



Hamilton-Wentworth Catholic Schools
150 years of 'Believing, Achieving, Serving'

SPECIFICATIONS

for

ST. MARTIN OF TOURS CATHOLIC ELEMENTARY SCHOOL

60 Gray Road South
Stoney Creek, ON L8G 2X5

Prepared For

Hamilton-Wentworth Catholic District School Board

90 Mulberry Street
Hamilton, ON L8R 2C8

Prepared By

LANHACK Steelcon Inc.

1709 Upper James Street
Hamilton, ON L9B 1K7

Project No: 26032E

April 1, 2026



DIVISION 00

PROCUREMENT AND CONTRACTING REQUIREMENTS

1 GENERAL

1.1 LIST OF CONSULTANTS

.1 The following firms comprise the Consultant team for the Project:

.1 Architectural:

LANHACK Steelcon Inc.
1709 Upper James Street, Hamilton, ON L9B 1K7
Contact: Giancarlo Lancia, P.Eng.
Telephone: 905-541-8711
Email: clancia@lanhack.ca

.2 Structural Engineering:

LANHACK Steelcon Inc.
1709 Upper James Street, Hamilton, ON L9B 1K7
Contact: Matt Boeringa, P.Eng.
Telephone: 905-777-1454 Ext. 105
Email: mboeringa@lanhack.ca

.3 Mechanical Engineering:

COPA Engineering Ltd.
29 Rolling Acres Drive, Kitchener, ON N2A 3W5
Contact: Costas Pashartis, P.Eng.
Telephone: 519-496-2672
Email: copaeng@gmail.com

.4 Electrical Engineering:

CK Engineering Inc.
2400 Industrial Drive, Burlington, Ontario L7P 1A5
Contact: Jonathan Schrader, C.E.T.
Telephone: 905-631-1115 Ext. 223
Email: Jonathan.schrader@ckengs.net

END OF DOCUMENT

ARCHITECTURAL BINDER

PROCUREMENT AND CONTRACTING REQUIREMENTS GROUP

Division 00 - Procurement and Contracting Requirements

Introductory Information

- 00 01 05 List of Consultants
- 00 01 10 Table of Contents

Procurement Requirements

- 00 31 00 Available Project Information

SPECIFICATIONS GROUP

GENERAL REQUIREMENTS SUBGROUP

Division 01 - General Requirements

- 01 11 00 Summary of Work
- 01 21 00 Allowances
- 01 25 00 Substitution Procedures
- 01 26 00 Contract Modification Procedures
- 01 29 00 Payment Procedures
- 01 31 00 Project Management and Coordination
- 01 32 00 Construction Progress Documentation
- 01 33 00 Submittal Procedures
- 01 35 00 Special Procedures
- 01 40 00 Quality Requirements
- 01 51 00 Temporary Utilities
- 01 52 00 Construction Facilities
- 01 56 00 Temporary Barriers And Enclosures
- 01 57 00 Temporary Controls
- 01 60 00 Product Requirements
- 01 71 00 Examination and Preparation Procedures
- 01 73 00 Execution
- 01 73 29 Cutting and Patching
- 01 74 00 Cleaning and Waste Management
- 01 76 00 Protecting Installed Construction
- 01 77 00 Closeout Procedures
- 01 78 00 Closeout Submittals
- 01 79 00 Demonstration and Training
- 01 91 13 General Commissioning Requirements

FACILITY CONSTRUCTION SUBGROUP

Division 02 - Existing Conditions

- 02 41 16 Structure Demolition
- 02 41 19 Selective Demolition

Division 03 - Concrete

- 03 10 00 Concrete Forming and Accessories
- 03 20 00 Concrete Reinforcing
- 03 30 00 Cast-In-Place Concrete

Division 04 - Masonry

- 04 05 00 Common Work Results for Masonry
- 04 05 10 Masonry Mortaring and Grouting
- 04 05 19 Masonry Anchorage and Reinforcing
- 04 05 23 Masonry Accessories
- 04 22 00 Concrete Unit Masonry

Division 05 - Metals

05 12 00	Structural Steel Framing
05 30 00	Metal Decking
05 40 00	Cold-Formed Metal Framing
05 50 00	Metal Fabrications

Division 06 - Wood, Plastics and Composites

06 10 00	Rough Carpentry
06 20 00	Finish Carpentry

Division 07 - Thermal and Moisture Protection

07 21 00	Thermal Insulation
07 26 00	Vapour Retarders
07 27 00	Air Barriers
07 27 36	Sprayed Foam Air Barriers
07 52 11	SBS Modified Bitumen Roofing
07 62 00	Sheet Metal Flashing and Trim
07 81 00	Applied Fireproofing
07 84 00	Firestopping
07 92 00	Joint Sealants

Division 08 - Openings

08 51 13	Aluminum Windows
08 80 16	Exterior Glazing

Division 09 - Finishes

09 81 00	Acoustic Insulation
09 90 00	Painting and Coating

Division 10 - Specialties

10 14 00	Signage
----------	---------

END OF SECTION

1 General

1.1 THIRD-PARTY DOCUMENTS

- .1 In addition to the Drawings and the Specifications, the Owner may also distribute a collection of reports, surveys and similar types of documents relevant to the Place of the Work that have been prepared by third-parties and are intended strictly as additional information for consideration by the bidders.
- .2 Bidders are cautioned that such documents, by their nature, cannot reveal all conditions that exist or can occur at the Place of the Work.
- .3 Should conditions at the Place of the Work, in the opinion of the Consultant, be found to substantially vary from those identified in the third-party documents, then changes in the Work may need to be made, with appropriate adjustments being made to the Contract Price and Contract Time.
- .4 Direct questions pertaining to third-party documents by contacting the authoring organization.

1.2 DESIGNATED SUBSTANCE SURVEY

- .1 A copy of a detailed Designated Substance Survey report with respect to the Place of the Work is being made available as part of the Bid Documents; titled as follows:

Titled:	Hazardous Building Materials Assessment (Pre-Construction) Roof Assembly Replacement St. Martin of Tours Catholic Elementary School 60 Gray Road South, Stoney Creek, ON L8G 2X5
Project No.:	368268.005
Dated:	April 10, 2026
Prepared by:	Pinchin Ltd.

- .2 Such reports record properties of the material components and include recommendations for the hazardous level of the component and have been prepared primarily for use by the Consultant. Recommendations contained therein are considered a requirement of this Contract unless also stated as such, either specifically or by reference, in the Contract Documents.

1.3 EXISTING CONDITION DOCUMENTS

- .1 Documents describing the existing building are available for viewing by bidders at the office of the Hamilton-Wentworth Catholic District School Board.
- .2 These documents were prepared by others and neither the Owner nor the Consultant can take responsibility for the accuracy of the information nor verify that they represent the actual construction at the Place of the Work.

END OF DOCUMENT

DIVISION 1

GENERAL REQUIREMENTS

1 General

1.1 CONTRACT DOCUMENTS

- .1 Refer to GC 1.1 - Contract Documents.
- .2 Work of this Contract comprises the removal of the existing Siporex roof deck and construction of a new roof system in the gymnasium at St. Martin of Tours Catholic Elementary School, located at 60 Gray Road South, Stoney Creek, Ontario; and further identified as Project No.: 26032E.
- .3 Division of the Work among Subcontractors and Suppliers is solely the Contractor's responsibility, and the Consultant assumes no responsibility to act as an arbiter to establish subcontract limits between Sections or Divisions of work.
- .4 The Contract Documents were prepared by the Consultant for the account of the Owner. The material contained herein reflects the Consultant's best judgement in light of the information available to him at the time of preparation. Any use which a third party makes of the Contract Documents, or any reliance on or decisions to be made based on them, are the responsibility of such third parties. The Consultant accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on the Contract Documents.
- .5 These specifications are written using metric measurement as the basis for dimensions. This does not preclude the use of Products manufactured or produced to imperial measurements. It remains, however, the Contractor's responsibility to make the various parts of the Project come together properly and neatly in a complete manner, in accordance with the Contract Documents.
- .6 These specifications are written in imperative mood in an abbreviated form. The imperative language of the technical sections is directed to the Contractor, unless specifically noted otherwise. Incomplete sentences shall be completed by inserting "shall", "the Contractor shall", and "shall be", and similar mandatory phrases by inference in the same manner as they are applied to notes on the drawings. The words "shall be" will be supplied by inference where a colon (:) is used within sentences and phrases. Except where worded to the contrary, fulfil and perform all indicated requirements whether stated imperatively or otherwise.

1.2 CONTRACT METHOD

- .1 Single Contract: Construct the Work under a single lump sum contract.

1.3 WORK SEQUENCE

- .1 Construct Work in stages to accommodate Owner's continued use of premises during construction.
- .2 Coordinate Progress Schedule and coordinate with Owner Occupancy during construction.

1.4 CONTRACTOR USE OF PREMISES

- .1 The contractor shall limit use of the Place of the Work for execution of the Work, for storage, and for access, to allow:
 - .1 Owner occupancy,
 - .2 Work by other contractors,
 - .3 Public usage.

1.5 OWNER OCCUPANCY OF EXISTING FACILITY

- .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.

1.6 PARTIAL OWNER OCCUPANCY OF THE WORK

- .1 Schedule and substantially complete designated portions of the Work for Owner occupancy prior to Substantial Performance of the Work.
- .2 Owner will occupy designated areas for the purpose of:
 - .1 Storage of furnishings and equipment,
 - .2 installation of equipment, and
 - .3 continuance of operations.
- .3 In accordance with GC 5.9 - Non-Conforming Work, partial Owner occupancy will not be considered as an acceptance of the Work, nor in any way relieve the Contractor of his responsibility to complete the Work.

END OF SECTION

1 General

1.1 CASH ALLOWANCES

- .1 Refer to GC 4.1 - Cash Allowances.
- .2 Submit to the Consultant, if directed, before submission of final application for payment, certified copies of all invoices and statements from Suppliers or Subcontractors furnishing Products purchased under a cash allowance.
- .3 The amount of each allowance for Work specified in the respective specification Sections:
 - .1 Include the stipulated sum of \$80,000 for the supply and installation of specialty flooring.

END OF SECTION

1 General

1.1 PRODUCT SUBSTITUTION PROCEDURES

- .1 Requests for substitution will only be considered when submitted in sufficient time to permit proper evaluation by the Consultant.
- .2 When requesting Consultant review of a proposed Product substitution, demonstrate that the proposed substitute will perform equally as well or better as the specified Product.
- .3 Accompany each request for substitution with a list of properties for both the specified Product and the proposed substitute, including the following information:
 - .1 Product identification, including manufacturer's name, address, telephone and fax numbers, and web site address where available.
 - .2 Manufacturer's Product data sheets, including material descriptions, compliance with applicable reference standards, and performance and test data.
 - .3 A summarized comparison of physical properties and performance characteristics for the specified Product and the proposed substitution, and clearly highlighting significant variations.
 - .4 Indication of availability of maintenance services and sources of replacement materials and parts, including associated costs and time frames.
 - .5 Indication of cost savings and reduction of construction schedule.
 - .6 Verification that the substitute will not result in additional costs or a reduction in performance to other portions of the Work.
 - .7 Reason for requesting the substitution.
- .4 The clauses "or equal", "or approved equal", or other similar clauses, will not be construed as an invitation to submit requests for substitution or to unilaterally substitute Products in place of the specified Products and systems.
- .5 Failure to order specified Products in adequate time to meet the approved construction schedule will not be a valid reason to submit a request for substitution. In accordance with CCDC 2, GC 6.5 - Delays, such delays remain the responsibility of the Contractor and will not result in an extension to the Contract Time or be subject to reimbursement by the Owner.
- .6 The Owner is under no obligation to consider Product or system substitutions recommended by the Contractor.
- .7 Remove and replace substitutions incorporated into the Work without the Consultant's written approval.

END OF SECTION

1 General

1.1 VARIATIONS

- .1 Refer to GC 6.1 - Owner's Right to Make Changes, GC 6.2 - Change Order and GC 6.3 - Change Directive.
- .2 The measurement of variations to the Contract Price shall be on the basis of the unit prices submitted. Where this is not possible the measurement will be on the basis of units of material and labour, estimated by the Contractor and evaluated by the Consultant.
- .3 Once a Proposed Change has been issued by the Consultant, it shall be the responsibility of the Contractor to ensure that no work is carried out that may increase the cost of the variation contemplated.
- .4 The Consultant will assess the cost of each change before issuing a Change Order. Assist the Consultant with this task by quoting variations in a complete manner, listing:
 - .1 quantity of each material,
 - .2 unit cost of each material,
 - .3 man hours involved,
 - .4 cost per hour,
 - .5 Subcontractor quotations, and
 - .6 mark-up.
- .5 The Consultant may require further quotations in order to show a breakdown of costs.
- .6 The Owner and the Consultant will not be responsible for delays to the Work resulting from late, incomplete or inadequately broken down valuations submitted by the Contractor.
- .7 Minor variations may be made in the project from time to time as approved by the Consultant. Such alterations or adjustments shall not constitute a change in cost unless a request is made at the time. No extra will be contemplated except where a clear indication is made that extra payment is claimed, in which case a Proposed Change or Change Directive will be issued by the Consultant in accordance with GC 6.1 - Owner's Right to Make Changes or GC 6.3 - Change Directive. Unless this procedure is followed, no claims for extras will be allowed.
- .8 Allowable mark-ups on changes in the Work will be subject to the following schedule.
 1. Contractor on work of own forces:
 1. on extras: 5% overhead, 5% profit.
 2. on credits: 0% overhead and profit.
 2. Contractor on work of Subcontractors:
 1. on extras: 5% overhead, 0% profit.
 2. on credits: 0% overhead and profit.

1.2 UNIT PRICES

- .1 Unit prices include all materials and labour, but do not include Value Added Taxes, overhead or profit. They represent the cost to the Contractor for each operation quoted.
- .2 The Owner reserves the right to examine the unit prices and require modification should they appear to be unfair or inaccurate.

- .3 If requested by the Consultant, supply additional unit prices prior to the first payment under the Contract. The Consultant reserves the right to amend these additional unit prices should they appear to be unfair or incorrect.
- .4 The unit prices shall be subject to the mark-up schedule described above when used for the valuation of changes.

END OF SECTION

1 General

1.1 SCHEDULE OF VALUES

- .1 Prior to first application for payment, submit for Consultant's review an initial schedule of values.
- .2 Modify initial schedule of values if and as requested by Consultant.
- .3 Obtain Consultant's written acceptance of initial schedule of values prior to first application for payment.
- .4 Together with first and all subsequent applications for payment, submit updated versions of the schedule of values, indicating the values, to the date of application for payment, of work performed and Products delivered to Place of the Work.
- .5 Prepare schedule of values in an electronic spreadsheet format based on the format and content described in CCDC 24-2022, A Guide to Model Forms and Support Documents.

1.2 CASH FLOW PROJECTION

- .1 Prior to first application for payment, submit for Consultant's review a forecast of approximate monthly progress payments for each month of Contract Time.
- .2 Submit revised cash flow forecasts when required due to significant changes in rate of progress of the Work, or significant changes in Contract Price or when specifically requested by Owner.

1.3 WORKERS' COMPENSATION CLEARANCE

- .1 Submit proof of workers' compensation clearance with each application for payment.

END OF SECTION

1 General

1.1 COORDINATION

- .1 Coordinate the Work to ensure the Work proceeds safely and expeditiously.
- .2 Ensure adequate communication among parties involved.
- .3 Allocate mobilization areas of the Place of the Work; for field offices and sheds, for access, traffic, and parking facilities.
- .4 Coordinate use of the Place of the Work and facilities through procedures for submittals, reports and records, schedules, coordination of Drawings, recommendations, and resolution of ambiguities and conflicts.
- .5 Submit information required for preparation of coordination and interference drawings. Review and approve revised drawings for submission to the Consultant.

1.2 CONTINUANCE OF OWNER OPERATIONS

- .1 Coordinate and schedule the Work to minimize any disruption of the normal functions of the existing building.
- .2 Changes to the traditional scheduling of construction may be required and certain portions of the Work may not be able to proceed in continuous sequence.
- .3 Every reasonable effort will be made to cooperate with the construction process.
- .4 The Owner may modify proposed scheduling where such changes are in the best interests regarding the operation of the existing building.

1.3 OTHER CONTRACTORS

- .1 Cooperate with any separate contractor employed by the Owner and, if necessary, co-ordinate with their work.
- .2 Submit necessary information to Owner to assist in the required scheduling of such contractors.

1.4 GENERAL REQUIREMENTS FOR MEETINGS

- .1 Schedule and administer meetings in consultation with the Consultant, throughout the progress of the Work.
- .2 Prepare agenda for meetings.
- .3 Distribute written notice of each meeting 4 days in advance of meeting date to Consultant and Owner.
- .4 Provide physical space and make arrangements for meetings.
- .5 Preside at meetings.
- .6 Record the minutes. Include significant proceedings and decisions. Identify action by the parties.

- .7 Submit draft copy of minutes to Consultant within 2 Working Days after meeting.
- .8 Consultant will review minutes and will submit comments for any necessary revisions or additions within 3 Working Days.
- .9 Update minutes to reflect Consultant's comments.
- .10 Reproduce and distribute copies of minutes within 5 days after meeting and transmit to meeting participants, affected parties not in attendance, the Consultant, and the Owner.
- .11 Representative of Contractor, Subcontractor, and Suppliers attending meetings shall be qualified and authorized to act on behalf of the party each represents.
- .12 Schedule meetings at regular 14-day intervals, on a day that is determined as convenient by Contractor and Consultant.

1.5 PRE-CONSTRUCTION AND PRE-INSTALLATION MEETINGS

- .1 Within 15 days after award of Contract, request a meeting of parties in contract to discuss and resolve administrative procedures and responsibilities.
- .2 Request pre-installation meetings as specified in individual specification Sections.
- .3 Owner, Consultant, Contractor, major Subcontractors, field inspectors, and supervisors will be in attendance.
- .4 Establish time and location of meeting and notify parties concerned a minimum of 5 days before meeting.
- .5 Incorporate mutually agreed variations to Contract Documents into Agreement, prior to signing.
- .6 Pre-construction Meeting Agenda: include the following:
 - .1 Appointment of official representative of participants in the Work;
 - .2 Schedule of Work, progress scheduling;
 - .3 Schedule of submissions of shop drawings, samples, colour chips;
 - .4 Requirements for temporary facilities, site sign, offices, storage sheds, utilities, fences;
 - .5 Delivery schedule of specified equipment;
 - .6 Site security;
 - .7 Proposed changes, change orders, procedures, approvals required, mark-up percentages permitted, time extensions, overtime, administrative requirements;
 - .8 Owner provided products;
 - .9 Record drawings;
 - .10 Maintenance manuals;
 - .11 Take-over procedures, acceptance, warranties;
 - .12 Monthly progress claims, administrative procedures, photographs, holdbacks;
 - .13 Appointment of inspection and testing agencies or firms;
 - .14 Insurances, transcripts of policies.

1.6 PROGRESS AND PROGRESS DRAW MEETINGS

- .1 During course of Work and 2 weeks prior to project completion, schedule progress meetings biweekly.
- .2 During course of Work, schedule progress draw meetings monthly.

- .3 Submit to Consultant a copy of the application for payment not less than two Working Days before scheduled progress draw meeting. Consultant may require changes to the application for payment prior to progress draw meeting.
- .4 Contractor, major Subcontractors involved in Work, Consultant, and Owner are to be in attendance.
- .5 Notify parties minimum 4 days prior to meetings.
- .6 Record minutes of meetings and circulate to attending parties and affected parties not in attendance within 3 days after meeting.
- .7 Progress Meeting Agenda: 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 impeding construction schedule;
 - .5 Review of off-site fabrication delivery schedules;
 - .6 Corrective measuring and procedures to regain project schedule;
 - .7 Revision of construction schedule;
 - .8 Progress, schedule, during succeeding work period;
 - .9 Review submittal schedules, record drawings: expedite as required;
 - .10 Maintenance of quality standards;
 - .11 Review of proposed changes for effect on construction schedule and on completion date;
 - .12 Other business.

END OF SECTION

1 General

1.1 SUBMISSION REQUIREMENTS

- .1 Submit initial schedules within 15 days after award of Contract and resubmit updated schedule with each application for payment.
- .2 Submit schedules electronically as Adobe Acrobat files.

1.2 CONSTRUCTION SCHEDULE - CRITICAL PATH METHOD

- .1 Include complete sequence of construction activities.
- .2 Include dates for commencement and completion of each major element of construction.
- .3 Show projected percentage of completion of each item as of first day of month.
- .4 Indicate progress of each activity to date of submission of the schedule.
- .5 Update schedule monthly and resubmit with each application for progress payment. The Consultant will not review an application for payment that does not include an updated construction schedule.
- .6 Show changes occurring since previous submission of schedule:
 - .1 Major changes in scope.
 - .2 Activities modified since previous submission.
 - .3 Revised projections of progress and completion.
 - .4 Other identifiable changes.
- .7 Provide a narrative report to define:
 - .1 Problem areas, anticipated delays, and impact on schedule.
 - .2 Corrective action recommended and its effect.
 - .3 Effect of changes on schedules of other contractors.

1.3 ADDITIONAL SCHEDULES

- .1 Concurrently with construction schedule, submit a schedule of values, a cash flow schedule, a shop drawing schedule and an equipment delivery schedule in formats acceptable to Consultant.
- .2 Cash Flow Schedule: broken down on a monthly basis, indicating anticipated monthly progress billings for duration of Contract.
- .3 Schedule of Values: to requirements of the Contract.
- .4 Submittal Schedule:
 - .1 Refer to GC 3.10 - Shop Drawings.
 - .2 Indicate anticipated submission dates and review periods for shop drawings, samples, lists of materials and other documentation.
 - .3 Highlight critical items, including latest date for submittal review by Consultant.
 - .4 Design sequence of submissions to reflect requirements of construction schedule.
- .5 Equipment Delivery Schedule: indicate list of manufactured equipment complete with order dates and anticipated delivery dates.

1.4 PROGRESS PHOTOGRAPHS

- .1 Concurrently, with monthly application for payment, submit colour photographs, formatted as bitmap (bmp) or JPEG (jpg) image files, with minimum resolution of 1.2 megapixels.
- .2 Photographs shall be taken by an experienced photographer.
- .3 Positions of photographs to be determined by Consultant.
- .4 Photographs will be properly exposed and in focus, with unobstructed views.
- .5 Identify each photograph with the following information:
 - .1 name of Project,
 - .2 name of photographer,
 - .3 description of view, and
 - .4 date photograph was taken.

END OF SECTION

1 General

1.1 ADMINISTRATIVE

- .1 Submit to Consultant submittals listed for review. Submit with reasonable promptness and in an orderly sequence so as not to cause delay in the Work.
- .2 Work affected by the submittal shall not proceed until review is complete.
- .3 Review submittals prior to submission to the Consultant. Submittals not stamped, signed, dated and identified will not be reviewed by Consultant.
- .4 Contractor's responsibility for deviations in submission from requirements of Contract Documents is not relieved by Consultant review.
- .5 Include with each submission a duplicate transmittal document indicating the following:
 - .1 Date of initial submission,
 - .2 Date of each resubmission, and
 - .3 Project title and Consultant's project number.
- .6 Indicate on each submission, the following information:
 - .1 Name of Contractor,
 - .2 Name of Subcontractor,
 - .3 Name of supplier (as applicable),
 - .4 Name of manufacturer (as applicable),
 - .5 Name of person responsible for preparation of submission, and
 - .6 Relevant specification Section numbers.

1.2 SUBMITTALS PRIOR TO START OF WORK

- .1 Submit the following documents within the time stipulated, or, if not stipulated, prior to first application for payment:
 - .1 Insurance certificates,
 - .2 Bonds,
 - .3 Workplace Safety and Insurance Board certificates,
 - .4 Construction schedule,
 - .5 Interference drawings,
 - .6 Schedule of values,
 - .7 Cash flow schedule,
 - .8 Shop drawing schedule, and
 - .9 Equipment delivery schedule.

1.3 INTERFERENCE DRAWINGS

- .1 Prepare a set of interference drawings, identifying and resolving potential conflicts among various parts of the Work, including fire suppression systems, HVAC ductwork, plumbing and drainage lines, lighting, and electrical systems.
- .2 Submit three copies of interference drawings to Consultant prior to start of Work.
- .3 Coordinate and review interference drawings with affected Subcontractors prior to commencement of their portions of the Work.

1.4 SHOP DRAWINGS AND PRODUCT DATA

- .1 Refer to GC 3.10 - Shop Drawings.

- .2 Prepare Shop Drawings in metric. Shop Drawings containing only imperial measures may be rejected.
- .3 Submit Shop Drawings electronically as Adobe Acrobat PDF files for each requirement requested in specification Sections and as Consultant may reasonably request.
- .4 Submit Product data sheets or brochures electronically as Adobe Acrobat PDF files for requirements requested in specification Sections and as the Consultant may reasonably request where Shop Drawings will not be prepared due to standardized manufacture of product.
- .5 The Consultant's review of the Shop Drawings does not authorize changes in either the Contract Price or Contract Time.
- .6 After review, the Consultant will return Shop Drawings to Contractor. Produce and distribute the necessary copies to affected parties.

1.5 SAMPLES

- .1 No later than 3 weeks after the award of the Contract, submit to Consultant the following information:
 - .1 a complete list of Suppliers and manufacturers intended for use in the completion of the Contract.
 - .2 a complete set of colour samples required by the Contract Documents for verification or selection by Consultant. Include the preparation of any representative panels of materials or colours deemed necessary by the Consultant.
- .2 Adjustments made on samples by the Consultant are not intended to change the Contract Price or Contract Time. If adjustments affect the Contract Price or Contract Time, state such in writing to the Consultant prior to proceeding with the Work.

END OF SECTION

1 General

1.1 CONSTRUCTION SAFETY

- .1 Refer to GC 9.4 - Construction Safety.
- .2 Assume the role of "Constructor" as defined by applicable safety legislation.
- .3 Provide a copy of the registration filed with a Director under the provincial Occupational Health and Safety Act (Construction Projects); referred to as "Registration Forms of Construction and Employers of Workers".
- .4 Hold regular, scheduled safety meetings.

1.2 PROPER CONDUCT OF WORKERS

- .1 Ensure workers conduct themselves in a proper and civilized manner at all times.
- .2 Workers using improper language, cat calls, lewd comments, or improper behaviour will be required to leave the Place of the Work and will be replaced by the Contractor.
- .3 Smoking is not permitted at the Place of the Work.
- .4 The consumption of alcohol and the use of controlled substances is not permitted at the Place of the Work.

1.3 FAIR WAGES AND LOCAL LABOUR

- .1 Ensure rates of wages, working hours and conditions of work are in accordance with the requirements of the authorities having jurisdiction.
- .2 The Contractor shall give preference to using local labour, building mechanics and Suppliers.

1.4 NOISY WORK RESTRICTIONS

- .1 Schedule noisy work, or work requiring the use of pneumatic tools, in a manner to avoid disturbance to existing building occupants.
- .2 This may require portions of the Work to be performed outside normal working hours.

1.5 SPECIAL PROCEDURES FOR CONTRACTORS WORKING IN EXISTING BUILDINGS

- .1 Comply with Owner's procedures and requirements for contractors performing work in existing buildings.
- .2 Conform to the latest edition of "Guidelines For Maintaining Fire Safety During Construction in Existing Buildings", as issued by the Office of the Fire Marshal.
- .3 Coordinate requirements with local fire department. Discuss fire safety planning issues and alternative measures.

1.6 FIRE ALARMS

- .1 Fire and smoke sensors are installed throughout the existing building. These devices may be triggered by jarring either directly or indirectly while working in adjacent building areas.
- .2 Determine nature and exact locations of existing fire and smoke sensors prior to the commencement of the Work.

- .3 Notify Owner prior to commencement of any part of the Work in the vicinity of fire and smoke sensor devices.
- .4 Owner reserves the right to charge the Contractor for costs incurred as a result of false fire alarms activated as a result of the execution of the Work.

1.7 HEALTH AND SAFETY REQUIREMENTS

- .1 Prepare and initiate a Health and Safety Plan in accordance with appropriate regulatory agencies' requirements prior to commencing work activities involving the excavation, transport, or handling of potentially contaminated material.
- .2 Keep an up-to-date copy of the Health and Safety Plan at the Place of the Work.
- .3 Adhere to approved Health and Safety Plan for the duration of the removal and disposal of contaminated material from the Place of the Work.
- .4 Provide and maintain a safe working environment for on-site personnel and minimize the impact of construction activities on the general public and the surrounding environment.
- .5 Supply workers, Consultants, inspectors, and other site-visitors with appropriate personal protective equipment.
- .6 Should any unforeseen, or site-peculiar safety related factor, hazard, or condition become evident during the performance of the work, notify the authority having jurisdiction and the Consultant immediately, and take prudent temporary action to establish and maintain safe working conditions until suitable permanent action can be implemented. Safeguard workers, the public and the surrounding area from contamination.
- .7 Perform routine air monitoring at the Place of the Work, testing for organic vapours, explosive conditions, and oxygen deficient conditions. Evacuate work area immediately and implement corrective measures if unsatisfactory conditions are discovered.
- .8 In the event of injury to on-site personnel, contact the designated hospital and describe the injury prior to or during transport of injured personnel. Transport the injured personnel to the defined medical facility along a predefined route.
- .9 Take appropriate measures to minimize the contact of vehicles and equipment with potentially contaminated materials. Vehicles, equipment, and workers which do contact contaminated materials shall be decontaminated in an approved manner prior to leaving the Place of the Work.

END OF SECTION

1 General

1.1 REGULATORY REQUIREMENTS

- .1 Conform to the latest editions of the following regulatory requirements, hereinafter referred to as codes:
 - .1 The Ontario Building Code;
 - .2 The Ontario Fire Code;
 - .3 The Ontario Plumbing Code;
 - .4 The Canadian Electrical Code;
 - .5 The Construction Lien Act;
 - .6 The Occupational Health and Safety Act (Construction Projects);
 - .7 The Elevating Devices Act;
 - .8 The Workplace Hazardous Materials Information System Regulation (WHMIS);
 - .9 Waste Audits and Waste Reduction Workplans; and
 - .10 Industrial, Commercial and Institutional Source Separation Programs.
- .2 Conform to requirements of authorities having jurisdiction, including public utilities.
- .3 Nothing contained in the Contract Documents shall be so construed as to be in conflict with any law, by-law, or regulation of the municipal, regional, provincial, or other Authorities Having Jurisdiction. Perform all work in conformity with all such regulatory requirements.

1.2 PERMITS AND FEES

- .1 Refer to GC 10.2 - Laws, Notices, Permits and Fees.
- .2 Determine detailed requirements of authorities having jurisdiction.
- .3 Pay construction damage deposits levied by municipality in connection with the issuance of a building permit.

1.3 REFERENCES

- .1 Where edition date is not specified, consider that references to manufacturer's data, and published codes, standards and specifications are made to the latest edition or revision, approved by the issuing organization.
- .2 Reference standards and specifications are quoted to establish minimum standards. Work which in quality exceeds the specified minimum will be considered to conform.
- .3 The requirements of the Contract Documents govern over the requirements of reference standards and specifications.
- .4 Standards, specifications, associations and regulatory agencies are generally referred to throughout the Contract Documents by their abbreviated designations, as listed below:
 - .1 AA The Aluminum Association
 - .2 AAMA Architectural Aluminum Manufacturers' Association
 - .3 ACI American Concrete Institute
 - .4 AISI American Iron and Steel Institute
 - .5 AMCA Air Movement and Air Control Association
 - .6 ANSI American National Standards Institute
 - .7 ARI Air Conditioning and Refrigeration Institute
 - .8 ASME American Society of Mechanical Engineering
 - .9 ASTM American Society for Testing and Materials
 - .10 ASHRAE American Society of Heating, Refrigeration and Air Conditioning Engineers, Inc.

.11	AWMAC	Architectural Woodwork Manufacturers Association of Canada
.12	CGA	Canadian Gas Association
.13	CGSB	Canadian General Standards Board
.14	CHPA	Canadian Hardwood Plywood Association
.15	CISC	Canadian Institute of Steel Construction
.16	CRCA	Canadian Roofing Contractors' Association
.17	CRI	Carpet and Rug Institute
.18	CSA	Canadian Standards Association
.19	CSC	Construction Specifications Canada
.20	CSDMA	Canadian Steel Door Manufacturers' Association
.21	CSSBI	Canadian Sheet Steel Building Institute
.22	CWC	Canadian Wood Council
.23	DHI	Door and Hardware Institute
.24	FGMA	Fixed Glass Manufacturers' Association
.25	IGMAC	Insulated Glass Manufacturers' Association of Canada
.26	NFPA	National Fire Protection Association
.27	NHLA	National Hardwood Lumber Association
.28	NLGA	National Lumber Grades Authority
.29	OPCA	Ontario Painting Contractors' Association
.30	SMACNA	Sheet Metal and Air Conditioning Contractors' National Association
.31	ULC	Underwriters Laboratories of Canada
.32	ULI	Underwriters Laboratories Incorporated
.33	WHI	Warnock-Hersey International

1.4 QUALITY ASSURANCE

- .1 Quality of work shall be the best quality, executed by the workers experienced and skilled in the respective duties for which they are employed.
- .2 Maintain good order and discipline among workers engaged on the Project. Do not employ on the Work anyone not skilled in the tasks assigned.
- .3 Immediately notify the Consultant if required Work is such as to make it impractical to produce required results.
- .4 Decisions as to the quality or fitness of work in cases of dispute rest solely with the Consultant, whose decision is final.

1.5 QUALITY CONTROL

- .1 Refer to GC 2.3 - Review and Inspection of the Work.

1.6 TESTING AND INSPECTION SERVICES

- .1 Independent inspection and testing agencies will be engaged by the Owner for the purpose of inspecting and testing portions of the Work.
- .2 Cost of testing and inspection shall be paid from the stipulated sum cash allowance specified in Section 01 21 00.
- .3 Supply equipment required for executing inspection and testing by the appointed agencies.
- .4 Employment of inspection and testing agencies does not relax the responsibility to perform Work in accordance with the Contract Documents.
- .5 If defects are revealed during inspection and testing, the appointed agency will request additional inspection and testing to ascertain full degree of defect. Correct defects and irregularities as advised by Consultant at no additional cost to Owner. Pay costs for retesting and reinspection.
- .6 Allow inspection and testing agencies access to the Work, off-site manufacturing and fabrication plants.

- .7 Cooperate to provide reasonable facilities for such access.
- .8 Notify the appropriate agency and Consultant in advance of the requirement for tests, in order that attendance arrangements can be made.
- .9 Submit samples 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 the Work.
- .10 Provide labour and facilities to obtain and handle samples and materials on site. Provide sufficient space to store and cure test samples.

1.7 DEFECTIVE WORK

- .1 Refer to GC 2.4 - Defective Work.

1.8 QUALITY CONTROL REPORTS

- .1 Submit the identified quantity of inspection and test reports promptly to each of the following:
 - .1 Consultant: 2 copies.
 - .2 Owner: 1 copy.
 - .3 Authorities having jurisdiction: 1 copy each.
- .2 Forward copies of inspection and test reports promptly to each affected Subcontractor.

1.9 TESTS AND MIX DESIGNS

- .1 Furnish test results and mix design as may be required.
- .2 The costs of tests and mix designs beyond those called for in the Contract Documents or beyond those required by the law of the Place of Work shall be appraised by the Consultant and may be authorized as recoverable.

1.10 MOCK-UP

- .1 Prepare mock-ups for portions of the Work specifically requested in the Contract Documents. Include work of all Sections required to provide each mock-up.
- .2 Construct mock-ups in locations acceptable to Consultant.
- .3 Prepare mock-up for Consultant review with reasonable promptness and in an orderly sequence, so as not to cause delay in the Work.
- .4 Failure to prepare mock-up in ample time is not considered sufficient reason for an extension of Contract Time and no claim for extension by reason of such default will be allowed.
- .5 If requested, the Consultant will assist in preparing a schedule fixing the dates for preparation.
- .6 Specification section identifies whether the mock-up may remain as part of the Work or must be removed.

1.11 MILL TESTS

- .1 Submit mill tests certificates as may be requested.

1.12 EQUIPMENT AND SYSTEMS

- .1 Submit adjustment and balancing reports for mechanical, electrical and building equipment systems.
- .2 Refer to facility services Sections for definitive requirements.

END OF SECTION

1 General

1.1 ADMINISTRATIVE REQUIREMENTS

- .1 Provide temporary utilities as specified and as otherwise necessary to perform the Work.
- .2 Maintain temporary utilities in a neat and tidy condition.
- .3 Remove temporary utilities from Place of the Work after use.

1.2 TEMPORARY WATER SUPPLY

- .1 Arrange and pay for a temporary supply of water required during construction.
- .2 Arrange and pay for necessary water supply connections and disconnections.

1.3 TEMPORARY HEATING AND VENTILATION

- .1 Arrange and pay for temporary heating and ventilation required during construction.
- .2 Vent construction heaters in enclosed spaces to the outside or use flameless type of construction heaters.
- .3 Provide temporary heat for the Work as required to:
 - .1 Facilitate progress of the Work.
 - .2 Protect the Work against dampness and cold.
 - .3 Prevent moisture condensation on surfaces, freezing, or other damage to finishes or stored Products.
 - .4 Maintain specified minimum ambient temperatures and humidity levels for storage, installation, and curing of Products.
 - .5 After Project is enclosed, maintain interior air temperature between 10 degrees C and 35 degrees C.
- .4 Provide temporary ventilation for the Work as required to:
 - .1 Prevent accumulation of fumes, exhaust, vapours, gases and other hazardous, noxious, or volatile substances in enclosed spaces, as required to maintain a safe work environment meeting applicable regulatory requirements.
 - .2 Ventilate temporary sanitary facilities.
- .5 After Project is enclosed, maintain minimum one air change per hour for enclosed areas receiving architectural finishes. Do not allow excessive build up of moisture in the Work.
- .6 New permanent building heating and ventilation systems may be used during construction, at Contractor's option. If used during construction:
 - .1 Contractor shall pay utility costs resulting from the use of permanent systems.
 - .2 Operate systems in a non-wasteful and energy efficient manner. Be responsible for any system damage.
 - .3 Just prior to Ready-for-Takeover, replace filters, clean ducts, and perform other required maintenance to ensure systems are in as near as new condition as possible.
 - .4 Ensure systems manufacturers' warranties do not commence until the date of Ready-for-Takeover or, if manufacturers' warranties do commence earlier when systems are put into use, arrange for necessary extension of manufacturers' warranties or equivalent coverage under Contractor's warranty.

1.4 TEMPORARY ELECTRICAL POWER AND LIGHTING

- .1 Arrange and pay for temporary power and lighting required during construction.

- .2 Arrange and pay for necessary connections and disconnections of temporary power and lighting in accordance with regulatory requirements.
- .3 New permanent building power and lighting systems may be used during construction, at Contractor's option. If used during construction:
 - .1 Contractor shall pay utility costs resulting from the use of permanent systems.
 - .2 Operate systems in a non-wasteful and energy efficient manner. Be responsible for any system damage.
 - .3 Just prior to Ready-for-Takeover, replace lamps which have been used for more than two months.
 - .4 Ensure systems manufacturers' warranties do not commence until the date of Ready-for-Takeover or, if manufacturers' warranties do commence earlier when systems are put into use, arrange for necessary extension of manufacturers' warranties or equivalent coverage under Contractor's warranty.

END OF SECTION

1 General

1.1 ADMINISTRATIVE REQUIREMENTS

- .1 Provide temporary construction facilities as necessary for performance of the Work and in compliance with applicable regulatory requirements.
- .2 Maintain temporary construction facilities in good condition for duration of the Work.
- .3 Remove temporary construction facilities from Place of the Work when no longer required.

1.2 CONSTRUCTION PARKING

- .1 Limited parking will be permitted at Place of the Work.

1.3 VEHICULAR ACCESS

- .1 Provide and maintain adequate access to Place of the Work, ensuring continuous access by emergency vehicles.
- .2 Construct and maintain temporary access roads as required or where indicated on Drawings.
- .3 Clean municipal roadways located immediately adjacent to Place of the Work, regardless of cause, as follows:
 - .1 At least once per week on Friday afternoons, just before end of Working Day,
 - .2 After construction equipment or vehicles have left Place of the Work, resulting in soil or debris being deposited on roadway surfaces,
 - .3 As directed by authorities having jurisdiction, and,
 - .4 As directed by Consultant.
- .4 Municipal Road Closures: Conform to requirements of authorities having jurisdiction.

1.4 FIELD OFFICES

- .1 Provide a temperature controlled and ventilated Contractor's field office, with suitable lighting, sufficiently sized and furnished to accommodate Project meetings and Contract Document layout.
- .2 Consultants Field Office: Provide minimum 10 square metres of temporary office space for Consultant, either separately or within Contractor's field office.
- .3 Provide field office with at least one operable window and a lockable door.
- .4 Provide field office with temperature control, ventilation, and suitable power and lighting.
- .5 Equip field office with table and chairs to accommodate at least 8 meeting attendees, one 3-drawer filing cabinet, and one Drawing rack.
- .6 Provide appropriate emergency and first aid equipment as required by authorities having jurisdiction. Mount equipment in a prominent and easily accessible location, complete with easily identifiable labels.
- .7 Provide public access wi-fi internet service for use by Contractor and Consultant.
- .8 Provide a photocopier/ scanner for use by Contractor and Consultant.
- .9 Clean field office weekly.

- .10 Major Subcontractors may provide their own field offices as necessary. Direct the location of these offices.

1.5 STORAGE FACILITIES

- .1 Provide and maintain, in a clean and orderly condition, lockable weatherproof sheds for storage of Products and Construction Equipment.
- .2 Do not store Products or Construction Equipment in the field office.

1.6 SANITARY FACILITIES

- .1 Provide a sufficient quantity of temporary sanitary facilities, separate for male and female workers, in accordance with authorities having jurisdiction.
- .2 Keep sanitary facilities clean and fully stocked with necessary supplies.
- .3 Permanent sanitary facilities may not be used during construction.
- .4 Except where connected municipal sewer system, periodically remove wastes from Place of the Work.

1.7 FIRE PROTECTION

- .1 Provide and maintain temporary fire protection systems and equipment during construction.

1.8 TEMPORARY HOISTS AND CRANES

- .1 Provide, operate and maintain hoists and cranes required for moving of workers, Products and Construction Equipment.
- .2 Make financial arrangements with Subcontractors for use thereof.
- .3 Hoists and cranes shall be operated by a qualified operator.

1.9 PERMANENT ELEVATORS

- .1 Permanent elevators may be used by construction personnel and for transporting Products, at Contractor's option. If used during construction:
 - .1 Provide protective coverings for finish surfaces of cars and entrances.
 - .2 Just prior to Ready-for-Takeover, perform required maintenance to ensure elevators are in as near as new condition as possible.
 - .3 Ensure elevator manufacturer's warranty does not commence until the date of Ready-for-Takeover or, if manufacturer's warranty does commence earlier when elevators are put into use, arrange for necessary extension of manufacturer's warranty or equivalent coverage under Contractor's warranty.

1.10 PROJECT IDENTIFICATION SIGNS

- .1 Provide two Project identification signs complete with graphics and text.
- .2 Project identification signs shall be 2 440 x 2 440 mm in size, of wood frame and plywood construction with graphics produced by a professional sign company.
- .3 Indicate on Project identification signs the following information:
 - .1 Name of Project,
 - .2 Name and logo of Owner,
 - .3 Name and logo of Consultant, and

- .4 Name and logo of Contractor.
- .4 Relevant graphics and text will be supplied to Contractor by Owner and Consultant promptly after Contract award.
- .5 Submit Shop Drawings for Project identification sign graphics and text.
- .6 Erect Project identification signs within 3 weeks of Contract award, in locations directed by Consultant.
- .7 Erect Project identification signs plumb and level, with bottom of signs set minimum 1 220 mm above finished grade.
- .8 No other signs or advertisements, other than safety, warning, or directional signs, are permitted without Consultant's prior written approval.
- .9 Maintain Project identification signs in clean condition.
- .10 Remove and dispose of Project identification signs when directed by Consultant.

END OF SECTION

1 General

1.1 ADMINISTRATIVE REQUIREMENTS

- .1 Provide temporary barriers and enclosures necessary to protect the public and to secure Place of the Work during performance of the Work.
- .2 Comply with applicable regulatory requirements.
- .3 Maintain temporary barriers and enclosures in good condition for duration of the Work.
- .4 Remove temporary barriers and enclosures from Place of the Work when no longer required.

1.2 FENCING

- .1 Erect temporary security and safety site fencing of type and height determined by Contractor, subject to applicable regulatory requirements.
- .2 Provide lockable access gates as required to facilitate construction access.

1.3 WEATHER ENCLOSURES

- .1 Provide weather tight enclosures to unfinished door and window openings, tops of shafts, and other openings in floors and roofs.
- .2 Provide weather enclosures to protect floor areas where walls are not finished and to enclose work areas that require temporary heating.
- .3 Design weather enclosures to withstand wind pressure and snow loading requirements.

1.4 DUST TIGHT SCREENS AND PARTITIONS

- .1 Provide dust tight partitions to localize interior building areas from dust generating activities.
- .2 Erect, maintain, and relocate screens and partitions as required to facilitate construction operations.

1.5 FIRE ROUTES

- .1 Maintain fire access routes, including overhead clearances, for use by emergency response vehicles.

1.6 SECURITY AT PLACE OF THE WORK

- .1 Become familiar with Place of the Work and surrounding neighbourhood.
- .2 Provide adequate security measures to prevent vandalism, theft, arson and trespassing by unauthorized persons at Place of the Work.
- .3 Maintain security measures for 24 hours a day, 7 days a week, 52 weeks of the year, including times when construction may be shut down due to strikes or lockouts.
- .4 Remove security measures upon Ready-for-Takeover.

1.7 PROTECTION OF BUILDING FINISHES

- .1 Provide necessary temporary barriers and enclosures to protect completed or partially-completed finished surfaces from damage during performance of the Work.

END OF SECTION

1 General

1.1 ADMINISTRATIVE REQUIREMENTS

- .1 Provide temporary controls necessary for performance of the Work and in compliance with applicable regulatory requirements.
- .2 Maintain temporary controls in good condition for duration of the Work.
- .3 Remove temporary controls and Construction Equipment used to provide temporary controls from Place of the Work when no longer required.

1.2 PLANT PROTECTION

- .1 Protect trees and other plant material designated to remain at Place of the Work where indicated on Drawings.
- .2 Protect trees and shrubs susceptible to damage during construction to OPSS.MUNI 801.
- .3 For trees designated to remain, protect roots inside dripline from disturbance or damage during excavation and grading. Avoid traffic, dumping and storage of materials over root zones.
- .4 Minimize stripping of topsoil near trees and other plant material designated to remain at Place of the Work.
- .5 Provide lockable access gates as required to facilitate construction access.

1.3 DUST AND PARTICULATE CONTROL

- .1 Implement and maintain dust and particulate control measures in accordance with applicable regulatory requirements.
- .2 Execute Work by methods that minimize dust from construction operations and spreading of dust at Place of the Work or to adjacent properties.
- .3 Provide temporary dust tight enclosures to prevent extraneous materials resulting from sandblasting or similar operations from contaminating air beyond immediate work area. Refer to Section 01 56 00.
- .4 Cover or wet down dry materials and rubbish to prevent blowing dust and debris. Provide dust control for temporary roads.
- .5 Use appropriate covers on trucks hauling fine, dusty or loose materials.

1.4 DEWATERING

- .1 Provide temporary drainage and pumping as necessary to dewater excavations, trenches, foundations and other parts of the Work. Maintain such areas free of water arising from groundwater or surface runoff, as required to keep them stable, dry and protected from damage due to flooding.
- .2 Maintain standby equipment necessary to ensure continuous operation of dewatering system.
- .3 Do not pump water containing suspended materials or other harmful substances into waterways, sewers or surface draining systems. Treat or dispose of such water in accordance with applicable regulatory requirements.

1.5 DRAINAGE AT PLACE OF THE WORK

- .1 Maintain grades to ensure proper drainage at Place of the Work.
- .2 Prevent surface water runoff from leaving Place of the Work.
- .3 Prevent precipitation from infiltrating or from directly running off stockpiled materials. Cover stockpiled materials with an impermeable liner during periods of work stoppage including at end of each Working Day.
- .4 Control surface drainage from cuts and fills, from borrow and waste disposal areas, from stockpiles, staging areas and other work areas as required to prevent erosion and sedimentation.
- .5 Control surface drainage by ensuring gutters are kept open and water is not directed across or over pavements or sidewalks, except through pipes or properly constructed troughs. Ensure runoff from unfinished areas is intercepted and diverted to suitable outlets.
- .6 Periodically inspect and clean catch basins and storm lines at Place of the Work to ensure their continuous operation during performance of the Work and upon Ready-for-Takeover.

1.6 EROSION AND SEDIMENT CONTROL

- .1 Minimize amount of bare soil exposed at one time. Stabilize disturbed soils as quickly as practical to minimize erosion. Remove accumulated sediment resulting from construction activity from adjoining surfaces, drainage systems and watercourses. Make good damage caused by soil erosion and sedimentation.
- .2 Provide and maintain appropriate temporary measures such as silt fences, straw bales, ditches, geotextiles, drains, berms, terracing, riprap, temporary drainage piping, sedimentation basins, vegetative cover, dikes and other measures that may be required to prevent erosion and migration of silt, mud, sediment and other debris.
- .3 Do not disturb existing embankments or embankment protection.
- .4 Periodically inspect erosion and sediment control measures to detect evidence of erosion and sedimentation. Promptly take corrective measures when necessary.
- .5 If soil and debris from Place of the Work accumulate in ditches or other low areas, remove accumulation and restore area to original condition.

1.7 POLLUTION CONTROL

- .1 Take measures to prevent contamination of soil, water, and atmosphere through uncontrolled discharge of noxious or toxic substances and other pollutants, potentially causing environmental damage.
- .2 Be prepared, by maintaining appropriate materials, equipment, and trained personnel at Place of the Work, to intercept, clean up, and dispose of spills or releases that may occur. Promptly report spills and releases that may occur to:
 - .1 Authority having jurisdiction.
 - .2 Person causing or having control of pollution source, if known.
 - .3 Owner and Consultants.
- .3 Contact manufacturer of pollutant, if known and applicable, to obtain safety data sheets (SDS) and ascertain hazards involved and precautions and measures required in cleanup or mitigating actions.
- .4 Take immediate action to contain and mitigate harmful effects of the spill or release.

END OF SECTION

1 General

1.1 BASIC PRODUCT REQUIREMENTS

- .1 Refer to GC 3.8 - Labour and Products.

1.2 OWNER FURNISHED ITEMS

.1 Owner's Responsibilities

- .1 Arrange for delivery of shop drawings, product data, samples, manufacturer's instructions and certificates to Contractor.
- .2 Deliver supplier's bill of materials to Contractor.
- .3 Arrange and pay for delivery to the Place of the Work in accordance with progress schedule.
- .4 Inspect deliveries jointly with the Contractor.
- .5 Submit claims for transportation damage.
- .6 Arrange for replacement of damaged, defective or missing items.
- .7 Arrange for manufacturer's field services; arrange for and deliver manufacturer's warranties and bonds to Contractor.

.2 Contractor's Responsibilities

- .1 Designate submittals and delivery date for each product in progress schedule.
- .2 Review shop drawings, product data, samples, manufacturer's instructions and other submittals. Submit to Consultant notification of any observed discrepancies or problems anticipated due to non-conformance with Contract Documents.
- .3 Receive and unload products at the Place of the Work.
- .4 Inspect deliveries jointly with Owner, record shortages and damaged or defective items.
- .5 Handle Products at the Place of the Work, including uncrating and storage.
- .6 Protect Products from damage and from exposure to elements.
- .7 Assemble, install, connect, adjust and finish Products.
- .8 Conduct installation inspections required by public authorities.
- .9 Repair or replace items damaged by Contractor or Subcontractors at the Place of the Work.

.3 Schedule of Owner-Furnished Items

- .1 Paper towel dispenser.

1.3 PRODUCT DELIVERY REQUIREMENTS

- .1 Ensure that Products are packaged, delivered and stored to prevent damage and to ensure that their moisture content is not increased beyond manufactured or specified installation limits.
- .2 Label packaged goods to completely describe contents.
- .3 Immediately review Product delivery requirements and anticipate foreseeable supply delays for any items.
- .4 In the event of failure to notify the Consultant at commencement of Work, the Consultant reserves the right to substitute more readily available products of similar character, at no increase in Contract Price.

1.4 PRODUCT STORAGE AND HANDLING REQUIREMENTS

- .1 Handle and store Products in a manner to prevent damage, adulteration, deterioration and soiling and in accordance with manufacturer's instructions when applicable.
- .2 Provide necessary protection for those materials that require it.
- .3 Store Products in a neat and tidy manner.

- .4 Store packaged or bundle Product in original and undamaged condition with manufacturer's seal and labels intact. Do not remove from packaging or bundling until required in the Work.
- .5 Do not allow Product to be placed in contact with the ground nor with other materials that could stain them. Store Product subject to damage from weather in weatherproof enclosures.
- .6 Store paint and other volatile substances in a separate structure located at least 15 metres from the building and equipped with a fire extinguisher.
- .7 Store materials within the building only as approved by Owner. Move materials stored within the building should they be a hindrance to the work or delivery of other materials.
- .8 Receive, handle, protect and store Products purchased by the Owner for the Work as it is delivered to the premises.
- .9 Remove flammable rubbish and packing materials such as sawdust, paint cans, wood shavings, etc. from the Place of the Work.

END OF SECTION

1 General

1.1 SUBMITTALS

- .1 Submit name and address of surveyor to Consultant.
- .2 On request of Consultant, submit documentation to verify accuracy of field engineering work.
- .3 Maintain a complete, accurate log of control and survey work as it progresses.
- .4 Submit certified surveys of the Work in accordance with the authorities having jurisdiction. Indicate dimensions, locations, angles, inverts and elevations; at the following stages of the Work:
 - .1 On completion of the building footings and foundations.
 - .2 On completion of the utility services and pavements.
 - .3 On completion of the finish grading and landscaping.
- .5 Submit a certificate signed by the surveyor certifying that the inverts, elevations, grades and locations of the completed Work are either in conformance, or non-conformance with the Contract Documents.

1.2 QUALITY ASSURANCE

- .1 Surveyor: registered land surveyor, acceptable to Owner.

1.3 FIELD ENGINEERING

- .1 Retain services of a surveyor.
- .2 Existing base horizontal and vertical control points are designated on Drawings.
- .3 Locate, confirm and protect control points prior to starting work. Preserve permanent reference points during construction.
- .4 Make no changes or relocations without prior written notice to Consultant.
- .5 Report to Consultant when a reference point is lost or destroyed or requires relocation because of necessary changes in grades or location.
- .6 Require surveyor to replace control points in accordance with original survey control.
- .7 Establish 2 permanent bench marks at the Place of the Work, referenced to established bench marks by survey control points. Record locations with horizontal and vertical data in Project Record Documents.
- .8 Establish lines and levels, locate and lay out by instrumentation.
- .9 Stake for grading, fill and topsoil placement and landscaping features.
- .10 Stake slopes and berms.
- .11 Establish pipe invert elevations.
- .12 Stake batter boards for foundations.
- .13 Establish foundation and column locations and floor elevations.
- .14 Establish lines and levels for mechanical and electrical work.

1.4 CONCEALED CONDITIONS

- .1 Refer to GC 6.4 - Concealed or Unknown Conditions.

1.5 EXAMINATION AND ACCEPTANCE OF CONDITIONS

- .1 Verify conditions are ready to receive installation.
- .2 Ensure substrate surfaces are clean, dimensionally stable, cured and free of contaminants such as oil, sealers and curing compounds.
- .3 Notify Consultant in writing of unacceptable conditions.
- .4 Commencement of installation means acceptance of conditions.

END OF SECTION

1 General

1.1 COLD WEATHER REQUIREMENTS

- .1 Perform the Work continually and avoid weather delays.
- .2 Provide temporary heating and cold weather working measures during the cold weather periods and winter months. Refer to Section 01 50 00.
- .3 Construction delays, whether the responsibility of the Contractor or otherwise, which result in unanticipated or extended winter work will not be considered justification for claims for additional payments.
- .4 Uniformly distribute heat to avoid hot or cool areas or excessive drying.

1.2 SITE STORAGE AND OVERLOADING

- .1 Refer to GC 3.11 - Use of the Work.

1.3 EXISTING UTILITIES

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

1.4 EXECUTION REQUIREMENTS

- .1 Unless otherwise indicated in the specifications, install or erect Products in accordance with manufacturer's instructions.
- .2 Improper installation or erection of Products, due to failure to comply with these requirements, authorizes Consultant to require removal and reinstallation at no increase in Contract Price.
- .3 In finished areas, conceal pipes, ducts, and wiring in floors, walls and ceilings, except where indicated otherwise.
- .4 Extra payment for incidental furring or other enclosure will not be approved.
- .5 Provide metal fastenings and accessories in same texture, colour and finish as adjacent materials, unless indicated otherwise.
- .6 Prevent electrolytic action between dissimilar metals and materials.
- .7 Use non-corrosive hot dip galvanized steel fasteners and anchors for securing exterior work, unless stainless steel or other material is specifically requested in the affected specification Section.
- .8 Prevent overloading of any part of the Work. Do not cut, drill or sleeve any load bearing structural member, unless specifically indicated without written approval of Consultant.
- .9 Remedial Work: Refer to GC 3.12 - Cutting and Remedial Work, and Section 01 73 29.

END OF SECTION

1 General

1.1 SUBMITTALS

- .1 Submit written request in advance of cutting or alteration which affects:
 - .1 Structural integrity of any element of Project.
 - .2 Integrity of weather-exposed or moisture-resistant elements.
 - .3 Efficiency, maintenance or safety of any operational element.
 - .4 Visual qualities of sight-exposed elements.
 - .5 Work of Owner or separate contractor.
- .2 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 contractors.
 - .8 Date and time work will be executed.

1.2 MATERIALS

- .1 Required for original installation.
- .2 Change in Materials: Submit requests for substitutions as specified in Section 01 25 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 and patching means acceptance of existing conditions.
- .4 Provide supports to assure structural integrity of surroundings; devices and methods to protect other portions of project from damage.
- .5 Provide protection from elements for areas which may be exposed by uncovering work; maintain excavations free of water.

1.4 EXECUTION

- .1 Execute cutting, fitting, and patching including excavation and fill to complete the Work.
- .2 Fit the several parts together, to integrate with other work.
- .3 Uncover work to install ill-timed work.
- .4 Remove and replace defective and non-conforming work.
- .5 Remove samples of installed work for testing.
- .6 Provide openings in non-structural elements of Work for penetrations of mechanical and electrical work.

- .7 Execute cutting and patching using methods to avoid damage to other portions of the Work, and which will result in proper surfaces to receive finishing.
- .8 Employ properly trained labourers to perform cutting and patching for weather-exposed and moisture-resistant elements, and for visually-exposed surfaces.
- .9 Cut rigid materials using masonry saw or core drill. Pneumatic or impact tools not allowed with masonry materials without prior written approval.
- .10 Restore work with new products in accordance with requirements of Contract Documents.
- .11 Fit work airtight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.
- .12 At penetration of fire-rated wall, ceiling or floor construction, completely seal voids with firestopping and smoke seal materials, full thickness of the construction element.
- .13 Refinish surfaces to match adjacent finishes: For continuous surfaces refinish to nearest intersection; for an assembly, refinish entire unit.

END OF SECTION

1 General

1.1 PROGRESS CLEANING

- .1 Maintain the Work in tidy condition, free from accumulation of waste products and debris, other than that caused by the Owner or other contractors.
- .2 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.
- .3 Remove waste material and debris from the Place of the Work in an approved manner at the end of each Working Day.
- .4 Clean interior areas prior to installing finishing Products.
- .5 Maintain areas free of dust and other contaminants during finishing operations.

1.2 FINAL CLEANING

- .1 Refer to GC 3.13 - Cleanup.
- .2 Provide professional cleaning by a recognized, established cleaning company.
- .3 Standards Meeting: Prior to final cleaning, hold a meeting on site to determine the acceptable standard of cleaning. Owner, Consultant, Contractor and cleaning Subcontractor to be in attendance.
- .4 Lock each room after completing final cleaning in that area.
- .5 Restrict access to areas that have been final cleaned. Re-clean areas that have been accessed by workers prior to Owner occupancy.
- .6 Remove labels, stains, dirt and smudges from finished surfaces. Conform to respective manufacturers' recommendations.
- .7 Clean and polish glass, mirrors, hardware, wall tile, stainless steel, chrome, porcelain enamel, baked enamel, and plastic laminate.
- .8 Replace broken, scratched or disfigured glass.
- .9 Clean electrical and mechanical fixtures and other fittings of labels, wrappings, paper and other foreign material.
- .10 Vacuum clean and dust building interiors, including inside ducts, blowers and coils and behind grilles, louvres and screens.
- .11 With the exception of resilient floors, prepare flooring as recommended by manufacturers.
- .12 Power wash exterior paved surfaces.

1.3 WASTE MANAGEMENT AND DISPOSAL

- .1 Fire and burning of rubbish and waste materials at the Place of the Work is not permitted.
- .2 Burying of rubbish and waste materials at the Place of the Work is not permitted.
- .3 Use of Owner's waste containers is not permitted.

- .4 Disposal of waste or volatile materials, such as kerosene, mineral spirits, oil or paint thinner into storm or sanitary sewers is prohibited. Collect such waste materials in appropriate containers and dispose of in accordance with the regulations and guidelines of the authority having jurisdiction.
- .5 Provide on-site disposal service for rubbish accumulated by Subcontractors and Suppliers, in accordance with the requirements of the local municipality.
- .6 Prevent extraneous materials from contaminating air beyond application areas by providing temporary enclosures as specified in Section 01 50 00.
- .7 Cover or wet down dry materials and rubbish to prevent blowing dust and debris.
- .8 Deposit packaging materials in appropriate container at the Place of the Work for recycling or reuse.
- .9 Avoid using landfill waste disposal procedures when recycling facilities are available.

1.4 HAZARDOUS WASTE DISPOSAL

- .1 If and when required, remove and dispose of contaminated material in accordance with the regulations and guidelines of the authority having jurisdiction.
- .2 Contaminated material shall be transported by a licensed waste hauling company. Submit a copy of the "Certificate of Approval" to the Consultant prior to the transport of any contaminated material.
- .3 Stockpile suspected contaminated material temporarily in neat and secure stockpiles overlying a double layer of 0.20 mm thick high density polyethylene. Isolate stockpiles from remainder of the Site and cover with a single layer of 0.20 mm thick polyethylene to prevent entry, wind disturbance or the collection of surface water.
- .4 Do not transport potentially contaminated material until such material has been identified by the appropriate authority.

END OF SECTION

1 General

1.1 PROTECTING INSTALLED CONSTRUCTION

- .1 Adequately protect parts of the Work that are completed and in-progress.
- .2 Protect Products from cold-weather during construction. Make Good damage to the Work resulting from lack of adequate heating protection.
- .3 As soon as the Work is sufficiently advanced, and in order to prevent delay, enclose the Work using tarpaulins, plastic sheeting or glazing and temporary doors, with locks to doors as required.
- .4 Following completion of the roof system, adequately ventilate the Work to prevent moisture build-up under the new roof membrane. Coordinate requirements with roofing Subcontractor's recommendations.
- .5 Provide protection for finished and partially finished building finishes and equipment during performance of the Work.
- .6 Protect existing trees and vegetation designated to remain from construction damage. Provide snow fencing or other protection where directed by Consultant.
- .7 Make Good parts or portions of the Work identified as defective or unacceptable. Coordinate adjacent affected Work as required.

END OF SECTION

1 General

1.1 CLOSEOUT PROCEDURES

- .1 Conform to OAA/OGCA Document 100.
- .2 Above Ceiling Work
 - .1 Prior to installation of gypsum board ceilings and placement of acoustical lay-in ceiling tiles, advise Consultant that above-ceiling work is complete and ready for review. Allow minimum 72 hours' notice for any cancellation or changes; failure to do so may result in back charges to Contractor for costs of Owner's personnel.
 - .2 Owner, Consultant, and affected subconsultants will conduct above-ceiling review and prepare list of deficiencies.
 - .3 Correct deficiencies and advise Consultant when they have been corrected.
 - .4 Do not install gypsum board ceilings or acoustical ceiling panels until Consultant has verified that all above-ceiling deficiencies have been corrected.
 - .5 The substantial performance inspection may not proceed until all above-ceiling deficiencies have been corrected.
- .3 Substantial Performance of the Work
 - .1 Prior to requesting Substantial Performance of the Work, prepare and submit a complete deficiency list.
 - .2 Owner, Consultant, and affected subconsultants will review the Work and may require additional items to be added to the deficiency list.
 - .3 Prior to requesting Substantial Performance of the Work, submit the following:
 - .1 Written statement that the Work has been substantially performed in accordance with the Contract Documents and is ready for use.
 - .2 Verification that operation of systems has been demonstrated to Owner.
 - .3 Two copies of complete and reviewed operations and maintenance manuals.
 - .4 Inspection and acceptance certificates required from regulatory agencies.
 - .5 Life safety systems verification.
- .4 Final Payment
 - .1 When deficiencies have been corrected, but not later than 60 days after the date of Substantial Performance of the Work, request a final review of the Work.
 - .2 Owner, Consultant, and affected subconsultants will review the Work and notify the Contractor of outstanding deficiencies.
 - .3 After expiry of 60 day period, Owner may elect to correct outstanding deficiencies and deduct resulting costs from final payment. Deficient work shall be valued at 150 percent of normal cost with no item less than \$50.00.
 - .4 Prior to claiming final payment, submit:
 - .1 record drawings.
 - .2 a complete set of reviewed Shop Drawings, folded to 8-1/2" x 11" size, contained in heavy duty manila envelopes, numbered and labelled. Follow specification format with no more than one Section per envelope.
 - .3 maintenance manuals.
 - .4 a final accounting of all approved changes to the Contract Price, including adjustments to cash allowances.

END OF SECTION

1 General

1.1 OPERATION AND MAINTENANCE MANUALS

- .1 Submit two final copies of operating and maintenance manuals to Consultant as described above.
- .2 Organize data in the form of an instructional manual in binders of commercial quality, 8-1/2" x 11" size, maximum ring size.
- .3 Cover: Identify each binder with typed or printed title "Project Record Documents"; list title of Project, identify subject matter of contents.
- .4 Arrange content by systems, under Section numbers and sequence of Table of Contents.
- .5 Provide tabbed fly leaf for each separate product and system, with typed description of product and major component parts of equipment.
- .6 Extended Warranties: arranged in systematic order matching specification format;. Include a listing of extended warranties. Each warranty must indicate the name and address of the Project, the name of the Owner and the corresponding Section number and title, and the issuer's name, address, telephone and fax number, contact person information, seal and signature.
- .7 Drawings: Provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.
- .8 Product Data: Mark each sheet to clearly identify specific products and component parts, and data applicable to installation; delete inapplicable information.
- .9 As a minimum requirement, include the following material as applicable:
 - .1 Table of Contents. If more than one volume is required, provide a cross-reference contents page at the front of each volume.
 - .2 Complete list of Subcontractors and Suppliers, indicating name, address, telephone and fax numbers, contact person information, and description of work performed.
 - .3 Complete list of Products used in the Work, indicating Product name, part number or code and manufacturer for each listing.
 - .4 Finish hardware schedule, as amended.
 - .5 Schedule of paints and coatings, including identification of each surface with applicable paint or coating used. Enclose copy of colour schedule.
 - .6 Maintenance instructions for all finished surfaces.
 - .7 Brochures, cuts of equipment and fixtures.
 - .8 Operating and maintenance instructions for equipment.
 - .9 Valve manual.
 - .10 Controls schematics.
 - .11 Air and water balancing reports.
 - .12 Extended warranties.
 - .13 Maintenance contracts.
 - .14 Other data required by the Contract Documents.

1.2 AS-BUILT DOCUMENTS

- .1 Promptly record revisions, omissions and additions on a set of black line opaque Drawings and in the Project Manual. These documents must be kept up to date at all times. *Failure to do so will result in postponement of payment.*
- .2 Record information concurrently with construction progress.

- .3 Do not conceal work until required information is recorded.
- .4 Specifications: legibly mark each item to record actual construction, including manufacturers, trade name, and catalog number of each project actually installed, particularly optional items and substitute items.
- .5 Other Documents: maintain manufacturers' certifications, inspection certifications, hardware schedules, colour schedules and field test records as required by the individual specification Sections.

1.3 RECORD DOCUMENTS

- .1 Prior to Substantial Performance of the Work, collect as-built documents and have information electronically transferred to a master set of drawing files provided by the Consultant, in AutoCAD Release 2026.
- .2 Mark revised drawings as "RECORD DRAW INGS". Include all revisions, with special emphasis on mechanical, electrical, structural steel and reinforced concrete.
- .3 Employ a competent computer draftsman to indicate changes on the electronic set of Record Drawings.
- .4 Submit completed Record Drawings to Owner on a CD-ROM, accompanied by 3 hard copy sets.

1.4 SPARE PARTS AND MAINTENANCE MATERIALS

- .1 Two weeks prior to Substantial Performance of the Work, submit to Consultant any special tools or equipment supplied for maintenance purposes.
- .2 Spare parts and maintenance materials provided shall be new, not damaged or defective, and of same quality and manufacture as Products provided in the Work. If requested, furnish evidence as to type, source and quality of Products provided.
- .3 Defective Products will be rejected, regardless of previous inspections. Replace products at own expense.
- .4 Store spare parts and maintenance materials in a manner to prevent damage, or deterioration.
- .5 Provide spare parts, special tools, maintenance and extra materials in quantities specified in individual specification Sections.
- .6 Provide items of same manufacture and quality as items in Work.

END OF SECTION

1 General

1.1 REFERENCES

- .1 Associated Air Balance Council (AABC): National Standards for Field Measurements and Instrumentation, Total Systems Balance, Air Distribution Hydronics Systems.

1.2 QUALITY ASSURANCE

- .1 Testing Organization: Current member in good standing of AABC certified to perform specified services.
- .2 Perform services under direction of supervisor qualified under certification requirements of sponsoring association.

1.3 SUBMITTALS

- .1 Prior to start of Work, submit names of specialty personnel proposed to perform services.
- .2 Submit 3 copies of final reports on applicable forms.

1.4 SYSTEM START-UP PROCEDURES

- .1 Comply with procedural standards of certifying associations under whose standards these services will be performed.
- .2 Arrange for affected Subcontractors to send senior and capable personnel for demonstrations, training and start-up instructions prior to system start-up.
- .3 Start-up the following equipment and systems, bringing them to expected operational levels:
 - .1 Heating, ventilating and air conditioning.
 - .2 Building security.
 - .3 Fire detection.
 - .4 Fire suppression.
- .4 Report to Consultant any deficiencies or defects noted during start-up.
- .5 Prepare each system for testing and balancing.

1.5 TESTING, ADJUSTING AND BALANCING PROCEDURES

- .1 Test equipment, balance distribution systems, and adjust devices for building equipment and systems noted above.
- .2 Cooperate with testing organization, provide access to equipment and systems.
- .3 Notify testing organization 7 days prior to when the Project will be ready for testing, adjusting, and balancing.
- .4 Provide instruments required for test, adjust, and balance operations.
- .5 Verify systems installation is complete and in continuous operation.
- .6 Verify lighting is turned on when lighting is included in cooling load.
- .7 Verify equipment is in full operation.

1.6 DEMONSTRATION AND TRAINING

- .1 Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, and maintenance of each item of equipment at agreed upon times, at the equipment location.
- .2 Owner will prepare a list of personnel to receive instructions and will coordinate their attendance at agreed upon times.
- .3 Instruct personnel in the phases of operation and maintenance using operation and maintenance manuals as the basis of instruction.
- .4 Review contents of manual in detail to explain aspects of operation and maintenance.
- .5 Allow Owner to video record demonstration and training sessions.
- .6 Prepare and insert additional data in operations and maintenance manuals when the need for additional data becomes apparent during demonstrations.

END OF SECTION

1 General

1.1 COMMISSIONING AGENCY

- .1 Contractor shall retain and pay for a commissioning agency to undertake commissioning services for the Project.

1.2 CONTRACTOR RESPONSIBILITIES

- .1 Contractor shall:
 - .1 Prepare each system ready for commissioning. Verify systems installation is complete and in operation.
 - .2 Coordinate commissioning with and assist commissioning agency.
 - .3 Perform and document verification, performance testing, adjusting, and balancing operations.
 - .4 Cooperate with commissioning agency and provide access to equipment and systems.
 - .5 Supply personnel and operate systems at designated times, and under conditions required for proper commissioning.
 - .6 Make instruments available to commissioning agency to facilitate spot checks during commissioning.
 - .7 Participate in commissioning meetings.
 - .8 Complete commissioning forms as requested by commissioning agency.
 - .9 Correct deficiencies identified in commissioning process.
 - .10 Incorporate commissioning data into operation and maintenance manual.
 - .11 Ensure commissioning agency participates in demonstration and training as specified in Section 01 79 00.

1.3 COMMISSIONING AGENCY RESPONSIBILITIES

- .1 The commissioning agency will:
 - .1 Prepare a commissioning plan, including a list of systems to be commissioned, forms, checklists, and responsibilities of commissioning team members.
 - .2 Implement the commissioning plan and lead the commissioning team through start-up, verification, performance testing, training, and document preparation.
 - .3 Convene, chair, prepare and distribute minutes of commissioning meetings.
 - .4 Supervise commissioning activities and witness inspections and tests.
 - .5 Make periodic visits to Place of the Work for the purpose of selective checking of accuracy of commissioning form submissions, witness testing, and review of mock-ups.
 - .6 Review content of operation and maintenance manual.
 - .7 Supply instruments necessary for commissioning.

1.4 CONSULTANT RESPONSIBILITIES

- .1 Consultant will:
 - .1 Participate in commissioning meetings.
 - .2 Coordinate commissioning agency's involvement in Shop Drawing review process.
 - .3 Review verification and performance test results and direct Contractor to correct defects or deficiencies in the Work.
 - .4 Initiate Change Orders or Change Directives identified as necessary by commissioning process.
 - .5 Review final commissioning report.

1.5 OWNER RESPONSIBILITIES

- .1 Owner will:
 - .1 Assign operation and maintenance personnel to participate in meetings and witnessing of demonstration and training.
 - .2 Designate a person to acknowledge receipt of reports.

END OF SECTION

DIVISION 2

EXISTING CONDITIONS

Part 1 General

1.1 SUMMARY

- .1 This Section includes requirements for the following:
- .2 This section does not include for the removal of Hazardous Substances or asbestos abatement, or selective demolition of interior building components and finishes.
- .3 Drawings contain details that suggest directions for solving some of the major demolition and removal requirements for this Project. Contractor representative is required to develop these details further by submitting a demolition plan prepared by a professional engineer.

1.2 RELATED REQUIREMENTS

- .1 Section 02 41 19 - Selective Demolition

1.3 DEFINITIONS

- .1 Demolition: Destruction of building following removal of Hazardous Substances.
- .2 Hazardous Substances: Dangerous substances, dangerous goods, hazardous commodities and hazardous products, may include but not limited to: asbestos PCB's, CFC's, HCFC's poisons, corrosive agents, flammable substances, ammunition, explosives, radioactive substances, or other material that can endanger human health or wellbeing or environment if handled improperly as defined by the federal Hazardous Products Act including latest amendments.
- .3 Waste Management Coordinator (WMC): Contractor representative responsible for supervising waste management activities as well as coordinating related, required submittal and reporting requirements.
- .4 Draft Construction Waste Management Plan (Draft CWM Plan): Detailed inventory of materials in building indicating estimated quantities of reuse, recycling and landfill, prepared in accordance with Section 01 74 00 - Waste Management and Disposal and as follows:
 - .1 Involves quantifying by volume/weight amounts of materials and wastes generated during construction, demolition, deconstruction, or renovation project.
- .5 Construction Waste Management Plan (CWM Plan): Written plan addressing opportunities for reduction, reuse, or recycling of materials prepared in accordance with Section 01 74 00 - Waste Management and Disposal .
- .6 Construction Waste Management Report (CWM Report): Written report identifying actual materials that formed CWM Plan for reduction, reuse, or recycling of materials prepared in accordance with Section 01 74 00 - Waste Management and Disposal .

1.4 REFERENCE STANDARDS

- .1 CSA Group (CSA):
 - .1 CSA S350- Latest edition; Code of Practice for Safety in Demolition of Structures
- .2 Department of Justice Canada (Jus):
 - .1 Canadian Environmental Protection Act (CEPA), 1999
 - .1 SOR/2003-2, On-Road Vehicle and Engine Emission Regulations
 - .2 SOR/2006-268, Regulations Amending the On-Road Vehicle and Engine Emission Regulations
 - .3 Transportation of Dangerous Goods Act (TDGA), 1992, c. 34
 - .4 Motor Vehicle Safety Act (MVSA), 1995
 - .5 Hazardous Substances Information Review Act, 1985

- .2 Hazardous Products Act, RSC 1985, c H-3
- .3 National Fire Protection Association (NFPA)
 - .1 NFPA 241- 21, Standard for Safeguarding Construction, Alteration, and Demolition Operations
- .4 National Research Council Canada (NRC):
 - .1 National Building Code of Canada 2015 (NBC)
- .5 Underwriters' Laboratories of Canada (ULC):
 - .1 CAN/ULC-S660-08, Standard for Nonmetallic Underground Piping for Flammable and Combustible Liquids
 - .2 ULC/ORD-C58.15-1992, Overfill Protection Devices for Flammable Liquid Storage Tanks
 - .3 ULC/ORD-C58.19-1992, Spill Containment Devices for Underground Flammable Liquid Storage Tanks

1.5 ADMINISTRATIVE REQUIREMENTS

- .1 Coordination: Coordinate with [Consultant] [Owner] for the material ownership as follows:
 - .1 Except for items or materials indicated to be reused, salvaged, reinstalled, or otherwise indicated to remain on the property, demolished materials shall become the Contractor's property and shall be removed from Project site.
 - .2 Historic items, relics, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, antiques, and other items of interest or value to the Owner that may be encountered during demolition remain the Owner's property:
 - .1 Carefully remove and salvage each item or object in a manner to prevent damage and deliver promptly to the Owner.
 - .2 Coordinate with the Owner, who will establish special procedures for removal and salvage operations.
- .2 Pre-Demolition Meetings:
 - .1 Convene pre-installation meeting 1 week before beginning work of this Section, with the Consultant in accordance with Section 01 31 19 - Project Meetings to:
 - .1 Verify project requirements.
 - .2 Verify existing site conditions adjacent to demolition work.
 - .3 Coordination with other construction subtrades.
 - .2 Hold project meetings every two weeks.
 - .3 Ensure key personnel, site supervisor, project manager, and Subcontractor representatives attend.
 - .4 The Contractor will provide written notification of change to meeting schedule established upon contract award 24 hours before scheduled meeting.
- .3 Scheduling:
 - .1 Employ necessary means to meet project timelines without compromising specified minimum rates of material diversion.
 - .1 In event of unforeseen delay notify the Consultant and Owner, in writing.

1.6 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Action Submittals: Provide the following submittals before starting any work of this Section:
 - .1 Shop Drawings: Submit drawings stamped and signed by professional engineer registered or licensed in Ontario as follows:
 - .1 Submit for review and approval demolition drawings, diagrams or details showing sequence of demolition work and supporting structures and underpinning.
 - .2 Submit in accordance with Section 01 33 00 - Submittal Procedures and Section 01 74 00 - Waste Management Disposal.
 - .3 WMC is responsible for fulfilment of reporting requirements.

- .4 Schedule of Demolition Activities: Coordinate with Section 01 32 00 - Construction Progress Schedule - Critical Path Method (CPM), and indicate the following:
 - .1 Detailed sequence of demolition and removal work, with starting and ending dates for each activity
 - .2 Interruption of utility services
 - .3 Coordination for shutoff, capping, and continuation of utility services
 - .4 Locations of temporary partitions and means of egress
- .5 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.
- .6 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.
- .7 Inventory: Submit a list of items that have been removed and salvaged after demolition is complete.
 - .1 Landfill Records: Indicate receipt and acceptance of hazardous wastes by a landfill facility licensed to accept hazardous waste.
 - .2 Pre-demolition Photographs: Submit photographs indicating existing conditions of adjoining construction and site improvements before starting Work. Include finish surfaces that may be misconstrued as damage caused by demolition operations.
- .2 Informational Submittals: Provide the following submittals when requested by the Consultant:
 - .1 Certificates: Submit Statement of Refrigerant Recovery as follows:
 - .1 Signed by refrigerant recovery technician responsible for recovering refrigerant, stating that all refrigerant that was present was recovered and that recovery was performed according to regulations of Authority Having Jurisdiction.
 - .2 Include name and address of technician and date refrigerant was recovered.
 - .2 Qualification Data: Submit information for companies and personnel indicating their capabilities and experience to perform work of this Section including; but not limited to, lists of completed projects with project names and addresses, names and addresses of the Consultant, for work of similar complexity and extent.

1.7 QUALITY ASSURANCE

- .1 Regulatory Requirements: Ensure Work is performed in compliance with CEPA, CEAA, TDGA, and applicable Provincial/Territorial and Municipal regulations.
 - .1 Comply with hauling and disposal regulations of Authority Having Jurisdiction.
 - .2 Standards: Comply with ANSI A10.6 and NFPA 241
- .2 Regulatory Requirements: Perform work of this Section in accordance with the following:
 - .1 Provincial/Territorial Workers' Compensation Boards/Commissions.
 - .2 Provincial/Territorial Occupational Health and Safety Standards and Programs.

1.8 SITE CONDITIONS

- .1 Environmental protection:
 - .1 Ensure Work is done in accordance with Section 01 35 00 - Environmental Procedures.
 - .2 Ensure Work does not adversely affect adjacent watercourses, groundwater and wildlife, or contribute to excess air and noise pollution.
 - .3 Fires and burning of waste or materials is not permitted on site.
 - .4 Do not bury rubbish waste materials.
 - .5 Do not dispose of waste or volatile materials including but not limited to: mineral spirits, oil, petroleum based lubricants, or toxic cleaning solutions into watercourses, storm or sanitary sewers.
 - .6 Ensure proper disposal procedures are maintained throughout project.
- .2 Do not pump water containing suspended materials into watercourses, storm or sanitary sewers, or onto adjacent properties.

- .3 Control disposal or runoff of water containing suspended materials or other harmful substances in accordance with authorities having jurisdiction.
- .4 Protect trees, plants and foliage on site and adjacent properties where indicated.
- .5 Prevent extraneous materials from contaminating air beyond application area, by providing temporary enclosures during demolition work.
- .6 Cover or wet down dry materials and waste to prevent blowing dust and debris. Control dust on all temporary roads.
- .7 The Owner will be occupying the building immediately adjacent to demolition area.
- .8 Conduct structure demolition so the Owner's operations will not be disrupted:
 - .1 Provide not less than 72 hours' notice to Owner of activities that will affect operations.
 - .2 Maintain access to existing walkways, exits, and other adjacent occupied or used facilities:
 - .1 Do not close or obstruct walkways, exits, or other occupied or used facilities without written permission from the Consultant.
- .9 The Owner and Consultant assumes no responsibility for buildings and structures being demolished:
 - .1 Conditions existing at time of inspection for bidding purpose will be maintained by the Owner as far as practical.
 - .2 Remove, protect and store salvaged items as directed by the Owner before structure demolition.
 - .3 Salvage items as identified by the Owner.
 - .4 Deliver to the Owner as directed.

1.9 EXISTING CONDITIONS

- .1 Refer to drawings and Pinchin Report referencing St. Martin of Tours Catholic Elementary School.

Part 2 Products

2.2 EQUIPMENT

- .1 Equipment and Heavy Machinery:
 - .1 On-road vehicles to: CEPA-SOR/2003-2, On-Road Vehicle and Engine Emission Regulations and CEPA-SOR/2006-268, Regulations Amending the On-Road Vehicle and Engine Emission Regulations.
 - .2 Off-road vehicles to: EPA CFR 86.098-10 and EPA CFR 86.098-11.
 - .3 Leave machinery running only while in use, except where extreme temperatures prohibit shutting machinery down.

2.3 TEMPORARY SUPPORT STRUCTURES

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

2.4 SOIL MATERIALS

- .1 Satisfactory Soils: Not Applicable.

Part 3 Execution

3.2 EXAMINATION

- .1 Survey existing conditions and correlate with requirements indicated to determine extent of structure demolition required.
- .2 Review Project Record Documents of existing construction provided by the Owner.
- .3 Consultant and Owner do not guarantee that existing conditions are the same as those indicated in Project Record Documents.
- .4 Inventory and record the condition of items being removed and salvaged.
- .5 When unanticipated mechanical, electrical, or structural elements are encountered, investigate and measure the nature and extent of the element.
- .6 Promptly submit a written report to the Consultant.
- .7 Perform an engineering survey of condition of building to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of structure or adjacent structures during structure demolition operations.
- .8 Verify that Hazardous Substances have been remediated before proceeding with structure demolition operations.

3.3 PREPARATION

- .1 Protection of in-place conditions:
 - .1 Prevent movement, settlement or damage of adjacent structures, services, walks, paving, trees, landscaping, adjacent grades, properties, parts of existing building to remain.
 - .1 Provide bracing and shoring as required.
 - .2 Repair damage caused by demolition as directed by the Consultant or Owner.
 - .2 Support affected structures and, if safety of structure being demolished or adjacent structures or services appears to be endangered, take preventative measures, stop Work and immediately notify the Consultant and Owner.
 - .3 Prevent debris from blocking surface drainage system, elevators, mechanical and electrical systems which must remain in operation.
- .2 Surface Preparation:
 - .1 Disconnect and re-route electrical and telephone service lines entering buildings to be demolished. Coordinate with the Owner.
 - .2 Disconnect and cap designated mechanical services.
 - .3 Do not disrupt active or energized utilities designated to remain undisturbed.
 - .4 Remove rodents and vermin.

3.4 DEMOLITION

- .1 Blasting operations not permitted during demolition.
- .2 Do blasting operations in accordance with CSA S350.
- .3 Remove contaminated or dangerous materials as defined by authorities having jurisdiction, relating to environmental protection, from site and dispose of in safe manner to minimize danger at site or during disposal.

- .4 Before start of Work remove contaminated or hazardous materials listed as hazardous, as directed by Pinchin Ltd., from site and dispose of at designated disposal facilities in safe manner and in accordance with TDGA and other applicable requirements. Refer to Existing Conditions in PART 1.
 - .5 Demolish areas identified in the documents.
 - .6 Crush concrete generated due to demolition of foundations to size suitable for recycling.
 - .1 Where possible, identify markets which will accept crushed material as aggregate.
 - .2 For further information regarding acceptable uses contact Ministries of Transportation.
 - .7 Demolish walls and roof, within areas of new construction.
 - .8 Remove existing equipment, services, and obstacles where required for refinishing or making good of existing surfaces, and replace as work progresses.
 - .9 At end of each day's work, leave Work in safe and stable condition.
 - .1 Protect interiors of parts not to be demolished from exterior elements at all times.
 - .10 Demolish to minimize dusting. Keep materials wetted as required.
 - .11 Demolish masonry and concrete walls.
 - .12 Remove structural framing.
 - .13 Contain fibrous materials to minimize release of airborne fibres while being transported within facility.
 - .14 Only dispose of material specified by selected alternative disposal option.
 - .15 Remove and dispose of demolished materials except where noted otherwise and in accordance with authorities having jurisdiction.
- 3.5 SITE RESTORATION
- .1 Below Grade Areas: Rough grade below grade areas ready for further excavation or new construction.
 - .2 Below Grade Areas: Completely fill below grade areas and voids resulting from structure demolition operations with satisfactory soil materials according to backfill requirements.
 - .3 Site Grading: Uniformly rough grade area of demolished construction to a smooth surface, free from irregular surface changes.
 - .4 Provide a smooth transition between adjacent existing grades and new grades.
- 3.6 REPAIRS
- .1 General : Promptly repair damage to adjacent construction caused by structure demolition operations.
 - .2 Where repairs to existing surfaces are required, patch to produce surfaces suitable for new materials.
 - .3 Restore exposed finishes of patched areas and extend restoration into adjoining construction in a manner that eliminates evidence of patching and refinishing.
- 3.7 CLEANING
- .1 Waste Management: Separate waste materials for recycling in accordance with Section 01 74 00 - Waste Management and Disposal.
 - .2 Divert excess materials from landfill to other approved site.

- .3 Designate appropriate security resources / measures to prevent vandalism, damage and theft.
- .4 Locate stockpiled materials convenient for use in new construction. Eliminate double handling wherever possible.
- .5 Stockpile materials designated for alternate disposal in location which facilitates removal from site and examination by potential end markets, and which does not impede disassembly, processing, or hauling procedures.
 - .1 Label stockpiles, indicating material type and quantity.
- .6 Separate from general waste stream each of following materials. Stockpile materials in neat and orderly fashion in location and as directed by the Owner for alternate disposal. Stockpile materials in accordance with applicable fire and safety regulations.
 - .1 Power source poles deemed unfit for reuse.
 - .2 Wiring and conduit.
 - .3 Outlets/switches.
 - .4 Floor receptacles.
 - .5 Metal duct work, baffles, HVAC equipment.
 - .6 Demountable partitions.
 - .7 Miscellaneous metals.
- .7 Supply separate, clearly marked disposal bins for categories of waste material.
- .8 Remove stockpiled material as, when it interferes with operations of project construction.
- .9 Remove stockpiles of like materials by alternate disposal option once collection of materials is complete.
- .10 Transport material designated for alternate disposal using approved haulers listed in accordance with applicable regulations.
- .11 Dispose of materials not designated for alternate disposal in accordance with applicable regulations.
 - .1 Disposal facilities must be those approved of and listed in Waste Reduction Workplan.

END OF SECTION

1 General

1.1 SCRAP VALUE

- .1 Demolition contractor to provide lump sum \$ of scrap value as a credit to the owner.

1.2 SUBMITTALS

- .1 Submit three copies of each photograph taken of existing conditions to Consultant.

1.3 QUALITY ASSURANCE

- .1 Qualifications: a firm specializing in the work of this Section and using only adequate equipment and skilled workers; and having a minimum of five years documented experience.
- .2 Demolition Supervisor: an individual experienced in the work of this Section to ensure that all demolition work is carried out safely, expeditiously and without unnecessary damage to materials and surfaces that are designated to remain.

1.4 REGULATORY REQUIREMENTS

- .1 Demolition (City) Permit: by owner.
- .2 Fees: include the cost of all tipping charges and other related fees necessary for the completion of the demolition operations.
- .3 Utilities: Obtain approval from the appropriate authorities prior to commencing demolition operations.
- .4 Hazardous Waste: conform to authorities having jurisdiction.

1.5 SITE CONDITIONS

- .1 Inspect and photograph existing adjacent surfaces and assemblies.
- .2 Record conditions and stability in a manner suitable for evaluation of possible damage caused by demolition operations.
- .3 Approximate locations of existing building services may be indicated on Drawings. The Consultant assumes no responsibility for the accuracy of this information.

1.6 SEQUENCING AND SCHEDULING

- .1 Schedule demolition activities to minimize disruption to existing building operations.
- .2 Verify demolition schedule with Consultant prior to commencement of the Work.
- .3 Protect occupants from dust and from any danger arising from the work of this Section. Refer to Section 01 50 00.

2 Products

2.1 EQUIPMENT

- .1 Demolition: appropriate equipment for the phase of work contemplated.

- .2 Do not use heavy equipment for making openings in existing walls or in confined spaces where damage to other work may result.

3 Execution

3.1 EXAMINATION

- .1 Refer to Section 01 71 00.
- .2 Verify locations and construction of structures to be demolished.
- .3 Verify construction and details of other existing and adjacent property.
- .4 Verify location of utility and other services.

3.2 PREPARATION

- .1 Erect shoring, bracing and other temporary structures to prevent collapse, settlement and movement of property. Refer to Section 01 50 00.
- .2 Provide and maintain dust protection screen as specified in Section 01 50 00.
- .3 Barricade access by unauthorized persons to areas in which demolition is in-progress.
- .4 Post danger signs in conspicuous locations to warn persons that demolition is in-progress.
- .5 Erect protection to provide safe access that must be maintained to existing areas still occupied by public.
- .6 Protect adjacent property from damage caused by demolition operations.
- .7 Remove flammable and contaminated materials and refuse from area before demolition operations commence.
- .8 Arrange for the disconnection, capping and plugging of any building services that may be affected by demolition operations.

3.3 DEMOLITION

- .1 Perform demolition work in an expeditious and safe manner.
- .2 Conform to CSA S350-M and CSA Z783.
- .3 Confine demolition operations to only the areas required.
- .4 Prevent and contain the spread of dust.
- .5 Do not drop debris more than one storey unless in an enclosed chute. Lower large components carefully, under control and fully supported at all times.
- .6 Withdraw or flatten protruding nails as demolition operations proceed.

3.4 SALVAGE

- .1 Carefully remove materials scheduled for salvage to CSA Z783. Protect from damage.

- .2 Store salvaged materials in secure locations, protected from damage.
- .3 Items not scheduled for salvage become the property of the Contractor.

3.5 CLEANING

- .1 Leave the Place of the Work in a clean and orderly condition, ready for use by others.
- .2 Remove debris in accordance with the authorities having jurisdiction.
- .3 Remove protections, barricades and other temporary constructions on completion of demolition operations.
- .4 Make Good property and materials damaged during demolition operations.

END OF SECTION

DIVISION 3

CONCRETE

1 General

1.1 RELATED SECTIONS

- .1 Section 03 20 00 - Concrete Reinforcing.
- .2 Section 03 30 00 - Cast-in-place Concrete.

1.2 REFERENCES

- .1 Canadian Standards Association (CSA):
 - 1. CAN/CSA-A23.1-09, Concrete Materials and Methods of Concrete Construction.
 - 2. CAN/CSA-O86-01, Engineering Design in Wood (Limit States Design).
 - 3. CSA O121-08, Douglas Fir Plywood.
 - 4. CSA O151-04, Canadian Softwood Plywood.
 - 5. CSA O153-10, Poplar Plywood.
 - 6. CAN3-O188.0-08, Standard Test Methods for Mat-Formed Wood Particleboards and Waferboard
 - 7. CSA O437.0-08, Standards for OSB and Waferboard.
 - 8. CSA S269.1-1992 (R2008), Falsework for Construction Purposes.
 - 9. CAN/CSA-S269.3-M92 (R2008), Concrete Formwork.
- .2 Council of Forest Industries of British Columbia (COFI)
 - 1. COFI Exterior Plywood for Concrete Formwork.
- .3 Refer to Section 03 30 00 Cast-in-Place-Concrete.

2 Products

2.1 MATERIALS

- .1 Plywood: Douglas Fir species, to CSA O121; solid one side (S1S) grade.
- .2 Lumber: SPF species; NLGA Light Framing grade, Utility stress group; with grade stamp clearly visible.
- .3 Tubular Forms: Spirally wound, adhesive laminated fibre paper tube forms having bursting pressure of 965 Kpa, coated with hot wax, diameters as required, 'Handiform', or 'Permaform' by Perma Tubes Ltd., or 'Sonotube' by Sonoco Limited.

2.2 ACCESSORIES

- .1 Form Ties: removable or snap-off metal type of fixed and adjustable length; to CAN/CSA-S269.3.
- .2 Form Release Agent: non-staining oil-based material, which will not impair natural bonding or colour characteristics of coating intended for use on concrete; eg. Duoguard ECO-Coat by W. R. Meadows of Canada Limited.
- .3 Fillets for Chamfered Corners: Rigid formed plastic type; 13 x 13 mm size; maximum possible lengths.
- .4 Formed Construction Joints: Premoulded asphaltic board; tongue and groove profile; 6 mm thick; complete with anchorage.

- .5 Dovetail Anchor Slots: Minimum 0.65 mm thick galvanized steel; non-filled; release tape sealed slots; bend tab anchors.
- .6 Flashing Reglets: Minimum 0.65 mm thick galvanized steel; longest possible lengths; alignments splines for joints.
- .7 Void Forms: Moisture resistant treated paper faces; biodegradable; initial set; 100 mm thick.

3 Execution

3.1 FORMWORK ERECTION

- .1 Design and erect formwork, shoring and bracing to CAN/CSA-S269.3.
- .2 Conform to design and code requirements.
- .3 Align joints and make watertight. Keep form joints to a minimum.
- .4 When using earth forms, hand trim sides and bottoms, and remove loose dirt prior to placing concrete.
- .5 Provide bracing to ensure stability of formwork. Shore or strengthen previously constructed formwork liable to be over stressed by construction loads.
- .6 Provide chamfer strips on all external corners.
- .7 Apply form release agent prior to placing reinforcing steel, anchoring devices, and embedded items. Do not apply form release agent where concrete surfaces will receive special finishes or applied coverings which are effected by agent.
- .8 Provide formed openings where required for pipes, conduits, sleeves, and other work to be embedded in and passing through concrete members.
- .9 Place items which will be cast directly into concrete.
- .10 Coordinate work of other sections involved in forming and setting openings, slots, chases, sleeves, bolts, anchors, and other inserts.
- .11 Place formed construction joints in pattern pouring sequence. Set top screed to required elevations.
- .12 Install void forms in accordance with manufacturer's recommendations.

3.2 FORMWORK CLEANING

- .1 Clean forms as erection proceeds, to remove foreign matter.
- .2 During cold weather, remove ice and snow from within forms. Do not use calcium chloride or other salt-based de-icing compounds.

3.3 FORM REMOVAL

- .1 Do not remove forms, shores and bracing until concrete has gained sufficient strength to carry its own weight, and construction and design load which are liable to be imposed upon it.
- .2 Remove formwork progressively and in accordance with code requirements.

- .3 Store removed forms, for exposed architectural concrete, in manner that surfaces to be in contact with fresh concrete will not be damaged.
- .4 Restore structural members where required due to design requirements or construction conditions and as required to permit progressive construction.
- .5 Remove forms not directly supporting weight of concrete as soon as stripping operations will not damage concrete.

END OF SECTION

1 General

1.1 RELATED SECTIONS

- .1 Section 03 10 00 - Concrete Forming and Accessories.
- .2 Section 03 30 00 - Cast-in-Place Concrete.

1.2 REFERENCES

- .1 American Concrete Institute (ACI)
 - 1. ACI 315R-96, Manual of Engineering and Placing Drawings for Reinforced Concrete Structure.
- .2 American National Standards Institute/American Concrete Institute (ANSI/ACI)
 - 1. ANSI/ACI 315-96, Details and Detailing of Concrete Reinforcement.
- .3 American Society for Testing and Materials (ASTM)
 - 1. ASTM A 775/A 775M-97e2, Standard Specification for Epoxy-Coated Reinforcing Steel Bars.
 - 2. ASTM A82/A82M-07, Standard Specification For Steel Wire, Plain, For Concrete Reinforcement
 - 3. ASTM A185/A185M-07, Standard Specification For Steel Welded Wire Reinforcement, Plain, For Concrete
- .4 Canadian Standards Association (CSA)
 - 1. CAN/CSA-A23.1-09, Concrete Materials and Methods of Concrete Construction.
 - 2. CAN3-A23.3-04 (R2010), Design of Concrete Structures for Buildings.
 - 3. CSA G30.3-M1991 (R1998), Cold Drawn Steel Wire for Concrete Reinforcement.
 - 4. CSA G30.5-M1991 (R1998), Welded Steel Wire Fabric for Concrete Reinforcement.
 - 5. CSA G30.14-M1991 (R1998), Deformed Steel Wire for Concrete Reinforcement.
 - 6. CSA G30.15-M1991 (R1998), Welded Deformed Steel Wire Fabric for Concrete Reinforcement.
 - 7. CAN/CSA-G30.18-09, Carbon-Steel Bars for Concrete Reinforcement.
 - 8. CAN/CSA-G40.20-04 / G40.21-04, General Requirements for Rolled or Welded Structural Quality Steel / Structural Quality Steel.
 - 9. CAN/CSA-G164-M92 (R2003), Hot Dip Galvanizing of Irregularly Shaped Articles.
 - 10. CSA W186-M1990 (R1998), Welding of Reinforcing Bars in Reinforced Concrete Construction.

1.3 SUBMITTALS

- .1 Submit Shop Drawings as specified in Section 01 33 00.
- .2 Shop Drawings:
 - .1 Prepared according to RSIC Manual of Standard Practice and CSA A23.3.
 - .2 Clearly indicate bar sizes, spacings, location and quantities of reinforcement, welded wire fabric, chairs spacers and hangers with identifying code marks to permit correct placement without reference to structural drawings.
 - .3 Provide details to show placement of reinforcing where special conditions occur.
 - .4 Shop drawings should not contain reproductions of Contract Documents.
- .3 Mill Tests: Submit upon request a certified copy of mill tests for steel supplied, showing physical and chemical analysis.

1.4 DELIVERY, STORAGE AND HANDLING

- .1 Refer to Section 01 60 00.
- .2 Store Products off the ground, free from dirt.
- .3 Maintain fabricated forms.

2 Products

2.1 MATERIALS

- .1 Reinforcing Steel: new billet steel, deformed bars, to CSA G30.18, Grade 400R, unless indicated otherwise; sizes as indicated on Drawings.
- .2 Welded Steel Wire Fabric: to ASTM A185/A185M, flat sheets; sizes as indicated on Drawings.
- .3 Tie Wire: to ASTM A82/A82M, minimum 3 mm size, annealed type.
- .4 Chairs, Bolsters, Bar Supports, Spacers: adequate for strength and support of reinforcing construction conditions.

3 Execution

3.1 SITE FABRICATION

- .1 Fabricate reinforcing steel to CSA A23.1 and RSIC Manual of Standard Practice.
- .2 Locate reinforcement splices at point of minimum stress. Fabricate splices with lap lengths as indicated on the Drawings.
- .3 Fabricate reinforcing steel within the following tolerances:
 - .1 Sheared length: plus or minus 25 mm.
 - .2 Stirrups, ties and spirals: plus or minus 13 mm.
 - .3 Other bends: plus or minus 25 mm.
- .4 Ship bundles of bar reinforcement clearly identified in accordance with bar lists.
- .5 Substitutes of different size bars will be permitted only upon written approval of the Consultant.

3.2 PLACING REINFORCEMENT

- .1 Place, support and space reinforcement in alignment to position indicated and as follows:
 - .1 Slabs-on-grade, beams, structural slabs, support reinforcement on and secure to supports.
 - .2 Beams: secure top reinforcement to stirrups.
 - .3 Beams and columns: laterally support along length and heights. Place supports in pairs on opposite faces.
- .2 Place reinforcement continuous through construction joints.
- .3 Do not weld concrete reinforcing.
- .4 Provide welded steel wire fabric in concrete slabs and toppings greater than 62 mm thick. Locate fabric minimum 37 mm below finished surface. Lap ends and sides to CSA A23.1, but not less than 100 mm.
- .5 Do not field bend reinforcement except where indicated or approved by Consultant. Bend reinforcing without heat applying at a slow and steady pressure. Replace reinforcement that has developed cracks or splits.
- .6 Do not field cut reinforcement without prior written approval of Consultant.
- .7 Obtain Consultant's approval of reinforcing steel and placing of reinforcement prior to placing concrete.

- .8 Preserve clear space between bars of not less than 1.5 times the nominal diameter of the larger bar.
- .9 Do not allow the clear distance between bars to be less than 40 mm.

3.3 CLEANING

- .1 Clean reinforcing to CSA A23.1.

END OF SECTION

1 General

1.1 RELATED SECTIONS

- .1 Section 03 10 00 - Concrete Forming and Accessories.
- .2 Section 03 20 00 - Concrete Reinforcing.
- .3 Section 05 12 00 - Structural Steel Framing.
- .4 Section 05 50 00 - Metal Fabrications.

1.2 REFERENCES

- .1 American Society for Testing and Materials (ASTM):
 - 1. ASTM C 109/C 109M- 99, Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in or 50-mm Cube Specimens).
 - 2. ASTM C 260- 00, Standard Specification for Air-Entraining Admixtures for Concrete.
 - 3. ASTM C 309- 98a, Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
 - 4. ASTM C 330-99, Standard Specification for Lightweight Aggregates for Structural Concrete.
 - 5. ASTM C 494/C 494M-99a, Standard Specification for Chemical Admixtures for Concrete.
 - 6. ASTM C 827-95a, Test Method for Change in Height at Early Ages of Cylindrical Specimens from Cementitious Mixtures.
 - 7. ASTM C 939-97, Standard Test Method for Flow of Grout for Preplaced-Aggregate Concrete.
 - 8. ASTM D 412-92, Test Methods for Vulcanized Rubber and Thermoplastic Rubbers and Thermoplastic Elastomers-Tension.
 - 9. ASTM D 624-91, Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomer.
 - 10. ASTM D 1751-83(1991), Specification for Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction (Non-extruding and Resilient Bituminous Types).
 - 11. ASTM D 1752- 84(1992), Specification for Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction.
 - 12. ACI 301-05, Specification for Structural Concrete.
 - 13. ASTM C1059/C1059M-99 (2008), Standard Specification for Latex Agents for Bonding Fresh to Hardened Concrete
- .2 Canadian General Standards Board (CGSB)
 - 1. CAN/CGSB-37.2- M88, Emulsified Asphalt, Mineral Colloid-Type, Unfilled, for Dampproofing and Waterproofing and for Roof Coatings.
 - 2. CAN/CGSB-51.34- M86, Vapour Barrier, Polyethylene Sheet for Use in Building Construction.
 - 3. CGSB 81-GP-1M- 77, Flooring, Conductive and Spark Resistant.
- .3 Canadian Standards Association (CSA)
 - 1. CAN/CSA-A5- 98, Portland Cement. (Part of A3000-98).
 - 2. CAN/CSA-A23.1-09, Concrete Materials and Methods of Concrete Construction.
 - 3. CAN/CSA-A23.2-09, Methods of Test for Concrete.
 - 4. CAN/CSA-A23.4-04, Precast Concrete - Materials and Construction.
 - 5. CAN/CSA-A23.5-M98, Supplementary Cementing Materials. (Part of A3000-98).
 - 6. CAN/CSA A362-M98, Blended Hydraulic Cement. (Part of A3000-98).
 - 7. CAN/CSA A3001-08, Cementitious Materials for Use In Concrete.

1.3 VERIFICATION SAMPLES

- .1 Submit samples as specified in Section 01 40 00.
- .2 Verification Samples: frequency and sizes to CSA A23.2.

1.4 DESIGN DATA

- .1 Submit mix design data as specified in Section 01 33 00.
- .2 Mix Design Data: verifying concrete has been designed to prevent segregation and excessive bleeding and indicating that the mix designs will result in the specified properties.

1.5 CLOSEOUT SUBMITTALS

- .1 Submit complete and accurate records of concrete operations as specified in Section 01 78 00.
- .2 Record Documents: Indicating date, location, shoring, reshoring and shoring removal, quantity, air temperature, weather and test samples taken.

1.6 ENVIRONMENTAL REQUIREMENTS

- .1 Cold Weather Requirements
 - .1 When the air temperature is at or below 5 degrees Celsius or when there is a probability of it falling to that limit within 24 hours of placing, the concrete temperature shall be maintained in accordance with CSA A23.1, Curing and Protection.
 - .2 In cold weather, concrete shall be delivered to the work having a temperature of not less than 18 degrees Celsius and not more than 32 degrees Celsius.
 - .3 Provide approved heating equipment. Protect concrete surfaces from direct exposure to the combustion gases of heaters.
 - .4 The housing, covering, or other protection used in connection with curing shall remain in place and intact at least twenty-four hours after the artificial heating is discontinued. No dependence shall be placed on salt or other chemicals for the prevention of freezing.
- .2 Hot Weather Requirements
 - .1 When the air temperature is at or above 25 degrees Celsius or when there is a probability of it rising to 25 degrees Celsius during the placing period, special effort shall be made to maintain the concrete temperature in accordance with CSA A23.1, Curing and Protection.
 - .2 In hot weather, concrete shall be delivered to the work having a temperature of not less than 10 degrees Celsius and not more than 27 degrees Celsius.
 - .3 Take suitable precautions to avoid drying of the concrete prior to finishing operations. Provide windbreaks, sunshades, fog sprays or other devices.

1.7 DELIVERY, STORAGE AND HANDLING

- .1 Refer to Section 01 60 00.
- .2 Store materials to CSA A23.1.

2 Products

2.1 CONCRETE MATERIALS

- .1 Portland Cement: to CSA A3001, Type GUL.
- .2 Fine and Coarse Aggregate: to CSA A23.1.
- .3 Water: potable, to CSA A23.1.
- .4 Air Entrainment, Chemical and Superplasticizer Admixtures: to CSA A23.1.

2.2 CONCRETE ACCESSORIES

- .1 Grout: non-shrink type; premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing additives, capable of developing a minimum compressive strength of 50 MPa at 28 days.
- .2 Saw Cut Fill: self-levelling, polysulfide-based joint filler, minimum cured Shore A Hardness of 40; e.g. Deck-O-Seal 150 by W. R. Meadows of Canada Limited.
- .3 Isolation Joint: 13 mm thick non-extruding, asphalt-impregnated cellular fibreboard, to OPSS 1308, Type A.
- .4 Bonding Agent: to ASTM C1059/C1059M, Type II; acrylic emulsion; e.g. Sealtight Intralok by W. R. Meadows of Canada Limited.
- .5 Colour Pigment: Chromix colour admixture by L. M. Scofield Company; 5 percent content on a dry weight basis; colour and loading as selected by Consultant.

2.3 CONCRETE MIXES

- .1 Mix concrete to CSA A23.1, for compressive strengths scheduled on the Drawings, and as follows:
 - .1 Minimum Cement Content:
 - .1 20 MPa Concrete: 310 kg/m³.
 - .2 25 MPa Concrete: 325 kg/m³.
 - .3 32 MPa Concrete: 355 kg/m³.
 - .2 Slump at Time and Point of Discharge: 50-100 mm.
 - .3 Air Entrainment: to CSA A23.1, Table 10.
 - .4 Maximum Water-to-Cement Ratio: 0.45.
- .2 Coarse Aggregate: not more than 19 mm and not less than 8 mm in size, except for concrete on steel deck where size of aggregates shall be not more than 8 mm.
- .3 Concrete Exposed to De-icing Chemicals: water/cement ratio not to exceed the values indicated in CSA A23.1, Table 14; Class C1 or C2.
- .4 Accelerating Admixtures: used during cold weather subject to Consultant approval. If approved, the use of admixture will not relax the cold weather placement requirements of CSA A23.1. Do not use calcium chloride.
- .5 Set-retarding Admixture: used during hot weather subject to Consultant approval, to allow for proper finishing of concrete.
- .6 Coloured Concrete: mix pigment with concrete to required loading in order to achieve selected colour upon concrete curing.

3 Execution

3.1 EXAMINATION

- .1 Refer to Section 01 71 00.
- .2 Ensure that footing excavations and skim slabs are free of frost or water before placing concrete. If a sump is required for pumping water from the excavation, excavate it outside the area of the footing.

- .3 Ensure forms are rigid and structurally safe, and reinforcing steel, formwork, sleeves, anchor bolts and other items are installed in accordance with the Contract Documents.
- .4 Ensure other Sections have checked the security and location of their components being cast in concrete.

3.2 PREPARATION

- .1 Notify Consultant at least 24 hours before each placement of concrete.
- .2 Remove any wet or disturbed soil just prior to placing concrete.
- .3 Set sleeves, ties, anchor bolts, pipe hangers and other inserts, openings and sleeves in concrete work, as required by other Sections. Sleeve, openings, etc., greater than 100 mm square or in diameter not indicated on the structural drawings must be approved by the Consultant.
- .4 Set frames in concrete.

3.3 INSTALLATION

- .1 Place concrete to CSA A23.1.
- .2 Maintain records of poured concrete items. Record date, location of pour, quantity, air temperature, and test samples taken.
- .3 Prepare previously placed concrete by cleaning with steel brush and applying bonding agent. Apply bonding agent in accordance with manufacturer's recommendations.
- .4 Pour concrete continuously between predetermined construction and control joints.
- .5 Saw cut control joints at maximum spacing of 3.0 metres in each direction and where noted on Drawings. Saw cut floor slabs within 24 hours after finishing, using a 5 mm thick blade and cutting to a minimum depth of one-third the total slab thickness.
- .6 In locations where new concrete is dowelled to existing work, drill holes in existing concrete, insert steel dowels and pack solidly with non-shrink grout.
- .7 Maintain concrete cover around reinforcing as follows:
 - .1 Concrete Placed Against Formwork: 40 mm.
 - .2 Walls exposed to weather or backfill: 75 mm.
 - .3 Footing or concrete formed against earth: 75 mm.
 - .4 Slabs-on-fill: 40 mm.
- .8 Separate slabs-on-fill from vertical surfaces with isolation joint filler. Extend joint filler from bottom of slab to within 13 mm of finished slab surface.

3.4 FIELD QUALITY CONTROL

- .1 Perform field inspection and testing as specified in Section 01 40 00.
- .2 Supply slump testing equipment at the Place of the Work, readily available for use.
- .3 Conduct slump tests to CSA A23.2; Test A23.2-5C.
- .4 Conduct slump tests in conjunction with sampling of concrete for cylinder tests. If the slump is excessive, remove the balance of that concrete from the site without further instructions.

- .5 If Consultant suspects that the slump of concrete is excessive, carry out additional slump tests in the presence of the Consultant and a representative of the independent inspection agency. No further concrete shall be placed until the test is carried out. Remove concrete with excessive slump from the Place of the Work.
- .6 Test concrete for compressive strength to CSA A23.2. Determine concrete strengths from standard cylinders, sampled, cured and tested at both 7 days and 28 days.
 - .1 Supply additional material and labour required to assist the testing laboratory in making such tests.
 - .2 If average strength at 7 days is less than 70 percent of specified 28-day strength, check mix at once, and adjust to ensure required strength is obtained.

3.5 PATCHING

- .1 Patch imperfections as directed by Consultant.

3.6 DEFECTIVE CONCRETE

- .1 Make Good concrete not conforming to required lines, details, elevations, or found defective by the Consultant.
- .2 Concrete will be considered defective when:
 - .1 completed installation contains visible honeycombing or embedded debris;
 - .2 concrete has been damaged by freezing;
 - .3 concrete has been placed at too high a temperature;
 - .4 three consecutive 28-day compressive strength tests fail to meet specified strength;
 - .5 any 28-day compressive strength test fails to meet 88 percent of the specified strength;
 - .6 cracking occurs in locations other than along control or construction joints; and
 - .7 curing is not carried out in accordance with the Contract Documents.

3.7 CONCRETE FINISHING

- .1 Finish visually-exposed concrete surfaces with Smooth Rubbed finish, to ACI 301.
- .2 Finish visually-concealed concrete surfaces with As-Cast Rough Form finish, to ACI 301.

3.8 CURING AND PROTECTION

- .1 Beginning immediately after placement, protect concrete from premature drying, excessively hot and cold temperatures, and mechanical injury.

END OF SECTION

DIVISION 4

MASONRY

1 General

1.1 RELATED SECTIONS

- .1 Section 04 05 10 - Masonry Mortaring and Grouting.
- .2 Section 04 05 19 - Masonry Anchorage and Reinforcing.
- .3 Section 04 05 23 - Masonry Accessories.
- .4 Section 04 21 00 - Clay Unit Masonry.
- .5 Section 04 22 00 - Concrete Unit Masonry.
- .6 Section 05 12 00 - Structural Steel Framing.
- .7 Section 05 50 00 - Metal Fabrications.

1.2 REFERENCES

- .1 CAN/CSA-A371-14 (R2019): Masonry Construction for Buildings.
- .2 CSA S304.1-14: Design of Masonry Structures.

1.3 ENVIRONMENTAL REQUIREMENTS

- .1 Conform to CSA A371.
- .2 Provide heated enclosures and heat as necessary during cold weather construction.
- .3 Protect freshly laid masonry from drying too rapidly during hot weather, by means of waterproof, non-staining coverings.

1.4 SUBMITTALS

- .1 Submit masonry analysis and testing reports, prepared by an independent agency to Consultant, as specified in Section 01 40 00.

1.5 SAMPLES

- .1 Submit samples as specified in Section 01 33 00.
- .2 Samples: as follows:
 - .1 Two samples of each type of masonry unit specified, illustrating colour, texture and extremities of colour range;
 - .2 One sample of each type of masonry reinforcement and tie specified in Section 04 05 19;
 - .3 One sample of each type of masonry accessory specified in Section 04 05 23; and
 - .4 as required for testing purposes.

1.6 QUALITY ASSURANCE

- .1 Applicator: company specializing in commercial masonry work with a minimum of 5 years documented experience.

1.7 MOCK-UPS

- .1 Construct mock-up as specified in Section 01 40 00.

- .2 Mock-Up Panel: 3.0 x 3.0 metre size, illustrating veneer cladding types, textures and colours; mortar joint thickness, tooled finish and colour. Include structural back-up materials, air and vapour barrier materials, through-wall flashing and weephole vents, wall insulation, wall ties and connectors, and a partial window frame, illustrating the window head, jamb and sill conditions.
- .3 Report mortar colour loading rate for acceptable panel.
- .4 Remove mock-up panel from the Place of the Work upon Substantial Performance of the Work.

1.8 DELIVERY, STORAGE AND HANDLING

- .1 Refer to Section 01 60 00.
- .2 Deliver Products to the Place of the Work in dry condition.
- .3 Keep Products dry until use.
- .4 Store Products under waterproof cover on pallets or plank platforms held off ground by means of plank or timber skids.
- .5 Protect masonry units from damage.

2 Products

2.1 SOURCE QUALITY CONTROL

- .1 Perform shop testing by independent inspection agency as specified in Section 01 40 00.
- .2 Refer to individual specification Sections for Product-specific shop testing requirements.

3 Execution

3.1 QUALITY OF WORK

- .1 Construct masonry plumb, level and true to line, with vertical joints in alignment.
- .2 Lay out coursing and bond to achieve correct coursing heights, and continuity of bond above and below openings, with minimum of cutting.
- .3 Maintain masonry courses to uniform width.
- .4 Lay masonry in full bed of mortar, properly jointed with other work.
- .5 Buttering corners of joints, and deep or excessive furrowing of mortar joints are not permitted.
- .6 Maintain dry masonry beds and lay only dry masonry units. Do not pre-soak masonry units in cold weather.
- .7 Fully bond intersections, and external corners.
- .8 Do not use chipped, cracked or otherwise damaged units in exposed and loadbearing masonry walls.
- .9 Build in items required to be built into masonry.

- .10 Brace door frames to maintain plumb. Fill spaces between frame jambs and masonry with grout.
- .11 Prevent displacement of built-in items during construction. Check plumb, location and alignment frequently, as work progresses.
- .12 Place grout as required to maintain an adequate level of structural bearing surface with no voids and to a depth as indicated on Drawings.
- .13 Prevent ingress of mortar and grout in cores of acoustical masonry units.

3.2 JOINTING

- .1 Make vertical and horizontal joints equal and of uniform thickness.
- .2 Tooled Joints: Allow joints to set just enough to remove excess water, then tool joints with round jointer to result in smooth, compressed, uniformly concave joints.
- .3 Flush Joints: Strike flush joints that will be concealed within the wall or which will receive a coating of plaster, tile, insulation, resilient base, bituminous foundation protection, or other joint-concealing finish. Do not strike flush mortar joints designated to receive painted or other thin finishes.

3.3 CUTTING

- .1 Cut out masonry neatly for recessed or built-in objects.
- .2 Make cuts straight, clean and free from uneven edges.
- .3 Make Good masonry which has cracked or broken as a result of cutting in built-in objects.

3.4 PARING

- .1 Use paring mortar as specified in Section 04 22 00.
- .2 Apply paring in 2 coats not less than 10 mm thick.
- .3 Roughen first coat to ensure a good bond for second coat. Allow first coat to dry a minimum of 24 hours before applying second coat.
- .4 Dampen first coat with water before applying second coat.

3.5 SUPPORT OF LOADS

- .1 Use 20 MPa strength grout as specified in Section 04 05 10, where grout fill is used instead of solid masonry units.
- .2 Install building paper below voids to be filled with grout. Keep paper 25 mm back from faces of units.

3.6 PROVISIONS FOR MOVEMENT

- .1 Leave a 10 mm deflection space below shelf angles.
- .2 Leave a 10 mm space between masonry and vertical structural elements.
- .3 Leave a 25 mm space between top of non-loadbearing walls and partitions and structural elements. Fill space with compressible material and seal both sides as specified in Section 07 92 00. Do not use wedges.

- .4 Provide continuous movement control joints, properly sealed with backing rod and joint sealant, interior and exterior surfaces of wall system to ensure water tightness; where indicated on Drawings, and as follows:
 - .1 at all column locations, and
 - .2 spaced along continuous lengths of wall, maximum 6.0 metres OC.

3.7 LOOSE STEEL LINTELS

- .1 Install loose steel lintels. Centre lintel over opening width.
- .2 Bridge openings less than 450 mm wide with 6 mm thick mild steel plate lintels, bearing minimum 100 mm on each side of opening and set on dry pack grout. Width of plate to be equal to the wall thickness less 15 mm.

3.8 TEMPORARY WALL BRACING

- .1 Provide engineered temporary bracing for masonry walls to resist wind pressure and other lateral loads during and after erection until permanent lateral support is in place.

3.9 PROTECTING MASONRY

- .1 Refer to Section 01 76 00.
- .2 Keep masonry dry using waterproof, non-staining coverings that extend over walls and down sides sufficient to protect walls from wind-driven rain, until masonry is completed and protected by flashings or other permanent construction.
- .3 Protect masonry and other work from marking and other damage.
- .4 Protect completed work from mortar droppings. Use non-staining coverings.

3.10 FIELD QUALITY CONTROL

- .1 Field Inspection: Consultant will inspect installed masonry and reject masonry that is chipped, cracked, or blemished (streaked, stained or otherwise damaged), as described below.
- .2 Masonry will be inspected to be free of chips, cracks or other blemishes on the finished face or front edges of the masonry units exceeding 10 mm or that can be seen from a distance of 3.0 metres. Masonry units supplied with a rusticated face will be inspected for cracks and blemishes only.
- .3 Make Good rejected masonry as directed by Consultant.

3.11 TOLERANCES

- .1 Conform to CSA A371.

3.12 CLEANING

- .1 Clean masonry as work progresses.
- .2 Allow mortar droppings on masonry to partially dry then remove by means of brushing with a stiff fibre brush.

- .3 Post-Construction: Clean one-half of mock-up panel as directed below and leave for one week. If no harmful effects appear and after mortar has set and cured, clean masonry as follows:
 - .1 Protect windows, sills, doors, trim and other work from damage.
 - .2 Remove large particles with stiff fiber brushes wood paddles without damaging surface. Saturate masonry with clean water and flush off loose mortar and dirt.
 - .3 Scrub with solution of 25 m L trisodium phosphate and 25 m L household detergent dissolved in 1 L of clean water using stiff fibre brushes, then clean off immediately with clean water using hose.
 - .4 Repeat cleaning process as often as necessary to remove mortar and other stains.
- .4 Use alternative cleaning solutions and methods for difficult to clean masonry only after consultation with masonry unit manufacturer.

END OF SECTION

1 General

1.1 RELATED SECTIONS

- .1 Section 04 05 00 - Common Work Results for Masonry.
- .2 Section 04 21 00 - Clay Unit Masonry.
- .3 Section 04 22 00 - Concrete Unit Masonry.

1.2 REFERENCES

- .1 ASTM C207-18: Standard Specification for Hydrated Lime for Masonry Purposes.
- .2 ASTM C979/C979M-16: Standard Specification for Pigments for Integrally Colored Concrete.
- .3 CAN/CSA A179-14: Mortar and Grout for Unit Masonry.
- .4 CSA A3001-18: Cementitious Materials for Use in Concrete.
- .5 CSA A3002-18: Masonry and Mortar Cement.
- .6 CSA S304-14: Design of Masonry Structures.
- .7 NCMA TEK 3-2A-2005: Grouting Concrete Masonry Walls.

1.3 RESPONSIBILITY

- .1 Make Good work that includes mortar not meeting the required specification. This includes the removal of the affected walls and the reconstruction of such walls using new materials.

1.4 PRODUCT DATA

- .1 Submit Product data as specified in Section 01 33 00.
- .2 Product Data: on design mix, indicating Proportion or Property specification method used, required environmental conditions and admixture limitations.

1.5 SAMPLES

- .1 Submit samples as specified in Section 01 33 00.
- .2 Verification Samples: 2 ribbons of mortar, illustrating colour and colour range.
 - .1 Complete upon acceptance, confirmation of site-mixed colour additive proportional to mix batch site.
 - .2 Prepare and submit sample colour ribbons for each day's work for review of consistency.

1.6 DELIVERY, STORAGE AND HANDLING

- .1 Refer to Section 01 60 00.
- .2 Deliver Products in original unbroken and undamaged packages with the maker's name and brand distinctly marked thereon, and upon delivery store in a shed until used on the work.
- .3 Store or pile sand on a plank platform and protect from dirt and rubbish. Store mortar materials and sand in such a manner as to prevent deterioration or contamination by foreign materials.

1.7 PROJECT CONDITIONS

- .1 Maintain materials and surrounding air temperature to minimum 5 degrees Celsius and maximum 50 degrees Celsius prior to, during, and 48 hours after completion of masonry work.
- .2 Do not use anti-freeze, liquid salts, or other substances to lower the freezing point of mortar or grout. Conform to CSA A179.

2 Products

2.1 MANUFACTURERS

- .1 Manufacturers of masonry cement having Product considered acceptable for use:
 - .1 St. Lawrence Cement.
 - .2 Lafarge Construction Materials.
- .2 Manufacturers of hydrated lime having Product considered acceptable for use:
 1. Genlime Group L.P.
 2. Rockwell Lime Company.
- .3 Manufacturers of mortar pigment having Product considered acceptable for use:
 1. Bayer Pigments.
 2. Elementis Pigments.
 3. Hamburger Company.
 4. Interstar Pigments.
- .4 Substitutions: refer to Section 01 25 00.

2.2 MATERIALS

- .1 Portland Cement: to CSA A3001, Type GU; Grey colour.
- .2 Masonry Cement: to CSA A3002, Type N.
- .3 Hydrated Lime: to ASTM C207, Type S-Special.
- .4 Mortar Aggregate: natural sand, to CSA A179, standard masonry type; clean, dry, protected against dampness, freezing, and foreign matter.
- .5 Grout Aggregate: to CSA A179, as follows:
 - .1 Coarse: maximum 10 mm size; 27 percent by volume.
 - .2 Fine: clean well graded sharp sand; 54 percent by volume.
- .6 Water: potable, clean and free of deleterious amounts of acids, alkalies or organic materials.

2.3 ADMIXTURES

- .1 Plasticizer: water reducing type, reducing porosity and absorption to increase bond strength.
- .2 Water Repellent: mixture of calcium carbonate and hydrous magnesium aluminum silicate powders; e.g. Hydrocide Powder by Degussa Building Systems.
- .3 Pigment: liquid manufactured or natural oxide pigment, colour and loading as selected by Consultant.

2.4 MORTAR MIXES

- .1 Mortar for Use with Loadbearing Concrete Unit Masonry: to CSA A179, Type S using the Proportion specification method; Portland cement-masonry cement-sand mix; c/w water repellent admixture.
- .2 Mortar for Use with Non-loadbearing Concrete Unit Masonry: to CSA A179, Type N using the Proportion specification method; masonry cement-sand mix; c/w water repellent admixture.
- .3 Mortar for Use with Masonry Veneers: to CSA A179, Type N using the Proportion specification method; Portland cement-hydrated lime-sand mix; comprised of 1-part hydrated lime, 1-part Portland cement, 6-parts mortar aggregate; c/w integral colour as selected by Consultant; minimum 3 colours required.

2.5 MORTAR MIXING

- .1 Thoroughly mix mortar ingredients in proper quantities needed for immediate use to CSA A179.
- .2 Add mortar colour and admixtures to requirements of manufacturer's instructions.
- .3 Provide uniformity of mix and colouration.
- .4 Take representative samples for testing consistency of strength and colour to CSA A179.
- .5 Use mortar within 2 hours after mixing at temperatures of 26 degrees Celsius, or 2-1/2 hours at temperatures under 10 degrees Celsius.

2.6 GROUT MIXES

- .1 Reinforced Cores, Bond Beams and Lintels: 20 MPa strength at 28 days; 200 - 250 mm slump; mixed to CSA A179, Fine Grout.

2.7 GROUT MIXING

- .1 Thoroughly mix mortar ingredients accurately in measured quantities needed for immediate use.

3 Execution

3.1 EXAMINATION

- .1 Refer to Section 01 71 00.
- .2 Request Consultant inspection of spaces to be grouted.

3.2 PREPARATION

- .1 Apply bonding agent to existing concrete surfaces.
- .2 Plug clean-out holes with masonry units to prevent leakage of grout materials.
- .3 Brace masonry for wet grout pressure.
- .4 Remove excess mortar from grout spaces.

3.3 APPLICATION

- .1 Install mortar and grout as specified in Sections 04 21 00, 04 22 00 and 04 73 13.

- .2 Work grout into masonry cores and cavities to eliminate voids.
- .3 Do not displace reinforcement while placing grout.

3.4 FIELD QUALITY CONTROL

- .1 Perform inspection and testing of mortar and grout mixes as specified in Section 01 40 00.
- .2 Submit sample cubes for laboratory testing and test data as specified in Section 01 40 00 and to CSA S304.1.
- .3 Report on the compressive strength and water content of mortar and grout mixes.

END OF SECTION

1 General

1.1 RELATED SECTIONS

- .1 Section 04 05 00 - Common Work Results for Masonry.
- .2 Section 04 05 10 - Masonry Mortaring and Grouting.
- .3 Section 04 05 23 - Masonry Accessories.
- .4 Section 04 22 00 - Concrete Unit Masonry.
- .5 Section 05 12 00 - Structural Steel Framing.
- .6 Section 05 50 00 - Metal Fabrications.

1.2 REFERENCES

- .1 ASTM A123/A123M-17: Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
- .2 ASTM A153/A153M-23: Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
- .3 ASTM A641/A641M-19: Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire.
- .4 ASTM A951/a951m-22: Standard Specification for Steel Wire for Masonry Joint Reinforcement.
- .5 ASTM A1011/a1011m-18A: Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability and Ultra-High Strength.
- .6 CSA A370-14 (R2018): Connectors for Masonry.
- .7 CAN/CSA A371-14 (R2019): Masonry Construction for Buildings.
- .8 CSA G30.18-09 (R2014): Carbon Steel Bars for Concrete Reinforcement.
- .9 CSA S304-14: Design of Masonry Structures.

1.3 QUALITY ASSURANCE

- .1 Single-Source Responsibility: Provide each type of Product from a single manufacturer.

1.4 MOCK-UPS

- .1 Supply Product for construction of mock-up panel as specified in Section 04 05 00.

1.5 REGULATORY REQUIREMENTS

- .1 Elements of Structure, Non-Structural Components and Equipment: Refer to Div. B, Article 4.1.8.17, Table 4.1.8.17, Category 8 of the OBC. Engineers stamp required.

2 Products

2.1 MANUFACTURERS

- .1 Manufacturers of horizontal joint reinforcement and anchors having Product considered acceptable for use:
 - .1 Blok-Lok.
 - .2 Dur-O-Wal.

- .2 Manufacturers of masonry veneer ties having Product considered acceptable for use:
 - .1 Blok-Lok.
 - .2 Fero.

- .3 Substitutions: refer to Section 01 25 00.

2.2 MATERIALS

- .1 Single-Wythe Horizontal Joint Reinforcement - Exterior Walls: Truss type, 4.8 mm side rods with 4.8 mm cross ties; to ASTM A82/A82M; hot-dipped galvanized; e.g. Dur-O- Wal DA3100.
- .2 Single-Wythe Horizontal Joint Reinforcement - Interior Partitions: Ladder type, 3.7 mm side rods with 3.7 mm cross ties; to ASTM A82/A82M; regular mill galvanized; e.g. Dur-O- Wal DA3200.
- .3 Wall Tie (Steel Stud Back-up): adjustable, dual component, rod adjustable plate tie system; e.g. Fero Side Mounting Rap-Tie, comprised of:
 - .1 Flat Plate: 1.37 mm thick stainless steel plate, to ASTM A167, Type 304; length to suit air space dimension and stud width; complete with a series of five 5.8 mm OD holes punched along the leading edge to receive the V-Tie.
 - .2 V-Tie: 4.76 mm diameter stainless steel wire, to ASTM A580, Type 304; length to provide placement of tie legs at centerline of veneer.
 - .3 Fasteners: self-tapping sheet metal screws, hex washer head, suitable length to penetrate stud no less than 13 mm; minimum 2 screws per tie.
 - .4 Insulation Retaining Clip: purpose-made plastic, as recommended by tie manufacturer.
- .4 Wall Tie (CMU Back-up): adjustable, dual component, shear connector system; e.g. Fero Block Shear Connector, comprised of:
 - .1 Block Plate: 1.61 mm thick stainless steel plate, to ASTM A167, Type 304; length to suit air space and CMU width dimension, less 6 mm; complete with a series of eight 5.8 mm OD holes punched along the leading edge to receive the V-Tie.
 - .2 V-Tie: 4.76 mm diameter stainless steel wire, to ASTM A580, Type 304; length to provide placement of tie legs at centerline of veneer.
 - .3 Insulation Retaining Clip: purpose-made plastic, as recommended by tie manufacturer.
- .5 Wall Tie (Concrete Back-up): adjustable, dual component, rod adjustable plate tie system; e.g. Fero Rap-Tie, comprised of:
 - .1 L-Plate: 1.37 mm thick stainless steel plate, to ASTM A167, Type 304; length to suit air space dimension; complete with a series of five 5.8 mm OD holes punched along the leading edge to receive the V-Tie.
 - .2 V-Tie: 4.76 mm diameter stainless steel wire, to ASTM A580, Type 304; length to provide placement of tie legs at centerline of veneer.
 - .3 Fastener: 6 mm OD Tapcon screws; minimum 2 screws per tie.
 - .4 Insulation Retaining Clip: purpose-made plastic, as recommended by tie manufacturer.
- .6 Wall Tie (Structural Steel Back-up): adjustable, dual component design; suitable for welded attachment; e.g. Fero CAT-TIE, comprised of:
 - .1 AB-Clip: 94 x 15 mm size, 1.61 mm thick stainless steel plate, to ASTM A167, Type 304.
 - .2 V-Tie: 4.76 mm diameter stainless steel wire, to ASTM A580, Type 304; length to provide placement of tie legs at centerline of veneer.
- .7 Reinforcing Steel: to CSA G30.18, as specified in Section 03 20 00; sizes as indicated on Drawings.
- .8 Strap Anchors: 4.76 mm thick steel plate, hot dipped galvanized; U-shaped and Z-shaped to suit application; e.g. BLT11 by Blok-Lok.
- .9 Fasteners: purpose made for substrate; stainless steel finish for exterior walls, mill galvanized for interior walls, to CSA A370.

2.3 SHOP FINISHING

- .1 Mill Galvanizing: to ASTM A641, Regular; minimum 30 g/m² zinc coating.
- .2 Hot Dip Galvanizing: to ASTM A123/A123M and ASTM A153/A153M, Class B2, minimum 458 g/m² zinc coating on all surfaces, except as specified below:
 - .1 Strap Anchors: to ASTM A123/A123M, minimum 503 g/m² zinc coating on all surfaces.

3 Execution

3.1 PREPARATION

- .1 Supply metal anchors to the appropriate trades for placement. Direct correct placement.
- .2 Verify that anchorages embedded in concrete or attached to structural steel members are properly placed. Embed anchorages in every second joint.

3.2 INSTALLATION

- .1 Install masonry connectors and reinforcement to CSA A370.
- .2 Place horizontal joint reinforcement continuous in every second horizontal joint.
- .3 Place horizontal joint reinforcement in first and second horizontal joints above and below openings. Extend 400 mm minimum each side of opening.
- .4 Place horizontal joint reinforcement continuous in first and second joints below top of walls.
- .5 Reinforce joint corners and intersections with strap anchors spaced at 400 mm OC vertically.
- .6 Place reinforcing bars supported and secured against displacement. Maintain minimum clearance of 12 mm from masonry and not less than one bar diameter between bars.
 - .1 Provide 2-15M reinforcing bars grouted vertically into CMU cores both sides of masonry openings.
- .7 Provide clean out openings at the bottom of cores containing vertical reinforcement at each lift or pour.
- .8 Solidly fill block cores containing vertical reinforcement or anchor bolts with grout.
- .9 Secure wall ties to structural back-up for veneer at maximum 400 mm OC vertically and 800 mm OC horizontally.
- .10 Double quantity of wall ties within 200 mm of wall openings and along parapet walls.

END OF SECTION

1 General

1.1 RELATED SECTIONS

- .1 Section 04 05 00 - Common Work Results for Masonry.
- .2 Section 04 05 10 - Masonry Mortaring and Grouting.
- .3 Section 04 05 19 - Masonry Anchorage and Reinforcing.
- .4 Section 04 22 00 - Concrete Unit Masonry.
- .5 Section 05 12 00 - Structural Steel Framing.
- .6 Section 05 50 00 - Metal Fabrications.
- .7 Section 07 21 00 - Thermal Insulation.
- .8 Section 07 27 00 - Air Barriers.
- .9 Section 07 62 00 - Sheet Metal Flashing and Trim.
- .10 Section 07 92 00 - Joint Sealants.

1.2 REFERENCES

- .1 ASTM A123/A123M-17: Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
- .2 ASTM A153/a153m-23: Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
- .3 ASTM A653/A653M-23: Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- .4 BIA Technical Note on Brick Construction 18A: Accommodating Expansion of Brickwork.
- .5 CAN/CSA A371-14 (R2019): Masonry Construction for Buildings.
- .6 NCMA TEK 10-2C-2010: Control Joints for Concrete Masonry Walls - Empirical Method.

1.3 MOCK-UPS

- .1 Supply Product for construction of mock-up as specified in Section 04 05 00.

2 Products

2.1 MANUFACTURERS

- .1 Manufacturers of mortar dropping control devices and cell vents having Products considered acceptable for use:
 - .1 Masonry Technology Inc.
- .2 Substitutions: refer to Section 01 25 00.

2.2 MATERIALS

- .1 Flexible Flashing: 1.0 mm thick self-adhering SBS rubberized asphalt membrane with a cross-laminated HPDE top surface, sheet width to suit application; eg. Blueskin TW F by Bakor.
- .2 Sheet Metal Flashing: 0.61 mm thick steel; flat sheet stock to ASTM A653/A653M, Grade 230, hot dipped galvanized.
- .3 Cavity Firestops: minimum 1.2 mm thick stainless steel sheet, to ASTM A167, Type 304.
- .4 Movement Joint Filler: closed cell polyurethane or polyethylene oversized by 50 percent; self-expanding.
- .5 Building Paper: No. 15 asphalt saturated felt.
- .6 Mortar Dropping Control Device: 0.6 mm thick high impact polystyrene sheets. They are formed with corrugations and a spunbond polypropylene fabric on one side with a 102 mm skirt on one edge; Sure Cavity SC5016 by Masonry Technology Inc.
- .7 Cavity Vent, Type CV-1: 57 mm wide weep legs spaced at 241 mm OC, 25 mm wide continuous belt; 152 mm total width; CV5010 by Masonry Technology Inc.
- .8 Cavity Vent, Type CV-2: 0.6 mm thick acetac, 9.5 mm wide, 9.5 mm high, 114.3 mm long; HJW 3845 by Masonry Technology Inc.
- .9 Cavity Wall Filler: compressible closed cell foam.
- .10 Nailing Inserts: 0.6 mm thick purpose made galvanized steel inserts for setting in mortar joints.
- .11 Primer: as recommended by sheet membrane manufacturer.

2.3 SHOP FINISHES

- .1 Galvanizing: to ASTM A153/A153M, Class B2.
- .2 Prefinished Coating: silicone modified polyester coating, applied to a minimum 0.025 mm dry film thickness; e.g. WeatherX by Valspar, colour as selected by Consultant from standard range of colours.

3 Execution

3.1 PREPARATION

- .1 Apply primer to porous surfaces scheduled to receive self-adhering sheet membranes.

3.2 INSTALLATION

- .1 Provide vertical cavity wall fillers at external corners to prevent wind driven moisture from crossing the cavity. Bond filler to outer wythe using approved adhesive.
- .2 Provide nailing inserts in mortar joints at 400 mm OC each way, for attachment of wall strapping.
- .3 Provide vertical cavity firestops at a maximum spacing of 9.0 metres OC.
- .4 Provide horizontal cavity firestops at every floor slab.

- .5 Provide mortar dropping control devices at the base of wall cavities, in accordance with manufacturer's installation guidelines.
- .6 Provide Cavity Vent Type CV-1 immediately over flashings at brick ledges and top-of-foundation walls, spaced at maximum 800 mm OC.
- .7 Provide Cavity Vent Type CV-2 immediately over flashings at wall opening heads, in head joints spaced at maximum 800 mm OC.
- .8 Provide Cavity Vent Type CV-2 along the top of wall cavities, in head joints spaced at maximum 800 mm OC.

3.3 FLASHING

- .1 Provide flashings in masonry to CSA A371.
- .2 Install flashings under exterior masonry walls bearing on foundation walls or slabs; shelf angles, and steel lintel angles at wall openings, and as indicated on Drawings.
- .3 In double wythe walls and veneered walls, carry flashings from front edge of masonry, under outer wythes, then up backing not less than 150 mm, and as follows:
 - .1 Masonry Backing: embed flashing 25 mm in joint.
 - .2 Concrete Backing: insert flashing into reglets and seal joint.
 - .3 Sheathed Backing: secure flashing to sheathing behind air barrier.
- .4 Lap joints 150 mm and seal watertight.
- .5 Provide end dam flashing at both jambs of openings, to prevent water from travelling horizontally past the flashing ends.
- .6 Return horizontal base flashing a minimum of 100 mm around corner to overlap abutting flashing. Seal watertight.

3.4 MOVEMENT JOINTS

- .1 Provide vertical and horizontal movement control joints in clay unit masonry and calcium silicate unit masonry to BIA Technical Note on Brick Construction 18A - Accommodating Expansion of Brickwork.
- .2 Provide control joints in concrete unit masonry to NCMA CAN/TEK 10-2B.
- .3 Do not continue horizontal joint reinforcing across movement control joints.
- .4 Form control joints in concrete unit masonry by installing a building paper bond breaker fitted to one side of the hollow contour of the block end. Fill the created core solid with grout. Rake joint at exposed faces for rod and sealant.
- .5 Form movement joints in clay and calcium silicate unit masonry by leaving the head joints between stacked units void of mortar, ready for application of compressible joint filler, bond breaker and joint sealant.
- .6 Size joint for sealant performance as specified in Section 07 92 00.

3.5 PROTECTION

- .1 Protect flashings from mortar droppings.

END OF SECTION

1 General

1.1 RELATED SECTIONS

- .1 Section 04 05 00 - Common Work Results for Masonry.
- .2 Section 04 05 10 - Masonry Mortaring and Grouting.
- .3 Section 04 05 19 - Masonry Anchorage and Reinforcing.
- .4 Section 04 05 23 - Masonry Accessories.
- .5 Section 05 12 00 - Structural Steel Framing.
- .6 Section 05 50 00 - Metal Fabrications.
- .7 Section 07 21 00 - Thermal Insulation.
- .8 Section 07 62 00 - Sheet Metal Flashing and Trim.
- .9 Section 07 92 00 - Joint Sealants.

1.2 REFERENCES

- .1 ASTM C331/C331M-17: Standard Specification for Lightweight Aggregates for Concrete Masonry Units.
- .2 CSA A165 SERIES-14 (R2019): CSA Standards on Concrete Masonry Units.
- .3 CAN/CSA A371-14 (R2019): Masonry Construction for Buildings.
- .4 CSA S304-14: Design of Masonry Structures.

1.3 MOCK-UPS

- .1 Supply Product for construction of mock-up panel as specified in Section 04 05 00.

1.4 PROJECT CONDITIONS

- .1 Environmental Requirements: as specified in Section 04 05 00.

1.5 DELIVERY, STORAGE AND HANDLING

- .1 Refer to Section 04 05 00.

2 Products

2.1 MASONRY UNITS

- .1 Normal Concrete Masonry Unit (CMU): to CSA A165.1, using N aggregate; 190 x 390 mm size, bed depth as indicated on Drawings; solid factory-finished ends with bull nosed corners for use at exposed wall corners, special shapes as required; types as follows:
 - .1 Hollow: Type H/15/A/M.
 - .2 Solid (100 percent): Sf/15/A/M.
 - .3 Solid (75 percent): S/15/A/M.

- .2 Lightweight Concrete Masonry Unit (LCMU): to CSA A165.1, using L 20S slag aggregate to ASTM C331; 190 x 390 mm size, bed depth as indicated on Drawings; solid factory-finished ends with bull nosed corners for use at exposed wall corners, special shapes as required; types as follows:

- .1 Hollow: Type H/15/C/M.
- .2 Solid (100 percent): S_f/15/C/M.
- .3 Solid (75 percent): S/15/C/M.

2.2 ACCESSORIES

- .1 Mortar and Grout: as specified in Section 04 05 10.
- .2 Horizontal Joint Reinforcement: as specified in Section 04 05 19.
- .3 Reinforcing Steel: as specified in Section 04 05 19.
- .4 Wall Ties: as specified in Section 04 05 19.
- .5 Strap Anchors: as specified in Section 04 05 19.
- .6 Accessories: flexible flashing membranes, sheet metal flashing, movement joint filler, nailing inserts: as specified in Section 04 05 23.

2.3 SOURCE QUALITY CONTROL

- .1 Perform testing of unit masonry as specified in Section 01 40 00.
- .2 Submit samples for laboratory testing and test data as specified in Section 01 40 00 and to CSA S304.1.
- .3 Report on the compressive strength and water absorption of concrete masonry units.

3 Execution

3.1 INSTALLATION

- .1 Place masonry to lines and levels indicated, as specified in Section 04 05 00.
- .2 Typically lay concrete masonry units in half-running bond, unless indicated otherwise.
- .3 Lay acoustical concrete masonry units in stack bond.
- .4 Maintain 10 mm wide mortar joints in both directions.
- .5 Provide purpose made pilaster units, 90 and 45 degree corner return units, bullnose units, bond beam units, lintel units as required.
- .6 Provide bullnose concrete masonry units at all exposed corners, except at the first course at floor level and at the corresponding course located at the ceiling level.
- .7 Fully bond intersections, and external corners.

- .8 Extend and laterally support non-loadbearing partitions to underside of structural deck above. Maintain a minimum deflection space at the top of partitions as follows:
 - .1 Partition parallel to structural assembly: 44 mm.
 - .2 Partition perpendicular to structural member: 19 mm.
 - .3 Structural member penetrates partition: 19 mm.
 - .4 Ducts or piping supported from structural assembly that penetrate the partition: 19 mm.
 - .5 Fill deflection space with mineral fibre sound attenuating insulation.
- .9 Place horizontal joint reinforcement as specified in Section 04 05 19.
- .10 Install masonry flashings as specified in Section 04 05 23.
- .11 Install loose steel lintels as specified in Section 04 05 00.
- .12 Install reinforced unit masonry lintels over openings where steel or precast concrete lintels are not scheduled. Construct lintels using grout fill and reinforcing. Maintain minimum 200 mm bearing on each side of opening.
- .13 Reinforce bond beams and pilasters as indicated on Drawings. Place and consolidate grout fill without disturbing reinforcing.
- .14 At bearing points, fill masonry cores with grout minimum 300 mm from opening.
- .15 Provide vertical and horizontal movement control joints as specified in Section 04 05 23.

3.2 TOLERANCES

- .1 Variation from Unit to Adjacent Unit: 1.5 mm maximum.
- .2 Variation of Joint Thickness: 3 mm per metre maximum.

3.3 CLEANING

- .1 Clean masonry as specified in Section 04 05 00.

3.4 PROTECTION

- .1 Protect concrete masonry units from damage resulting from subsequent construction operations. Refer to Section 04 05 00.
- .2 Remove protection materials upon Substantial Performance of the Work, or when risk of damage is no longer present.

END OF SECTION

DIVISION 5

METALS

1 General

1.1 RELATED SECTIONS

- .1 Section 03 30 00 - Cast-in-Place Concrete.
- .2 Section 04 22 00 - Concrete Unit Masonry.
- .3 Section 05 30 00 - Metal Decking.
- .4 Section 05 40 00 - Cold-Formed Metal Framing.
- .5 Section 05 50 00 - Metal Fabrications.

1.2 REFERENCES

- .1 Canadian Standards Association (CSA).
 - 1. CAN/CSA-G40.20-04, General Requirements for Rolled or Welded Structural Quality Steel.
 - 2. CAN/CSA-G40.21-04, Structural Quality Steels.
 - 3. CAN/CSA-G164-M92 (R2003), Hot Dip Galvanizing of Irregularly Shaped Articles.
 - 4. CAN/CSA-S16-04, Limit States Design of Steel Structures.
 - 5. CAN/CSA-S136-01, Cold Formed Steel Structural Members.
 - 6. CSA W47.1-09, Certification of Companies for Fusion Welding of Steel Structures.
 - 7. CSA W48-01, Electrodes.
 - 8. CSA W55.3-1965 (R2003), Resistance Welding Qualification Code for Fabricators of Structural Members Used in Buildings.
 - 9. CSA W59-03 (R2008), Welded Steel Construction (Metal Arc Welding).
- .2 Canadian General Standards Board (CGSB).
 - 1. CAN/CGSB-1.40-97, Primer Structural Steel, Oil Alkyd Type.
 - 2. CAN/CGSB-1.140-M89, Oil-Alkyd Type Red Lead, Iron Oxide Primer.
 - 3. CGSB 85-GP-16M, Painting Steel Surfaces Exposed to Normally Dry Weather.
 - 4. CAN/CGSB-85.100-93, Painting.
- .3 American Society for Testing and Materials (ASTM).
 - 1. ASTM A 36/A 36M-91, Specification for Structural Steel.
 - 2. ASTM A 193/193M-92, Specification for Alloy-Steel and Stainless Steel Bolting Materials for High-Temperature Service.
 - 3. ASTM A 307-12, Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength.
 - 4. ASTM A 325M-13, Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.
 - 5. ASTM A 325M-00, Specification for High-Strength Bolts for Structural Steel Joints (Metric).
 - 6. ASTM A 490-02, Specification for Structural Bolts, Alloy Steel, Heat Treated 150 ksi (1035 MPa) Minimum Tensile Strength.
 - 7. ASTM A 490M-00, Specification for High-Strength Steel Bolts, Classes 10.9 and 10.9.3, for Structural Steel Joints.
- .4 Canadian Institute of Steel Construction (CISC)/Canadian Paint Manufacturer's Association (CPMA).
 - 1. CISC/CPMA 1-73a, Quick-Drying, One-Coat Paint for Use on Structural Steel.
 - 2. CISC/CPMA 2-75, Quick-Drying, Primer for use on Structural Steel.

1.3 SUBMITTALS

- .1 Submit Shop Drawings and mill test reports as specified in Section 01 33 00.
- .2 Shop Drawings: Indicate profiles, sizes, spacing, and locations of structural members, openings, attachments, fasteners, connections, cambers, and loads. Shop drawings must be stamped, signed and dated by the fabricator's design engineer.

- .3 Mill Test Reports: properly correlated to the materials.

1.4 QUALITY ASSURANCE

- .1 Fabricator's Design Engineer: a professional structural engineer, experienced in structural steel design and licensed in the Place of the Work.
- .2 Welding: individual or organization certified by the Canadian Welding Bureau to requirements of CSA W 47.1 or CSA W 55.3 or both as applicable.
- .3 Fabrication: company specializing in fabricating structural steel to CAN/CSA-S16 with a minimum of five years documented experience.

2 Products

2.1 DESIGN CRITERIA

- .1 Maximum Live Load Deflection: $1/360$ of span.
- .2 Maximum Dead Load Deflection: $1/240$ of span.

2.2 MATERIALS

- .1 Structural Steel: to CSA G40.20, and CSA G40.21, as follows:
 - .1 Angles, Channels, Plates, etc.: Grade 300W.
 - .2 W-Shapes: Grade 350W.
 - .3 Structural Steel Tubing (HSS): Grade 350W, Class H.
- .2 High Strength Bolts: to ASTM A325M, including suitable nuts and plain hardened washers; hot dipped galvanized for exterior members.
- .3 Machine Bolts: to ASTM A307, externally and internally threaded standard fasteners.
- .4 Welding Materials: to CSA W 59.
- .5 Grout: to ASTM C1107/C1107M, non-shrink type, premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing additives, capable of developing a minimum compressive strength of 55 MPa at 28 days; e.g. Sealtight CG-86 Construction Grout by W. R. Meadows of Canada Limited.
- .6 Ferrous Metal Primer: to CAN/CGSB-1.40.
- .7 Galvanized Metal Primer: to CGSB 85-GP-16M.

2.3 FABRICATION

- .1 Fabricate structural steel to CAN/CSA-S16.
- .2 Continuously seal joined members by intermittent welds and plastic filler.
- .3 Grind exposed welds smooth.
- .4 Perform welding to CSA W 59. Make Good welds which show inclusions, porosity, lack of fusion penetration beyond the tolerances set out in CSA W 59.1.

- .5 For manual arc welding use low hydrogen electrodes of the E-70 XX series. For semi-automatic welding of tubular joints use processes described in CSA W 48.4-M and CSA W 48.5-M.
- .6 Perform gas cutting by machine where practicable, to CSA W 59.
- .7 Bear angle lintels not less than 200 mm at each end. Bolt or weld angles together where the upstanding legs are back to back.
- .8 Temporarily bolt spandrel beam angles to clip tees through vertically slotted holes. After erection and final adjustment, weld angles to clips and remove the bolts.
- .9 At any time before the detailed shop drawings are completed and reviewed, provide punched holes from 11 mm to 26 mm OD for the convenience of other trades in attaching wood or other materials. Holes for lagging shall be for 17 mm bolts spaced at 600 mm OC and where in both sides of a flange shall be staggered.
- .10 Unless otherwise specified, make holes 2 mm larger than the nominal diameter of the fastener. Holes may be punched, sub-punched, drilled or reamed as permitted in CAN/CSA- S16.
- .11 Provide holes for pipes and ducts and the reinforcing for same as indicated on Drawings. Cutting of the steel frame in the field shall be done only when directed by the Consultant.
- .12 Finished members shall be true to line and free from twists, bends and open joints. Keep stiffeners, connection clips and seats within the extremities of the relative members and do not allow them to project through exposed or finished surfaces.
- .13 Lintels: loose steel lintels necessary to support openings in loadbearing and non-loadbearing walls; sizes as indicated on Lintel Schedule. Provide concealed angle clips welded to lintels and anchored with bolts at lintel supports.
- .14 Miscellaneous Channels and Clip Angles: miscellaneous fastenings, including supports, anchor bolts and other items required to complete the Work.

2.4 SHOP FINISHING

- .1 Clean and prepare structural steel members for finishing.
- .2 Clean steel designated to receive an intumescent coating to SSPC SP-6, Commercial Blast Cleaning method. Otherwise, clean structural steel to SSPC SP-3, Power Tool Cleaning method.
- .3 Shop coat structural steel to CISC/CPMA 1-73a.
- .4 Do not prime surfaces that will be fireproofed, field welded, in contact with concrete, or high strength bolted.
- .5 Galvanizing: to CAN/CSA-G164-M, hot dipped method, minimum 275 g/m² zinc coating.

3 Execution

3.1 PREPARATION

- .1 Where masonry walls abut columns or beams, install anchor slots and anchors to tie in masonry. Verify exact location required.

- .2 Supply necessary anchor bolts, together with an anchor bolt setting diagram detailing proper installation. Once installed, verify that anchor bolts have been installed according to the setting diagram prior to commencing steel work.

3.2 ERECTION

- .1 Erect structural steel to CAN/CSA-S16.
- .2 Allow for erection loads, and for sufficient temporary bracing to maintain structure safe, plumb, and in true alignment until completion of erection and installation of permanent bracing.
- .3 Field weld components indicated on the shop drawings to requirements of CSA W59.
- .4 Do not field cut or alter structural members without approval of Consultant.
- .5 Grind exposed welds smooth.
- .6 After erection, prime welds, abrasions, and surfaces not shop primed or galvanized, except surfaces to be in contact with concrete.
- .7 Assemble bolted parts together solidly. Do not separate with gaskets or any other interposed compressible material.
- .8 Ensure joint surfaces including those adjacent to bolt heads, nuts, and washers shall be free of scale (tight mill scale accepted), burrs, dirt, and foreign material that would prevent solid seating of the parts.
- .9 Tighten bolts to provide the minimum bolt tension recommended in CAN/CSA-S16. Bolts may be torqued using the turn-of-the-nut method or by a Direct Tension Indicator.
- .10 Do not distort or enlarge holes as a result of drifting done during assembly to align holes. Holes in adjacent parts shall match sufficiently well to permit easy entry of bolts.
- .11 Where required, holes, other than oversize or slotted holes may be enlarged to permit the admission of bolts by a moderate amount of reaming. Do not enlarge holes by burning using welding equipment.
- .12 Gross mismatch of holes shall be cause for rejection.
- .13 Grout under baseplates in accordance with manufacturer's installation guidelines.

3.3 TOLERANCES

- .1 Maximum Variation from Plumb: 6 mm per storey, non-cumulative.
- .2 Maximum Offset from True Alignment: 6 mm.

3.4 FIELD QUALITY CONTROL

- .1 Perform field inspection and testing as specified in Section 01 40 00.
- .2 Inspect steel, welds and bolted connections for structural integrity.

3.5 CLEANING

- .1 Thoroughly clean welds between passes and upon completion of slag with a descaling tool and wire brush.
- .2 Ensure exposed steel connections, alignment, welding, etc. is neat and thoroughly cleaned.
- .3 After final erection, thoroughly clean and paint field joints with a coat of shop primer. Where the shop coat has been rubbed off during erection, apply a touch-up coat of primer.

END OF SECTION

1 General

1.1 RELATED SECTIONS

- .1 Section 05 12 00 - Structural Steel Framing.
- .2 Section 05 40 00 - Cold-Formed Metal Framing.
- .3 Section 07 52 11 - Modified Bitumen Membrane - N.V.S.
- .4 Section 07 92 00 - Joint Sealants.
- .5 Section 09 90 00 - Painting and Coating.

1.2 REFERENCES

- .1 Canadian Standards Association (CSA).
 - 1. CSA C22.2No.79-1978(R1992), Cellular Metal and Cellular Concrete Floor Raceways and Fittings.
 - 2. CAN/CSA-S16.1-04, Limit States Design of Steel Structures.
 - 3. CSA-S136-01, Cold Formed Steel Structural Members.
 - 4. CSA 47.1-09, Certification of Companies for Fusion Welding of Steel Structures.
 - 5. CSA 55.3-1965 (R2003), Resistance Welding Qualification Code for Fabricators of Structural Members Used in Buildings.
 - 6. CSA W59-03 (R2008), Welded Steel Construction, (Metal Arc Welding).
- .2 Canadian General Standards Board (CGSB).
 - 1. CAN/CGSB-1.181- 92, Ready-Mixed Organic Zinc-Rich Coating.
- .3 American Society for Testing and Materials (ASTM).
 - 1. ASTM A 653/A 653M-11, Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - 2. ASTM A792/A 792M-03, Specification for Steel Sheet, 55%Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.
- .4 Canadian Sheet Steel Building Institute (CSSBI).
 - 1. CSSBI 10M- 96, Standard for Steel Roof Deck.
 - 2. CSSBI 12M-96, Standard for Composite Steel Deck.

1.3 SHOP DRAWINGS

- .1 Submit Shop Drawings as specified in Section 01 33 00.
- .2 Shop Drawings: Indicate decking plan, support locations, projections, openings and reinforcement, outlet box locations, pertinent details and accessories.
- .3 Design deck layout, spans, fastening, joints, and openings under the direct supervision of the fabricator's steel deck design engineer.
- .4 Shop Drawings must be stamped, signed and dated by the fabricator's steel deck design engineer, licensed in the Province of Ontario, Canada.
- .5 Submit calculations if requested by the Structural Engineer.

1.4 QUALITY ASSURANCE

- .1 Welding: undertaken only by organizations fully approved by the Canadian Welding Bureau, meeting the requirements of CSA W 47.1 and CSA W 55.3.

- .2 Fabricator's Steel Deck Design Engineer: a professional structural engineer, experienced in steel deck design and licensed in the Place of the Work.

1.5 DELIVERY, STORAGE AND HANDLING

- .1 Refer to Section 01 60 00.
- .2 Deliver and store Products to prevent bending, warping and corrosion.
- .3 Damaged material will be rejected.

2 Products

2.1 MANUFACTURERS

- .1 Manufacturers of steel deck having Product considered acceptable for use:
 - .1 Agway Metals Inc.
 - .2 Canam Steel Works.
 - .3 Peerless Enterprises.
 - .4 Vicwest Steel Inc.
- .2 Substitutions: refer to Section 01 25 00.

2.2 DESIGN CRITERIA

- .1 Design metal deck using limit states design in accordance to CAN/CSA-S136 and CSSRI 10M and CSSBI 12M.
- .2 Design deck units to span continuously over 3 spans, supplied in proper length for support conditions.
- .3 Maximum Live Load Deflection: $1/360$ of span.
- .4 Steel deck and connections to steel framing to carry dead, live and other loads including lateral loads, diaphragm action, composite deck action and uplift as indicated.

2.3 MATERIALS

- .1 Steel Roof Deck: 38 mm deep; acoustic, fluted steel roof deck to ASTM A653/A653M, Grade 230; galvanized; flutes spaced at 150 mm OC; c/w interlocking male and female side laps; thickness as indicated on Drawings; e.g. Vicwest RD-938, unpainted finish, 0.76 mm minimum base steel thickness.
- .2 Cover Plates, Cell Closures and Flashings: steel sheet; 0.76 mm thick; galvanized finish.
- .3 Closures to External Walls: neoprene or polyvinyl chloride, closed cell type.
- .4 Sealant: as specified in Section 07 92 00.
- .5 Acoustic Insulation: fibrous glass 17.6 kg/m² density profiled to suit deck flutes.
- .6 Primer: zinc rich, ready mix to CAN/CGSB-1.181.
- .7 Decks to be painted: zinc rich alloy coated decks suitable for finish painting.

2.4 SHOP FINISHING

- .1 Galvanized Coating: to ASTM A653/A653M, hot dipped method, Z275 coating designation, minimum 275 g/m² zinc coating.
- .2 Galvannealed Coating: streak-free matte grey appearance, to ASTM A653/A653M, ZF75 coating designation, minimum 75 g/m² zinc-iron coating.

3 Execution

3.1 INSTALLATION

- .1 Erect metal decking to CSSBI standards.
- .2 Erect decking on support surfaces with 100 mm minimum bearing. Align and level.
- .3 Fasten deck to steel support members at ends and intermediate supports with 19 mm OD puddle welds at 300 mm OC maximum. Space marginal welds at 900 mm OC maximum.
- .4 Weld to CSA W 59.
- .5 Mechanically clinch male/female side laps at 600 mm OC maximum.
- .6 Cut and structurally reinforce openings as required by Shop Drawings.
- .7 Structurally reinforce openings larger than 150 mm square or 200 mm round. Smaller openings need not be reinforced. Refer to Section 05 12 00 for openings greater than 300 mm square.
- .8 Cut additional unreinforced openings as required. Confirm placement of such openings with Consultant prior to cutting.
- .9 Install 150 mm minimum wide sheet steel cover plates, of same thickness as decking, where deck changes direction. Fusion weld at 300 mm OC maximum.
- .10 Make connections and deck alignment neat and to the approval of the Consultant wherever the underside of the metal deck is exposed to view. Make Good dented, damaged or weld-perforated deck.
- .11 Install wet concrete stops at floor deck edge, upturned to top surface of slab. Provide stops of sufficient strength to remain stationary without distortion during concrete pours.
- .12 Install closures and angle flashings to close openings between deck and walls, columns, and openings, as described below:
 - .1 Where fluted end of metal decking rests on exterior masonry walls, fill web spaces with closed cell neoprene or polyvinyl chloride closures as recommended by manufacturer.
 - .2 Where deck flutes are perpendicular to exterior walls, and decking exposed on underside extends beyond these walls, caulk interlocking side laps of decking for 400 mm immediately over walls. Install interior and exterior closures. Seal exterior closures to prevent air infiltration and interior closures to prevent water vapour exfiltration. Provide sufficient quantity of closures to close off topside flutes directly over face of wall.
 - .3 Where flutes run perpendicular to interior partitions, install double run of steel closures as recommended by manufacturer.
 - .4 Where flutes are parallel to interior partitions, install steel closure flashings to provide neat juncture between two materials, as recommended by manufacturer.
 - .5 Closures are not required between interior partitions and underside of decking in areas designated to receive suspended ceiling.

- .13 Immediately after deck is permanently secured in place, touch up metallic coated top surface with compatible primer where burned welding.

3.2 FIELD QUALITY CONTROL

- .1 Perform field inspection and testing as specified in Section 01 40 00.
- .2 Inspect steel deck welds for structural integrity.

3.3 ADJUSTING

- .1 Grind smooth welds.
- .2 Make Good damaged galvanized and galvanized coatings.
- .3 Fill holes blown through metal deck during welding with weld metal.

END OF SECTION

1 General

1.1 RELATED SECTIONS

- .1 Section 03 30 00 - Cast-In-Place Concrete.
- .2 Section 04 22 00 - Concrete Unit Masonry.
- .3 Section 07 21 00 - Thermal Insulation.
- .4 Section 07 26 00 - Vapour Retarders.
- .5 Section 07 27 00 - Air Barriers.

1.2 REFERENCES

- .1 ANSI/AWS D1.3 Structural Welding Code – Sheet Steel.
- .2 ASTM A307-10: Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength.
- .3 ASTM A325M-07: Standard Specification for Structural Bolts, Steel, Heat Treated, 830 MPa Minimum Tensile Strength (Metric).
- .4 ASTM A653/A653M-11: Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- .5 ASTM A792/A792M-10: Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy- Coated by the Hot-Dip Process.
- .6 ASTM C954-07: Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs From 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness.
- .7 ASTM C955-11b: Standard Specification for Load-Bearing (Transverse and Axial) Steel Studs, Runners (Tracks), and Bracing or Bridging for Screw Application of Gypsum Panel Products and Metal Plaster Bases.
- .8 ASTM C1007-11a: Standard Specification for Installation of Load-Bearing (Transverse and Axial) Steel Studs and Related Accessories.
- .9 CAN/CGSB-1.181-99: Ready-Mixed Organic Zinc-Rich Coating.
- .10 CAN/CGSB-7.1-98: Lightweight Steel Wall Framing Components.
- .11 CAN/CSA-S16-01: Limit States Design of Steel Structures.
- .12 CAN/CSA-S136-01: North American Specification for the Design of Cold-Formed Steel Structural Members.
- .13 CSA W47.1-09: Certification of Companies for Fusion Welding of Steel Structures.
- .14 CSA W59-03 (R2008): Welded Steel Construction (Metal Arc Welding).
- .15 CAN/ULC-S101-04: Standard Methods of Fire Endurance Tests of Building Construction and Materials.

1.3 SUBMITTALS

- .1 Submit Shop Drawings, Product data and test reports as specified in Section 01 33 00.
- .2 Shop Drawings
 - .1 Each Shop Drawing submitted shall bear the stamp and signature of a qualified Professional Engineer registered in the Place of the Work.
 - .2 Include necessary shop details and erection diagrams. Indicate member sizes, locations, thicknesses exclusive of coating, coatings, and material types.
 - .3 Include connection details for attaching framing to itself and for attachment to the structure. Show splice details where permitted.
 - .4 Indicate dimensions, openings, requirements of related work and critical installation procedures. Show temporary bracing required for erection purposes.
 - .5 Indicate design loads.
- .3 Submit 5 certified copies of mill reports covering chemical and mechanical properties, and coating designation of steel.
- .4 Product Data: illustrating mechanical fasteners, indicating sizes, load capacities and type of corrosion protection.
- .5 Upon request, submit representative pieces of all framing component parts including mechanical fasteners if used.
- .6 Submit 5 copies of engineering calculations or data verifying the capacity of the members, including masonry connectors if specified, and the ability of the assemblies to meet the design requirements.
- .7 Do not fabricate or construct until submittals other than field review reports are reviewed and approved.
- .8 Submit 5 copies of field review reports.

1.4 QUALITY ASSURANCE

- .1 Retain a Professional Engineer registered in the Place of the Work to design the Lightweight Steel Framing System; to prepare, seal and sign all shop drawings; and to perform field review. Shop drawings shall show both design and installation requirements.
- .2 Installers: company specializing in installing lightweight steel framing systems, with minimum of ten years experience and a member in good standing of the Interior Systems Contractors Association of Ontario (ISCA).
- .3 Welders: Companies certified by the Canadian Welding Bureau to CSA W47.1, and having welders qualified for the base material types and thicknesses that are to be welded.

1.5 DELIVERY STORAGE AND HANDLING

- .1 Refer to Section 01 60 00.
- .2 Store Products protected from conditions that may cause physical damage or corrosion.
- .3 Handle and lift prefabricated panels carefully to avoid permanent distortion to any member or collateral material.

2 Products

2.1 MANUFACTURERS

- .1 Manufacturers of cold-formed metal framing having Products considered acceptable for use:
 - .1 All CSSBI members only.
- .2 Substitutions: refer to Section 01 25 00.

2.2 SYSTEM DESCRIPTION

- .1 Wind Bearing Studs: comprised of the following elements:
 - .1 Wall studs subjected to lateral loads (no axial loads other than self-weight and the weight of applied finishes).
 - .2 Steel bridging.
 - .3 Top and bottom track.
 - .4 Lintel, sill and jamb members for wall openings.
 - .5 Stud, bridging and track connections.
 - .6 Top and bottom connections to the main structure including anchor clip angles, through- bolts and epoxy bolts, and detailing to accommodate floor and/or roof deflections.

2.3 DESIGN CRITERIA

- .1 Base design on Limit States Design principles using factored loads and resistances.
- .2 Loads and load factors shall be in accordance with the applicable code.
- .3 For wind load calculations, the reference velocity pressure, q , shall be based on a 1 in 50 probability of being exceeded in any one year for strength design and for deflection.
- .4 Determine resistances and resistance factors in accordance with the applicable code and CAN/CSA-S136.
- .5 Conform to the requirements of fire rated assemblies which have been tested in accordance with CAN/ULC-S101 and provide a fire resistance rating as indicated on the Drawings.
- .6 Stud depths are shown on the Drawings. Adjust stud material thicknesses and spacings, as required by the design criteria. Use greater or lesser depths only if approved by the Consultant.
- .7 Space wall studs at 600 mm maximum. Use lesser spacings if required by the design criteria.
- .8 For studs, track and joists, conform to the minimum design thicknesses listed below. Use greater stud, track and joist design thicknesses if required by the design criteria.
 - .1 64 mm Width: 0.84 mm thick.
 - .2 92 mm Width: 0.84 mm thick.
 - .3 102 mm Width: 0.84 mm thick.
 - .4 140 mm Width: 0.84 mm thick.
 - .5 152 mm Width: 0.84 mm thick.
 - .6 184 mm Width: 0.91 mm thick.
 - .7 203 mm Width: 1.12 mm thick.
 - .8 235 mm Width: 1.22 mm thick.
 - .9 254 mm Width: 1.52 mm thick.
 - .10 286 mm Width: 1.52 mm thick.
 - .11 305 mm Width: 1.52 mm thick.
 - .12 356 mm Width: 1.91 mm thick.

- .9 For wall studs supporting masonry veneer, the minimum design thickness exclusive of coating shall be the greater of the design thicknesses listed above or 1.12 mm.
- .10 The minimum design thickness for bridging channel shall be 1.22 mm for studs and 1.52 mm for joists. Use greater bridging channel design thickness if required by the design criteria.
- .11 The minimum design thickness for clip angles shall be 1.52 mm for studs and 1.91 mm for joists. Use greater clip angle thickness if required by the design criteria.
- .12 Maximum flexural deflections under specified live or wind loads shall conform to the following:
 - .1 Wall studs supporting masonry veneer shall meet the requirements of CSA S304.1 with stud deflections limited to $L/720$.
 - .2 Wall studs supporting other finishes: $L/360$.
 - .3 Building sway due to all effects, $1/400$ of building height or $1/500$ of storey height.
- .13 Design connections to accommodate vertical deflection movement of the structure, frame shortening and vertical tolerances without imposing axial loads onto the framing. Leave a minimum gap of 12 mm. Larger gaps may be required to accommodate structural movement. Co-ordinate with the Consultant.
- .14 Limit free play and movement in connections perpendicular to the plane of the framing to plus or minus 0.5 mm relative to the building structure.
- .15 Design components and assemblies to accommodate specified erection tolerances of the structure.
- .16 Design bridging to prevent member rotation and member translation perpendicular to the minor axis. Provide for secondary stress effects due to torsion between lines of bridging. Do not rely on collateral sheathing to help restrain member rotation and translation perpendicular to the minor axis.
- .17 Provide bridging at 1500 mm OC maximum. Space bridging at equal intervals over the span length of the member. Closer spacings may be required to satisfy structural requirements.
- .18 Design anchorage and splice details for bridging.
- .19 Design for local loading due to anchorage of cladding and interior wall mounted fixtures where shown.
- .20 Connections between light steel framing members shall be by bolts, welding or sheet metal screws.
- .21 Provide lintel, sill and jamb members and connections to frame openings larger than 100 mm in any dimension.
- .22 Anchor top and bottom track to structure at maximum 800 mm OC. Closer spacings may be required to satisfy structural requirements.

2.4 MATERIALS

- .1 Steel: to CSA-S136; identified on Shop Drawings as to specification, grade, mechanical properties and coating type and thickness.
- .2 Bolts and Nuts: to ASTM A307 or ASTM A325M; hot-dipped galvanized, c/w washers.
- .3 Screws: steel, sheet metal type, to ASTM C954.
- .4 Welding Materials: to CSA W59.
- .5 Welding Electrodes: 480 MPa minimum tensile strength series; e.g. E480XX or ER480S-X.
- .6 Touch-up Paint: Zinc rich paint for touching up welds and damaged metallic coatings, to CAN/CGSB-1.181.

2.5 MANUFACTURED ITEMS

- .1 Load-bearing Steel Studs, Tracks and Bracing: to ASTM C955; finishes, sizes and thicknesses as identified on accepted Shop Drawings.

2.6 FABRICATION

- .1 Except as noted herein, fabricate wall framing components to CAN/CGSB-7.1 and in accordance with approved Shop Drawings.
- .2 Where specified, provide cut-outs centred in the webs of members to accommodate services and through-the-knockout style bridging. Unreinforced cut-outs shall be limited to the following dimensions. Limit the distance from the centreline of the last unreinforced cut-out to the end of the member to be not less than 300 mm. The effect of cut-outs on the strength and stiffness of the member shall be considered.
 - .1 92 mm and 102 mm Deep Members
 - .1 Perpendicular to the Length of the Member: 40 mm.
 - .2 Parallel to the Length of the Member: 105 mm.
 - .3 Centre to Centre Spacing: 600 mm.
 - .2 152 mm Deep Members
 - .1 Perpendicular to the Length of the Member: 65 mm.
 - .2 Parallel to the Length of the Member: 115 mm.
 - .3 Centre to Centre Spacing: 600 mm.
- .3 Length tolerances for members:
 - .1 Tracks: none.
 - .2 Studs: plus or minus 3 mm.
- .4 Cross sectional geometry tolerances for members shall conform to the following:
 - .1 Member Depth: minus 1 mm, plus 2 mm.
 - .2 Flange depth: minus 1 mm, plus 2 mm; minimum 31 mm width.
 - .3 Lip Length: plus 4 mm.
 - .4 Thickness: to CSA S136.
 - .5 Corner Angles: plus or minus 3 degrees.
- .5 Mark the steel thickness, exclusive of coating, on each member by embossing, stamping with indelible ink or by colour coding.

2.7 SHOP FINISH

- .1 Steel: galvanized to ASTM A653/A653M, Z275 coating designation, or ASTM A792/A792M, AZM150 coating designation.
- .2 Concrete Anchors: minimum zinc coating thickness of .008 mm. Other coatings providing equal or better corrosion protection may be used.
- .3 Powder-actuated/low velocity Fasteners: minimum zinc coating thickness of 0.008 mm. Other coatings providing equal or better corrosion protection may be used.

3 Execution

3.1 FASTENERS AND WELDS

- .1 Ensure that connected parts are in contact. Provide clamping before welding or installing screws as required.
- .2 Welds: to CAN/CSA-S136, CSA W59 and ANSI/AWS D1.3, as applicable.

- .3 For material less than 3 mm thick, Shop Drawings may show nominal weld leg sizes. For such material, the effective throats of welds shall not be less than the thickness of the thinnest connected part.
- .4 Sheet metal screws shall be of the minimum diameter indicated on the Shop Drawings but not less than a #8.
- .5 Penetration of Sheet Metal Screws Beyond Joined Materials: not less than 3 exposed threads.
- .6 Sheet metal screw thread types, drilling capability and installation shall conform to the manufacturer's recommendations.
- .7 Provide sheet metal screws with low profile heads where covered by sheathing materials.
- .8 Install concrete anchors in accordance with manufacturer's recommendations.

3.2 ERECTION

- .1 Erect cold-formed metal framing to ASTM C1007.
- .2 Methods of construction may be either piece by piece (stick-built) or by fabrication into panels (panelized) either on- or off-site.
- .3 Erect Products true and plumb, within the specified tolerances.
- .4 Employ temporary bracing wherever necessary to withstand all loads to which the structure may be subject during erection and subsequent construction. Leave temporary bracing in place as long as required for the safety and integrity of the structure. During construction, ensure that a margin of safety consistent with the requirements of the applicable code and CSA-S136 exists in the uncompleted structure.
- .5 Seat studs into top and bottom tracks. Do not allow gap between the end of the stud and the web of the track to exceed 4 mm.
- .6 Align adjacent or abutting members in the same plane to within plus or minus 0.5 mm maximum.
- .7 Space studs within 3 mm either direction of the design spacing. The cumulative error in spacing shall not exceed the requirements of the finishing materials.
- .8 Align web cut-outs in studs and joists as required for the installation of through-the-knockout style bridging and services.
- .9 Take field measurements necessary to ensure proper fit of members.
- .10 Use either saws or shears to cut members. Do not torch cut material.
- .11 Reinforce cut-outs when the distance from the centre line of the cut-out to the end of the member is less than 300 mm. Submit reinforcing detail to Consultant for approval.
- .12 Field cut holes into lightweight steel framing members as described above.
- .13 Replace members with localized damage.
- .14 Unless a closer spacing is shown on the shop drawings, anchor top and bottom tracks securely to structure at 800 mm OC maximum. Place one additional anchor within 100 mm of the end of each piece of track and additionally as required by the shop drawings.

- .15 Install additional studs at abutting walls, openings, terminations against other materials and on each side at corners unless explicitly detailed otherwise on the shop drawings.
- .16 Insulate jamb and header assemblies that may become inaccessible after installation. Use self-expanding foam sealant as specified in Section 07 27 00.

3.3 ERECTION TOLERANCES

- .1 For the purposes of this section, camber is defined as the deviation from straightness of a member or any portion of a member with respect to its major axis, and sweep is defined as the deviation from straightness of a member or any portion of a member with respect to its minor axis.
- .2 Out of Plumbness: do not exceed 1/500th of the member length.
- .3 Out of Straightness (camber and sweep): do not exceed 1/1000th of the member length.
- .4 Track Camber: do not exceed 1/1000th of the member length.

3.4 FIELD QUALITY CONTROL

- .1 The fabricator's shop drawing engineer will undertake periodic field review during construction and shall submit reports as described above.
- .2 Include review of mill tests reports, welded and screwed connections, connections to the main structure, member sizes, location and material thickness, coating thickness, erection tolerances, and all field cutting.
- .3 Additional field inspection and testing will be conducted by a qualified Independent Inspection Agency, as specified in Section 01 40 00.
- .4 Independent inspection and testing will include:
 - .1 Checking that mill test reports are properly correlated to materials.
 - .2 Sampling fabrication and erection procedures for general conformity to the requirements of the specification.
 - .3 Checking that the welding conforms to the requirements of the Contract Documents.
 - .4 Checking fabricated members against specified member geometries.
 - .5 Visual inspection of all welded connections including sample checking of joint preparation and fit-up.
 - .6 Sample checking of screwed and bolted joints.
 - .7 Sample checking that tolerances are not exceeded during fit-up or erection.
 - .8 Additional inspection and testing of welded connections as required by CSA W59.
 - .9 General inspection of field cutting and alterations required by other trades.
 - .10 Submission of reports to the Consultant, the Contractor and the authorities having jurisdiction covering the work inspected with details of deficiencies discovered.

3.5 ADJUSTING AND CLEANING

- .1 Touch-up welds and coatings damaged by welding with zinc rich paint.
- .2 Prior to touch-ups, prepare surface in accordance with paint manufacturer's recommendations.

END OF SECTION

1 General

1.1 RELATED SECTIONS

- .1 Section 03 30 00 - Cast-in-Place Concrete.
- .2 Section 04 22 00 - Concrete Unit Masonry.
- .3 Section 05 12 00 - Structural Steel Framing.
- .4 Section 07 84 00 - Firestopping.
- .5 Section 09 90 00 - Painting and Coating.

1.2 REFERENCES

- .1 AAMA 611-20: Voluntary Specification for Anodized Architectural Aluminum.
- .2 AAMA 2604-22: Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels (With Coli Coating Appendix).
- .3 AAMA 2605-22: Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels (With Coli Coating Appendix).
- .4 ASTM A123/A123M-17: Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
- .5 ASTM A153/A153M-23: Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
- .6 ASTM A240/A240M-22b: Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.
- .7 ASTM A269/A269M-22: Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service.
- .8 ASTM A276/A276M-17: Standard Specification for Stainless Steel Bars and Shapes.
- .9 ASTM A307-21: Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength.
- .10 ASTM A385/A385M-22: Standard Practice for Providing High-Quality Zinc Coatings (Hot-Dip).
- .11 ASTM A449-14 (R2020): Standard Specification for Hex Cap Screws, Bolts, and Studs, Steel, Heat Treated, 120/105/90 ksi Minimum Tensile Strength, General Use.
- .12 ASTM A563/A563M-21a: Standard Specification for Carbon and Alloy Steel Nuts (Inch and Metric).
- .13 ASTM A653/A653M-23: Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by the Hot-Dip Process.
- .14 ASTM A780/A780M-09(2015): Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.
- .15 ASTM A1008/A1008M-21a: Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Required Hardness, Solution Hardened, and Bake Hardenable.

- .16 ASTM B36/B36M-18: Standard Specification for Brass Plate, Sheet, Strip, and Rolled Bar.
 - .17 ASTM B103/B103M-19: Standard Specification for Phosphor Bronze Plate, Sheet, Strip, and Rolled Bar.
 - .18 ASTM B139/B139M-12: Standard Specification for Phosphor Bronze Rod, Bar, and Shapes.
 - .19 ASTM B209/B209M-21: Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
 - .20 ASTM B221M-21: Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric).
 - .21 ASTM D6386-22: Standard Practice for Preparation of Zinc (Hot-Dip Galvanized) Coated Iron and Steel Product and Hardware Surfaces for Painting.
 - .22 ASTM D7803-19: Standard Practice for Preparation of Zinc (Hot-Dip Galvanized) Coated Iron and Steel Product and Hardware Surfaces for Powder Coating.
 - .23 ASTM F436/F436M-19: Standard Specification for Hardened Steel Washers Inch and Metric Dimensions.
 - .24 ASTM F467M-06a(2012): Standard Specification for Nonferrous Nuts for General Use (Metric).
 - .25 ASTM F468M-06(2012): Standard Specification for Nonferrous Bolts, Hex Cap Screws, and Studs.
 - .26 ASTM F593-22: Standard Specification for Stainless Steel Bolts Hex Cap Screws and Studs.
 - .27 ASTM F594-22: Standard Specification for Stainless Steel Nuts.
 - .28 ASTM F3125/F3125M-19e2: Standard Specification for High Strength Structural Bolts and Assemblies, Steel and Alloy Steel, Heat Treated, Inch Dimensions 120 ksi and 150 ksi Minimum Tensile Strength, and Metric Dimensions 830 MPa and 1040 MPa Minimum Tensile Strength.
 - .29 CSA A500-16: Building Guards.
 - .30 CSA G40.20-13 (R2018): General Requirements for Rolled or Welded Structural Quality Steel.
 - .31 CSA G40.21-13 (R2018): Structural Quality Steel.
 - .32 CSA S136-16: North American Specification for the Design of Cold-Formed Steel Structural Members.
 - .33 CSA W47.1:19: Certification of Companies for Fusion Welding of Steel.
 - .34 CSA W47.2-11 (R2020): Certification of Companies for Fusion Welding of Aluminum.
 - .35 CSA W55.3-08 (R2018): Certification of Companies for Resistance Welding of Steel and Aluminum.
 - .36 CSA W59-18: Welded Steel Construction (Metal Arc Welding).
 - .37 CSA W59.2-M1991 (R2018): Welded Aluminum Construction.
- 1.3 SUBMITTALS
- .1 Submit Shop Drawings as specified in Section 01 33 00.
 - .2 Shop Drawings: Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories.

- .3 Shop Drawings for metal guards, railings and ladders must be stamped, signed and dated by the fabricator's design engineer.

1.4 QUALITY ASSURANCE

- .1 Fabricator's Design Engineer: a professional structural engineer, experienced in design of steel guards and railings, and licensed in the Place of the Work.
- .2 Fabricator: company specializing in welded structural building components with three years documented experience and approved under CSA W 47.1 and CSA W 55.3.

1.5 PROJECT CONDITIONS

- .1 Prior to fabrication, verify existing conditions and take field measurements to ensure perfect fit of fabricated items.
- .2 Report deficiencies and misalignments to Consultant.

2 Products

2.1 DESIGN CRITERIA

- .1 Design metal balustrades, guards and railings to resist a uniform load of 0.75 kN/m and a lateral force of 1.0 kN at any point without damage or permanent set.
- .2 Design steel ladder and cage in accordance with the OBC Health and Safety manual and any party having jurisdiction.

2.2 MATERIALS

- .1 Sheet Steel: to CSA G40.20.
- .2 Steel Sections and Plates: to CSA G40.21.
- .3 Stainless Steel: to ASTM A167, Type 304.
- .4 Extruded Aluminum: to ASTM B221M, 6063 alloy, T6 temper.
- .5 Sheet Aluminum: to ASTM B209M, 5005 alloy, H14 temper.
- .6 Brass: to ASTM B36/B36M.
- .7 Bronze Plate, Strip and Sheet: phosphor type, to ASTM B103/B103M.
- .8 Machine Bolts: to ASTM A307, externally and internally threaded standard fasteners.
- .9 High Strength Bolts: to ASTM A325M, including suitable nuts and plain hardened washers; hot dipped galvanized for exterior members.
- .10 Perforated Metal Sheet: 1.9 mm thick sheet aluminum; 1 200 x 2 400 mm size sheets; 6 mm OD round perforations spaced at 10 mm OC with a staggered line pattern; by Unalloy IW RC.
- .11 Welding Materials: to CSA W59.
- .12 Metal Primer: to CGSB 85-GP-10M, red oxide type.

- .13 Galvanized Metal Primer: zinc rich type, to CGSB 85-GP-16M.

2.3 FABRICATION

- .1 Fabricate components to CAN/CSA-S136.
- .2 Fit and shop assemble components in largest practical sections to accommodate delivery to the Place of the Work.
- .3 Continuously seal joined pieces by continuous welds.
- .4 Grind exposed joints flush and smooth with adjacent finish surface.
- .5 Make exposed joints butt tight, flush and hairline.
- .6 Exposed Mechanical Fastenings: Flush countersunk screws or bolts; except where specifically noted otherwise.
- .7 Supply components required for anchorage of fabrications.

2.4 FINISHES

- .1 Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.
- .2 Do not prime surfaces in direct contact with concrete or where field welding is required.
- .3 Prime paint items with two coats.
- .4 Galvanizing: to CAN/CSA-G164-M, hot dipped method, minimum 275 g/m² zinc coating.
- .5 Stainless Steel: No. 4 - Brushed.
- .6 Brass: No. 8 - Polished.
- .7 Aluminum: natural mill finish.
- .8 Powder Coating: electrostatic spray-applied polymer powder coating, minimum 0.05 mm dry film thickness; colour as selected by Consultant.
- .9 Baked Enamel Shop Finish: silicone modified polyester coating, applied to a minimum 0.025 mm dry film thickness; e.g. WeatherX by Valspar, colour as selected by Consultant from standard range of colours.

3 Execution

3.1 PREPARATION

- .1 Make provision for erection loads with temporary bracing.
- .2 Clean and strip primed steel items to bare metal where site welding is required.
- .3 Supply items required to be cast into concrete and or embedded in masonry with setting templates, to appropriate Sections.

3.2 INSTALLATION

- .1 Install components plumb and level, accurately fitted, free from distortion or defects.

- .2 Provide fasteners and anchors necessary to secure components rigidly in place.
- .3 Field weld components to CSA W 59.
- .4 Field bolt and weld to match shop bolting and welding.
- .5 Mechanically fasten joints butted tight, flush, and hairline. Grind welds smooth and flush.
- .6 After erection, prime welds, abrasions, and surfaces not shop primed or galvanized, except surfaces to be in contact with concrete.

3.3 SCHEDULE

- .1 The following schedule is a list of principal items only. Refer to Drawings for additional information, and for items not specifically scheduled.
 - .1 Sleeves and Openings: including templates and required information, supplied to appropriate Sections.
 - .2 Attachments: anchor bolts, washers, nuts, lag screws, expansion shields, toggles, straps, sleeves, brackets, etc. as required and secured with sufficient self-tapping "shake-proof" screws with flat countersunk heads.
 - .3 Miscellaneous Brackets: mild steel plate, sizes and configurations as required to support shelving, seats, benches, valances, counter tops, coat hooks, etc.; pre-drilled for fastening of other components.
 - .4 Lateral Support of Masonry Partitions: 75 x 75 mm steel angles, 6 mm thick, as follows:
 - .1 Concealed Conditions: 200 mm long and spaced at 3,000 mm OC; minimum 2 anchors each.
 - .2 Exposed Conditions: continuous lengths, anchored at 1,000 mm OC.
 - .5 Access Ladders: conforming to guidelines of authorities having jurisdiction, mounted 150 mm clear of wall surface; shop primed for interior applications and hot dipped galvanized to Z275 finish for exterior applications; and constructed as follows:
 - .1 Stringers: 10 x 65 mm steel bars, spaced 400 mm apart.
 - .2 Rungs: 20 mm OD steel bars, welded to stringers; spaced 300 mm OC
 - .3 Brackets: 6 mm thick steel angles, welded to stringers, for bolted connection using expansion-type fasteners to wall substrate.
 - .6 Metal Handrails, Guardrails and Balustrades: stainless steel construction, as indicated on Drawings.

END OF SECTION

DIVISION 6

WOOD, PLASTICS AND COMPOSITES

1 General

1.1 RELATED SECTIONS

- .1 Section 03 30 00 - Cast-In-Place Concrete.
- .2 Section 05 50 00 - Metal Fabrications.
- .3 Section 07 21 00 - Thermal Insulation.
- .4 Section 07 26 00 - Vapour Retarders.
- .5 Section 07 27 00 - Air Barriers.
- .6 Section 07 52 11 - Modified Bitumen Membrane - N.V.S.
- .7 Section 07 62 00 - Sheet Metal Flashing and Trim.
- .8 Section 07 92 00 - Joint Sealants.

1.2 REFERENCES

- .1 ASTM A153/A153M-23: Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
- .2 ASTM F593-22: Standard Specification for Stainless Steel Bolts, Hex Cap Screws and Studs.
- .3 ASTM F594-22: Standard Specification for Stainless Steel Nuts.
- .4 ASTM F1667-21: Standard Specification for Driven Fasteners: Nails, Spikes and Staples.
- .5 CAN/CSA O80 SERIES-08 (R2012) Consolidated: Wood Preservation.
- .6 CAN/CSA-O86-09 Consolidated: Engineering Design in Wood.
- .7 CSA O112.9-10: Evaluation of Adhesives for Structural Wood Products (Exterior Exposure).
- .8 CSA O121-08 (R2013): Douglas Fir Plywood.
- .9 CSA O141-05 (R2009): Softwood Lumber.
- .10 CSA O151-09: Canadian Softwood Plywood.
- .11 NLGA Standard Grading Rules for Canadian Lumber, August 2017 Edition.
- .12 CAN/ULC-S102-2018 (REV1): Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies.

1.3 DELIVERY, STORAGE AND HANDLING

- .1 Refer to Section 01 60 00.
- .2 Deliver and store Products under waterproof cover.
- .3 Prevent damage to Products, existing properties and to the Work.
- .4 Store Products where it does not hinder the progress of the Work.

2 Products

2.1 MATERIALS

- .1 Lumber: to CSA O141, S4S; 19 percent maximum moisture content (S-Dry); SPF species; Light Framing Grade Category, Standard and Better Common Grade Mix.
- .2 Plywood Sheathing: CSP to CSA O151, SHG grade; veneer core, butt edge, unsanded faces.
- .3 Nails: to CSA B111, Type 304 or 316 stainless steel, common wire type for general use and spiral type for structural connections.
- .4 Anchors: toggle bolt type for anchorage to hollow masonry, expansion shield and lag bolt type for anchorage to solid masonry or concrete, or bolts or ballistic fasteners for anchorages to steel.
- .5 Screws: bugle head, drywall type, steel, power driven type, length as required.

2.2 WOOD TREATMENT

- .1 Wood Preservative Pressure Treatment: to CSA O80; using alkaline copper quaternary (ACQ) preservative.
- .2 Wood Preservative Surface Application: to CSA O80, brush-applied.

3 Execution

3.1 SITE APPLIED WOOD TREATMENT

- .1 When wood in contact with cementitious materials, roofing and related metal flashings has not been previously pressure treated, brush apply two coats of surface applied preservative treatment on wood.
- .2 Apply 2 coats of surface applied preservative treatment to sawn ends of pressure treated material.
- .3 Apply preservative treatment to CSA O80 and in accordance with the manufacturer's instructions.

3.2 INSTALLATION

- .1 Erect wood framing members level and plumb.
- .2 Place horizontal members laid flat, crown side up.
- .3 Construct framing members full length without splices.
- .4 Secure plywood perpendicular to framing members with ends staggered. Secure sheet edges over firm bearing.
- .5 Provide wood blocking required for the attachment of Products, fitments and equipment by other Sections.
- .6 Provide a 19 mm thick plywood backer board on wood blocking for mounting electrical equipment where indicated on Drawings.

- .7 Construct curbs and can't members of single pieces per location.
- .8 Curb roof openings except where prefabricated curbs are provided.
- .9 Form corners by lapping side members alternately.

END OF SECTION

1 General

1.1 RELATED SECTIONS

- .1 Section 06 10 00 - Rough Carpentry.
- .2 Section 07 92 00 - Joint Sealants.
- .3 Section 09 90 00 - Painting and Coating.

1.2 REFERENCES

- .1 ANSI A135.4-2004: Basic Hardboard.
- .2 ANSI A208.1-2009: Particleboard.
- .3 ANSI A208.2-2009: Medium Density Fiberboard (MDF) for Interior Applications.
- .4 ASTM B456-17(2022): Standard Specification for Electrodeposited Coatings of Copper Plus Nickel Plus Chromium and Nickel Plus Chromium.
- .5 ASTM F1667-21: Standard Specification for Driven Fasteners: Nails, Spikes and Staples.
- .6 AWMAC NAAWS 4.0-2021: North American Architectural Woodwork Standards.
- .7 CHPVA Official Grading Rules for Canadian Hardwood Plywood.
- .8 CSA O121-08 (R2013): Douglas Fir Plywood.
- .9 CSA O141-05 (R2009): Softwood Lumber.
- .10 CSA O151-09: Canadian Softwood Plywood.
- .11 ANSI/HPVA HP-1-2020: American National Standard for Hardwood and Decorative Plywood.
- .12 NHLA Grading Rules.

1.3 QUALITY ASSURANCE

- .1 Fabricator: company specializing in custom carpentry work with three years documented experience.
- .2 Perform finish carpentry to AW MAC Quality Standards, Custom grade.

2 Products

2.1 MATERIALS

- .1 Softwood Lumber (SL): SPF species, to CSA O141, maximum moisture content of 7 percent, with mixed grain, of quality capable of receiving high quality opaque finish.
- .2 Hardwood Lumber (HL): Maple species, to NHLA Select and Better Grade; maximum moisture content of 7 percent, with vertical grain, of quality capable of receiving high quality transparent finish.

- .3 Softwood Plywood (SP): CSP, to CSA O121-M; SEL TF appearance; veneer core materials; rotary cut; of clear unmatched grain capable of receiving high quality opaque finish.
- .4 Hardwood Plywood (HP): Maple species, to CSA O115-M, Architectural G1S appearance, lumber core material; rotary cut; of clear book match grain capable of receiving high quality transparent finish.
- .5 Particle Board (PB): 100 percent post-industrial wood fibres; to ANSI A208.1, Grade M-2, minimum 635 kg/m³ density; 6 percent maximum moisture content; no added urea formaldehyde; certified EPP by Composite Panel Association; e.g. Nu Green by Uniboard Canada.
- .6 Medium Density Fiberboard (MDF): to ANSI A208.2, Grade MD, minimum density of 740 kg/m³ density; 4.5 - 8.0 percent maximum moisture content.

2.2 ACCESSORIES

- .1 Coat Hooks: as specified in Section 06 40 00.
- .2 Plastic Laminate: standard decorative laminate, as specified in Section 06 24 00.
- .3 Contact Adhesives: solvent release type.
- .4 Wall Adhesive: solvent release, cartridge type, compatible with wall substrate, capable of achieving durable bond.
- .5 Nails: Size and type to suit application, plain finish.
- .6 Bolts, Nuts, Washers, Blind fasteners, Lags, and Screws: Size and type to suit application; plain finish.
- .7 Lumber for Shimming, Blocking, and Strapping: softwood lumber, to CSA O141, NLGA No. 2 SPF species.
- .8 Primer: alkyd primer sealer type.
- .9 Wood Filler: Solvent base, tinted to match surface finish colour.

3 Execution

3.1 INSTALLATION

- .1 Install Products to AW MAC Custom Grade.
- .2 Set and secure materials and components in place, plumb and level.
- .3 Install components and trim with nails, screws, or bolts with blind fasteners at 400 mm OC; or wall adhesive by gun application as required by specific installation requirements.
- .4 Cover exposed edges of casework with 10 mm thick hardwood edging.
- .5 Apply laminated plastic to wood surfaces as specified in Section 06 24 00.
- .6 Install wood doors as specified in Section 08 14 00.
- .7 Install finish hardware as specified in Section 08 71 00.

- .8 Seal gaps between walls and counter tops as specified in Section 07 92 00.

3.2 ADJUSTING AND CLEANING

- .1 Set exposed fasteners.
- .2 Apply wood filler in exposed fastener indentations.
- .3 Site Finishing: refer to Section 09 90 00.

END OF SECTION

DIVISION 7

THERMAL & MOISTURE PROTECTION

1 General

1.1 RELATED SECTIONS

- .1 Section 07 26 00 - Vapour Retarders.
- .2 Section 07 27 00 - Air Barriers.
- .3 Section 07 42 43 - Aluminum Composite Wall Panels.
- .4 Section 07 52 11 - Modified Bitumen Membrane - N.V.S.
- .5 Section 07 81 00 - Applied Fireproofing.
- .6 Section 07 84 00 - Firestopping.
- .7 Section 09 81 00 - Acoustic Insulation.

1.2 REFERENCES

- .1 ASTM C518-21: Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
- .2 ASTM C612-14(2019): Standard Specification for Mineral Fiber Block and Board Thermal Insulation.
- .3 ASTM C1104/C1104M-19: Standard Test Method for Determining the Water Vapor Sorption of Unfaced Mineral Fiber Insulation.
- .4 ASTM D1621-10: Standard Test Method for Compressive Properties of Rigid Cellular Plastics.
- .5 ASTM D2842-19: Standard Test Method for Water Absorption of Rigid Cellular Plastics.
- .6 ASTM E96/E96M-16: Standard Test Methods for Water Vapor Transmission of Materials.
- .7 CGSB 71-GP-24M: Adhesive, Flexible, for Bonding Cellular Polystyrene Insulation.
- .8 CAN/ULC-S102-2018 (REV 1): Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies.
- .9 CAN/ULC-S114-2018: Standard Method of Test for Determination of Non-Combustibility in Building Materials.
- .10 CAN/ULC-S701.1-2017: Standard for Thermal Insulation, Polystyrene Boards.
- .11 CAN/ULC-S702.1-14 (R2019): Standard for Mineral Fibre Thermal Insulation for Buildings.
- .12 ULC-S702.2-15: Standard for Mineral Fibre Thermal Insulation for Buildings, Part 2: Installation.

1.3 REGULATORY REQUIREMENTS

- .1 Conform to applicable code for combustibility, flame and smoke performance requirements of polystyrene insulations.

1.4 DELIVERY, STORAGE AND HANDLING

- .1 Store, handle and protect Products as specified in Section 01 60 00.
- .2 Minimize time plastic-type insulation Products are stored or exposed to sunlight at project site.
- .3 Store Products away from construction activity and sources of ignition.
- .4 Protect Products from damage during handling, installation and at point of installation.

1.5 ENVIRONMENTAL REQUIREMENTS

- .1 Apply insulation only when surfaces and ambient temperatures are within manufacturer's prescribed limits.

2 Products

2.1 MANUFACTURERS

- .1 Manufacturers of rigid extruded polystyrene insulation for use in below grade applications having Product considered acceptable for use:
 - .1 The Dow Chemical Company.
 - .2 Owens Corning Canada Inc.
- .2 Manufacturers of rigid extruded polystyrene insulation for use in cavity wall having Product considered acceptable for use:
 - .1 The Dow Chemical Company.
- .3 Manufacturers of non-rigid and semi-rigid mineral fibre insulation having Product considered acceptable for use:
 - .1 CertainTeed Insulation Canada.
 - .2 Knauf Insulation.
 - .3 Owens-Corning Canada Inc.
 - .4 Roxul Inc.
- .4 Substitutions: refer to Section 01 25 00.

2.2 MATERIALS

- .1 Extruded Polystyrene Board Insulation for Below Grade and Below Slab Applications: to CAN/ULC-S701, Type 4, rigid, closed cell type, with integral high density skin.
 - .1 Thermal Resistance : 5 year aged RSI value of 0.87/25mm.
 - .2 Board Size: As indicated.
 - .3 Compressive Strength: Minimum 210 kPa.
 - .5 Water Absorption: to ASTM D2842, 0.7% by volume maximum.
 - .6 Edges: Shiplap.
 - .7 Water Vapour Permeance: to ASTM E96, 50 ng/Pa•s•m².
 - .8 Manufacturer and Product Name: e.g. Styrofoam SM by The Dow Chemical Company.
- .3 Mineral Fibre Thermal Batt Insulation: to CAN/ULC-S702, Type 1; non-rigid, friction fit type, manufactured from glass, rock or slag:
 - .1 Aged Thermal Resistance: RSI 0.67 per 25 mm of thickness.
 - .2 Facing: Unfaced.
 - .3 Size: 610 x 1 220 mm.

- .4 Nominal Density: 32 kg/m³.
 - .5 Combustibility: Noncombustible to CAN/ULC-S114.
 - .6 Surface Burning Characteristics: to CAN/ULC-S102, maximum flame spread of 15, smoke developed of 5.
 - .7 Thickness: as indicated on Drawings.
 - .8 Manufacturer and Product Name: e.g. Fiberglas AF110 by Owens-Corning Canada Inc.
-
- .4 Mineral Fibre Semi-Rigid Board Insulation for Metal Walls: to CAN/ULC-S702, Type 3; semi-rigid board type, manufactured from glass, rock or slag:
 - .1 Aged Thermal Resistance: RSI 0.67 per 25 mm of thickness.
 - .2 Board Size: 610 x 1 220 mm.
 - .3 Nominal Density: 48 kg/m³ when tested to ASTM C303.
 - .4 Combustibility: Noncombustible to CAN/ULC-S114.
 - .5 Surface Burning Characteristics: to CAN/ULC-S102, maximum flame spread of 25, smoke developed of 50.
 - .6 Thickness: as indicated on Drawings.
 - .7 Manufacturer and Product Name: e.g. Fiberglas Type 703 by Owens-Corning Canada Inc.

2.3 ACCESSORIES

- .1 Mechanical Fasteners: stainless steel screw type fastener, c/w moulded plastic disc washer, minimum 75 mm diameter.
- .2 Adhesive (for Polystyrene): to CGSB 71-GP-24M, Type 1.
- .3 Adhesive: mastic type, synthetic rubber base, fungi resistant, gun or trowel application, application temperature 12 degrees C to 50 degrees C.
- .4 Tape: polyester self-adhering type; translucent; 50 mm wide.

3 Execution

3.1 EXAMINATION

- .1 Refer to Section 01 71 00.
- .2 Ensure that air seals and vapour retarders are in place.

3.2 RIGID AND SEMI-RIGID BOARD INSULATION

- .1 Unless specified otherwise, secure rigid board insulation with an approved adhesive.
- .2 Apply adhesive in three continuous beads per board length.
- .3 Install insulation boards on wall surface either horizontally or vertically as required. Place membrane surface of insulation solidly against substrate and securely fasten.
- .4 Install mineral fibre semi-rigid boards to CAN/ULC-S702.2.
- .5 Do not crush insulation face when fastening with mechanical fasteners.
- .6 Stagger side and end joints. Butt edges and ends tight to adjacent board and to protrusions.

3.3 BATT AND BLANKET INSULATION

- .1 Install mineral fibre batts and blankets to CAN/ULC-S702.2.
- .2 Install batt insulation in spaces without gaps and voids.
- .3 Fit insulation tight in spaces and tight to exterior side of mechanical and electrical services within the plane of insulation.
- .4 Place vapour retarder on warm side of insulation as specified in Section 07 26 00.

3.4 FIELD QUALITY CONTROL

- .1 Notify Consultant and roofing inspector to inspect roof and wall insulation before, during and upon completion of installation.

3.5 PROTECTION

- .1 Refer to Section 01 76 00.
- .2 Protect insulation edges at the end of each Working Day.
- .3 Protect insulation in areas where welding will be carried out.
- .4 Replace insulation damaged by others.
- .5 Protect insulation requiring a thermal barrier to requirements of local and provincial legislation.

END OF SECTION

1 General

1.1 RELATED SECTIONS

- .1 Section 07 21 00 - Thermal Insulation.
- .2 Section 07 27 00 - Air Barriers.
- .3 Section 07 42 13 - Metal Wall Panels.
- .4 Section 07 42 43 - Composite Wall Panels.
- .5 Section 07 52 11 - Modified Bitumen Membrane - N.V.S.
- .6 Section 07 92 00 - Joint Sealants.

1.2 REFERENCES

- .1 ASTM E96/E96M-22a: Standard test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials.
- .2 CAN/CGSB-51.34-M86: Vapour Barrier, Polyethylene Sheet for Use In Building Construction.
- .3 SWI Sealant and Caulking Guide Specification.

1.3 SUBMITTALS

- .1 Submit Product data and manufacturer's installation instructions as specified in Section 01 33 00.
- .2 Product Data: including material characteristics, performance criteria, and limitations.
- .3 Manufacturer's Installation Instructions: indicate preparation and installation requirements, and/or techniques.

1.4 QUALITY ASSURANCE

- .1 Perform Work to Sealant and Waterproofers Institute - Sealant and Caulking Guide Specification.

1.5 SCHEDULING

- .1 Sequence Work to permit installation of materials in conjunction with other barrier materials and seals.

2 Products

2.1 PERFORMANCE CRITERIA

- .1 Installed Products shall ensure continuity of building enclosure vapour retarder:
 - .1 In conjunction with materials described under other Sections.
 - .2 To seal gaps between building enclosure components and wall and roof opening frames.

2.2 MATERIALS

- .1 General Purpose Vapour Retarder: 0.15 mm thick polyethylene, to CAN/CGSB-51.34-M.
- .2 Roof Vapour Retarders: as specified in Section 07 52 11.
- .3 Adhesive: compatible with sheet barrier and substrate, permanently non-curing.
- .4 Joint Sealant: as specified in Section 07 92 00.

3 Execution

3.1 PREPARATION

- .1 Ensure surfaces to receive vapour retarder are clean, dry and free of oil, grease, dirt, excess mortar or other contaminants.
- .2 Cure new concrete for a minimum of two weeks.

3.2 INSTALLATION

- .1 Position joints or laps of sheets over studs or other firm bearing in order to achieve an effective and permanent seal.
- .2 Seal laps, joints, and terminations with an approved sealant to ensure complete, continuous seal of building envelope.

3.3 FIELD QUALITY CONTROL

- .1 Inspect vapour retarders prior to concealment and identify gaps, holes, punctures, etc.
- .2 Seal gaps in vapour retarders with a joint sealer as specified in Section 07 92 00.
- .3 Request Consultant inspection of vapour retarders prior to concealment. Work that has been concealed prior to Consultant inspection will be exposed while Consultant remains at the Place of the Work, inspected, and then only concealed upon Consultant acceptance of conditions.

END OF SECTION

1 General

1.1 RELATED SECTIONS

- .1 Section 04 05 00 - Common Work Results for Masonry.
- .2 Section 07 21 00 - Thermal Insulation.
- .3 Section 07 26 00 - Vapour Retarders.
- .4 Section 07 42 43 - Aluminum Composite Wall Panels.
- .5 Section 07 52 11 - Modified Bitumen Membrane - N.V.S.
- .6 Section 07 92 00 - Joint Sealants.

1.2 REFERENCES

- .1 ASTM D412-16: Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers – Tension.
- .2 ASTM E96/E96M-22ae1: Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials.
- .3 ASTM E154/E154M-08a(2019): Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover.
- .4 ASTM E2178-21: Standard Test Method for Determining Air Leakage Rate and Calculation of AIR Permeance of Building Materials.
- .5 SWI Sealant and Caulking Guide Specification.
- .6 CAN/ULC-S741-2008 (R2016): Standard for Air Barrier Materials – Specification.
- .7 CAN/ULC-S742-2011 (R2016): Standard for Air Barrier Assemblies – Specification.

1.3 SUBMITTALS

- .1 Submit Product data and installation instructions as specified in Section 01 33 00.
- .2 Product Data: indicating material characteristics, performance criteria, and limitations.
- .3 Manufacturer's Installation Instructions: indicate preparation and installation requirements and techniques for foam sealant Products.

1.4 QUALITY ASSURANCE

- .1 Perform Work to requirements of Sealant and Waterproofers Institute - Sealant and Caulking Guide Specification requirements.
- .2 Applicators: recognized by membrane manufacturer as being suitable for the execution of the Work.

1.5 DELIVERY STORAGE AND HANDLING

- .1 Refer to Section 01 60 00.
- .2 Deliver Products in undamaged containers and original packaging indicating the name of the manufacturer and product.
- .3 Store roll materials on end in original packaging.
- .4 Store adhesives and primers at temperatures of 5 degrees Celsius to facilitate handling.
- .5 Keep solvent away from open flame or excessive heat.
- .6 Protect rolls from direct sunlight until ready for use.

1.6 ENVIRONMENTAL REQUIREMENTS

- .1 Apply sheet membranes when ambient air temperature is above 5 degrees Celsius.
- .2 Apply liquid membranes when ambient air temperature is above -12 degrees Celsius.

1.7 SCHEDULING

- .1 Sequence Work to permit installation of materials in conjunction with other barrier materials and seals.

2 Products

2.1 DESIGN CRITERIA

- .1 Ensure continuity of building enclosure air barrier in conjunction with other materials and seal gaps between building enclosure components and wall and roof opening frames.

2.2 MATERIALS

- .1 Air Barrier Transition Sheet Membrane: 1 mm thick, self-adhering and self-sealing sheet membrane; 915 mm wide rolls; maximum air leakage rate of 0.02 L/s•m²; Sealtight Air Shield by W. R. Meadows, Air/Vapour Barrier by Henry, Exoair 110 by Tremco, Sopraseal Stick 1100 by Soprema Inc., or AquaBarrier AVB by IKO Industries Ltd.
- .2 Air/Vapour Barrier Liquid Membrane: single component, spray-applied; solvent type synthetic rubber; maximum air leakage of 0.02 L/s•m² measured at 75 Pa; maximum water vapour permeance of 3.2 ng/Pa•m²; Sealtight Air-Shield LM by W. R. Meadows, Blueskin SA by Henry, Exoair 120 by Tremco, or Sopraseal LM 200 by Soprema Inc.
- .3 Insulating Air Sealant: two-component polyurethane sealant, to CAN/ULC-S711.1; e.g. Zerodraft Insulating Air Sealant.
- .4 Foam Sealant: one-component polyurethane sealant, to CAN/ULC-S710.1; e.g. Zerodraft Foam Sealant.
- .5 Attachments: galvanized steel bars and anchors.
- .6 Primer: as recommended by sheet membrane manufacturer.

.7 Joint Sealant: as specified in Section 07 92 00.

3 Execution

3.1 PREPARATION

- .1 Ensure surfaces to receive air barrier are clean, dry and free of oil, grease, dirt, excess mortar or other contaminants.
- .2 Cure new concrete for a minimum of two weeks.
- .3 Fill spalled concrete or open mortar joints to provide an even plane.
- .4 Apply primer to porous surfaces scheduled to receive self-adhering transition sheet membranes.

3.2 SELF-ADHERING TRANSITION SHEET MEMBRANES

- .1 Apply transition sheet membranes at openings and transitional connections.
- .2 Leave a sufficient amount of excess membrane material over the top of the parapet walls and around wall openings for tie-in by other Sections.
- .3 Cut transition sheet membranes neatly around ties.
- .4 Use a heated trowel to soften and form membrane around ties. Seal with mastic sealant.
- .5 Provide airtight joints.

3.3 LIQUID AIR BARRIERS

- .1 Spray-apply liquid membrane using manufacturer's recommended spray equipment.
- .2 Apply material to form a continuous and seamless layer having a wet film thickness between 2.25 mm and 3 mm.
- .3 Overlap liquid membrane on to transition sheet membranes a minimum of 25 mm.
- .4 Apply membranes completely around all projections.
- .5 Air dry membrane and allow to cure before installation of insulation boards.

3.4 FOAM SEALANTS

- .1 Install foam sealants in accordance with authorities having jurisdiction.
- .2 Avoid overfilling restricted spaces.
- .3 Apply one-component foam sealant for cracks or openings 6 mm to 50 mm wide. Conform to CAN/ULC-S710.2.
- .4 Apply two-component insulating air sealant for gaps over 50 mm wide, and for voids in hidden cavities. Conform to CAN/ULC-S711.2.

3.5 FIELD QUALITY CONTROL

- .1 Inspect air barriers prior to concealment and identify gaps, holes, punctures, etc.
- .2 Seal holes in air barrier transition sheet membranes using an approved asphalt-based mastic.
- .3 Seal holes in spray-applied liquid membranes by applying additional liquid membrane as necessary.
- .4 Request Consultant inspection of air barriers prior to concealment. Work that has been concealed prior to Consultant inspection will be exposed while Consultant remains at the Place of the Work, inspected, and then only concealed upon Consultant acceptance of conditions.

3.6 CLEANING

- .1 Refer to Section 01 74 00.
- .2 Clean extra material from adjacent surfaces.
- .3 Ensure a suitable substrate for subsequent installations.

END OF SECTION

1 General

1.1 RELATED SECTIONS

- .1 Section 04 22 00 - Concrete Unit Masonry.
- .2 Section 07 21 00 - Thermal Insulation.
- .3 Section 07 26 00 - Vapour Retarders.
- .4 Section 07 27 00 - Air Barriers.
- .5 Section 07 92 00 - Joint Sealants.
- .6 Section 08 51 13 - Aluminum Windows.

1.2 REFERENCES

- .1 SWI Sealant and Caulking Guide Specification.
- .2 CAN/ULC-S710-2019: Standard for Bead-Applied One Component Polyurethane Air Sealant Foam, Part 1: Material Specification.
- .3 CAN/ULC-S710.2-11: Standard for Thermal Insulation – Bead Applied One-Component Polyurethane Air Sealant Foam, Part 2: Application.
- .4 CAN/ULC-S711.1-2019: Standard for Bead-Applied Two Component Polyurethane Air Sealant Foam, Part 1: Material Specification.
- .5 CAN/ULC-S711.2-11: Standard for Thermal Insulation – Bead Applied Two-Component Polyurethane Air Sealant Foam, Part 2: Application.

1.3 SEQUENCING

- .1 Sequence installation of Products in conjunction with air barriers and vapour retarders.

1.4 PRODUCT DATA

- .1 Submit Product data as specified in Section 01 33 00.
- .2 Product Data: Manufacturer's standard data sheets, indicating material characteristics, performance criteria and Product limitations.

1.5 MANUFACTURER'S INSTRUCTIONS

- .1 Submit manufacturer's instructions as specified in Section 01 33 00.
- .2 Manufacturer's Instructions: Manufacturer's standard installation instructions, indicating preparation and installation requirements and techniques.

1.6 DELIVERY STORAGE AND HANDLING

- .1 Refer to Section 01 60 00.
- .2 Deliver Products in undamaged containers and original packaging indicating name of manufacturer and Product.

2 Products

2.1 MANUFACTURERS

- .1 Manufacturers having Product considered acceptable for use:
 - .1 DuPont de Nemours, Inc.
 - .2 Henkel Canada Corporation.

2.2 PERFORMANCE CRITERIA

- .1 Ensure continuity of building enclosure air barrier in conjunction with Products specified in other Sections.
- .2 Seal gaps between building enclosure components and opening frames.

2.3 MATERIALS

- .1 Air Sealant Foam (ASF-1): to CAN/ULC-S710.1; one-component polyurethane sealant.
- .2 Air Sealant Foam (ASF-2): to CAN/ULC-S711.1; two-component polyurethane sealant.

3 Execution

3.1 PREPARATION

- .1 Install air sealant foam in accordance with authorities having jurisdiction.
- .2 Avoid overfilling restricted spaces.
- .3 Seal gaps between air barrier membranes and frames installed in openings.
- .4 Apply air sealant foam Type ASF-1 to cracks or openings 6 mm to 50 mm wide. Conform to CAN/ULC S710.2.
- .5 Apply air sealant foam Type ASF-2 to gaps over 50mm wide, and to voids in hidden cavities. Conform to CAN/ULC S711.2

3.2 CLEANING

- .1 Refer to Section 01 74 00.
- .2 Clean extra material from adjacent surfaces.
- .3 Leave suitable substrate for subsequent construction.

END OF SECTION

1 General

1.1 SECTION INCLUDES

- .1 Section includes for provision of all labour, materials, equipment and services for SBS Modified Bituminous Membrane Roofing in accordance with Contract Documents.
- .2 Note: The following roof replacement areas shall be carried out only on weekends with required interior protection, minimum 10 mil poly:
 - 1. Roof R3 - Over Electrical Room Between Lines 4-5 / A'-AZ
 - 2. Roof R5 – Over Data Centre Between Lines 3-5 / E-F

1.2 RELATED SECTIONS

- .1 Section 06 10 00 Rough Carpentry
- .2 Section 07 62 00 Sheet Metal Flashing and Trim
- .3 Section 07 92 00 Joint Sealers

1.3 REFERENCES

- .1 Roofing work, roofing materials, products, and accessories shall be in accordance with most current applicable industry standards including but not limited to:
 - .1 Ontario Building Code, Part 3
 - .2 CAN/CSA A123.21 – Standard Test Method For The Dynamic Wind Uplift Resistance of Membrane Roofing Systems
 - .3 CAN/CSA B149.1 - Natural Gas and Propane Installation Code
 - .4 CAN/ULC – S107 – Fire Test of Roof Covering
 - .5 CAN/ULC-S701 / ASTM C578 - Thermal Insulation, Polystyrene, Boards and Pipe Covering
 - .6 CAN/ULC–S702 – Mineral Fiber Thermal Insulation for Buildings.
 - .7 CAN/ULC-S704 / ASTM C1289 - Thermal Insulation, Polyurethane and Polyisocyanurate Boards, Faced.
 - .8 CAN/ULC S770 / ASTM C1303 - Standard Test Method for Determination of Long-term Thermal Resistance of Closed-cell Thermal Insulating Foams
 - .9 CSA A231.1 / A231.2; Precast Concrete Paving Slabs
 - .10 CAN/ULC–S107 / ASTM E-108 - Fire Test of Roof Covering
 - .11 CGSB-37-GP-56 / ASTM D6164 / ASTM 6163 - - Membrane, Modified, Bituminous, Prefabricated and Reinforced for Roofing
 - .12 CGSB 37-GP-9 / ASTM D41 - Primer, Asphalt for Asphalt Roofing, Damp proofing and Waterproofing
 - .13 ASTM E108 – Standard Test Methods for Fire Tests of Roof Coverings
 - .14 ASTM C1177 - Glass Mat Gypsum Substrate for Use as Sheathing
 - .15 ASTM C1278 – Fiber Reinforced Gypsum Panels
 - .16 ASTM C1289 - Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board
 - .17 ASTM D6164 - Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using Polyester Reinforcements
 - .18 CSA B149.1 – Natural Gas & Propane Installation Code (Gas line supports)
 - .19 Canadian Roofing Contractors Association (CRCA) – Specification Manual
 - .20 FM 4470 - Approval Standard for Class 1 Roof Covers

1.4 OPERATIONS

- .1 Perform operations, at times designated by *Owner*, that will not adversely affect occupants of building and operations in and around site access and egress.

- .2 *Contractor* shall undertake all reasonable measures to reduce vibration and noise level on the roof decks during work hours.
- .3 Should specific complaints be issued by *Owner* to this matter, *Consultant* reserves the right to have *Contractor* proceed with other facets of the Work.

1.5 ROOF SYSTEM COMPLIANCE

- .1 Submit document issued by Authorities having jurisdiction certifying that roof system complies with of CAN/ULC-S107 "Fire Tests of Roof Coverings", Class A.
- .2 Roof system is based on a 2-ply SBS Modified Bituminous Membrane System by Soprema Inc. for minimum standard and performance requirements.
- .3 Approved Alternatives shall comply with CSA A123.21 Listing and in no way modify the roof system components, application methods or Warranty.

1.6 INSULATION REQUIREMENTS

- .1 Polyisocyanurate Roof Insulation Manufacturers shall be members of Polyisocyanurate Insulation Manufacturers Association (PIMA).
- .2 Manufacturers shall submit documentation listing their LTTR values based on CAN/ULC and ASTM test methods for 2014.
- .3 *When insulation thickness exceeds 69 mm (2.7 in.), it shall be installed in multiple layers. Minimum thickness for bottom layer shall be 33 mm (1.3 in.) and 38 mm (1.5 in.) for top layer.*
- .4 *In multiple layer applications, if thicknesses greater than 38 mm (1.5 in.) are required, thicker layer shall be installed in bottom followed by minimum 38 mm (1.5 in.) top layer.*
- .5 Curing Time: Insulation shall be cured and delivered to site in accordance with Polyisocyanurate Insulation Manufacturers Association (PIMA).

1.7 WARRANTY

- .1 Provide Standard Form of Warranty including all labour, material and workmanship and a Preventative Maintenance Manual. Warranty shall be for a period of two (2) years from date of Total Completion, as certified by *Consultant*. The warranty shall be for labour, materials and workmanship.
- .2 Provide fifteen (15) year roof membrane manufacturer's Warranty for labour, materials and workmanship from date of Substantial Performance covering entire roof system and all materials.
- .3 Repair leaks into building or roofing assembly within 24 hours of notification. Repair all roof membrane deficiencies, including ridges, blisters, splits and bare spots.
- .4 Carry out all repair work during the Warranty period as directed by *Consultant* or *Owner* and at no additional cost to *Owner*. *Contractor* shall extend Warranty on repairs and replace parts and workmanship for an additional period of two (2) years from date of acceptance of replacement/repairs and workmanship.
- .5 Defects shall include but will not be limited to: leaking; failure to stay in place; lifting; blow off; deformation; and breaking of weathertight seals.

1.8 CONTRACTOR QUALIFICATIONS

- .1 Roofing *Contractor* shall be trained, approved and certified by roof system manufacturer's quality assurance program within the last five (5) years and shall submit appropriate documentation prior to commencing roofing applications.

1.9 QUALITY ASSURANCE

- .1 Skilled trades and *Contractors* having a minimum of five (5) years related experience shall execute the Work.
- .2 *Contractor* shall be trained, certified and approved applicator of system specified. Documentation shall be provided prior to commencing Work.

1.10 DELIVERY, STORAGE AND HANDLING

- .1 All Products shall be delivered, stored and handled in accordance with the Contract Documents, be in original manufacturer wrapping with labels intact and clearly identifying the product.
- .2 All modified bitumen membranes that will be used for installation daily shall be stored at a minimum of 15°C (58°F) for a period of at least 4 hours prior to application. Stand rolled materials on end and protect edges.
- .3 Products transported, stored or handled in a manner that contradicts the Contract Documents, shall not be installed at the Place of the Work, shall be marked and removed from site.
- .4 Insulation, vapour retarders and roofing membranes must be kept dry under protective coverings or stored in trailers.
- .5 Plastic wrapping installed at the factory is not to be used as an outside storage cover. Emulsions must be maintained at temperatures above freezing.
- .6 Immediately remove and dispose of wet materials off site. Do not hoist materials with straps/ropes that damage materials. Use specialty supports.
- .7 Hoist material to roof surface on a daily basis, for same day use. Do not 'drop' materials during handling and installation.

1.11 ENVIRONMENTAL REQUIREMENTS

- .1 Do not install roofing when temperature remains below 0°F (-18°C) for torch applications.
- .2 Removal and installation of any roof components during inclement weather is not permitted.

1.12 SCAFFOLDING, LADDERS AND CONVEYANCES

- .1 Provide scaffolding, ladders and conveyances required for execution of Work and in accordance with the Contract Documents. Provide all hoisting equipment and barricades required to complete the Work.
- .2 Construct and maintain scaffolding in accordance with authorities having jurisdiction. If required, have scaffolding designed and stamped by Professional Engineer, licensed in Province of Ontario.

1.13 SAFETY BARRIERS

- .1 *Contractor* shall provide upstanding barrier protection at all perimeters, eaves and parapets. Barriers shall be adequately constructed and secured to prevent toppling over.
- .2 Mesh, screen and tarpaulins shall also be provided to prevent debris from blowing or falling over edge.

1.14 FIRE PROTECTION

- .1 Comply with Fire Protection and Prevention Act, Ontario Regulation 213/07, Fire Code, Section 5.11 Hot Surface Applications.
- .2 Maintain an approved fire extinguisher within 3 m (10 ft.) and at same level as torch applicator and open flame. Maintain adequate fire watch (as recommended by membrane manufacturer) after each day roofing operations cease and as noted within this section.
- .3 Torches must never be placed near combustible or flammable products. Torches should never be used where flame is not visible or cannot be easily controlled.
- .4 Never apply the torch directly to old and wood surfaces. Maintain adequate fire watch (as recommended by membrane manufacturer) during work and after each day roofing operations cease.
- .5 Maintain minimum four (4) hour fire watch after torch applications have ceased. A hand-held thermal imaging camera shall be used and operated by contractor's competent and trained person in detecting hidden hot spots, who shall maintain a fire watch log. Provide additional protection as required.
- .6 In addition, and prior to leaving site, use digital thermometer to scan roof surface temperature for 'any hot spots' and address them accordingly.

1.15 PROTECTION

- .1 Daily, provide interior protection to equipment, services, material, floors and walls by use of polyethylene or drop sheets, tape, tarps, plywood sheathing or other means to effectively protect contents.
- .2 Protect work of this Section from damage. Damaged work which cannot be satisfactorily repaired, restored or cleaned shall be replaced at no cost to *Owner*.
- .3 Protect work of other Sections from damage while performing roofing work. Provide tarpaulins and other coverings, as required, to protect lower and adjacent walls, finishes and surfaces. Additional protection shall be provided if instructed by *Consultant*.
- .4 Work is to be performed on occupied buildings. Take all reasonable precautions to protect against entry of elements and persons to unauthorized areas.
- .5 Prevent adhesives, precipitation and debris from entering openings and drains during work. Prevent damage to site, roads, curbs, landscaping and building elements.
- .6 Protect finished roof surfaces with minimum 13 mm (1/2 in.) plywood sheathing with 25 mm (1 in.) polystyrene insulation board on underside.
- .7 Damaged areas and surfaces shall be repaired to satisfaction of *Consultant* at no additional cost to *Owner*.

1.16 TEMPORARY FACILITIES

- .1 Provide temporary storage facilities for materials, tools and equipment. Location to be approved by *Owner*.
- .2 Provide temporary washroom facilities for workers. Secure portable washrooms to adjacent fences or walls to prevent toppling over.
- .3 Groundwork stations shall be fully enclosed by temporary fencing and be manned at all times.

- .4 Prevent unauthorized entry to the site. Barricade, guard, or lock access points to satisfaction of the *Owner* and *Consultant*. Snow fencing or plastic fencing is not acceptable as protection
- .5 Disposal bins shall be located minimum 2 m (6'-6") away from building walls.

1.17 FASTENINGS

- .1 Fasteners, anchors and adhesives shall be of appropriate size and type and must be used in sufficient quantity to provide positive and permanent anchorage of component.
- .2 Fastenings which cause spalling or cracking of material to which anchorage is being made are not permitted.
- .3 Powder-actuated fastening devices are not permitted on this project. Only low velocity plunger-type devices are permitted.

2 Products

2.1 MATERIAL

- .1 Primer:
 - .1 Self-Adhesive Membrane Primer: Elastocol Stick Zero by Soprema Inc.
 - .2 Modified Membrane Primer: Elastocol 500 by Soprema Inc.
 - .3 Metal Deck Primer: Rustguard Q.D. Shop Coat Primer by Devoe Coatings
- .2 Vapour Retarder For Metal Decks: Sopravap'r' by Soprema Inc.
- .3 Thermal Barrier: 12.7 x 1220 x 2440 mm (1/2 in. x 4 ft. x 8ft.) DensDeck Prime Roof Board by Georgia Pacific.
- .4 Vapour Retarder For Thermal Barrier: Sopraply Stick Duo by Soprema Inc.
- .5 Adhesive For: Thermal Barrier, Base and Tapered Insulation and Overlay Board:
 - .1 'Duotack' Low-rise two-part Polyurethane Adhesive by Soprema Inc.
- .6 Base Insulation (Refer to Architectural Drawings for Roof types): 79 mm x 1220 x 1220 mm (3.1 in. x 4 ft. x 4 ft.), comprising of rigid closed cell polyisocyanurate foam core, bonded with all inorganic fibre glass reinforced facer on each side. *Minimum long-term thermal resistance (LTTR) of RSI 1.00 (R 5.7) per 25 mm (1 in.) thickness.*
 - .1 SOPRA-ISO PLUS by Soprema Inc.
Long-Term Thermal Resistance of 79mm = RSI 3.17 (R18.0)
Note: All polyisocyanurate insulation boards shall be provided with same production dates and lot numbers.
- .7 Tapered Insulation (See Architectural Drawings): Fabricated from rigid closed cell polyisocyanurate foam core, bonded with all fibre glass reinforced facer on each side to layouts and slopes as indicated on drawings. Minimum thickness of 13 mm (1/2 in.) x 1220 x 1220 mm (4 x 4 ft.), 'SOPRA-ISO Plus' by Soprema Inc. Acceptable Suppliers:
 - .1 Accu-Plane Enterprises Inc.
 - .2 Posi Slope Enterprises Inc.
- .8 Tapered Insulation Sumps (See Architectural Drawings): Dual-density mineral wool board insulation with a rigid upper layer and surface impregnated with bitumen. Minimum thickness of 0 mm (0 in.) to 76mm (3 in.) x 1220 x 1220 mm (4 x 4 ft.), 'Soprarock DD Plus' by Soprema Inc. Acceptable Suppliers:
 - .1 Accu-Plane Enterprises Inc.
 - .2 Posi Slope Enterprises Inc.

- .9 Overlay Board with Integral Membrane Base Sheet: 7 x 914 x 2440 mm (9/32 in. x 3 ft. x 8 ft.) base sheet panel composed of SBS modified bitumen membrane with a with a non-woven polyester reinforcement, factory laminated on asphaltic core board with sanded top surface.
 - .1 2-1 Soprasmart Board Sanded by Soprema Inc.
- .10 Cover Strip: Cover strip composed of SBS Modified Bitumen Membrane with a composite reinforcement. Top surface shall be sanded and underface covered with a silicone release film.
 - .1 2.5 mm x 330 mm x 12 m (0.1 in.x13 in.x39 ft.) Sopralap Stick by Soprema Inc.
- .11 Modified Bituminous Membrane Base Sheet Flashings – Perimeters/Curbs/Walls:
 - .1 Sopraply Stick by Soprema Inc.
 - .2 Elastocol Stick Zero Primer by Soprema Inc.
- .12 Modified Bituminous Membrane Base Sheet Flashings – Flanges/Low Areas:
 - .1 Colply Base 410 in Cold Adhesive by Soprema Inc.
 - .2 Colply EF Flashing Cement by Soprema Inc.
- .13 Modified Bituminous Membrane Cap Sheet:
 - .1 Colply Traffic Cap FR (Grey) by Soprema Inc.
 - .2 Colply Adhesive by Soprema Inc.
- .14 Modified Bituminous Membrane Cap Sheet Flashings:
 - .1 Colply Traffic Cap FR (Grey) by Soprema Inc.
 - .2 Colply EF Flashing Cement by Soprema Inc.
- .15 Membrane Cap Sheet Fasteners: Hardened carbon steel no 14 Phillips head fasteners with anticorrosion coating, minimum length 38 mm (1-1/2 in) and 50mm (2 in.) diameter 0.81mm (20 gauge) Galvalume Plate
- .16 Modified Bituminous Membrane Liquid Flashings: Polyurethane/bitumen resin 'Alsan Flash' and 152 mm (6 in.) wide fabric reinforcement by Soprema Inc.
- .17 Flashings for Penetrations: Polyurethane/bitumen resin 'Alsan Flash' and 152 mm (6 in.) wide fabric reinforcement by Soprema Inc.
- .18 Mastic/Sealants/Liquid Flashings:
 - .1 Sopramastic by Soprema Inc.
 - .2 Alsan Flashing by Soprema Inc.
- .19 Precast Curbs (For Penetrations):
 - .1 Low Slope Membrane System: ChemCurb System and M-1 Structural Adhesive/Sealant by Chem Link.
 - .2 Filler: 1-Part Moisture Cure Pourable Sealer by Chem Link.
- .20 Round Top Cap Nails: Ardox spiral shank with 25 mm (1 in.) steel washer
- .21 Bulk Granules: Coloured granules in bulk to match cap sheet.
- .22 Pitch-Pans (If Approved by Consultant):
 - .1 Fabricated from 0.71 mm (24 gauge) stainless steel, 102 mm (4 in.) high with 152 mm (6 in.) wide flanges, all seams continuously soldered. Allow 51 mm (2 in) gap all around protrusion for pitch-pan filler.
 - .2 Pitch-Pan Filler: Sopralastic by Soprema Inc.

2.2 ROOFING ACCESSORIES

- .1 Roof Drains: Prefabricated Aluminum Roof Drain complete with nuts and bolts, clamping ring, aluminum locking drain strainer and mechanical (MJ) connections, minimum 100 mm (4 in.) diameter or to suit maximum onsite rainwater leader diameter. Acceptable Material:
 - .1 RD-4A RR Vandalproof Retrofit Roof Drain with T-7 Aluminum Control Flow and Sediment Collar by Thaler Metal Industries Ltd. Prefabricated Aluminum Roof Drain complete with nuts and bolts, cast aluminum under deck clamping ring; aluminum locking dome drain strainer and mechanical (MJ) connections, minimum 100 mm (4 in.) diameter or to suit maximum on-site rainwater leader diameter.
 - .2 Pipe Sleeves: 1.6 mm (0.64 in.) thick, 75 or 102 mm (3 or 4 in.), one-piece spun aluminum pre-insulated stack jack, 330 mm (13 in.) above finished roof surface. Diameter to suit site conditions. Acceptable Material:
 - .1 SJ-38 Insulated Stack Jack Flashing by Thaler Roofing Specialty Products Inc.
 - .3 Storm Collars and Clamps: Fabricated from same material as exhaust stacks and sleeves, with continuously soldered seams and extending a minimum of 50 mm (2 in.) down face of sleeve. Allow 6 mm (1/4 in.) gap between storm collar and sleeve.
 - .4 Insulation Stop: Fabricated from 0.56 mm (16 oz.) Copper or 0.71 mm (24 gauge) stainless steel. Provide Insulation Stop with a minimum height of insulation plus 13 mm (1/2 in.). Sleeve flange shall have a 150 mm (6 in.) wide apron with continuously soldered seams.
 - .5 Goose Necks: Fabricated from 0.71 mm (24 gauge) stainless steel. To be a minimum 350 high (12 in.) with continuously soldered seams with a 150 mm (6 in.) wide apron/flanges. End cap to be removal/slip on end cap with hemmed edges.
 - .6 Sprayed polyurethane foam insulation: one component polyurethane foam insulating sealant to CAN/ULC-S705,
 - .1 Duotack by Soprema Inc.
 - .7 Mineral Batt Insulation: 'Roxul' Mineral Batt, of size and thickness to suit site requirements.
 - .8 Extruded Insulation: 38 mm (1-1/2 in.) and 75 mm (3 in.) Polystyrene 'Roofmate' by Dow Chemical Canada Inc. or Foamular 250 by Owens Corning.
 - .9 Butyl Tape: 3 mm x 13 mm (1/8 x 1/2 in.) double coated grey, elastomeric butyl rubber tape
 - .10 Termination Bar: 3 mm thick x 25 mm wide (1/8 x 1 in.) Extruded Aluminum, 'TB-100 Termination Bar' with sealant edge by Trufast
 - .11 Overflow Scuppers (Where Shown on Drawings): Fabricated from 0.71 mm (24 gauge) stainless steel. To be a minimum 250 mm wide x 150 mm high (10 x 6 in.) with continuously soldered seams with a 150 mm (6 in.) wide apron/flanges. Overflows to be open ended with bottom drip edge to extend 38 mm (1-1/2 in.) past wall/fascia.

3 Execution

3.1 WORKMANSHIP

- .1 Do work in accordance with Canadian Roofing Contractors Association Roofing Specifications Manual (CRCA) and Manufacturer's requirements except as specified within Contract Documents and approved by *Consultant*.
- .2 More stringent requirements shall govern.

3.2 EXAMINATION AND PREPARATION

- .1 Examine site conditions and surfaces to ensure that they are in satisfactory condition for the commencement of Work of this Section.
- .2 Ensure that substrates are smooth, clean and dry. Clean surfaces of all substances, which may be detrimental to new roof system. Clean adhesives with solvent and allow vapours to dissipate prior to membrane application.

- .3 Application of the Work, or any part of it will constitute acceptance of conditions upon which Work is to proceed.

3.3 GENERAL REQUIREMENTS

- .1 Complete new roof system, including vapour retarder, insulations and membrane and membrane flashings to each day's termination point and install temporary water cut-off. Remove water cut-off when work resumes.

3.4 ADHESIVE FOR THERMAL BARRIER, BASE AND TAPERED INSULATION AND OVERLAY BOARD

- .1 Use manufacturer's designed applicator and apply 19 mm (3/4 in.) wide adhesive ribbon bead as follows:
 - .1 Applied at 152 mm (6 in.) on centre in the field of the roof area.
 - .2 Applied at 152 mm (6 in.) on centre at all roof perimeters, for a distance of 4,880 mm (16ft.).
 - .3 Applied at 102 mm (4 in.) at all roof corners, for a distance of 4,880 mm (16ft.) each way.

3.5 VAPOUR RETARDER ON METAL DECK

- .1 At all roof perimeters, walls, curbs, dividers, movement and control joints and penetrations, provide 305 mm (12 in.) self-adhesive reinforcing vapour retarder strip to seal openings/gaps at junction of wall and thermal barrier, with half the membrane extending onto vertical and horizontal surfaces.
- .2 Ensure metal deck is clean, dry and sound prior to proceeding with primer. Surface temperatures of substrate shall be above -10°C (14°F) and rising.
- .3 Apply primer to existing curbs, walls, wood and metal deck at a minimum rate of 0.3 to 0.5 litres/m² (0.96 to 1.6 fl.oz./sq.ft) with roller or brush to cover approximately 50 sq. m. (520 sq. ft.). Allow primer to cure prior to application of new roofing membrane or membrane flashings as detailed. Do not accelerate drying time (by use of flame).
- .4 Roll out vapour retarder and peel back first 914 mm (3 ft.) of release paper and adhere vapour retarder in place. Hold vapour retarder tight and peel off remaining release film diagonally. Vapour Retarder side laps must bear on crest of metal deck.
- .5 Apply additional rolls in similar fashion and maintain 75 mm (3 in.) side laps and 152 mm (6 in.) end laps. Roll vapour retarder onto primed surface ensuring all laps are sealed. Seal vapour retarder to all penetrations. Laps shall be installed to shed water, commencing from low point and working upslope.
- .6 Pass a 34 kg. (75 lbs) weighted roller over the completed area, two passes are required to provide adequate bond. Ensure a wrinkle free vapour retarder without air pockets or tears is provided. Where damaged or not acceptable, cut-out affected area and repair with minimum 1 m (3.3 ft.) wide patch.
- .7 Roll side and end laps to ensure adequate adhesion in the self-adhesive laps of membrane with application of primer.
- .8 Application shall provide a continuous and effective vapour retarder and shall provide a temporary watertight system.

3.6 THERMAL BARRIER – R4 & R5

- .1 Install thermal barrier over metal deck and adhere to substrate with adhesive as noted in Article 3.4 - Adhesive for Thermal Barrier, Base and Tapered Insulation and Overlay Board in this Section.

- .2 Thermal barrier shall be immediately placed into adhesive ensuring panels are tightly butted and walk thermal barrier into adhesive to achieve solid bond before a film (skin) forms. Provide adequate weights immediately after placement until adhesive has cured.
- .3 Stagger end joints of adjacent rows of boards. Use largest pieces possible but no piece shall be smaller than 305mm x 305mm (12 in. x 1 in.). Fill in voids larger than 6 mm (1/4 in.) with same material.

3.7 VAPOUR RETARDER ON THERMAL BARRIER - R5

- .1 Thermal barrier shall be completely and adequately primed with new vapour retarder primer and allowed to cure prior to application of self-adhesive vapour retarder. Minimum application temperature is 0 °C (32 °F).
- .2 Apply primer to existing curbs, walls, wood and metal deck at a minimum rate of 0.3 to 0.5 litres/m² (0.96 to 1.6 fl.oz./sq.ft) with roller or brush to cover approximately 50 sq. m. (520 sq. ft.). Allow primer to cure prior to application of new roofing membrane or membrane flashings as detailed. Do not accelerate drying time (by use of flame).
- .3 At all roof perimeters, walls, curbs, dividers, movement and control joints and penetrations, provide 305 mm (12 in.) self-adhesive reinforcing vapour retarder strip to seal openings/gaps at junction of wall and thermal barrier, with half the membrane extending onto vertical and horizontal surfaces.
- .4 Roll out vapour retarder and peel back first 914 mm (3 ft.) of release paper and adhere vapour retarder in place. Hold vapour retarder tight and peel off remaining release film diagonally.
- .5 Apply additional rolls in similar fashion and maintain 75 mm (3 in.) side laps and 152 mm (6 in.) end laps. Roll vapour retarder onto primed thermal barrier ensuring all laps are sealed. Seal vapour retarder to all penetrations. Laps shall be installed to shed water, commencing from low point and working upslope.
- .6 Pass a 34 kg. (75 lbs) weighted roller over the completed area, two passes are required to provide adequate bond. Ensure a wrinkle free vapour retarder without air pockets or tears is provided. Where damaged or not acceptable, cut-out affected area and repair with minimum 1 m (3.3 ft.) wide patch.
- .7 Roll side and end laps to ensure adequate adhesion in the self-adhesive laps of membrane with application of primer.
- .8 Heat weld exterior 25 mm (1 in.) edge of side and end laps with a hot-air welder and membrane roller.
- .9 Application shall provide a continuous and effective vapour retarder and shall provide a temporary watertight system.

3.8 INSULATION STOP

- .1 Install insulation stop at all hot exhaust stacks and secure to metal deck, prior to installation of vapour retarder, to maintain combustible insulation away from hot exhaust stack / pipes.
- .2 Contractor shall verify minimum required spacing on site, depending on exhaust stack type.

3.9 BASE INSULATION (TWO LAYERS R1, R2, & R3 AND ONE-LAYER R5)

- .1 Apply base insulation in adhesive as noted in this section Article 3.4 – Adhesive for Thermal Barrier, Base and Tapered Insulation and Overlay Board in this Section.
- .2 Base insulation shall be reduced 13 mm (1/2 in.) for 1220 mm (4 ft.) centered at drain sump as noted on drawings. Transition shall be 'shaved' to provide a smooth surface for tapered insulation or overlay board.

- .3 At junction with wood blocking at parapets, walls and curbs, neatly trim insulation to suit profile of wood assembly and to provide a tight/butt joint. Cut insulation boards to fit snugly within 6 mm (1/4 inch) of board joints, perimeters, penetrations, etc., but not oversized to damage vapour barrier during installation.
- .4 Stagger all joints in insulation boards within each adjacent layer and between lower and upper layers, minimum 610 mm (24 in.).
- .5 Cut insulation boards to fit snugly within 3 mm (1/8 inch) of board joints, perimeters, penetrations, etc., but not oversized to damage vapour retarder during installation.
- .6 Any gaps larger than 3mm (1/8 in.) shall be filled flush with the expanding adhesive.
- .7 Where required, uneven butt joints shall be 'shaved' to provide a smooth transition/surface for tapered insulation.
- .8 At junction with wood blocking at parapets, walls, dividers and curbs, neatly trim insulation to suit profile of wood assembly and to provide a tight/butt joint.
- .9 Do not lay more insulation/board than can be covered with roof membrane on same day. Insulation, which is damaged by moisture, shall be marked and promptly removed from site.

3.10 TAPERED INSULATION AND SUMPS

- .1 Tapered insulation shall be applied over base and under overlay board. Tapered insulation, which is damaged or wet, shall be marked and promptly removed from site.
- .2 Install tapered insulation, sumps, crickets and backslope in accordance with reviewed shop drawings, in adhesive as noted in Article 3.4 - Adhesive for Thermal Barrier, Base and Tapered Insulation and Overlay Board in this Section.
- .3 Insulation shall be immediately placed into adhesive ensuring panels are tightly butted and walk insulation into adhesive to achieve solid bond before a film (skin) forms. Provide adequate weights immediately after placement until adhesive has cured.
- .4 Tapered sump shall be installed in its entirety the same day. Under no circumstance shall sump be installed in more than one application as to build-in a high point within sump area.
- .5 Do not lay more insulation than can be covered with base sheet / overlay board on same day.

3.11 OVERLAY BOARD WITH INTEGRAL ROOF MEMBRANE BASE SHEET

- .1 Install overlay board in adhesive as per Paragraph 3.4 - Adhesive for Thermal Barrier, Base and Tapered Insulation and Overlay Board in this Section.
- .2 Install overlay board parallel with the slope.
- .3 On overlay boards longer than 1220 mm (4 ft.) the adhesive ribbon shall be applied length wise on the board so that a continuous bead is provided along exterior edge.
- .4 Overlay board shall be immediately placed into adhesive ensuring panels are tightly butted and walk insulation into adhesive to achieve solid bond before a film (skin) form. Provide adequate weights immediately after placement until adhesive has cured or pass a 34 kg. (75 lbs.) weighted roller over completed area, two passes are required.
- .5 If overlay board is repositioned, the adhesive bond is broken and not acceptable. Board shall be removed, adhesive removed and re-applied as noted herein before re-installing board.

- .6 Gradually peel back silicone release paper at side and end laps, pressing down on membrane with an aluminum applicator to ensure good contact and adhesion. Roll side and end laps to ensure adequate adhesion in the self-adhesive laps of membrane.
- .7 Heat weld exterior 25 mm (1 in.) of all side and end laps providing a 3 mm (1/8 in.) bitumen bleed out. Thoroughly and effectively roll membrane (using manufacturer's recommended steel roller) to attain full contact and adhesion.
- .8 Where there is no factory lap, seal butt ends with 330 mm (13 in.) self-adhesive grade membrane Cover Strip, centered over lap to provide watertight seal.
- .9 To facilitate placement of membrane Cover Strip, end laps are not required to be staggered from adjacent boards.
- .10 Do not lay more boards than can be covered with roof membrane on same day. Boards that are damaged shall be marked and promptly removed from site.

3.12 DRAINS

- .1 At existing drain locations, ensure drain and rainwater leader are adequately supported and secured prior to any removal/demolition work.
- .2 Remove existing drain and expose drainpipe without damage. Check underside of deck and reposition drain location if obstructions are present.
- .3 Cut opening through membrane base sheet, insulation, thermal barrier, vapour retarder and centre drain over pipe. Apply mastic on underside of flange. Install new wood blocking around circumference of drain, height to suit insulation thickness, to support drain flange.
- .4 Insert drain body into existing or new drainpipe until flange is flush with roof membrane. Secure new drains with mechanical (MJ) connection and underside with deck clamp. Inserts are to be approved by *Consultant*.
- .5 Flash drain flange with one ply of base sheet. Extend membrane a minimum of 305 mm (12 in.) beyond the edge of drain flange. Membrane cap sheet to be extended continuously through drain area.
- .6 Install clamping ring and aluminum strainer over raised bosses and install screws to tighten ring against membrane and flashings until secure. Install control flow.
- .7 Ensure roof drains are clear of debris and free draining at project completion.

3.13 ROOF MEMBRANE BASE SHEET FLASHINGS - SELF-ADHESIVE APPLICATIONS

- .1 Apply appropriate primer to surfaces that are to receive membrane flashings at rates recommended by manufacturer. Allow primer to 'flash off' prior to membrane flashing application. Membrane shall be applied same day as primer.
- .2 Apply membrane base sheet flashings in general conformance with details commencing from low point and working up-slope. Maintain minimum 75 mm (3 in.) side laps and 152 mm (6 in.) end laps onto field base sheet membrane. Laps shall be installed to shed water.
- .3 Apply base sheet in maximum 1 m (3.25 ft.) wide strips. Extend base sheet a minimum of 152 mm (6 in.) beyond vertical transition and onto field of roof.
- .4 Peel back 102 to 152 mm (4 to 6 in.) of the silicone release paper to hold the membrane in place. Gradually peel back remaining silicone release paper, applying self-adhesive base sheet flashing into primed surfaces and roll into place.

- .5 Thoroughly and effectively roll membrane (using manufacturer's recommended steel roller) to attain full contact and adhesion.
- .6 Underlying end lap corners shall be cut 75 mm (3 in.) on an approximate 45-degree angle before the next sheet is installed.
- .7 Heat weld with a hot-air gun, exterior 50 mm (2 in.) of all side and end laps providing a 3 mm (1/8 in.) bitumen bleed out with an electric heat gun approved by membrane manufacturer.
- .8 At wall and curbs, provide mechanical fasteners within laps of base sheet flashing, prior to applying succeeding sheet. Fasteners shall be installed at maximum 102 mm (4 in.) on centre commencing from 203 mm (8 in.) above roof membrane.
- .9 Extend modified bituminous base sheet over parapet, perimeter and eaves down outside face of walls 50 mm (2 in.) onto the lower substrate. Secure membrane flashing with large head galvanized nails at 152 mm (6 in.) on centre.
- .10 At exterior face of parapets / perimeters, apply self-adhesive base sheet flashing, to provide continuous cover over exposed wood and joints between substrates as detailed.
- .11 Repair defects in applications with additional piece of self-adhesive base sheet. Carry out repairs to satisfaction of *Consultant*.

3.14 ROOF MEMBRANE BASE SHEET FLASHINGS – COLD ADHESIVE APPLICATION

- .1 Ensure surfaces are clean, dry and free of any dirt, oil and deleterious material.
- .2 Apply membrane base sheet flashings in general conformance with details commencing from low point and working up-slope. Maintain minimum 75 mm (3 in.) side laps and 152 mm (6 in.) end laps onto field base sheet membrane. Laps shall be installed to shed water.
- .3 Apply minimum 200mm (8 in.) wide strip of base sheet flashing in maximum 1 m (3.25 ft.) wide strips. Extend base sheet a minimum of 100 mm (4 in.) each way from inside corner.
- .4 Fully adhere base sheet flashing in Colply EF Flashing Cement applied using a 4.8 mm (3/16 in) or a 6.0 mm (1/4 in) notched trowel. Apply a uniform coat as per the recommended coverage rate. The minimum application temperature is 0 °C (32 °F).
- .5 Thoroughly and effectively roll membrane (using manufacturer's recommended steel roller) to attain full contact and adhesion.
- .6 Heat weld exterior 50 mm (2 in.) of all side and end laps providing a 3 mm (1/8 in.) bitumen bleed out.

3.15 REINFORCEMENT GUSSETS

- .1 Apply gussets at every angle, on inside and outside corners in accordance with manufacturer's requirements. Install self-adhesive gussets before application of membrane base sheet flashing.

3.16 ROOF MEMBRANE CAP SHEET

- .1 Overlay Board / Base sheet application shall be reviewed by manufacturer and *Consultant* prior to proceeding with membrane cap sheet.
- .2 Unroll membrane on roof surface and allow to relax minimum 15 minutes or as required depending on weather conditions. Position in desired location, commencing from low point working upslope. Membrane may also be relaxed by applying heat to the poly top surface in a 'zig-zag' pattern to release the polyester reinforcement tension on the membrane.

- .3 If membrane base sheet has been contaminated by debris and dust, pressure wash to provide a clean and suitable surface for the cap sheet.
- .4
- .5 If required, apply appropriate primer to surfaces that are to receive membrane at rates recommended by manufacturer. Allow primer to 'flash off' prior to membrane application.
- .6 Apply membrane cap sheet commencing at low point working upslope and in same direction as base sheet. Maintain minimum 50% stagger from base sheet side laps. Use chalk lines to maintain neat and straight lines. Do not walk on or step into newly applied membrane.
- .7 Fully adhere membrane cap sheet to overlay board/membrane base sheet in Colply Adhesive applied using a 4.8 mm (3/16 in) trowel or a 6.0 mm (1/4 in) notched squeegee at minimum rate of 0.8 to 1.2 L/m² (2.0 to 3.0 US Gallon/100 ft²). The minimum application temperature is 0 °C (32 °F). Keep adhesive 50 mm (2 in.) back from all side and end laps.
- .8 Extend membrane cap sheet to edge of perimeter/curbs/walls, after base sheet flashing has been completed. Maintain minimum 75 mm (3 in.) side and 152 mm (6 in.) end laps. Laps shall be installed to shed water.
- .9 Heat weld exterior 50 mm (2 in.) of all side and end laps providing a 3 mm (1/8 in.) bitumen bleed out.
- .10 Underlying end lap corners shall be 'cut' 75 mm (3 in.) on an approximate 45-degree angle before the next sheet is installed.
- .11 Ensure a wrinkle free membrane without air pockets or tears is provided. Where damaged or not acceptable, cut-out affected area and repair with minimum 1 m (3.3 ft.) wide patch.
- .12 Apply loose granules in areas where excess heat welding has occurred. Apply heat to affected area, place granules and embed them into warm membrane.
- .13 Apply membrane cap sheet without air pockets, voids, wrinkles, buckles, fishmouths open laps or any evidence of a lack of full adhesion. All anomalies must be repaired the same day.
- .14 Repair defects in applications with additional pieces of membrane. Carry out repairs to satisfaction of *Consultant*.

3.17 ROOF MEMBRANE CAP SHEET FLASHINGS

- .1 Apply membrane cap sheet flashings in general conformance with details commencing from low point and working up-slope.
- .2 Maintain minimum 50% stagger from base sheet flashing side/end laps. Use chalk lines to maintain neat and straight lines. Do not walk on or step into newly applied membrane.
- .3 Membrane Cap Sheet Flashings shall be fully adhered with Colply EF Flashing Cement using a 4.8 mm (3/16 in.) or a 6.0mm (1/4 in.) notched trowel at a rate of 0.8 L/m² (2.0 US gal/100 ft²) with a thickness of 0.80 mm (31 mil) on each surface. Wait 10 minutes and lay the membrane onto the substrate and apply pressure with membrane roller.
- .4 Membrane cap sheet end laps shall be applied using the trowel grade adhesive for the first 125 mm (5 in.) of end laps with a steel trowel with minimum 5 mm (3/16 in.) notches and the last 50 mm (2 in.) of overlap to existing surface shall be sealed using an electric hot-air welding machine or heat gun.
- .5 Maintain minimum 75 mm (3 in.) side and 203 mm (8 in.) end laps onto field cap sheet membrane. Provide 3 mm (1/8 in.) bleed out at all side and end laps.

- .6 At perimeters, terminate cap sheet 13 mm (1/2 in.) back from outside edge of parapet blocking and past base sheet flashing 52 mm (2 in.) onto flat of roof or as detailed.
- .7 At wall terminations, install and secure termination bar to adequately restrain the flashings. Secure termination bar at maximum 305 mm (12 in.) on centre. Apply sealant bead along entire length of termination bar.
- .8 Repair defects in applications with additional piece of torch grade base sheet. Carry out repairs to satisfaction of *Consultant*.
- .9 At perimeters, terminate cap sheet 13 mm (1/2 in.) back from outside edge of parapet blocking and past base sheet flashing 52 mm (2 in.) onto flat of roof.
- .10 At wall terminations, install and secure termination bar to adequately restrain the flashings. Secure termination bar at maximum 305 mm (12 in.) on centre. Apply sealant bead along entire length of termination bar.
- .11 Repair defects in applications with additional piece of torch grade base sheet. Carry out repairs to satisfaction of *Consultant*.

3.18 FINAL ROOF SYSTEM ACCEPTANCE

- .1 Final Membrane acceptance by *Owner* and *Consultant* shall be based on;
 - .1 Free of any blisters, ridges, fishmouths or delamination and other imperfections.
 - .2 Continuous and monolithic membrane application with no or minimal and acceptable patches that is aesthetically pleasing and uniform.
 - .3 All shall be acceptable to *Owner and Consultant*, regardless of manufacturer's approval and warranty acceptance.

3.19 SLEEVES

- .1 Provide all required vents, stacks and conduit sleeves and supports to suit site conditions.
- .2 At existing vent pipes, extend pipe with same material to 100 mm (4 in.) above top edge of sleeve. At existing exhaust stacks, extend pipe as required to allow for rain collar installation.
- .3 Where required and approved, install new split-sleeve flashings.
- .4 Prime stack flanges, top and bottom and set underside of flange in bed of mastic on membrane and position evenly around projection.
- .5 Flash in flanges with one ply of torch grade base sheet. Extend membrane a minimum of 305 mm (12 in.) beyond the edge of drain flange.
- .6 Where stacks are installed on top of curbs, entire 'boxed curb' shall be covered with adequately secured overlay board and completely covered with torch grade membrane base sheet and cap sheet.

3.20 AT EAVES WITH GUTTER (R5)

- .1 Provide new self-adhesive membrane to cover exposed fascia prior to installation on new roof system and metal drip flashing that extends onto overlay board and onto fascia, minimum 76 mm (3 in.) on each substrate.
- .2 Once metal drip flashing has been installed, provide minimum 152 mm (6 in.) self-adhesive membrane flashing strip and primer, extending 76mm (3 in.) onto each substrate.

- .3 Install membrane Cap Sheet as noted within this Section with exterior 50mm (2 in.) edge heat welded onto primed metal flange. Complete termination with application of continuous and approved sealant bead.

3.21 LIQUID FLASHING - SEALING ALL PENETRATIONS / SCUPPERS

- .1 This application is required at all penetrations prior to application of the precast curbs, pitch-pan, goose neck and overflow/functional scuppers, etc.
- .2 Existing surface shall be dry and adequately cleaned of all loose debris, residue, curing products etc. Use power brush and grinder/sander to remove all surface debris and laitance that could inhibit bond of membrane. Metal shall be cleaned to a 'bright' surface. Apply primer to manufacturer's requirements.
- .3 Ensure substrate is cleaned of all foreign substances that can impair adhesion. Apply a base coat of liquid waterproofing membrane. Trim reinforcing material to conform to shape of penetrations and fully embed into liquid base coat.
- .4 Mix contents in accordance with manufacturer's requirements. After mixing, apply resin to clean and prepared substrate at required rates using roller, brushes or notched squeegee.
- .5 First Coat Application: Spread resin out evenly and embed reinforcement fleece into wet material. Resin shall extend minimum 50 mm (2 in.) past fleece on each side. Brush membrane into place to obtain full contact.
- .6 Trim reinforcing material to conform to shape of penetrations and fully embed into liquid base coat.
- .7 Second Coat Application: Apply second coat of resin to fully encapsulate/obliterate fleece, so that no portion is dry or exposed.
- .8 Apply a second coat of liquid waterproofing membrane fully saturating the reinforcement. Apply an additional thin coat of liquid waterproofing and embed coloured granules at base of penetration before it dries. Top edge of fabric reinforcement shall be adequately coated with no fabric exposed to the elements.
- .9 Note: If second coat is deemed unacceptable by *Consultant*, a third coat of the resin must be applied.

3.22 STORM COLLARS

- .1 Install storm collars complete with clamping ring and sealant over stacks where caps cannot be installed.

3.23 PRECAST CURBS – (PENETRATIONS WHERE SLEEVES NOT PRACTICAL)

- .1 Provide precast curb at all penetrations that do not receive sleeves. On metal roof systems with ribs and standing seams, modify curb to suit site conditions.
- .2 Surfaces shall be clean, dry and free of debris, dust, non-adhered particles, oil, corrosion, rust, condensation or other contaminants. Metal surfaces (and PVC pipes) shall be cleaned with non-greasy solvents, such as acetone or methyl ethyl ketone (MEK).
- .3 Lay out the precast curbs at the desired location and trace the outline for reference. Precast blocks must be placed so as to ensure a minimum gap of 25 mm (1 in) between the curb inner wall and the penetrations.
- .4 Using a standard cartridge extruder, seal the base of each penetration with the sealant and adhesive. Cover the penetration with sealant at least 25 mm (1 in) above the height of the precast curb.

- .5 Under and at the ends of the precast curb, on the flat surface, apply a 6 mm (1/4 in) bead around the perimeter and at the centre of the surface. Place and align the precast curb on the roof outline.
- .6 Apply pressure on the precast curb until product overflows from all sides to avoid any water infiltration between granules and precast curb. Install all precast curb required to achieve the desired configuration.
- .7 Apply a bead of sealing product to the curb joints and at the outer perimeter of the structure made of precast curb. Using the tip of a trowel, bond the sealant and adhesive to the substrate/membrane.
- .8 Horizontal surfaces: completely fill the configuration with the pourable sealer.

3.24 PARAPETS/PERIMETERS/WALLS/SLEEPERS/CURBS

- .1 Provide new wood sleepers as detailed that extend over minimum 3 joist supports to maximum length required to support units or match existing. Butt new insulation to sleepers by neatly cutting perimeter to fit profile of sleeper.
- .2 Provide 2-ply membrane flashings over all sleepers to fully encapsulate wood and in accordance with this Section.
- .3 Construct parapet, perimeters, wall and curbs as detailed.
- .4 Provide 2-ply membrane flashings at all noted locations in accordance with this Section and as detailed.
- .5 Provide metal cap flashings at sleepers and curbs prior to re-installing units.

3.25 OVERFLOW SCUPPERS

- .1 Existing walls will have to be saw-cut, boxed in with plywood sheathing and membrane base sheet flashing prior to installing scupper. Allow for required rough opening.
- .2 At high walls and concrete/core slab and Siporex deck, existing substrate shall be scanned to avoid cutting through any reinforcement.
- .3 Where indicated on drawings, install new scuppers and secure to substrate. Scuppers shall be set no higher than 50 mm (2 in.) above lowest point of roof area.
- .4 Flash in scupper flanges with one-ply of self-adhesive torch grade base sheet flashing and one ply torch grade cap sheet. All exposed seams at corner and base of scupper shall also receive the liquid flashing system, as noted in Article 3.25, this section.
- .5 Exterior face of scupper shall be covered with stainless steel plate unless otherwise approved. Plate shall extend minimum 50 mm (2 in.) beyond opening.

3.26 GOOSE NECKS

- .1 Set Goose Neck flange in adhesive, apply 1-ply modified membrane base sheet flashing over flange and apply membrane cap sheet continuously though penetration as noted herein.
- .2 Insulate bottom half of sleeve with mineral fibre and spray foam top half leaving a 25 mm (1 in) gap. Once spray foam has cured, trim to a flush surface and apply pourable sealer for the top 25 mm (1 in.). Install the separate cap and mechanically secure to base, carefully fitting cables through end and seal with metal end plate and caulking.

3.27 MECHANICAL EQUIPMENT

- .1 *Contractor* shall be responsible to remove and re-install roof mounted mechanical equipment and services necessary to facilitate application of new roof system. This includes temporary removal and replacement of all associated ductwork. Do not disconnect H.V.A.C. without approval of *Owner*.
- .2 Mechanical pipes and gas lines must be disconnected and sufficiently supported. Use treated wood blocks located on concrete pavers resting on top of pedestals to temporarily support equipment. During roof replacement operations, all H.V.A.C. ducts are to be adequately supported.
- .3 *Contractor* shall provide for adjustments to ducting, duct supports and piping to suit new roof elevations and new waterproofing membrane to match existing duct membrane and sealed at all junctions and at HVAC Units to provide watertight junctions.
- .4 At wall junctions, ductwork is to be sealed with transition membranes that are secured to wall with termination bar or metal flashings and provide a watertight junction.
- .5 Submit certificate from licensed mechanical contractor stating that all modifications/connections comply with Building Automation System and that it is fully functional.
- .6 *Contractor* shall be responsible for Building Automation System (BAS) and may retain mechanical/electrical services contractor from *Owner* to ensure system is adequately disconnected, connected and functioning properly. Testing and certification shall be submitted.

3.28 ELECTRICAL EQUIPMENT

- .1 *Contractor* must disconnect all wiring and junction boxes required to facilitate installation of new roof system.
- .2 Prior to disconnecting electrical systems, obtain approval from *Consultant* or *Owner*. Provide minimum 48 hours' notice for clearance.

3.29 COMMISSIONING

- .1 HVAC commissioning shall be carried out assuring that all systems and components designed, installed, tested, operated, verified and maintained according to operational requirements of HVAC system and to *Owner* satisfaction.
- .2 *Contractor* shall submit signed and certified checklist from 'certified and qualified mechanical contractor' stating that HVAC system meets or exceeds required functioning requirements.

3.30 QUALITY CONTROL

- .1 *Owner* may retain an independent *Consultant* to carry out periodic supervision during construction. If requested by *Consultant*, take cut-test samples of roofing membrane and membrane flashings, wrap and label samples, identify locations and submit to *Consultant* for review and testing.
- .2 *Contractor* shall make an allowance for minimum of two (2) cut test per day and all required patching to match existing assembly. Samples must be a minimum 305 x 305 mm (12 x 12 in.) and include all new roof components.
- .3 Failed test results will require remedial work acceptable to *Consultant* and may entail complete removal and replacement of failed areas.

3.31 CLEAN-UP

- .1 Remove all excess materials, debris, tools and equipment as work proceeds and on completion, or sooner if requested by *Consultant*.
- .2 Remove all stains, asphalt, caulking or other adhesive from all surfaces to satisfaction of *Owner* and *Consultant*.

END OF SECTION

1 GENERAL

1.1 SECTION INCLUDES

- .1 Supply and installation of new prefinished sheet metal flashings and counter flashings to complete roof system installation. Unless specifically indicated otherwise, all references to Sheet Metal Flashings in specifications and drawings to refer to new pre-painted steel.
- .2 Form, break, and install metal flashings to suit perimeter and projection details as specified and as shown on detail drawings.
- .3 Coordinate all work in this section with other sections and trades as required to ensure proper installation of specified components.

1.2 RELATED SECTIONS

- .1 Section 01 11 00 – Summary of Work
- .2 Section 05 30 00 – Metal Decking
- .3 Section 07 52 11 – SBS Modified Bituminous Roofing
- .4 Section 07 92 00 – Joint Sealants

1.3 APPLICABLE PUBLICATIONS

- .1 Latest edition of all listed references shall apply:
 - .1 ASTM A606 – Specification for Steel, Sheet and Strip, High-Strength, Low-Alloy, Hot- Rolled and Cold-Rolled, with Improved Atmospheric Corrosion Resistance.
 - .2 ASTM A653/A653M – Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc- Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - .3 ASTM A792/A792M – Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.
 - .4 CSA B111 – Wire Nails, Spikes and Staples.
 - .5 CAN/CGSB 51.32M – Sheathing, Membrane, Breather Type.
 - .6 CAN/CGSB 93.1M – Sheet, Aluminum Alloy, Prefinished, Residential.
 - .7 SMACNA – Sheet Metal and Air Conditioning Contractors National Association – “Architectural Sheet Metal Manual”
 - .8 Canadian Roofing Contractors Association (CRCA) – Roofing Specifications Manual.

1.4 SUBMITTALS

- .1 Warranty: Provide Owner with a Material and Workmanship Warranty for sheet metal flashing work on Contractor’s letterhead, signed and authorized.
- .2 Compatibility: Provide written certification to Consultant stating that materials and components of the roofing system and wall system, as assembled in system are compatible.
- .3 Mock-ups: Create mock-up sample of typical metal flashing detail and related accessories for review. Provide any additional mock-up samples as reasonably requested by QAObserver.

1.5 CONTRACTOR QUALIFICATIONS

- .1 Contractor and his staff must be certified by membrane Manufacturer and be pre-approved by Owner and Consultant prior to Tender.
- .2 Contractor must be a member in good standing with Ontario Roofing Contractors Association (OIRCA) and have a minimum ten (10) years relevant experience with similar roof materials.

1.6 STORAGE AND HANDLING

- .1 Do not store metals in direct contact with earth, road surface, roof deck, or other metals.
- .2 Place suitable supports or pallets under metal stock upon delivery. Protect metal from scratches, dents, punctures, and moisture.
- .3 Store caulking and sealants at +5°C minimum.
- .4 Handle and store products in a manner to prevent damage, oxidization, and deterioration.
- .5 Remove and replace damaged products at own expense and to satisfaction of Quality Assurance Observer/Consultant.
- .6 Apply materials in accordance with Manufacturer's recommendations.

1.7 SAFETY AND PROTECTION

- .1 References:
 - .1 CAN/CSA S269.2M: Access Scaffolding for Construction Purposes.
 - .2 FCC No. 301: Standard for Construction Operations.
 - .3 Comply with all safety requirements as per current printed edition of OHSA, and OIRCA standards.
- .2 Solvents, Adhesives and Membranes
 - .1 Store only enough solvents and adhesives on roof for same day's use.
 - .2 Manufacturer supplied adhesives should be stored in their overnight containers. Minimum temperature for solvent based adhesives and primers is -5°C.
- .3 Hoisting:
 - .1 Protect walls and roof perimeters where hoisting is required.
 - .2 Protect roofs from damage due to traffic and material handling until completion of project.

1.8 WARRANTY

- .1 Sheet Metal Flashings:
 - .1 Two (2) year Material Warranty and one (1) year Workmanship Warranty.

1.9 QUALITY ASSURANCE OBSERVATION AND TESTING

- .1 IRC Building Sciences Group Inc., hereafter known as the "Observer", is an independent Quality Assurance Observation agency appointed by Owner to observe installation of sheet metal flashing Work:
 - .1 Arrange Prestart site meeting with Observer no more than three (3) weeks prior to commencement of Work on site. Obtain Observer's instructions and reference procedures to be followed on project.
 - .2 Provide to Observer date when work will begin, at least forty-eight (48) hours prior to commencement of Work for phase.
 - .3 Arrange Final Inspection of installed work with QA Observer and where required with membrane Manufacturer's technical representative.

- .2 Cooperate with Observer and afford all facilities necessary to permit full Quality Assurance Observations during performance of Work. Act immediately on instructions given by Observer.
- .3 When required, provide cut-outs and samples in field where directed by Observer and make good without additional cost to Owner.
- .4 When initial tests and observations reveal work failing to meet contract requirements, pay for any additional testing and observations required by Observer or third party testing agency for correction of Work, without additional cost to Owner.
- .5 Copies of Q.A. Observation Reports to be issued by Observer to Owner and Prime Contractor.

1.10 PREPARATORY WORK

- .1 Examine drawings and specifications and any other necessary data which may affect installation to determine extent of Work involved in this Section. No additional claims against Owner to be allowed resulting from failure to ascertain full extent of Work required as described or implied.
- .2 Prior to application of flashings, review roof perimeters and projections.
- .3 Examine installed membrane flashings for any defect of level or construction before proceeding with work.
- .4 Advise Consultant of any deficiencies that may affect performance of roof system and any deviations from specified tolerances.
- .5 Defective or improper work must be corrected before proceeding with installation of sheet metal flashings.

2 PRODUCTS

2.1 PRE-FINISHED METAL FLASHINGS

- .1 All standards, regulations and specifications listed herein are considered to be the latest available edition.
- .2 Compatibility between materials is essential. Use only materials that are known to be compatible when incorporated in a completed assembly.
- .3 Prefinished Metal Flashing: 24 gauge (0.457mm) steel with G90 (Z275) zinc coating conforming to ASTM A653A/A653M. Surface with Dofasco Perspectra Series or Valspar WeatherX factory-baked finish. Colour selected by Architect from Manufacturer's standard colour range.
- .4 Cleats and Hook Strips Not Otherwise Specified: Two gauges heavier of material matching that of flashing being employed; minimum 22 gauge (0.050").

2.2 JOINTING

- .1 Linear mating of sections of cap flashings and parapet flashings to be with an "S" lock joint.
- .2 Corner mating to be completed with a standing seam.

2.3 ACCESSORIES

- .1 Underlay: Smooth unsaturated quality rosin sized paper weighing not less than 6 lbs per 100 ft² (0.3 Kg/m²) unless otherwise shown to CSA A123.3M.
- .2 Touch-up paint: As recommended by pre-finished material manufacturer.
- .3 Bituminous Paint: Gilsonite asphalt 910-02 by Bakelite to CGSB 1-GP-108 Type II.
- .4 Sealants: as per Section 07 92 00.

2.4 FASTENERS

- .1 Use galvanized, copper, aluminum or stainless-steel nails or screws most compatible with materials being employed. Use fasteners as most generally suitable to.
- .2 Fasteners to Wood: Nails, annular threaded of length to penetrate into bases minimum 1" (25 mm) or No. 8 screws to penetrate surface by min. 0.75" (19 mm), at 24" (600 mm) o.c.
- .3 Exposed Fasteners: Nylon headed, No. 14 Colormate fasteners by Leland Industries with 7/16" (11mm) hex heads, self-tapping or drilling point tips. Length to suit installation and with colour to match prepainted metal.
- .4 Masonry Fasteners: Tapcon, Gripcon or Rawl spike sized to penetrate concrete 1.5" (38mm) minimum unless otherwise shown.
- .5 Wedges: Rolled plumber sheet lead. Secure metal flashings on inside and should be secured with No.10 galvanized screws through neoprene washers at 30" (760 mm) o.c.
- .6 Masonry Anchors: Rawl lead lags for screws as recommended by manufacturer.

2.5 FABRICATION

- .1 Fabricate all possible work in shop in 8' (2.4m) lengths by brake forming, bench cutting, drilling and shaping. On high vertical sections install metal in 4' (1.2m) section as specified and detailed. Profiled metal to be cold rolled.
- .2 On coping or flashing with a horizontal dimension of 16" (406mm) or greater, fabricate metal flashings in maximum 4' (1.2m) sections.
- .3 On coping or flashing with a horizontal dimension of 20" (508mm) or greater, use 1" (25mm) lock folded standing seam joints.
- .4 Form bends with straight sharp lines, angles and corners into true planes, free from twists, buckles, dents and other visual distortions.
- .5 Double-back exposed metal edges at least 0.5" (13mm). Raw edges will not be permitted.
- .6 Supply all accessories required for installation of sheet metal work of this Section. Fabricate accessories of same materials to which they will be used.

3 EXECUTION

3.1 INSTALLATION

- .1 Install sheet metal flashings at copings, walls, joints, roof openings and other components required to protect the membrane flashings as shown on the drawings, or otherwise required.
- .2 Install continuous concealed hook strips at all exterior faces. Install cleats as required to protect membrane roofs and flashings from damage at lock joints and as required to permanently hold flashing in place. Secure cleats at 6" (152mm) on center in V-pattern, keeping lower fastener within 1.25" (32mm) of the drip edge.
- .3 Sheet metal work shall be installed to cover the entire area it protects and shall be watertight under all service and weather conditions.
- .4 Install in a uniform manner, level, true to line, free of dents, warping and distortion.
- .5 Back-paint at the rate of ¼ Gal/100 ft² (0.12L/m²) with bituminous paint, sheet metal that comes into contact with another kind of metal, masonry or concrete.

- .6 Install sheet metal with concealed fasteners at lock joints. Exposed fastening will be permitted only with the approval of the Consultant. Space all fasteners evenly in an approved manner. Use lead plugs and screws where fasteners are exposed, otherwise use concrete drive fasteners where metal flashings are installed over concrete or masonry.
- .7 Install underlay under sheet metal, installed directly over wood or masonry surfaces. Overlap joints 2" (51mm) and turn up 3" (76mm) at edges where horizontal surfaces intersect vertical planes.
- .8 Join sheet metal by "S" lock seams, to permit thermal movement. Form inside and outside corners by means of raised seams. Lock seams and caulk all overlaps to ensure water tightness. Do not use pop rivets.
- .9 Slope all metal to interior to maintain minimum 8% slope. Do not form open joints or pockets that fail to drain water.
- .10 Caulk all open sheet metal joints. Solder corners and other locations as required for a permanent waterproof connection.
- .11 Where existing reglets can not be reused, provide new reglets sized minimum 3/8" (10mm) wide, 1" (25mm) deep and to suit site conditions.
- .12 Clean reglets free of contaminates and dust.
- .13 Wedge flashings into reglet joints with lead wedges at 9" (229mm) o.c. Set minimum 1/4" (6mm) from masonry surface.
- .14 At reglets wider than 3/8" (10mm) and deeper than 3/4" (19mm) provide polyethylene rod, 25% wider than joint width. Caulk all reglets to provide a continuous waterproof seal. Use colour to match materials. Conform to manufacturer's latest printed recommendations for use of products being employed.
- .15 Carry flashings out onto the roof minimum 3" (76mm).
- .16 Prepare mock-up installations of metal flashing details for approval by QA Observer prior to installation of sheet metal flashings.

3.2 FINISH

- .1 At project's conclusion, leave surface and adjacent work areas free of damage and clean of debris. Finished surfaces of formed metal flashings shall be free of oil canning, dents and be perfectly colour matched.
- .2 Changes in colour between sheets and dented or oil canned surfaces that detract from the visual appearance of finished product will be rejected. Remove and replace damaged, defaced or defective work.
- .3 Paint all exposed metal due to cutting.
- .4 After erection touch-up finish surfaces damaged during handling and erection in conformance with manufacturer's recommendations. Refinish shop applied finishes as approved by Consultant.
- .5 Remove deposits or protections and wash metals left unpainted and exposed to view as specified by metal manufacturer.

3.3 CLEAN-UP

- .1 Daily as the work proceeds and on completion, remove all surplus materials and debris resulting from the foregoing work.
- .2 Drag a magnetic bar across work area and grounds to ensure removal of all discarded fasteners and sharp metal debris.

- .3 Remove all stains, caulking or other adhesive from all affected surfaces.

END OF SECTION

1 General

1.1 RELATED SECTIONS

- .1 Section 05 12 00 - Structural Steel Framing.
- .2 Section 07 21 00 - Thermal Insulation.
- .3 Section 07 84 00 - Firestopping.

1.2 REFERENCES

- .1 ASTM C847-12: Standard Specification for Metal Lath.
- .2 ASTM E84-12: Standard Test Method for Surface Burning Characteristics of Building Materials.
- .3 ASTM E119-12: Standard Test Methods for Fire Tests of Building Construction and Materials.
- .4 ASTM E605-93 (2011): Standard Test Methods for Thickness and Density of Sprayed Fire-Resistive Material (SFRM) Applied to Structural Members.
- .5 ASTM E736-00 (2011): Standard Test Method for Cohesion/Adhesion of Sprayed Fire-Resistive Materials Applied to Structural Members.
- .6 ASTM E759-92 (2005): Standard Test Method for Effect of Deflection on Sprayed Fire-Resistive Material Applied to Structural Members.
- .7 ASTM E760-92 (2005): Standard Test Method for Effect of Impact on Bonding of Sprayed Fire-Resistive Material Applied to Structural Members.
- .8 ASTM E761-92 (2005): Standard Test Method for Compressive Strength of Sprayed Fire-Resistive Material Applied to Structural Members.
- .9 ASTM E859-93 (2011): Standard Test Method for Air Erosion of Sprayed Fire-Resistive Materials (SFRMs) Applied to Structural Members.
- .10 ASTM E1513-93 (2011): Standard Practice for Application of Sprayed Fire-Resistive Materials (SFRMs).
- .11 AW CI Standard Practice for the Testing and Inspection of Field Applied Sprayed Fire-Resistive Materials.
- .12 CAN/ULC-S101-04: Standard Methods of Fire Endurance Tests of Building Construction and Materials.
- .13 CAN4-S114-M80 (R1997): Standard Method of Test for Determination of Non-Combustibility in Building Materials.
- .14 Underwriters Laboratories of Canada (ULC) List of Equipment and Materials.

1.3 QUALITY ASSURANCE

- .1 Installer: a firm with expertise in the installation of fire protection or similar materials; licensed or otherwise approved by the spray-applied fire resistive material manufacturer.

1.4 SUBMITTALS

- .1 Submit Product data as specified in Section 01 33 00.
- .2 Product Data: Include certifications, to show compliance with Contract Documents.
- .3 Test Data: Submit independent laboratory test results for all specified performance criteria.

1.5 DELIVERY, STORAGE AND HANDLING

- .1 Refer to Section 01 60 00.
- .2 Deliver Products to the Place of the Work in manufacturer's unopened packages, fully identified as to trade name, type and other identifying data. Packaging shall bear the UL labels for fire hazard and fire-resistance classifications.
- .3 Store Products above ground, in a dry location, protected from the weather. Remove damaged packages found unsuitable for use from the Place of the Work.

1.6 PROJECT CONDITIONS

- .1 When the prevailing outdoor temperature at the building is less than 4 degrees Celsius, maintain a minimum substrate and ambient temperature of 4 degrees Celsius prior to, during and a minimum of 24 hours after application of the spray-applied fire resistive material.
- .2 If necessary for job progress, provide heated protective enclosures to maintain temperatures. Refer to Section 01 50 00.
- .3 Provide adequate ventilation of not less than 4 air changes per hour to allow proper drying of the spray-applied fire resistive material during and subsequent to its application.

1.7 SEQUENCING

- .1 Perform fire protection work on a given floor prior to proceeding with fire protection work on the next floor.
- .2 Coordinate and schedule the fire protection work to avoid delays in the progress of the Work.
- .3 Do not install board fire protection on structural members until piping and other construction behind the fire protection has been completed, uninterrupted coverage can be provided and the need for subsequent cutting and patching can be eliminated.

2 Products

2.1 MANUFACTURERS

- .1 Manufacturers of fire-resistive materials having Product considered acceptable for use:
 - .1 Cafco Industries Inc.
 - .2 AD Fire Protection Systems.
 - .3 Grace Canada Inc.
- .2 Substitutions: refer to Section 01 25 00.

2.2 PERFORMANCE CRITERIA

.1 Spray-Applied Fire Resistive Coating

- .1 Deflection: When tested in accordance with ASTM E759, the material shall not crack or delaminate when the non-concrete topped galvanized deck to which it is applied is subjected to a one-time vertical centerload resulting in a downward deflection of 1/120th of the span.
- .2 Bond Impact: When tested in accordance with ASTM E760, the material shall not crack or delaminate from the concrete topped galvanized deck to which it is applied.
- .3 Cohesion/Adhesion (bond strength): When tested in accordance with ASTM E736, the material applied over uncoated or galvanized steel shall have an average bond strength of 15.9 kPa.
- .4 Air Erosion: When tested in accordance with ASTM E859, the material shall not be subject to losses from the finished application greater than 0.27 grams per square metre.
- .5 Compressive Strength: When tested in accordance with ASTM E761, the material shall not deform more than 10 percent when subjected to a crushing force of 85.7 kPa.
- .6 Corrosion Resistance: When tested in accordance with ASTM E937, the material shall not promote corrosion of steel.
- .7 Non-combustibility: When tested in accordance with ASTM E136 or CAN4-S114-M, the material shall be noncombustible.
- .8 Surface Burning Characteristics: When tested in accordance with ASTM E84 or CAN/ULC-S102, the material shall exhibit the following surface burning characteristics:
 - .1 Flame Spread = 0
 - .2 Smoke Developed = 0
- .9 Density: When tested in accordance with ASTM E605, the material shall meet the minimum individual and average density values as listed in the appropriate UL/ULC design or as required by the authority having jurisdiction or shall have a minimum average of 280 kg/m³.
- .10 The material shall have been tested and reported by Underwriters Laboratories of Canada (ULC) in accordance with the procedures of CAN/ULC-S101.
- .11 Spray-applied fire resistive materials shall be applied at the required thickness and density to achieve the ratings as noted on Drawings.

2.3 MATERIALS

- .1 Spray-Applied Fire Resistive Material (SFRM): cementitious wet-mix type, free of asbestos; Grey colour; e.g. Cafco 300 by Cafco Industries Inc.
- .2 Refractory Mineral Wool Board Fire Protection: Rigid boards of 144 kg/m³ (9 pcf) nominal density; produced from asbestos free materials by combining refractory mineral wool manufactured from slag with thermosetting resin binders to comply with ASTM C612 for Class 4 and as follows:
 - .1 Thermal Resistance: RSI 0.76 @ 24 degrees C (R-4.35 @ 75 degrees F).
 - .2 Surface Burning Characteristics: Flame Spread and Smoke Developed ratings of 15 and 5, respectively.
 - .3 Manufacturer and Product Name: e.g. Cafco-board Mineral Wool Board Fire Protection by Cafco Industries Inc.
- .3 Fastening Accessories: For each fire resistive assembly in which mineral wool board fire protection serves as rigid fire protection, provide a board fastening system complying with the related UL design or other acceptable testing and inspecting organization's report.
- .4 Metal Lath: galvanized type, 1.4 kg/m², to ASTM C847.
- .5 Water: Potable.

3 Execution

3.1 EXAMINATION

- .1 Refer to Section 01 71 00.
- .2 Ensure surfaces to receive fire protection are free of oil, grease, loose mill scale, dirt, paints/primers (other than those listed and tested) or other foreign materials which would impair satisfactory bonding to the surface.
- .3 Ensure clips, hangers, supports, sleeves and other attachments to the substrate are to be placed by others prior to the application of spray-applied fire resistive materials.
- .4 Ensure that the installation of ducts, piping, conduit or other suspended equipment shall not take place until the application of sprayed fire protection is complete in an area.

3.2 PREPARATION

- .1 Prepare substrates in accordance with Underwriters' Laboratories of Canada (ULC) clarification entitled Sprayed-Applied Fire-Resistive Materials New Requirements for the Use of Sprayed-Applied Fire-Resistive Materials on Primed Steel Surfaces.
- .2 Provide bonding agents and metal lath as required.

3.3 APPLICATION

- .1 Apply sprayed fire-resistive materials to ASTM E1513.
- .2 Do not apply fire protection to steel floor decks prior to the completion of concrete work on that deck.
- .3 Do not apply sprayed fire protection to the underside of roof deck until the roof is completely installed and tight, all penthouses are complete, all mechanical units have been placed, and all roof traffic has ceased.
- .4 Provide masking, drop cloths or other suitable coverings to prevent overspray from coming in contact with surfaces not intended to be sprayed.
- .5 Apply bonding materials as per the identified ULC fire resistance design and the manufacturer's written recommendations.
- .6 Topcoat materials shall be the type recommended and approved by the manufacturer of each spray-applied fire resistive material required for the applications indicated.
- .7 Install mineral wool board fire protection to comply with requirements for thicknesses, number of layers, construction of joints and corners, and fastening methods referenced in the appropriate fire resistance design indicated.
- .8 Coordinate installation of board fire protection with other construction to minimize cutting into, or removal of, already installed board material.

3.4 FIELD QUALITY CONTROL

- .1 Test the spray-applied fire resistive material for thickness and density in accordance with one of the following procedures:
 - .1 ASTM E605 - Standard Test Method for Thickness and Density of Sprayed Fire-Resistive Materials Applied to Structural Members.
 - .2 AW CI Standard Practice for the Testing and Inspection of Field-Applied Sprayed Fire-Resistive Materials.

3.5 ADJUSTING AND CLEANING

- .1 Make Good damaged fire protection.

3.6 PROTECTION

- .1 Protect completed installation as specified in Section 01 76 00.
- .2 Provide final protection and maintain conditions in a manner acceptable to Consultant and authorities having jurisdiction.
- .3 Ensure fire protection is not damaged at time of Substantial Performance of the Work.

END OF SECTION

1 General

1.1 RELATED SECTIONS

- .1 Section 03 30 00 - Cast-in-Place Concrete.
- .2 Section 03 41 13 - Precast Concrete Hollow Core Planks.
- .3 Section 04 22 00 - Concrete Unit Masonry.
- .4 Section 05 50 00 - Metal Fabrications.
- .5 Section 07 92 00 - Joint Sealants.

1.2 REFERENCES

- .1 ASTM C303-21: Standard Test Method for Dimensions and Density of Preformed Block and Board-Type Thermal Insulation.
- .2 ASTM C1104/C1104M-19: Standard Test Method for Determining the Water Vapor Sorption of Unfaced Mineral Fiber Insulation.
- .3 ASTM E84-23b: Standard Test Method for Surface Burning Characteristics of Building Materials.
- .4 ASTM E119-22: Standard Test Methods for Fire Tests of Building Construction and Materials.
- .5 ASTM E814-23a: Standard Test Method for Fire Tests of Penetration Fire Stop Systems.
- .6 ASTM E2174-20a: Standard Practice for On-Site Inspection of Installed Firestop Systems.
- .7 ASTM E2393-20a: Standard Practice for On-Site Inspection of Installed Fire Resistive Joint Systems and Perimeter Fire Barriers.
- .8 CAN-ULC-S101-14 (REV1): Standard Methods of Fire Endurance Tests of Building Construction and Materials.
- .9 CAN-ULC-S102-2018 (REV1): Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies.
- .10 CAN-ULC-S114-2018: Standard Method of Test for Determination of Non-Combustibility in Building Materials.
- .11 CAN/ULC-S115-2018: Standard Method of Fire Tests of Firestop Systems.
- .12 CAN/ULC-S129-15 (REV1): Standard Method of Test for Smoulder Resistance of Insulation (Basket Method).
- .13 CAN/ULC-S702.1-14 (R2019): Standard for Mineral Fibre Thermal Insulation for Buildings, Part 1: Material Specification.
- .14 ULC List of Equipment & Materials.

1.3 SUBMITTALS

- .1 Submit Shop Drawings and Product data as specified in Section 01 33 00.
- .2 Product Data: sealant manufacturer's installation instructions and standard drawings, indicating ULC or WHI test designations.
- .3 Shop Drawings: Indicate sizes of openings, nature of penetrations, and tested method of firestop and smoke seal protection being proposed.
 - .1 Shop Drawings are to be sealed, signed and dated by manufacturer's design engineer.
 - .2 Submit shop drawings to Consultant and to the authority having jurisdiction for their review and approval.

1.4 CERTIFICATES

- .1 Submit certification as specified in Section 01 33 00.
- .2 Certificate: sealant manufacturer's letter of certification verifying that Products meet or exceed specified requirements.

1.5 TEST REPORTS

- .1 Submit test reports as specified in Section 01 33 00.
- .2 Test Reports: certified laboratory reports, indicating that Products proposed for use conform to ASTM E814 and CAN-ULC-S115, and are so classified by the Underwriter's Laboratories of Canada or Warnock-Hersey International.

1.6 QUALITY ASSURANCE

- .1 Manufacturer's Design Engineer: a registered professional engineer licensed to practice in the Place of the Work and having a minimum of 10 years documented experience designing firestop and smoke seal systems.
- .2 Applicator: approved and acceptable to sealant material manufacturer.
- .3 Firestopping compounds shall not contain volatile solvents or require special application to protect plastic pipe from firestopping compound.

1.7 PRE-INSTALLATION MEETING

- .1 Prior to commencement of firestopping, arrange and conduct a pre-installation meeting as specified in Section 01 31 00.
- .2 Pre-installation Meeting: discuss proposed methods and materials to be used in instances.
- .3 Representatives of the Owner, Consultant, Contractor, installer, manufacturer and the authority having jurisdiction are to be in attendance. Do not conduct meeting unless identified parties are present.

1.8 MOCK-UPS

- .1 Construct job site mock-up as specified in Section 01 40 00.

- .2 Apply one sample seal on representative substrates on each site for each fire rating required at each type of wall, floor or roof construction.
- .3 Comply with project requirements as to thickness and density of application to achieve fire rating.
- .4 Proceed with installation only after Consultant has reviewed and accepted mock-up.
- .5 Acceptable mockup may remain as part of the completed Work as standard.

1.9 DELIVERY, STORAGE AND HANDLING

- .1 Refer to Section 01 60 00.
- .2 Deliver Products to the Place of the Work in their original unopened packages.
- .3 Store Products in an enclosed shelter, preventing damage to containers.

1.10 PROJECT CONDITIONS

- .1 Do not apply sealants when temperature of substrate material and surrounding air is below 5 degrees Celsius.
- .2 Maintain sealant at a minimum 18 degrees Celsius for best workability.

2 Products

2.1 MANUFACTURERS

- .1 Manufacturers of firestop sealants having Product considered acceptable for use:
 - .1 3M.
 - .2 AD Fire Protection.
 - .3 Hilti Canada.
 - .4 Nuco Inc.
 - .5 Specified Technologies, Inc.
 - .6 Tremco.
 - .7 The Rectorseal Corporation.
- .2 Substitutions: refer to Section 01 25 00.

2.2 DESIGN CRITERIA

- .1 Seal joints, holes and penetrations at floors, fire rated walls and smoke barrier walls.
- .2 Seal holes accommodating penetrating items such as cables, cable trays, pipes, ducts and conduits.
- .3 Seal penetration system used to maintain the integrity of time rated construction by providing a sealant against the spread of heat, flame and smoke.
- .4 Systems shall be UL classified or listed by Warnock-Hersey International for the appropriate required time rating.

2.3 MATERIALS

- .1 Firestop Insulation: to CAN/ULC-S702, Type 2; mineral fibre manufactured from rock or slag, suitable for manual application:
 - .1 Density: 72 kg/m³ when tested to ASTM C303.
 - .2 Combustibility: Noncombustible to CAN-ULC-S114.
 - .3 Melt Temperature: >1175 degrees C.
 - .4 Surface Burning Characteristics: to CAN-ULC-S102, maximum flame spread of 0, smoke developed of 0.
 - .5 Moisture Sorption: 0.04 percent when tested to ASTM C1104.
 - .6 Smoulder Resistance: 0.01 percent when tested to CAN-ULC-S129.
- .2 Firestop Sealant Type A: single-component, water based, intumescent acrylic; ULC labelled; to CAN-ULC-S115 and CAN-ULC-S101-M; e.g. TREMstop IA by Tremco.
- .3 Firestop Sealant Type B: three component; epoxidized polyurethane terpolymer; accommodating joint movement of +40/-25%; ULC labelled; to CAN/CGSB-19.24-M and CAN-ULC-S115; e.g. DYmeric 240 ULC by Tremco.
- .4 Firestop Sealant Type C: three component; self-levelling; chemically curing polyurethane sealant; ULC labelled; to CAN-ULC-S115; e.g. THC-900 ULC by Tremco.
- .5 Firestop Sealant Type D: single component; low modulus; silicone rubber; moisture curing; ULC labelled; to CAN/CGSB-19.13-M and CAN-ULC-S115; e.g. Fyre-Sil by Tremco.
- .6 Firestop Sealant Type E: single component; modified polyurethane; moisture curing; ULC labelled; to CAN/CGSB-19.13-M and CAN-ULC-S115; e.g. DYmonic ULC by Tremco.
- .7 Primer: as recommended by sealant manufacturer for specific material, substrate and end use.

2.4 COMPONENTS

- .1 Provide firestopping and smoke sealing systems to CAN-ULC-S115 and as described below:
 - .1 Asbestos free materials and systems fully capable of maintaining an effective barrier against gases, flame and smoke in compliance with CAN-ULC-S115, not exceeding opening sizes stated.
 - .2 Service Penetration Assemblies: certified by CAN-ULC-S115 and used by ULC Guide 40 U19. Service components listed as certified in this guide are noted under Label Service of ULC.
- .2 Fire resistance rating of fire stopping material assembly must meet or exceed the fire resistance rating of the floor or wall section being penetrated.
- .3 Firestopping and smoke seals at openings around penetrations for pipes, ductwork and other mechanical items requiring sound and vibration control: elastomeric seal; do not use a cementitious or rigid seal at such locations.
- .4 Damming and back up materials, supports and anchoring devices shall be to manufacturer's recommendations, and in strict accordance with tested assembly being installed as acceptable to authorities having jurisdiction.
- .5 Sealants: non-sagging type for vertical joints.

3 Execution

3.1 EXAMINATION

- .1 Refer to Section 01 71 00.
- .2 Confirm compatibility of surfaces to receive sealant materials.
- .3 Verify surfaces of openings are sound, clean, dry and ready to receive application of sealant.
- .4 Verify that penetration elements are securely fixed and properly located.

3.2 PREPARATION

- .1 Protect adjacent surfaces and equipment from damage.
- .2 Clean contact surfaces of dirt, dust, grease, oil, loose material, or other matter which may affect bond of sealant.
- .3 Remove incompatible materials which affect bond by scraping, brushing, water or solvent cleaning, or sandblasting.

3.3 APPLICATION

- .1 Install mineral fibre insulation in compacted thicknesses required by ULC design. Compress insulation approximately 33 percent.
- .2 Apply sealant in strict accordance with manufacturer's instructions and ULC certification.
- .3 Coordinate and cooperate with adjacent, contiguous and related materials trades, such as concrete, drywall, plumbing, conduit, electrical wiring, communication systems, etc., to ensure a proper and timely installation.
- .4 Seal holes or voids made by penetrating items to ensure an effective fire and smoke barrier.
- .5 Seal intersections and penetrations of floors, ceilings, walls and columns.
- .6 Seal around cutouts for lights, cabinets, pipes and plumbing, ducts, electrical boxes, etc.
- .7 Wrap non-insulated heated pipes that may be subject to movement with a non-combustible smooth material to permit the pipe to move without damaging the firestopping and smoke seal.
- .8 Maintain the integrity of any insulation and vapour retarders on insulated pipes and ducts at the fire separation.
- .9 Where floor openings exceed 100 mm in width and may be subjected to traffic or loading, install cover plate systems capable of supporting same loading as floor.

3.4 FIELD QUALITY CONTROL

- .1 Perform field testing and inspection as specified in Section 01 40 00.
- .2 Conduct inspections to ASTM E2174.
- .3 Examine finished penetrations to ensure proper installation before concealing or enclosing any areas of work.

- .4 Keep areas of work accessible until inspection has been completed.
- .5 Manufacturer's Field Service: inspect to verify and confirm that systems installation is in strict accordance with manufacturer's and ULC requirements.
 - .1 Submit reports to Consultant verifying compliance with the Contract Documents.
- .6 Correct unacceptable work and provide further inspection to verify compliance with requirements.

3.5 CLEANING

- .1 Refer to Section 01 74 00.
- .2 Immediately remove spots, smears, stains, residues, adhesives, etc., from installation, including from adjacent surfaces.
- .3 Do not use Products containing volatile solvents.
- .4 Leave the Work in a clean and satisfactory condition.

3.6 PROTECTION

- .1 Refer to Section 01 76 00.
- .2 Protect firestopping assemblies from damage until Owner occupancy.
- .3 Make Good damaged firestopping assemblies.

END OF SECTION

1 General

1.1 RELATED SECTIONS

- .1 Section 03 30 00 - Cast-In-Place Concrete.
- .2 Section 04 05 00 - Common Work Results for Masonry.
- .3 Section 06 20 00 - Finish Carpentry.
- .4 Section 07 26 00 - Vapour Retarders.
- .5 Section 07 27 00 - Air Barriers.
- .6 Section 07 27 36 - Spray Foam Air Barriers.
- .7 Section 07 62 16 - Sheet Metal Flashing and Trim.
- .8 Section 07 84 00 - Firestopping.

1.2 REFERENCES

- .1 ASTM C919-19: Standard Practice for Use of Sealants in Acoustical Applications.
- .2 ASTM C920-18: Standard Specification for Elastomeric Joint Sealants.
- .3 ASTM C1193-16: Standard Guide for Use of Joint Sealants.
- .4 ASTM C1521-19(2020): Standard Practice for Evaluating Adhesion of Installed Weatherproofing Sealant Joints.
- .5 CAN/CGSB-19.13-M87: Sealing Compound, One Component, Elastomeric, Chemical Curing.
- .6 CAN/CGSB-19.17-M90: One Component Acrylic Emulsion Base Sealing Compound.

1.3 QUALITY ASSURANCE

- .1 Arrange for sealant manufacturer's representative to be present prior to commencement of caulking. Consult with representative as to joint conditions.
- .2 Applicator: company specializing in applying the work of this Section with 5 years documented experience.

1.4 DELIVERY, STORAGE AND HANDLING

- .1 Refer to Section 01 60 00.
- .2 Deliver Products in manufacturer's sealed packages.
- .3 Store Products in warm, dry conditions.

1.5 PROJECT CONDITIONS

- .1 Do not install solvent curing sealants in enclosed building spaces.

- .2 Maintain temperature and humidity recommended by the sealant manufacturer during and after installation.

1.6 WARRANTY

- .1 Submit extended warranties in accordance with the General Conditions of the Contract.
- .2 System Warranty: 2-year extended warranty including coverage of installed sealants and accessories which fail to achieve air tight and watertight seal, exhibit loss of adhesion or cohesion, or do not cure.

2 Products

2.1 MANUFACTURERS

- .1 Manufacturers of joint sealants having Product considered acceptable for use:
 - .1 Dow Corning.
 - .2 General Electric.
 - .3 Sonneborn.
 - .4 Tremco.
- .2 Manufacturers of flashing sealant having Product considered acceptable for use:
 - .1 Henry / Bakor.
- .3 Manufacturers of preformed expansion joint seals having Product considered acceptable for use:
 - .1 BASF Inc.
 - .2 Degussa / Watson Bowman Acme.
 - .3 Emseal Corporation.
- .4 Substitutions: refer to Section 01 25 00.

2.2 SYSTEM DESCRIPTION

- .1 Seal gaps between dissimilar Products and equipment, visible or otherwise, to protect building components from air infiltration and moisture penetration.

2.3 MATERIALS

- .1 Exterior Weatherseal Sealant: to CAN/CGSB-19.24-M, Type II, Class B; three-part, epoxidized polyurethane; chemically curing; accommodating joint movement of plus or minus 50 percent; colours as selected by Consultant.
- .2 Structural Glazing Sealant: to ASTM C920, Type S, Grade NS, Class 25, Use NT, G and A; one-part self-priming, neutral cure elastomeric adhesive; e.g. Dow Corning 995, Black colour.
- .3 Glazing Sealant: one part, moisture curing, acetoxysilicone sealant; to CAN/CGSB-19.13-M, Type MG-2-25-A-L; Clear colour.
- .4 Mildew-Resistant Interior Sealant for Washroom, Kitchen and Served Areas: to ASTM C920, Type S, Grade NS, Class 25, Use NT; one-part, fungicidal silicone rubber; White colour.

- .5 Acoustical and General Purpose Interior Sealant: to CAN/CGSB-19.17-M; one-part, siliconized acrylic latex, mildew-resistant, accommodating joint movement of plus or minus 12-1/2 percent; White colour.
- .6 Flashing Sealant: to ASTM C920, Type S, Grade NS, Class 25; one-part, solvent-free, moisture cure medium modulus sealant; accommodating joint movement of plus or minus 25 percent; Henry Bakor HE925-BES Sealant.
- .7 Pre-moulded Expansion Joint Filler: binary sealant system, factory-applied low modulus silicone, acrylic-impregnated expanding foam sealant and closed-cell EVA foam; accommodating joint movement of plus or minus 25 percent, colour as selected by Consultant from manufacturer's standard range, sizes as indicated on Drawings; e.g. Colorseal by Emseal.

2.4 ACCESSORIES

- .1 Primer: non-staining type, recommended by sealant manufacturer to suit application.
- .2 Joint Cleaner: non-corrosive and non-staining type, recommended by sealant manufacturer; compatible with joint forming materials.
- .3 Joint Backing: open cell polyethylene foam core wrapped in a closed cell polyethylene skin.
- .4 Bond Breaker: pressure sensitive tape recommended by sealant manufacturer to suit application.

3 Execution

3.1 PREPARATION

- .1 Clean and prime joints to requirements of manufacturer's instructions.
- .2 Remove loose materials and foreign matter which might impair adhesion of sealant.

3.2 APPLICATION

- .1 Install joint sealants to ASTM C1193.
- .2 Install acoustical sealants to ASTM C919.
- .3 Apply sealant with pressure gun having proper size nozzle and extrusion nozzle where required.
- .4 Use sufficient pressure to fill joints solid to joint filler.
- .5 Shape nozzle to finish sealant in a neat concave bead.
- .6 Apply sealant sufficiently in from normal face of joints to form a positive shadow line.
- .7 Tool sealant smooth and slightly concave, free from ridges, wrinkles, air pockets and embedded impurities.
- .8 Ensure proper configuration and depth achieved. Depth of sealant at point of adhesion shall be not more than one-half the width.
- .9 Remove excess sealant and droppings using a cleaner which will not damage adjacent surfaces.

- .10 Apply premoulded expansion joint seal in accordance with manufacturer's printed instructions.
Mitre expansion joint seal where material will be joined and wipe silicone onto mitred face.

3.3 FIELD QUALITY CONTROL

- .1 Field inspection will be conducted by Consultant as specified in Section 01 40 00.
- .2 Joints filled with only a skin bead or insufficient volume of sealant will be rejected.
- .3 Remove material from rejected joints, clean and re-seal to attain proper width-to-depth joint coverage.

3.4 CLEANING

- .1 Refer to Section 01 74 00.
- .2 Clean adjacent soiled surfaces.
- .3 Make Good surfaces that have become defaced or disfigured as a result of sealant application.

END OF SECTION

DIVISION 8

OPENINGS

1 General

1.1 RELATED SECTIONS

- .1 Section 04 05 00 - Common Work Results for Masonry.
- .2 Section 05 40 00 - Cold-Formed Metal Framing.
- .3 Section 07 26 00 - Vapour Retarders.
- .4 Section 07 27 00 - Air Barriers.
- .5 Section 07 27 36 - Sprayed Foam Air Barrier.
- .6 Section 07 92 00 - Joint Sealants.
- .7 Section 08 80 00 - Glazing.

1.2 REFERENCES

- .1 AAMA CW-10-15: Care and Handling of Architectural Aluminum from Shop to Site.
- .2 AAMA/WDMA/CSA 101/I.S. 2/A440-22: North American Fenestration Standard / Specification for Windows, Doors and Skylights.
- .3 AAMA 611-20: Voluntary Specification for Anodized Architectural Aluminum.
- .4 ASTM A123/A123M-17: Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
- .5 ASTM A153/A153M-23: Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
- .6 ASTM A653/A653M-23: Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- .7 ASTM B209/B209M-21: Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
- .8 ASTM B221M-21: Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric).
- .9 CAN/CGSB-79.1-M91: Insect Screens.
- .10 CSA A440S1:19: Canadian Supplement to AAMA/WDMA/CSA 101/I.S. 2/A440-17, North American Fenestration Standard / Specification for Windows, Doors and Skylights.
- .11 CSA A440.2:22: Fenestration Energy Performance.
- .12 CSA A440.4:19: Window, Door and Skylight Installation.
- .13 ANSI/NFRC 100-2017: Procedure for Determining Fenestration Product U-factors.
- .14 ANSI/NFRC 200-2017: Procedure for Determining Product Solar Heat Gain Coefficient and Visible Transmittance at Normal Incidence.

1.3 SHOP DRAWINGS

- .1 Submit Shop Drawings as specified in Section 01 33 00.
- .2 Shop Drawings: Project-specific drawings, illustrating:
 - .1 Large scale details of members and materials, of brackets and anchorage devices and of connection and jointing details;
 - .2 Fully dimensioned layouts for positioning of brackets and anchorage devices to structures;
 - .3 Dimensions and thicknesses;
 - .4 Glazing details, description of materials including catalogue numbers, products and manufacturer names;
 - .5 Aluminum alloy and temper designations;
 - .6 Finish specifications; and
 - .7 Other pertinent data.
- .3 Submit documentation of:
 - .1 Compliance with AAMA/WDMA/CSA 101/I.S. 2/A440 and CSA A440S1.
 - .2 Thicknesses, profiles and descriptions of components used in assembly.
 - .3 Engineering calculations verifying the assembly has been designed, constructed and attached to withstand forces anticipated for this Project and will meet performance criteria.
 - .4 Ensure calculations are stamped, dated and signed by the fabricator's design engineer.

1.4 CERTIFICATES

- .1 Submit certifications as specified in Section 01 40 00.
- .2 Frame Certification: a certificate from aluminum extruder certifying aluminum alloys and tempers meet or exceed specified types.

1.5 TEST AND EVALUATION REPORTS

- .1 Submit test reports as specified in Section 01 33 00.
- .2 Test Reports: Manufacturer's standard test results indicating Products meet specified performance criteria, prepared by independent testing agency and current within past 5 years.

1.6 CLOSEOUT SUBMITTALS

- .1 Submit closeout submittals as specified in Section 01 78 00.
- .2 Maintenance Data: Manufacturer's standard maintenance and cleaning instructions; sufficient quantity for inclusion in operation and maintenance manual.

1.7 QUALIFICATIONS

- .1 Fabricator's Design Engineer: a professional structural engineer, experienced in designing aluminum windows, licensed to practice at Place of the Work.
- .2 Fabricator and Installer: a firm specializing in fabricating and installing aluminum windows, having minimum 5 years documented experience.

1.8 MOCK-UPS

- .1 Construct mock-ups as specified in Section 01 40 00.

- .2 Mock-Up: One 1 220 x 1 220 mm size mock-up panel, including one corner cross section for each type of window assembly, demonstrating sill and jamb sections, and complete with thermal break, hardware, weatherstripping, glazing, insect screens, and shop-applied finishes.
- .3 Accepted mock-ups will be used as the standard for acceptance of the Work.
- .4 Remove and replace installed Product that does not conform to accepted mock-up.
- .5 Remove mock-ups from Place of the Work upon Ready-for-Takeover.

1.9 DELIVERY, STORAGE AND HANDLING

- .1 Refer to Section 01 60 00.
- .2 Conform to AAMA CW-10.
- .3 Take precautionary measures and adequately protect frames and frame finishes to prevent damage during fabrication, storage, shipping, handling and installation.
- .4 Deliver, handle and store units by methods approved by manufacturer. Protect from damage and staining.
- .5 Deliver and store units carefully to avoid damage to window frame.

1.10 WARRANTY

- .1 Submit extended warranties in accordance with the General Conditions of the Contract.
- .2 Manufacturer's Extended Warranty: for a period of 10 years, covering the following:
 - .1 Finish: replace any window unit whose finish shows defects, such as but not limited to delamination, blistering or excessive fading.
 - .2 Performance: replace or repair any window unit with air leakage, water leakage, defects or malfunctions under normal usage.
- .3 Installer's Extended Warranty: for a period of 2 years, protecting against leakage, operational defects and malfunction under normal usage.

2 Products

2.1 MANUFACTURERS

- .1 Manufacturers having Product considered acceptable for use:
 - .1 Aerloc Industries Ltd.
 - .2 Alumicor.
 - .3 Alwind Industries, Ltd.
 - .4 Commdoor Aluminum.
 - .5 CRL US Aluminum.
 - .6 Kawneer.
 - .7 Oldcastle Building Envelope.
 - .8 Sherwood Windows, Ltd.
 - .9 Windspec Inc.
- .2 Substitution Procedures: refer to Section 01 25 00.

2.2 DESCRIPTION

- .1 Aluminum Windows: extruded aluminum frame and operable vent sash sections, shop fabricated, with factory anodized finish; site-glazed with sealed insulating glass units; complete with insect screens, metal sills, metal flashings, anchorages and attachment devices.
- .2 Configuration: as indicated on Architectural Drawings.

2.3 PERFORMANCE CRITERIA

- .1 Aluminum Windows: to AAMA/WDMA/CSA 101/I.S. 2/A440 and CSA A440S1 and meeting the following performance criteria.
 1. Air Tightness:
 - .1 Fixed Units: Class Fixed.
 - .2 Operable Vents: Class A3.
 2. Water Tightness:
 - .1 Fixed Units: Class B7.
 - .2 Operable Vents: Class B5.
 3. Wind Load Resistance: Class C5.
 4. Screen Strength: Class S1.
 5. Forced Entry: Class F2.
 6. Temperature Index (CSA A440.2): $1 \geq 58$.
 7. Assembly Thermal Transmittance (ANSI/NFRC 100):
 - .1 Fixed Units: $U \leq 2.15 \text{ W/m}^2 \text{ degrees C.}$
 - .2 Operable Vents: $U \leq 2.56 \text{ W/m}^2 \text{ degrees C.}$
 8. Assembly Solar Heat Gain Coefficient (ANSI/NFRC 200): $\text{SHGC} \leq 0.40$.

2.4 DESIGN CRITERIA

- .1 Design assembly to drain water entering joints, condensation occurring in glazing channel, and migrating moisture occurring within system to the exterior.
- .2 Design intermediate members within units to be either solid or tubular design to suit wind loading, weight carrying requirements and wind deflection limitations.
- .3 Design coupling mullions to permit unit module construction and provide for thermal expansion. When required, reinforce wind load carrying members with steel reinforcement suitable treated to prevent electrolytic action.
- .4 Design operable vents to have a restricted opening not exceeding 100 mm.

2.5 MATERIALS

- .1 Sheet Aluminum: to ASTM B209/B209M, 5005-H32 alloy.
- .2 Extruded Aluminum: to ASTM B221M, 6063-T5 alloy.
- .3 Sheet Steel: to ASTM A653/A653M, Commercial Steel (CS) Types A, B, and C; cold-rolled sheet steel, galvanized.
- .4 Steel Sections: Shaped to suit mullion sections.
- .5 Fastener: Stainless steel.
- .6 Screen Mesh: 18/16 aluminum mesh, Black colour.
- .7 Bituminous Coating: fibred asphalt emulsion.

- .8 Thermal Break: Rigid polyamide.
- .9 Vapour Retarder: As specified in Section 07 26 00.
- .10 Air Barriers: As specified in Section 07 27 00.
- .11 Air Sealant Foam: As specified in Section 07 27 36.
- .12 Glazing Sealant: Type SEAL-GLZ as specified in Section 07 92 00.
- .13 Glazing Materials: As specified in Section 08 80 00.
- .14 Joint Sealants:
 - .1 Exterior Applications: exterior weatherseal sealant, Type SEAL-EXT.
 - .2 Transition Sheet Connections: Exterior flashing sealant, Type SEAL-EXT-FL.
 - .3 Interior Applications: Interior general purpose sealant, Type SEAL-INT-GP.
- .15 Touch-Up Primer for Galvanized Metal Surfaces: Zinc-rich paint type.

2.6 COMPONENTS

- .1 Frames and Mullions: 2.5mm thick extruded aluminum; 127 mm deep profile; thermally broken with interior tubular section insulated from exterior; applied glazing stops; drainage holes; internal weep drainage system; e.g. 518 Isoport by Kawneer.
- .2 Operable Vent Sash: 2.5 mm thick extruded aluminum sections; 81 x 57 mm size profile, side-hinged opening out (SHO) design; thermally broken with interior tubular section insulated from exterior; applied glazing stops; e.g. 526 SHO Isoport Window by Kawneer.
- .3 Metal Sills: 2.5 mm thick extruded aluminum sections, complete with pre-formed clip anchor; sufficient depth to extend beyond wall face, full length pieces to minimize joints; and with integral drip edge profile and end dams.
- .4 Metal Flashing: 2.0 mm thick extruded aluminum, finish to match mullion sections where exposed.
- .5 Operable Vent Hardware:
 - .1 Hinges: Extruded aluminum butt hinges, minimum two per sash, greater quantity when required by sash size.
 - .2 Friction Adjuster: Heavy duty metal construction, manufacturer's standard design.
 - .3 Limit Stop: Heavy duty metal construction, manufacturer's standard design.
 - .4 Operator: Pivot shoe roto operator complete with collapsible crank handle.
 - .5 Lockable Handles: Hook bolt lock handle, complete with sash mounted strike plate.
 - .6 Weatherstripping: Manufacturer's standard type to suit application, finish to match frame.
- .6 Connection Flange: 3.0 mm thick extruded aluminum angle, size as indicated on Drawings.
- .7 Glass: As specified in Section 08 80 00, Types as indicated on Drawings.

2.7 FABRICATION

- .1 Fabricate Products to AAMA/WDMA/CSA 101/I.S. 2/A440 and CSA A440S1.
- .2 Fabricate Products with minimum clearances and shim spacing around perimeter of assembly.
- .3 Make joints flush, hairline and weatherproof.
- .4 Arrange fasteners and attachments to conceal from view.

- .5 Prepare components with internal reinforcement for operating hardware.
- .6 Provide minimum two lockable handles per operable vent sash.
- .7 Overlap and seal glazing flanges of abutting members for entire depth and width of flanges to ensure a solid, unbroken air and water barrier. Glass stops shall be screwless, lock-in type.
- .8 Provide fully resilient settings for glass and panels by use of EPDM elastomeric glazing gaskets on both sides of glass installed in window frames.
- .9 Provide connection flange to full perimeter of frame, attached from interior side of frame with concealed fasteners cut flush with face of flange. Pre-drill fastener holes into flange to accommodate immediate on-site installation.
- .10 Fabricate screen frames of tubular extruded aluminum, to CAN/CGSB-79.1-M; prefinished to match window frames.
- .11 Secure screen mesh to screen frame with removable polyethylene spline.
- .12 Secure screen assemblies to window frames using mechanical fasteners as required by authorities having jurisdiction.

2.8 FINISHES

- .1 Anodized Coating on Aluminum: to AAMA 611, AA-M10C21A31, Class II Clear Anodic Oxide coating, No.17.
- .2 Galvanized Coating on Steel Components: to ASTM A123/A123M, Coating Grade 55; hot dipped zinc alloy coating.
- .3 Galvanized Coating on Steel Hardware: to ASTM A153/A153M, Classes B3, C or D; hot dipped zinc alloy coating.

2.9 SOURCE QUALITY CONTROL

- .1 Perform shop inspection and testing as specified in Section 01 40 00.
- .2 Shop Inspection and Testing: Random tests conducted by independent testing agency on fabricated window framing at point of manufacture, verifying compliance with specified performance criteria.

3 Execution

3.1 PREPARATION

- .1 Apply heavy coat of bituminous paint on surfaces of aluminum placed in contact with concrete, mortar, plaster, or dissimilar metals.
- .2 Provide fastenings and anchors required to be built into adjacent work to other Sections.

3.2 INSTALLATION

- .1 Install Products to CSA A440.4.
- .2 Install Products in correct locations, level, square, plumb, free from distortion, properly aligned and at proper elevations.

- .3 Make joints neat, fine and weathertight.
- .4 Allow for expansion and contraction of components.
- .5 Provide additional mouldings and closures necessary.
- .6 Use appropriate fasteners compatible with materials being fastened. Conceal fasteners.
- .7 Fasten connection flange to wall assembly and connect building envelope air barrier membrane to flange.
- .8 Seal connection flange to transition sheet membranes with continuous bead of joint sealant prior to application of air sealant foam.
- .9 Provide trim panning and flashings of sufficient size to neatly finish window frame to interior and exterior window opening.
- .10 Fill gaps between exterior frames and adjacent wall assemblies with air sealant foam, as specified in Section 07 27 36.
- .11 Install glass as specified in Section 08 80 00.
- .12 Provide sills in place with anchoring devices located at ends and evenly spaced at 600 mm OC. Fasten expansion joint cover plates and drip deflectors with self-tapping stainless steel screws.
- .13 Maintain a 6 – 9 mm space between butted ends of continuous sills. For sills over 1 220 mm in length, maintain a 3 – 6 mm space at each end.
- .14 Install end dams at each sill.
- .15 Grind smooth exposed edges of aluminum sills, ensuring no sharp edges.
- .16 Provide joint sealants as specified in Section 07 92 00.

3.3 FIELD QUALITY CONTROL

- .1 Perform field inspection and testing as specified in Section 01 40 00.
- .2 Field Inspection and Testing: Random tests conducted by independent testing agency on installed windows, verifying compliance with specified performance criteria.
- .3 Make good Products not meeting specified performance criteria.
- .4 Re-test replacement Products at no additional cost to Owner.

3.4 TOLERANCES

- .1 Deviation from Plumb and Level: ≤ 3 mm in 3 000 mm.

3.5 CLEANING

- .1 Refer to Section 01 74 00.
- .2 Clean glass and aluminum surfaces.
- .3 Do not scratch or damage surfaces.

- .4 Do not remove protective cover from framing until final cleaning operations.

3.6 PROTECTION

- .1 Refer to Section 01 76 00.
- .2 Provide protective coatings on surfaces subject to damage.

END OF SECTION

1 General

1.1 RELATED SECTIONS

- .1 Section 07 21 00 - Thermal Insulation.
- .2 Section 07 92 00 - Joint Sealants.
- .3 Section 08 51 13 - Aluminum Windows.

1.2 REFERENCES

- .1 CAN/CGSB-12.1-M90: Tempered or Laminated Safety Glass.
- .2 CAN/CGSB-12.3-M91: Glass, Polished Plate or Float, Flat, Clear.
- .3 CAN/CGSB-12.8-97: Insulating Glass Units.
- .4 CAN/CGSB-12.9-M91: Glass, Spandrel.
- .5 Fixed Glass Manufacturers Association (FGMA): Glazing Manual.
- .6 Fixed Glass Manufacturers Association (FGMA): Glazing Sealing Systems Manual.
- .7 Insulated Glass Manufacturers Association of Canada (IGMAC): Quality Standard Specification.

1.3 SUBMITTALS

- .1 Submit Product data as specified in Section 01 33 00.
- .2 Product Data on Glass Types Specified: Provide structural, physical and environmental characteristics, size limitations, special handling or installation requirements.

1.4 SAMPLES

- .1 Submit samples as specified in Section 01 33 00.
- .2 Samples: Submit two samples 300 x 300 mm in size, illustrating glass units, colouration and design.

1.5 QUALITY ASSURANCE

- .1 Conform to glazing installation methods and quality standards specified in IGMAC Quality Standard Specification, and IGMAC Glazing Recommendations for Sealed Insulated Glass Units.
- .2 Select glazing compounds and sealants in accordance with glass manufacturers' instructions.

1.6 WARRANTY

- .1 Submit an extended warranty in accordance with the General Conditions of the Contract.
- .2 Extended Warranty: for a period of five years, including coverage for sealed glass units from seal failure, interpane dusting or misting, and replacement of same.

2 Products

2.1 MANUFACTURERS

.1 Manufacturers of glass having Product considered acceptable for use:

- .1 AFG Glass Inc.
- .2 Guardian Industries Corp.
- .3 PPG Industries.
- .4 Vitro Architectural Glass.
- .5 AGC Glass Company North America.

.2 Substitutions: refer to Section 01 25 00.

2.2 DESIGN CRITERIA

- .1 Design glazing to ensure continuity of building enclosure vapour and air barrier.
- .2 Size glass to withstand dead loads and positive and negative live loads acting normal to plane of glass.
- .3 Limit glass deflection to 1/200 or flexure limit of glass with full recovery of glazing materials, whichever is less.
- .4 Design glass products to ASTM E1300.

2.3 PERFORMANCE CRITERIA

- .1 Sealed Insulated Glass Units: having the following physical properties:
 - .1 Coefficient of Thermal Heat Transmission: Winter, Argon Filled (ANSI/NFRC 100): $U=1.36$ w/m² degrees C. nighttime.
 - .2 Solar Heat Gain Coefficients: (ANSI/NFRC 200): SHGC=0.39.
 - .3 Light to Solar Gain Ratio: LSG=1.79.
 - .4 Visible Light Transmittance (VLT): 70%
 - .5 Visible Light Reflections =
 - .1 Exterior 11%
 - .2 Interior 12%

2.4 SINGLE PANE GLASS MATERIALS

- .1 Heat-Strengthened Glass (Type FG-D): to CAN/CGSB-12.1-M; clear float glass heat strengthened horizontally to achieve a net strength of not less than 4 to 5 times greater than regular annealed glass; impact safety rating meeting ANSI Z97.1, Class A and CPSC 16 CFR 1201, Categories I and II; 6 mm thick unless noted otherwise.

2.5 SEALED INSULATED GLASS UNIT MATERIALS

- .1 Sealed Glass Units: to CAN/CGSB-12.8; 25 mm thick, double pane unit with warm edge seal, sputtered Low-E coating on #2 surface and Argon gas filled inner pane space. Exterior pane to be: 6 mm Solarcool Grey Tempered safety glass. Interior pane to be: 6 mm Clear Tempered with Solarban 60 Low-E surface #2, filled minimum 90% Argon gas.

2.6 ACCESSORIES

- .1 Warm Edge Seal: polyisobutylene primary seal with a secondary seal comprised of either silicone, butyl, polysulphide or urethane, as recommended by sealed insulating glass unit manufacturer for each particular glazing application; e.g. SuperSpacer by Edgetech.

- .2 Low-E Coating: sputtered coating; e.g. PPG Solarban 60 Solar Control Low-E (Sputtered), to ASTM C1376.
- .3 Sealant: as specified in Section 07 92 00.
- .4 Setting Blocks: neoprene, 80-90 Shore A durometer hardness.
- .5 Spacer Shims: neoprene, 50-60 Shore A durometer hardness.
- .6 Glazing Tape: preformed butyl compound with integral resilient tube spacing device.
- .7 Glazing Splines: resilient polyvinyl chloride extruded shape; black colour.

3 Execution

3.1 EXAMINATION

- .1 Refer to Section 01 71 00.
- .2 Verify that openings for glazing are correctly sized, within tolerance and clean.

3.2 PREPARATION

- .1 Clean contact surfaces with solvent and wipe dry.
- .2 Seal porous glazing channels or recesses with substrate compatible primer or sealer.
- .3 Prime surfaces scheduled to receive sealant.

3.3 INSTALLATION - WET/DRY METHOD

- .1 Cut glazing tape to length and set against permanent stops, 5 mm below sight line. Seal corners by butting tape and dabbing with sealant.
- .2 Apply heel bead of sealant along intersection of permanent stop with frame ensuring full perimeter seal between glass and frame to complete the continuity of the air and vapour seal.
- .3 Place setting blocks at one-quarter points with edge block no more than 150 mm from corners.
- .4 Rest glazing on setting blocks and push against tape and heel bead of sealant with sufficient pressure to attain full contact at perimeter of pane or glass unit.
- .5 Install removable stops, with spacer strips inserted between glazing and applied stops, 6 mm below sight line.
- .6 Place glazing tape on glazing pane or unit with tape flush with sight line.
- .7 Fill gap between glazing and stop with sealant to depth equal to bite of frame on glazing, but not more than 9 mm below sight line.
- .8 Apply cap bead of sealant along void between the stop and the glazing, to uniform line, flush with sight line. Tool or wipe sealant surface smooth.

3.4 CLEANING

- .1 Refer to Section 01 74 00.

- .2 Remove glazing materials from finish surfaces.
- .3 Remove labels after Work is complete.
- .4 Clean glass.

END OF SECTION

DIVISION 9

FINISHES

1 General

1.1 RELATED SECTIONS

- .1 Section 07 21 00 – Thermal Insulation.

1.2 REFERENCES

- .1 ASTM C423-17: Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.
- .2 ASTM E90-09(2016): Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements.
- .3 CAN/ULC-S102-2018 (REV1): Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies.
- .4 CAN/ULC-S114-2018: Standard Method of Test for Determination of Non-Combustibility in Building Materials.
- .5 CAN/ULC-S129-15 (REV1): Standard Method of Test for Smoulder Resistance of Insulation (Basket Method).
- .6 CAN/ULC-S702.1-14 (R2019): Standard for Mineral Fibre Thermal Insulation for Buildings, Part 1: Material Specification.
- .7 ULC-S702.2-15: Standard for Mineral Fibre Thermal Insulation for Buildings, Part 2: Installation.

1.3 DELIVERY, STORAGE AND HANDLING

- .1 Refer to Section 01 60 00.
- .2 Store Products away from construction activity and sources of ignition.
- .3 Protect Products from damage during handling, installation and at point of installation.

2 Products

2.1 MANUFACTURERS

- .1 Manufacturers of fire-resistant acoustical insulation having Product considered acceptable for use:
 - .1 Roxul Inc.
- .2 Substitutions: refer to Section 01 25 00.

2.2 MATERIALS

- .1 Acoustical Insulation - Fire-Resistant Type: mineral fibre acoustical batts, to CAN/ULC-S702, Type 1; non-rigid, friction fit type, manufactured from rock or slag, and acceptable for use in fire rated partitions:
 - .1 Noise Reduction Coefficient: 1.10 at 100 mm thickness, to ASTM C423.
 - .2 Facing: Unfaced.
 - .3 Density: minimum 40 kg/m³.
 - .4 Combustibility: Noncombustible to CAN/ULC-S114.

- .5 Surface Burning Characteristics: to CAN/ULC-S102, maximum flame spread of 0, smoke developed of 0.
- .6 Smoulder Resistance: 0.09 percent when tested to CAN/ULC-S129.
- .7 Aged Thermal Resistance: RSI 0.76 per 25 mm of thickness.
- .8 Thickness: as indicated on Drawings.
- .9 Manufacturer and Product Name: e.g. Roxul AFB by Roxul Inc.

2.3 ACCESSORIES

- .1 Mechanical Fasteners: stainless steel screw type fastener, c/w moulded plastic disc washer, minimum 75 mm diameter.
- .2 Adhesive: mastic type, synthetic rubber base, fungi resistant, gun or trowel application, application temperature 12 degrees C to 50 degrees C.

3 Execution

3.1 INSTALLATION

- .1 Install mineral fibre batts and blankets to ULC-S702.2.
- .2 Install batt insulation in spaces without gaps and voids.
- .3 Fit acoustical insulation tight within spaces, around cut openings, behind and around electrical and mechanical items within or behind partitions, and tight to items passing through partitions.

3.2 PROTECTION

- .1 Refer to Section 01 76 00.
- .2 Protect insulation edges at the end of each Working Day.
- .3 Protect insulation in areas where welding will be carried out.
- .4 Replace insulation damaged by others.
- .5 Protect insulation requiring a thermal barrier to requirements of local and provincial legislation.

END OF SECTION

1 General

1.1 PRODUCTS FURNISHED OR INSTALLED UNDER OTHER SECTIONS

- .1 Carefully examine the scope of the Work as indicated on the Drawings, and include all finishing, whether specifically mentioned or not, except as specifically excluded below:
 - .1 Section 05 12 00 - Structural Steel Framing: shop priming.
 - .2 Section 05 30 00 - Metal Decking: shop priming.
 - .3 Section 05 50 00 - Metal Fabrications: shop priming.
 - .4 Section 07 42 13 - Metal Wall Panels: shop finishing.
 - .5 Section 07 62 00 - Sheet Metal Flashing and Trim: shop finishing.

1.2 RELATED SECTIONS

- .1 Section 03 30 00 - Cast-in-Place Concrete.
- .2 Section 04 22 00 - Concrete Unit Masonry.
- .3 Section 05 12 00 - Structural Steel Framing.
- .4 Section 05 30 00 - Metal Decking.
- .5 Section 05 50 00 - Metal Fabrications.
- .6 Section 06 10 00 - Rough Carpentry.
- .7 Section 06 20 00 - Finish Carpentry.

1.3 REFERENCES

- .1 CAN/CGSB-85.100-93: Painting.
- .2 Ontario Painting Contractors' Association (OPCA): Architectural Painting Specification Manual.
- .3 Steel Structures Painting Council (SSPC): Painting Manual, Volume 2 - Systems and Specifications.
- .4 Underwriters Laboratories of Canada: List of Equipment and Materials.

1.4 SAMPLES

- .1 Submit samples as specified in Section 01 33 00.
- .2 Selection Samples: a full range of colour selector samples for each type of paint or stain required.
- .3 Verification Samples: If requested by Consultant, prepare sample panels, 1 000 x 1 000 mm minimum size. Apply finish material to the actual surface or acceptable alternate if required to be portable.

1.5 EXTRA MATERIALS

- .1 Supply extra materials as specified in Section 01 78 00.
- .2 Extra Materials: minimum of 4 litres of each Product, colour and sheen used. Supply extra materials in unopened, new containers, clearly labelled as to manufacturer, product, colour and sheen.

1.6 QUALIFICATIONS

- .1 Manufacturer: use only paint manufacturers and products listed in the OPCA Architectural Painting Specification Manual - Paint Product Recommendation section.
- .2 Applicators: company specializing in the work of this Section, and with a minimum of ten years documented experience.
- .3 Independent Inspection Agency: painting and decorating inspector acceptable to Owner and the Ontario Painting Contractors' Association.

1.7 DELIVERY, STORAGE AND HANDLING

- .1 Refer to Section 01 60 00.
- .2 Deliver Products in original containers with unbroken seals and labeled to indicate the name of the manufacturer, brand, colour and quality of the contents.
- .3 Store thinners, loose soaked rags and similar combustible materials in closed containers. Remove from site or store in an assigned area.
- .4 Provide adequate safe-guards against spontaneous combustion of finishing materials.
- .5 Arrange for a properly enclosed and heated space, satisfactory to Consultant, to be used as a paint shop. Store paint materials in a minimum temperature of 10 degrees Celsius.

1.8 ENVIRONMENTAL REQUIREMENTS

- .1 Conform to OPCA Architectural Painting Specification Manual.

1.9 WARRANTY

- .1 Submit a 30 month OPCA warranty or a 30 month 100 percent maintenance bond in accordance with the General Conditions of the Contract.
- .2 Warranty: Ontario Painting Contractors Association standard Certificate of Guarantee, warranting that the work of this Section meets the standards and requirements incorporated in the OPCA Painting Specification Manual.

2 Products

2.1 MANUFACTURERS

- .1 Where OPCA code numbers are not referenced, use Products from one of the following manufacturers:
 - .1 Benjamin Moore & Co. Ltd..
 - .2 ICI (Glidden) Paints.
 - .3 The Sherwin-Williams Company.
 - .4 SICO Coatings.
- .2 Substitutions: refer to Section 01 25 00.

2.2 SYSTEM DESCRIPTION

- .1 Gloss Range: paint and varnish textures are specified by their Gloss type, which is defined by the dried film Sheen Factor. Refer to OPCA Architectural Painting Specification Manual - "Glossary of Terms" to determine Sheen Factors for the various Gloss types.
- .2 Colours:
 - .1 As selected by Consultant.
 - .2 There may be a maximum of 2 exterior colours and 8 interior colours required.
 - .3 There may be more than 2 colours used in each room or space.

2.3 SUSTAINABLE DESIGN CRITERIA

- .1 Use ECOLOGO paints and coatings with volatile organic compound (VOC) contents less than 150 g/L for non-flat sheen coatings and 50 g/L for flat sheen coatings.

2.4 MATERIALS

- .1 Paints: highest grade, first line quality, ready mixed except field catalyzed coatings; good flow and brushing properties; capable of drying or curing free of streaks or sags.
- .2 Paint Accessory Materials: linseed oil, shellac, turpentine, and other materials, of commercial quality.

2.5 MIXING

- .1 Pigments shall be fully ground and shall maintain a soft paste consistency in the vehicle during storage, that can and will be dispersed readily and uniformly by paddle to a complete homogeneous mixture.

3 Execution

3.1 EXAMINATION

- .1 Refer to Section 01 71 00.
- .2 Do not proceed with finishing until surface is acceptable.
- .3 Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces are below the recommended maximum.

3.2 PREPARATION

- .1 Prepare surfaces to receive finishes in accordance with OPCA Painting Specification Manual.
- .2 Prepare existing surfaces scheduled for re-painting to CAN/CGSB-85.100.
- .3 Mask out surrounding surfaces not designated to receive paint to protect from overspray and overbrushing.
- .4 Remove mildew, efflorescence and all foreign material from surfaces by appropriate methods.
- .5 Correct minor defects and deficiencies in surfaces which affect the work of this Section.
- .6 Provide barrier coats over incompatible primers.

- .7 Clean ungalvanized ferrous metal surfaces designated to receive site finish. Use solvent or mechanical cleaning methods to SSPC Painting Manual, Volume 2 - Systems and Specifications.
- .8 Clean galvanized surfaces with non-petroleum-based solvents. Surface to be free of oil and surface contaminants. Remove pretreatment from galvanized steel metal fabricated from coil stock by mechanical methods.

3.3 APPLICATION

- .1 Apply Products to OPCA Architectural Painting Specification Manual for the paint systems listed, Premium grade unless otherwise specified.
- .2 Refer to CAN/CGSB-85.100.
- .3 Do not use compressed air or aerosol methods of application without the prior written approval of the Consultant.
- .4 Spread finishes evenly and flow on smoothly without runs or sags.
- .5 Apply Products under adequate illumination.
- .6 Sand lightly between coats to achieve required finish.
- .7 Where clear finishes are required, tint fillers to match wood. Work fillers into the grain before set. Wipe excess from surface.
- .8 Vary tint of successive coats to assist with inspection.
- .9 Backprime interior woodwork with enamel primer sealer paint.
- .10 Backprime exterior woodwork with exterior primer paint.
- .11 Apply one coat latex primer to surfaces designated to receive a textured coating, as specified in Section 09 21 16.
- .12 Finish wood door stiles, head and bottom rails and glass stops prior to final door installation.

3.4 MECHANICAL AND ELECTRICAL EQUIPMENT

- .1 Refer to facility services Sections for mechanical and electrical schedules of painting and finishing requirements, colour coding and identification banding of equipment, ducting, piping, and conduit.
- .2 Remove finished louvres, grilles, covers, and access panels on mechanical and electrical components from location and paint separately. Finish paint primed equipment to colour as selected by Consultant.
- .3 Prime and paint insulated and exposed pipes, conduit, boxes, insulated and exposed ducts, hangers, brackets, collars and supports, to match adjacent work, except where items are prefinished.

- .4 Paint interior surfaces of air ducts, convection and baseboard heating cabinets that are visible through grilles and louvers with one coat of flat black paint, to limit of sight line. Paint dampers exposed behind louvers, grilles, convection and baseboard cabinets to match face panels.
- .5 Paint exposed conduit and electrical equipment occurring in finished areas. Colour and texture to match adjacent surfaces.
- .6 Paint both sides and edges of plywood backboards for electrical equipment before installing equipment.
- .7 Colour code equipment, piping, conduit, and exposed ductwork in accordance with colour schedule. Colour band and identify with flow arrows, names, and numbering.

3.5 FIELD QUALITY CONTROL

- .1 Arrange for the assignment of an inspector from an Independent Inspection Agency by the Ontario Painting Contractors Association prior to the commencement of work.
- .2 Pay for costs of inspection as set out by the Ontario Painting Contractors Association.

3.6 ADJUSTING

- .1 Make Good damaged surfaces.
- .2 The Work shall be in perfect condition, free of spattering, finger marks, rust, water marks, scratches and other blemishes.

3.7 CLEANING

- .1 Refer to Section 01 74 00.
- .2 As the Work proceeds, promptly remove spots, stains and other disfigurements. Leave the Work clean and free from dirt and debris.

3.8 PROTECTION

- .1 Refer to Section 01 76 00.
- .2 Protect completed applications from damage.
- .3 Make Good damage.

3.9 FINISH SCHEDULE

- .1 Uppercase titles and code numbers refer to the OPCA Architectural Painting Specification Manual, latest edition.
- .2 Other generic systems stipulate type of coating required, based upon the use of Products by Manufacturers listed in Article 2.1.
- .3 Existing Surfaces Previously Finished: Suitable finish material for substrate as described above, sufficient coats to adequately cover substrate and provide a seamless and neat finish.
- .4 Exterior Painting and Finishing Schedule:

- .1 Wood Trim
 - .1 Latex Finish; as follows:
 - .1 100% Acrylic Primer - 1 coat.
 - .2 100% Acrylic Gloss - 2 coats.
 - .2 Ferrous Metal - Non-rated Coating
- .2 Waterborne Finish; as follows:
 - .1 Waterborne Metal Primer - 1 coat.
 - .2 100% Acrylic Corrosion Resistant Gloss - 2 coats.
- .3 Galvanized Metal
 - .1 EXT. 12-C, LATEX FINISH; Premium grade, High Gloss finish.
- .4 Aluminum
 - .1 EXT. 13-A, ALKYD FINISH - EXPOSED; Premium grade, High Gloss finish.
- .5 Interior Painting and Finishing Schedule:
 - .1 Wood - Opaque Finish
 - .1 INT. 1-B, LATEX FINISH; Premium grade; Semi-Gloss finish, using low odour / VOC Product No. 133 for 2nd and 3rd coats.
 - .2 Wood - Transparent Finish
 - .1 INT. 1-D, SEMI-TRANSPARENT STAIN POLYURETHANE VARNISH (SINGLE COMPONENT) FINISH; Premium grade, Semi-Gloss finish.
 - .3 Wood - Fire Retardant Transparent Finish
 - .1 INT. 1-K, FIRE RETARDANT CLEAR FINISH; Premium grade, Semi-Gloss finish.
 - .4 Gypsum Board - Painted Finish
 - .1 Walls: INT. 4-B, LATEX FINISH; Premium grade; Semi-Gloss finish, using low odour / VOC Product No. 132 for 2nd and 3rd coats; 100 percent solvent free.
 - .2 Ceilings: INT. 4-B, LATEX FINISH; Premium grade; Satin/Eggshell finish, using low odour / VOC Product No. 132 for 2nd and 3rd coats; 100 percent solvent free.
 - .5 Gypsum Board - Glazed Finish
 - .1 INT. 4-D, EPOXY TILE-LIKE FINISH (SOLVENT BASE); Premium grade; Gloss finish.
 - .6 Concrete Masonry Units - Dry Areas
 - .1 INT. 8-A, LATEX FINISH; Premium grade; Semi-Gloss finish, using low odour / VOC Product No. 132 for 2nd and 3rd coats; concrete block walls. Use minimum 2 coats of block filler, each tinted differently.
 - .7 Concrete Masonry Units - Wet Areas
 - .1 INT. 8-D, TILE-LIKE EPOXY FINISH FOR WET SURFACES; Premium grade, Semi-Gloss finish.
 - .8 Concrete Floors
 - .1 INT. 9-B, FLOOR ENAMEL; Premium grade; for interior concrete traffic-bearing surfaces.
 - .9 Ferrous Metal - Non-Rated Coating
 - .1 INT. 12-A, ALKYD FINISH; Premium grade; Semi-Gloss finish.
 - .10 Ferrous Metal - Ceiling Coating
 - .1 INT. 12-F, DRY FALL / FOG FINISH (WATERBORNE); Custom grade.
 - .11 Ferrous Metal - Epoxy Coating for High Traffic Areas
 - .1 INT. 12-G, WATER-BASED EPOXY FINISH; Premium grade.
 - .12 Galvanized and Galvannealed Metal
 - .1 INT. 13-D, LATEX FINISH; Premium grade; using a vinyl wash primer and low odour / VOC Product No. 133 for 2nd and 3rd coats, Semi-Gloss finish.

END OF SECTION

DIVISION 10

SPECIALTIES

1 General

1.1 RELATED SECTIONS

- .1 Section 04 21 00 - Clay Unit Masonry.
- .2 Section 04 22 00 - Concrete Unit Masonry.
- .3 Section 05 50 00 - Metal Fabrications.

1.2 ALLOWANCES

- .1 The Contract Price includes a stipulated sum cash Allowance as specified in Section 01 21 00.
- .2 Cash Allowance: to supply and install exterior and interior building signage.

1.3 REFERENCES

- .1 AAMA 611-98: Voluntary Specification for Anodized Architectural Aluminum.
- .2 AAMA 2604-10: Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels.
- .3 ASTM A307-10: Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength.
- .4 ASTM A1008/A1008M-12: Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable.
- .5 ASTM B221M-12: Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric).
- .6 ASTM B456-11e1: Standard Specification for Electrodeposited Coatings of Copper Plus Nickel Plus Chromium and Nickel Plus Chromium.

1.4 REGULATORY REQUIREMENTS

- .1 Stairwell Door Signage: conform to local code requirements for exiting.

1.5 SUBMITTALS

- .1 Submit Shop Drawings as specified in Section 01 33 00.
- .2 Shop Drawings: Indicate sizes, thicknesses, style, methods of attachment, and special details.

1.6 SAMPLES

- .1 Submit samples as specified in Section 01 33 00.
- .2 Verification Samples: one full size sample of each sign type, illustrating size, thickness, method of attachment, font style and size, and finishes.

1.7 CLOSEOUT SUBMITTALS

- .1 Submit installation and maintenance data for signage as specified in Section 01 78 00.

2 Products

2.1 MATERIALS

- .1 Sheet Steel: to ASTM A1008/A1008M, galvanized.
- .2 Extruded Aluminum: to ASTM B221M, 6061 alloy, T6 temper.
- .3 Bolts, Nuts and Washers: to ASTM A307.
- .4 Adhesive: as recommended by sign manufacturer.

2.2 MANUFACTURED ITEMS

- .1 Text Door Plates: surface engraved type; 2 mm thick dual-layered acrylic with 30 degree bevelled edges; as follows:
 - .1 Length: as required to fit text, minimum 300 mm;
 - .2 Height: 57.2 mm high;
 - .3 Text: 25 mm high Helvetica upper and lower case letters;
 - .4 Fastening: pre-drilled 5 mm OD holes to accommodate countersunk fasteners, centered along left and right edges;
 - .5 Colours: as selected by Consultant from manufacturer's complete colour selection;
 - .6 Text: as determined by Owner.
 - .7 Product Name: e.g. Gravoply by A-K & Lippert Plastics.
- .2 Pictogram Door Plates: 3 mm thick plexiglass, square edged, hot stamped or silk screened image on rear face, 150 mm high; pre-drilled 5 mm OD holes to accommodate countersunk fasteners, centered along left and right edges; e.g. A-K & Lippert Plastics Pictograms, as follows:
 - .1 Male with Barrier Free: 200 mm wide, white symbols on blue background;
 - .2 Female with Barrier Free: 200 mm wide, white symbols on blue background;
 - .3 Janitor: 150 mm wide, black symbol on white background;
 - .4 No Smoking: 150 mm wide, international red and black "NO SMOKING" symbol on white background;
 - .5 No Entry: 150 mm wide, red symbol on white background; and
 - .6 Stairwell: 150 mm wide, black symbol on white background.
- .3 Signs: 300 mm long, minimum 75 mm high, greater height as required to accommodate text and insert channels; double layered acrylic, as follows:
 - .1 Back Layer: 3 mm thick clear acrylic with surface mounted Sparcal premium vinyl film background colour and 19 mm high lettering in white premium vinyl film.
 - .2 Front Layer: 3 mm thick non-glare acrylic with subsurface premium vinyl film strips designed to cover mounting pads and insert channels.
 - .3 Fastening Holes: pre-drilled 5 mm OD holes to accommodate countersunk fasteners, centered along left and right edges.
 - .4 Colours: as selected by Consultant.
- .4 Name Inserts: 0.5 mm thick clear plastic with White premium vinyl film lettering; text as provided by Consultant.
- .5 Fasteners: countersunk screw-type; suitable for materials. Do not use through-fastening types.

2.3 SHOP FINISHES

- .1 Chrome Nickel Plating: to ASTM B456, Type SC 2, Polished finish.
- .2 Anodized Aluminum: to AAMA 611, AA-M12C22A31, Class II Clear Anodic Oxide treatment, No. 17.
- .3 Prefinished Aluminum: to AAMA 2604, 2-coat thermosetting fluoropolymer coating, minimum 0.03 mm thick; eg. PPG Duranar, colour as selected by Consultant.

- .4 Galvanizing: to CAN/CSA-G164-M, hot dipped method, 610 g/m² zinc coating.
- .5 Powder Coating: electrostatic spray-applied polymer powder coating, minimum 0.05 mm dry film thickness.

3 Execution

3.1 INSTALLATION

- .1 Install signage in accordance with manufacturer's installation guidelines.
- .2 Install signs straight, plumb, level and secured in a manner to prevent distortion or displacement.
- .3 Provide routing or mortising for items required to be mortised, rebated or otherwise housed within material.
- .4 Replace Products that are bent, scratched or damaged.
- .5 Properly tighten screws and fastenings and install to the full required complement.
- .6 Finished work shall be free of defects, warping, open seams, and rattles.
- .7 Exposed fasteners shall be neatly executed and shall match adjacent surfaces.
- .8 Do not fasten signage through sound control doors.

3.2 PROTECTION

- .1 Protect installed Products as specified in Section 01 76 00, until Owner occupancy.

END OF SECTION