport Canada.

1.5 PROVINCIAL GOVERNMENT DEPARTMENTS AND AGENCIES

- .1 MOEE - Ontario Ministry of Environment and Energy.
- .2 MOL - Ontario Ministry of Labour.
- .3 MTO and MOT - Ontario Ministry of Transportation.
- .4 TSSA - Technical Standards and Safety Authority.

1.6 INTERNATIONAL GOVERNMENT DEPARTMENTS AND AGENCIES

- .1 DOHMH - New York City Department of Health and Mental Hygiene, USA.
- .2 GSA - Government Services Administration, USA.

1.7 UNITS OF MEASURE METRIC

- .1 The following abbreviations of units of measure are commonly found in the Project Manual:
- .1 C: Celsius.
 - .2 cm: centimetre.
 - .3 kg: kilogram.
 - .4 kg/m³: kilogram per cubic metre.
 - .5 kN: kilonewton.
 - .6 kPa: kilopascals.
 - .7 kw: kilowatts.
 - .8 l/s: litre per second.
 - .9 m: metre.
 - .10 m³: cubic metre.
 - .11 mg/kg: milligrams per kilogram.
 - .12 mg/L: milligrams per litre.
 - .13 mm: millimetres.
 - .14 MPa: megapascal.
 - .15 NTU: nephelometric turbidity unit.
 - .16 ppm: parts per million.
 - .17 ug/L: micrograms per litre.
 - .18 ug/m³: micrograms per cubic metre.

1.8 UNITS OF MEASURE IMPERIAL

- .1 The following abbreviations of units of measure are commonly found in the Project Manual:
- .1 BTU: British thermal units.
 - .2 CFM: cubic feet per minute.
 - .3 F: Fahrenheit.
 - .4 ft: foot/feet.
 - .5 FPI: fins per inch.
 - .6 FPM: feet per minute.
 - .7 ga: gauge.
 - .8 gpm: gallons per minute.
 - .9 in: inches.
 - .10 lbs: pounds.
 - .11 NTU: nephelometric turbidity unit.
 - .12 psi: pounds-force per square inch.
 - .13 PSIG: PSI gauge.
 - .14 ppm: parts per million.
 - .15 RPM: revolutions per minute.
-

Part 2 PRODUCTS

2.1 NOT USED

.1 Not Used.

Part 3 EXECUTION

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 GENERAL

1.1 SECTION INCLUDES

- .1 Inspection and testing, administrative and enforcement requirements.
- .2 Mock-ups.

1.2 INSPECTION

- .1 Allow Departmental Representative access to Work. If part of Work is in preparation at locations other than Place of Work, allow access to such Work whenever it is in progress.
- .2 Give timely notice requesting inspection if Work is designated for special tests, inspections or approvals by Departmental Representative instructions, or law of Place of Work.
- .3 If Contractor covers or permits to be covered Work that has been designated for special tests, inspections or approvals before such is made, uncover such Work, have inspections or tests satisfactorily completed and make good such Work.
- .4 Departmental Representative may order any part of Work to be examined if Work is suspected to be not in accordance with Contract Documents. If, upon examination such work is found not in accordance with Contract Documents, correct such Work and pay cost of examination and correction. If such Work is found in accordance with Contract Documents, Departmental Representative shall pay cost of examination and replacement.

1.3 INDEPENDENT INSPECTION AGENCIES

- .1 Independent Inspection/Testing Agencies will be engaged by Departmental Representative for purpose of inspecting and/or testing portions of Work under Section 01 29 83, above and beyond those required of the Contractor. Cost of such services will be borne by Departmental Representative.
- .2 Provide equipment required for executing inspection and testing by appointed agencies.
- .3 Employment of inspection/testing agencies does not relax responsibility to perform Work in accordance with Contract Documents.
- .4 If defects are revealed during inspection and/or testing, appointed agency will request additional inspection and/or testing to ascertain full degree of defect. Correct defect and irregularities as advised by Departmental Representative at no cost to Departmental Representative. Pay costs for retesting and reinspection.

1.4 ACCESS TO WORK

- .1 Allow inspection/testing agencies access to Work, off site manufacturing and fabrication plants.
 - .2 Co-operate to provide reasonable facilities for such access.
-

1.5 PROCEDURES

- .1 Notify appropriate agency and Departmental Representative in advance of requirement for tests, in order that attendance arrangements can be made.
- .2 Submit samples and/or materials required for testing, as specifically requested in specifications. Submit with reasonable promptness and in an orderly sequence so as not to cause delay in Work.
- .3 Provide labour and facilities to obtain and handle samples and materials on site. Provide sufficient space to store and cure test samples.

1.6 REJECTED WORK

- .1 Remove defective Work, whether result of poor workmanship, use of defective products or damage and whether incorporated in Work or not, which has been rejected by Departmental Representative as failing to conform to Contract Documents. Replace or re-execute in accordance with Contract Documents.
- .2 Make good other Contractor's work damaged by such removals or replacements promptly.
- .3 If in opinion of Departmental Representative it is not expedient to correct defective Work or Work not performed in accordance with Contract Documents, Departmental Representative may deduct from Contract Amount difference in value between Work performed and that called for by Contract Documents, amount of which shall be determined by Departmental Representative.

1.7 REPORTS

- .1 Submit 4 copies of inspection and test reports to Departmental Representative.
- .2 Provide copies to Subcontractor of work being inspected or tested, manufacturer or fabricator of material being inspected or tested.

Part 2 PRODUCTS

2.1 NOT USED

- .1 Not Used.

Part 3 EXECUTION

3.1 NOT USED

- .1 Not Used.

END OF SECTION

Part 1 GENERAL

1.1 SECTION INCLUDES

- .1 Barriers.
- .2 Environmental Controls.

1.2 REFERENCES

- .1 Canadian General Standards Board (CGSB):
 - .1 CAN/CGSB-1.189-2000, Exterior Alkyd Primer for Wood.
 - .2 CAN/CGSB-1.59-97, Alkyd Exterior Gloss Enamel.
- .2 Canadian Standards Association (CSA):
 - .1 CSA O121-08(R2013), Douglas Fir Plywood.

1.3 INSTALLATION AND REMOVAL

- .1 Provide temporary controls in order to execute Work expeditiously.
- .2 Remove from site all such work after use.

1.4 GUARD RAILS AND BARRICADES

- .1 Provide secure, rigid guard rails and barricades around open shafts, open stair wells, open edges of floors and roofs.
- .2 Provide as required by governing authorities.

1.5 WEATHER ENCLOSURES

- .1 Provide weather tight closures to unfinished door and window openings, tops of shafts and other openings in floors and roofs.
- .2 Close off floor areas where walls are not finished; seal off other openings; enclose building interior work for temporary heat.
- .3 Design enclosures to withstand wind pressure and snow loading.

1.6 ACCESS TO SITE

- .1 Provide and maintain construction runways as may be required for access to Work.

1.7 FIRE ROUTES

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

1.8 PROTECTION FOR OFF-SITE AND PUBLIC PROPERTY

- .1 Protect surrounding private and public property from damage during performance of Work.
- .2 Be responsible for damage incurred.

1.9 PROTECTION OF BUILDING FINISHES

- .1 Provide protection for finished and partially finished building finishes and equipment during performance of Work.
- .2 Provide necessary screens, covers, and hoardings.
- .3 Confirm with Departmental Representative locations and installation schedule 3 days prior to installation.
- .4 Be responsible for damage incurred due to lack of or improper protection.

Part 2 PRODUCTS

2.1 NOT USED

- .1 Not Used.

Part 3 EXECUTION

3.1 NOT USED

- .1 Not Used.

END OF SECTION

Part 1 GENERAL

1.1 SECTION INCLUDES

- .1 Product quality, availability, storage, handling, protection, and transportation.
- .2 Manufacturer's instructions.
- .3 Quality of Work, coordination and fastenings.
- .4 Existing facilities.

1.2 RELATED SECTIONS

- .1 Section 01 45 00 - Quality Control.

1.3 REFERENCES

- .1 Within text of specifications, reference may be made to reference standards.
- .2 Conform to these standards, in whole or in part as specifically requested in specifications.
- .3 If there is question as to whether any product or system is in conformance with applicable standards, Departmental Representative reserves right to have such products or systems tested to prove or disprove conformance.
- .4 The 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.
- .5 Conform to latest date of issue of referenced standards in effect on date of submission of Bids, except where specific date or issue is specifically noted.

1.4 QUALITY

- .1 Products, materials, equipment and articles (referred to as products throughout specifications) incorporated in Work shall be new, not damaged or defective, and of best quality (compatible with specifications) for purpose intended. If requested, furnish evidence as to type, source and quality of Products provided.
 - .2 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.
 - .3 Should any dispute arise as to quality or fitness of products, decision rests strictly with Departmental Representative based upon requirements of Contract Documents.
 - .4 Unless otherwise indicated in specifications, maintain uniformity of manufacture for any particular or like item throughout building.
 - .5 Permanent labels, trademarks and nameplates on products are not acceptable in prominent locations, except where required for operating instructions, or when located in mechanical or electrical rooms.
-

1.5 AVAILABILITY

- .1 Immediately upon signing Contract, review product delivery requirements and anticipate foreseeable supply delays for any 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, Departmental Representative reserves right to substitute more readily available products of similar character, at no increase in Contract Amount or Contract Time.

1.6 METRIC SIZED MATERIALS

- .1 SI metric units of measurement are used exclusively on the drawings and in the specifications for this project.
- .2 The Contractor is required to provide metric products in the sizes called for in the Contract Documents except where a valid claim can be made that a particular product is not available on the Canadian market.
- .3 Claims for exemptions from use of metric sized products shall be in writing and fully substantiated with supportive documentation. Promptly submit application to Departmental Representative for consideration and ruling. Non-metric sized products may not be used unless Contractor's application has been approved in writing by the Departmental Representative.
- .4 Difficulties caused by the Contractor's lack of planning and effort to obtain modular metric sized products which are available on the Canadian market will not be considered sufficient reasons for claiming that they cannot be provided.
- .5 Claims for additional costs due to provision of specified modular metric sized products will not be considered.

1.7 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 Store and mix paints in heated and ventilated room. Remove oily rags and other combustible debris from site daily. Take every precaution necessary to prevent spontaneous combustion.
-

- .8 Remove and replace damaged products at own expense and to satisfaction of Departmental Representative.
- .9 Touch-up damaged factory finished surfaces to Departmental Representative's satisfaction. Use touch-up materials to match original. Do not paint over name plates.

1.8 TRANSPORTATION

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

1.9 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 may 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 Amount or Contract Time Extension.

1.10 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.

1.11 CO-ORDINATION

- .1 Ensure cooperation of workers in laying out Work. Maintain efficient and continuous supervision.
- .2 Be responsible for coordination and placement of openings, sleeves and accessories.

1.12 REMEDIAL WORK

- .1 Perform remedial work required to repair or replace parts or portions of Work identified as defective or unacceptable. Coordinate 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.
-

1.13 LOCATION OF FIXTURES

- .1 Consider location of fixtures, outlets, and mechanical and electrical items indicated as approximate.
- .2 Inform Departmental Representative of conflicting installation. Install as directed.

1.14 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.

1.15 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.

1.16 PROTECTION OF WORK IN PROGRESS

- .1 Prevent overloading of any part of building. Do not cut, drill or sleeve any load bearing structural member, unless specifically indicated without written approval of Departmental Representative.

1.17 EXISTING UTILITIES

- .1 When breaking into or connecting to existing services or utilities, execute Work at times directed by local governing authorities, with minimum of disturbance to Work, and/or building occupants.
 - .2 Protect, relocate or maintain existing active services. When services are encountered, cap off in manner approved by authority having jurisdiction. Stake and record location of capped service.
-

Part 2 **PRODUCTS**

2.1 **NOT USED**

.1 Not Used.

Part 3 **EXECUTION**

3.1 **NOT USED**

.1 Not Used.

END OF SECTION

Part 1 GENERAL

1.1 SUBMITTALS

- .1 Submittals: in accordance with Section 01 33 00.
- .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.
 - .5 Work of Owner or separate contractor.
- .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.

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 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.
- .10 Submit proposed materials, finishes and installation method for patching to Departmental Representative for approval, prior to patching.
- .11 Refinish surfaces to match adjacent finishes: Refinish continuous surfaces to nearest intersection. Refinish assemblies by refinishing entire unit.
- .12 Fit Work airtight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.
- .13 Conceal conduit and wiring in floor construction of finished areas except where indicated otherwise.

1.5 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate waste materials for reuse, and recycling in accordance with Section 01 74 20.

Part 2 PRODUCTS

2.1 NOT USED

- .1 Not Used.

Part 3 EXECUTION

3.1 NOT USED

- .1 Not Used.

END OF SECTION

Part 1 GENERAL

1.1 SECTION INCLUDES

- .1 Progressive cleaning.
- .2 Final cleaning.

1.2 PROJECT CLEANLINESS

- .1 Maintain Work in tidy condition, free from accumulation of waste products and debris, other than that caused by Owner or other Contractors.
- .2 Remove waste materials from site at 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 clearly marked separate bins for recycling. Refer to Section 01 74 20.
- .6 Remove waste material and debris from site and deposit in waste container at end of each working day.
- .7 Dispose of waste materials and debris off site.
- .8 Store volatile waste in covered metal containers, and remove from premises at end of each working day.
- .9 Provide adequate ventilation during use of volatile or noxious substances. Use of building ventilation systems is not permitted for this purpose.
- .10 Use only cleaning materials recommended by manufacturer of surface to be cleaned, and as recommended by cleaning material manufacturer.
- .11 Schedule cleaning operations so that resulting dust, debris and other contaminants will not fall on wet, newly painted surfaces nor contaminate building systems.

1.3 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 other than that caused by Owner or other Contractors.
 - .5 Remove waste materials from site at regularly scheduled times or dispose of as directed by Departmental Representative. Do not burn waste materials on site.
 - .6 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.
-

- .7 Clean and polish glass, hardware, stainless steel, chrome, porcelain enamel, baked enamel, plastic laminate, and mechanical and electrical fixtures.
- .8 Remove stains, spots, marks and dirt from electrical and mechanical fixtures, floors.
- .9 HEPA vacuum clean and dust behind grilles, louvres and screens.
- .10 Inspect fitments and equipment and ensure specified workmanship and operation.
- .11 Clean and sweep roofs, gutters, areaways, and sunken wells.
- .12 Sweep and wash clean paved areas.
- .13 Clean equipment and fixtures to a sanitary condition; clean or replace filters of mechanical equipment.
- .14 Clean roofs, downspouts, and drainage systems.
- .15 Remove debris and surplus materials from crawl areas and other accessible concealed spaces.

Part 2 PRODUCTS

2.1 NOT USED

- .1 Not Used.

Part 3 EXECUTION

3.1 NOT USED

- .1 Not Used.

END OF SECTION

Part 1 GENERAL

1.1 CONSTRUCTION & DEMOLITION WASTE

- .1 Carefully deconstruct and source separate materials/equipment and divert, from D&C waste destined for landfill to maximum extent possible. Target for this project is 60% diversion from landfill. Reuse, recycle, compost, anaerobic digest or sell material for reuse except where indicated otherwise. On site sales are not permitted.
- .2 Source separate waste and maintain waste audits in accordance with the Environmental Protection Act, Ontario Regulation 102/94 and Ontario Regulation 103/94.
 - .1 Provide facilities for collection, handling and storage of source separated wastes.
 - .2 Source separate the following waste:
 - .1 Corrugated cardboard.
 - .2 Wood, not including painted or treated wood or laminated wood.
 - .3 Steel.
- .3 Submit a waste reduction workplan indicating the materials and quantities of material that will be recycled and diverted from landfill.
 - .1 Indicate how material being removed from the site will be reused, recycled, composted or anaerobically digested.
- .4 Submit proof that all waste is being disposed of at a licensed land fill site or waste transfer site. A copy of the disposal/waste transfer site's license and a letter verifying that said landfill site will accept the waste must be supplied to Departmental Representative prior to removal of waste from the demolition site.

1.2 WASTE PROCESSING SITES

- .1 Province of: Ontario.
 - .1 Ministry of Environment and Energy, 135 St. Clair Avenue West, Toronto, ON, M4V 1P5.
 - .2 Telephone: 800-565-4923 or 416-323-4321.
 - .3 Fax: 416-323-4682.
- .2 Recycling Council of Ontario: 215 Spadina Avenue, #225, Toronto, ON, M5T 2C7.
 - .1 Telephone: 416-657-2797.
 - .2 Fax: 416-960-8053.
 - .3 Email: rco@rco.on.ca.
 - .4 Internet: <http://www.rco.on.ca/>.

Part 2 PRODUCTS

2.1 NOT USED

- .1 Not Used.

Part 3 EXECUTION

3.1 CANADIAN GOVERNMENTAL DEPARTMENTS CHIEF RESPONSIBILITY FOR THE ENVIRONMENT

.1 Government Chief Responsibility for the Environment.

Province	Address	General	Fax <u>Inquiries</u>
Ontario	Ministry of Environment and Energy 135 St Clair Avenue West Toronto, ON M4V 1P5 Environment Canada Toronto, ON	(416) 323-4321 (800) 565-4923 (416) 734-4494	(416) 323-4682

END OF SECTION

Part 1 GENERAL

1.1 INSPECTION AND DECLARATION

- .1 Contractor's Inspection: Contractor and all Subcontractors shall conduct an inspection of Work, identify deficiencies and defects, and repair as required to conform to Contract Documents.
 - .1 Notify Departmental Representative in writing of satisfactory completion of Contractor's Inspection and that corrections have been made.
 - .2 Request Departmental Representative's Inspection.
- .2 Departmental Representative's Inspection: Departmental Representative and Contractor will perform inspection of Work to identify obvious defects or deficiencies. Contractor to correct Work accordingly.
- .3 Completion: submit written certificate that following have been performed:
 - .1 Work has been completed and inspected for compliance with Contract Documents.
 - .2 Defects have been corrected and deficiencies have been completed.
 - .3 Equipment and systems have been tested, adjusted and balanced and are fully operational.
 - .4 Operation of systems have been demonstrated to Owner's personnel.
 - .5 Work is complete and ready for final inspection.
- .4 Final Inspection: when items noted above are completed, request final inspection of Work by Departmental Representative and Contractor. If Work is deemed incomplete by Departmental Representative, complete outstanding items and request reinspection.

1.2 CLEANING

- .1 In accordance with Section 01 74 11.
- .2 Remove waste and surplus materials, rubbish and construction facilities from the site in accordance with Section 01 74 20.

Part 2 PRODUCTS

2.1 NOT USED

- .1 Not Used.

Part 3 EXECUTION

3.1 NOT USED

- .1 Not Used.

END OF SECTION

Part 1 GENERAL

1.1 SECTION INCLUDES

- .1 As-built, samples, and specifications.
- .2 Product data, materials and finishes, and related information.
- .3 Operation and maintenance data.
- .4 Spare parts, special tools and maintenance materials.
- .5 Warranties and bonds.

1.2 SUBMISSION

- .1 Prepare instructions and data using personnel experienced in maintenance and operation of described products.
- .2 Copy will be returned after final inspection, with Departmental Representative's comments.
- .3 Revise content of documents as required prior to final submittal.
- .4 Two weeks prior to Substantial Performance of the Work, submit to the Departmental Representative, four final copies of maintenance manuals and commissioning documentation in English.
- .5 Ensure spare parts, maintenance materials and special tools provided are new, undamaged or defective, and of same quality and manufacture as products provided in Work.
- .6 If requested, furnish evidence as to type, source and quality of products provided.
- .7 Defective products will be rejected, regardless of previous inspections. Replace products at own expense.
- .8 Pay costs of transportation.

1.3 FORMAT

- .1 Organize data in the form of an instructional manual.
 - .2 Binders: vinyl, hard covered, 3 'D' ring, loose leaf 219 x 279 mm with spine and face pockets.
 - .3 When multiple binders are used, correlate data into related consistent groupings. Identify contents of each binder on spine.
 - .4 Cover: Identify each binder with type or printed title 'Project Record Documents'; list title of project and identify subject matter of contents.
 - .5 Arrange content by systems, under Section numbers and sequence of Table of Contents.
 - .6 Provide tabbed fly leaf for each separate product and system, with typed description of product.
 - .7 Text: Manufacturer's printed data, or typewritten data.
-

.8 Drawings: provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.

.9 Provide 1:1 scaled CAD files in dwg format on CD

1.4 CONTENTS - EACH VOLUME

.1 Table of Contents: provide title of project;

.2 Date of submission; names,

.3 Addresses, and telephone numbers of Contractor with name of responsible parties;

.4 Schedule of products and systems, indexed to content of volume.

.5 For each product or system:

.1 List names, addresses and telephone numbers of subcontractors and suppliers, including local source of supplies and replacement parts.

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

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

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

1.5 AS-BUILTS AND SAMPLES

.1 In addition to requirements in General Conditions, maintain at the site for Departmental Representative one record copy of:

.1 Contract Drawings.

.2 Specifications.

.3 Amendments and addenda.

.4 Change Orders and other modifications to the 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. 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. Label each document "PROJECT RECORD" in neat, large, printed letters.

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

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

- .6 Turn one set, paper copy and electronic copy, of AS-BUILT drawings and specifications over to Departmental Representative on completion of work. Submit files on USB compatible with PWGSC encryption requirements or through email or alternate electronic file sharing service such as ftp, as directed by Departmental Representative.
- .7 If project is completed without significant deviations from Contract drawings and specifications submit to Departmental Representative one set of drawings and specifications marked "AS-BUILT".

1.6 RECORDING ACTUAL SITE CONDITIONS

- .1 Record information on set of black line opaque drawings, and in copy of Project Manual, provided by Departmental Representative.
- .2 Provide felt tip marking pens, maintaining separate colours for each major system, for recording information.
- .3 Record information concurrently with construction progress. Do not conceal Work until required information is recorded.
- .4 Contract Drawings and shop drawings: legibly mark each item to record actual construction, including:
 - .1 Measured locations of internal utilities and appurtenances, referenced to visible and accessible features of construction.
 - .2 Field changes of dimension and detail.
 - .3 Changes made by change orders.
 - .4 Details not on original Contract Drawings.
 - .5 References to related shop drawings and modifications.
- .5 Specifications: legibly 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 Amendments and change orders.
- .6 Other Documents: maintain manufacturer's certifications, inspection certifications, field test records, required by individual specifications sections.

1.7 MATERIALS AND FINISHES

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

1.8 MAINTENANCE MATERIALS

- .1 Provide maintenance and extra materials, in quantities specified in individual specification sections.
- .2 Provide items of same manufacture and quality as items in Work.
- .3 Deliver to location as directed; place and store.
- .4 Receive and catalogue all items. Submit inventory listing to Departmental Representative. Include approved listings in Maintenance Manual.
- .5 Obtain receipt for delivered products and submit prior to final payment.

1.9 STORAGE, HANDLING AND PROTECTION

- .1 Store spare parts, maintenance materials, and special tools in manner to prevent damage or deterioration.
- .2 Store in original and undamaged condition with manufacturer's seal and labels intact.
- .3 Store components subject to damage from weather in weatherproof enclosures.
- .4 Store paints and freezable materials in a heated and ventilated room.
- .5 Remove and replace damaged products at own expense and to satisfaction of Departmental Representative.

1.10 WARRANTIES AND BONDS

- .1 Separate each warranty or bond with index tab sheets keyed to Table of Contents listing.
- .2 List subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal.
- .3 Obtain warranties and bonds, executed in duplicate by subcontractors, suppliers, and manufacturers, within ten days after completion of the applicable item of work.
- .4 Except for items put into use with Departmental Representative's permission, leave date of beginning of time of warranty until the Date of Certificate of Substantial Performance is determined.
- .5 Verify that documents are in proper form, contain full information, and are notarized.
- .6 Co-execute submittals when required.
- .7 Retain warranties and bonds until time specified for submittal.

Part 2 PRODUCTS

2.1 NOT USED

- .1 Not Used.
-

Part 3 EXECUTION

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 GENERAL

1.1 SUMMARY

- .1 Acronyms:
 - .1 BMM - Building Management Manual.
 - .2 Cx - Commissioning.
 - .3 HVAC - Heating, Ventilation and Air Conditioning.
 - .4 PI - Product Information.
 - .5 PV - Performance Verification.
 - .6 TAB - Testing, Adjusting and Balancing.
 - .7 WHMIS - Workplace Hazardous Materials Information System.

1.2 GENERAL REQUIREMENTS

- .1 Standard letter size paper 216 mm x 279 mm.
- .2 Methodology used to facilitate updating.
- .3 Drawings, diagrams and schematics to be professionally developed.
- .4 Electronic copy of data to be in a format accepted and approved by Departmental Representative.

1.3 APPROVALS

- .1 Prior to commencement, co-ordinate requirements for preparation, submission and approval with Departmental Representative.

1.4 CONTENTS OF OPERATING AND MAINTENANCE MANUAL

- .1 For detailed requirements refer to Section 01 78 00.
 - .2 Departmental Representative to review and approve format and organization within 3 weeks of award of contract.
 - .3 Include original manufactures brochures and written information on products and equipment installed on this project.
 - .4 Include completed PI report forms, data and information from other sources as required.
 - .5 Inventory directory relating to information on installed systems, equipment and components.
 - .6 Approved project shop-drawings, product and maintenance data.
 - .7 Manufacturer's data and recommendations relating: manufacturing process, installation, O&M and training materials.
 - .8 Inventory and location of spare parts, special tools and maintenance materials.
 - .9 Warranty information.
-

- .10 Maintenance program supporting information including:
 - .1 Recommended maintenance procedures and schedule.

1.5 LIFE SAFETY COMPLIANCE (LSC) MANUAL

- .1 Samples of LSC Manual will be available from Departmental Representative.
- .2 Content of Manual:
 - .1 All possible Emergency situations modes including: presence of fire and smoke, power failure, lose of water or pressure, chemical spills and refrigerant release.
 - .2 Failure of elevators and escalators.
 - .3 HVAC emergencies and fuel supply failures.
 - .4 Intrusion and security breach.
 - .5 Emergency provisions for natural disasters, bomb threats and other disruptive situations.
 - .6 Dedicated emergency generators for high security projects, medical facilities and computer systems.
 - .7 Emergency control procedures for fire, power and major equipment failure.
 - .8 Emergency contacts and numbers.
 - .9 Manual to be readily available and comprehensible to non-technical readers.

1.6 SUPPORTING DOCUMENTATION FOR INSERTION INTO SUPPORTING APPENDICES

- .1 Provide Departmental Representative supporting documentation relating to installed equipment and system, including:
 - .1 General:
 - .1 Finalized commissioning plan.
 - .2 WHMIS information manual.
 - .3 Approved "as-built" drawings and specifications.
 - .4 Procedures used during commissioning.
 - .5 Cross-Reference to specification sections.
 - .2 Architectural and structural:
 - .1 Inspection certificates, construction permits.
 - .2 PV reports.
 - .3 Fire prevention, suppression and protection:
 - .1 Test reports.
 - .2 Smoke test reports.
 - .3 PV reports.

1.7 USE OF CURRENT TECHNOLOGY

- .1 Use current technology for production of documentation. Emphasis on ease of accessibility at all times, maintain in up-to-date state, compatibility with user's requirements.
- .2 Obtain Departmental Representative's approval before starting Work.

Part 2 PRODUCTS

2.1 NOT USED

- .1 Not used.

Part 3 EXECUTION

3.1 NOT USED

- .1 Not used.

END OF SECTION

Part 1 GENERAL

1.1 REFERENCES

- .1 CSA International
 - .1 CSA S350-M1980 (R2003), Code of Practice for Safety in Demolition of Structures.
- .2 U.S. Environmental Protection Agency (EPA)/Office of Water
 - .1 EPA 832/R-92-005, Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices.

1.2 ADMINISTRATIVE REQUIREMENTS

- .1 Pre-Demolition Meeting: Conduct a pre-demolition meeting at Project site in accordance with requirements listed in Section 01 31 19, to confirm extent of demolished materials; and to review Contractor's demolition plan and the following:
 - .1 Confirm substrate condition and requirements to maintain warranty conditions for roofing membranes and lightweight insulating concrete system applied on structural deck.
 - .2 Departmental Representative will complete the minutes and prepare a report for this meeting
- .2 Coordination:
 - .1 Minimize disruptions to regular building activities. Noisy Work to be performed outside of regular office/operating hours. Arrange work sequence and coordinate timing with the Department Representative.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 and 01 74 20.
 - .2 Submit demolition drawings:
 - .1 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:
-

- .3 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 Departmental Representative's ongoing operations.
- .4 Landfill Records: Indicate receipt and acceptance of wastes by a licensed landfill facility.

1.4 SITE CONDITIONS

- .1 Protection.
 - .1 Prevent movement, settlement or damage of adjacent structures, services, walks, paving, trees, landscaping, and adjacent grades. Repair damage caused by deconstruction as directed by Departmental Representative.
 - .2 Prevent debris from blocking surface drainage system, walks, paving, adjacent grades, mechanical and electrical systems.
- .2 Notify Departmental Representative before disrupting building access or services.

Part 2 PRODUCTS

2.1 NOT USED

- .1 Not used.

Part 3 EXECUTION

3.1 EXAMINATION

- .1 Inspect building with Departmental Representative and verify extent and location of items designated for removal, disposal, alternative disposal, recycling, salvage and items to remain.
- .2 Locate and protect utilities. Preserve active utilities traversing site in operating condition.
- .3 Notify and obtain approval of utility companies before starting demolition.
- .4 Disconnect, cap, plug or divert, as required, existing public utilities within the property where they interfere with the execution of the work, in conformity with the requirements of the authorities having jurisdiction. Mark the location of these and previously capped or plugged services on the site and indicate location (horizontal and vertical) on the record drawings. Support, shore up and maintain pipes and conduits encountered.
 - .1 Immediately notify Departmental Representative and utility company concerned in case of damage to any utility or service, designated to remain in place.
 - .2 Immediately notify the Departmental Representative should uncharted utility or service be encountered, and await instruction in writing regarding remedial action.

3.2 PROTECTION

- .1 Building Protection: Provide tarps and hoarding as required to protect existing building finishes and assemblies from work of this Section; clean any spills and repair any damaged materials resulting from work of this Section.
- .2 Penetration Protection: Provide suitable protection during preparation and installation of new roofing penetrations to prevent water or weather from entering interior spaces:
 - .1 Lap protective coverings over existing roofing to prevent water ingress
 - .2 Secure protective coverings against wind blow-off
 - .3 Leave protective covering in place for duration of the work
- .3 Prevent movement, settlement, or damage to adjacent structures, utilities, and parts of building to remain in place. Provide bracing and shoring required.
- .4 Keep noise, dust, and inconvenience to occupants to minimum.
- .5 Protect building systems, services and equipment.
- .6 Provide temporary dust screens, covers, railings, supports and other protection as required.

3.3 PREPARATION

- .1 Prior to the removal of any roof components, cover or plug existing openings include drains, vents, air intakes, and roof components to prevent debris or contaminate from entering the building. Remove covering at the end of each working day and reinstall prior to the next day's start up.
 - .2 Disconnect electrical services and mechanical equipment as required.
 - .3 Ensure that projections and equipment are secured to the decking where applicable. If any inadequate securement is found, inform the Department Representative and work around that area is to be halted until the situation has been rectified.
 - .4 Responsible for disconnecting rooftop equipment in consultation with the Department Representative unless otherwise specified in this document.
-

3.4 SELECTIVE DEMOLITION PROCEDURES FOR ROOFING

- .1 Roofing: Remove existing roof system including membranes, insulation, flashings and associated debris to expose the structural decking:
 - .1 Remove existing roofing system down to substrate.
 - .2 Clean and prepare surfaces ready for new materials
- .2 Remove unused and abandoned pitch pockets, vents, curbs, sleepers, and projections from the designated removal areas. Obtain verification and authorization from the Department Representative before removing any suspected unused or abandoned services or projections.
- .3 Dispose of existing roof ballast, projections and perimeter flashings, roof membrane, and membrane flashings, insulation, vapour retarder, and appurtenances at designated removal area.
- .4 Once the existing roofing systems are removed, ensure that a review the existing concrete deck is undertaken by the Contractor, Roofing Inspector and the Departmental Representative.
 - .1 Report on the existing concrete deck in accordance with Section 01 32 00.

3.5 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 11.
 - .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.
- .3 Refer to demolition drawings and specifications for items to be salvaged for reuse.
- .4 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 20.
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

END OF SECTION

Part 1 GENERAL

1.1 SUMMARY

- .1 This section includes for the supply, placement and quality control testing of lightweight insulating concrete and;

.1 Insulation sumps and membrane underlayment.

1.2 RELATED REQUIREMENTS

- .1 Section 07 52 00 – Modified Bituminous Membrane Roofing.

1.3 REFERENCE STANDARDS

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

.1 ASTM C94/C94M-16, Standard Specification for Ready-Mixed Concrete.

.2 ASTM C150/C150M-16, Standard Specification for Portland Cement.

.3 ASTM C332-09, Standard Specification for Lightweight Aggregates for Insulating Concrete.

.4 ASTM C495/C495M-12, Standard Test Method for Compressive Strength of Lightweight Insulating Concrete.

.5 ASTM C578-15b, Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation.

.6 ASTM C726-12, Standard Specification for Mineral Fiber Roof Insulation Board.

.7 ASTM 1177/C1177M-13, Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing

- .2 Canadian Standards Association (CSA):

.1 CSA A23.1/A23.2-14, Concrete Materials and Methods of Concrete Construction / Test methods and standard practices for concrete.

.2 CAN/ULC-S702-14, Thermal Insulation, Mineral Fibre, for Buildings.

1.4 ADMINISTRATIVE REQUIREMENTS

- .1 Pre-installation Conference: Conduct conference at Project site to comply with requirements in Section 01 31 19; meeting will address following items: to verify project requirements, structural substrate conditions, and coordination with other sections of the Work, manufacturer's installation instructions and manufacturer's warranty requirements.

.1 Coordinate the meeting to coincide with the pre-installation meeting requirements in Section 07 52 00.

.2 Confirm coordination and installation requirements of roofing membranes, requirements for maintaining warranty conditions for membranes during installation.

.3 Roofing inspector will complete the minutes and prepare a report for this meeting

- .2 Coordination:
 - .1 Minimize disruptions to regular building activities. Noisy Work to be performed outside of regular office/operating hours. Arrange special access and coordinate timing with the Departmental Representative.
- .3 Site Access and Staging Area: Arrange location and extent for construction staging are with the Departmental Representative and as indicated on Drawing.

1.5 SUBMITTALS

- .1 Make submittals in accordance with Section 01 33 00.
 - .2 Action Submittals: Provide the following submittals before starting any work of this Section:
 - .1 Product Data:
 - .1 Submit product data for each type of product specified, and manufacturer's recommended guidelines for achieving specified floor flatness and levelness tolerances, and repair methods for out-of-tolerance materials.
 - .2 Shop Drawings:
 - .1 Provide layout for expanded polystyrene insulation in a stair-step design and maintain a 1% slope as indicated on drawings.
 - .2 Provide layout of insulation sumps to maintain a minimum 1% slope.
 - .3 Provide calculation of lightweight insulating concrete average and minimum RSI-values.
 - .3 Informational Submittals: Provide the following submittals when requested by the Department Representative:
 - .1 Certificates:
 - .1 Submit confirmation that concrete mix design delivered to site is in accordance with mix design provided by the acceptable materials manufacturer.
 - .2 Submit confirmation that the proposed lightweight insulating concrete system confirming that the expanded polystyrene used as a component in the lightweight insulating concrete system is to be furnished by the supplier of the proposed lightweight insulating concrete system.
 - .3 Submit confirmation that the expanded polystyrene used as a component in the lightweight insulating concrete system approved by Factory Mutual forming the substrate for the roofing membrane system specified in Section 07 52 00.
 - .1 Submit confirmation that the proposed lightweight insulating concrete is compatible with roofing materials in accordance with Section 07 52 00.
 - .4 Submit confirmation that the proposed lightweight insulating concrete with conjunction of the roofing material specified in Section 07 52 00 archived an average of RSI-value of 6.33 and RSI-value of 3.52 at the roof lowest point.
-

- .5 Submit documentation confirming compliance with FM Global 1-60 Windstorm Resistance Classification utilizing the roof membrane system specified under Section 07 52 00.
- .2 Site Quality Control Submittals: Submit on-site slurry density test results indicating as delivered and as installed conditions confirming that mix is in accordance with manufacturer's slurry density adjustment chart.
- .3 Manufacturer's field report: in accordance with Section 01 45 00.
- .4 Reports: indicate procedures followed, ambient temperatures and weather conditions during application.

1.6 QUALITY ASSURANCE

- .1 Qualifications: Provide proof of qualifications when requested by the Department Representative:
 - .1 Manufacturer: A firm experienced in manufacturing ready mixed lightweight concrete products and that complies with ASTM C94/C94M requirements for production facilities and equipment.
 - .2 Source Limitations: Obtain each type of cement of the same brand from the same manufacturer's plant and obtain admixtures through one source from a single manufacturer.
 - .3 Installer: Expansion of the slurry into lightweight concrete shall be conducted only by manufacturer's qualified personnel, or by persons trained and qualified by the manufacturer, using equipment provided by the manufacturer.

1.7 FIELD CONDITIONS

- .1 Environmental Requirements:
 - .1 Precipitation: Apply when no precipitation during application. Ensure materials and building interiors are protected from moisture damage and contamination.
- .2 Ambient Conditions
 - .1 Install lightweight insulating concrete in accordance with manufacturer's restrictions and coordinate with Section 07 52 00 roofing membrane restrictions.

Part 2 PRODUCTS

2.1 PERFORMANCE CRITERIA:

- .1 Provide a lightweight insulated concrete system that forms a part of a tested roofing assembly and resists corner, perimeter and field-of-roof uplift pressures specified in Section 07 52 00.
 - .2 Compatibility: Verify that lightweight insulated concrete materials are provided by the same manufacturer or are compatible with one another when provided by different manufacturers.
-

- .3 Compatibility between lightweight insulated concrete system and the roofing system is essential. Provide written declaration to Departmental Representative stating that lightweight insulated concrete system is compatible with roofing materials and components specified in Section 07 52 00.
- .4 Thermal Performance: Provide a lightweight insulated concrete system to provide an average RSI-value of 6.33 and a minimum RSI-value of 3.5.

2.2 MATERIALS

- .1 Portland Cement: In accordance with ASTM C150, Type I, II, or III.
- .2 Water: In accordance with CSA A23.1/A23.2, and meeting the manufacturers requirements; water of questionable quality may be permitted where tests results are submitted showing 28 day compressive strength is minimum 90% of those made with a known acceptable water and an identical material mix.
- .3 Expand Polystyrene (EPS) Insulation Board:
 - .1 Minimum 16 kg/m^3 in accordance with ASTM C578 Type 1.
 - .2 Thickness in accordance with reviewed shop drawings and with minimum RSI-value per 25mm of 0.68.
 - .3 Have bond holes approximately 3% of the board area.
- .4 Rigid Mineral Wool Insulation Board: Meeting the requirements of CAN/ULC-S702 and ASTM C726 and;
 - .1 Density: Minimum 48 kg/m^3 .
 - .2 Thermal Resistance: Minimum RSI-value per 25 mm of 0.77.

2.3 AGGREGATE TYPE LIGHTWEIGHT INSULATING CONCRETE

- .1 General:
 - .1 Consist of a slurry of Portland cement, water and vermiculite aggregate.
 - .2 Tested in accordance with ASTM C495.
 - .3 Density:
 - .1 Compressive strength: 2068 kPa.
- .2 Aggregate: Vermiculite concrete aggregate in accordance with ASTM C332, and with volume ratio of 1:3.5.
- .3 Concrete Mix Design:
 - .1 Wet density: 960 to 1089 kg/m^3 .
 - .2 Dry density: Minimum 561 kg/m^3

2.4 INSULATION SUMPS

- .1 Insulation Sumps: 2.4 m x 2.4 m premanufactured insulation sump with a minimum 1% slope and 610 mm x 610 mm central flat with membrane underlayment board. Sump thicknesses to meet minimum average RSI-values indicated in 2.1 above.
 - .1 Manufactured of rigid mineral wool board insulation.
 - .2 Thickness in accordance with reviewed shop drawings.
 - .3 Membrane Underlayment: Glass mat faced gypsum board or high performance mineral fibre cover-board, meeting the requirements of ASTM - C1177, having a non-combustible core, primed ready for mopped application of SBS base sheets;
 - .1 Thickness: 13 mm.
 - .2 Surfacing: Fiberglass mat with non-asphaltic coating.
 - .4 Insulation and membrane underlayment adhesive: Low rise polyurethane adhesive.

Part 3 EXECUTION

3.1 EXAMINATION

- .1 Inspect existing conditions and substrates upon which work of this section is dependent. Report to the Department Representative in writing any defects or discrepancies. Commencement of work implies acceptance of existing conditions and assuming full responsibility for the finished condition of the work.
- .2 Defective work resulting from application to unsatisfactory conditions will be considered the responsibility of those performing the work of this section.

3.2 PREPARATION

- .1 Ensure existing site condition are in satisfactory condition for commencement of the work in this section.
- .2 Examine work for defects and discrepancies and report to the Departmental Representative in writing. Do not proceed work until surfaces are satisfactory.
- .3 Verify that surface onto which lightweight concrete is being placed is free of standing water, oil or other deleterious material that could affect bond or performance or the material.
- .4 Coordinate demolition work in accordance with Section 02 41 99.

3.3 PLACING

- .1 Place a minimum 3 mm thick insulating concrete slurry coat over the top of prepared substrate.
 - .2 Trowel the slurry around projections wider or longer than 25mm to form a drainage cricket or saddle.
 - .3 The slurry top coat is to be allowed to dry completely to attain a minimum fastener pullout resistance of 275 kPa prior to the venting base sheet. Manufacturer technical representative required to be present during pull-strength tests.
-

- .4 Place the thickness of expanded polystyrene insulation panels shown in the reviewed shop drawings prior applying insulating concrete slurry coat to the substrate.
- .5 Insulation sumps installation:
 - .1 Install wood block frame of appropriate height centered on each existing drain location to accommodate a 2.4 x 2.4 m tapered insulation drainage sump.
 - .2 Adhere the insulation sump to the vapour retarder using adhesive to meet requirements of FM Global Windstorm Resistance Classification specified in Section 07 52 00.
 - .3 Adhere membrane underlayment to adhesive to meet requirements of FM Global Windstorm Resistance Classification specified in Section 07 52 00.
- .6 The maximum allowable panel step in a stair-step design is 25 mm. Fill the holes in the expanded polystyrene insulation panels and place a 25 mm minimum thickness of insulating concrete over top of the expanded polystyrene insulation panels within the same day's application.
- .7 Install ready-mix insulating concrete with manufacturer approved equipment and pump into place. Install in accordance with manufacturer's instruction.
 - .1 Install the lightweight insulating concrete to provide the average and minimum RSI-values indicated in 2.1 above with a minimum 1% slope to drain.
- .8 Prior to the application of the roof membrane system, scrape any ridges, trowel markings or other protrusions, and fill any voids as required to create a smooth surface for the membrane.

3.4 CURING

- .1 Prevent roof-top traffic from newly placed lightweight concrete until material has attained sufficient strength to withstand the loads with no damage, using suitable warning signs and barricades.
- .2 Cure concrete at a temperature of 10°C minimum until sufficient strength has been attained to prevent damage by subsequent temperature effects as directed by the acceptable material manufacturer.
- .3 Moist cure concrete by covering or periodically dampened concrete after initial setting to prevent premature drying arising from exposure to direct sunlight, wind or other causes of rapid drying.
- .4 Do not allow rain (moisture) entering the concrete after cast and finish.

3.5 LIMITATION

- .1 Do not leave exposed for longer than 5 days after installation.

3.6 SITE QUALITY CONTROL

- .1 Concrete production shall conform to the requirements of the manufacturer's mix design.
 - .2 Require site attendance of lightweight concrete materials manufacturer's representative during installation of Work.
 - .1 Submit Manufacturer's field reports.
-

- .3 Production quality control testing shall be provided by the material manufacturer and shall be conducted by a person trained and certified by the manufacturer as follows:
 - .1 Density: Measured and recorded once for every 10m³, or once per 20 minutes for continuous production, whichever is more frequent; maintain density to within ±5% of the design density.
- .4 Inspections:
 - .1 Inspection and testing of lightweight insulated concrete application Inspection and testing of roofing application will be carried out by testing laboratory designated by Departmental Representative as follows:
 - .1 Random samples the top placement of insulating concrete to verify the thickness and density, and to secure and test compressive strength cylinder in accordance with ASTM C495.
 - .2 Random verification of insulation board securement and layout as well as insulating concrete thickness.
 - .3 Review of installation procedures for conformance with the requirements of roof membrane and roofing system specified Section 07 52 00.
 - .4 Repair or replace insulated concrete system as directed by the Departmental Representative.

3.7 PATCHING

- .1 Perform patching and repairing of lightweight insulating concrete using manufacturer's recommended materials to meet the requirements of roof membrane and roofing system specified Section 07 52 00 as directed by the Departmental Representative.

3.8 CLEANING

- .1 Clean up accidental spills immediately and restore the affected areas to original condition at no cost to the Department Representative.

END OF SECTION

Part 1 GENERAL

1.1 REFERENCES

- .1 American Wood Protection Association (AWPA):
 - .1 AWPA P5-15, Standard for Waterborne Preservatives.
- .2 CSA International
 - .1 CAN/CSA-O80 Series-15, Wood Preservation, Includes Update No. 1 (2008).
 - .2 CSA B111-1974(R2003), Wire Nails, Spikes and Staples.
 - .3 CSA O112-M Series 1977(R2006), Standards for Wood Adhesives.
 - .4 CSA O121-08 (R2013), Douglas Fir Plywood.
 - .5 CSA O141-05 (R2014), Softwood Lumber.
- .3 National Lumber Grades Authority (NLGA)
 - .1 Standard Grading Rules for Canadian Lumber 2014.

1.2 QUALITY ASSURANCE

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

1.3 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 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 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 as specified in Waste Reduction Workplan in accordance with Section 01 74 20.

Part 2 PRODUCTS

2.1 MATERIALS

- .1 Lumber: softwood, S4S, moisture content S-DRY graded and stamped in accordance with following standards:
 - .1 CSA O141.
 - .2 NLGA Standard Grading Rules for Canadian Lumber.
-

- .2 Preservative treated plywood: Douglas Fir to CSA O121, G1S good one side, pressure treated with CCA to CAN/CSA-O80.9, minimum retention 4.0 kg/m³ by assay.
 - .1 Preservative: chromated copper arsenate (CCA) to AWPA P5 as amended by CAN/CSA-O80-Series.
- .3 Furring, blocking, nailing strips, strapping, grounds, rough bucks, bracing, bridging, curbs, fascia backing and sleepers: NLGA spruce, pine or fir (SPF), 121c. and pine, 113d.

2.2 ACCESSORIES

- .1 Sealants: in accordance with Section 07 92 00.
- .2 General purpose adhesive: to CSA O112 Series.
- .3 Nails, spikes and staples: to CSA B111.
- .4 Bolts: 12.5 mm diameter unless indicated otherwise, complete with nuts and washers.
- .5 Proprietary fasteners: toggle bolts, expansion shields and lag bolts, screws and lead or inorganic fibre plugs, recommended for purpose by manufacturer.

Part 3 EXECUTION

3.1 EXAMINATION

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

3.2 PREPARATION

- .1 Treat surfaces of material with wood preservative, before installation.
- .2 Apply preservative by dipping, or by brush to completely saturate and maintain wet film on surface for minimum 3 minute soak on lumber.
- .3 Re-treat surfaces exposed by cutting, trimming or boring with liberal brush application of preservative before installation.
- .4 Treat material as follows:
 - .1 Wood cants, fascia backing, curbs, nailers, sleepers on roof deck.

3.3 INSTALLATION

- .1 Apply wood preservative to wood in contact with roofing.
 - .2 Treat surfaces of pressure treated wood which are cut or bored after pressure treatment with field applied wood preservative.
-

- .3 Install members true to line, levels and elevations, square and plumb to a tolerance of 1:600 and rigidly secure in place.
- .4 Install wood blocking to ensure that curbs and sleepers for HVAC and mechanical equipment are level.
- .5 Wood blocking and plywood are considered part of the roof, made watertight by the end of each working day to eliminate moisture infiltration into the roof system.
- .6 Install furring and blocking as required to space-out and other work as required.
- .7 Install sleepers as indicated.
- .8 Countersink bolts where necessary to provide clearance for other work.
- .9 Secure exterior work with galvanized or non-ferrous fasteners.
- .10 Apply continuous bead of sealant at junction between roof deck and abutting parapet wall.

3.4 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 11.
 - .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.
- .3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 20.
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

END OF SECTION

Part 1 GENERAL

1.1 RELATED REQUIREMENTS

- .1 Section 03 52 16 – Lightweight Insulation Concrete: Lightweight insulating concrete forming the substrate for roof membrane specified in Section 07 52 00.
- .2 Section 06 10 00 –Rough Carpentry: Wood blocking and curbs required for roof construction.
- .3 Section 07 62 00 – Sheet Metal Flashing and Trim.
- .4 Section 07 71 00 – Roofing Specialties: Prefabricated roof penetrations.

1.2 REFERENCES

- .1 ASTM International Inc.
 - .1 ASTM D4601/D4601M -04 (2012)e1, Standard Specification for Asphalt-Coated Glass Fiber Base Sheet Used in Roofing.
 - .2 ASTM D5147/D5147M-14, Standard Test Methods for Sampling and Testing Modified Bituminous Sheet Material.
 - .3 ASTM C726-12, Standard Specification for Mineral Fiber Roof Insulation Board.
- .2 Canadian General Standards Board (CGSB)
 - .1 CGSB 37-GP-9Ma-83, Primer, Asphalt, Unfilled, for Asphalt Roofing, Dampproofing and Waterproofing.
 - .2 CGSB 37-GP-56M-80(1985), Membrane, Modified, Bituminous, Prefabricated, and Reinforced for Roofing.
- .3 Canadian Roofing Contractors Association (CRCA)
 - .1 CRCA Roofing Specifications Manual-2011.
- .4 Canadian Standards Association (CSA International)
 - .1 CAN/CSA-A123.4-04(R2013), Asphalt for Constructing Built-Up Roof Coverings and Waterproofing Systems.
 - .2 CSA O121-08(R2013), Douglas Fir Plywood.
 - .3 CSA O151-09(R2013), Canadian Softwood Plywood.
 - .4 CAN/ULC-S702-14, Thermal Insulation, Mineral Fibre, for Buildings.
- .5 Factory Mutual Global (FM):
 - .1 FM 4454 Approval Standard for Lightweight Insulating Concrete Roof Deck.
 - .2 FM 4470 Approval Standard for Class 1 Roof Covers.
 - .3 Property Loss Prevention Data Sheets:
 - .1 1-28 Design Wind Loads and 1-28R Roof Systems
 - .2 1-29 Roof Deck Securement and Above Deck Roof Components and 1-29R Roof Systems

- .3 1-49, Perimeter Flashing
- .6 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
 - .1 Material Safety Data Sheets (MSDS).
- .7 Underwriters Laboratories' of Canada (ULC)
 - .1 CAN/ULC S107-10, Standard Methods of Fire Tests of Roof Coverings

1.3 ADMINISTRATIVE REQUIREMENTS

- .1 Convene pre-installation meeting 3 weeks prior to beginning roofing Work, with roofing contractor's representative, Contractor, roofing inspector and Departmental Representative in accordance with Section 01 31 19.
 - .1 Coordinate the meeting to coincide with the pre-installation conference in Section 03 52 16.
 - .2 The purpose of this meeting is to review installation conditions particular to this project and review materials specified in this section.
 - .3 Agenda to cover but not limited to the following:
 - .1 Verify project requirements.
 - .2 Review installation and substrate conditions.
 - .3 Co-ordination with other Sections including Section 03 52 16.
 - .4 Review manufacturer's installation instructions and warranty requirements.
 - .4 The Roofing inspector will complete the minutes and prepare a report for this meeting.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 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.
 - .2 Provide two copies of WHMIS MSDS, and indicate VOC content for:
 - .1 Asphalt.
- .3 Shop drawings:
 - .1 Submit membrane manufacturer's standard details that will be used for this project, indicate changes that must be made to make the details project specific for review by the Departmental Representative.
 - .2 Provide calculation of roofing material with conjunction lightweight insulating concrete of the specified in Section 03 52 16 and archived an average of RSI-value of 6.34 and a minimum RSI – value of 3.5.

- .4 Informational Submittals: Submit the following submittals to the Departmental Representative:
 - .1 Provide a wind uplift pressure calculations established by the Building Code using Building Code 1/50 year wind pressures for location of installation.
 - .2 Certificates:
 - .1 Submit confirmation that roofing materials is compatible with lightweight insulating concrete in accordance with Section 03 52 16.
 - .2 Manufacturer's Certificate: certify that products meet or exceed specified requirements.
 - .3 Test and Evaluation Reports: submit laboratory test reports certifying compliance of bitumen membrane with specification requirements.
 - .4 Manufacturer's Installation Instructions: indicate special precautions required for seaming the membrane.
 - .5 Manufacturer's field report: in accordance with Section 01 45 00.
 - .6 Reports: indicate procedures followed, ambient temperatures and wind velocity during application.

1.5 QUALITY ASSURANCE

- .1 Regulatory Requirements: Perform roofing and sheet metal work in accordance with the roofing manufacturer's written recommendations using materials that meet the requirements of CAN/ULC - S107 Class C fire resistance rating and wind uplift loads calculated in accordance with Section 4.1.7 of the Building Code; submit proof that roofing materials meet required performance to the Departmental Representative.
- .2 Installation Requirements: FM Global listing below is used as a guide document only, roofing system is not required to meet FM Global approval requirements, as follows:
 - .1 Install roofing system in accordance with requirements of FM Global 1-60 Windstorm Resistance Classification; submit proof that roofing system installation meets or exceeds these minimum requirements.
- .3 Installer qualification: Maintain a full time experienced journeyman roofer, with 5 years documented experience and at least one apprentice per crew on the Work at all times and as follows:
 - .1 The roofing Subcontractor and his sub-subcontractors must have "Approved Contractor" status by the roofing product manufacturer. Only skilled and certified trade persons, officially employed by a roofing Subcontractor operating adequate and necessary equipment, must be authorized to perform all roofing work.
 - .2 Crew members using torches must be trained under a recognized training program and certified from the manufacturer of materials being installed. Only competent, qualified tradesmen, using adequate plant and equipment, must execute the Work of this Section.

1.6 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.
- .3 Size 9 kg on roof per torch applicator, within 6 m of torch applicator.
- .2 Maintain fire watch for 1 hour after each day's roofing operations cease.

1.7 DELIVERY, STORAGE, AND HANDLING

- .1 Deliver, store and handle materials in accordance with manufacturer's written instructions and Section 01 61 00.
- .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 membrane in upright position 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 not less than + 5 degrees C.
- .3 Packaging Waste Management:
 - .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 20.
 - .2 Remove from site and dispose of packaging materials at appropriate recycling facilities.
 - .3 Collect and separate for disposal paper, plastic, polystyrene, corrugated cardboard, packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.
 - .4 Place materials defined as hazardous or toxic in designated containers.
 - .5 Handle and dispose of hazardous materials in accordance with the CEPA, TDGA, Regional and Municipal regulations.
 - .6 Unused sealant material must not be disposed of into sewer system, into streams, lakes, onto ground or in other location where it will pose health or environmental hazard.
 - .7 Divert unused joint sealing material from landfill to official hazardous material collections site approved by Departmental Representative.
 - .8 Empty plastic joint sealer containers are not recyclable. Do not dispose of empty containers with plastic materials destined for recycling.
 - .9 Fold up metal banding, flatten, and place in designated area for recycling.

1.8 FIELD CONDITIONS

- .1 Ambient Conditions
 - .1 Do not install roofing when temperature remains below -18°C for torch 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.

Part 2 PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- .1 Provide Products that are compatible with one another under site conditions, as demonstrated by roofing manufacturer.
- .2 Compatibility between components of roofing system and substrate is essential. Provide written declaration to Departmental Representative stating that roofing materials and components, as assembled in system are compatible with the lightweight insulated concrete system specified in Section 03 53 16.
- .3 Provide a prefabricated membrane in accordance with CAN/CGSB 37-GP-56M.
- .4 Provide a vapour retarder membrane that possesses waterproofing capability that with only the modified bitumen vapour retarder in place, can waterproof the building for prolonged periods of time without detriment to the watertight integrity of the entire roof system.
- .5 Provide a membrane roofing system that resists corner, perimeter and field-of-roof uplift pressure criteria established by the Building Code using Building Code 1/50 year wind pressures for location of installation and;
 - .1 Install roofing system in accordance with requirements of FM Global Windstorm Resistance Classification standard using factored uplift pressures from procedure in 2.1.4 above.
- .6 Provide watertight roofing system capable of resisting thermally induced movement and exposure to weather.

2.2 ROOFING SYSTEM

- .1 Consist of waterproof vapour retarder, mechanical fastened vented base sheet, torch adhered base sheet, torch adhered cap sheet membrane and accessories.

2.3 MEMBRANE

- .1 Vapour retarder:
 - .1 Roofing membrane with non-woven polyester or glass mat reinforcement and elastomeric bitumen, both sides covered with thermofusible plastic film in accordance with CGSB 37-GP-56M type 2, class C, grade 1.
 - .1 Base sheet:
 - .1 Type: Torch Adhered.
 - .2 Components:
 - .1 Reinforcement: Non-woven polyester or glass mat.
 - .2 Elastomeric bitumen: Mix of selected bitumen and SBS polymer.
 - .3 Mark top face with lines to ensure proper roll alignment.

- .3 Characteristics:
 - .1 Cold bending at minimum -25°C: No cracking
 - .2 Softening point: $\geq 110^{\circ}\text{C}$
 - .3 Static puncture resistance (N): ≥ 300
 - .4 Reinforcing weight: 180 g/m²
 - .5 Membrane thickness: minimum 2 mm
- .2 Vapour retarder continuity strip: Self-adhesive roof membranes as specified in 2.3.4 below.
 - .1 Primer: Manufacturer's recommended elastomeric bitumen or synthetic rubber blend, volatile solvents, adhesive enhancing additives and resins used to prime substrate to enhance the adhesion of self-adhesive membranes suitable for application temperatures
- .2 Ventilated base sheet membrane:
 - .1 Roofing manufacturer's recommended membrane for mechanically fasten with specified lightweight insulated concrete fastener.
 - .2 Glass mat reinforcement coated with oxidized bitumen or fibrous glass mat impregnated and coated with oxidized asphalt.
 - .3 Type: Mechanical fastened.
 - .4 Top and bottom surfaces: Sanded/sanded
 - .5 Vented base sheet membrane properties: In accordance with ASTM D5147 or ASTM D4601, Type II.
 - .1 Membrane thickness: minimum 1 mm
 - .2 Breaking strength (longitudinal/transversal): minimum 11 / 8.5 kN/ m.
 - .3 Ultimate elongation (longitudinal/transversal): 4 / 4%.
 - .6 Fasteners: Recommended by lightweight insulated concrete manufacturer; meeting FM 4470 for wind uplift and corrosion resistance requirement.
- .3 Base sheet membrane:
 - .1 Roofing membrane with non-woven polyester reinforcement and elastomeric bitumen, both sides covered with thermofusible plastic film in accordance with CGSB 37-GP-56M type 2, class C, grade 1.
 - .1 Type: Torch Adhered.
 - .2 Components:
 - .1 Reinforcement: Non-woven polyester.
 - .2 Elastomeric bitumen: Mix of selected bitumen and SBS polymer.
 - .3 Mark top face with lines to ensure proper roll alignment.
 - .3 Characteristics:
 - .1 Cold bending at minimum -25°C: No cracking
 - .2 Softening point: $\geq 110^{\circ}\text{C}$
 - .3 Static puncture resistance (N): ≥ 300
 - .4 Reinforcing weight: 180 g/m²

- .5 Membrane thickness: minimum 3 mm
- .4 Base sheet flashing (stripping):
 - .1 Self-adhesive roofing membrane with non-woven polyester reinforcement and glass grid elastomeric bitumen, upper surface covered with thermofusible plastic film, underside self-adhesive in accordance with CGSB 37-GP-56M type 1A, class C, grade 1.
 - .1 Type: Self-adhesive.
 - .2 Components:
 - .1 Reinforcement: Non-woven polyester.
 - .2 Elastomeric bitumen: Mix of selected bitumen and SBS polymer.
 - .3 Mark top face with lines to ensure proper roll alignment.
 - .3 Characteristics:
 - .1 Cold bending at minimum -25°C: No cracking
 - .2 Softening point: $\geq 110^{\circ}\text{C}$
 - .3 Static puncture resistance (N): ≥ 300
 - .4 Reinforcing weight: 160 g/m²
 - .5 Membrane thickness: minimum 2.5 mm
 - .2 Primer: Manufacturer's recommended elastomeric bitumen or synthetic rubber blend, volatile solvents, adhesive enhancing additives and resins used to prime substrate to enhance the adhesion of self-adhesive membranes suitable for application temperatures
- .5 Cap sheet membrane and cap sheet flashing:
 - .1 Roofing membrane with non-woven polyester and glass reinforcement and elastomeric bitumen with flame retarding agent. Top face protected by coloured granules, underside covered with a thermofusible plastic film, in accordance with CGSB 37 GP 56M type 1, class A, grade 2.
 - .2 Type: Torch adhered.
 - .3 Components:
 - .1 Reinforcement: Non-woven polyester and glass.
 - .2 Elastomeric bitumen: Mix of selected bitumen and SBS polymer.
 - .3 Protection: Coloured granules – light grey.
 - .4 Characteristics:
 - .1 Cold bending at minimum -25°C: No cracking
 - .2 Softening point: $\geq 110^{\circ}\text{C}$
 - .3 Reinforcing weight: minimum 250 g/m²
 - .4 Membrane thickness: minimum 3.6 mm

2.4 LIQUID FLASHING

- .1 One component, cold fluid-applied reinforced resinous waterproofing membrane with polyester reinforcing fleece, consisting of base coat, top coat and finish coat; recommended by Manufacturer.

- .1 Auxiliary Materials: Materials required for a complete and functioning waterproof membrane system and as follows:
 - .1 Primer: Manufacturer's standard, factory formulated polyurethane or epoxy primer.
 - .2 Reinforcing Strip: Manufacturer's recommended fibreglass mesh or polyester fabric.
 - .3 Joint Sealant: Multi-component polyurethane sealant, compatible with waterproofing; and as recommended by manufacturer for substrate and joint conditions.

2.5 WALKWAY MEMBRANE

- .1 Walkway membrane:
 - .1 Roofing membrane with non-woven polyester reinforcement and elastomeric bitumen with flame retarding agent. Top face protected by coloured granules, underside covered with a thermofusible plastic film, in accordance with CGSB 37 GP 56M type 1, class A, grade 2.
 - .2 Type: Torch adhered.
 - .3 Components:
 - .1 Reinforcement: Non-woven polyester
 - .2 Elastomeric bitumen: Mix of selected bitumen and SBS polymer.
 - .3 Protection: Coloured granules – Colour to be different from field membrane as selected by Departmental Representative.
 - .4 Characteristics:
 - .1 Cold bending at minimum -25°C: No cracking
 - .2 Softening point: $\geq 110^{\circ}\text{C}$
 - .3 Reinforcing weight: minimum 250 g/m²
 - .4 Membrane thickness: minimum 5.0 mm
 - .5 Primer: Manufacturer's recommended elastomeric bitumen or synthetic rubber blend, volatile solvents, adhesive enhancing additives and resins used to prime roof cap sheet.

2.6 CARPENTRY

- .1 Refer to Section 06 10 00.

2.7 CANT STRIPS

- .1 Rigid mineral wool insulation board meeting the requirements of CAN/ULC-S702 and ASTM C726 and;
 - .1 Minimum 170 kg/m³ density.
- .2 Fabricate from laminated rigid mineral wool material, to measure 140 mm on slope.

2.8 ROOF SPECIALTIES

- .1 In accordance with Section 07 71 00.

2.9 SHEET METAL FLASHING AND TRIM

- .1 Refer to Section 07 62 00.

Part 3 EXECUTION

3.1 QUALITY OF WORK

- .1 Do examination, preparation and roofing Work in accordance with Roofing Manufacturer's Specification Manual, CRCA Roofing Specification Manual, particularly for fire safety precautions, compliance with local fire insurance requirements and local building codes.
- .2 The interface of the walls and roof assemblies will be fitted with durable rigid material providing connection point for continuity of air barrier.
- .3 Assembly, component and material connections will be made in consideration of appropriate design loads.

3.2 EXAMINATION OF ROOF DECKS

- .1 Verification of Conditions:
 - .1 Inspect with Departmental Representative deck conditions including parapets, construction joints, roof drains, plumbing vents and ventilation outlets to determine readiness to proceed.
- .2 Evaluation and Assessment:
 - .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 PREPARATION

- .1 Ensure roof drains have been installed at proper elevations relative to finished roof surface and allow for sufficient drainage of the roof surface.
- .2 Prior to application of vapour retarder, examine deck, and ensure any defect of level or construction is correct before proceeding with the work.

3.4 PROTECTION OF IN-PLACE CONDITIONS

- .1 Cover walls, walks, sloped roofs 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.
- .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.

3.5 VAPOUR RETARDER

- .1 Install a continuous layer of modified bitumen base sheet flashing over prepared substrate.
- .2 The substrate to be clean, dry, and free of dust, grease, or other contaminants.
- .3 Install vapour retarder on the same day as the primer application and meeting field conditions
- .4 Install torch adhesive type vapour retarder in field and self-adhering type at flashing.
- .5 Field sheet installation:
 - .1 In accordance with manufacturer's recommendation.
 - .2 Starting at low point of roof, perpendicular to slope, unroll base sheet, align and re-roll from both ends.
 - .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 fish-mouths.
- .6 Self-adhering modified bitumen flashing installation:
 - .1 Prime substrate to receive self-adhering base sheet flashing with manufacturer recommended primer and with recommended rate.
 - .2 Ensure complete coverage of the primer to both prepared substrates and to the filed sheet membrane prior to placement of the membrane flashing.
- .7 Install membrane gusset reinforcement at all inside and outside corners.
- .8 New vapour retarder to act as a temporary roof membrane providing complete, continuous waterproofing to the roof prior to the wet installation of the lightweight insulated concrete.
- .9 Ensure temporary roof membrane is watertight and has sufficient temporary drainage prior to lightweight insulated concrete installation.
- .10 Water damage caused to building and its contents by roof leaks after this stage will be rectified at no expense.

3.6 (EXPOSED) CONVENTIONAL MEMBRANE ROOFING (CMR) APPLICATION

- .1 Ventilated base sheet membrane application:

- .1 Lay the specified base sheet over the entire area to be roofed, lapping sides 3 inches and ends 6 inches.
 - .2 Use the specified fasteners as recommended by the lightweight insulated concrete manufacturer, and mechanically fasten each sheet.
 - .3 Attach base sheet mechanically in conformance with the roofing manufacturer recommendations for wind uplift criteria for building type, height and geographic location.
 - .4 Adhere base sheet flashings onto substrate in 1 metre wide strips.
 - .5 Lap flashing base sheet to membrane base sheet minimum 150 mm and seal.
 - .2 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 torch base sheet onto substrate taking care not to burn membrane or its reinforcement or substrate.
 - .3 Lap sheets 75 mm minimum for side and 150 mm minimum for end laps.
 - .4 Application to be free of blisters, wrinkles and fishmouths.
 - .3 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 torch cap sheet onto base sheet taking care not to burn membrane or its reinforcement.
 - .3 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. Seal laps by torch welding.
 - .4 Application to be free of blisters, fishmouths and wrinkles.
 - .5 Do membrane application in accordance with manufacturer's recommendations.
 - .4 Membrane flashings:
 - .1 Complete installation of flashing base sheet stripping prior to installing membrane cap sheet.
 - .2 Adhere base sheet onto substrate in 1 metre wide strips.
 - .3 Torch cap sheet onto substrate in 1 metre wide strips.
 - .4 Lap flashing base sheet to membrane base sheet minimum 150 mm and seal.
 - .5 Lap flashing cap sheet to membrane cap sheet 250 mm minimum and torch weld.
 - .6 Provide 75 mm minimum side lap and seal.
 - .7 Properly secure flashings to their support, without sags, blisters, fishmouths or wrinkles.
 - .8 Do work in accordance with manufacturer's recommendations and Section 07 62 00.
 - .5 Roof penetrations:
 - .1 Install roof penetration flashings and seal to membrane in accordance with manufacturer's recommendations and details and Section 07 71 00.
-

- .6 Liquid flashings:
 - .1 At junctions where installation of membrane flashings is not possible, install new liquid flashing.
 - .2 Install liquid flashings in conformance with various roofing details illustrated in the manufacturer's installation manual and as submitted for review as noted above.
 - .3 Preparation of Steel/Aluminum Substrates:
 - .1 Grind to generate a "white-metal" surface and remove loose particles.
 - .2 Extend preparation area beyond the termination of the roofing/flashing system.
 - .3 Do not use cleanser/solvent after grinding.
 - .4 Notch steel surfaces to provide a rust-stop.
 - .4 Preparation of Wood/Plywood Flashing Substrates to receive resin:
 - .1 Tape the joints between plywood or wood panels using the specified tape and prime wood/plywood surfaces to receive the specified flashing system with compatible primer.
 - .2 Allow primer to set prior to the flashing system application.
- .7 End lap and side lap sealing:
 - .1 Overlap rolls of membrane at potential moisture infiltration area.
- .8 Voids sealing:
 - .1 Prior to installation, cut off the corner of the salvage edge covered by the next roll of material.
- .9 Seams:
 - .1 Check seams during work with a round nosed trowel.
 - .2 Repair found deficiencies before installing the covering layer or leaving the roof area at the end of the day.
- .10 Reinforcement:
 - .1 Required at corners, vents and drains, mechanical units, and gravel stops.

3.7 ROOF RELIEF VENT:

- .1 Install in accordance with Section 07 71 00.
- .2 Install a minimum 1 vent for every 93 sq.metres of roof area and in accordance with Manufacturer's recommendation and requirements of Section 03 52 16.

3.8 CANTS

- .1 Install mineral wool fibre cants over base sheet.
 - .2 Apply hot bitumen to receiving surface and embed cant firmly by hand.
 - .3 Angle cut cants to fit tightly on back and bottom where roof to wall angle varies from 90 degrees.
-

3.9 WALKWAYS

- .1 Install walkway membrane in accordance with manufacturer's instructions and as indicated.
 - .1 Apply primer to cap sheet membrane and torch apply, ensuring selvage edge is removed.

3.10 SHEET METAL FLASHING AND TRIM

- .1 Complete flashing work using specified materials described on plans and details, and as described in Section 07 62 00.
- .2 Installation:
 - .1 Install in accordance with Section 07 62 00.
 - .2 Caulk sheet metal joints and junctions with other materials.
 - .3 Install appropriate flashing, cap sheet, counter flashing, casings and other accessories to vents, pipes and other ducts to ensure perfect sealing.

3.11 FIELD QUALITY CONTROL

- .1 Require site attendance of roofing materials manufacturer's representative during installation of Work.
 - .1 Submit Manufacturer's field reports.
- .2 Fastener Pull Test:
 - .1 Conduct a ventilated base ply fastener pull test by roofing materials manufacturer's representative or approved roofing contractor, 3 days following the application of the lightweight insulating concrete to ensure a minimum 18kg withdrawal resistance per fastener.
 - .2 Number and locations of tests to be as directed by Departmental Representative
 - .3 Submit Manufacturer's test reports.
 - .4 Repair or replace insulated concrete system as directed by Departmental Representative.
- .3 Inspections:
 - .1 Membrane core test:
 - .1 Conduct a membrane core test, number and locations of tests to be as directed by Departmental Representative.
 - .2 Membrane and membrane flashing adhesion test:
 - .1 Conduct a membrane adhesion test, number and locations of tests to be as directed by Departmental Representative.
 - .3 Repair or replace membrane, or air and vapour retarder system as directed Departmental Representative.

3.12 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 recommended instructions.
- .3 Repair or replace defaced or disfigured finishes caused by work of this section.
- .4 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 20.
 - .1 Place materials defined as hazardous or toxic in designated containers.
 - .2 Clearly label location of salvaged material's storage areas and provide barriers and security devices.
 - .3 Ensure emptied containers are sealed and stored safely.
 - .4 Unused adhesive, sealant materials must not be disposed of into sewer system, into streams, lakes, onto ground or in other location where it will pose health or environmental hazard.
 - .5 Dispose of unused adhesive material at official hazardous material collections site approved by Departmental Representative.
 - .6 Dispose of unused sealant material at official hazardous material collections site approved by Departmental Representative.
 - .7 Dispose of unused asphalt material at official hazardous material collections site approved by Departmental Representative.

END OF SECTION

Part 1 GENERAL

1.1 RELATED REQUIREMENTS

- .1 Section 06 10 00 –Rough Carpentry: Wood blocking and framing required for roof flashings.

1.2 REFERENCES

- .1 American Society for Testing and Materials International (ASTM)
 - .1 ASTM A653/A653M-15e1, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - .2 ASTM C1087-00(2011), Standard Test Method for Determining Compatibility of Liquid-Applied Sealants with Accessories Used in Structural Glazing Systems.
 - .3 ASTM C1248-08(2012), Standard Test Method for Staining of Porous Substrate by Joint Sealants.
 - .4 ASTM C920-14a, Standard Specification for Elastomeric Joint Sealants
 - .5 ASTM D523-14, Standard Test Method for Specular Gloss.
 - .6 ASTM D822/D822M-13, Standard Practice for Filtered Open-Flame Carbon-Arc Exposures of Paint and Related Coatings.
- .2 Canadian Roofing Contractors Association (CRCA)
 - .1 Roofing Specifications Manual 2012.
- .3 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-51.32-M77, Sheathing, Membrane, Breather Type.
- .4 Canadian Standards Association (CSA International)
 - .1 CSA A123.3-05(R2015), Asphalt Saturated Organic Roofing Felt.
 - .2 CSA B111-1974(R2003), Wire Nails, Spikes and Staples.
- .5 Factory Mutual Global (FM):
 - .1 Property Loss Prevention Data Sheets:
 - .1 1-28 Design Wind Loads and 1-28R Roof Systems
 - .2 1-29 Roof Deck Securement and Above Deck Roof Components and 1-29R Roof Systems
 - .3 1-49, Perimeter Flashing
- .6 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
 - .1 Material Safety Data Sheets (MSDS).

1.3 RELATED REQUIREMENTS

- .1 Section 07 52 00 – Modified Bituminous Membrane Roofing: Flashing and roofing accessories installed integral with roofing membrane as part of roofing system work.

- .2 Section 07 71 00 – Roofing Specialties: Vents, and other pre-manufactured roof accessory units.

1.4 SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00.
- .2 Product Data:
 - .1 Submit manufacturer's printed product literature for sheet metal flashing systems materials, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.
 - .2 Submit two copies WHMIS MSDS - Material Safety Data Sheets.
- .3 Shop Drawings:
 - .1 Shop Drawings: Submit shop drawings showing layout, profiles, methods of joining, and anchorage details.
- .4 Samples:
 - .1 Submit 50 x 50 mm samples of each type of sheet metal material, finishes and colours.
- .5 Quality assurance submittals: submit following in accordance with Section 01 45 00.
 - .1 Manufacturer's Instructions: submit manufacturer's installation instructions and special handling criteria, installation sequence, and cleaning procedures.
 - .2 Manufacturer's Field Reports: submit to manufacturer's written reports within 3 days of review, verifying compliance of Work, as described in PART 3, FIELD QUALITY CONTROL.

1.5 QUALITY ASSURANCE

- .1 Pre-Installation Meetings: convene pre-installation meeting two weeks prior to beginning on-site installation, with Departmental Representative to:
 - .1 Verify project requirements.
 - .2 Review installation and substrate conditions.
 - .3 Co-ordination with other building subtrades.
 - .4 Review manufacturer's installation instructions and warranty requirements.

1.6 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00.
- .2 Waste Management and Disposal:
 - .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 20.

Part 2 PRODUCTS

2.1 SHEET METAL MATERIALS

- .1 Zinc coated steel sheet: Commercial quality to ASTM A653/A653M, with Z275 designation zinc coating and the following:
 - .1 Base Flashing, exposed trim, equipment support flashing, and roof penetration flashing: Minimum 0.76 mm thickness.
 - .2 Copings: Minimum 0.91mm thick.
 - .3 Drip Edges: Minimum 0.61 mm thick.

2.2 PREFINISHED STEEL SHEET

- .1 Prefinished steel with factory applied polyvinylidene fluoride.
 - .1 Class FIS.
 - .2 Colour as selected by Departmental Representative from manufacturer's standard range.
 - .3 Specular gloss: 30 units +/- in accordance with ASTM D523.
 - .4 Coating thickness: not less than 22 micrometres.
 - .5 Resistance to accelerated weathering for chalk rating of 8, colour fade 5 units or less and erosion rate less than 20% to ASTM D822/D822M as follows:
 - .1 Outdoor exposure period 2500 hours.
 - .2 Humidity resistance exposure period 5000 hours.

2.3 THROUGH WALL FLASHING AND UNDERLAYMENT MEMBRANES

- .1 Self adhering SBS modified bitumen high temperature reinforced membrane with cross-linked polyethylene skins, specifically manufactured for use as through wall flashing and having the following nominal properties:
 - .1 Service Temperature Range: -40°C to +80°C
 - .2 Thickness: Minimum 1.0 mm
- .2 Primers and Undercoats: Manufacturer's recommended primer or surface conditioner to improve bond between membranes to substrates.

2.4 SEALANT

- .1 Performance Requirements:
 - .1 Provide elastomeric joint sealants that establish and maintain watertight and airtight continuous joint seals without staining or deteriorating joint substrates.
 - .2 Provide elastomeric joint sealants that have been tested in accordance with ASTM C1248 where elastomeric sealants are required for non-staining to porous substrate applications and that are manufactured by a Manufacturers capable of providing a non-stain Warranty as specified.
 - .3 Provide joint sealants that are compatible with one another, and with adjacent materials, as demonstrated by sealant manufacturer using ASTM C1087 testing and related experience.
-

- .2 Do not use sealant that emits strong odours, contains toxic chemicals or is not certified as mould resistant in air handling units.
- .3 When low toxicity sealants are not possible, confine usage to areas which offgas to exterior, are contained behind air barriers, or are applied several months before occupancy to maximize offgas time.
- .4 Where sealants are qualified with primers use only these primers.
- .5 Sealant material designations
 - .1 Silicone Sealant:
 - .1 Exterior Weatherproofing Sealant: Silicone based, single component, low modulus, neutral cure, Shore A Hardness 15-25, conforming to CAN/CGSB-19.13-M, Classification C-1-40-B-N and C-1-25-B-N, and ASTM C920, Type S, Grade NS, Class 50, use NT, M, G, A and O, Custom Colour as selected by Departmental Representative and with the following properties;
 - .1 Non-staining in accordance with ASTM C1248
 - .2 Low dirt pick-up
 - .2 Colours of exposed joint sealants will be selected by the Departmental Representative from manufacturer's complete range to match adjacent finish materials.

2.5 ACCESSORIES

- .1 Isolation coating: alkali resistant bituminous paint.
- .2 Plastic cement: to CAN/CGSB-37.5.
- .3 Underlay for metal flashing: No. 15 perforated asphalt felt to CSA A123.3.
- .4 Cleats: of same material, and temper as sheet metal, minimum 50 mm wide. Thickness same as sheet metal being secured.
- .5 Fasteners: of same material as sheet metal, to CSA B111, ring thread flat head roofing nails of length and thickness suitable for metal flashing application.
- .6 Washers: of same material as sheet metal, 1 mm thick with rubber packings.
- .7 Touch-up paint: as recommended by prefinished material manufacturer.

2.6 FABRICATION

- .1 Fabricate metal flashings and other sheet metal work in accordance with applicable FM G Data Sheet 1-49 details and requirements.
 - .1 Sheet metal work will conform to details, with plumb profiles free from deformities or defects that may hinder appearance.
- .2 Form pieces in 2400 mm maximum lengths.
 - .1 Make allowance for expansion at joints.
- .3 Hem exposed edges on underside 12 mm.
 - .1 Mitre and seal corners with sealant.

- .4 Form sections square, true and accurate to size, free from distortion and other defects detrimental to appearance or performance.
- .5 Apply isolation coating to metal surfaces to be embedded in concrete or mortar.

Part 3 EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 INSTALLATION

- .1 Install sheet metal work in accordance with FM G Data Sheet 1-49 and in accordance with reviewed shop drawings.
- .2 Provide continuous hook strips and perimeter securement in accordance with FM G Data Sheet 1-49
- .3 Use concealed fastenings except where approved before installation.
- .4 Provide underlay under sheet metal.
 - .1 Secure in place and lap joints 100 mm.
- .5 Through Wall Flashings: Install flexible membranes where required to maintain flow direction to divert water away from face of building envelope.
- .6 Counterflash bituminous flashings at intersections of roof with vertical surfaces and curbs.
- .7 Lock end joints and caulk with sealant.

3.3 FIELD QUALITY CONTROL

- .1 Inspections:
 - .1 Inspection and testing of roofing application will be carried out by testing laboratory designated by Departmental Representative.
 - .2 Repair or replace membrane, or air and vapour retarder system as directed by the Departmental Representative.

3.4 CLEANING

- .1 Proceed in accordance with Section 01 74 11.
- .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

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 Section 03 52 16 – Lightweight Insulating Concrete
- .2 Section 07 52 00 – Modified Bituminous Membrane Roofing

1.2 REFERENCE STANDARDS

- .1 American Society for Testing and Materials (ASTM):
 - .1 ASTM A666-15, Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar
 - .2 ASTM B209-14, Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate
 - .3 ASTM B221-14, Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes
 - .4 ASTM B272-12 - Standard Specification for Copper Flat Products with Finished (Rolled or Drawn) Edges (Flat Wire and Strip).
 - .5 ASTM B370-12 - Standard Specification for Copper Sheet and Strip for Building Construction.
 - .6 ASTM C1029-15, Standard Specification for Spray-Applied Rigid Cellular Polyurethane Thermal Insulation
- .2 Canadian Standards Association (CSA):
 - .1 CSA-B79-08 (R2013) - Commercial and residential drains and cleanouts.
- .3 Canadian Roofing Contractors' Association (CRCA):
 - .1 Roofing Specification Manual - Modified Bituminous Membranes Section

1.3 SUBMITTALS

- .1 Provide required information in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Submit manufacturer’s descriptive literature for each product, including sections and details indicating descriptive installation instructions.
- .3 Manufacturers Reports:
 - .1 Submit manufacturer's field reports.

Part 2 Products

2.1 MANUFACTURED UNITS

- .1 Manufactured roofing accessories from spun aluminum with cast aluminum accessories , copper or stainless steel and complete with removable cap where applicable.
- .2 Units have foamed in place closed cell urethane foam insulation sprayed into the unit.
- .3 Prime flanges with rubberized primer.

- .4 Types:
 - .1 Retro roof drain:
 - .1 Consists of vandalproof dome with hinged access gate, stabilizer ring, mounting bolts, pan-formed drain body and straight outlet with ferrule, deck flange, under-deck clamping ring and mechanical watertight compression seal mechanism.
 - .2 Relief vent:
 - .1 Manufacturer recommended alloy aluminum vent with integral deck flange, and factory designed insert accessory to vent moisture vapour accumulating in the roofing and lightweight insulating concrete system.
 - .2 Alloy aluminum thickness: Minimum 1.5mm.
 - .3 Unit designed with perimeter vent holes, and insert accessory filler with half perforated holes.
 - .4 Provide flanges in accordance with manufacturer's recommendation.
 - .3 Tall cone or "B" vent:
 - .1 Consists of flashing sleeves with integral deck flange, matching two piece collar, pressure grommet seal.
 - .4 Split flashing for round penetration:
 - .1 Split flashing sleeve with integral deck flange and vented cap fitted with a pressure grommet seal.
 - .2 Continuous seals are located at the split junctures of the sleeve and deck flange.
 - .3 Use clips to lock the friction-fit flashing sections together.
 - .5 Conduit and gas line penetrations:
 - .1 Flexible conduit flashing consist of a "gooseneck" shape flange, end cap seal and base seal.
 - .6 Scupper Drain:
 - .1 Fabricated from galvanized metal to suit and complete with edge on 3 sides, open-top collector head, and open-faced pre-finished metal rain water leader.
 - .2 Cap with prepainted metal to match flashings.
 - .7 Overflow Scupper Drain:
 - .1 Fabricated from galvanized metal to suit and complete with edge on 4 sides of pipe mouth at base flange.
 - .2 Cap with prepainted metal to match flashings.

2.2 FABRICATION

- .1 Fabricate, assemble and erect manufactured materials in accordance with manufacturer's published specifications for specific types of functions required; manufacturer's specifications are considered to form part of this Section.
- .2 Fabricate assemblies complete in every respect, square, true to size and details, and free from distortion, twist or other defects that could affect strength, operation or appearance.

Part 3 Execution

3.1 EXAMINATION

- .1 Report in writing defects in adjacent work and other unsatisfactory site conditions that could affect work of this Section.
- .2 Verify site dimensions.
- .3 Commencement of work will imply acceptance of prepared work.

3.2 INSTALLATION

- .1 Install in accordance with the manufacturer's written instructions and the contract documents, plumb, true, level and rigid.
- .2 Isolate aluminum surfaces from adjacent concrete materials and other metals and in conjunction with membrane roofing installation.

3.3 ADJUSTING

- .1 Verify that manufactured units are installed in accordance with specifications and details, and will function as intended.
- .2 Adjust any items where necessary to ensure proper operation.

3.4 FIELD QUALITY CONTROL

- .1 Manufacturer's Field Services:
 - .1 Require site attendance of manufactured units manufacturer's representative during installation of Work.
 - .2 Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.
- .2 Inspections:
 - .1 Inspection and testing of manufactured unit installations will be carried out by testing laboratory designated by Departmental Representative.
 - .2 Repair or replace manufactured units, roof membrane, or air and vapour retarder system as directed by the Departmental Representative.

3.5 CLEANING

- .1 Clean manufactured units using materials and methods approved by manufacturer.
- .2 Do not use cleaners or techniques that could impair performance of the roofing system.

END OF SECTION