

SPECIFICATION

FOR

Building J – TD Bank
419 Norwich Ave.
Woodstock, ON

PROJECT NO. 16041-J

STARBANK DEVELOPMENTS 1678 CORP.
21 ROYSUN ROAD, UNIT 17
WOODBIDGE, ON L4L 8R3

PREPARED BY:

VENCHIARUTTI GAGLIARDI ARCHITECT INC.
2651 John Street, Unit 1B
Markham, Ontario
L3R 2W5

**ISSUED FOR TENDER
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**All Specification Sections indicated in this Table of Contents were prepared by
Venchiarutti Gagliardi Architect Inc. unless otherwise noted by others.**

END OF DOCUMENT

1 GENERAL

- 1.1 The Specification has generally been divided into Divisions and the Divisions into Sections for reference, but a Section may consist of the work of more than one subcontractor or supplier. The responsibility for determining which subcontractor or supplier is to provide labour, material, products, equipment and services to complete the work rests solely with the Contractor.
- 1.2 Mention in the Specification or indication on the drawings of materials, products, operations, or methods, requires that the Contractor provide each item mentioned or indicated of the quality or subject to the qualifications shown and/or specified. Perform, according to the conditions stated, each operation prescribed, and provide labour, materials, products, equipment and services to complete the work.
- 1.3 Drawings are intended to convey scope of work and indicate general and approximate location, arrangement and sizes of materials and products. Become familiar with conditions and spaces affecting these materials and products before proceeding with the work. Where conditions require reasonable changes in indicated location and arrangements, make such changes at no additional cost to the Owner.
- 1.4 Where the singular or masculine is used in the Contract Documents, it is to be read and construed as if the plural, feminine or neuter had been used when the context of the statement so requires and as required to complete the work, and the rest of the sentence, clause, paragraph, or article is to be construed as if all changes in grammar, gender or terminology thereby rendered necessary had been made.

2 EXAMINATIONS

- 2.1 Make a careful examination of the site of the work, and investigate and be satisfied as to all matters relating to the nature of the work to be undertaken, as to the means of access and egress thereto and therefrom, as to the obstacles to be met with, as to the rights and interests which may be interfered with during the construction of the work, as to the extent of the work to be performed and any and all matters which are referred to in the Contract Documents, or which are necessary for the full and proper understanding of the work and the conditions under which it will be performed.
- 2.2 Before commencing the work of any Section or trade, carefully examine the work of other Sections and trades upon which it may depend and examine substrate surfaces. Commencement of new work will constitute acceptance of conditions and work by other Sections, trades, and other Contractors upon which the new work depends. If repair of surfaces is required after commencement of specific work, it is to be included in the work of the trade providing the specific system or finish.
- 2.3 Make finished work flush, plumb, true to lines and levels and accurate in all respects.

3 DELIVERY, STORAGE AND HANDLING

- 3.1 Protect materials and products from damage during handling, storage and installation. Deliver, store and handle items in accordance with the manufacturers' instructions and as specified.
- 3.2 Reject damaged materials and products.
- 3.3 Store cementitious and clay products clear of the earth or concrete floors and away from walls.
- 3.4 Keep sand dry and clean and store on tight wooden platforms and covered with tarpaulins during inclement weather, if exposed to same.
- 3.5 Protect metal bars against damage, dirt or dampness, provide wooden platforms.
- 3.6 Sheet metal products to be laid flat with solid support.
- 3.7 Handle and store materials and products in such a manner that no damage is caused to the materials and products, the work, the site and surrounding property.

3.8 Allocate an area of the work site, approved by the Architect and Owner, for the storage of materials and products. Keep the storage area tidy at all times and do not use other areas of the property for storage.

3.9 Arrange and pay for off-site storage when required.

3.10 Receive and unload all materials, products and equipment including those or specified as furnished by Owner.

4 MANUFACTURER'S INSTRUCTIONS

4.1 Fabricate, install, apply, connect, erect, use, clean, and condition materials and products in accordance with the manufacturer's instructions except where greater requirements are specified.

5 WORKMANSHIP

5.1 Work is to be executed by workers experienced and skilled in the respective duties for which they are employed.

5.2 In finished areas, conceal pipes, ducts, conduit and wiring in floors, walls, ceilings, chases or behind furring except where indicated otherwise.

5.3 Install and arrange ducts, piping, tubing, conduit, equipment, fixtures, materials and products to conserve headroom and space with minimum interference and in a neat, orderly and tidy arrangement. Run pipes, ducts, tubing and conduit, vertical, horizontal and square with the building grid unless otherwise indicated. Install piping, ducts, and conduit as close to underside of the structure as possible unless shown otherwise.

5.4 Before installation, inform the Architect of contradictory situations. Install as directed by the Architect.

5.5 Finish access panels and doors to match adjacent wall and/or ceiling finish unless otherwise specified or indicated.

6 DEFECTS

6.1 Defective products, materials and workmanship found at any time prior to Completion of the Contract will be rejected regardless of previous reviews of the work. Be responsible for all delays and all expenses caused by rejection, and ensure any delays do not affect the schedule dates listed in the Construction Progress Schedule.

7 DIMENSIONS

7.1 Check all dimensions at the site before fabrication and before installation commences. Report all discrepancies to the Architect.

7.2 Where dimensions are not available before fabrication commences, ensure that the dimensions required are agreed upon between the parties concerned.

7.3 Wall thicknesses and openings shown on the drawings may be nominal only. Determine actual sizes at the site.

7.4 Ensure that equipment supplied is dimensionally suitable for the space available.

7.5 The mechanical and electrical drawings are intended to show approximate locations of mechanical and electrical materials, products and equipment in diagrammatic form. Where the mechanical and electrical items are not dimensioned, consider their locations to be approximate. Check the architectural and structural drawings and confer with the Architect to settle the actual locations of these items.

7.6 Whether shown on the drawings or not, leave adequate space for servicing of equipment and removal and reinstallation of replaceable items such as motors, coils, filters, and tubes.

8 COOPERATION AND COORDINATION

- 8.1 Cooperate and coordinate with other Contractors and ensure that subcontractors and trades cooperate and coordinate their work to have the work performed expeditiously and satisfactorily. Maintain efficient and continuous supervision. Ensure interference drawings are prepared and work coordinated prior to erection of lights, mechanical piping, sprinkler piping, ductwork and equipment. Report any inconsistencies to the Architect. See Section 01 33 00 for requirements for interference and coordination drawings.
- 8.2 Be responsible for coordinating products supplied in metric (SI) and Imperial units into the overall layout.
- 8.3 Pick up the building permit and approved drawings from the City and bring documents to the site trailer.

9 OVERLOADING

- 9.1 Do not load the structure during construction with a weight or force greater than it is calculated to bear safely.
- 9.2 Do not cut, drill or sleeve load bearing members unless shown on structural drawings or otherwise approved by the Architect in writing for each location.

10 CONSTRUCTION SAFETY

- 10.1 Observe and enforce all construction safety measures, as contained in the current regulations of Federal, Provincial, Municipal and other authorities having jurisdiction, including Occupational Health & Safety Act and Regulations for Construction Projects.

11 CONSTRUCTION MEETINGS

- 11.1 Establish the time and location of the meeting and notify the parties concerned a minimum of 3 days before the meeting.
- 11.2 The meeting agenda is to include the following:
1. appointment of official representatives of participants in the work
 2. schedule of work, and progress scheduling
 3. schedule of submissions of shop drawings, samples, colour chips, etc.
 4. requirements for temporary facilities, site sign, offices, storage sheds, utilities, fences, etc.
 5. a delivery schedule for products and equipment
 6. site security
 7. contemplated change notices, change orders, procedures, approvals required, time extensions, overtime, and administrative requirements
 8. record drawings
 9. maintenance manuals
 10. monthly progress claims, administrative procedures, photographs, holdbacks

12 PROGRESS MEETINGS

- 12.1 Progress meetings shall be arranged by the Contractor every 2 weeks.
- 12.2 The Contractor, major subcontractors, Consultants, and the Owner are to be invited for progress meetings. The Consultants will attend project meeting only as required.
- 12.3 Record the minutes of the meetings and photographs (10 minimum) of the construction site and send by email to attending parties and affected parties not in attendance within 3 days after the meeting.

- 12.4 The meeting agenda is to include the following:
- .1 review, and approval of minutes of the previous meeting
 - .2 review of work progress since the previous meeting
 - .3 field observations, problems, conflicts
 - .4 problems which affect the construction schedule
 - .5 review of off-site fabrication and delivery schedules
 - .6 corrective measures and procedures to regain the construction schedule
 - .7 revisions to the construction schedule
 - .8 progress schedule during the succeeding work period
 - .9 review of the submittal schedule, and methods to expedite as required
 - .10 maintenance of quality standards
 - .11 pending changes and substitutions
 - .12 review proposed changes for affect on the construction schedule and on the completion date
 - .13 other business
- 12.5 Copies of the minutes of project meetings and photographs are to be kept on site with other Contract Documents.
- 13 **CONTRACTOR/SUBCONTRACTOR MEETINGS**
- 13.1 The Contractor is to convene meetings with his subtrades as he may require from time to time.
- 13.2 Only at the request of the Contractor will the Owner's and Architect's representative(s) attend these meetings.
- 13.3 Advise the Owner and Architect of pertinent data requiring the Owner's and/or Architect's input as a result of these meetings.
- 14 **RELOCATION OF DOORS, PARTITIONS, MECHANICAL AND ELECTRICAL ITEMS**
- 14.1 The Owner and the Architect reserve the right to relocate doors, frames and partitions at a later date, but prior to installation, without additional cost to the Owner, assuming that there will be no increase in the number of doors and frames, nor greater lengths or heights of partition, and no increase in number of corners.
- 14.2 The Owner and the Architect reserve the right to relocate electrical outlets at a later date, but prior to installation, without additional cost to the Owner, assuming that the relocation per outlet does not exceed 3.0 m from the original location. No credits will be anticipated where relocation per outlet of up to and including 3.0 m reduces materials, products and labour.
- 14.3 Alter the location of pipes and other equipment, without additional cost to the Owner, if approved, and if the change is made before installation.
- 14.4 Make necessary changes, due to lack of coordination, as required and when approved, at no additional cost, to accommodate structural and building conditions.

15 MECHANICAL AND ELECTRICAL REQUIREMENTS AT SOUND ATTENUATING PARTITIONS

- 15.1 Avoid sound transfer at sound attenuating partitions by careful location and treatment of ducts, grilles, diffusers, electrical outlets and boxes, and similar items. Seal cracks and wall openings with acoustic caulking.

16 CODES AND STANDARDS

- 16.1 Consider Codes, standards, manuals, and installation and application instructions referred to in the Contract Documents to be the latest published editions at the date of submission of the bid unless otherwise stated or otherwise required by the authorities having jurisdiction.
- 16.2 Where application, installation and workmanship standards are cited, it is intended that the referenced standards form the basis for minimum requirements of the specified item and that the Specifications supplement the standards unless specified otherwise.

17 PENETRATIONS THROUGH WALLS AND FLOORS

- 17.1 Where holes are made in walls and slabs for passage of pipes, ducts, conduit or conductors, fill the holes with cement grout in concrete or masonry or with plaster compound in gypsum board systems, regardless of whether or not escutcheon plates are provided. At fire rated separations, refer to requirements of the following article.

18 FIRE RATINGS

- 18.1 Where a material, component or assembly is required to be fire rated, the fire rating is to be as determined or listed by one of the testing authorities acceptable to the authorities having jurisdiction.
- 18.2 Refer to Section 07 84 43 for requirements for firestopping and smoke seals.

19 GEOLOGICAL AND SUBSURFACE INFORMATION

- 19.1 A copy of the geotechnical subsurface investigation report is provided by the Owner (refer to separate document) and forms a part of the Contract Documents. The geological subsurface investigation report was prepared for use in the design and preparation of the Contract Documents. Become familiar with this document and be aware of the subsurface conditions to be found.
- 19.2 The subsurface investigation report, by its nature, cannot reveal all conditions that exist or that can occur on the site. Should conditions be found which vary substantially from the report, promptly notify the Architect in writing and request instructions.
- 19.3 Neither the Owner nor the Architect guarantee the accuracy or completeness of the geotechnical subsurface investigation. Be satisfied with regard to all matters relating to soil, sub-soil and subsurface conditions which may affect methods or cost of construction before commencing work.

20 WHMIS – WORKPLACE HAZARDOUS MATERIALS INFORMATION SYSTEM REQUIREMENTS

- 20.1 Comply with the workplace Hazardous Materials Information System in accordance with the Occupational Health and Safety Act requirements.

21 AS-BUILT TOPOGRAPHICAL SURVEY

- 21.1 The Owner will provide a topographical as-built survey of the existing site prior to construction.
- 21.2 The Contractor shall review the as-built conditions of the site and report any discrepancies to the Consultant prior to construction.

22 AS-BUILT FOUNDATION PLAN SURVEY

22.1 The Contractor shall provide an as-built foundation survey plan after the foundation walls are constructed (confirm the distance of foundation walls to the property line in accordance with set backs shown on drawings)

22.2 The As-Built foundation survey plan shall indicate the elevation at top of foundation wall.

END OF SECTION

1. GENERAL

- 1.1 Where products are specified only by reference to standards, provide products which meet the standard.
- 1.2 Products specified by their proprietary names or by part or catalogue number are to form the basis for the work. No substitutes for these products may be used without prior approval in writing. The Architect will not be responsible for substitutions which are incorporated in the work which have not been brought to the Architect's attention and approved by the Architect in writing, whether or not they are discovered during site reviews.
- 1.3 Where a product is specified by naming two or more acceptable proprietary products, provide any one of the specified products. If compliance with a referenced standard is also specified, the product selected is to meet the standard.
- 1.4 Substitutions will be considered only during tendering stage and must be submitted in sufficient time to permit proper investigation by the Architect, and under the conditions specified herein.
- 1.5 There is no obligation on the part of the Architect or Owner to review or accept proposed substitutions.
- 1.6 When proposing substitutions, submit the product names and complete specifications substantiating compliance of the proposed substitution with the requirements of the Contract Documents, including details, and item by item comparison between the properties and characteristics of the specified product and the proposed substitution.
- 1.7 The General Contractor will assume full responsibility for coordination and incurred costs when the substitution affects any other part of the work.
- 1.8 Substitutions shown on shop drawings which have not been accepted through the process described in this Section will be rejected.

2. SUBSTITUTIONS – CODE REQUIREMENTS

- 2.1 Ensure that proposed substitutions for products, methods and processes meet the requirements of the Building Code, and other requirements of authorities having jurisdiction.

END OF SECTION

1 GENERAL

- 1.1 Submit, at the second job meeting, a complete list of all submittals (including shop drawings, mock-ups and samples) with dates.
- 1.2 Submittals are to be stamped with the name of the company making the submittal, dated, signed by authorized person and identified as to the specific Project and the work involved.
- 1.3 Ensure that there is adequate space on each submittal for review stamps of the Contractor, the Architect, and the Architect's Consultants as required.
- 1.4 Keep a final reviewed copy of submittals on the site.
- 1.5 Delays by the Architect in the return of submittals will not be considered sufficient reason for extension of Contract Time or an increase in the Contract Price.
- 1.6 Shop drawings submitted for review are to be stamped or endorsed "Certified to be in accordance with all requirements", and shop drawings which are submitted without this stamp or endorsement as well as the Contractor's company stamp, date and signature will not be reviewed and will be promptly returned, and delays to the Construction Schedule caused by such return of shop drawings will be your responsibility.

2 SHOP DRAWINGS

- 2.1 Arrange for the preparation of clearly identified shop drawings as required by the Contract Documents and as the Architect may reasonably request.
- 2.2 Shop drawings are to be submitted in pdf format. Supply additional prints or copies when required by the Architect or the Owner.
- 2.3 Shop drawings which have been submitted to the Architect and have not been stamped, reviewed and dated by the General Contractor; or does not have an engineers seal as requested in the specification section will be returned to the General Contractor. The General Contractor will be responsible for delays resulting from this.
- 2.4 At the time of submission, notify the Architect in writing of any deviations in the shop drawings from the requirements of the Contract Documents. A general statement to the effect that there are or may be deviations will not be considered as notice.
- 2.5 Make changes in shop drawings which the Architect may require consistent with the Contract Documents and resubmit unless otherwise directed by the Architect.
- 2.6 Where items or equipment attach to or connect to other items, systems or construction, indicate that such items have been coordinated regardless of the Section or trade under which the adjacent work is to be provided.
- 2.7 Review of shop drawings by the Architect is for the sole purpose of ascertaining conformance with the general design concept and for general arrangement only. This review does not mean that the Architect approves the detail design inherent in the shop drawings, responsibility for which remains with the Contractor submitting same and such review does not relieve you of your responsibility for errors or omissions in the shop drawings or your responsibility for meeting all requirements of the Contract Documents. Contractor is responsible for dimensions to be confirmed on the shop drawings and correlated at the job site, for information that pertains solely to fabrication processes or to techniques of construction and installation, for coordination of the work of all subcontractors and trades, and for coordination of the work of this Contract with the work of other Contractors.

- 2.8 Any adjustments made on the shop drawings by the Architect are not intended to change the Contract Price. If you deem that such adjustments affect the value of the work, so state in writing before proceeding with the fabrication and installation of the work.
- 2.9 Shop Drawing Numbering: Identify, register, and number shop drawings and revised shop drawings to correspond with applicable Section numbers and article titles of Contract Specifications.
- 2.10 Return of Shop Drawings to Contractor: Reviewed and stamped shop drawings will be returned to and are to be retained by the Contractor who is to be responsible for distribution of copies of the reviewed shop drawing to the respective subcontractors and trades for appropriate action, and to the Municipal Building Department for their records if required. Only shop drawings bearing the Architect's review stamp are to be used in the field.
- 2.11 Submission of shop drawings and subsequent reviews by the Architect do not entitle the Contractor to a payment of any kind. Payment for products and materials will only occur when such products and materials are delivered to the site, all as per Section 00 22 13, Supplementary Conditions.

3 INTERFERENCE AND COORDINATION DRAWINGS

- 3.1 Prepare drawings indicating the relationship of unforeseen conditions at congested areas prior to commencement of work in the area.
- 3.2 Prepare coordination drawings for efficient use of available space, for proper sequence of installation, and to resolve conflicts as required.
- 3.3 Interference and coordination drawings are to be initialed by each subcontractor involved, then signed and submitted to the Architect for review and record purposes.

4 SAMPLES

- 4.1 Samples are to be submitted to the Architect in the number specified in the respective Section or as requested by the Architect in sufficient time to permit the review process before the item is needed for installation or as otherwise directed by the Architect.
- 4.2 Where the Specification states that the Architect will make a selection from available colour, pattern or texture ranges, submit colour and pattern with shop drawings to indicate the full range for selection.
- 4.3 The review of samples by the Architect is for the sole purpose of ascertaining conformance with the general design concept. Such review does not mean that the Architect approves the detail design inherent in the samples, responsibility for which remains with you, and such review does not relieve you of your responsibility for errors or omissions or of the contractor's responsibility for meeting all requirements of the Contract Documents.
- 4.4 Adjustments made on samples by the Architect are not intended to change the Contract Price. If adjustments affect the value of work, so state in writing to the Architect before proceeding with the fabrication and installation of the work.

5 ACCESS DOOR LOCATIONS

- 5.1 Before commencing installation of mechanical and electrical work, prepare, together with the mechanical and electrical subcontractors, a complete lay-out of all access doors which as required. Submit these lay-outs for review as specified for shop drawings, and show the exact sizes and locations of access panels and doors.
- 5.2 Access panels and doors shall be finished to match adjacent finished surface unless otherwise specified or indicated.

6 CONSTRUCTION PROGRESS SCHEDULE

6.1 The schedule to be submitted with milestone dates.

7 CERTIFICATES AND TRANSCRIPTS

7.1 Immediately after receiving notification of award of Contract, submit workers' Compensation Board status, transcription of insurances and other certificates and transcripts requested in the Contract Documents or by the Architect or Owner.

END OF SECTION

1 GENERAL

- 1.1 For the purposes of this Section, independent inspection and testing agencies are referred to as "Inspector(s)".
- 1.2 The Owner, or the Architect on his behalf, may obtain the services of Inspectors for the purpose of obtaining quality reviews for compliance with the Contract Documents independent of the Contractor's quality control. Services and reports by such Inspectors in no way relieved the Contractor of his obligation to perform the work in accordance with the Contract Documents, or to maintain his own quality control.
- 1.3 The Owner and the Architect reserve the right to amend or reduce inspection and testing for the Owner's quality reviews. The Owner is not to be contractually obligated to supply such inspection and testing which may be described or referred to in the Contract Document for the information of the Contractor.
- 1.4 The Contractor is to correct deficient work on a timely basis as noted by the Inspector. This correction is not intended to change the Contract Price. If the Contractor deems that such adjustments affect the value of the work he is to so state in writing before proceeding with the fabrication and correction of the work.

2 APPOINTMENT AND PAYMENT

- 2.1 The Owner, or the Architect on his behalf, may appoint Inspectors to perform services specified in respective Specification Sections, except for the following which is to be part of the work of this Contract:
 - .1 inspection and testing required by laws, ordinances, rules, regulations or orders of governing authorities
 - .2 inspection and testing performed exclusively for the Contractor's convenience or his own quality control
 - .3 testing, adjustment and balancing of mechanical and electrical equipment and systems
 - .4 mill tests and certificates of compliance
 - .5 tests specified to be carried out by the Contractor under the supervision of the Architect

3 INSPECTORS' RESPONSIBILITIES

- 3.1 Cooperate with the Architect and the Contractor. Supply qualified personnel after due notice.
- 3.2 Perform specified inspections, sampling, and testing of materials and methods of construction.
- 3.3 Comply with specified standards.
- 3.4 Ascertain compliance of materials with requirements of the Contract Documents.
- 3.5 Promptly notify the Architect, Owner, and Contractor in writing of observed irregularities or deficiencies of work and products.
- 3.6 Submit copies of reports of such inspections and tests.
- 3.7 Interpret test results, when requested by the Architect.
- 3.8 Perform additional services as required by the Owner.
- 3.9 Notify the Contractor upon arriving on the site.
- 3.10 The Inspector is not authorized to:
 - .1 revoke, alter, enlarge on, or release requirements of the Contract Documents
 - .2 approve or accept any portion of the work

- .3 perform any duties of the Contractor

4 REPORTS

- 4.1 Reports are to contain notation of the Specification, Standard, or other document reference covering the items to be inspected or tested. Reports are to contain affirmative or negative indications of whether or not the various items comply with the corresponding document requirements, and are to contain a description of non-compliance.
- 4.2 Reports are to also contain the following information:
 - .1 name, address, telephone and e-mail of the inspection and testing company
 - .2 report number and date
 - .3 project name and location
 - .4 name of the Owner and the Architect
 - .5 the date and time of the test or inspection
 - .6 record of temperature and weather conditions, when applicable
 - .7 name and signature of the inspector or technician performing the inspection or test
 - .8 Supervisory engineer's professional seal and signature, where applicable

5 CONTRACTOR'S RESPONSIBILITIES

- 5.1 The Contractor is to maintain his own quality control to ensure that the requirements of the Contract Documents are attained.
- 5.2 The results of inspection and testing performed for the Owner's quality review will be made available for the information of the Contractor, but such inspection and testing results or reports are not a part of the Contract Documents nor will they relieve the Contractor of the responsibility to maintain a quality control program adequate to ensure the fulfillment of the requirements of the Contract.
- 5.3 Cooperate with the Inspector's personnel. Provide access to the work, and to the manufacturer's operations to facilitate execution of the required services.
- 5.4 Secure and deliver to the Inspector adequate quantities of representative samples of materials proposed to be used and which require testing.
- 5.5 Submit copies of product tests, or mill test reports of steel products, as required.
- 5.6 Supply labour and facilities, at no cost to the Owner, to:
 - .1 provide access to work to be inspected and tested
 - .2 facilitate inspections and tests, including obtaining and handling samples at the Project site or at the source of products to be tested, and deliver to the testing laboratory in quantities as required.
 - .3 make good work disturbed by inspection and test
- 5.7 Provide storage on site for the Inspector's exclusive use to store equipment and cure test samples.
- 5.8 Notify the Inspector and Architect sufficiently in advance of operations to allow for assignment of personnel and scheduling of tests. When tests or inspections cannot be performed after such notice, reimburse the Owner for the Inspector's personnel and travel expenses incurred due to failure to comply.
- 5.9 Where tests or inspections reveal work not in accordance with contract documents, the contractor shall bear costs for additional tests and inspections as the consultant deems necessary to verify the acceptability of corrected work.

6 MOCK-UPS

- 6.1 Prepare mock-ups for the work as specified. Include for the work of all Sections as required to provide mock-ups. Modify as required for approval.
- 6.2 Remove mock-ups at the conclusion of the work or when directed by the Architect.

7 SAMPLE INSTALLATIONS

- 7.1 Sample installations may be required and a design/quality check may be performed for various parts of the work in accordance with the Contract Documents and additionally as directed by the Architect.
- 7.2 The sample installations will be required in advance of the start of the balance of the work to allow evaluation and, if necessary, modifications within the time frame of the Construction Progress Schedule. Modify sample installations as required for approval.
- 7.3 Sample installations, if and when approved, will become a part of the final work and will serve as the standard of quality for the balance of the work.

END OF SECTION

1. **ABBREVIATIONS OF SPECIFYING AUTHORITIES**

- 1.1 The following abbreviations used in the Contract Documents, shall have the meanings listed and the applicable standards shall apply.

AA	Aluminum Association (USA)
AAMA	American Architectural Manufacturers Association
ACI	American Concrete Institute
AISC	American Institute of Steel Construction
AISI	American Iron and Steel Institute
ANSI	American National Standards Institute
ASHRAE	American Society of Heating, Refrigeration and Air-Conditioning Engineers, Inc.
ASTM	American Society for Testing and Materials
AWMAC	Architectural Woodwork Manufacturer's Association of Canada
BCLMA	British Columbia Lumber Manufacturer's Association
BHMA	Builders Hardware Manufacturers Association
CAN	Canadian Standards Association
CCA	Canadian Construction Association
CCDC	Canadian Construction Documents Committee
CEC	Canadian Electrical Code (published by CSA)
CEMA	Canadian Electrical Manufacturers' Association
CGSB	Canadian General Standards Board
CISC	Canadian Institute of Steel Construction
CLA	Canadian Lumberman's Association
COFI	Council of Forest Industries of British Columbia
CPCA	Canadian Painting Contractors' Association
CPCI	Canadian Prestressed Concrete Institute
CPMA	Canadian Paint Manufacturers Association
CRCA	Canadian Roofing Contractor's Association
CSA	Canadian Standards Association
CSC	Construction Specifications Canada
CSDFMA	Canadian Steel Door and Frame Manufacturers' Association
CSI	Construction Specifications Institute (USA)
CSSBI	Canadian Sheet Steel Building Institute
FM	Factory Mutual
ISO	International Organization for Standardization
MFMA	Maple Flooring Manufacturers Association (USA)
MCCR	Ministry of Consumer and Commercial Relations
MSDS	Material Safety Data Sheet
MTC	Ministry of Transportation and Communications (Ontario)
NAAMM	National Association of Architectural Metal Manufacturers
NBC	National Building Code of Canada
NBFU	National Board of Fire Underwriters (USA)
NEMA	National Electrical Manufacturers Association
NFPA	National Fire Prevention Bureau
NHLA	National Hardwood Lumber Association (USA)
NLGA	National Lumber Grades Authority
NRC	National Research Council

NSC	National Standards of Canada
OAA	Ontario Association of Architects
OBC	Ontario Building Code
OGCA	Ontario General Contractors Association
OHS	Occupational Health and Safety Act
OIRCA	Ontario Industrial Roofing Contractor's Association
OFM	Ontario Fire Marshal
OPSS	Ontario Provincial Standard Specifications
PEI	Porcelain Enamel Institute (USA)
RAIC	Royal Architectural Institute of Canada
SSPC	Steel Structures Painting Council
TTMAC	Terrazzo, Tile and Marble Association of Canada
ULC	Underwriters Laboratories of Canada
UL, ULI	Underwriters Laboratories Incorporated
USSL	United States Sports Surfacing Laboratories (USA)
WCB	Workers' Compensation Board
WHMIS	Workplace Hazardous Materials Information System

END OF SECTION

1 LIMITS OF THE SITE

- 1.1 Confine materials, products, equipment and temporary structures within the limits of the site as shown on the drawings.

2 GENERAL RE: TEMPORARY FACILITIES AND SERVICES

- 2.1 Provide, maintain, and locate where directed, temporary facilities and services as specified below and required for the work, and for trades, the Architect, the Owner and others associated with work, and remove such temporary facilities and services from the site upon Substantial Completion of the work, or sooner if no longer required.
- 2.2 Pay for and maintain all required temporary facilities and services such as water and electrical until the certified date of Substantial Completion.
- 2.3 At the date of Substantial Completion, all utility accounts for water, electrical power and natural gas consumption are to be transferred to the Owner who will be responsible for all water, electrical power and natural gas consumption costs after the date of Substantial Completion.

3 POWER AND LIGHTING

- 3.1 Provide continuous temporary electric power during construction for temporary lighting, the operating of electric pumps, motors, vibrators, power tools, hoists and other equipment for construction use.
- 3.2 Provide and maintain temporary lighting throughout the work. The level of illumination is not to be less than 15 lumens per square foot or 15 foot candles.
- 3.3 Provide extension cords in accordance with governing regulations and ordinances.
- 3.4 Arrange for connection of the temporary service with the Utility. Pay all costs for installation, power used, maintenance and removal.

4 WATER

- 4.1 Provide a continuous supply of potable water for construction use. Ensure adequate pressure is available at all times.
- 4.2 Provide and maintain temporary lines, hoses, and pumps as required. Remove temporary connections and lines prior to Substantial Completion and make good any damaged surfaces.
- 4.3 Arrange for connection of the temporary service with the Utility. Pay all costs for installation, water used, maintenance and removal.

5 SANITARY/TOILET FACILITIES

- 5.1 Provide sufficient sanitary facilities for the use of all engaged on the work

6 SITE OFFICE

- 6.1 Provide and maintain in a clean condition during the progress of work, an adequately lighted, heated and ventilated, weatherproof, lockable, furnished site office with space for filing and layout of Contract Documents, holding of site meetings, and the Contractor's normal site office staff. Furnishings are to include a table of suitable length and adequate seating for all progress meetings.

7 EQUIPMENT, TOOL, AND MATERIAL STORAGE

- 7.1 Provide and maintain in a clean and orderly condition, secure lockable weatherproof sheds for storage of tools, equipment and materials.

8 TELEPHONE AND COMMUNICATIONS

- 8.1 Provide and pay for telephone and computer facilities in the construction site office.

9 PARKING

- 9.1 Parking for the Contractor's vehicles at the site is the responsibility of the Contractor. Supply proper parking space at the site office for the Owner and Architect.

10 HEATING

- 10.1 Provide all temporary heating required during the construction period, until Substantial Completion is obtained. Maintain heating during delays and shutdowns and other such events to protect the work. Provide adequate heating for materials affected by cold in storage and construction. Provide coverings required
- 10.2 Use methods of temporary heating as required, acceptable to the Owner and Architect and the Construction Safety Association. Provide adequate ventilation to the outside and keep the building free of exhaust or combustion gases to ensure the safety and health of the workers and others.
- 10.3 Store fuel cylinders outside the building.
- 10.4 If heaters are used in completed areas of the building, provide protection to floors and surfaces to prevent damage, including damage caused by refueling.
- 10.5 Provide CSA certified strip electric heaters in transformers and switchboard enclosures, energized to prevent condensation.
- 10.6 Provide protection and heating as necessary should bearing surfaces and other surfaces of excavations be in danger of freezing before concrete or other work is placed.
- 10.7 Provide temporary heat or adequate protection by means of non-staining coverings during freezing weather where frost might penetrate floor slabs, footings or any part of the structure not specifically designed to withstand frost penetration.

11 TEMPORARY SITE DRAINAGE

- 11.1 Provide adequate water collection, and diversion and dewatering without affecting the drainage of adjacent properties and maintain the surface of the site in a workable condition for construction purposes. Pay for all necessary fees and charges for dewatering and discharge in the storm or sanitary systems as appropriate.
- 11.2 Provide temporary drainage, pumps and dry plank walkways in order to facilitate construction operations.

12 PROTECTION AND SAFEGUARDS

- 12.1 Properly secure and lock the building at nights, weekends, holidays and other occasions when the work is not in progress.
- 12.2 The Owner and Architect assume no responsibility for the safeguarding of tools or equipment from theft.
- 12.3 Take precautions to guard the site, premises, contents, materials and the public during and after working hours, including the hiring of security guards if deemed required.
- 12.4 Provide spare safety helmets for and enforce their use by the Owner, the Architect, and their representatives and authorized visitors to the site.
- 12.5 Provide barriers around trees and plants designated to remain. Protect from damage barriers to meet local standards.

- 12.6 Take special measures when moving heavy loads or equipment on concrete or finished floors. Protect from damage.
- 12.7 Hoarding is to be complete with lockable doors and gates for access to the site by workers and vehicles. Provide covered walkways with lighting where required to provide protection from overhead work. Hoarding paint colours and graphics are to be to the Owner's approval. Maintain hoardings in neat, clean, painted condition, free from advertisements and other unauthorized signs.
- 12.8 Provide secure, rigid guard railings, hoardings and barricades around excavations, open or exposed edges of roofs, and other openings as required by authorities and to maintain safety.
- 12.9 Provide proper guard devices, signs, signals and lights for the prevention of accidents. Guards to meet local standards.
- 12.10 Maintain at night, sufficient and suitable warning lights to prevent accidents and injuries to persons or property.
- 12.11 Be responsible for all scaffolding, or other temporary supports used during the work. Scaffolding is to be supported independently of the building's finished surfaces. Construct and maintain scaffolding in a rigid, secure and safe manner. When not in use, move scaffolding as necessary to permit the installation of other work, and remove promptly when not required.
- 12.12 Provide hoists and cranes required for moving materials and equipment. Hoists, cranes and other equipment is to be operated by qualified operators.
- 12.13 Provide and maintain temporary weathertight protection at all exterior openings in walls and roof areas until the building is closed in.
- 12.14 Close off floor areas where walls are not finished, seal off openings and enclose the building interior work area. Polyethylene or other approved translucent material is to be framed in or around walls openings. Provide temporary doors, frames, hinges, locks, keys and bolts as required.
- 12.15 Should the work be stopped for any cause, provide adequate protection and bracing as required.
- 12.16 Provide and maintain a log of all visitors to the site.
- 13 FIRE SAFETY REQUIREMENTS**
- 13.1 Comply with governing fire safety regulations.
- 13.2 Take necessary precautions to eliminate fire hazards and to prevent damage to materials, equipment and property both public and private. Inspect the work at minimum weekly intervals for this purpose.
- 13.3 Provide and maintain in working order, ULC 2A:10BC labeled dry chemical type fire extinguishers. Locate in prominent positions in accordance with requirements of authorities and insurance companies having jurisdiction, codes, regulations and bylaws until the permanent fire protection system in the building is available.
- 13.4 Soldering, welding and cutting operations are to be carried out in areas free of combustible and flammable contents, with walls, ceilings and floor of noncombustible construction or lined with noncombustible materials.
- 14 PERSONAL HEALTH AND SAFETY REQUIREMENTS**
- 14.1 When carrying out soldering, welding or cutting procedures, ensure that workers:
- .1 wear appropriate protective clothing such as gloves, leather aprons and/or arm spark guards
 - .2 wear suitable goggles or face shields

- .3 protect co-workers from eye or other injuries through the use of fire resistant portable shielding devices

15 FIRST AID

- 15.1 Provide adequate first aid facilities on the site at all times. Locate in the site office trailer in a prominent, easily accessible location.

16 DUST CONTROL

- 16.1 Prevent contamination of and nuisance to adjacent areas and properties from dust by taking appropriate dust control measures. Respond immediately to complaints of dust received from the public, authorities, the Owner or the Architect.

17 NOISE AND VIBRATION CONTROL

- 17.1 Take measures to control noise and vibration generated by the work. Respond immediately to complaints of noise and vibration received from the public, authorities, the Owner or the Architect.

18 TEMPORARY ROADS AND ACCESS

- 18.1 If required build and maintain all temporary roads and access to the site and building.

19 SITE PHOTOGRAPHS

- 19.1 The Contractor is to include for taking at least 24 digital colour photographs (automatically dated) of the site each month and keeping a record of all photographs for reference.
- 19.2 Photograph views are to be selected to include as much of the work on site as possible. Photograph submittals are to commence when work begins on site and are to end at the substantial completion date, unless otherwise instructed.

END OF SECTION

1 PRODUCTS AND MATERIALS

- 1.1 Products, materials, and equipment are to be new, undamaged, and free from defects.
- 1.2 Should any dispute arise as to the quality or suitability of products and materials, the decision rests with the Architect based upon the requirements of the Contract Documents.
- 1.3 Obtain product cuts, rough-in requirements, service characteristics, delivery arrangements and similar information of Owner supplied items from the Owner.

2 FASTENINGS

- 2.1 Provide permanent type fastenings, anchors and accessories required for the work.
- 2.2 Use metal fastenings and accessories of the same texture, colour and finish as the base metal on which they occur.
- 2.3 In general, for exterior anchors for windows, roofing, sheet metal, and for anchors and fasteners occurring on or in an exterior wall or slab, use non-ferrous metal or hot dip galvanized steel unless stainless steel or other corrosion resistant material is specifically required by the Contract Documents. Do not use prime paint as protection against corrosion.
- 2.4 Use fastenings of such type and size and install in such manner to provide positive anchorage of the unit to be anchored in position. Install anchors and fasteners at spacing required to maintain their load bearing or shear capacity, and not less frequent than as may be specified.
- 2.5 Do not use fastenings which will cause spalling or cracking of material to which anchorage is being made.
- 2.6 Do not use powder-activated fastenings on any portion of the work unless written approval for a specific use is obtained from the Architect. Only tools of low velocity, double guidance type may be acceptable.
- 2.7 When expansion type fastening devices are to be used, submit following data to Architect for review if requested:
 - .1 load carrying capacity of device
 - .2 nature and magnitude of force to be applied to device with supporting data
 - .3 materials to which device is to be fastened
 - .4 size of bit to be used to drill hole to receive the device
- 2.8 Do not damage reinforcing bars, and if encountered, relocate the fastener.
- 2.9 In general, do not penetrate air and vapour barriers. Where it is proposed to use fastenings which will penetrate air and/or vapour barriers, submit details for review, indicating how the integrity of the air and vapour barrier will be maintained.

3 CONTACT BETWEEN DISSIMILAR METALS

- 3.1 Prevent electrolytic action between dissimilar metals and metals in contact with cementitious materials. Use butyl tape, bituminous paint, or other acceptable means of protection.

END OF SECTION

1 CLEAN UP DURING CONSTRUCTION

- 1.1 Provide containers and locate on site for collection of waste materials, rubbish and debris. Do not allow waste materials, rubbish and debris to accumulate.
- 1.2 Schedule cleaning operations so that dust and other contaminants will not fall on wet, newly painted surfaces. Sprinkle dusty debris with water. Remove debris from areas where application of finishes has commenced, in sealed containers to minimize production of dust.
- 1.3 Burning or burying of rubbish and waste material on or adjacent to the Project site is not permitted. Do not dispose of volatile fluid wastes (such as mineral spirits, oil or paint thinner) in storm or sanitary sewer systems or into streams or waterways.
- 1.4 Remove waste materials, rubbish and debris from the site and dispose of in accordance with requirements of authorities having jurisdiction (including obtaining required permits) at public or private dumping areas off the Owner's property.

2 FINAL CLEANING

- 2.1 Prior to attaining Substantial Completion, remove all remaining waste products and debris, surplus products, tools, construction machinery and equipment not required for the performance of the remaining work.
- 2.2 Carry out all final cleaning to meet the approval of the Architect and Owner. This work includes, without being limited to, the cleaning of finishes, flashings, floors, partitions, walls, ceilings, doors, hardware, windows, glass, fixtures and equipment, and all work required on the interior and exterior to complete the building and site cleaning.
- 2.3 The concrete floors are to be cleaned using a scrubbing machine before the date of Substantial Completion.
- 2.4 Pressure wash the complete concrete and asphalt paved areas prior to total completion of the project.
- 2.5 Use experienced workers or professional cleaners for final cleaning. Use only cleaning materials and methods recommended by the manufacturer of the surface to be cleaned.

END OF SECTION

1 QUALIFICATIONS OF SURVEYOR

- 1.1 The surveyor who is to perform the survey work of this Section is to be a professional land surveyor, registered in the Province of the place of the work, acceptable to Owner, and referred to herein as "Surveyor". Pay all costs to retain the services of the Surveyor.

2 SETTING OUT

- 2.1 The Owner will supply drawings to show the limits of the property. Have the Surveyor establish the lot lines, restrictions and/or bench mark and other grades, lines and levels as required.
- 2.2 Before commencing work on the property, verify grades, lines, levels and dimensions shown on the drawings. Report discrepancies to the Architect.

3 SURVEY REFERENCE POINTS

- 3.1 Relate horizontal and vertical control points designated on the drawings to datums determined by the Surveyor.
- 3.2 Confirm and protect control points prior to starting site work. Preserve permanent reference points during construction.
- 3.3 When a reference point is lost or destroyed, or requires relocation because of necessary changes in grades or locations, have the Surveyor replace the control points in accordance with the original survey control.

4 SURVEY REQUIREMENTS

- 4.1 Establish permanent bench marks on site, referenced to established bench marks by survey control points. Provide and maintain monuments, bench marks, batter-boards and similar work necessary to preserve the lines and levels required for setting out of all parts of the work.
- 4.2 Establish lines and levels of the building, structures, services and other work of the Contract. Locate and lay out by instrumentation.
- 4.3 Establish foundations, column locations and floor elevations.
- 4.4 Establish locations of walls and partitions as a guide to the various Sections and trades. Check the layouts of other Sections and trades.
- 4.5 Establish lines and levels for mechanical and electrical work.
- 4.6 Check bench marks, batter-boards, grades, levels and lines with respect to the drawings.
- 4.7 Maintain a complete, accurate log of control and survey work as it progresses.
- 4.8 On completion of foundations and major site work, prepare a Certified Survey showing dimensions, locations, angles and elevations of the work. Certified drawings are to be produced by the Surveyor who is to check and certify lines and levels.

5 SUBMITTALS

- 5.1 Submit documentation to verify the accuracy of field engineering work.
- 5.2 Confirm location of foundation forms with respect to Drawings.
- 5.3 Upon completion of the substructure, footings and foundation walls, submit a certified original drawing showing actual location of the substructure relating to property lines and adjacent buildings.

- 5.4 Make verifications and submit to the Architect not later than 7 days after foundation forms and 7 days after walls are completed.

END OF SECTION

1 CONTRACT CLOSEOUT

- 1.1 The General Contractor will be responsible to gather and submit for approval to the Consultant all As-Built documents, Operating and Maintenance Instruction Manuals, Warranties and Extended Warranties as noted within the specification. Failure to submit this information prior to completion of work will result in a holdback of the Closeout Document monies as specified in the tender.
- 1.2 Holdback for Closeout Documents will be released upon approval of the submitted information.
- 1.3 Refer to the latest version of OAA / OGCA Take-Over Procedures, Document 100.

2 AS-BUILT DOCUMENTS

- 2.1 Provide line work and print lettering and numbers in size and clarity to match original Contract Documents. Add "AS-BUILT DOCUMENTS" at each as-built drawing title block.
- 2.2 Keep one set of white prints in the site trailer and record (red-line) as Work progresses (a) dimensioned locations of buried and concealed services and utilities including existing ones found during course of work and (b) changes and deviations to Work as built.
- 2.3 Regularly review and update the as-built drawings on site.
- 2.4 When Substantial Performance is achieved, submit three digital (3) copies of all as-built drawings in pdf format (including Architectural, Structural, Mechanical, Electrical, Fire Protection, Civil and Landscaping drawings).

3 OPERATING AND MAINTENANCE INSTRUCTIONS MANUAL

- 3.1 Supply to the Architect three (3) digital copies of operating and maintenance instruction manuals (pdf format). Each copy of the manual is to include:
 - .1 a complete list of subcontractors and suppliers, including contact names, addresses, and phone and e-mail.
 - .2 paint schedule indicating the manufacturer's colour and code number for reorder
 - .3 a complete listing of materials, products, and equipment including serial numbers, manufacturer's names, and sources of supply
 - .4 operation instructions for each assembly, component and system
 - .5 complete cleaning, maintenance, repair and refinishing instructions for each assembly, component and system, including warnings of harmful materials and practice
 - .6 a maintenance schedule for roofing and flashing systems
 - .7 lists of spare parts for each assembly, component and system, complete with names, addresses, telephone and fax. numbers of suppliers and repair and maintenance sources, companies, technicians, etc.
 - .8 a lubrication schedule and filter schedule for all equipment
 - .9 equipment maintenance and overhaul and adjustments schedules
 - .10 final testing and balancing reports for mechanical systems as specified on drawings.
 - .11 an installation manual or installation instructions for each mechanical, electrical or architectural item, stamped and signed by subcontractors submitting them;
 - .12 a final as-built hardware schedule
 - .13 copies of final reviewed shop drawings, filed in accordance with Specification Section numbering.

- .14 Survey drawing of foundations and major site work, prepare a Certified Survey showing dimensions, locations, angles and elevations of the work. Certified drawings are to be produced by the Surveyor who is to check and certify lines and levels.
- .15 Separate DVD showing video final inspection report regarding exterior storm and sanitary sewers.
- 3.2 Organize and label contents into applicable categories of work, parallel to Specification Sections and provide a title page and table of contents.
- 4 **LIST OF EXTENDED WARRANTIES**
 - 4.1 Provide three digital (3) copies of all extended warranties specified (pdf format).
 - 4.2 Each extended warranty is to be issued by the manufacturer of the product involved, and the specified extended warranty period is to commence upon expiry of the one year Contract warranty. Each extended warranty is to include:
 - .1 the proper name of the Owner.
 - .2 the proper name and address of the Project
 - .3 the date the warranty commences and the duration (as specified)
 - .4 a clear definition of what is being warranted and what remedial action will be taken under the warranty
 - .5 a statement that the terms and conditions of the extended warranty are as specified for the one year Contract warranty
 - .6 the signature of the signing officer(s) and the seal of the company issuing the warranty
- 5 **MAINTENANCE MATERIALS AND EXTRA STOCK**
 - 5.1 Deliver to the site and store where directed by the Owner, all specified maintenance materials and extra stock. Obtain a receipt from the Owner for all delivered items.
- 6 **TRIAL USAGE AND INSTRUCTIONS**
 - 6.1 Prior to giving demonstrations and instructions to the Owner's representatives, ensure that equipment has been inspected and that testing, adjusting and balancing has been performed and equipment and systems are fully operational.
 - 6.2 Notify the Owner in advance of demonstrations and instructions so that attendance arrangements can be made.
 - 6.3 Demonstrate operation and maintenance of equipment and systems and thoroughly instruct the Owner's authorized representatives in all aspects of the safe operation of the systems and equipment prior to Substantial Completion. Supply of the services of qualified service engineers and manufacturers' representatives to give the instructions. Coordinate with the Owner and schedule instructions times which are acceptable to the Owner. Submit operating, maintenance and other documents to the Owner for review prior to demonstrations and instructions. Submit a commissioning schedule to the Owner one week prior to the commissioning of each system.
 - 6.4 Obtain and submit to the Architect, letters from manufacturers of equipment and systems indicating that their technical representatives have inspected and tested systems and have approved methods of installation, connections and operation.
 - 6.5 In conjunction with the foregoing requirements, the Contractor is to arrange for all necessary inspections and obtain written approval and acceptance of the equipment and systems requiring approval by authorities, and correction of unacceptable items to the satisfaction of authorities. Submit verification of acceptance by authorities to the Architect.

7 REMOVAL

- 7.1 Remove temporary facilities and repair any damaged areas.

8 TOUCH-UP, REPAIR AND REPLACEMENT

- 8.1 Complete the final touch-up to finished work for:

- .1 project structures
- .2 adjacent structures
- .3 surrounding areas

- 8.2 Replace worn parts of products which were utilized during construction. Refer also to Divisions 22, 23, and 26. Operation of permanent equipment used for temporary purposes during construction is to match the standard specified for new work once the replaced parts are inserted.

9 STAGE 1: DOCUMENTATION PROCEDURES

- 9.1 As soon as possible after award of the Contract, itemize in the form of 2 lists, all documentation required by the Contract as follows:

- .1 the first list is to itemize all operating instructions, maintenance manuals, spare parts and similar data which are required at the time of Substantial Completion in order to allow the Owner to properly operate the premises
- .2 the second list is to itemize all data, operating instructions, maintenance manuals, record drawings, spare parts, warranties, and the balance of the documentation as applicable to the Project and as required by the Contract which will later be required to be submitted and reviewed by the Architect before issue of the final certificate for payment

- 9.2 Transmit copies of the 2 above mentioned lists to the Architect for review and approval.

- 9.3 Within 14 days of their receipt, the Architect will review the lists and notify the Contractor of his approval of them, with or without changes, assembly of the items on the lists is then to commence.

10 STAGE 2: CONTRACTOR'S INSPECTION FOR SUBSTANTIAL COMPLETION

- 10.1 Determine when the Project meets the requirements of Substantial Completion and undertake an inspection at the earliest opportunity, giving written notice to the Architect for information only.

- 10.2 The inspection team is to consist of:

- .1 the Contractor or his representative(s)
- .2 such subcontractors or their representatives as may be required by the Contractor

- 10.3 Upon completion of this inspection, prepare a list of all uncompleted and unsatisfactory work and issue to those concerned, including the Architect.

11 STAGE 3: CONTRACTOR'S APPLICATION FOR CERTIFICATE OF SUBSTANTIAL COMPLETION

- 11.1 When the steps in Stage 2, have been performed, make a written application to the Architect for a Certificate of Substantial Completion.

- 11.2 This application is to include:

- .1 a statement to the Architect to the effect that:
 - .1 the contract is substantially complete

- .2 the performance of the balance of the contract is in progress and completion is scheduled for the _____ day of _____, 20____, and where the balance of the Contract, or a part or parts thereof, cannot be performed forthwith, but must be deferred for reasons beyond the control of the Contractor, the completion date for each phase of the balance of the Contract where possible
 - .2 an invoice showing the amount of basic holdback monies due for release and payment following the issue of the Certificate of Substantial Completion, and a Statutory Declaration and Worker's Compensation Board Letter of Good Standing which are required before the Architect will issue his certificate for payment covering the release of lien holdback
 - .3 the submission of operating instructions, maintenance manuals, maintenance materials, spare parts, and similar data which are required by the Owner in order to be able to properly operate the premises
 - .4 a statement of completion with the cost values of:
 - .1 work to be completed including unsatisfactory work
 - .2 outstanding items
 - .3 work which cannot be performed for reasons beyond your control
 - .4 where applicable, work which the Owner and the Contractor agree not to complete expeditiously
 - .5 within 10 calendar days of the receipt of the Contractor's application, the Architect will make his review and assessment of the work to establish the validity of the application and the Owner may and the Contractor is to take part in this inspection.
 - .6 within 7 calendar days of his review, the Architect will notify the Owner and the Contractor of his approval of the Contractor's application, and in the event that the Architect does not deem the Contract to be substantially complete he will so notify the Owner and Contractor in writing within 7 calendar days of his review, and will include his reasons for the non-acceptance
- 11.3 The application for a Certificate of Substantial Completion and the release of basic holdback monies is to be separate from the application for regular monthly payments, and the latter will continue to be made throughout the duration of the Contract.
- 12 **STAGE 4: ARCHITECT'S CERTIFICATE OF SUBSTANTIAL COMPLETION**
 - 12.1 When the Architect approves the application for a Certificate of Substantial Completion, the Architect will issue his Certificate of Substantial Completion to the Owner and to the Contractor on the prescribed form. The Certificate will establish the date of Substantial Completion of the Contract as the date when the Architect is satisfied as a result of the inspection and review of the documentation that substantial completion was achieved.
 - 12.2 Publish a copy of the Certificate of Substantial Completion in a construction trade newspaper and submit to the Owner and the Architect proof of the date of publication. The date of publication is to be the date of commencement of the Holdback Period prior to release of the basic holdback monies.
 - 12.3 Should the requirement to publish not exist in the lien legislation at the place of work, or no such lien legislation exists, then the Holdback Period will commence on the Date of Substantial Completion as certified by the Architect.
 - 12.4 Continue to work towards Final Completion during the Holdback Period.
- 13 **STAGE 5: ARCHITECT'S CERTIFICATE FOR PAYMENT OF BASIC HOLDBACK MONIES**
 - 13.1 The Architect will prepare the certificate for payment of the basic holdback monies and promptly, upon receipt of the documentation listed above required for release of these monies, issue the certificate to the

Owner, with a copy to the Contractor. This certificate will be dated one day after the termination of the Holdback Period.

- 13.2 Upon issuing the certificate for payment of the basic holdback monies, the Architect will advise the Owner to satisfy himself no liens are registered and no notice of liens has been received at the end of the Holdback Period.
- 13.3 The Architect will simultaneously notify the Owner that, provided no liens exist, payment of basic holdback monies is due and will be payable 1 day after termination of the Holdback Period.
- 13.4 The Architect's certificate for payment of the basic holdback monies will be in the amount shown in the Contractor's approved application for a Certificate of Substantial Completion.
- 13.5 Before expiry of the Holdback Period, all forms of insurances are to be reviewed jointly by the Owner and the Contractor to ensure adequate coverage for all parties.

14 STAGE 6: INSPECTION AND STATEMENT OF COMPLETION

- 14.1 When the work is Totally Complete as defined in OAA / OGCA take-over procedures Document No. 100, and after inspection of the Work, make a written request for an inspection by the Architect. This request is to include a statement showing the amount of monies for the holdback for finishing work due for release and payment upon expiry of the Holdback Period from the date the contract is deemed to be completed. This inspection will be carried out within 10 calendar days of the request and is to constitute the inspection precedent to the issuance of a statement of completion and issuance of a certificate of payment for work completed to the date of completion.
- 14.2 The final review team is to include:
- .1 the Owner, assisted by the Architect and such Consultants as the Architect may require
 - .2 the Contractor, and any subcontractors deemed necessary by the Contractor
- 14.3 Within 7 calendar days of his inspection the Architect will notify the Contractor of his approval of the Contractor's application. In the event that the Architect does not deem the Contractor to be complete, he shall so notify the Owner and Contractor in writing within 7 calendar days of his review and his reasons for the non-acceptance.
- 14.4 If there are any deficiencies determined by this review, they will be listed by the Owner or the Architect and submitted to the Contractor. This list is to be recognized as a final deficiency list for the purposes of acceptance of the work under the Contract.
- 14.5 Such deficiencies are to be corrected by a date mutually agreed upon between the Owner, Architect and the Contractor, unless a specific date is required by the Contract, and a reinspection by the Architect is to be called for by the Contractor following his own inspection to take place within 7 calendar days from the date of request.

15 STAGE 7: ARCHITECT'S CERTIFICATE OF PAYMENT OF MONIES FOR HOLDBACK FOR FINISHING WORK

- 15.1 The Architect will prepare the certificate of payment of the monies for the holdback for finishing work. This certificate will be dated one day after termination of the Holdback Period commencing on the date the Contract is deemed by the Architect to be Totally Complete.
- 15.2 Upon issuing the certificate for payment of monies for the holdback for finishing work, the Architect will advise the Owner to satisfy himself no liens are registered and no notice of liens have been received at the end of the Holdback Period.
- 15.3 The Architect will simultaneously notify the Owner that, provided no liens exist, payment of the monies for the holdback for finishing work is due and will be payable when the Owner deems the work to be complete.

- 15.4 The Architect's certificate for payment of the monies for the holdback for finishing work will be in the amount shown in the Contractor's approved application for a statement of completion.

16 STAGE 8: FINAL PAYMENT CERTIFICATE

- 16.1 At the completion of Stage 6, when the Architect is satisfied that all deficiencies, as established under Stage 6, have been corrected, the Architect, upon receipt of the Contractor's invoice for final payment will issue to the Contractor, a final certificate for payment for the remaining monies due to the Contractor under the Contract.
- 16.2 Final payment will be made to the Contractor as stipulated in the certificate not later than 5 days after its insurance or as provided in the Contract.
- 16.3 All "WORK" related to the letters of credit with the Municipality is to be completed and approved by the Municipality.

17 STAGE 9: WARRANTY PERIOD (S)

- 17.1 The warranty period(s) for the Project will commence as specified OAA / OGCA Take-over Procedures, Document No. 100.
- 17.2 The Owner will give prompt notice in writing to the Contractor and the Architect of any defects (as defined by the Contract) noted during the warranty period(s).
- 17.3 Prior to the completion of the warranty period, the Owner will review any defects or deficiencies which have been observed during that period and will notify the Contractor of those items requiring attention by the Contractor to complete the terms of the Contract.

END OF SECTION

PART 1 – GENERAL

1.1 GENERAL

- 1.1.1 Contractor is fully responsible for continuous examination and inspection of work related to the exterior building envelope assemblies to ensure compliance with Contract Documents.
- 1.1.2 Materials and workmanship shall be subject to inspection and testing. Cooperate in permitting access for inspection and testing to places where work is being done or stock is being stored.
- 1.1.3 Owner's quality control inspection and testing is specified in Contract Documents and will be paid in accordance with Section 01 40 00. Pay for inspections and retesting to verify acceptability of corrected work.
- 1.1.4 Allow sufficient time for testing, evaluation, alterations and retesting so as not to affect the construction schedule.
- 1.1.5 Consultant may require testing of connections and special prefabricated inserts, as part of the work of this section.
- 1.1.6 This section shall apply to those parts of the Contract Documents pertaining to building envelope.

1.2 BUILDING ENVELOPE PERFORMANCE REQUIREMENTS

- 1.2.1 General requirements for building envelope include parts of work related to the following:
 - .1 Control of condensation in and on, and transfer of heat, air and moisture through building elements and interfaces between building elements that separate:
 - .1 Interior space from exterior space.
 - .2 Interior space from ground.
 - .3 Environmentally dissimilar interior spaces.
 - .2 Conditions at the place of the project that may affect moisture loading on building elements that separate interior space from exterior space, and interior space from the ground.
- 1.2.2 Provide building envelope in compliance with building code, other regulations and requirements of authorities having jurisdiction, with the most stringent requirements to govern.
- 1.2.3 Building envelope components to withstand own dead load, snow, ice and wind loads and combination thereof, in accordance with the building code. Design wind loads shall be based on the most recent building code and greater values as required.
- 1.2.4 Take into account tolerance limitations of structure, creep, deflection and other movements of structure, both during work and in service.
- 1.2.5 Allow for expansion and contraction of components caused by ambient, temperature range and surface temperature variation of components, and structural movements, without causing distortion, failure of fastening, joints and/or air barrier seals, undue stress or other defects detrimental to appearance and/or performance.
- 1.2.6 Accommodate, by means of expansion and contraction provisions, any movements in building assemblies themselves and between assemblies and building structure, caused by structural movements, both deflection and racking; and/or thermal expansion and contraction, without distortion, damage, misalignment of joints, breakage of air barriers, water and air penetration through assembly, or glass breakage.

- 1.2.7 Method of attachment to structure shall take into account conditions at place of the project such that there shall be no possibility of site and air vibrations or normal temperature movements of building to loosen, weaken and/or fracture connection between building envelope assembly components and structure or between the components themselves.
- 1.2.8 Reinforce building envelope assembly components, as required, so that members can safely sustain design loads.
- 1.2.9 Assemble and secure assemblies in manner that will keep stresses on sealants within sealant manufacturers' recommended maximum.
- 1.2.10 Comply with requirements specified in building code, with most stringent requirements to govern, and as specified herein, including the following principles:
 - .1 Drain to exterior face of wall or window assembly, any water entering at joints and any condensation occurring within building envelope assembly.
 - .2 Fabricate and install assembly to minimize specified materials' ability to transmit moisture through capillary action.
 - .3 Fabricate and install assembly to be watertight to interior under interior and exterior design conditions in combination with movements occurring due to loads imposed.
- 1.2.11 The requirements for an air barrier are intended to be provided at same plane in the building envelope design unless otherwise indicated or specified. In such cases, Contract Documents refer to "air barrier". The definition of air barrier for the purpose of these Contract Documents is "a continuous system including joints of materials between components and to adjacent construction which prevents or retards passage of air".
- 1.2.12 Sealants used for various building envelope assemblies shall be selected from those specified in respective assembly section, and shall be coordinated with sealant being provided under other building envelope sections of specifications. Preferably, one sealant of same manufacturer shall be used throughout. If different sealants are selected from those specified, it is the responsibility of Trade Contractor to ensure compatibility between selected sealant, substrates, and sealants of other sections of specifications that come in contact with selected sealant.
- 1.2.13 Provide sealant joints with strict regard for sizing of joint and parallel orientation of contact surfaces. Ensure support for both sealant and backer rod.
- 1.2.14 Provide building envelope assemblies and components with sufficient isolation to prevent galvanic or corrosive reactions of discoloration. Ensure separation of dissimilar metals with neoprene or other suitable material at points of contact.
- 1.2.15 Provide completed installations free from vibrations, wind whistles, and noise due to thermal and structural movement and wind pressure.
- 1.2.16 The work incorporates design principles of positive air and vapour leakage control at building enclosure line. Air barrier extends to encompass the entire building envelope.
- 1.2.17 In order to maintain continuity of building envelope, the interfacing of various building elements requires close coordination of exterior building materials. Positive mechanical connections and seal of transition medium extending from primary wall air barriers to insulation line of glazing and door frames, or from primary roof air barrier to insulation line of glazing frames shall be made with proper construction sequencing established by the Contractor to ensure such interfacing. Submit written request for Consultant review of air barrier transition installation prior to concealing with subsequent covering construction.

1.3 AIR LEAKAGE AND WATER PENETRATION PERFORMANCE REQUIREMENTS

1.3.1 Air Leakage: Air infiltration and exfiltration through completed cladding system shall not exceed 0.1 L/s/m² (0.02 cfm/ft²) at 300 Pa (6.24 psf) pressure difference. This rate and criteria applies to building envelope systems, including interfaces between adjacent assemblies.

1.3.2 Water penetration (static): Water penetration testing shall occur at a pressure difference as indicated below. Water penetration shall not occur to interior face of assembly. There shall be no infiltration through assembly into an adjacent system. There shall be no water trapped in the assembly after pressure has been released.

.1 300 Pa (6.24 psf)

PART 2 – PRODUCTS – Not Applicable

PART 3 – EXECUTION - Not Applicable.

END OF SECTION

PART 1 – GENERAL

1.1 WORK INCLUDED

- 1.1.1 Provide labour, materials, products, equipment and services to complete the unit masonry work, including clay masonry units used as brick veneer, and cavity construction.

1.2 REFERENCES

1.2.1 American Society for Testing and Materials (ASTM):

- .1 ASTM C207, Standard Specification for Hydrated Lime for Masonry Purposes.
- .2 ASTM C1329, Standard Specification for Mortar Cement.

1.2.2 Canadian Standards Association (CSA):

- .1 CAN/CSA A82, Fired Masonry Brick Made from Clay or Shale.
- .2 CAN/CSA A179, Mortar and Grout for Unit Masonry
- .3 CAN/CSA A370, Connectors for Masonry
- .4 CAN/CSA A371, Masonry Construction for Buildings
- .5 CAN/CSA A3000, Cementitious Materials Compendium.

1.2.3 International Masonry Institute (IMI):

- .1 All-Weather Council: Recommended Practices and Guide Specifications for Cold Weather Masonry Construction.

1.3 SUBMITTALS

1.3.1 Samples:

- .1 Submit not less than five representative samples for each type of brick specified or a suitable sample board to illustrate colour and texture.
- .2 Brick samples are to be submitted for approval by the Consultant, prior to purchase.

1.3.2 Pre-Installation Meetings: Conduct pre-installation meeting to verify project requirements, substrate conditions, manufacturer's installation instructions and manufacturer's warranty requirements.

1.3.3 Tests: Submit test report of unit masonry.

- .1 Test samples in accordance with CAN/CSA A82.

1.4 QUALITY ASSURANCE

1.4.1 Masonry Contractor: Company or person specializing in commercial masonry work five (5) years experience.

1.4.2 Installation of Masonry Work: To CAN/CSA A371.

1.4.3 Mock-Up:

- .1 Do not proceed with work until mock-up has been approved. Only work which matches approved mock-up in all respects will be acceptable for Project.
- .2 Retain each approved mock-up for duration of the Work and protect from damage.
- .3 Mock-up shall not remain part of the finished Work as directed by Consultant. Remove upon Project completion if mock-up not incorporated into Work.

1.5 DELIVERY, STORAGE AND HANDLING

- 1.5.1 Ensure that sufficient brick has been ordered to complete project from single production run.
- 1.5.2 Ensure that special shape brick are ordered in time to be manufactured with the main order of brick to facilitate colour consistency.
- 1.5.3 Deliver mortar materials in original unbroken and undamaged packages with the maker's name and brand distinctly marked, and upon delivery protect materials from the elements until required.
- 1.5.4 Store or pile sand on a plank platform and protect from dirt and rubbish. Store mortar materials and sand to prevent deterioration or contamination by foreign materials.
- 1.5.5 Deliver masonry units to the site. Prevent damage to units.
- 1.5.6 Lift skids with proper and sufficiently long slings or forks with protection to prevent damage to units. Protect edges and corners.
- 1.5.7 Store masonry units to prevent damage and staining of units.
- 1.5.8 Stack units on timbers or platforms at least 75 mm above grade.
- 1.5.9 Cover stored units with waterproof protective enclosure if exposed to weather.
- 1.5.10 Do not use salt or calcium-chloride to remove ice from masonry surfaces.
- 1.5.11 Split twin packs into single cubes before loading onto scaffold.
- 1.5.12 All smooth finished brick shall be handled on wooden pallet.
- 1.5.13 Extra on-site handling care shall be given to smooth finished brick.

1.6 WASTE MANAGEMENT AND DISPOSAL

- 1.6.1 Deposit packaging materials in appropriate container on site for recycling or reuse.
- 1.6.2 Avoid using landfill waste disposal procedures when recycling facilities are available.
- 1.6.3 Notify Masonry Company to collect skids when available.
- 1.6.4 Keep all discarded packaging away from children.

1.7 SITE CONDITIONS

- 1.7.1 Conform to CAN/CSA A371.

1.8 WARRANTY

- 1.8.1 Provide written manufacturer warranty.
- 1.8.2 Replace at no charge any masonry unit that has been proven to cause wall failure resulting from brick manufacturing defect.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

2.1.1 Brick Masonry Veneer:

- .1 Refer to drawings.

2.1.2 Stone Accents:

- .1 Refer to drawings.

2.2 MORTAR MATERIALS

2.2.1 Mortar and grout in accordance with Masonry Standards. Refer to structural drawings.

2.2.2 **Mortar:** CAN/CSA A179-14, Type N.

2.2.3 **Joints:** Exterior joint concave.

2.2.4 **Portland Cement:** CSA/CSA A3000, Type 10.

2.2.5 **Masonry Cement:** CAN/CSA A3000 Type N.

2.2.6 **Hydrated Lime:** ASTM C 207, Type S.

2.2.7 **Mortar Aggregate:** CAN/CSA A179, standard masonry, white silica type; clean, dry, protected against dampness, freezing, and foreign matter.

2.2.8 **Colour Pigment:** natural oxide pigment.

2.2.9 Water shall be potable, clean and free of deleterious amounts of acids, alkalis or organic materials.

2.2.10 Mortar should be used within two and a half hours or batching.

2.3 ANCHORS AND TIES

2.3.1 Reinforcement and connectors in accordance with Masonry Standards. Refer to structural drawings.

2.3.2 **Anchors:** To CAN/CSA A370.

2.3.3 **Wall Ties:** To CAN/CSA A370.

2.3.4 **Joint Reinforcement:** To CAN/CSA A370.

2.3.5 **Corrosion Protection:** CAN/CSA A370 stainless steel II.

2.4 ACCESSORIES

2.4.1 Provide flashings above doors and windows and at the bottom of all cavities in accordance with Masonry Standards.

- .1 Provide weep hole above doors and windows, at bottom of all cavities.

- .2 Provide vents at top of wall and below continuous shelf angle location.

2.4.2 **Sheet Metal:** Galvanized steel.

2.4.3 **Thru-wall Flashing Membrane:** Blueskin TWF by Henry Company Canada, or approved alternative.

PART 3 – EXECUTION

3.1 EXAMINATION

- 3.1.1 Verify that site conditions are ready to receive Work.
- 3.1.2 Beginning of installation means acceptance of site conditions.

3.2 PREPARATION

- 3.2.1 Supply metal anchors according to Masonry Standards. Direct correct placement of metal anchors.

3.3 CUTTING OF MASONRY UNITS

- 3.3.1 Wet saw masonry units.
- 3.3.2 Pre-soak units using clean water prior to cutting.
- 3.3.3 Clean cut units using a stiff fibre brush and clean water. Allow units to surface dry prior to placement.

3.4 INSTALLATION

- 3.4.1 Erect masonry in accordance with Standard Methods
- 3.4.2 Jointing: Use raked tooled joints for all exterior exposed masonry.
- 3.4.3 Mixing and blending: Mix units within each pallet and with other pallets to ensure uniform blend of colour and texture.
- 3.4.4 Clean clay masonry as work progresses.

3.5 COURSING

- 3.5.1 Place masonry to lines and levels indicated.
- 3.5.2 Maintain masonry courses to uniform width. Make vertical and horizontal joints equal and of uniform thickness.
- 3.5.3 Masonry coursing should conform to design of building.
- 3.5.4 Maintain mortar joint thickness of 10 mm, plus or minus 3mm. Adjust mortar joint thickness to accommodate variation in unit size in order to achieve specified coursing.

3.6 PLACING AND BONDING

- 3.6.1 Lay masonry in full bed and head joints of mortar, properly jointed with other work.
- 3.6.2 Buttering corners of joints, and deep or excessive furrowing of mortar joints are not permitted.
- 3.6.3 Fully bond intersections, and external corners.
- 3.6.4 Isolate masonry partitions from vertical structural framing members with a control joint as indicated.
- 3.6.5 Do not adjust masonry units after laying. Where resetting of masonry is required, remove, clean units and reset in new mortar.

3.7 BRICK VENEER AND CAVITY WALL

- 3.7.1 Install weep hole vents in brick veneer at 800 mm maximum spacing horizontally above through-wall flashing, above shelf angles, and at bottom of walls.
- 3.7.2 Install cavity vents at top of cavity space at same spacing.

3.8 TOLERANCES

- 3.8.1 Variation in vertical alignment: ± 20 mm.
- 3.8.2 Variation in lateral alignment: ± 13 mm.
- 3.8.3 Variation in level alignment - joints: ± 13 mm.
- 3.8.4 Variation in relative alignment in 3 m: ± 6 mm.
- 3.8.5 Variation of mortar joint thickness: ± 3 mm.

3.9 REINFORCEMENT AND ANCHORAGES

- 3.9.1 For brick veneer, embed wall ties in masonry back-up at maximum 400 mm oc vertically and 400 mm oc horizontally. Place within 300 mm of openings. Refer to structural drawings

3.10 MASONRY FLASHING

- 3.10.1 Extend flashing through brick veneer, turn up and bed into mortar joint of masonry back-up.
- 3.10.2 Install through-wall flashing to direct accumulated moisture from air space, behind brick.
- 3.10.3 Ensure bricks are set within one minute of spreading mortar.
- 3.10.4 Use mortar within an hour and a half of batching.

3.11 MOVEMENT CONTROL JOINTS

- 3.11.1 Do not continue horizontal joint reinforcing across movement control joints.
- 3.11.2 Form movement control joints by leaving head joints between stacked units void of mortar, ready for application of bond breaker and joint sealant.
- 3.11.3 Size joint in accordance with Section 07 92 00 - Joint Sealers for sealant performance.

3.12 COLD WEATHER MASONRY

- 3.12.1 Air temperature 0°C to 4°C Protect masonry from rain and snow for 24 hours minimum. Heat sand and mixing water to minimum 20°C, maximum 70°C.
- 3.12.2 Air temperature -4°C to 0°C: Cover masonry for 24 hours minimum after completion of each portion of Work. Heat sand and mixing water to minimum 20°C, maximum 70°C.
- 3.12.3 Air temperature -7°C to -4°C: Provide heat on both sides of wall and use windbreaks when wind is in excess of 25 km/hr. Cover masonry with insulating blanket for 24 hours minimum after completion of each portion of work. Heat sand and mixing water to minimum 20°C, maximum 70°C. Use windbreaks when wind is in excess of 25 km/hr.

3.12.4 Completely enclose Work and maintain air enclosed temperature above 0°C when outside air temperature is less than -7°C. Ensure temperature of brick when laid is not less than 7°C. Maintain temperature of Work above 0°C for 24 hours minimum after completion of each portion of Work. Heat sand and mixing water to minimum 20°C, maximum 70°C.

3.12.5 The protection periods mentioned above shall be increased from 24 hours to 48 hours unless Type 30 High Early Strength Portland cement and Type S hydrated lime are used in the mortar.

3.13 **WARM WEATHER MASONRY**

3.13.1 When air temperature is 38°C or greater, or 32°C with wind velocity in excess of 13 km/hr:

3.13.2 Prewet clay brick masonry units.

3.13.3 Limit spread of mortar beds to: 1.2 m length.

3.13.4 Ensure bricks are set within one minute of spreading mortar.

3.13.5 Use mortar within an hour and a half of batching.

3.14 **PROTECTION**

3.14.1 Protect masonry work in accordance with CAN/CSA A371.

.1 Use straw, sand, sawdust, or plastic sheeting spread out on the ground, below the wall under construction. Protect base of walls from rain-splatter, mud and mortar.

.2 Turn scaffold boards on edge at end of day to prevent possible rainfall from splashing mortar and dirt directly onto completed masonry. When turning scaffold boards, they should be angled away from the wall to prevent dirt from splashing onto the wall

3.14.2 **Wall covering:**

.1 During erection, cover top of wall with waterproof membrane at end of each day or when work stops.

.2 Cover partially completed wall when work is not in progress.

.3 Extend protective cover minimum 600 mm down both sides and secure in place.

.4 Brickwork below windows should be covered until the windows and sills are installed.

.5 Horizontal movement joints beneath shelf angles are to be caulked as soon as possible to prevent ingress of moisture.

3.14.3 **Load application:**

.1 Do not apply uniform floor or roof loading for at least 12 hours after building masonry columns or walls.

.2 Do not apply concentrated loads for at least 3 days after building columns or walls.

3.15 **CLEANING**

3.15.1 **Preparation before cleaning:**

.1 Cut out and replace any defective mortar joints.

.2 Dry clean wall.

.3 Remove large particles of mortar using wood paddles without damaging surface. Saturate masonry with clean water and flush off loose mortar and dirt.

.4 Protect all windows, sills, doors, trim and other Work

- 3.15.2 Remove large particles with wood paddles without damaging surface. Saturate masonry with clean water and flush off loose mortar and dirt.
- 3.15.3 Before completion of work day scrub brick surface with a wire brush and or moist cloth to remove any mortar droppings form surface of brick. Do not clean newly laid brick as the mortar joint is still fresh.
- 3.15.4 Scrub with solution of 25 ml trisodium phosphate and 25mL household detergent dissolved in one litre of clean water using stiff fibre brush, then clean off immediately with clean water using hose. Alternatively, use proprietary compound recommended by brick masonry manufacturer in accordance with manufacturer's directions.
- 3.15.5 Repeat cleaning process as often as necessary to remove mortar and/or other stains.

END OF SECTION

PART 1 - GENERAL

1.1 WORK INCLUDED

- 1.1.1 Provide labour, materials, products, equipment and services to complete the metal fabrication work.

1.2 REFERENCE DOCUMENTS

1.2.1 American Society for Testing and Materials (ASTM):

- .1 ASTM A53/A53M, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
- .2 ASTM A653/A653M, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- .3 ASTM A1008/A1008M, 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.
- .4 ASTM A1011/A1011M, 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.
- .5 ASTM F3125/F3125M, Standard Specification for High Strength Structural Bolts, Steel and Alloy Steel, Heat Treated, 120 ksi (830 MPa) and 150 ksi (1040 MPa) Minimum Tensile Strength, Inch and Metric Dimensions.

1.2.2 Canadian Standards Association (CSA):

- .1 CAN/CSA G40.20/G40.21, General requirements for rolled or welded structural quality steel / Structural quality steel.
- .2 CSA S16, Design of Steel Structures.
- .3 CSA S136, North American specification for the design of cold-formed steel structural members.
- .4 CSA W47.1, Certification of companies for fusion welding of steel.
- .5 CSA W55.3, Certification of companies for resistance welding of steel and aluminum
- .6 CSA W59, Welded steel construction (metal arc welding).

1.3 DESIGN CRITERIA

- 1.3.1 Work which will support other items or will be required to support structural loads of any nature is to be designed by a professional engineer licensed to design structures and registered in the Province of the place of the work.

1.4 SUBMITTALS

1.4.1 Shop Drawings: Comply with the following requirements:

- .1 Make a thorough examination of the Drawings and details, determine the intent, extent, and materials, and be fully cognizant of requirements when preparing Shop Drawings.
- .2 Submit Shop Drawings showing and describing in detail all miscellaneous metal work including large scale detail of members and materials, of connection and interfacing with the work of other Sections, jointing details, and of anchorage devices, dimensions, gauges, thicknesses, description of materials, metal finishing, as well as other pertinent data and information.
- .3 Shop Drawings for items which will to support loads as specified under design criteria above are to bear the professional seal and signature of the engineer who designed the work.

1.4.2 **Templates & Instructions:** Submit necessary templates and instructions where fastenings or anchors have to be built in by other trades.

1.4.3 **Samples:** Submit samples of all finishes for review.

1.5 **QUALITY ASSURANCE**

1.5.1 Conform to requirements of CAN/CSA S16, Steel Structures for Buildings, and CAN/CSA S136, Cold Formed Steel Structural Members.

1.5.2 Work is to be executed by experienced tradesmen under the full time supervision of a senior, qualified representative who is to be at the site to direct the work.

1.5.3 Welding of steel is to be undertaken only by a fabricator certified to the requirements of CSA W47.1 and CSA W55.3 as applicable.

PART 2 – PRODUCTS

2.1 **MATERIALS**

2.1.1 **Structural Steel Sections and Steel Plate:** CAN/CSA-G40.20/G40.21-92, Grade 300W.

2.1.2 **Hollow Structural Sections:** CAN/CSA G40.20/G40.21, Grade 350W, Class H.

2.1.3 **Sheet Steel (Structural Quality):** ASTM A1011/A1011M.

2.1.4 **Sheet Steel (Commercial Quality):** ASTM A1008/A1008M, stretcher levelled or temper rolled.

2.1.5 **Tube:** ASTM A53.

2.1.6 **Steel Poles:** As shown on drawings.

2.1.7 **Galvanized Sheet Steel (Commercial Quality):** Galvanized coating G90 (Z275) in accordance with ASTM A653/A653M, minimized spangle, stretch levelled or temper rolled.

2.1.8 **Steel Pipe:** Schedule 40 mild steel pipe, ASTM A53, Grade B, 150 mm or 200 mm dia. as required, black where inside the building, galvanized where outside.

2.1.9 **Galvanizing:** All uncoated steel specified to be galvanized is to be galvanized after fabrication by the hot dip process according to ASTM A123, with a minimum coating of 600 g/m. Galvanize after all welding is complete. Welding of galvanized material will not be permitted.

2.1.10 **Bolts, Nuts, Washers:** ASTM F3125/F3125M.

2.1.11 **Welding Materials:** CSA W59.

2.1.12 **Metal Filler:** Polyester based type by Dura Chemical Ltd., or approved alternative.

2.1.13 **Paint Primer:** CPMA 1.73a.

2.1.14 **Zinc Rich Primer:** Ready mixed zinc-rich primer, 'Carbozinc 11WB' by Carboline Company, 'Catha-Coat 305' by Devco Coatings, or 'Zinc Clad XI' by Sherwin Williams.

2.1.15 **Bituminous Paint:** Acid and alkali resistant material.

2.1.16 **Butyl Tape:** Extruded, high grade, macro-polyisobutylene tape of the size, width and shore hardness to suit conditions.

2.2 FABRICATION

- 2.2.1 Fit and assemble work in the shop where possible. Fabricate work according to drawing details and reviewed Shop Drawings.
- 2.2.2 Take measurements at the building for work which is to fit or be connected to steel, concrete, or masonry, before commencing fabrication.
- 2.2.3 Grind welds smooth and flush with the surface of the parent metal where exposed to view and where specifically indicated on drawings. Welds are to be continuous seam welds unless specified otherwise. Maintain sharp arrises.
- 2.2.4 Fit joints and intersecting members accurately in true planes, square, plumb, straight with tight joints and intersections.
- 2.2.5 Provide adequate reinforcing, fastenings, anchors, accessories required for fabrication and erection of the miscellaneous metal work. Items occurring on or in an exterior wall or slab are to be hot-dip galvanized. Make thread dimensions such that nuts and bolts will fit without rethreading or chasing threads.
- 2.2.6 Fabricate, drill and tap members to accommodate attachments, anchorage and work of other Sections where located and directed by them.
- 2.2.7 Exposed steel surfaces are to be smooth and free from imperfections such as warping, buckling, weld marks, burrs, rust and scale.
- 2.2.8 Make exposed metal fastenings and accessories of the same material, texture, colour and finish as the base metal on which they occur, unless otherwise shown or specified. Keep exposed fastenings to an absolute minimum, evenly spaced and neatly laid out. Make fastenings of permanent type unless otherwise indicated.
- 2.2.9 **Priming:** Comply with the following requirements:
- .1 Thoroughly clean steel free of rust, scale and weld spatter by power wire brushing, remove oil and grease with solvent and clean cloths, apply a shop coat of primer by brush to all surfaces, except areas requiring field welding, working the primer well into surfaces, and cavities
 - .2 Prime field welded areas after erection and touch-up the shop coat where damaged by erection and handling
 - .3 Prime steel with 2 full coats of zinc rich paint in strict accordance with the paint manufacturer's directions

PART 3 – EXECUTION

3.1 GENERAL

- 3.1.1 Provide all required miscellaneous metal work, including work indicated on the drawings but not specified in this Section or other Sections of the Specification.
- 3.1.2 Carefully read all other Sections and review the drawings to determine the extent of metal work provided, or installed only as part of the work of other Sections.
- 3.1.3 Where items are specified to be installed by other Sections, supply the items to the appropriate trade with the necessary instructions and templates required for proper installation. Include all required fastenings such as screws, bolts, expansion shields and similar items.
- 3.1.4 **Erection:** To meet specified requirements of CAN/CSA S16.
- 3.1.5 **Bearing Plates and Anchors:** Standard.

3.1.6 **Anchors:** Anchors to structural concrete are to be approved inserts set into concrete or approved self-drilling expansion inserts drilled and placed afterwards.

3.2 **INSTALLATION**

3.2.1 Assemble and erect the work plumb, true, square, straight, level and accurate to sizes detailed and to reviewed Shop Drawings, free from distortion and defects.

3.2.2 Isolate metals where necessary to prevent corrosion due to contact between dissimilar metals and between metals and masonry or concrete. Use bituminous paint or butyl tape.

3.2.3 Perform drilling of steel and/or concrete and/or masonry as required to fasten the miscellaneous metal work.

3.3 **METAL FABRICATION SCHEDULE**

3.3.1 Refer to Drawings for details of metal fabrication work and related items not specifically listed in this Section.

3.3.2 Where work is required to be built into work of other Sections supply such members to respective Sections.

3.3.3 Provide metal fabrication items indicated below and items not indicated to be supplied under other Sections.

3.3.4 **Lateral Supports for Partitions:** Where masonry partitions extend to the underside of the structure, refer to structural drawings for lateral support at the top of the masonry partitions provided as part of the structural steel work. Supply lateral support continuous vertical steel angle members to anchor ends at each side of masonry to adjacent structure. Mechanically fasten to concrete with expansion bolts in predrilled holes.

3.3.5 **Miscellaneous Steel Framing, Channels, Angles, Plates and Brackets:** Provide as required and indicated on the drawings.

3.3.6 **Lintels:** Supply loose steel lintels to other Sections where required for building into the work. Fabricate lintels as shown on the structural drawings. Galvanize lintels which will be exposed to the exterior.

3.3.7 **Roof Access Ladder:** Provide a steel ladder and "fall-off" protection cage conforming to local workplace safety regulations for access to the roof hatch.

3.3.8 **Bollards:** Bollards to consist of 6mm wall thickness steel pipe, filled with concrete and then end capped with 6mm steel. Refer to drawings for diameter and height of bollard. Prepare, prime and paint bollards.

3.3.9 **Anchor Bolts & Other Means of Anchorage:** Provide all anchor bolts and expansion bolts or other means of anchorage required for building into floors, walls and ceilings where it is necessary to secure metal and wood to concrete, masonry or steel. Supply anchor bolts, nuts and similar hardware as required for building-in.

3.3.10 Elevator pit metal ladder.

3.3.11 Metal stairs, stringer, landing, guard, handrail. (interior and exterior locations as per drawings).

END OF SECTION

PART 1 - GENERAL

1.1 WORK INCLUDED

- 1.1.1 Provide labour, materials, products, equipment and services to complete the rough carpentry work.

1.2 REFERENCE DOCUMENTS

- 1.2.1 Canadian Standards Association (CSA):
- .1 CAN/CSA O80 Series, Wood preservation.
 - .2 CSA O121, Douglas Fir Plywood.
 - .3 CSA O141, Softwood Lumber.
 - .4 CSA O151, Canadian Softwood Plywood.
 - .5 CSA O153, Poplar Plywood.
- 1.2.2 National Lumber Grades Authority (NLGA).

PART 2 - PRODUCTS

2.1 MATERIALS

- 2.1.1 **Wood Materials:** Straight, sawn square, true, dressed four sides, properly sized and shaped to correct dimensions from nominal sizes indicated or specified. Well seasoned NLGA, free from defects which impair strength and durability. Moisture content limit is to be maximum 12% for exterior locations and maximum 8% for interior locations.
- 2.1.2 **Lumber Grade:** CSA O141 Softwood Lumber. Comply with the official grading rules of NLGA for the particular lumber. Use only grade marked lumber.
- 2.1.3 **Blocking, Copings, Nailing Strips:** NLGA No. 2 Ontario White Pine, No. 2 Red Pine, or Construction No. 1 Jack Pine, or Douglas Fir complying with COFI standard grading and dressing rules.
- 2.1.4 **Plywood:** Douglas Fir plywood is to comply with CSA O121, COFI Exterior. Western softwood plywood, is to comply with CSA O151, COFI Waterproof glue WSP. Poplar plywood is to comply with CSA O153, exterior waterproof type, interior moisture resistant type. Exposed 2 sides is to be Grade G2S, and exposed 1 side is to be Grade G/Solid.
- 2.1.5 **Rough Hardware:** Nails, screws, bolts, lag screws, anchors, special fastening devices and supports as required for the erection of all carpentry items.
- 2.1.6 **Wood Preservative, Clear For Surfaces to be Painted:** 'Conservatr' by Osmose-Pentox Inc., or approved alternative.
- 2.1.7 **Wood Preservative, Green for Concealed Surfaces:** 'Pentox Green' by Osmose-Pentox Inc., or approved alternative.
- 2.1.8 **Preservative Pressure Treatment for All Exterior Construction:** 'Wolmanized' by Lonza or approved alternative, green pigmented.
- 2.1.9 **Fire Retardant Pressure Treatment:** To provide flame spread, fuel contributed and smoke developed ratings of 25 or less, equal to 'Dricon' fire retardant chemicals by Lonza, or approved alternative. Provide colour dye identification in chemical treatment for treated wood to be concealed.

2.2 FIRE RETARDANT PRESSURE TREATMENT

- 2.2.1 Fire retardant pressure treatment of wood against fire is to comply with CAN/CSA O80 Series, kiln dried after treatment to the required moisture content specified in this Section, and ULC or WH labelled as received from the pressure treating plant. Do not expose pressure treated material to dampness between the time the material is treated and the time the finish is applied. Carefully sand surfaces which show surface salt deposits to remove such deposits before the finish is to be applied.

PART 3 - EXECUTION

3.1 GENERAL

- 3.1.1 Provide all required rough carpentry work. Refer to drawing elevations and details.
- 3.1.2 Provide running members of the longest lengths obtainable.
- 3.1.3 Properly frame material with tight joints and rigidly secure in place.
- 3.1.4 Use construction methods to allow for expansion and contraction of the materials.
- 3.1.5 Conceal joints and connections wherever possible. Locate prominent joints only where directed.
- 3.1.6 Accurately scribe, cope and mitre members where required to produce tight joints.
- 3.1.7 Erect work plumb, level, square and to the required lines.
- 3.1.8 Do not regard blocking, strapping and other rough carpentry indicated as complete or exact. Provide rough carpentry items required for the installation of the work of other Sections.
- 3.1.9 Provide temporary wood protection strips at door jambs and similar locations vulnerable to damage.

3.2 FURRING, BLOCKING, COPINGS AND CURBS

- 3.2.1 Furring and strapping generally is to be spaced at 406 mm o.c. and erected to suit job conditions.
- 3.2.2 Shim members as required to provide a true and plumb surface.
- 3.2.3 Provide fire retardant treated nailing strips, strapping and furring for interior locations.
- 3.2.4 Provide continuous wood copings in minimum 4.8 lengths of the size indicated, at the perimeter of the roof and as shown. Bolt securely in place. Where the top of precast concrete wall panels are not flush with adjacent panels, provide a joint in the wood coping at the precast panel joint so that the underside of the wood coping sits tight on the top of the precast concrete panels.
- 3.2.5 Apply wood preservative to all surfaces of wood copings. Treat end cuts with wood preservative.
- 3.2.6 Provide wood blocking as indicated and required. Provide curbs for exhaust ductwork goosenecks penetrating the roof, and around any other roof openings wider than 406 mm in any direction. Build up curbs of nominal 55 mm thick members to 200 mm minimum above the finished roof level. Bolt or anchor curbs securely in place.
- 3.2.7 All wood materials for the roof are to be pressure treated.

3.3 PLYWOOD SHEATHING

- 3.3.1 Provide 16 mm thick exterior grade Douglas Fir plywood sheathing at the back of high parapets. Secure to metal framing using recessed fastenings.

3.3.2 Provide 16 mm exterior grade plywood backing in walls to support the Tenant's exterior signage requirements as shown on drawings.

3.3.3 Provide backing in wall to support the Tenant's washroom grab bar accessories where such accessories attach to an exterior or demising wall, as shown on drawings.

3.4 **BACKING BOARDS FOR ELECTRICAL PANELS**

3.4.1 Provide 19 mm thick fire retardant treated softwood plywood backing boards for mounting telephone and electrical equipment. Attach backing boards to wall construction or partition framing with recessed mechanical fasteners.

3.5 **WOOD PRESERVATIVE**

3.5.1 Treat wood in contact with masonry or concrete with wood preservative before setting in place. Apply preservative in accordance with the manufacturer's written instructions.

3.6 **FIRE RETARDANT TREATED WOOD**

3.6.1 Minimize reworking of fire retardant treated wood. Re-treat surfaces exposed by cutting, trimming or boring with fire retardant chemical before installation.

3.7 **ROUGH HARDWARE**

3.7.1 Provide rough hardware, including hardware for temporary enclosures.

3.7.2 Provide fasteners long enough so that at least half their length penetrates into the second member. Minimize splitting of wood members by staggering the fasteners in the direction of the grain and by keeping fasteners well in from the edges. Use spiral, annular or resin coated nails for plywood. Use spiral galvanized nails for exterior exposed lumber.

3.7.3 Fasten to hollow units with toggle bolts, and to solid masonry or concrete with lead expansion shields and lag screws. Do not use organic fibre or wood plugs.

END OF SECTION

PART 1 – GENERAL

1.1 WORK INCLUDED

- 1.1.1 Provide labour, materials, products, equipment and services to complete the thermal insulation work.

1.2 REFERENCE DOCUMENTS

- 1.2.1 Canadian Standards Association (CSA):

.1 CSA B111, Wire Nails, Spikes and Staples.

- 1.2.2 Underwriters' Laboratories of Canada (ULC):

.1 CAN/ULC S701, Standard for Thermal Insulation, Polystyrene, Boards and Pipe Covering.

.2 CAN/ULC S705.1, Standard for Thermal Insulation – Spray Applied Rigid Polyurethane Foam, Medium Density – Application.

.3 CAN/ULC S705.2, Standard for Thermal Insulation – Spray Applied Rigid Polyurethane Foam, Medium Density – Installer's Responsibility.

PART 2 – PRODUCTS

2.1 MATERIALS

- 2.1.1 **Wall or Perimeter Insulation Below Grade Extruded Polystyrene Board Insulation:** CAN/ULC S701, Type 4, rigid, CFC (chlorofluorocarbon) free, extruded polystyrene board insulation, R=5 per 25 mm thickness, a minimum compressive strength of 30 psi, and thickness as indicated on drawings, Dow Styrofoam SM.

- 2.1.2 **Under Sidewalks or Loading Area Ramps High Density Extruded Polystyrene Board Insulation:** CAN/ULC S701, Type 4, rigid, CFC (chlorofluorocarbon) free, extruded polystyrene board insulation, R=5 per 25 mm thickness, a minimum compressive strength of 60 psi at 5% deformation or yield; 75 mm thick (minimum) unless otherwise indicated.

- 2.1.3 **Batt Insulation:** Lightweight, resilient, inorganic fibrous glass or mineral wool batts (blankets) by Owens Corning Canada Inc., Ottawa Fibre Inc., or Roxul

- 2.1.4 **Spray in Place Foam Insulation:** Spray type polyurethane foam insulation to CAN/ULC S705.1, complete with primers in accordance with the insulation manufacturer's recommendations to suit surface conditions. Minimum density of 28.9 kg/m³. Walltite Eco' by BASF or HEATLOK SOYA by Demilec IR=6.0 per inch (minimum), Class 1, flame spread rating less than 25.

- 2.1.5 **Cavity Wall Insulation:** Codebord exterior rigid insulating sheathing, extruded polystyrene, shiplap joint, by Owens Corning.

- 2.1.6 **Adhesive:** As recommended by manufacturer of insulating materials.

- 2.1.7 **Mechanical Fasteners:**

.1 Nails: Galvanized steel, length 25 mm longer than insulation thickness, CSA B111, Table 12.

.2 Staples: Galvanized wire, 12 mm minimum.

PART 3 – EXECUTION

3.1 EXAMINATION

- 3.1.1 Ensure that surfaces to receive adhesive or insulation are dry, firm, and free from loose material, projections, ice, frost, grease, oil or other matter detrimental to the bond of the adhesive or uniform bedding of the insulation.
- 3.1.2 Maintain the surface and ambient temperatures constantly between 38° C and 10° C during application and curing of adhesive.

3.2 GENERAL

- 3.2.1 Perform all required building insulation and related work.
- 3.2.2 Provide insulation to thicknesses indicated on drawings.
- 3.2.3 Ensure a uniform, continuous thermal barrier effect. Where insulation barriers are to be provided under other Sections, coordinate the work such that thermal barrier continuity is achieved.
- 3.2.4 Where insulation barrier are fixed to the inside face of exterior wall components or cladding units, arrange the insulation such that joints in insulation boards are coincident with the joints in the exterior wall components. Butt insulation board joints tightly.
- 3.2.5 Where hangers, anchors, and supports pass through insulation barrier construction, butter apertures liberally with adhesive and ensure continuity of thermal barrier provisions.

3.3 INSTALLATION

- 3.3.1 Apply polystyrene perimeter insulation at foundations with a dollop application of adhesive.
- 3.3.2 Provide high density polystyrene insulation below concrete sidewalk/ paving where indicated.
- 3.3.3 Cut insulation as required and fit snugly to penetrations, obstructions, openings and corners. Butt insulation boards tightly and stagger joints. Provide a single layer of insulation in the thickness required unless shown otherwise. Stagger joints in multiple layer installations.
- 3.3.4 Tear apart fibreglass batt insulation and pack tightly into miscellaneous building cavities as required to ensure a continuous thermal barrier where such provision is not specified under other Sections.
- 3.3.5 Perimeter Insulation: Install insulation boards vertically and horizontally on inside face of perimeter foundation walls and under slab as shown on drawings.
- 3.3.6 Under Concrete Floor Slab Insulation: Lay insulation boards on level compacted fill extending a minimum of 1200 mm in from perimeter foundation wall.
- 3.3.7 **Batt of Roll Insulation:**
 - .1 Install batt or roll insulation where indicated on Drawings.
 - .2 Fit batt between framing and press firmly into place. Butt tightly at joints, free of gaps.
 - .3 Insulate behind pipes, ducts, electric conduits and outlets or junction boxes. Cut insulation to fit around and behind obstructions and non-standard spaces.
 - .4 Place insulation over soffits grid system sealing around metal hangers and at wall on all sides. Carry insulation up wall and fit around steel or in masonry voids.

3.3.8 Spray Applied Insulation:

- .1 Install insulation in accordance with manufacturer's written instructions and conforming to CAN/ULC S705.2.
- .2 Apply sprayed foam insulation to thickness indicated on drawings and to provide continuous air retarder in locations indicated on the Drawings. Apply insulation to within 3 mm of thickness indicated on drawings. Provide one measuring pin for every 50 m2.
- .3 Insulation thickness greater than 50 mm shall be completed in a minimum of 2 steps.
- .4 Insulation to be continuous, level, plumb and uniform thickness throughout. Insulation shall be free of voids and imbedded foreign materials.

3.4 PATCHING

- 3.4.1 Perform cutting and patching necessary to accommodate irregularities in the insulation work caused by of the work of other Sections projecting through the thermal barriers. Allow for expansion and contraction and linear movement of these items.
- 3.4.2 Where there is a possibility of heat loss through ductwork, piping or conduit which passes through the thermal barrier, extend insulation around the duct, pipe or conduit for a distance of 1' minimum on both sides of the barrier.
- 3.4.3 After installation under other Sections of heating equipment and other construction adjacent to the building insulation work, inspect the work and perform such reasonable taping and patching of barriers and replacing of insulation as necessitated by unavoidable minor damage caused by the work of the other Section.

END OF SECTION

PART 1 – GENERAL

1.1 WORK INCLUDED

1.1.1 Provide labour, materials, products, equipment and services to complete the air barrier system work. Air barrier system consists of:

- .1 Extruded polystyrene insulation boards fastened to exterior face of back-up wall (intermediate sheathing).
- .2 Joint sealers (bituminous membrane strips, trowel applied sealants and urethane foam air barrier) used to block and seal joints in the assembly itself, penetrations and voids between air barrier system and wall openings such as windows, doors, ventilation or decorative louvres and others, prescribed in related Sections and complementing this Section.
- .3 Accessories used to fasten insulation boards.

1.2 REFERENCES

1.2.1 American Society for Testing and Materials International, (ASTM):

- .1 ASTM D2240, Standard Test Method for Rubber Property—Durometer Hardness.
- .2 ASTM E2178, Standard Test Method for Air Permeance of Building Materials.

1.2.2 Underwriters' Laboratories of Canada (ULC):

- .1 CAN/ULC S701, Standard for Thermal Insulation, Polystyrene, Boards and Pipe Covering.
- .2 CAN/ULC S710.1, Standard for Thermal Insulation – Bead-Applied One Component Polyurethane Air Sealant Foam, Part 1: Material Specification.
- .3 CAN/ULC S710.2, Standard for Thermal Insulation – Bead-Applied One Component Polyurethane Air Sealant Foam, Part 2: Installation.

1.3 SUBMITTALS

1.3.1 **Samples:**

- .1 One sample of each type polystyrene board, 600 x 600 mm x indicated thickness, including the following required information printed on one face:
 1. Reference standard product meets.
 2. Board Type, name of manufacturer or brand name.
 3. The following cautionary statement: Combustible product. Keep away from heat, sparks and flame. This product will ignite if exposed to an ignition source of sufficient heat and intensity. Protection or thermal barrier is required in accordance with applicable building codes.
- .2 One sample of joint sealer forming integral part of air barrier system:
 1. Self-adhesive tape.
 2. Trowel applied joint sealant.
 3. One component spray-applied urethane insulating foam, low expansion grade.
 4. Fasteners.

1.4 QUALITY ASSURANCE

1.4.1 Identification: Each insulation board must be clearly labelled with the information listed in manufacturer's applicable product data sheet.

- 1.4.2 Submit the certificate issued by the Scientific Certification Systems (SCS) certifying that the prescribed polystyrene board insulation meets the recycled materials content requirements in the tested product.
- 1.4.3 The certificates shall include the following details: certificate number, duration of the certification and all restrictions issued by the certification agency for the product, as applicable.
- 1.4.4 **Mock-Up:**
- .1 Construct typical panel illustrating materials interface and seals.
 - .2 Mock-up may remain as part of the Work.
 - .3 Allow 24 hrs. for inspection of mock-up by Consultant before proceeding with air barrier Work.
- 1.5 **DELIVERY, STORAGE AND HANDLING**
- 1.5.1 Deliver, store and handle polystyrene boards in accordance with manufacturer's printed instructions.
- 1.5.2 Store materials in their original packaging in a dry interior location. Avoid all contact with soil or wet supports.
- 1.5.3 Protect materials from the weather and store at a temperature and a relative humidity recommended by their manufacturer.
- 1.6 **WASTE MANAGEMENT AND DISPOSAL**
- 1.6.1 Remove from site and dispose of packaging materials at appropriate recycling facilities.
- 1.6.2 Collect and separate for disposal for recycling in accordance with Waste Management Plan.
- 1.7 **SITE CONDITIONS**
- 1.7.1 Apply air barrier system only when ambient climatic conditions (risk of rain, high humidity levels) and temperature of surfaces to be insulated are within acceptable limits to prevent risk of condensation.
- 1.7.2 Safety: Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of insulation materials.

PART 2 – PRODUCTS

2.1 INSULATION

- 2.1.1 Extruded rigid polystyrene board insulation to CAN/ULC S701, Type 3:
- .1 Products: 'Foamular C-200' or 'Foamular CodeBord' by Owens Corning Canada, or approved alternative conforming to the following:
 - .1 Dimensions: 1220 mm x 2743 mm x 51 mm thickness as indicated, ship-lapped edges.
 - .2 Rsi 0.87 / 25 mm, 140 kPa compressive strength.
 - .3 Air permeance: negligible.
 - .4 Water vapour permeance (max.): 45 ng / Pa.s.m².
- 2.1.2 Self-adhesive air barrier membrane strips:
- .1 Products: 'Blueskin VP160' by Henry Company Canada or approved alternative. Provide 'Hi-Tac Primer' by Henry Company Canada, or SA-280 Flashing, 100 mm, self-adhered, full coverage, vapour permeable adhesive by SPR or approved alternative air barrier conforming to the following:
 - .1 Thickness: 0.58 mm.

- .2 Air permeability (ASTM E2178): Pass.
 - .3 Water vapour permeance: 1658 ng / Pa.m².s (29 perms).
 - .2 Intended use: To seal joints between polystyrene boards and to seal between air barrier system and adjacent building components such as windows, doors and other openings in the building envelope.
- 2.1.3 Trowel-applied air barrier sealant:
 - .1 Product: 'Air-Bloc 31MR' by Henry Company Canada, or approved alternative conforming to the following:
 - .1 Minimum application temperature (ambient air and substrate): +4°C.
 - .2 Air permeability: 0.001 L/s.m² at 75 Pa .
 - .3 Water vapour permeance: 1201 ng / Pa.m².s (21 perms).
 - .2 Intended use: to seal joints between polystyrene boards and around penetrations into the assembly such as masonry connectors and anchors and other types of cladding, conduits, etc.
- 2.1.4 Air/vapour barrier adhesive caulk in gun-grade cartridges:
 - .1 Product: 'Kop-R-Lastic' sealant by Henry Company Canada or approved alternative conforming to the following:
 - .1 Minimum application temperature (ambient air and substrate): +4°C.
 - .2 Durometer Hardness (ASTM D2240): 55 Shore A.
 - .2 Intended use: to seal around penetrations into the assembly such as masonry connectors, anchors and other types of cladding, conduits, etc.
- 2.1.5 Air barrier low expansion polyurethane foam sealant:
 - .1 Acceptable product: [product listed in CCMC 13074-R evaluation report and] to CAN/ULC-S710.1 and S-710.2 providing the following:
 - .1 Application temperature range: as indicated on container.
 - .2 Air permeability: ≤ 0.05 L/s.m² at 75 Pa.
 - .3 Initial thermal resistance: RSI 0.8 / 25 mm.
 - .2 Intended use: To seal voids around openings in building envelope such as windows, doors, mechanical or electrical conduits, ventilation louvres and other penetrations.
- 2.2 **ACCESSORIES**
 - 2.2.1 Screws for insulation fastening: self-drilling and self-tapping type hot-dip galvanized steel screws, #8-18, of sufficient length to penetrate steel studs at least 9.5 mm (minimum 3 exposed screw threads).
 - 2.2.2 Fastening plates:
 - .1 Corrosion resistant metal hot-dip galvanized.
 - .2 Size: 38 x 38 (50 x 50) mm square.

PART 3 - EXECUTION

3.1 EXAMINATION

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

- 3.1.2 Ensure all surfaces are clean, dry, sound, smooth, continuous and comply with air barrier manufacturer's requirements.
- 3.1.3 Ensure joints in intermediate sheathing have been sealed with an appropriate product.
- 3.1.4 Ensure work penetrating sheathing is completed.
- 3.1.5 Ensure all exterior cladding anchoring devices have been installed.
- 3.1.6 Ensure that batt insulation installed in metal stud voids and vapour retarder meet requirements of the Ontario Building Code.
- 3.1.7 Report any unsatisfactory conditions to the Consultant in writing.
- 3.1.8 Do not start work until deficiencies have been corrected. Commencement of Work implies acceptance of conditions.

3.2 **PREPARATION**

- 3.2.1 Remove loose or foreign matter which might impair adhesion of materials.
- 3.2.2 Ensure all substrates are clean of oil or excess dust; all masonry joints struck flush, and open joints filled; and all concrete surfaces free of large voids, spalled areas or sharp protrusions.
- 3.2.3 Ensure all substrates are free of surface moisture prior to application of air barrier system.
- 3.2.4 Ensure metal closures are free of sharp edges and burrs.
- 3.2.5 Prime substrate surfaces to receive self-adhesive membranes in accordance with manufacturer's instructions.
- 3.2.6 Using an appropriate sealant listed in Part 2, seal all penetrations and voids made in intermediate sheathing by work of other Sections and by exterior cladding fastening devices.

3.3 **INSTALLATION**

3.3.1 Polystyrene board:

- .1 Use only insulation boards free from chipped or broken edges; reject any board with holes greater than 2500 mm².
- .2 Install polystyrene boards horizontally (vertically) with offset vertical joints; butt joints tightly and ensure a plumb, level and square installation, as weathertight as possible.
- .3 Cut and fit insulation tight around electrical boxes, conduits, doors and windows and all other penetrations in exterior building envelope.
- .4 Keep insulation minimum 75 mm from heat-emitting devices such as chimneys and vents protruding through wall.
- .5 Mechanically fasten polystyrene boards to metal wall studs, through the intermediate gypsum board sheathing back-up.
 - .1 Square edge boards:
 - .1 Screw boards using specified screws and min. 32 mm diameter fastening plates at following spacing:
 - .1 Individual board edges, along steel studs: 150 mm oc.
 - .2 Board field, along intermediate steel studs: 300 mm oc.
 - .2 Shiplapped edges:

- .1 Screw boards using specified screws and variable diameter fastening plates at following spacing:
 - .1 Along ship-lapped edges, aligned with vertical steel studs, 150 mm oc, using min. 65 mm diameter fastening plates overlapping both boards placed side by side.
 - .2 Board field, along intermediate steel studs: 300 mm oc. using min. 32 mm diameter fastening plates.

3.3.2 Joint sealing:

- .1 Once polystyrene boards are installed, [prime board perimeters and] seal joints between each board using 100 mm wide membrane strips centered on the joint.
- .2 As work progresses, trowel apply air barrier sealant continuously to all board edges to a wet thickness of 3 mm.

3.3.3 Air barrier and thermal resistance continuity:

- .1 Block and seal protruding exterior cladding connectors and anchoring, fissures and around penetrations in air barrier system with gun-grade adhesive prescribed herein.
- .2 Inject low expansion polyurethane foam sealant into voids around windows, doors, ventilation louvres and other elements located in the air barrier system plane; avoid spillage past voids and protect from any contact with water.

3.4 **PROTECTION OF WORK**

- 3.4.1 Do not permit adjacent work to damage work of this Section.
- 3.4.2 Ensure finished Work is protected from climatic conditions.

END OF SECTION

PART 1 – GENERAL

1.1 WORK INCLUDED

- 1.1.1 Provide labour, materials, products, equipment and services to complete the weather barrier work.

1.2 REFERENCE DOCUMENTS

- 1.2.1 American Society for Testing and Materials (ASTM):

.1 ASTM C920, Specification for Elastomeric Joint Sealants.

- 1.2.2 Canadian general Standards Board (CGSB):

.1 CAN/CGSB 51.34-M, Vapour Barrier, Polyethylene Sheet for Use in Building Construction.

1.3 SUBMITTALS

1.3.1 Product Data:

- .1 Submit product data for weather barrier.
- .2 Submit manufacturer's installation instructions including preparation, installation requirements, product storage and handling.

1.4 QUALITY ASSURANCE

- 1.4.1 The applicator shall be familiar with and fully equipped to apply weather barrier membranes and shall be familiar with the OBC requirements of continuous barriers.
- 1.4.2 The applicator shall be approved by the manufacturer and use the various products following the recommendations and standard details of the manufacture.

1.5 DELIVERY STORAGE AND HANDLING

- 1.5.1 Materials shall be delivered to the job site in undamaged and original packaging indicating the name of the manufacturer and product.
- 1.5.2 Store roll materials on end in original packaging.
- 1.5.3 Store liquid membrane and primers at temperatures of 5°C and above to facilitate handling. Keep solvent away from open flames or excessive heat.
- 1.5.4 Protect rolls from direct sunlight until ready for use.
- 1.5.5 Liquid membrane and primers contain solvents and are flammable. Do not use near open flame or spark.

1.6 SITE CONDITIONS

- 1.6.1 No installation work shall be performed during rainy or inclement weather and on frost covered or wet surfaces.

1.7 WARRANTY

- 1.7.1 Guarantee the Work of this Section for a period of 5 years against defects in materials and workmanship.

PART 2 – PRODUCTS

2.1 MATERIALS

Refer to Drawings for location of sheet vapour retarder, membrane vapour retarder, and vapour permeable air barrier.

2.1.1 Sheet vapour retarder (at locations such as interior side of gypsum board):

- .1 Sheet: 6 mil. polyethylene sheet to CAN/CGSB-51.34M.
- .2 Vapour retarder sealant tape: 50 mm wide polyethylene with laminated cloth backing with high-tack rubber-faced adhesive in total min. thickness of 1.5 mil.
- .3 Sealant: ASTM C920, One-part, non-sag, non-bleeding, non-drying, non-hardening, sealant shall remain tacky for permanent bonding to all surfaces.
- .4 Moulded box vapour retarder: factory-moulded polyethylene box for use with recessed electrical switch and outlet device boxes.

2.1.2 Membrane vapour retarder (at locations such as aluminum windows, curtain walls, shelf angles, control joints, construction joints, parapet walls, composite aluminum panels.

- .1 1.0 mm thick, single-ply, self adhering, self sealing, rubberised asphalt, bonded to a cross-laminated high density polyethylene film. 'Blueskin SA' by Henry Company Canada Inc., 'Sopraseal Stick 1100 T' by Soprema, or approved alternative.
- .2 Primer and mastic: As recommended by manufacturer.
- .3 Metal fastening bars: Minimum 3 mm thick x 25 mm wide strips of sheet aluminum with compatible fasteners, and punched at 150 mm o.c.

2.1.3 Vapour permeable air barrier (at locations such as masonry walls with air cavity and metal siding):

- .1 Single-ply, self adhering membrane consisting of engineered film and permeable adhesive with poly-release film; 'Delta-Vent SA' by Cosella-Dörken, 'Blueskin VP160' by Henry Company Canada Inc. or 'WrapShield SA' by Vaproshield or SPR Air Outshield SA-280. Primer as recommended by membrane manufacturer.
- .2 Sealant: ASTM C920, Type S, Grade NS, Class 25; Moisture sure, medium modulus polymer modified sealing compound 'HE925 BES' by Henry Company Canada Inc. or approved alternative by Cosella-Dörken Products, Inc. or VaproShield.

PART 3 – EXECUTION

3.1 EXAMINATION AND COORDINATION

- 3.1.1 Do not proceed with weather barrier installation until all defects in the substrate have been repaired.
- 3.1.2 Coordinate with related Sections and assure that a fully continuous barrier will be constructed to prevent air and vapour in-filtration and ex-filtration through exterior walls, soffits, roof and other components separating heated spaces from unheated ones. Coordinate with weather barriers specified in other sections.
- 3.1.3 Use barrier materials which can be installed to withstand differential air pressures resulting from specified environmental conditions inside the building and OBC defined maximum design wind loads on the exterior of the building.
- 3.1.4 Seal effectively all joints between adjoining barriers and at all penetrations through them.
- 3.1.5 Consider details shown on drawings as illustration of basic conditions and use them as guides for implementing the requirements of this subsection; select all details to conform to the pressurized rain screen principle.

3.2 PREPARATION

- 3.2.1 Do not install weather barrier until other Work which penetrates membrane has been completed.
- 3.2.2 Ensure that all surfaces to receive air barrier are smooth, clean, dry, and in good condition. Ensure that all moisture, grease, machine oil, and other foreign material have been removed.
- 3.2.3 Ensure that concrete has been cured minimum (14) days and dry before weather barrier is applied.
- 3.2.4 Clean and prepare existing substrates to receive applied materials. Provide clean compatible substrates suitable for positive bond of membranes. Patch, fill and level surfaces with latex modified cementitious type parging, or other approved parging, as required to ensure smooth, solid substrates.
- 3.2.5 Cracks in masonry and concrete to be sealed with a strip of membrane flashing, extending minimum 75 mm on both sides of crack.

3.3 SHEET VAPOUR RETARDER INSTALLATION

- 3.3.1 Install sheet vapour retarders on warm side of exterior wall, ceiling and soffits assemblies prior to installation of interior cladding.
- 3.3.2 Use sheets of largest practical size to minimize joints.
- 3.3.3 Inspect sheets for continuity. Repair punctures and tears effectively before Work is concealed.
- 3.3.4 Assure that vapour retarders, intended to function as air barriers, can withstand the air pressures to which they are exposed.
- 3.3.5 Lap joints minimum 100 mm and tape with sealant tape.
- 3.3.6 Inspect for continuity. Repair punctures and tears with sealing tape before work is concealed.
- 3.3.7 Perimeter Seals:
 - .1 Seal perimeter of sheet vapour retarder as follows:
 - .2 Apply continuous bead of sealant to substrate at perimeter of sheets.
 - .3 Lap sheet over sealant and press into sealant bead.
 - .4 Ensure that no gaps exist in sealant bead. Smooth out folds and ripples occurring in sheet over sealant.
- 3.3.8 Lap Joint Seals:
 - .1 Seal lap joints of sheet vapour retarder as follows:
 - .2 Attach first sheet to substrate.
 - .3 Apply continuous bead of sealant over solid backing at joint.
 - .4 Lap adjoining sheet minimum 150 mm and press into sealant bead.
 - .5 Ensure that no gaps exist in sealant bead. Smooth out folds and ripples occurring in sheet over sealant.
- 3.3.9 Electrical Boxes:
 - .1 Seal electrical switch and outlet device boxes that penetrate vapour retarder as follows:
 - .2 Install moulded box vapour retarder.
 - .3 Apply sealant to seal edges of flange to main vapour retarder and seal wiring penetrations through box cover.

3.4 **MEMBRANE VAPOUR RETARDERS**

- 3.4.1 Install air/vapour retarder and associated components in accordance with manufacturer's instructions in locations indicated.
- 3.4.2 Primer:
- .1 Prime substrate surfaces to receive air/vapour retarder, at recommended application rate, allow to dry. Vary coverage to suit surface porosity.
 - .2 Prime surfaces. Re-prime surfaces if not covered with air/vapour retarder within 4 hours.
- 3.4.3 Mastic:
- .1 Install mastic where required to ensure integrity of air/vapour retarder installation at protrusions and other complex details.
 - .2 Fill substrate voids, gaps, depressions, cracks, and joints with mastic until continuous, smooth, substrate for air/vapour retarder is achieved.
- 3.4.4 Lap air/vapour retarder ends and edges 50 mm minimum. Roll air/vapour retarder and laps for continuous adhesion over entire substrate area; use manufacturer's recommended roller.
- 3.4.5 Extend air/vapour retarder as required to connect to roof parapets, windows, doors frames, aluminum work and other components of Work comprising air/vapour retarder system.
- 3.4.6 Provide end-dams and terminations fabricated from same material as membrane air/vapour retarder or material recommended by membrane manufacturer at sills, lintels, openings, and where horizontal surfaces intersect with vertical surfaces to ensure moisture is shed to exterior.
- 3.4.7 Cut and fit air/vapour retarder as required for passage of protrusions, ensuring continuous adherence to substrate.
- 3.4.8 At end of days' Work, trowel mastic water cut-off along uppermost edge of incomplete air/vapour retarder assembly, to prevent loss of adhesion and damage air/vapour retarder.
- 3.4.9 Supply and install continuous mechanical fastening bar to clamp air/vapour retarder both sides of unfilled gaps, cracks, and joints.

3.5 **VAPOUR PERMEABLE AIR BARRIER**

- 3.5.1 Prime substrate surfaces to receive air barrier in accordance with manufacturer's instructions, at recommended application rate, allow to dry. Vary coverage to suit surface porosity.
- 3.5.2 Prime surfaces. Re-prime surfaces if not covered with air barrier within 4 hours.
- 3.5.3 Install mastic where required to ensure integrity of air barrier installation at protrusions and other complex details.
- 3.5.4 Install air barrier in accordance with reviewed shop drawings and manufacturer's instructions in locations indicated.
- 3.5.5 Lap air barrier ends and edges 50 mm minimum. Roll air barrier and laps for continuous adhesion over entire substrate area; use manufacturer's recommended roller.
- 3.5.6 Extend air barrier as required to connect to other components of Work comprising air barrier system.
- 3.5.7 Provide end-dams and terminations fabricated from same material as air barrier or material recommended by membrane manufacturer at sills, lintels, openings, and where horizontal surfaces intersect with vertical surfaces to ensure moisture is shed to exterior.

3.5.8 Cut and fit air barrier as required for passage of protrusions, ensuring continuous adherence to substrate.

3.5.9 Seal around masonry reinforcing or ties and all penetrations with termination mastic.

3.5.10 At end of days' Work, trowel mastic water cut-off along uppermost edge of incomplete air barrier assembly, to prevent loss of adhesion and damage air barrier.

3.5.11 Do not expose air barrier to sunlight for more than 30 days prior to enclosure.

3.6 **FIELD QUALITY CONTROL**

3.6.1 Inspect weather barriers immediately prior to installation of subsequent construction. Manufacturer shall provide site inspections, technical assistance, and membrane application guidance, as may be necessary to complete the weather barrier application.

3.7 **CLEAN-UP**

3.7.1 Upon completion of work of this Section, inspect completed weather barriers and repair all defects to meet the specifications.

3.7.2 Clean-up all debris, excess materials and equipment and remove from site.

3.7.3 Clean work of all drippage, spills of sealant, mastic, and primers.

3.8 **ADJUSTMENTS**

3.8.1 Correct all work found to be defective by independent testing agencies.

3.8.2 Pay for the cost of testing if defects were found.

END OF SECTION

PART 1 - GENERAL

1.1 WORK INCLUDED

- 1.1.1 Provide labour, materials, products, equipment and services to complete the metal composite wall panel work.

1.2 REFERENCES

1.2.1 American Architectural Manufacturers Association (AAMA):

- .1 AAMA 2605, Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminium Extrusions and Panels - Series: Components, Coatings and Finishes.
- .2 AAMA CW-10, Care and Handling of Architectural Aluminium from Shop to Site.

1.2.2 American National Standards Institute (ANSI):

- .1 ANSI/ASME B18.6.4, Thread Forming and Thread Cutting Tapping Screws and Metallic Drive Screws.

1.2.3 American Society for Testing and Materials (ASTM):

- .1 ASTM C920, Specification for Elastomeric Joint Sealants.
- .2 ASTM D1781, Standard Test Method for Climbing Drum Peel for Adhesives.
- .3 ASTM D4214, Standard Test Methods for Evaluating the Degree of Chalking of Exterior Paint Films.

1.2.4 Canadian Standards Association (CSA):

- .1 CSA G40.20/G40.21M, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steels.
- .2 CSA S136, Design of Cold Formed Steel Structural Members.
- .3 CSA W47.1, Certification of Companies for Fusion Welding of Steel.
- .4 CSA W47.2, Certification of Companies for Fusion Welding of Aluminum.
- .5 CSA W59, Welded Steel Construction (Metal Arc Welding).

1.3 DESIGN REQUIREMENTS

- 1.3.1 Design soffit system to accommodate expansion and contraction of soffit elements without causing buckling, failure of joints, undue stress on fasteners or other effects detrimental to appearance or performance.
- 1.3.2 Design soffit system to withstand live, dead, lateral, wind, seismic, handling, transportation, and erection loads, imposed and other loads.
- 1.3.3 Prevent rain penetration through system. Incorporate means of draining to the exterior.
- 1.3.4 Design exterior metal panel system to support its own weight and the wind load, positive and negative, prevalent for the location of the building, but no less than windgust pressure calculated from National Building Code using 1-10 year probability factor. To minimize the potential for "dished" panels after loading, permanent set of the panel, measured normal to the panel surface after application and removal of the design load, must not exceeding L/800 of distance between supported edges of panel or distance between stiffeners where stiffeners are used. Stiffeners, where used, must not deflect more than L/90 of span under load.
- 1.3.5 Design exterior metal panel system to accommodate thermal movements of the components and structural movements to provide an installation free of oil canning, buckling, delamination, failure of joint seals, excessive stress on fasteners or any other detrimental effects.

- 1.3.6 Design composite panel system to prevent rattling and vibration of panels, overstressing of fasteners and clips, and other detrimental effects on the system.
- 1.3.7 Panel removal: System design to allow removal of individual panels within wall system.
- 1.3.8 Design miscellaneous, additional structural framing members as required to complete composite panel system, where not indicated on Contract Drawings.
- 1.3.9 The attachment face of subgirts supporting the panel system must not deflect vertically more than 3 mm due to the dead load of the panel system.
- 1.3.10 **SUBMITTALS**
- 1.3.11 **Product data:** Submit copies of manufacturer's Product data indicating:
 - .1 Performance criteria, compliance with appropriate reference standard, characteristics, limitations.
 - .2 Product transportation, storage, handling and installation requirements.
- 1.3.12 **Shop drawings:** Submit shop drawings indicating elevations, details, profiles, dimensions, thickness of materials, finishes, methods of joining, joint location, methods of anchoring, anchor and clip details, types of sealants and gaskets, details of other pertinent components of the work, and compliance with design criteria and requirements of related work.
- 1.3.13 **Samples:** Submit two 300 x 300 mm samples of panels in the selected colours and finish for approval.
- 1.3.14 **Closeout Submittals:** Provide maintenance instructions for incorporation into Operation and Maintenance Manual
- 1.3.15 **Reports:** Submit written field inspection and test report results after each inspection.
- 1.4 **QUALITY ASSURANCE**
- 1.4.1 **Installers qualifications:** Perform Work of this Section by a company that has a minimum of five years proven experience installing work of similar size and nature and that is approved by system manufacturer. Submit to Consultant, applicator's current certificate of approval by the material manufacturer as proof of compliance.
- 1.4.2 Soffit system manufacturer shall conduct Site inspections, prepare and submit written inspection reports verifying that this part of Work is in accordance with Contract Documents and reviewed shop drawings. Perform inspections once per week minimum.
- 1.4.3 **Mock-up:**
 - .1 Construct one 3000 mm minimum mock-up of soffit system in location acceptable to Consultant.
 - .2 Arrange for Consultant's review and acceptance.
 - .3 Mock-up may remain as part of Work if accepted by Consultant. Remove and dispose of mock-ups which do not form part of Work.
- 1.4.4 Execute steel welding to CSA W59 by fabricators certified by the Canadian Welding Bureau to CSA W47.1.
- 1.4.5 Execute aluminium welding by fabricators certified by the Canadian Welding Bureau to CSA W47.2.
- 1.5 Execute finishing coatings and metal pre-treatments by applicators approved in writing by the manufacturer of the coatings and under the supervision of the manufacturer's qualified representative.

1.6 DELIVERY, STORAGE, AND HANDLING

- 1.6.1 Handle aluminium Work in accordance with AAMA CW-10. Protect aluminium surfaces with strippable coating. Do not use adhesive papers or sprayed coatings which bond when exposed to sunlight or weather. Do not remove before final cleaning of building.

1.7 EXTENDED WARRANTY

- 1.7.1 Submit warranty for composite panel Work in accordance with General Conditions, except that warranty period is extended to 3 years.
- .1 Against leaking, warping, twisting, joint, and finish failure.
 - .2 Coverage: Complete replacement including affected adjacent parts.
- 1.7.2 Manufacturer's Warranty: Provide panel manufacturer's written warranty naming Owner as beneficiary and covering failure of factory-applied exterior finish on composite metal panels within the warranty period; warrant finish per ASTM D4214 for chalk not in excess of 8 NBS units and fade not in excess of 5 NBS units. Warranty period for finish: 10 years from date Work is certified as substantially performed.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURER(S)

- 2.1.1 Alucobond Composite panels by 3A Composites.
- 2.1.2 Larson by Alucoil.
- 2.1.3 Alpolic Composite panels, by VicWest.
- 2.1.4 Reynobond by Alcoa Architectural Prod.
- 2.1.5 Alcotex Aluminum Composite Material.

2.2 MATERIALS

- 2.2.1 **Composite Aluminium Panel:** Dry set composite material consisting of a thermoplastic compound core laminated between two sheets of 0.51 mm thick of 3303 alloy aluminium formed in a continuous process without the use of glues or adhesives between dissimilar materials. Panel thickness: 4 mm. Bond integrity testing to adhere to ASTM D1781.
- 2.2.2 **Finishes:**
- .1 Exposed to view:
 - .1 PPG Duranar XL Plus, 3 coat, coil coated fluoropolymer thermal setting enamel containing Kynar 500 resin, meeting requirements of AAMA 2605, minimum thickness 2.4 mil.
 - .2 Metallic Colour: Refer to drawings for colours.
 - .2 Concealed aluminium finish: Mill finish.
- 2.2.3 **Structural shapes, plates, sag rods, and similar items:** CSA G40.20/G40.21-M, Grade 350W.
- 2.2.4 **Z girts and C channels:** CSA S136-M; Minimum 1.2 mm thick, Z275 galvanized. Depth as indicated on Contract Drawings.
- 2.2.5 Provide all additional structural supports not shown on Drawings as required.
- 2.2.6 **Fasteners:** Concealed, ANSI/ASME B18.6.4, stainless steel Type 304.

- 2.2.7 **Flashings, Closure Pieces, Trim:** Same material and colour as panels.
- 2.2.8 **Clips and Panel Reinforcement:** Extruded aluminium.
- 2.2.9 **Sealants:** In accordance with Section 07 92 00.
- 2.2.10 **Touch-up paint:** as recommended by panel manufacturer.
- 2.2.11 **Isolation coating:** Bituminous coating, acid and alkali resistant material.
- 2.2.12 **Joint backing:** Product as recommended by siding sealant manufacturer.
- 2.2.13 **Soffit vents:** Continuous, high impact, rigid, polyvinyl chloride type soffit vent with continuous insect screen as recommended by composite panel manufacturer.
- 2.2.14 **Sealant:** ASTM C920, Type M, Grade NS, Class 25; Two-part, Polyurethane non-sag type, Sikaflex 2C-NS by Sika Canada Inc. or Dymeric 240 by Tremco Ltd. Colour: As selected by Consultant.

2.3 **FABRICATION**

- 2.3.1 Fabricate facings and concealed support members in a manner which will provide an installation free of exposed fastenings, with sufficient support and allowance for thermal movement to prevent facing distortion. Take site measurements before proceeding with production.
- 2.3.2 Fabricate components of the system at factory, ready for field installation. Include full continuous joint reveals within system.
- 2.3.3 Fabricate facings flat, true, free of marks, without visible distortion and with edges straight and true. Make all planes true, and corners square and bend of minimum radius.
- 2.3.4 Provide proprietary aluminium extrusions to manufacturer's standard profiles for a complete installation.
- 2.3.5 Extrusions shall be full length around panel perimeter for panel reinforcement and alignment. Intermittent clips are unacceptable.
- 2.3.6 Joint filler strip shall be same material and colour as panels. Use of caulking at joints is not acceptable.
- 2.3.7 Plastic shims shall be used as thermal separator between extrusions and sub-girts.
- 2.3.8 Form panels to dimensions indicated with tolerances to accommodate expansion and contraction between panels and structure members. Accurately form shaped panels.
- 2.3.9 Panel sizes and construction joints shall be consistent within the following range unless otherwise shown on drawings:
 - .1 Panel lengths: not less than 1500mm and not more than 1800mm.
 - .2 Joints: 12.7mm maximum.

PART 3 - EXECUTION

3.1 **EXAMINATION**

- 3.1.1 Verify condition and dimensions of previously installed Work upon which this Section depends. Report defects to Consultant. Commencement of Work means acceptance of existing conditions.
- 3.1.2 Verify that backup construction is aligned for proper installation of wall panels before commencing erection.

- 3.1.3 Protect metal surfaces in contact with concrete, masonry mortar, plaster or other cementitious surface with isolation coating.

3.2 **INSTALLATION**

- 3.2.1 Install soffit system in accordance with reviewed shop drawings, manufacturer's written instructions and under direct supervision of the manufacturer. Comply with system manufacturer's requirements regarding terminations at end of each day's work and resumption of work.

- 3.2.2 Supply and install miscellaneous, additional structural framing members, required to complete composite panel system, where not indicated on Contract Drawings.

- 3.2.3 Erect panels complete with girts, clips, and fasteners, to meet design criteria. Anchor each individual panel over solid backing. Ensure that all penetrations through air/vapour barrier are sealed.

- 3.2.4 Erect panels and joint filler strip in accordance with manufacturer's details to meet specified design criteria and performance. Use concealed fastening only.

- 3.2.5 Finished work shall be securely anchored, free of distortion, free of surface imperfections and uniform in colour.

- 3.2.6 Cut and flash wall penetrations.

- 3.2.7 Erect panels in straight lines, true, level, and plumb.

- 3.2.8 Site Tolerances: Erection tolerances apply to each individual panel and shall not be accumulative. Maximum deviation from vertical and horizontal alignment of erected panels 6 mm in 6 m.

3.3 **JOINT BACKING AND SEALANT**

- 3.3.1 Prepare substrate surface and mask as recommended by sealant manufacturer.

- 3.3.2 Install joint backing and sealant at perimeter of composite panel system and where indicated on drawings for weathertight installation. Tool sealant to concave profile.

3.4 **CONTROL JOINTS**

- 3.4.1 Install 12.7 mm control joints at the following locations:

- .1 Soffit abuts a structural element, dissimilar wall or other vertical penetration.
- .2 Construction changes within the plane of the soffit.
- .3 Ceiling or soffit dimensions exceed 15 m in either direction.
- .4 Locations indicated on drawings.

3.5 **REPAIR**

- 3.5.1 Remove damaged, dented, defaced, defectively finished, or tool marked components and replace with new.

- 3.5.2 Refinish shop applied finishes in field with compatible materials and only with approval of Consultant.

3.6 **CLEANING**

- 3.6.1 Remove protective plastic film from panels.

- 3.6.2 Clean off dirt resulting from erection from surfaces exposed to view.

END OF SECTION

PART 1 – GENERAL

1.1 SUMMARY

1.1.1 Reference Documents:

- .1 Drawings and general provisions of the Subcontract apply to this Section.
- .2 Review these documents for coordination with additional requirements and information that apply to work under this Section.

1.1.2 Section Includes:

- .1 Preformed and prefinished steel siding including related trim, flashings, closures, sub-girts, and installation accessories.

1.2 REFERENCES

1.2.1 General:

- .1 The following documents from part of the Specifications to the extent stated. Where differences exist between codes and standards, the one affording the greatest protection shall apply.
- .2 Unless otherwise noted, the referenced standard edition is the current one at the time of commencement of the Work.
- .3 Refer to Division 01 Section – General Requirements for the list of applicable regulatory requirements.

1.2.2 ASTM International:

- .1 ASTM A653 / A653M Standard Specification of Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- .2 ASTM A792 / A792M Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.

1.3 SYSTEM DESCRIPTION

1.3.1 Structural Requirements:

- .1 Design, fabricate and install preformed metal wall panels (and sub-girts) to withstand design wind pressures prescribed in the Ontario Building Code.
 - .1 Design spans are shown on the Drawings. Additional structural supports that would reduce design span or panel gage shall be the responsibility of the Subcontractor.
- .2 Maximum deflection of wall panels in a direction normal to the plane of the panel, when subjected to maximum design pressure shall not exceed $L/175$.

1.4 SUBMITTALS

1.4.1 Submit under provisions of Divisions 01 Section - General Requirements.

1.4.2 Product Data: Manufacturer's specifications, product data and installation instructions.

1.4.3 Shop Drawings: Shop and erection drawings for metal panels, trim, flashings, closures, sub-girts, fastenings, sealant and accessories. Show metal gages, dimensions and finishes. Indicate relationships and connections to adjacent materials.

1.4.4 Engineering Calculations: Engineering calculations substantiating compliance with structural requirements of Article 1.04A "Structural Requirements" shall be prepared, signed and stamped by a Structural Engineer.

1.4.5 **Samples:** Full profile width 300 mm long for approval of each metal panel color, finish and profile.

1.5 **QUALITY ASSURANCE**

1.5.1 **Qualifications:**

- .1 Manufacturer's Qualifications: Minimum of ten (10) years of successful experience in fabricating metal systems in this type of size.
- .2 Erector's Qualifications: Erector acceptable to panel manufacturer.

1.6 **DELIVERY, STORAGE AND HANDLING**

- 1.6.1 Transport, handle, and store panels and trim in a manner to preclude damage or staining of any nature.
- 1.6.2 Remove panels and trim which are cracked, bent, chipped, scratched, stained or otherwise unsuitable for installation and replace with new.

1.7 **WARRANTY**

- 1.7.1 Warrant metal finish for a period of twenty (20) years from date of installation against chipping, cracking, checking, peeling, blistering and colour change within the limitations stated in panel manufacturer's standard warranty.
- 1.7.2 **Subcontractor's Warranty:** Warrant panel system, including flashings, sealants, fasteners, and accessories against defective materials and/or workmanship, to remain watertight and weatherproof for two (2) years following Notice of Substantial Completion in accordance with the requirements of Division 01 Section – General Requirements.

PART 2 – PRODUCTS

2.1 **ACCEPTABLE MANUFACTURERS**

- 2.1.1 Agway Metals Inc.
- 2.1.2 Roll Form Group.
- 2.1.3 Vic West Steel Inc.

2.2 **MATERIALS**

- 2.2.1 **Steel Siding at Parapet Wall on Roof Side:** AD300-R with concealed fasteners by Vic West or approved alternative. Colour: Bone White
- 2.2.2 **Steel Soffit:** V-Rib, Soffit Panel, 24 gauge, vented, round holes on one side, Colour: Bone White, by Agway or equal.
- 2.2.3 Refer to Drawings for location, colour and other profiles.

2.3 **ACCESSORIES**

- 2.3.1 Trim, Closures and Flashings: Of same manufacture, material, gage and finish as wall panels.
- 2.3.2 Sub-Girts: G90 zinc coated, formed steel, 16 gage minimum as shown on approved engineering calculations submittal.
- 2.3.3 Fasteners: As per manufacturer's recommendations for conditions off se, stainless steel or hot dip galvanized. Fasteners shall be designed to be concealed where possible.

2.3.4 Sealants and Sealant Tapes: Non-sagging, non-bleeding type as per approved manufacturer's recommendations. Factory applied sidelap sealant is required, Field applied sidelap sealant is not permitted.

2.3.5 Profiles Closures: Neoprene or polyethylene foam, die-cut or formed to panel configuration.

2.4 **FABRICATION**

2.4.1 Factory fabricate components ready for field assembly, in accordance with manufacturer's specifications and recommendations and reviewed shop drawings for the particular installations and conditions indicated.

2.4.2 Fabricate wall panels in single lengths, top to bottom, as per field measurements. Transverse joints are not permitted.

2.4.3 Fabricate trim and flashings in longest practical lengths

PART 3 – EXECUTION

3.1 **CONDITION OF SURFACES**

3.1.1 Prior to commencing work, examine surfaces and framing to receive wall panels and accessories and report in writing any conditions that would prevent the proper installation of the system. Starting work implies acceptance of surfaces as satisfactory.

3.2 **COORDINATION**

3.2.1 Coordinate installation of wall panels and accessories with installation of work of other trades whose work adjoins with the work of this Section.

3.3 **INSTALLATION**

3.3.1 Install steel siding, flashings, closures, trim and accessories as per Drawing requirements, reviewed shop drawings and manufacturer's specifications, instructions and recommendations, and so as to provide a watertight installation.

3.3.2 Erect components using manufacturer's own crews or approved and licensed erector.

3.3.3 Remove any strippable protective coating on the panels, trim and flashings prior to installation. In any case, do not allow strippable coating to remain in extreme heat, cold, or in direct sunlight or other UV source.

3.3.4 Install work true, square and plumb, field cuts, bending and fitting neatly and accurately done without damage to surfaces.

3.3.5 Fit adjacent panels together so that joints are uniform, tight and in full contact.

3.3.6 Unless shown or specified otherwise, conceal fasteners. Where exposed fasteners are required for formed metal trim, they shall be uniformly spaced and aligned. Heads of exposed fasteners shall match adjacent panel and trim faces.

3.3.7 Provide sealants as per manufacturer's directions and recommendations and so as to provide a watertight installation.

3.3.8 Protect dissimilar metals from galvanic corrosion.

3.4 **CLEANING**

3.4.1 Clean exposed surfaces free of dirt, dust and construction soil. Touch up abrasions in factory applied coatings. Where extent of damage will not permit inconspicuous touch up and repair, removed damaged items from the site and replace with new.

3.5 **PROTECTION**

3.5.1 Protect work until entire installation is fully completed.

END OF SECTION

PART 1 – GENERAL

1.1 WORK INCLUDED

- 1.1.1 Provide labour, materials, products, equipment and services to complete the built-up bituminous roofing work.

1.2 REFERENCE DOCUMENTS

- 1.2.1 American Society for Testing and Materials (ASTM):
- .1 ASTM D2178, Standard Specification for Asphalt Glass Felt Used in Roofing and Waterproofing.
- 1.2.2 Canadian Standards Association (CSA):
- .1 CSA A123.3, Asphalt Saturated Organic Roofing Felt.
 - .2 CAN/CSA-A123.4, Asphalt for Constructing Built-Up Roof Coverings and Waterproofing Systems.
- 1.2.3 Underwriters Laboratory of Canada (ULC):
- .1 CAN/ULC S704, Standard For Thermal Insulation, Polyurethane and Polyisocyanurate, Boards, Faced.

1.3 SUBMITTALS

- 1.3.1 Prior to installation of roofing systems submit the following:
- .1 A list of materials intended for use on the job.
 - .2 A signed statement that all the materials listed therein meet the reference standards of these Specifications, including applicable FM fire resistance ratings.
 - .3 Copy of the primary roofing manufactures' publications applicable to the system proposed. Highlight individual system in publication.
- 1.3.2 **Shop Drawings:**
- .1 Provide layout for tapered insulation.

1.4 DELIVERY STORAGE AND HANDLING

- 1.4.1 Store materials on raised platforms in approved manner at site preceding application, and protect from inclement weather, at all times. Roofing membranes which become wet will be rejected.
- 1.4.2 Store roofing membrane rolls and insulation in heated atmosphere 20 degrees C for 24 hours before application in cold weather. Polywrap roofing membranes.
- 1.4.3 Do not store roof insulation in direct contact with the earth, road surface, or roof deck. Place suitable supports under the insulation upon delivery to protect it from absorbing dampness from the surrounding terrain or deck.
- 1.4.4 Do not store gravel on roof ahead of demand. Bring gravel to roof only as it is required for spreading as work proceeds.
- 1.4.5 Only remove as much roofing materials from storage as can be applied with 8 hours of continuous work.
- 1.4.6 Do not exceed design loads of roof structure when storing materials on roof.

- 1.4.7 Indicate on containers or wrappings of materials:
 - .1 Manufacturer's name and brand.
 - .2 Compliance with applicable standard.
- 1.4.8 Deliver materials in original containers, sealed, with labels intact. Ensure that shelf life of materials has not expired.
- 1.4.9 Deliver fasteners in boxes of kegs and keep in protective storage until used. Do not oil or grease fasteners.
- 1.4.10 Supply three copies of purchase orders to, Consultant. Include the following data:
 - .1 Purchase order number.
 - .2 Supplier's name and address.
 - .3 Purchaser's name and address.
 - .4 Contract number and job number.
 - .5 Material and governing specification including type, grade, colour, class and quantity.
 - .6 Bills of lading for liquid asphalt showing Equiviscous Temperature (EVT), Flash Point Temperature (FP) and Final Blowing Temperature (FBT).
 - .7 Shipping instructions.
 - .8 Destination.
- 1.4.11 Remove damaged and/or rejected materials from site.

1.5 **SITE CONDITIONS**

- 1.5.1 Do not install built-up bituminous membranes when air and substrate temperature remains below 5°C, or when wind chill gives equivalent cooling effect.
- 1.5.2 Install built-up bituminous membranes on dry substrate, free of snow and ice, use only dry materials and apply only during weather that will not introduce moisture into system.
- 1.5.3 Ensure that temperature of substrate and its moisture content conforms to manufacturer's minimum requirements, before proceeding with work.

1.6 **WARRANTY**

- 1.6.1 Provide 10 year, specified manufacturer's Total System Roofing Membrane guarantee from date of substantial performance of the project to include labour, material and workmanship.
- 1.6.2 Guarantee to cover: Roof insulation, membrane, base flashings and all other related products, quality performance and installation for 10 years. Guarantee costs are to be part of roofing bid.
- 1.6.3 Roof manufacturer and roofing applicator to make an inspection of completed work. All corrective work should be made by applicator prior to leaving job site. Consultant will make another roofing inspection at Substantial Performance of project which may result in another list of corrective items.
- 1.6.4 The roofing contractor will supply a written and signed document issued in the name of the Owner certifying that the work completed to remain as installed, free of any application defect for a period of two (2) years.

PART 2 – PRODUCTS

2.1 **MATERIALS**

- 2.1.1 **Vapour Barrier:** two-ply high strength kraft paper laminated together with an asphalt adhesive, complete with manufacturer's recommended adhesive tape suitable for making vapour tight joints.
- 2.1.2 **Bitumens:**
- .1 Bitumen: type 2 and type 3, as appropriate, asphalt to CAN/CSA A123.4.
 - .2 Primer: asphalt as recommended by membrane manufacturer.
 - .3 Roofing cement: asphalt to CSA A123.4.
 - .4 Sealing compound: rubber asphalt type as recommended by membrane manufacturer.
 - .5 Roofing felts: saturated glass fiber felts: to ASTM D2178, GAF Material Corporation Glass Ply IV, modified bitumen flashing CSA A123.3M.
- 2.1.3 **Roof insulation:**
- .1 Roof insulation: Polyisocyanurate to CAN/ULC S704, thickness as required, "Polyisocyanurate Roof" insulation to achieve R-35 min. as supplied by Atlas Corp ACFoam – II, GAF Material Corporation Energy Guard, or Carlisle Syntec Inc. , or IKOtherm by IKO.
 - .2 Tapered Insulation: Factory pre-engineered tapered insulation H-Shield, Tapered Rigid Roof Insulation as supplied by Accu-Plane or Posi-Slop or IPM slop. Submit shop drawings showing 2% slope (minimum).
 - .3 Overlayment: 13 mm asphalt high density fibreboard such as GAF Fibreboard.
- 2.1.4 **Modified Bituminous Cap Flashing Sheet:** SBS modified asphalt granular cap sheet 180 g moppable grade a manufactured by Soprema, or GAF Material Corporation Rubberoid MOP Plus Cap Sheet, or IKO.
- 2.1.5 **Accessories:**
- .1 Adhesive: listed by ULC under Roof Deck Construction Materials, Guide No. 360 R13 and as recommended by manufacturer of material being adhered and for use under climatic conditions to be encountered.
 - .2 Mechanical fasteners: coated and tested to Factory Mutual 4470 with recessed washer, length to suit application as per manufacturers specification for guarantee. (Such as OMA heavy duty / Olympic fasteners.)
 - .3 Pitch pockets: galvanized sheet steel, 0.95 mm thick, zinc coated.
 - .4 Fill for pitch pockets: Sikaflex 2C polyurethane elastomeric sealant white, or hot rubberized asphalt, Carlisle one part pourable sealer or GAF Material Corp M-Thane.
 - .5 Bituminous Paint: a quick drying asphalt enamel.
 - .6 Walkway pavers: Refer to Section 07 72 00.
 - .7 Expansion joints: FR-40 flexible flashing as manufactured by Lexsucu or GAF Material Corp metalastic expansion joint.
 - .8 Roof Hatch: Refer to Section 07 72 00.
 - .9 Aggregate: water washed river stone, rounded 6 mm to 16 mm free of all foreign matter, dust and fines, light grey colour only.
 - .10 Cant Strips:
 - .1 Cant strips are required at intersections of the roof and all walls, parapets, curbs, or angle changes greater than forty-five (45°) degrees that are to be flashed.
 - .2 Cant strips to be mechanically fastened with acceptable fasteners, set in hot asphalt.

- .3 Cant strips to be made of wood or fiberglass, Modular RTS Cant RSS – rigid mineral wool or approved alternative. Cant strips to be approximately 102 mm in horizontal and vertical dimension. The face of the cant shall have an incline of no greater than forty-five (45°) degrees with the roof. Wood cant strips shall be solid and not resistant. Wood cants shall be used when mechanical attachment to cants is required or when solid wood cants will help stabilize wood nailers at expansion joints or other penetrations.
- .4 Cant strips to be installed on top of roof insulation or wood nailers. All cant strips shall be neatly fitted at joints and mitered at inside and outside corners.
- .5 Metal cant or metal curb strips are not acceptable.

PART 3 – EXECUTION

3.1 WORKMANSHIP

- 3.1.1 Use materials to accordance with the manufacturer's recommendations.
- 3.1.2 Follow Ontario Industrial Roofing Contractor's Association Good Practice and Minimum Standards Code latest revision when higher application standards are not specified or shown.

3.2 PLANT AND EQUIPMENT

- 3.2.1 Do not use direct-fired equipment.
- 3.2.2 Use only kettles equipped with thermometers or gauges in good working order.
- 3.2.3 Locate kettles in safe place outside of building or, if approved by Consultant, on non-combustible substrate at location to avoid danger of igniting combustible material below. When locating kettles, give consideration to direction of prevailing winds, building fans and air handling units to minimize possibility of smoke and fumes entering surrounding occupied buildings. If wind direction causes smoke and fume problems, relocate kettles on daily basis when directed by Consultant.
- 3.2.4 Maintain supervision while kettles are in operation and provide metal covers for kettles to smother flames in case of fire. Provide suitable fire extinguishers.
- 3.2.5 Maintain efficiency of kettles and equipment by frequent cleaning. Remove all carbonized bitumen.
- 3.2.6 Maintain equipment in good condition. Equip kettles with thermometers which will accurately register the temperature of the bitumen at all times. Do not heat asphalt over 232 degrees C. Unless otherwise specified temperatures at the time of mopping shall be between 176.6 to 232 degrees C for Type 1 asphalt and between 190 to 218 degrees C for Type 2 and Type 3 asphalts.

3.3 PROTECTION

- 3.3.1 Cover walls and adjacent work where materials are hoisted or used.
- 3.3.2 Use warning signs and barriers. Maintain in good order until completion of work.
- 3.3.3 Clean off drips and smears of bituminous material immediately.
- 3.3.4 Dispose of rainwater off substrates and away from face of building until drains or hoppers installed and connected.
- 3.3.5 Protect from traffic and damage. Comply with precautions deemed necessary by Consultant.
- 3.3.6 Place plywood runways over work to enable movement of material and other traffic.

3.3.7 At end of each day's work or when stoppage occurs due to inclement weather, provide protection for completed work and materials out of storage.

3.3.8 Install insulation promptly to avoid possibility of condensation beneath vapour retarder.

3.4 EXAMINATION

3.4.1 Examine substrates and immediately inform Consultant in writing of defects.

3.4.2 Prior to commencement of work ensure:

- .1 Substrates are firm, straight, smooth, dry, free of snow, ice or frost, and swept clean of dust and debris.
- .2 Curbs have been built.
- .3 Drains have been installed at proper elevations relative to finished roof surface.
- .4 Plywood and lumber nailer plates have been installed to walls and parapets as indicated.
- .5 Deck is properly sloped to drains.
- .6 Items projecting through roof are solidly set and all rough carpentry items properly fitted and securely fastened to the backing.

3.5 VAPOUR BARRIER

3.5.1 Cover entire roof area over heated areas of building with vapour barrier lapping all edges at least 100 mm. Run vapour barrier up and over top of parapets and seal to parapet and other edge conditions, openings and protrusions with continuous tape seal or bead of butyl sealant.

3.5.2 At wood copings at top of precast concrete wall panels, if joint between adjacent panels is not flush, butter low side with butyl sealant to provide a gradual transition between panels so that no gaps or voids occur between vapour barrier and substrate.

3.5.3 Install vapour barrier in widest available width, smooth, free from air pockets, fishmouths, prominent lap joints or tears.

3.5.4 Tape seal all joints including joints to adjacent materials to form continuous vapour tight barrier. Taped joints shall occur over solid backing.

3.5.5 Ensure that vapour barrier is tight to substrate and is retained by the construction above the vapour barrier, or provide sealant bond, continuous clamping bar or mechanical fastening of vapour barrier, at all perimeter and protrusion locations, to ensure no gaps or voids exist which would allow interior air leakage to exterior.

3.5.6 Do not broom or roll the adhesive on to the vapour barrier.

3.6 INSULATION

3.6.1 Glazing top surface of vapour retardant if placing of insulation does not follow immediately.

3.6.2 Mechanically fasten insulation using screws and pressure distribution plates.

3.6.3 Number and pattern of screws per board to meet Factory Mutual requirements.

3.6.4 Take care to ensure that no voids exist between the roof surface and the underside of the insulation or between pieces of insulation. Where insulation butts a sloping surface, trim the insulation to the profile of that surface.

3.6.5 Trim insulation to provide plain butt joints at the perimeter of the insulation, meets a vertical surface passing through roof, and at water cut-offs and trim off ship lap or bevel on edges in these locations.

- 3.6.6 Apply only as much insulation to the roof as can be covered the same day with built-up roofing. At the conclusion of each day's work, seal exposed edges of roof insulation. This seal shall be cut and lifted upon continuation of the Work.
- 3.6.7 Place boards in parallel rows and length parallel with slope, with ends staggered, and in firm contact with one another.
- 3.6.8 Cut end pieces to suit.
- 3.6.9 Install fibreboard overlayment in a solid mopping of Type 3 asphalt, staggering all joints from the insulation below.
- 3.7 **ROOF CANTS**
- 3.7.1 Supply and install non-asphaltic fibre roof cant strips at horizontal and vertical intersections, if necessary for membrane manufacturer's requirements.
- 3.8 **HEATING OF ASPHALT**
- 3.8.1 Asphalt to be heated in kettle or tanker sufficiently to provide correct EVT range at point of application.
- 3.8.2 In cold weather insulate hauling equipment and re-circulation lines to minimize heat loss.
- 3.8.3 Do not heat asphalt above its Final Blowing Temperature (FBT) in tanker.
- 3.8.4 Heating asphalt above its FBT may be permissible in kettle as long as asphalt is used up within four hours.
- 3.8.5 Equip kettle and tanker with working thermometers.
- 3.9 **MEMBRANE**
- 3.9.1 Apply four ply roofing membrane to CRCA Specification. Phased roofing is not acceptable.
- 3.9.2 Apply membrane flashings as detailed and/or as required to CRCA Specification and finish with flashing cap sheet.
- 3.9.3 Mop in and seal flashings and flanges of items projecting through membrane.
- 3.9.4 Install expansion joints in roofing membranes where indicated and as required to facilitate differential movements.
- 3.9.5 Starting at low point, perpendicular to slope, embed four piles of roofing felts in hot asphalt over insulation.
- 3.9.6 Overlap sheets $\frac{3}{4}$ of their width plus 15 mm for four ply membrane and lap ends 150 mm.
- 3.9.7 Apply asphalt at rate of 1.2 kg/m^2 with glass felts.
- 3.9.8 Extend felts up to top of cant strip.
- 3.9.9 Install water cut-offs at end of day, and remove before resuming work.
- 3.9.10 Apply uniform flood coat at rate of 3 kg/m^2 for asphalt and while bitumen is still hot, apply protective gravel at rate of 20 kg/m^2 .
- 3.9.11 Ensure that there are no skips in flood coat. If some are found, sweep gravel aside and reflood area.
- 3.10 **BITUMINOUS FLASHINGS**

- 3.10.1 Following installation of the roof membrane apply bituminous flashing consisting of three plies of No. 15 felt laid in bitumen and prepared to receive elastic flashing, metal flashing.
- 3.10.2 At vertical abutments, install first ply to cover face of cant and extend 200 mm over roof membrane and 150 mm above cant, apply two additional plies to overlap preceding ply by 75 mm over roof membrane and 100 mm above cant. Fully mop in each ply.
- 3.10.3 At canted eaves or parapets, install two plies to cover face of cant and extend 200 mm over roof and 75 mm above fascia. Turn top edge down over fascia and nail. Apply third ply in similar manner but overlap other plies by 50 mm over roof membrane.

3.11 **CAP FLASHING**

- 3.11.1 At canted locations, install 4th ply of modified bituminous cap sheet in Type 3 asphalt.
- 3.11.2 Carry flashing down over cant and out 150 mm onto membrane before top pour. Adhere to membrane Seal all joints and edges. Cover lower, flat part of flashing with top pours of bitumen and aggregate.
- 3.11.3 Provide a minimum overlap of 100 mm when forming laps and flashing corners. Torch all laps.
- 3.11.4 Install expansion joints at locations as detailed on drawings.

3.12 **GRAVEL SURFACING**

- 3.12.1 Inspect entire area to ensure no wrinkles, buckles or fishmouths exist.
- 3.12.2 Apply bitumen and gravel surfacing only after placement of roofing felts and membrane flashings.
- 3.12.3 Apply flood coat of hot bitumen at 3 kg/m² into which, while hot, embed aggregate at minimum rate of 20 kg/m². Ensure aggregate is dry and free from frost.

3.13 **FIELD QUALITY CONTROL**

- 3.13.1 Inspection and testing of roofing application will be carried out by testing laboratory designated by Consultant.
- 3.13.2 Costs of tests will be paid by the owner.
- 3.13.3 Arrange site meeting with Roofing Inspector three weeks prior to commencement of Work on site. Obtain Inspector's instructions with reference to procedures to be followed.
- 3.13.4 Cooperate with the Inspector and afford all facilities necessary to permit full inspection of the Work and testing of materials prior to their use. Act. Immediately on instructions given by the Inspector.
- 3.13.5 The inspection and testing consultant will check, among other things: surfaces prepared to receive the membrane, materials to be used, installation of the vapour retarder and insulation, installation of membrane flashings, application thickness of membranes, bitumen temperature, moisture content and aggregate cover.
- 3.13.6 Make cut-outs for testing purposes when required and make good roofing without additional cost to the Owner.
- 3.13.7 A representative of the roofing membrane manufacturer shall make a minimum of 2 visits to the site to ensure that the membrane application is carried out in compliance with the manufacturer's established procedures. A letter to this effect shall be submitted after each inspection.

3.14 PROTECTION OF FINISHED WORK

- 3.14.1 Where work must continue over finished roofing membrane, protect surface with minimum 12 mm thick plywood sheets.

3.15 CLEANING

- 3.15.1 Check drains to ensure cleanliness and proper function, and remove debris, equipment and excess material from site.

END OF SECTION

PART 1 – GENERAL

1.1 WORK INCLUDED

- 1.1.1 Provide labour, materials, products, equipment and services to complete the sheet metal flashing work.

1.2 REFERENCE DOCUMENTS

- 1.2.1 American Society for Testing and Materials (ASTM):

- .1 ASTM A653/A653M, Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- .2 ASTM C920, Specification for Elastomeric Joint Sealants.

1.3 QUALIFICATIONS

- 1.3.1 Flashing and sheet metal work is to be performed by a company which is a member in good standing of the Canadian Roofing Contractor's Association and which has a minimum of 5 years of proven satisfactory experience in the type of work specified.

PART 2 – PRODUCTS

2.1 MATERIALS

2.1.1 Sheet Metal:

- .1 Steel sheet: to ASTM A653/A653M; Classification LFQ. Grade A, Z275 zinc coating designation, 0.60 mm minimum base steel thickness.
- .2 Precoated Finish for Sheet Steel (used over out of sight surfaces such as roof curbs):
 - .1 Use sheet metal with pre-coated finish where metal is exposed to view.
 - .2 Organic coating applied to galvanized sheet steel in shop by continuous coating line, Perspectra Series by U.S. Steel Canada, or WeatherX by Vicwest Canada.
- .3 Apply manufacturers standard back coating to back face of sheet metal.

- 2.1.2 **Sealant:** ASTM C920, Type S, Grade NS, Class 25; High-performance, medium-modulus, one-part, neutral-cure silicone sealant. 'CWS' by Dow Corning or approved alternative.

- 2.1.3 **Nails, Screws, Bolts and Other Fastenings:** Corrosion resistant to suit the applicable conditions.

PART 3 – EXECUTION

3.1 INSTALLATION – GENERAL

- 3.1.1 Perform all required flashing and sheet metal work.

- 3.1.2 Supply to the various trades concerned, in ample time, all inserts and accessories required to be built into the work of other Sections. Instruct as to the proper location and position of reglets, inserts, accessories and such items.

- 3.1.3 Cooperate with mechanical and electrical trades to ensure watertight junctions with drains, vents, and other items in or passing through the roof.

3.2 METAL FLASHINGS

- 3.2.1 Provide metal flashings not included under other Sections.

- 3.2.2 Do not install metal flashings until the roofing system has been reviewed and accepted.
- 3.2.3 Lock all joints using a type of joint which will allow for expansion and contraction, and which will produce surfaces which are free from buckling, warp, wave, dents, oil canning or other defects. Provide corners square and surfaces straight and in true planes.
- 3.2.4 Provide all metal drips, cleats, clips and starter strips as shown and required, fabricated of the same metal as the flashing and of sufficient thickness to hold flashings in true planes without deformation.
- 3.2.5 Do not fasten metal counterflashings on the top of cant strips to the cant strip and do not fasten on the face with nails or screws.
- 3.2.6 Where reglets are shown, securely anchor into the reglet above the membrane flashing with lead wedges or pack with lead wool, ready to receive sealant.
- 3.2.7 At parapets, coordinate the installation of metal flashing with items provided by other Sections.
- 3.2.8 Extend flashings out onto the surface of the membrane as shown and/or required.
- 3.2.9 Provide metal flashing for scupper overflow drains at copings as shown.
- 3.3 **MISCELLANEOUS ROOF OPENINGS**
 - 3.3.1 Provide flashings around all mechanical and electrical openings, ducts, pipes and other projections through roofs as detailed and as required. Ensure that all members passing through the roof deck have a properly caulked air seal on the underside.
 - 3.3.2 Fabricate metal sleeves around vent pipes and other similar items. Coordinate with the preformed roofing flashings work.
 - 3.3.3 Dress down metal counterflashings supplied with the item passing through the roof and seal and make good the completed installation.
- 3.4 **FLASHING POCKETS**
 - 3.4.1 Provide metal flashing pockets where indicated and required. Wherever possible, avoid the use of flashing pockets and flash the penetrating item with membrane flashing as part of the work of the roofing Section.
 - 3.4.2 Flashing pocket openings are to be 50 mm wider than the member passing through the pocket unless shown otherwise.
 - 3.4.3 Fabricate flashing pockets of prefinished steel sheet, "L" shaped, with a 150 mm bottom flange and minimum 150 mm high uprights with folded exposed edges. Double hem and continuously seal all joints.
 - 3.4.4 Place the bottom flange on the top of the membrane and securely anchor in place. Coordinate the application of membrane flashing around the perimeter of the flashing pocket, and ensure that it extends for not less than 457 mm beyond the flashing pocket.
 - 3.4.5 When the roofing is complete, fill flashing pockets with semi-rigid fibrous glass or mineral wool insulation to within 50 mm of the top and fill the remainder with 2 component polyurethane sealant sloped to drain from the centre. Do not damage or contaminate the roofing membrane.
- 3.5 **SEALING**
 - 3.5.1 **General:** Apply sealant into all reglets, along joints, and over fasteners upon completion of the flashing. Apply sealant wherever else shown.

- 3.5.2 **Preparation:** Ensure that the ambient and surface temperatures are above 4°C and that surface conditions are suitable for the materials to be installed. Conform to the following preparation requirements:
- .1 Ensure that surfaces to be sealed are sound, dry, free from dirt, water, frost, loose scale, corrosion, paints or other contaminants, and remove protective oil coatings and other oil or grease films
 - .2 Mask areas adjacent to the joints as required, and remove masking promptly after the joint has been completed
 - .3 If recommended by the manufacturer of the sealing materials, prime joints to prevent staining, or to assist the bond
 - .4 Apply primer with a brush which will permit all joint surfaces to be primed, and perform priming immediately before installation of sealant
- 3.5.3 **Installation:** Install materials in accordance with the manufacturer's instructions, and the following requirements:
- .1 Sealants are to be of gun grade or knife grade consistency to suit the joint condition
 - .2 Install sealant with pressure operated guns and properly sized nozzles, using sufficient pressure to fill all voids and joints
 - .3 Superficial painting with a skim bead will not be accepted
 - .4 The installation is to be a full bead free from air pockets and embedded impurities and having smooth surfaces, free from ridges, wrinkles, and sags
 - .5 Immediately clean adjacent surfaces which have been soiled and remove excess materials and droppings using recommended cleaners and solvents

END OF SECTION

PART 1 – GENERAL

1.1 WORK INCLUDED

- 1.1.1 Provide labour, materials, products, equipment and services to complete the roof accessories work.

1.2 REFERENCE DOCUMENTS

- 1.2.1 Canadian Standards Association (CSA):

- .1 CSA A231.1/A231.2, Precast Concrete Paving Slabs/Precast Concrete Pavers.

1.3 SUBMITTALS

- 1.3.1 **Shop Drawings:** Submit shop drawings and catalogue cuts to show all materials, thicknesses, gauges, finishes and other pertinent data.

1.4 DELIVERY, STORAGE AND HANDLING

- 1.4.1 Transport, handle and store units by approved methods to prevent damage.

1.5 WARRANTY

- 1.5.1 Installer to warranty installed system for a period of two (2) years.

PART 2 - PRODUCTS

2.1 MATERIALS

- 2.1.1 Precast Concrete Pavers:

- .1 Standard: 610 X 610 x 45 mm thick non-interlocking roof slabs, less than 5% absorption, minimum 55MPa compressive strength, standard diamond finish, chamfered edges, patio quality, conforming to CSA A231.1/A231.2. 'Diamond' concrete roof slab by Armtex, Brooklin or approved alternative.
- .2 Paver pedestal high density polyethylene Pave-El by EnviroSpec or approved alternative by Bison. Pedestal to support corners of precast pavers and raise the paver min. 16 mm from roof surface. Provide Min. 6 mm space between pavers to allow for drainage. Provide additional leveling plates for required.

- 2.1.2 Roof Hatch:

- .1 Factory assembled 760 mm x 900 mm 'Type S' Roof hatch by Bilco, 'Lexsuo R-100 Roof Hatch' by Lexsuo Canada Limited, or approved alternative complete with:
- .1 Cover of #14 gauge galvanized sheet steel with 75 mm beaded flange, neatly welded, and 25 mm thick fibrous glass insulation, fully covered and protected by a #22 gauge galvanized sheet steel cover liner.
- .2 Prefabricated curb 300 mm high of #14 gauge galvanized sheet steel formed with a 914 mm flange with holes provided for securing to the roof deck, and integral metal capflashing of same thickness and material as curb, fully welded for weather tightness.
- .3 25 mm thick rigid fibrous glass insulation on the curb walls.
- .4 Heavy pintle hinges, compression spring operators enclosed in telescopic tubes, positive snap latch with turn handles and padlock hasps inside and outside, and neoprene draft seal.
- .5 Automatic hold-open arm for the cover, complete with vinyl covered grip handle to permit easy, one hand release.

- .6 Externally mounted 90° angle corner type safety bar railing to provide exit assistance without blocking the hatch well, fabricated of heavy duty steel tubing coated in safety green coloured PVC.
- .7 Factory installed HASP, for maximum security padlock.
- .8 Safety post extension – Bilco Ladder-Up.
- .9 Bil-Guard 2.0 Roof Hatch Safety Railing System.

PART 3 – EXECUTION

3.1 INSTALLATION

- 3.1.1 Inspect units before installation and reject all damaged, chipped and cracked caps.
- 3.1.2 Roofing system to be approved by Consultant prior to installing roof accessories.
- 3.1.3 Install roof accessories in accordance with manufacturers written instructions.

3.2 FIELD QUALITY CONTROL

- 3.2.1 Cooperate with inspector and give him adequate notification when work is ready to be inspected. Work to be covered shall be inspected before covering proceeds.

END OF SECTION

PART 1 – GENERAL

1.1 WORK INCLUDED

- 1.1.1 Provide labour, materials, products, equipment and services to complete the firestopping work.

1.2 REFERENCE DOCUMENTS

- 1.2.1 American Society for Testing and Materials (ASTM):

- .1 ASTM C920, Standard Specification for Elastomeric Joint Sealants.
- .2 ASTM E2174, Standard Practice for On-Site Inspection of Installed Firestops.
- .3 ASTM G21, Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi.

- 1.2.2 Underwriters Laboratories of Canada (ULC):

- .1 CAN/ULC S115, Standard Method Of Fire Tests Of Firestop Systems.
- .2 CAN/ULC S702, Standard for Mineral Fibre Thermal Insulation for Buildings.

1.3 DESIGN CRITERIA

- 1.3.1 Contractor shall provide complete system with all components and accessories as required for fire resistant and smoke seal installation.
- 1.3.2 Firestopping and smoke seals: ULC or Intertek Testing Services listed Products and systems in accordance with CAN/ULC S115 suitable to actual application and installation conditions.
- 1.3.3 Firestop applications that exist for which no ULC or UL tested system is available through a manufacturer, a manufacturer's engineering judgment derived from similar ULC or UL system designs or other tests will be submitted to local authorities having jurisdiction for their review and approval prior to installation. Engineer judgment drawings must follow requirements set forth by the International Firestop Council.
- 1.3.4 Firestop and smoke seal system shall achieve a fire resistance rating and smoke seal rating equal to that of assemblies into which they are installed.
- 1.3.5 Provide smoke sealants over firestopping materials or combination smoke seal/firestop seal material to form air tight barriers to retard the passage of gas and smoke.
- 1.3.6 Firestopping and smoke seals located at movement joints shall be designed with movement capability.
- 1.3.7 Provide penetration firestoppping with mould and mildew resistance rating of 0 in accordance with ASTM G21.
- 1.3.8 Firestopping and smoke seals within mechanical and electrical assemblies shall be provided as part of the work of Divisions 21, 22, 23, 26, 27, and 28 respectively.

1.4 SUBMITTALS

- 1.4.1 **Product Data Sheets:** Submit copies of current ULC or WH listings for each system and condition. Submit manufacturer's product data and printed instructions for installation.
- 1.4.2 **Samples:** If requested, submit samples of each type of firestopping and smoke seal material indicating location(s) where system or material is to be used.

PART 2 – PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- 2.1.1 AD Fire Protection Systems Inc.
- 2.1.2 Hilti Canada Corporation.
- 2.1.3 3M Canada Inc.
- 2.1.4 Tremco Ltd.

2.2 MATERIALS

- 2.2.1 Firestop sealant: single component, low modulus, silicone rubber, moisture curing sealant to ASTM C920, ULC labelled to CAN/ULC S115. Hilti CP-606 or equal.
- 2.2.2 Pre-Installed firestop devices for use with non-combustible and combustible pipes, conduit and/or cable bundles penetrating concrete floors and walls.
- 2.2.3 Re-penetrable, round cable management devices for use with new or existing cable bundles penetrating walls:
- 2.2.4 Firestop insulation: to CAN/ULC S702, Type 2; mineral fibre manufactured from rock or slag, suitable for manual application.
- 2.2.5 Colour: White

PART 3 – EXECUTION

3.1 GENERAL

- 3.1.1 Provide all required firestopping and smoke seals for the following conditions
 - .1 Work penetrating walls and ceiling of fire rated separations.
 - .2 Top of fire rated walls
 - .3 Joint between floor and wall assembly
 - .4 Interior wall to exterior wall
 - .5 At floor slab edges adjacent interior wall and exterior wall at all floors above grade

3.2 PREPARATION

- 3.2.1 Clean bonding surfaces to remove loose materials and foreign matter which may otherwise impair effective bonding.
- 3.2.2 Ensure that pipe and duct insulation and wrappings occurring within openings to receive firestopping and smoke seal are installed prior to work of this Section and that insulation and wrappings within fire seals is a listed component of the system to be installed, unless certified assembly permits such other insulation and wrapping to remain within the assembly. Otherwise, precede the installation of mechanical insulations or remove insulation from the area of insulated pipe or ducts where such pipes or ducts penetrate a fire separation. Ensure the continuity and integrity of thermal and vapour barriers where such are removed, altered, or replaced.
- 3.2.3 Mask where necessary to avoid spillage and over coating onto adjoining surfaces.

3.3 APPLICATION

- 3.3.1 Apply firestopping and smoke seals in accordance with the manufacturer's instructions and tested designs to provide the required temperature and flame rated seal, and to prevent the passage of smoke and liquids.
- 3.3.2 Provide temporary forming as required and remove forming only after materials have gained sufficient strength after initial curing.
- 3.3.3 Completely fill and seal voids with firestopping and smoke seal materials. Tool or trowel exposed surfaces. Remove excess products promptly as work progresses.
- 3.3.4 Allow materials to cure. Do not cover materials until full curing has taken place.
- 3.3.5 Compress mineral wool firestopping and fill the joint or void leaving space at each exposed face to receive flush sealant smoke seal. Provide continuous sealant smoke seal at each face of the fire separation for the full width of the joint.
- 3.3.6 Fire Dampers: At fire damper perimeters, apply a 6.5 mm to 10 mm bead of service penetration firestop sealant as a smoke seal at the interface of retaining angles around the fire dampers where retaining angles meet the fire rated separations.

3.4 INSPECTION AND TESTING

- 3.4.1 Inspection of through-penetration firestopping shall be performed in accordance with ASTM E2174 to ensure that firestopping and smoke seals have been installed in accordance with Contract documents and to tested and listed firestop system.

END OF SECTION

PART 1 – GENERAL

1.1 WORK INCLUDED

- 1.1.1 Provide labour, materials, products, equipment and services to complete the joint sealant work.

1.2 REFERENCE DOCUMENTS

1.2.1 American Society for Testing and Materials (ASTM):

- .1 ASTM C834, Standard Specification for Latex Sealants.
- .2 ASTM C920, Standard Specification for Elastomeric Joint Sealants.
- .3 ASTM C1193, Standard Guide for Use of Joint Sealants.
- .4 ASTM C1248, Standard Test Method for Staining of Porous Substrate by Joint Sealants.
- .5 ASTM C1330, Standard Specification for Cylindrical Sealant Backing for Use with Cold Liquid-Applied Sealants.
- .6 ASTM C1382, Test Method for Determining Tensile Adhesion Properties of Sealants when used in Exterior Insulation and Finish Systems (EIFS) Joints.

1.3 SUBMITTALS

1.3.1 **Product Data:** Submit manufacturer's Product data sheet for Products proposed for use in the work of this section.

- .1 For Products specified to comply with SWR Institute Sealant Validation Program, provide written confirmation from SWRI of Product compliance.

1.3.2 **Samples:** Submit "wet sample" sealant colour samples for each sealant Product and colour.

1.3.3 **Mock-Up:** Submit 2440 mm long sealant joint mock-up.

1.3.4 Testing:

- .1 Test sealant in contact with samples of materials to be sealed to verify adhesion will be achieved, and no staining of the material will result. Prepare sample joints at the Place of the Work of each type of sealant for each joint condition.
- .2 Stain-Test-Response Characteristics: Where elastomeric sealants (ASTM C920 sealants) are applied to porous substrates, provide products that have undergone testing according to ASTM C1248 and have not stained porous joint substrates indicated for Project.

1.4 QUALITY ASSURANCE

1.4.1 **Qualifications:** Provide work of this section, executed by competent installers with minimum 5 years experience in application of Products, systems and assemblies specified and with approval and training of Products, systems and assemblies specified and with approval and training of Product manufacturers, and is a member in good standing of the Sealant and Waterproofing Association. Installer to comply with quality assurance articles referenced in ASTM C1193 for installation of joint sealants.

1.4.2 Conduct a pre-installation meeting covering the following items:

- .1 Analysis of the work and weather conditions.
- .2 Anticipated frequency of joint movement.
- .3 Sharpe factor of the joint.
- .4 Correct size of joint for sealant used.
- .5 Recommendations for priming joints.

- .6 Durometer hardness of material to be used.
- .7 Number of beads to be used in the sealing operation.
- .8 Inspection of surfaces and joints.
- .9 Make recommendations for sealant installation.
- .10 Mixing procedures for multi-component sealants.
- .11 Building acoustic joints and isolation joints.

1.5 **SITE CONDITIONS**

- 1.5.1 Verify substrates and ambient air temperature at project site before, during and after application to ensure compliance with manufacturer's recommendations. Surfaces shall be forest-free, dust-free, clean and completely dry at time of insulation.
- 1.5.2 Weather Conditions: In accordance with manufacturer's instructions, do not apply silicone joint sealants in snow, rain, fog and mist, or when such conditions are expected. Allow joint surfaces to attain dry conditions as recommended by manufacturer before sealant application.
- 1.5.3 Sealant and substrate materials: Conform to sealant manufacturer's specifications and recommendations. Keep organic sealant materials heated to at least 16⁰C when working at temperatures below 10⁰C.

1.6 **WARRANTY**

- 1.6.1 Repair or replace joint sealants which fail to perform as air tight and water-tight joints; or fail in joint adhesion, cohesion, abrasion resistance weather resistance, or general durability; or appear to deteriorate or become unserviceable or causing an objectionable appearance resulting from either defective or non-conforming materials and workmanship or in any other manner not clearly specified by submitted manufacturer's data as an inherent quality of the material for the exposure indicated.
 - .1 Defects shall include, but are not limited to
 - .1 Staining from abutting materials or filler.
 - .2 Migrating, bleeding into, or staining abutting materials.
 - .3 Unsightly surface deformation by causes other than movement.
 - .4 Excessive colour change, chalking, or dust pick-up.
 - .5 Failing adhesively or cohesively where maximum elongation is less than 25% of designed width of exposed joints.
 - .6 Hardening to more than 25% over specified hardness.
- 1.6.2 For silicone sealants applied to porous substrates, provide Product non-stain sealant warranty for period of 5 years, against migrating, bleeding into, or staining abutting materials.

PART 2 – PRODUCTS

2.1 **MATERIALS**

2.1.1 **General:**

- .1 Provide joint sealants, primer(s) and backings that are compatible with one another and with joint substrates under conditions of service and application as demonstrated by joint sealant manufacturer based on proven test results and field experience.
- .2 Elastomeric Sealant Standard: Comply with ASTM C920 and other requirements indicated for each liquid-applied chemically curing sealant, including those referencing ASTM C920 classifications for type, grade, class and uses.

- .3 Sealant supplied shall not exude any material(s) which travels into adjacent materials, or travels onto surfaces of adjacent materials; causing damage, or attracting soiling, which becomes apparent during the service life of the building, and sealant manufacturer shall confirm such compatibility in writing and submit such confirmation to the Consultant, prior to supply of sealant to the Work. Sealant shall be of single manufacturer throughout the Work.

2.1.2 Exterior sealants:

- .1 Exterior joints; typical joints: single-component, non-sag, medium modulus non-bleed silicone sealant, substrate primer mandatory, in accordance with the following:
 - .1 Comply with:
 - .1 ASTM Specification C920, Type S, Grade NS, Class 50.
 - .2 SWR Institute Sealant Validation Program.
 - .2 Acceptable Products:
 - .1 Dow Corning '790'.
 - .2 GE silicones 'Silpruf NB SCS9000'.
 - .3 Tremco, Inc. 'Spectrem 1'.
- .2 Exterior joints; traffic and walkway areas, joints in horizontal surfaces: silicone low modulus pour grade traffic sealant in accordance with the following:
 - .1 Comply with:
 - .1 ASTM Specification C920, Type S, Grade P, Class 25.
 - .2 Acceptable Products:
 - .1 Dow Corning "SL Parking Structure Sealant".
 - .2 Tremco, Inc. 'Spectrem 900SL'.

2.1.3 Interior sealants:

- .1 Interior sealant, one-component paintable acrylic sealant in accordance with the following:
 - .1 Comply with:
 - .1 ASTM C834.
 - .2 Acceptable Products:
 - .1 Sherwin Williams "950A Siliconized Acrylic Latex Caulk"
 - .2 Sika "Sikaflex 1A"
 - .3 Tremco, Inc. "Tremflex 834"
- .2 Interior sealant, one-component sealant in accordance with the following:
 - .1 Comply with:
 - .1 ASTM C920, Type M or S, Grade NS, Class 25
 - .2 Acceptable Products:
 - .1 Dow Corning "CWS"
 - .2 Sika "Sikaflex 15LM"
 - .3 Tremco, Inc. "Dymonic"
- .3 Interior sealant, mildew resistant one part silicone sealant in accordance with the following:
 - .1 Comply with:
 - .1 ASTM C920, Type S, Grade NT, Class 25

- .2 Acceptable Products:
 - .1 GE Silicones “Sanitary SCS1700 Sealant”
 - .2 Dow Corning “786”
 - .3 Tremco, Inc. “Tremsil 200”

2.1.4 Special sealants:

- .1 Expansion joint foam sealant: expanding foam sealant with internal laminations of closed cell foam and an exterior colour coating of Dow Corning 790 silicone sealant. Expanding foam laminations to be compressed 4-time to approximately 25% of fully expanded dimension.
 - .1 Acceptable Products:
 - .1 Emseal Joint Systems, Ltd. ‘Colorseal’.
- .2 Waterstop sealant; for concrete penetrations: one component hydrophilic polyurethane-based extrudible swelling profile. Swelling rubber creates compression seal within joint, blocking the passage of water, for sealing construction joints with head pressures of up to 345 KPa or 35 m Hydrostatic head.
 - .1 Acceptable Products:
 - .1 Sika ‘SikaSwell S-2’.

2.1.5 Sealant backing:

- .1 General: Provide component joint sealant primers, backings and fillers that are compatible with joint substrates and other sealants or joint fillers specified and approved for applications indicated under joint sealant schedule.
- .2 Cylindrical sealant backings: Provide joint backings that meet ASTM C1330, Type O (open-cell polyurethane), or Type B (non-absorbent bi-cellular backing materials with surface skin), sized 25 percent or greater than joint opening with proper density to control sealant depth and profile. Follow joint sealant manufacturer’s recommendations with backing selections or optimum joint sealant performance, in accordance with the following schedule:
 - .1 Use open cell foam with non-absorbing closed cell skin (Sof-Rod) for vertical joints; round shape for open joints and triangular shape for angular joints, ASTM C1330, Type O.
 - .2 Use closed cell foam for horizontal joints.
 - .3 Use closed cell foam for joints in EIFS cladding systems.
 - .4 Use closed cell foam in precast concrete panel cladding systems.
- .3 Bon-breaker tape: Polyethylene tape or other approved plastic tape as recommended by joint sealant manufacturer to prevent 3-sided joint adhesion to rigid, inflexible joint fillers or joint surfaces at back of joint where such adhesion would restrict proper sealant movement or result in sealant failure.

2.1.6 Masking Tape: Non-staining, non-absorbent and compatible with joint sealants and adjacent surfaces.

2.1.7 Primers: Use primers only as recommended by sealant manufacturer where required to enhance adhesion of sealant to specific joint substrates indicated and as determined for use from pre-construction mock-up testing.

2.1.8 Sealant colours: Sealant colours to Consultant’s selection, from manufacturer’s standard range, unless otherwise indicated.

PART 3 – EXECUTION

3.1 MANUFACTURER’S RECOMMENDATIONS

- 3.1.1 Unless specified otherwise herein, comply with the recommendations and directions of the manufacturer whose materials are being used in the work of this section.

3.2 PREPARATION

- 3.2.1 Prior to installation, clean substrates of substances that could impair the bond of joint sealants. Clean and prepare joint surfaces immediately before installing joint sealants. Protect adjacent work areas and finished surfaces from damage during joint sealant installation.
- 3.2.2 Clean porous joint surfaces by using heavy-duty brushing, light abrasive, mechanical abrading or combination of these methods to produce a clean, sound surface for optimum bond with joint sealants per manufacturer’s recommendations. Provide a dry, dust-free and cleaned substrate for optimum results.
- 3.2.3 Non-porous surfaces should be cleaned using the two-cloth solvent wipe method as referenced in ASTM C1193 and outlined by joint sealant manufacturer’s instruction. IPA (isopropyl alcohol) is not a degreasing solvent yet may be used in new construction for non-porous joint cleaning and preparation. Use xylene, toluene or MEK for degreasing solvent and general cleaning of non-porous surfaces.
- 3.2.4 Rusting or scaling surfaces must be prepared using abrasive cleaning methods as recommended by joint sealant manufacturer prior to joint sealant installation. Efflorescence, mould, mildew and algae must be removed and neutralized prior to joint sealant installation.
- 3.2.5 Coordinate cleaning, priming and installation to avoid contamination of wet, freshly coated or adjacent finished surfaces. Prepare finish-coated surfaces per joint sealant manufacturer’s specific recommendations.
- 3.2.6 Test all materials for indications of staining or poor adhesion before any sealing is commenced. Submit reports in writing to Consultant of results.

3.3 MASKING

- 3.3.1 Where necessary to prevent contamination or matting surfaces of adjacent materials, mask areas adjacent to joints with masking tape prior to priming or sealing application. Remove tape immediately after joint has been completed and an initial set achieved.

3.4 MIXING

- 3.4.1 Comply with joint sealant manufacturer’s installation instructions for products, primers and applications indicated unless more stringent project-specific instructions or requirements apply.
- 3.4.2 Mix materials using equipment recommended by manufacturer.

3.5 INSTALLATION

- 3.5.1 Review the complete Contract Documents for extent of sealant work required.
- 3.5.2 Comply with joint sealant manufacturer’s installation instructions for products, primers and applications indicated unless more stringent project-specific instruction or requirements apply.
- 3.5.3 Apply joint sealants for continuous waterproof sealant joint protection. Vertical joints should be lapped over horizontal joints as recommended by sealant manufacturer. Comply with installation recommendations in ASTM C1193 for use of joint sealants as applicable to each specific sealant installation.

- 3.5.4 Install sealant primers only when recommended by sealant manufacturer and demonstrated at pre-construction tests after joint surface preparation has been completed and when surfaces are verified as clean and dry. Allow any primer installation to completely dry or cure prior to installation of backing or joint sealants.
- 3.5.5 Install joint sealants in accordance with joint sealant manufacturer's instructions using proven techniques that comply with the following and in proper sequence with installation of primers and backings.
 - .1 Using proper joint sealant dispensing equipment, place sealants by pushing sealant beads into opening to fully wet-out joint sealant substrates. Fill sealant joint opening to full and proper configuration.
 - .2 Install, providing uniform cross-sectional shapes and depths in relation to joint width for optimum sealant movement capability per joint sealant manufacturer's instructions.
- 3.5.6 Joint sealant tooling is required for non-sag joint sealant installations. Immediately after placing fresh sealants and before skinning or curing begins, tool sealants using metal spatulas designed for this purpose in accordance with manufacturer's recommendations. Provide a smooth, uniform sealant finish, eliminating air pockets and ensuring good contact for optimum sealant adhesion within each side of the joint opening.
 - .1 Provide concave joint configuration as indicated in ASTM C1193 unless otherwise indicated. Dry tooling is required for joint sealants, and wet tooling agents are not allowed. Tool sealant joint is located, unless otherwise indicated.
 - .2 Remove excess sealant from surfaces adjacent to joint openings using metal spatula, promptly cleaning any sealant residue from adjacent finished surfaces. Remove masking after joint sealant is installed.
- 3.5.7 Allow single-component sealants to fully cure before adhesion testing is performed as recommended by joint sealant manufacturer as outlined herein.
- 3.5.8 Match approved sealant mock-up for colour, finish and overall aesthetic. Remove, refinish and re-install work not in compliance with Contract Documents.
- 3.5.9 When surfaces of adjacent materials are to be painted, perform sealant work before these surfaces are painted.
- 3.5.10 Check to make sure shop paint is compatible with primer and sealant. When incompatible, inform Consultant and change primer and sealant to compatible type acceptable to Consultant.
- 3.5.11 Check form release agent used on concrete for compatibility with primer and sealant. If they are incompatible inform Consultant and change primer and sealant to compatible type, or clean concrete to sealant manufacturer's acceptance.
- 3.5.12 Install joint backing material, filler strips, gaskets, bond breakers and similar type material of comparable performance characteristics. Install bond breaker tape or packing over asphalt impregnated fibre board as recommended by sealant manufacturer.
- 3.5.13 Where joints are 12.7 mm or deeper, insert backing material in continuous uniform compression with setback from finished face of adjoining materials equal to required depth of sealant (width/depth ratio) as specified herein.
- 3.5.14 On horizontal traffic surfaces, support joint filler against vertical movement which might result from traffic loads, including foot traffic.
- 3.5.15 Pack joints tightly with sealant backing set at depth specified for sealant. Fill other voids with filler.
- 3.5.16 Install bond breaker tape in bottom of joints in lieu of sealant backing where proper depth cannot be obtained when backing is installed.

- 3.5.17 Maintain correct sealant depth. Sealant depth shall be $\frac{1}{2}$ the width of the joint, maximum depth shall be 12.7 mm, minimum depth shall be 6 mm. Comply with manufacturer's written recommendations.
- 3.5.18 Fillet bead sealant joints to be sized to provide proper contact area with substrates, in accordance with manufacturer's written recommendations.
- 3.5.19 Apply sealants using pressure-operated guns fitted with suitable nozzles in accordance with manufacturer's directions. Apply sealants in such manner as to ensure good adhesion to sides of joints and to completely fill all voids in joints.
- 3.5.20 Apply sealants so that surfaces of joints are smooth, full bead, free from ridges, wrinkles, sags, air pockets and embedded impurities. Tool sealant surfaces to produce a smooth surface.
- 3.5.21 Remove droppings and excess sealant as work progresses, before material achieves initial set. Do not use soap and water in tooling.
- 3.5.22 Install sealant materials and primers when surfaces are prepared, and ambient temperature and weather conditions are prevalent, consistent with manufacturer's recommendations. Primer is mandatory for gun applied sealants.
- 3.5.23 Install sealant with exterior face of sealant set back 10 mm from face of adjacent materials, unless otherwise indicated.

3.6 EXTERIOR SEALANT SCHEDULE

- 3.6.1 Schedule of sealant given hereunder shall not be considered to represent a complete listing of all sealant applications required in the Work. Thorough scrutiny of the complete Contract Documents shall be done to obtain a complete schedule of all instances requiring sealant application.
- 3.6.2 Include in work of this section all sealants, except where specified under the work of other sections, to seal open joints in surfaces exposed to view, and to make the building weather-tight and airtight, as applicable, as indicated, and as otherwise specified.
- 3.6.3 Exterior sealant work is part of the work of this section. Install exterior sealant to:
 - .1 Exterior joints between dissimilar materials.
 - .2 Perimeters of exterior openings where frames meet exterior façade of building.
 - .3 Movement and control joints in exterior surfaces of in situ concrete and masonry.
 - .4 Exterior joints between masonry and in situ concrete.
 - .5 Exterior joints in horizontal wearing surfaces.
 - .6 Exterior exhaust louvers. Provide space in sealant at bottom for drainage.
 - .7 Exterior expansion joints; foam sealant installation: Compression when expanded in joint, shall be 25% of uncompressed thickness. Depth shall be in accordance with manufacturer's sizing table.
 - .1 Material to be installed recessed from substrate faces and to receive a field-applied coating of low modulus liquid sealant, not to exceed 6 mm thick.

3.7 INTERIOR SEALANT SCHEDULE

- 3.7.1 Schedule of sealant given hereunder shall not be considered to represent a complete listing of all sealant applications required in the Work. Thorough scrutiny of the complete Contract Documents shall be done to obtain a complete schedule of all instances requiring sealant application.
- 3.7.2 Install interior sealant to:
 - .1 Movement and control joints on exposed in situ concrete walls.
 - .2 Interior control and expansion joints in floor and wall surfaces.

- .3 Raked out joints at junctions of masonry with concrete walls and columns, and at intersection of masonry walls and partitions where joint reinforcement is installed.
 - .4 Perimeters of exterior door and window frames.
 - .5 Joints at tops of non-load bearing masonry walls at the underside of in situ concrete.
 - .6 Perimeter and perimeter joints of washroom fixtures, with mildew resistant sealant.
 - .7 Exposed interior control joints in gypsum board.
 - .8 Ceramic tile joints, tile to tile at corners and tile to bathtub joints.
 - .9 Millwork junctions with walls.
- 3.7.3 Mildew resistant sealant to be used in wet areas (showers, tubs, counters with sinks, janitors rooms) and elsewhere as indicated, and as follows:
- .1 Perimeter joints of washroom fixtures such as urinals, water closets, sinks and bathtubs.
 - .2 Perimeter of bathroom fixtures such as sinks, and bathtub trim.
 - .3 Ceramic tile joints, tile to tile at corners and tile to bathtub joints.
 - .4 Counter/wall junctions at plastic laminate counters.
- 3.8 **FIELD QUALITY CONTROL**
- 3.8.1 Provide manufacturer's field service consisting of periodic site visits by manufacturer or their distributor representative for observation of silicone joint sealant application.
- 3.8.2 Field-Adhesion Testing: Installer to keep daily log of sealant installation recording self-performed field-adhesion test at each elevation of the project and as follows:
- .1 Document and perform field adhesion testing in accordance with manufacturer's recommended field adhesion requirements and submit written reports cosigned by sealant manufacturer's representative.
 - .2 Perform 5 field adhesion tests for the first 300 meters and one test in each 300 meters of sealant joint length thereafter. One (1) test per floor height and per elevation is also recommended. When the sealant is used to weatherseal between 2 dissimilar substrates, the sealant adhesion to each side of the joint should be individually tested.
 - .3 Field test joint sealants in accordance with Method A, Field-Applied Sealant Joint Hand-Pull Tab, in ASTM C1193 and in compliance with manufacturer's specific recommendations.
 - .4 Evaluation: in compliance with joint sealant manufacturer, joint sealants tested and not indicating adhesive failure within the substrates are considered satisfactory results. For joint sealants that fail to adhere to the substrate, clean, re-install and then re-test until satisfactory results are obtained.
- 3.9 **CLEANING**
- 3.9.1 Cleaning off excess sealant or sealant residue adjacent to sealant joint installations as the work progresses by methods approved by joint sealant manufacturer. Do not damage adjacent surfaces with harmful removal techniques and protect finished surfaces beyond those that have been masked. Protect installed sealants during and after final curing from damage resulting during construction. Remove and replace damaged joint sealants.
- 3.9.2 Remove temporary coverings and masking protection from adjacent work areas upon completion. Remove construction debris from the project site on a planned and regular basis.

END OF SECTION

PART 1 – GENERAL

1.1 WORK INCLUDED

- 1.1.1 Provide labour, materials, products, equipment and services to complete the hollow metal door and frame work.

1.2 REFERENCE DOCUMENTS

- 1.2.1 American Society for Testing and Materials (ASTM):

- .1 ASTM A568, Specification for Steel, Sheet, Carbon, Structural, and High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled, General Requirements for.
- .2 ASTM A653/A653M, Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

- 1.2.1 Canadian Standards Association (CSA):

- .1 CSA W47.1, Certification of companies for fusion welding of steel.
- .2 CSA W59, Welded steel construction (metal arc welding).

- 1.2.2 Underwriters Laboratories of Canada (ULC):

- .1 CAN/ULC S104, Standard Method for Fire Test of Door Assemblies.
- .2 CAN/ULC S105, Standard Specification for Fire Door Frames, Meeting the Performance Required by CAN/ULC-S104.

1.3 SUBMITTALS

- 1.3.1 **Shop Drawings:** Submit shop drawings showing the construction of doors and frames, the methods of joining, welds, fastening and sleeving, type of metal, thickness, finishes, door hand, location of hardware, and other pertinent data. Clearly locate visible fixings on shop drawings.

1.4 QUALITY ASSURANCE

- 1.4.1 Perform Work in accordance with requirements by a member of the Canadian Steel Door and Frame Manufacturers Association.

- 1.4.2 Label and list fire rated doors and frames by an organization acceptable to authorities having jurisdiction and accredited by the Standards Council of Canada in conformance with CAN/ULC S104 and CAN/ULC S105 for ratings indicated, Labelling shall be in accordance with NFPA 80.

PART 2 – PRODUCTS

2.1 MATERIALS

- 2.1.1 **Steel Sheet:** ASTM A568, Class 1, cold rolled, commercial quality, ASTM A653/A653M hot dip galvanized steel with coating designation ZF75 (A25) for zinc coating.

	<u>Item</u>	<u>Gauge</u>
.1	Frames:	16
.2	Door faces:	18
.3	Accessories:	
.1	lock and strike reinforcements	16
.2	hinge reinforcements	12

	.3	flush bolt reinforcements	16
	.4	reinforcements for surface applied hardware	18
	.5	door closer or holder reinforcements	12
.4		Wall anchors:	
	.1	masonry strap type	18
	.2	masonry wire type	-
	.3	masonry stirrup-strap type	16
	.4	steel stud type	20
	.5	existing masonry and concrete type	20
.5		Jamb floor anchors	16
.6		Jamb spreaders	20
.7		Mortar guard boxes	22
.8		Glazing and grille stops	20
2.1.2		Zinc Rich Primer: Ready mixed zinc-rich primer, 'Carbozinc 11WB' by Carboline Company, 'Catha-Coat 305' by Devoe Coatings, or 'Zinc Clad XI' by Sherwin Williams.	
2.1.3		Resilient Bumpers: Round, black rubber, stud mount.	
2.1.4		Fasteners for Stops: Cadmium plated steel, recessed, flat or oval head Phillips screws.	
2.1.5		Insulation Core Material: Minimum density 24 kg/cu.m, consisting of durable fibrous mineral or glass batt material bound with deterioration resistant binders.	
2.1.6		Materials for Fire Rated Doors and Frames: Complying with ULC requirements.	
2.2		FABRICATION – GENERAL	
2.2.1		Assemble units by welding in accordance with CSA W59 to produce a finished unit square, true and free of distortion. Welding is to be continuous unless specified otherwise, and undertaken only by a fabricator fully approved by the Canadian Welding Bureau to the requirements of CSA W47.1. Unless otherwise specified, comply with "Specifications for Commercial Steel Doors and Frames", 1990, published by the Canadian Steel Door and Frame Manufacturers Association.	
2.2.2		Make provisions in doors and frames where required, to suit electrically operated hardware and/or security devices. Provide removable plates or knock-outs for electrical contacts. Provide conduit and fish wire on the concealed face of frames from the location of electric strikes to the top of the frame or to a point above the ceiling as required.	
2.2.3		Fabricate galvanized steel channels to reinforce frames and screens as required for size, and for fire protection rating requirements. Extend reinforcements from the floor to supports above. Design the top connection to accommodate structural deflection. Conceal reinforcement in frames and screens.	
2.3		FABRICATION – STANDARD DOOR FRAMES	
2.3.1		Frames are to be factory assembled and of mitred and welded frame construction. Knocked down frames will not be permitted unless it can be shown that preassembled welded frames are impossible to install.	
2.3.2		Blank drill, reinforce and tap frames to receive templated hardware, security and electrical devices. Reinforce frames for the installation of closers. Install stiffener plates or 2 angle spreaders where required to prevent bending of the frame and to maintain alignment when setting. Weld reinforcement in place.	

- 2.3.3 Cut frame mitres accurately and weld on the inside of the frame profile. Fill frame corners, exposed surface depressions, and butted joints with air-drying paste filler. Sand to a smooth uniform finish. Touch up damaged galvanized finish with zinc-rich primer.
- 2.3.4 Provide 3 resilient bumpers per single door at the strike jamb. Provide 2 resilient bumpers per door leaf at the head of double doors.
- 2.3.5 Provide appropriate anchorage to floor and wall construction.
- 2.3.6 Where frames terminate at the finished floor, supply floor plates for anchorage to the slab.
- 2.3.7 Locate wall anchors immediately above or below each hinge reinforcement on the hinge jamb, and directly opposite on the strike jamb. Provide 3 anchors per jamb for frames up to 2,280 mm. Add 1 anchor per jamb for each additional 760 mm or fraction thereof in frame height.
- 2.3.8 For frames to be installed in previously placed precast concrete or masonry, provide anchors located not more than 150 mm from the top and bottom of each jamb, and intermediate anchors at maximum 660 mm on centre.
- 2.3.9 Provide a removable portion of stop and frame where required for overhead concealed door closers, properly connected to the frame, and prepare for attachment of the closer prior to shipment.
- 2.3.10 Reinforce the door frame head if the opening is wider than 1.2 m. Reinforce jambs and mullions at junction of heads.

2.4 FABRICATION – FIRE RATED DOOR FRAMES

- 2.4.1 Construct frame members in fire rated separations to ULC approval. Fire rated frames are to bear a ULC, ULI or Warnock Hersey Professional Services label located on the inside of the hinge jamb midway between the top hinge and the head of the door frame, so that it is concealed when the door is closed.

2.5 DOOR FABRICATION - GENERAL

- 2.5.1 Fabricate doors to conform to drawing details and the Door Finish Schedule. Doors are to be flush face, seamless type.
- 2.5.2 Mortise, reinforce, drill and tap doors to receive templated hardware, security and electrical devices, and reinforce for surface mounted hardware. Check the hardware schedule in Section 08710 for details.
- 2.5.3 Fabricate doors with a clearance of 3 mm to the frame and 6.5 mm to the completed floor finish or threshold, except at openings in non fire-rated separations where undercuts are indicated.
- 2.5.4 Where openings are required, provide integrally formed cut-outs with steel framing and closely fitted steel glass stops. Mitre the corners of stops. Drill and countersink fasteners symmetrically at 150 mm o.c. Screw stops in place.
- 2.5.5 Provide a flush top edge on all exterior doors.

2.6 DOOR FABRICATION – FIRE RATED

- 2.6.1 Manufacture fire rated doors to the fire resistance classification scheduled.
- 2.6.2 Construct fire rated doors to ULC requirements and affix the ULC, ULI or Warnock Hersey Professional Services label on the hinged edge of the door midway between the top hinge and the head of the door.

PART 3 – EXECUTION

3.1 INSTALLATION

- 3.1.1 Install hollow metal doors and frames plumb, square, level, secure, and at correct elevation.
- 3.1.2 Set frames plumb and square in their exact location. Firmly block and brace to prevent shifting. Shim where required to ensure proper alignment and dimensions from the finished floor to the head of the frame. Install temporary wood spreaders at mid height.
- 3.1.3 Coordinate with trades building in frame anchors at walls and partitions. Secure frames with anchors and fastenings where not specified under other Sections.
- 3.1.4 Where steel frames are installed in openings at completed concrete walls, secure frames to the concrete with expansion bolts. Perform drilling of the concrete as required. Fill recessed bolt heads flush to the frame face with metal filler and sand smooth.
- 3.1.5 Check hollow steel doors and pressed steel frames for correct size and proper preparation to receive finish hardware. If any door is improperly sized or prepared, return it to the manufacturer for corrections.
- 3.1.6 Check each hardware item before installation. Drill pilot holes of suitable diameter.
- 3.1.7 Install doors and hardware. Maintain an even clearance, not exceeding 3 mm, between the door and the frame, and 6.5 mm at the floor or threshold to allow free action of door, except at openings in non fire-rated separations where undercuts are indicated.
- 3.1.8 Fire rated doors: Install fire rated doors and frames in accordance with requirements of NFPA 80.

END OF SECTION

PART 1 – GENERAL

1.1 WORK INCLUDED

- 1.1.1 Provide labour, materials, products, equipment and services to complete the aluminum curtain wall work.

1.2 REFERENCE DOCUMENTS

1.2.1 American Architectural Manufacturers Association (AAMA):

- .1 AAMA CW-DG-1, Aluminum Curtain Wall Design Guide Manual.
- .2 AAMA 2603, , Voluntary Specification, Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix)
- .3 AAMA 2605, Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix).

1.2.2 American Society for Testing and Materials (ASTM):

- .1 ASTM A653/A653M, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- .2 ASTM B209, Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
- .3 ASTM B221, Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
- .4 ASTM C920, Standard Specification for Elastomeric Joint Sealants.
- .5 ASTM D2240, Standard Test Method for Rubber Property—Durometer Hardness.
- .6 ASTM E283, Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.
- .7 ASTM E330/E330M, Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference
- .8 ASTM E331, Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference.

1.2.3 Canadian Standards Association (CSA):

- .1 CAN/CSA G40.20/G40.21, General requirements for rolled or welded structural quality steel / Structural quality steel.

1.2.4 National Fenestration Rating Council (NFRC):

- .1 NFRC 100, Procedure for Determining Fenestration Product U-factors.
- .2 NFRC 200, Procedure for Determining Fenestration Product Solar Heat Gain Coefficient and Visible Transmittance at Normal Incidence.

1.3 DESIGN CRITERIA

- 1.3.1 Design Aluminum curtain walls to meet requirements of AAMA CW-DG-1, ASTM E283, ASTM E330/E330M, ASTM E331, NFRC 100, NFRC 200 and to meet performance and energy requirements specified herein and as required by authorities having jurisdiction.

- 1.3.2 Air Leakage: in accordance with ASTM E283.

- 1.3.3 Water Penetration: in accordance with ASTM E331.

- 1.3.4 Fabricate mullions to ensure under specified loads a maximum deflection of 1/175 of mullion span or 19 mm, whichever is less.
- 1.3.5 Design and size components to withstand dead and live loads caused by pressure and suction of wind, acting normal to plane of system as calculated in accordance with code.
- 1.3.6 Design and size components to withstand seismic loads and sway displacement as calculated in accordance with code.
- 1.3.7 Maintain continuous air barrier throughout assembly, primarily in line with inside pane of glass and heel bead of glazing compound.
- 1.3.8 Ensure no vibration harmonics, wind whistles, noises caused by thermal movement, thermal movement transmitted to other building elements, loosening, weakening, or fracturing of attachments or components of system occur.
- 1.3.9 Provide anchors sufficiently rigid to resist wind and snow loads caused by aluminum shades and brackets, without damage to wall system.
- 1.3.10 Design members and their connections to withstand, within acceptable deflections limitations, their own weight, the weight of the glass, loads imposed by the motion of operable elements and the minimum design loads, and combinations of loads due to the pressure and suction of wind as calculated in accordance with the applicable Building Code, and internal pressure.
- 1.3.11 Design assemblies, their connections, glazing clearances and glazing and sealing details to accommodate material and climatic temperature range without overstressing materials or generating sound.
- 1.3.12 Design glazing systems and insulating glass units to minimize the possibility of thermal breakage.

1.4 **SUBMITTALS**

- 1.4.1 **Shop Drawings:** Submit shop drawings prepared by a professional engineer with seal showing all components of the assemblies in as large a scale as practical, and showing the construction, methods of joining, welding bonding, fastening, sealing, gasketing and anchorage, as well as the type of metal, material thickness, finishes and other pertinent data. Include a schedule of hardware items which are to be provided.

1.5 **EXTENDED WARRANTIES**

- 1.5.1 Warrant the work of this Section against defects in materials, product and workmanship for an additional period of 4 years after expiry of the 1 year Contract warranty.
- 1.5.2 Submit a 4 year extended warranty against defects in the insulating glass units and warrant that they will be free from material obstruction of vision as a result of dust or film formation on the internal glass surfaces. Terms and conditions of this extended warranty are to be as specified above.

PART 2 – PRODUCTS

2.1 **MANUFACTURERS**

- 2.1.1 Work of this section shall be provided by one of the following acceptable manufacturers:

- .1 Alumaticor.
- .2 CRL/U.S. Aluminum.
- .3 Kawneer Company Ltd.
- .4 Windspec Inc.

2.2 MATERIALS

2.2.1 **Extruded Aluminum:** ASTM B221, 6063 T54, T5, or T6 aluminum alloy and temper, or other approved alloy and temper.

2.2.2 **Aluminum Sheet and Plate:** ASTM B209 alloy suitable for anodized finish, "H14" or other approved manufacture, special hardness for flat panel application.

2.2.3 **Steel:** CAN/CSA G40.20/40.21, 300W or 350W.

2.2.4 **Thermal Separators (Thermal Break):** Of a size to conform to the extruded aluminum members, or other locations where required, neoprene or polyvinylchloride and having a minimum tensile strength of 2000 psi and Durometer A hardness of 60 plus/minus 5.

2.2.5 **Glass and other glazing materials:** Refer to Section 08 80 00.

2.2.6 **Silicone Sealant:** One component, chemical curing, capable of water immersion without loss of properties: cured Shore A Durometer hardness of 15 to 25 to ASTM D2240, colour as selected by Consultant, where exposed, to ASTM C920.

2.2.7 **Sheet metal work air barrier sealant:** One component elastomeric chemical curing, to ASTM C920.

2.2.8 Air barrier membrane:

.1 Self-Adhesive membrane: Composite preformed modified membrane system consisting of SBS modified asphalt for low temperature flexibility and polyethylene scrim reinforcing. Acceptable Products:

.1 Henry Company Canada 'Blueskin SA' Self-Adhesive Grade Air Barrier Membrane.

.2 Soprema 'Sopraseal Stick 1100'.

.3 W.R. Meadows 'Air Shield'.

.2 Primer: as recommended by manufacturer.

.3 Membrane Properties:

.1 Thickness: 1.0 mm (40 mils).

.2 Application temperature: minimum +5°C.

.3 Service temperature: -40°C to +70°C.

.4 Elongation: 200% minimum in accordance with ASTM D412.

.5 Low temperature flexibility: to -30°C to CGSB 37-GP-56M.

.6 Air leakage: 0.005 L/m².s under pressure differential of 75 Pa in accordance with ASTM E283.

2.2.9 Spandrel Panels:

.1 Backpan: ASTM A653/A653M; 0.9 mm thick, Z275 galvanized steel sheet.

.2 Spandrel panel insulation: CAN/ULC S702; Semi-rigid mineral fibre.

2.3 FABRICATION – GENERAL

2.3.1 Take field measurements and levels for the proper layout and installation of the work.

2.3.2 Frames which are to receive insulating glass units are to have a continuous thermal break.

2.3.3 Make joints toward the exterior weathertight. The location of exposed joints is subject to the approval of the Architect. No exposed fixings are permitted.

2.3.4 Reinforce frames by concealed means as necessary to meet the design requirements.

2.3.5 Provide devices for anchoring the frame assemblies to the building structure with sufficient adjustment to permit correct and accurate alignment and to accommodate deflection and similar movement.

2.4 **FABRICATION – CURTAIN WALL SYSTEM**

2.4.1 **Curtain Wall System:** Kawneer 1600 UT series System #1 or approved alternative. Perimeter window mullion cover cap to be 63.5 x 19 mm deep. Window mullion section depth is 152 mm, curtain wall system including spandrel glass panels with backpan as shown on drawings.

2.4.2 **Spandrel Glass Panels:** Consists of 6 mm thick spandrel glass to the exterior with insulated backpan to the inside. Insulation (R-15) shall be in thickness as indicated on Contract Drawings, retained with stick clips. Seal all joints in shop with high grade butyl sealant, including perimeter seal at backpan. Colour to be selected by Consultant.

2.4.3 **Doors:** Kawneer 360 Insulclad for exterior doors and 350 for vestibule doors or approved alternative. All doors to have 1 1/2 pair of heavy duty Hager butt hinges with four (4) stainless steel ball bearings. Kawneer Classic offset C0-9 Pull handle and Kawneer Classic Push CPII Push bar, finish in mirror stainless steel. M.S. locks with keyed cylinders and thumb turn. Aluminum threshold, sweeps and LCN 4040 Series closer with cush-n-stop arm, cush shoe support – 440-30 or Barrier-free Operator -Horton Series 4000 LE or equal.

2.4.4 Fabricate frame systems complete with mullions, head and sill frames, spigots, and plugs for horizontals, spline gaskets, thermal break pressure plates, filler pieces, snap-on caps and other necessary components.

2.4.5 Where frame assemblies exceed 6 m' provide one split frame expansion/ contraction mullion per assembly unless other provision is provided. Make the width of the expansion/contraction mullion the same as that of the other mullions.

2.4.6 Fabricate transoms, corner pieces, filler panels and closure assemblies, sills, wood coping covers, bases, and fascias from 3 mm thick aluminum plate. Make all planes true, and corners square and sharp. Provide concealed clips for fastening the plate assemblies in place.

2.5 **METAL FINISH**

2.5.1 Anodized aluminum surfaces: Anodized coating complying with Aluminum Association designation AAM12C22A41, 0.7 mils coating Class 1.

.1 Colour: Clear anodized.

PART 3 – EXECUTION

3.1 **INSTALLATION – GENERAL**

3.1.1 Install Aluminum Work in accordance with reviewed shop drawings, manufacturer's instructions, and to meet requirements of authorities having jurisdiction.

3.1.2 Install work of this section plumb, square, level, free from warp, twist and superimposed loads.

3.1.3 Secure work in required position. Do not restrict thermal movement.

3.1.4 After alignment, positively lock anchorage devices to prevent movement other than those designed to accommodate deflection and thermal expansion and contraction.

- 3.1.5 Perform necessary drilling of concrete, masonry and steel to install the work of this Section. Site located fixings to masonry and concrete are to be stainless steel lag screws and lead expansion shields.
- 3.1.6 Apply bituminous paint to aluminum in or in contact with concrete, masonry, mortar or dissimilar metals.
- 3.1.7 Provide aluminum closures, flashings, drips, sills and similar items related to work of this Section and at other locations where such are indicated as being aluminum, and to match the other work of this Section.
- 3.1.8 As erection progresses, pack cavities of exterior open-back frames and assemblies and voids with low density fibrous glass insulation.
- 3.1.9 Provide a completed installation free from noise, rattles, wind whistles, creak or noise due to thermal movement.
- 3.1.10 Install hardware in accordance with templates.
- 3.1.11 Adjust operable parts for correct function.
- 3.1.12 Erection tolerances are to be as follows:
 - .1 Vertical position: plus/minus 3 mm.
 - .2 Horizontal position: plus/minus 3 mm.
 - .3 Deviation from plumb: 3 mm maximum each plane.
 - .4 Racking of face: 6.5 mm maximum.
 - .5 Racking in elevation: nil.
 - .6 For operable elements: consistent with smooth operation and weatherproof performance.

3.2 **AIR BARRIER CLOSURES**

- 3.2.1 It is the responsibility of this section to give complete cooperation in providing and maintaining the continuity of air/vapour seal to adjacent materials to which the windows and frames abut. Fit flexible seals, tapes, sealants and gaskets at locations required to achieve air/vapour/water resistant and weathertight junctions. Ensure continuity of seal at end joints between lengths of material by overlapping and cementing. Caulk junctions of system components to themselves and other work with sealant to maintain effective vapour, air and water barrier and fix in place with an aluminum flat to the air/vapour seal line at the adjacent material and to the glazing rebate.
- 3.2.2 Where deflection of structure will cause dynamic joint movement between aluminum work and dissimilar materials, install flexible seals of sufficient width to allow formation of bellows to take up any torsional and shear stresses.

3.3 **GLAZING**

- 3.3.1 Glaze aluminum curtain walls at exterior using insulating glazing units in accordance with Section 08 80 00.

3.4 **SEALANTS**

- 3.4.1 Seal between frame members, sills and adjacent construction as a part of the work of this section and in accordance with Section 07 92 00.

3.5 **HARDWARE**

- 3.5.1 Install in accordance with manufacturer's installation instructions.

- 3.5.2 Accurately locate and adjust hardware to meet manufacturer's instructions. Use special tools and jigs as recommended.
- 3.5.3 Set, fit and adjust hardware according to manufacturer's directions, at heights later directed by Consultant. Hardware shall operate freely. Protect installed hardware from damage and paint spotting.
- 3.5.4 Powered hardware:
- .1 Power wiring will be supplied and installed by electrical work installer including conduit, boxes and other electrical appurtenances, including connections and terminations. Be responsible for ensuring that all wiring work is done in accordance with the Supplier's wiring diagrams and directions.
 - .2 Arrange for testing and commissioning of system by the distributor of the system. Submit a copy of reports to the Consultant.
- 3.6 **CLEANING**
- 3.6.1 Cleaning on completion of installation:
- .1 Remove deposits which affect appearance or operation of units.
 - .2 Remove protective materials.
 - .3 Clean interior and exterior surfaces by washing with clear water, or with water and soap or detergent, followed by a clear water rinse.
 - .4 Clean and restore stained metal surfaces in accordance with manufacturer's recommendations. Replace if cleaning is impossible.

END OF SECTION

PART 1 – GENERAL

1.1 WORK INCLUDED

- 1.1.1. Provide labour, materials, products, equipment and services to complete the supply of finish hardware work.

1.2 SUBMITTALS

- 1.2.1 **Samples:** Submit duplicate samples of each hardware item. Identify each sample by label indicating manufacturer's name, door number, finish, and hardware package number.
- 1.2.2 **Templates:** Submit templates for use by installers and fabricators as required for proper location and installation of hardware.
- 1.2.3 **Operation and Maintenance Data:** Provide maintenance data, parts list and manufacturer's instructions for each type of door closer, lockset, fire exit hardware and door holder; provide manufacturer's instructions for proper care of hardware, including lubrication, for incorporation into operation and maintenance instruction manual.

1.3 QUALITY ASSURANCE

- 1.3.1 **Qualifications:** Furnish services of an Architectural Hardware Consultant (AHC) for preparation of keying, coordination with other trades, consultation with the Owner and the Consultant and for performing on-site inspections.
- 1.3.2 **Regulatory Agencies:**
- .1 Ensure hardware for fire-rated openings complies with requirements of authorities having jurisdiction, with door and frame manufacturer's tested and labelled assemblies, and that hardware items bear certification labels.
 - .2 Electronic hardware such as magnetic locks, power supplies, key switches and alarm panic bolts shall be ULC labelling.

1.4 DELIVERY, STORAGE, AND HANDLING

- 1.4.1 Purchase and deliver to building finish hardware for doors listed on Door Schedule. Deliver hardware to trades which are designated to perform installation.
- 1.4.2 Pack hardware in suitable wrappings and containers to protect it from injury during shipping and storage. Accessories, fastening devices and other loose items shall be enclosed with each applicable item of hardware. Mark packages for easy identification as indicated on approved delivery schedules.
- 1.4.3 All permanent cores shall be individually packaged in envelopes, in order of their appearance in the Hardware Schedule, by item number, and shall be clearly marked with the corresponding item (heading) number, door number, keying designation, quantity of keys and factory order number.
- 1.4.4 Label packages legibly indicating manufacturer's numbers, types, sizes, Finish Hardware Schedule item number and location of installation.
- 1.4.5 Store delivered hardware in a clean, heated, dry and lockable location with shelving.
- 1.4.6 Provide and maintain inventory list with Finish Hardware Schedule.

1.5 WARRANTY

- 1.5.1 Submit manufacturer's warranty against defects in materials or workmanship in accordance with General Conditions, but for a period of two (2) years. Immediately replace any defective hardware supplied including installation, at no cost to Owner.
- 1.5.2 Submit manufacturer's warranty for closers against defects in materials and workmanship for a period of five (5) years.

1.6 MAINTENANCE MATERIALS

- 1.6.1 Submit to Owner's building maintenance staff prior to date of Substantial Performance, two sets of wrenches for door closers, locksets and fire exit hardware.

PART 2 – PRODUCTS

2.1 BASIC HARDWARE

- 2.1.1 Provide door closers, locksets and latchsets meeting ANSI/BHMA Qualified Products List, Commercial Grade 1.
- 2.1.2 Verify kick plate sizes and threshold sizes before fabrication.
- 2.1.3 Push plates, kick plates and similar plates shall be type 304 stainless steel, 1.3 mm thick, drilled for countersunk fixing, complete with matching oval head screws. Bevel all edges of plates; ensure plates are free of rough or sharp corners and edges.
- 2.1.4 Supply screws, bolts, expansion shields, anchors and other fastening devices and accessories required for satisfactory installation and operation of hardware. Use only the manufacturer's supplied fasteners to ensure guaranteed maintenance and fire rating certification labels are maintained.
- 2.1.5 Provide finish of exposed fastening devices to match finish of hardware. Provide screws with Phillips or Robertson heads.
- 2.1.6 Supply fasteners compatible with material through which they pass.
- 2.1.7 Where pull is scheduled on one side of door and push plate on other side, supply fastening devices, and make provision so pull can be secured through door from reverse side. Supply push plate to cover fasteners.
- 2.1.8 Provide one keying cabinet complete with two tag system and all associated reference cards and instruction material, by Telekee, or acceptable alternative by Lund.

2.2 HARDWARE SCHEDULE

- 2.2.1 Refer to Architectural Drawings and submit a complete Hardware Schedule and shop drawings prepared by Architectural Hardware Consultant for all doors.

2.3 KEYING

- 2.3.1 All cylinders shall be high security removable core, 'Schlage', or 'Medeco' commercial keyway. No Keys shall be duplicated without proper authorization.
- 2.3.2 Key locks to Owner's requirements (construction master keyed, grand master keyed, sub-master keyed, as directed).
- 2.3.3 Key system shall be a new factory registered keying system.

- 2.3.4 The lock manufacturer shall supply permanent cores grand master keyed, master keyed and keyed alike, or different, as requested by the Owner.
- 2.3.5 All locks shall be construction keyed with construction core. Allow for a construction master key to pass all cylinders required for the Work.
- 2.3.6 All cylinders shall be 6 pin, removable core.
- 2.3.7 Key locks and lay out key control system to Owner's requirements.
- 2.3.8 Final keying arrangements shall be approved by Owner. The hardware consultant, at the request of the Owner's representatives, shall assist in preparing a detailed keying schedule.
- 2.3.9 Provide keying chart and explain keying system to Owner.
- 2.3.10 Provide keys in duplicate for each lock.
- 2.3.11 Stamp keying code numbers on keys and cylinders.
- 2.3.12 All cylinders and padlocks shall be manufactured by one manufacturer.

PART 3 – EXECUTION

3.1 EXAMINATION

- 3.1.1 Before furnishing any hardware, carefully check all Architectural Drawings of Work requiring hardware, verify door swings, door and frame material and operating conditions and assure that all hardware will fit Work to be attached.

3.2 TEMPLATES

- 3.2.1 Check Hardware Schedule, Drawings and Specifications and furnish promptly to applicable trades any patterns, templates, template information and manufacturer's literature, required for proper preparation for and application of hardware, in ample time to facilitate progress of Work.
- 3.2.2 Furnish metal door and frame manufacturers with complete instructions and templates for preparation of their work to receive hardware.

3.3 INSTALLATION

- 3.3.1 Install finish hardware to template in accordance with the hardware manufacturer's written instructions. Do not modify finish hardware without manufacturer's and Architect's written approval.
- 3.3.2 Install finish hardware secure, plumb, level and true to line.
- 3.3.3 Cut and fit substrates as required, avoiding damage and weakening of substrates. Reinforce attachment substrates as necessary for proper installation and operation of hardware.
- 3.3.4 Size cutouts so that the hardware item completely covers the cutout.
- 3.3.5 Install hardware items affixed to concrete and masonry with machine screws and threaded metal expansion shields.
- 3.3.6 Where a door stop contacts a door pull, mount the stop to strike the bottom of the pull.
- 3.3.7 Ensure that door stops provided at gypsum board partitions are floor stops, not wall stops.

- 3.3.8 Where a pull is scheduled on one side of a door and a push plate on the other side, install so that the pull can be secured through the door from the reverse side. Use countersunk fasteners. Install a push plate to cover fasteners.
- 3.3.9 Use fasteners compatible with the material through which they pass. Use fasteners supplied by the manufacturer of the hardware item to ensure warranty and fire rating listings are complied with.
- 3.3.10 Confirm the degree of swing and proper function of door holders, closers, and similar items. Ensure that all adjustments such as back checking degree have been properly made.
- 3.3.11 Mount closers on the "room" side of the door wherever possible and in accordance with the Finish Hardware Schedule.
- 3.3.12 Use concealed fasteners wherever possible.
- 3.3.13 Cylinders used by the Contractor and not incorporated into the work are to be handed to the Owner at Substantial Completion.
- 3.3.14 After installation of hardware, check opening units for correct fit and uniformity of space around the perimeter of units, or between units.
- 3.3.15 Set, fit, adjust and clean hardware according to the manufacturer's written instructions. Provide smoothly operating opening units free from binding.
- 3.3.16 Install hardware at the following mounting heights except where otherwise required by authorities having jurisdiction. Locate unlisted items as directed:
- | | | |
|----|------------------------|---|
| .1 | Butt hinges: | 300 mm from centre of hinge to finished floor
300 mm from centre of hinge to top of door
other(s) centred between top and bottom hinges |
| .2 | Mortise lock strike: | 990 mm from centre of knob to finished floor. |
| .3 | Deadlock strike: | 1200 mm from centre of cylinder to finished floor. |
| .4 | Mortise night latches: | 1200 mm from centre of cylinder to finished floor. |
| .5 | Panic sets: | 1000 mm from centre of cross bar to finished floor. |
| .6 | Door pulls: | 1200 mm from centre to finished floor. |
| .7 | Door closer arms: | to allow maximum degree of swing. |
| .8 | Floor stops: | to allow maximum degree of swing. |

3.4 FIELD QUALITY CONTROL

- 3.4.1 Have hardware supplier's representative visit the site and submit a written report of each visit to the site, giving storage conditions and installation details, date and name of hardware supplier's representative. Site inspections shall be performed by an Architectural Hardware Consultant (AHC) who shall notify Contractor and Consultant of cases of improper installation, required adjustments, improper type of hardware, and defective hardware.
- 3.4.2 Before completion of Work, but after hardware installation, have Architectural Hardware Consultant inspect Work and submit certificate to Consultant stating that final inspection has been made and that hardware of proper type has been properly installed and adjusted, is in good working order and condition, and is in conformance with Contract requirements.

3.5 DEMONSTRATION

- 3.5.1 The Hardware Consultant shall provide a demonstration to the Owner regarding proper care, cleaning and general maintenance.

END OF SECTION

PART 1 - GENERAL

1.1 WORK INCLUDED

- 1.1.1 Provide labour, materials, products, equipment and services to complete the automatic door operator work.

1.2 REFERENCES

- 1.2.1 ANSI/BHMA A156.19, Power Assist and Low-Energy Power-Operated Doors.

1.3 DESIGN CRITERIA

- 1.3.1 Accessible door system comprising of low energy power operator with optional push and go door system as defined in ANSI/BHMA A156.19.
- 1.3.2 Equipment shall be designed to operate swing doors up to weight of 102 kg.
- 1.3.3 Door operating equipment shall be complete with electro mechanical motor gear box. Provide 3 position (off-on) switch. System shall operate between -34 deg C and 71 deg C.

1.4 SUBMITTALS

- 1.4.1 **Shop drawings** Submit shop drawings clearly indicating materials being supplied and shall have all connections, attachments, reinforcing, anchorage and location of exposed fastenings.

1.5 WARRANTY

- 1.5.1 Warrant work of this Section against defects and deficiencies for a period of two years. Promptly make good defects and deficiencies which become apparent within warranty period.

PART 2 - PRODUCTS

2.1 ACCEPTABLE PRODUCTS AND MANUFACTURERS

- 2.1.1 Power swing door operation shall be Horton Series 4000 LE, Besam-Assa Abloy-SW 200i, Record 8100 or Stanley Magic Force, overhead side access swing door operator. Operator closure panel to span single door or double door width.
- 2.1.2 Wireless push button system for each door shall be:
- .1 2 - #CM 45/4 push button embossed with wheelchair logo
 - .2 2 - #CM-43 CBL double gang surface box
 - .3 2 - BEA #10 TD 900 PB hardware kit
 - .4 1- BEA #10RD 900 Receiver

- 2.1.3 Refer to drawings for location.

2.2 FUNCTIONAL REQUIREMENTS

2.2.1 Opening Speed:

- .1 Door shall be field adjusted to back check as required in Table 1 of ANSI/BHMA A156.19.
- .2 Opening speed to fully open shall be 4 seconds or longer.

- 2.2.2 **Hold Open:** Door shall be field adjusted to remain fully open for not less than 5 seconds or more than 30 seconds.

2.2.3 Closing Speed

- .1 Doors shall be field adjusted to close 90 to 10 in 3 seconds or longer as required in Table 1 of ANSI/BHMA A156.19.
- .2 Doors shall close from 10 to fully closed in not less than 1.5 seconds.
- .3 Force required to prevent door from opening or closing shall not exceed 7 kg applied 25 mm from latch edge of door at any point in opening or closing cycle.
- .4 During power failure, doors shall open with manual pressure not exceeding 11.3 kg at point 25 mm from latch edge of door.
- .5 Doors shall be equipped with signs visible from either side, instructing user as to operation and function of door.

2.2.4 System Operation: Where 1 of push buttons on either side of door is actuated door shall open slowly to back check (80) in 3 to 6 seconds and to full open position in 4 to 7 seconds. Door shall remain open for period set to suit requirements (period of 5 to 30 seconds). After time delay door shall close by spring in door operator from 90 to 10° in 3 to 6 seconds from 10 to fully closed in 1-1/2 to 2 seconds.

2.2.5 Provide header complete with full housing, finish to be clear anodized to match aluminum mullions.

2.2.6 Operator shall be activated by push button switches on each side of door as indicated. Switches shall be located no more than 1200 mm from floor. Switches shall bear universal handicap logo visible to all types of traffic.

PART 3 - EXECUTION

3.1 INSTALLATION AND OPERATION

3.1.1 Provide automatic door operators, controls and accessories for doors indicated.

3.1.2 Doors shall operate manually as though equipped with manual door closers, without damage to automatic door components, in event of power failure or in event of power termination.

3.1.3 Door operators and accessories shall be installed in strict accordance with manufacturer's recommendations.

3.1.4 Power supply to each door operator and wiring shall be provided by Division 26 - Electrical. Make connections at operators and at control panel and supply and install each electrical work between operators and activating controls. Comply with requirements of Division 26 - Electrical. All wiring shall be concealed.

3.2 ADJUST AND CLEAN

3.2.1 Test and adjust operators and controls smooth and proper operation.

3.2.2 Upon completion of Work of this Section, remove from Site all debris, equipment and excess material resulting from Work of this Section.

END OF SECTION

PART 1 – GENERAL

1.1 WORK INCLUDED

- 1.1.1 Provide labour, materials, products, equipment and services to complete the glazing work.

1.2 REFERENCE DOCUMENTS

1.2.1 American Society for Testing and Materials (ASTM):

- .1 ASTM C920, Specification for Elastomeric Joint Sealants.
- .2 ASTM C1048, Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass.
- .3 ASTM C1503, Standard Specification for Silvered Flat Glass Mirror.

1.2.2 Canadian General Standards Board (CGSB):

- .1 CAN/CGSB 12.1M, Tempered or Laminated Safety Glass.
- .2 CAN/CGSB 12.3M, Flat, Clear Float Glass.
- .3 CAN/CGSB 12.8, Insulating Glass Units.
- .4 CAN/CGSB 12.11, Wired Safety Glass.

1.2.3 Insulating Glass Manufacturer's Alliance (IGMA).

1.2.4 Underwriters' Laboratories of Canada (ULC):

- .1 CAN/ULC S104, Standard Method for Fire Tests of Door Assemblies.
- .2 CAN/ULC S105, Standard Specification For Fire Door Frames Meeting The Performance Required By CAN/ULC S104.

1.3 DESIGN CRITERIA

- 1.3.1 Perform stress analysis. Design units to accommodate live, dead, lateral, wind, seismic, handling, transportation, and erection loads in accordance with the Ontario Building Code.
- 1.3.2 Perform a thermal stress analysis on each glass unit with Low-E coating and provide heat strengthening and/or tempered units as necessary to prevent thermal breakage.
- 1.3.3 Perform a thermal stress analysis on each insulating thermal unit and provide heat strengthening and/or tempered units as necessary to prevent thermal breakage.
- 1.3.4 Where required, design glazing units so as not to allow thermal stress fracture due to heat build-up behind insulating units.
- 1.3.5 Utilize inner light of multiple light sealed units for continuity of air and vapour seal.
- 1.3.6 Design glazing in accordance with City of Toronto Green Development Standard - Bird Friendly Development Guidelines.

1.4 QUALITY ASSURANCE

- 1.4.1 Insulating glass unit fabricators shall be a certified member of the Insulating Glass Manufacturer's Alliance (IGMA). IGMA members must participate in the certification program and shall have successfully passed a Compliance Audit within the last six months.
- 1.4.2 Each lite fire rated glass shall bear permanent, nonremovable label of ULC certifying it for use in tested and rated fire protective assemblies.

1.5 SITE CONDITIONS

- 1.5.1 Proceed with glazing only when glazing surfaces are accumulating no moisture from rain, mist or condensation.
- 1.5.2 When temperature of glazing surfaces is below 4 deg.C, obtain approval of glazing methods and protective measures which will be used during glazing operations.

1.6 WARRANTY

- 1.6.1 Submit a warranty of the installation of insulating glass covering the period for four years beyond the expiration of the warranty period specified in the General Conditions of the Contract. Deflects in glass units shall include, but shall not be restricted to, breakage (other than by accidental cause exterior to the glazed unit after installation of the glass) and loss of seal. Fogging of glass inside sealed units will be considered sufficient evidence of loss of seal.

PART 2 - PRODUCTS

2.1 MATERIALS

2.1.1 Glass:

- .1 Glass shall be manufactured by AGC Flat Glass, Guardian Industries, PPG Industries, or Viracon Inc.:
- .1 Polished Plate or Float Glass: CAN/CGSB 12.3M, Glazing Quality.
 - .2 Tempered Glass: CAN/CGSB 12.1M, Type 2, Class B, clear.
 - .3 Laminated Safety Glass: CAN/CGSB 12.1, Category II, two panes of 3 mm thick glass, and 0.8 mm thick interlayer.
 - .4 Clear Wired Glass: CAN/CGSB 12.11, polished georgian wired plate.
 - .5 Fire Rated Glass: CAN/ULC S104 and CAN/ULC S105, clear polished glass, 'Firelite' by Nippon Electric Glass or approved alternative.
 - .6 Spandrel Glass: ASTM C1048, Condition B, [heat strengthened] [tempered] glass with water-based silicone emulsion coating applied to backside. Colour: to be selected.
 - .7 Mirror glass: ASTM C1503, 6 mm thick, laminated safety mirror. Polish and round all corners.
 - .8 Insulating Glass: To meet specified requirements of CAN/CGSA 12.8M and IGMA, with approved metallic stainless steel edge spacer. Dual seal.
 - .9 Low E coating: High performance sputtered low-E coating.

2.1.2 Glazing Accessories:

- .1 Setting Blocks: Neoprene, of durometer hardness of Shore "A" 70 to 90.
- .2 Edge Blocks: 80 Durometer A hardness plus/minus 5 respectively, neoprene rubber, resistant to sunlight, weathering, oxidation and permanent deformation under load.
- .3 Glazing Gaskets: Neoprene, EPDM, thermoplastic or other approved material, of sufficient thickness. Gaskets are to have a 2000 psi tensile strength, Durometer A hardness of 60, plus/minus 5, resistance to permanent set of 30% maximum, minimum elongation at break of 300%, and resistance to ozone showing no cracks.
- .4 Glazing Tape: Glazing tape with EPDM shim, 'Polyshim II' by Tremco or approved alternative.
- .5 Glazing and rebate primers, sealants, sealers, and cleaners: Compatible with each other. Type as recommended by glass manufacturer.

2.1.3 Glazing Sealants:

- .1 Ensure that glazing sealants are completely compatible with insulating glass unit sealants.
- .2 Glazing Sealant: Silicone sealant conforming to ASTM C920, type as recommended by glass manufacturer.
- .3 Structural sealant: ASTM C920, Type S or M, Grade NS, Class 25, one part silicone.
- .4 Fire rated glazing sealant: ASTM C920, Type S, Grade NS, Class 25, one part neutral cure silicone.

PART 3 - EXECUTION

3.1 INSTALLATION

- 3.1.1 Install materials in accordance with manufacturer's specifications, and ensure that each material in a glazing system is compatible with the others.
- 3.1.2 Ensure that projections have been removed from rebates and that sufficient width and depth clearances are provided for specified glass.
- 3.1.3 Remove stops and store during glazing to avoid damage to them.
- 3.1.4 Remove excess glazing sealants from adjacent surfaces, including glass, during working life of material, and by methods not harmful to the surfaces.
- 3.1.5 Collect broken glass and cuttings in boxes and remove from site.
- 3.1.6 Do not set any glass without glazing beds or gaskets.
- 3.1.7 **Glass:**
 - .1 Install glass in thickness to comply with Ontario Building Code requirements.
 - .2 Cut glass to fit openings and to allow clearances which will ensure that glass is held firmly in place and is not subjected to stresses.
 - .3 Ensure that glass edges are clean cut, not nipped or seamed.
 - .4 Do not cut or nip tempered glass to fit. Replace oversize or flared lights with entirely new units or proper dimensions.
 - .5 Glazing Preparation and Methods: Clean glazing rebate surfaces of all traces of dirt, dust, or other contaminants.
 - .6 Positioning Glass: Support glass, in lights of over 2540 mm perimeter, by two setting blocks, one at each quarter point of each light.
 - .7 Tape Bedding at Fixed Stops: Cut tapes of full depth of stop accurately to length on a work table. Set sill and head tapes first at full length of rebated opening. Butt jamb tapes into sill and head tapes tightly to weld them together. Remove protective paper backing only when glass is ready for setting, and ensure that butted joints of tape are positively filled with applied sealant.
 - .8 Bedding at Stop Beads: Apply tape to removable stops as specified for fixed stops.

3.2 ADJUSTMENT AND CLEANING

- 3.2.1 Replace scratched, etched, or defective glazing resulting from manufacture, setting, handling, or storage before or during installation. Glass accidentally broken or physically damaged, by other than faulty glazing or materials, after glazing by this Section has been completed shall be replaced.

3.2.2 Remove stains, deposits, marks or blemishes caused by this Section from surfaces of all materials exposed to view. Replace materials that cannot be cleaned to appear as new.

3.3 **PROTECTION**

3.3.1 Following glazing, mark each light of glass, except heat absorbing, to indicate its presence with a material, easily removable and harmless to glass.

3.4 **GLAZING SCHEDULE**

3.4.1 **Aluminum Curtain Wall** specified in Section 08 44 13.

- .1 25 mm thick hermetically sealed glass units, 6 mm thick [clear] tempered glass outer lite and 6 mm thick [clear] float glass inner lite.
- .2 13 mm wide dehydrated air space utilizing a formed metal spacer, filled with Argon gas, double sealed and pressure equalized.
- .3 Low E: Solarban 60 coating on the No. 2 surface.
- .4 Refer to elevation drawing for tint location.

3.4.2 **Aluminum Windows (Exterior)** specified in Section 08 41 13.

- .1 25 mm thick hermetically sealed glass units, 6 mm thick [clear] tempered glass outer lite and 6 mm thick [clear] float glass inner lite.
- .2 13 mm wide dehydrated air space utilizing a formed metal spacer, filled with Argon gas, double sealed and pressure equalized.
- .3 Low E: Solarban 60 coating on the No. 2 surface, air filled U-value = 0.29, SHGC = 0.38.
- .4 Refer to elevation drawing for tint location.

3.4.3 **Aluminum Entrances (Exterior)** specified in Section 08 41 13.

- .1 25 mm thick hermetically sealed glass units, 6 mm thick [clear] tempered glass outer lite and 6 mm thick [clear] tempered glass inner lite.
- .2 13 mm wide dehydrated air space utilizing a formed metal spacer, filled with Argon gas, double sealed and pressure equalized.
- .3 Low E: Solarban 60 coating on the No. 2 surface.
- .4 Refer to elevation drawing for tint location.

3.4.4 **Aluminum Entrance Doors (Exterior)** specified in Sections 08 41 13 and 08 44 13

- .1 25 mm thick hermetically sealed glass units, 6 mm thick [clear] tempered glass outer lite and 6 mm thick [clear] tempered glass inner lite.
- .2 13 mm wide dehydrated air space utilizing a formed metal spacer, filled with Argon gas, double sealed and pressure equalized.
- .3 Low E: Solarban 60 coating on the No. 2 surface.

3.4.5 **Metal Framed Skylights:** specified in Section 08 63 00

- .1 25 mm thick hermetically sealed glass units, 6 mm thick (clear) tempered glass outer lite and 6 mm thick (clear) tempered glass inner lite
- .2 13 mm wide dehydrated air space utilizing a formed metal spacer, filled with Argon gas, double sealed and pressure equalized.
- .3 Low E: Solarban 60 coating on the No. 2 surface.

3.4.6 **Spandrel Glass:** specified in Section 08 44 13.

- .1 Opacicoat 300 – Refer to Drawings for colour.

3.4.7 **Aluminum Entrance Doors (Interior):** specified in Sections 08 41 13 and 08 44 13.

- .1 6 mm thick, single pane, [clear] tempered glass.

3.4.8 **Fire Rated Doors and Windows (Interior):** specified in Section 08 11 13.

- .1 6 mm thick, single pane, clear fire rated glass.

3.4.9 Refer to drawings for location of applicable glazing.

3.4.10 Refer to Drawings for location of exterior doors with laminated glass units.

END OF SECTION

PART 1 – GENERAL

1.1 WORK INCLUDED

- 1.1.1 Provide labour, materials, products, equipment and services to complete the metal framing work.

1.2 REFERENCE DOCUMENTS

- 1.2.1 American Society for Testing and Materials (ASTM):

- .1 ASTM A653/A653M, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- .2 ASTM C1177, Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing.

- 1.2.2 Canadian Standards Association (CSA):

- .1 CSA S136, North American specification for the design of cold-formed steel structural members.
- .2 CSA W59, Welded steel construction (metal arc welding).

1.3 DESIGN CRITERIA

- 1.3.1 Have work of this Section designed by a Professional Engineer licensed to design structures and registered in the Province of the Work.
- 1.3.2 Design members and their connections to withstand, within acceptable deflection limitations as specified, their own weight, the weight of the exterior cladding, and the minimum design loads and combination of loads due to the pressure and suction of wind and internal pressure. Use a return period of one in ten years for design wind load.
- 1.3.3 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. Comply with the design and performance requirements of the Building Code and as specified, and design and engineer the work accordingly.
- 1.3.4 Base design on Limit States Design principles using factored loads and resistances, determined in accordance with the building code and CSA S136.
- 1.3.5 Deflection (inward or outward) shall not be greater than $L/600$ of the span between supports.
- 1.3.6 Anchors, fasteners and braces shall be structurally stressed not more than 50% of the allowable stress when maximum load conditions are applied.

1.4 SUBMITTALS

- 1.4.1 Shop drawings: Signed and sealed by the engineer responsible for the design of work of this Section, indicating profiles, dimensions, joints and arrangements of units, details of anchors, inserts, connections to structure and methods of installation.
- 1.4.2 Submit engineering calculations or data, bearing the stamp and signature of the engineer responsible for the design of the work of this Section, verifying the capacity of the members and the ability of the system to meet the design requirements.

1.5 DELIVERY, HANDLING AND STORAGE

- 1.5.1 Deliver, handle and store materials in a manner to avoid undue damage. Store units free of the ground and protected from mud or rain splashes. Cover units, secure covers firmly.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURER

2.1.1 Bailey Metal Products Limited.

2.1.2 Corus Metal Profiles.

2.2 MATERIALS

2.2.1 Metal framing members: CSA S136, Grade A to D with Z275 zinc coating to ASTM A653/A653M.

2.2.2 Bolts, screws, nuts, washers and other fasteners: Galvanized steel with minimum coating thickness of 0.008 mm.

2.2.3 Sheathing board: Gypsum board sheathing, thickness shown of drawings, to ASTM C1380.

2.2.4 Asphalt Felt: CSA A123.3, No. 15 type.

2.3 FABRICATION

2.3.1 Materials for fire rated assemblies to conform to the requirements of the specified listing.

2.3.2 Stud width(s) to be as indicated and to include factory pre-punched cutouts for services and channel bridging.

2.3.3 Stud framing for screw attachment of gypsum board, roll formed from 0.46 mm thick cold formed steel with either Galvalume or minimum G60 (Z180) galvanized coating.

2.3.4 Top track to be of same material as studs and sized to suit. Leg length of top track to be long leg 50mm.

2.3.5 Bottom track to be of same material as studs and sized to suit stud. Leg length of bottom track to be 30mm.

2.3.6 Fasteners to secure metal framing together.

2.3.7 Drywall Furring Channels, roll formed from 0.46mm thick cold formed galvanized steel with knurled face to accept screw attachment of gypsum board.

2.3.8 Retainer tee stud to hold rigid insulation against masonry wall and provide surface to accept screw attachment of gypsum board.

2.3.9 Cutting of members shall be by saw or shear. Torch cutting is not permitted.

2.3.10 Field cut holes into framing shall be limited to 65 mm maximum across the member web 114 mm maximum along member length, 609 mm o.c. minimum.

PART 3 - EXECUTION

3.1 EXAMINATION

3.1.1 Check site dimensions and examine work of other Sections on which this Section depends.

3.1.2 Examine the structure. Provide only after all structural defects are corrected, and all permanent connections are completed and supporting structure is straight and plumb.

3.2 METAL FRAMING

- 3.2.1 Align tracks at top and bottom of partitions and secure 600 mm on centre maximum and maximum 50 mm from each end.
- 3.2.2 Place studs vertically 400 mm on centre maximum and maximum 50 mm from abutting walls and each side of corners and openings.
- 3.2.3 Install partition to accommodate vertical deflection of structure without imposing axial loads onto the framing.
- 3.2.4 Install partitions to underside of structure above or as indicated on Drawing.
- 3.2.5 Connections between framing members shall be by bolts, welding or sheet metal screws.
- 3.2.6 Resistances for sheet metal screws shall be based on the manufacturer's lower bound test values multiplied by the appropriate resistance factor, given in CSA S136.
- 3.2.7 At openings in stud walls, install track at head and sills to accommodate intermediate studs. Install intermediate studs above and below openings at same spacing as wall studs. Install double studs at jambs and double tracks at heads of door openings.
- 3.2.8 Install resilient furring channel transverse to framing members. Start rows of channel 50 mm up from floor and within 150 mm from ceiling. Space rows at maximum 610 mm. Locate splices over framing and secure channel ends to framing.
- 3.2.9 Install acoustical sealant under tracks around perimeter of sound control partitions where indicated.
- 3.2.10 Install Furring Channels as indicated, not more than 150 mm from perimeter.
- 3.2.11 Finished work to be rigid, secure, square, level, plumb and erected to maintain dimensions and contours.
- 3.2.12 Provide adequate reinforcing for framing to receive wall mounted items. Prepare for installation of washroom accessories railings and similar items by installing horizontal framing and reinforcing adequate to take the load of the item in use. Provide concealed fire rated plywood plates screwed or bolted to partition framing as backup to receive fasteners. Mark the gypsum board surface to show where supports are located.
- 3.2.13 Provide asphalt felt under runners for partitions on slabs on grade.
- 3.2.14 Employ temporary bracing whenever 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 safety and integrity of the structure.
- 3.2.15 Ensure that during erection a margin of safety consistent with the requirements of the Building Code and CSA S136 is provided.

3.3 CEILING AND BULKHEAD FRAMING

- 3.3.1 Frame around fixtures, grilles and other openings. Where ducts or other items interfere so that hanger spacing exceeds 1.2 m, increase the size of the main runners and hanger wire accordingly, to sustain increased loading and span. Provide additional hangers as required to support the weight of lighting fixtures, diffusers, grilles and other built-in items occurring in ceilings.

- 3.3.2 Provide ceilings with cold rolled stud framing and metal lath security mesh fastened to framing before application of gypsum board where indicated. Ensure that metal lath security mesh is installed in a manner to allow proper and secure attachment of gypsum board without distorting or causing damage to the gypsum board application or appearance.

3.4 ERECTION TOLERANCES

- 3.4.1 For the purpose 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.
- 3.4.2 Out of plumb: Not to exceed L/500 of the member length.
- 3.4.3 Out of straightness (camber or sweep): Not to exceed L/1000 of the member length.
- 3.4.4 Track camber: Not to exceed L/1000 of member length.
- 3.4.5 Spacing of studs: Not more than 3 mm from design spacing. Cumulative error in spacing shall not exceed requirements of finishing materials.

3.5 SHEATHING

- 3.5.1 Install in accordance with ASTM C1280 and Section 09 29 00.

3.6 INSPECTION

- 3.6.1 The Engineer responsible for the production of the shop drawings, shall provide periodic field review during construction and shall submit reports to the Consultant. Include inspection for:
- .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 this Section.
 - .4 Checking fabricated members against specified number shapes.
 - .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 reduction.
 - .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.

END OF SECTION

PART 1 – GENERAL

1.1 WORK INCLUDED

- 1.1.1 Provide labour, materials, products, equipment and services to complete the gypsum board work.

1.2 REFERENCE DOCUMENTS

1.2.1 American Society for Testing and Materials (ASTM):

- .1 ASTM C665, Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.
- .2 ASTM C834, Standard Specification for Latex Sealants.
- .3 ASTM C840, Standard Specification for Application and Finishing of Gypsum Board.
- .4 ASTM C1178, Standard Specification for Coated Glass Mat Water-Resistant Gypsum Backing Panel.
- .5 ASTM C1278, Standard Specification for Fiber-Reinforced Gypsum Panel.
- .6 ASTM C1396, Standard Specification for Gypsum Board.
- .7 ASTM E84, Standard Test Method for Surface Burning Characteristics of Building Materials.
- .8 ASTM E90, Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements.

1.3 DESIGN CRITERIA

- 1.3.1 **Fire Rated:** Fire rated construction is to be in accordance with the appropriate ULC design, or other acceptable test design, to provide the fire ratings indicated. If requested, submit written evidence of acceptable test design.

- 1.3.2 **Sound Rated:** Sound rated construction is to have a STC rating tested in accordance with ASTM E90.

1.4 SUBMITTALS

- 1.4.1 **Shop Drawings:** Submit shop drawings in large scale detail showing pertinent construction details for location of control joints, fire rated and sound rated construction. Submit shop drawings showing the layout of control joints, where applicable.

PART 2 – PRODUCTS

2.1 SHEET MATERIALS

- 2.1.1 **Gypsum Board:** ASTM C1396, 16 mm thick or 13 mm thick as indicated on drawings, 1.2 m wide and of maximum length. All face layers are to have tapered edges unless otherwise required or indicated.

- 2.1.2 **Fire Rated Gypsum Board:** ASTM C1396, Type X, ULC (or other acceptable test authority) listed and labelled or 16 mm thick as indicated on drawings or as required to conform to fire rated assemblies, 1.2 m wide and of maximum practical length, complete with tapered edges.

- 2.1.3 **Tile Backing Board:** ASTM C1178 or ASTM C1278; Water resistant tile backer board, 13 mm thick.

2.2 ACCESSORIES

- 2.2.1 Joint treatment is to be perforated tape reinforcement, joint filler or compound, and topping compound.

- 2.2.2 **Water:** Potable.

- 2.2.3 **Casing Bead:** 16 mm to suit the gypsum board thickness, #25 gauge galvanized steel trim and of a type designed to be concealed in the finish work by joint tape and joint compound.
- 2.2.4 **Corner Bead:** #25 gauge galvanized steel, 25 mm x 25 mm and thick, 2.4 m length.
- 2.2.5 **Zinc Control Joint:**
- .1 Install 9.0 m on centre fill joint with paintable sealant.
 - .2 Control joints shall not be installed at fire rated wall.
- 2.2.6 **Miscellaneous:** Clips, splices, laminating adhesive and all other accessories as required.
- 2.2.7 **Sealant:**
- .1 Acoustic Sealant: ASTM C834, non-hardening acoustic sealant by Tremco (Canada) Ltd.
 - .2 Fire rated Sealant: ASTM E84, acrylic based firestop sealant at fire rated locations.
 - .3 Sealant At Other Locations: Refer to Section 07 92 00.
- 2.2.8 **Sound Insulation:** ASTM C665 full cavity, friction fitting fibrous glass batts by Owens Corning Canada, Ottawa Fibre Inc., or mineral wool batts by Canadian Gypsum Company Limited or Roxul Company.
- 2.2.9 **Moisture Resistant Insulating Material:** Neoprene sponge strip self adhesive tape.

PART 3 – EXECUTION

3.1 INSTALLATION - GENERAL

- 3.1.1 Perform all required gypsum board work. Perform all required metal stud system work in accordance with requirements of architectural and structural drawings, including but not limited to the following:
- .1 Wall studs subjected to lateral and imposed loads.
 - .2 Top and bottom track connection including detailing to accommodate deflections and anticipated movements.
 - .3 Head and sill members and jamb studs for openings.
 - .4 Stud, bridging and track connections.
 - .5 Support systems for attachment of metal fascia, soffits, facing, etc., specified in other Sections.
- 3.1.2 Comply with ASTM C840.
- 3.1.3 Accommodate fixtures, fittings and other items in gypsum board areas.
- 3.1.4 Coordinate the work with trades installing equipment above or in the suspended ceiling areas so as to produce a layout of hangers, carrying channels and furring channels suitable to accommodate fittings and units of equipment in a proper manner.
- 3.1.5 Continue gypsum board systems through the ceiling to the underside of the structure above except where otherwise shown.
- 3.1.6 Install access doors supplied by other trades.
- 3.1.7 Provide continuous compressible filler strip material at the edges of gypsum board in contact with exterior wall surfaces and between the top of partitions and suspended ceilings.
- 3.1.8 Do not fasten work of this Section to window mullions or other elements of exterior walls.
- 3.1.9 Provide structural grade steel stud framing at the back of parapets as indicated.

3.2 GYPSUM BOARD

- 3.2.1 Erect gypsum board vertically or horizontally whichever results in fewer end joints. Butt joints loosely with a maximum gap of 6.5 mm. Do not force boards into position. Place tapered edges next to one another. All end joints are to occur over framing members.
- 3.2.2 Minimize end joints. Joints are not to align with edge of wall openings.
- 3.2.3 Provide moisture-resistant insulating material at the edges of gypsum board in contact with metal windows and at exterior door frames.
- 3.2.4 Install control joints 9.0 m on centre.

3.3 FASTENERS AND FASTENING

- 3.3.1 Apply gypsum board to metal furring, studs, runner channels, angles and other framing with drywall screws. Space screws at maximum 300 mm on centre in the field of the board and at maximum 200 mm on centre staggered along abutting edges.

3.4 FINISHING

- 3.4.1 Apply corner beads to all external vertical and horizontal corners and edges. Apply casing beads where the gypsum board butts against a surface having no trim concealing the juncture.
- 3.4.2 Erect corner beads and casing beads plumb and level with a minimum number of joints and secured at 200 mm on centre with screws in each flange. Stagger fasteners in each flange. At double layer gypsum board applications use a crimping tool to secure corner beads at 200 mm on center
- 3.4.3 Mix and apply joint compound and reinforcing tape in accordance with the manufacturer's instructions at all joints, fasteners and trim.
- 3.4.4 Fill all gaps and screw depressions with 3 coats of joint compound.
- 3.4.5 Feather all coats of joint compound onto adjoining surfaces so that all joints, tape holes and flanges of beads are undetectable.
- 3.4.6 Make the finished work smooth, seamless, plumb, true, flush and with square, plumb, neat corners and edges.

3.5 CONTROL JOINTS

- 3.5.1 Construct control joints using premanufactured control joint or 2 back- to- back casing beads.
- 3.5.2 Where application is on metal studs, double up studs at control joints, and place one stud on each side of the joint. Terminate runners at each side of the joint.
- 3.5.3 Locate control joints where indicated, at changes in substrate construction, at approximate 9.0 m spacing in wall runs, at approximate 15 m spacing on interior ceilings.
- 3.5.4 Refer to drawings for detail pertaining to fire rated partitions.

3.6 SOUND ATTENUATION

- 3.6.1 Provide continuous sound attenuation blankets at gypsum board work where shown and as required to attain sound attenuation indicated or specified.
- 3.6.2 Secure blankets to one interior face of gypsum board with adhesive or mechanical fasteners, or by other approved means unless friction fitting fibrous glass batts are provided.

3.7 SEALING

- 3.7.1 Provide perimeter sealant (sound seal) at the junction of gypsum board with the structure, other partitions and at the junction with dissimilar materials and adjacent construction. Apply in concealed locations. Install in strict accordance with the sealant manufacturer's written instructions.
- 3.7.2 Seal openings around ducts and similar protrusions passing through gypsum board systems, except fire rated assemblies which are to receive firestopping and smoke seals as part of the work specified in Section 07 84 43.

3.8 FIELD QUALITY CONTROL

- 3.8.1 The light-weight steel framing design engineer responsible for the production of the shop drawings for load bearing metal stud assemblies is to provide periodic field review during construction and is to submit reports to the Owner and the Consultant.
- 3.8.2 Inspection is to 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 specifications and reviewed shop drawings
 - .3 Checking fabricated members against specified member shapes
 - .4 Sample checking of screwed and bolted joints
 - .5 Sample checking that tolerances are not exceeded
 - .6 Additional inspection and testing of welded connections as required by CSA W59, if applicable
 - .7 General inspection of field cutting and alterations required by other trades

END OF SECTION

PART 1 – GENERAL

1.1 WORK INCLUDED

- 1.1.1 Provide labour, materials, products, equipment and services to complete the painting work.

1.2 REFERENCE DOCUMENTS

- 1.2.1 Master Painters Institute (MPI), Painting Specification Manual.

1.3 SUBMITTALS

- 1.3.1 **Samples:** Submit 2 samples of each finish and colour required, in the required number of coats, on representative substrates. Include specifications of materials, products and application procedure used to obtain the finish.

1.4 QUALITY ASSURANCE

- 1.4.1 Comply with requirements of the Master painters Institute (MPI), where greater requirements are not specified, excluding requirement for the inspection program.
- 1.4.2 Provide paint products meeting MPI "Green Performance Standard GPS-1-05".

1.5 SITE CONDITIONS

- 1.5.1 Ensure that the temperature and humidity at the time of application are suitable and that proper ventilation is provided. Do not apply finishes in any area where dust is being generated.

PART 2 – PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- 2.1.1 In accordance with the MPI Manual, unless otherwise specified.

2.2 MATERIALS

- 2.2.1 **Paint and Finishing Materials:** Products in accordance with MPI Painting Specifications Manual, Premium Grade, of the highest grade, first line quality of the manufacturer. Paint materials for each system are to be by the same manufacturer.
- 2.2.2 **Galvanized Metal Primer:** Cementitious primer as per the MPI Manual.

PART 3 – EXECUTION

3.1 GENERAL PAINTING AND FINISHING

- 3.1.1 Perform all required painting and finishing work in accordance with the Contract Documents, including drawing finish, door and colour schedules, and include for painting and finishing work throughout the building which is required but is left unpainted or unfinished as part of the work of the Section in which the work is specified.

3.2 EXAMINATION

- 3.2.1 Examine the work upon which the work of this Section depends prior to application.
- 3.2.2 Surfaces to be finished are to be dry and free of dirt, grease or other contaminants. Test masonry surfaces to be painted for alkalinity. Bring surfaces to neutral pH.

- 3.2.3 Test all surfaces for moisture content before commencing painting. Do not apply paint to a material when the moisture content exceeds 12% as determined by an approved moisture testing device.

3.3 **PREPARATION**

- 3.3.1 Cut out scratches, cracks and abrasions and fill with suitable non-shrink patching compound flush with the adjoining surface. When dry, sand the patch smooth and seal before the application of the prime coat.
- 3.3.2 Fill nail holes, screw holes and other similar defects.
- 3.3.3 Surfaces to be finished are to be free from machine, tool, or sanding marks, dust, grease, soil or other extraneous matter.
- 3.3.4 Comply with the MPI Manual, Surface Preparation requirements, for preparation of surfaces, except where greater requirements are specified herein.
- 3.3.5 **Wood:** Sand smooth, removing all tool marks, and dust clean.
- 3.3.6 **Gypsum Board:** Inspect to ensure properly filled joints, sand smooth. Fill small nicks or holes with patching compound and sand smooth.
- 3.3.7 **Concrete, Masonry, Cementitious Products:** Allow 28 days cure, and coordinate repair with responsible trades.
- 3.3.8 **Ferrous Metals:** Remove all rust and mill scale using the best method to reach this end (sandblasting, needle-gun, chipping, power or hand wire brushing). Weld flux is to be power tool cleaned and washed with water to remove alkali contaminants.
- 3.3.9 **Shop Coated Ferrous Metals:** Remove oil or grease contamination by solvent washing. Touch up abraded, damaged and deteriorated areas with rust inhibiting primer the same as or similar to and compatible with the primer used for shop coating.
- 3.3.10 **Galvanized Steel:** Wash thoroughly with mineral spirits and wipe entirely clean using a sufficient number of clean cloths.
- 3.3.11 **Copper:** Wash with xylene solvent and apply vinyl etch primer.

3.4 **APPLICATION – PRIMERS**

- 3.4.1 Apply one coat of primer to other exposed ferrous metal surfaces which have not received a shop coat of primer.
- 3.4.2 Touch up shop primed metal work after loose paint and scale have been removed.
- 3.4.3 Apply wood primer or undercoat by brush and work thoroughly into the wood grain, cracks, splits and recessed nail heads.
- 3.4.4 For ferrous piping with a factory applied bituminous covering, apply a primer which is compatible with the finish paint and which will prevent bitumen bleeding through the finish.

3.5 **APPLICATION – FINISH COATS**

- 3.5.1 Mix materials thoroughly before application, apply evenly under adequate illumination and free from sags, runs, crawls and other defects. Do cutting in neatly.
- 3.5.2 Apply coats of the proper consistency as received from the container, and brush well showing a minimum of brush marks.

- 3.5.3 Sand semi-gloss, medium and high gloss finishes lightly between coats.
- 3.5.4 Apply filler to open grain woods. Filler for wood, if required, is to be coloured. Work it well into the wood grain, and before set, wipe the excess clean from the surface.
- 3.5.5 Finish work uniformly as to sheen, gloss, colour and texture.
- 3.5.6 Apply materials in accordance with the directions and instructions of the manufacturer's of the various materials. Do not use adulterants.
- 3.5.7 Repaint the entire plane of areas showing incomplete coverage.
- 3.5.8 Do not paint over ULC or other fire rating labels on doors and frames, nor over identification labels on mechanical and electrical equipment.
- 3.5.9 Paint interior of ducts and pipes visible through diffusers, grilles, louvres and registers with black matte paint.
- 3.5.10 Paint gas piping with standard yellow colour enamel.
- 3.5.11 Paint removable items such as access panels and doors, grilles, and similar items while the item is removed or the door open, so as not to create a paint seal at the juncture of the opening or removable item and its fixed frame or substrate.
- 3.5.12 Keep sprinkler heads free of paint.
- 3.5.13 Paint disconnect switches for the fire alarm system and exit light systems in red enamel.
- 3.5.14 Leave equipment supplied with a factory enamel finish in the original finish except for touch-up as required, and paint conduits, mounting accessories and other unfinished items.
- 3.6 **DISPOSAL OF PAINT WASTE**
- 3.6.1 Be responsible for proper disposal of material and waste of this Section.
- 3.7 **PAINT FINISH SYSTEMS – GENERAL**
- 3.7.1 Other interior ferrous metal work which is exposed in the completed work in areas scheduled to be finish painted is to receive a minimum of 2 coats of interior finish paint over the prime coat.
- 3.7.2 At areas scheduled to be unfinished, such as receiving area, painting of interior ferrous metal work is limited to steel doors and frames (including hollow metal doors, pressed steel frames, steel frames at overhead doors and openings) where such ferrous metal work is to be painted with a minimum 1 coat of interior finish paint over the prime coat.
- 3.7.3 All other finishes are to be a minimum of 2 finish coats over the prime coat.
- 3.8 **EXTERIOR FINISHES**
- 3.8.1 Comply with the MPI Manual, Exterior Systems coded systems.
- 3.8.2 In addition to the previously specified treatments, coatings and primers, finish exterior surfaces as indicated below. The number of coats specified will be considered the minimum and are to be increased where necessary to attain proper coverage satisfactory to the Owner and Consultant:

	Surface	Finish
.1	Pavement marking:	EXT 2.1A, latex, matte
.2	Miscellaneous steel	
	Primed:	EXT. 5.1D, alkyd, semi-gloss
	Galvanized:	EXT. 5.3B, alkyd, semi-gloss
.3	Steel – high heat:	EXT. 5.2A, enamel, gloss
3.8.3	Metal bollards and metal guard/handrail.	
3.9	INTERIOR FINISHES	
3.9.1	Comply with the MPI Manual, Interior Systems coded systems.	
3.9.2	In addition to the previously specified treatments, coating or primers, finish interior surfaces as indicated below. The number of coats specified herein will be considered minimum and are to be increased where necessary to attain proper coverage satisfactory to the Owner and Consultant:	
	Surface	Finish
.1	Miscellaneous steel	
	Primed:	INT. 5.1E, alkyd, semi-gloss
	Galvanized:	INT. 5.3C, alkyd, semi-gloss
.2	Steel – high heat:	INT. 5.2A or 5.2D, as applicable
.3	Wood – painted:	INT. 6.3B, alkyd, semi-gloss
.4	Wood- transparent:	INT. 6.3K, polyurethane, matte
.5	Gypsum board:	INT. 9.2C, alkyd, semi-gloss
3.9.3	Colour Schedule: Consultant will select choice of colours and gloss when compiling a Colour Schedule after award of Contract; allow for colour selection beyond paint manufacturer's standard colour range. Additional colour requirements:	
.1	Roof Access Ladder, Hollow metal doors and frames, steel bollards, metal guard / handrail / and stair stringers: Benjamin Moore – Stormy Monday 2112-50.	
.2	Pavement marking – yellow	
.3	Gypsum board – not applicable	
.4	Wood – not applicable	
.5	Masonry – not applicable	

END OF SECTION

PART 1 - GENERAL

1.1 WORK INCLUDED

- 1.1.1 Provide labour, materials, products, equipment and services to complete the earth moving work.

1.2 REFERENCE DOCUMENTS

1.2.1 American Society for Testing and Materials (ASTM):

- .1 ASTM D698, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using standard Effort (600 kN-m/m³).

1.2.2 Canadian Standards Association (CSA):

- .1 CSA A23.1/A23.2, Concrete materials and methods of concrete construction / Test methods and standard practices for concrete.
- .2 CAN/CSA G40.20/G40.21, General requirements for rolled or welded structural quality steel / Structural quality steel.

1.2.3 Ontario Provincial Standard Specification (OPSS):

- .1 OPSS 1010, Material Specification For Aggregates - Base, Subbase, Select Subgrade, And Backfill Material.
- .2 OPSS 1860, Material Specification For Geotextiles.

1.3 PROTECTION

1.3.1 Underground Services: Notify Public Utilities in advance of planned excavations adjacent to their services. Take care not to damage or displace encountered services. When such services are encountered notify Consultant immediately and protect, brace and support them. Advise Consultant which services require adjustment, relocation or abandonment. Where work on these services become necessary use following procedure:

- .1 Essential Services: Make necessary repairs only to maintain essential services satisfactory to Consultant and authorities having jurisdiction.
- .2 Known Services: Repair promptly at no expense to Owner.
- .3 Unknown Services: Repair promptly on Consultant's instructions. Submit complete breakdown of cost of such work. Amount approved will be added to Contract Sum.
- .4 Record location of maintained, re-routed and abandoned underground services.
- .5 Shoring and trench timbering, in addition to requirements of local authorities shall be carried out in accordance with requirements of The Occupational Health and Safety Act, specified herein for Construction Projects, and other applicable regulations of Ontario Ministry of Labour. In addition, follow recommendations of Construction Safety Association brochure "Shoring and Timbering in Trenches", wherever applicable.
- .6 Shoring and bracing shall be designed by professional engineer registered in Province of Ontario. Submit design data bearing stamp and signature of professional engineer.

1.3.2 Shoring and Bracing:

- .1 Provide necessary shoring and bracing for excavations and to existing building with special attention to areas indicated to be underpinned. Submit method of shoring and bracing for review before installing. Maintain shoring and bracing during work. Remove when no longer required and when notified.
- .2 Shoring and bracing shall properly retain banks of excavations and prevent caving-in or displacement or damage to surrounding or adjacent buildings or other property.

- .3 Retain shoring and bracing until other work affected thereby is carried out.
- .4 Erect shoring and bracing free of footings, foundations, walls or other such work so it may be removed entirely or in sections when it is no longer required and when directed, without causing damage or injury to Work or adjacent property.

PART 2 - PRODUCTS

2.1 MATERIALS

- 2.1.1 **Backfill and Fill Under Paved Areas and Areas to Receive Floor Slabs:** Granular, either well-graded gravel or crushed stone with not more than 10% passing 75 um (#200) sieve or Granular B, Type 1 material OPSS 1010. Surplus excavated material, if it conforms to these requirements, may be used.

2.1.2 Backfill and Fill Materials for Work of Mechanical and Electrical Divisions

- .1 Earth Trenches to 600 mm Above Mechanical Pipe Work: Clean, natural, unwashed gravel or sand, ranging in size from medium gravel to medium sand, 100% passing 25 mm sieve and 95% to 100% retained on 250 um (#60 sieve).
- .2 Earth Trenches - 100 mm Envelope Surrounding Electrical Raceways and Wiring: Fine aggregate (sand) for concrete, graded, CSA A23.1/A23.2.
- .3 Top Portion of Earth Trenches Specified Above, Concrete Trenches and Other Mechanical and Electrical Work in Areas Not to be Paved and Not to Receive Floor Slabs: As specified herein.
- .4 Top Portion of Earth Trenches Specified Above, Concrete Trenches and Other Mechanical and Electrical Work Under Paved Areas and Areas to Receive Floor Slabs: As specified herein.

- 2.1.3 **Remaining Backfill and Fill:** Clean excavated materials free from waste materials, debris, rubbish, frozen portions, muskeg, organic or cohesive matter and rocks larger than 100 mm in diameter. If sufficient quantity of material is not available from excavation, use imported fill having same, or better, characteristics.

- 2.1.4 **Topsoil:** Friable loam, neither heavy clay nor of very light sand nature containing minimum of 4% organic matter for clay loams and 2% for sandy loams to maximum of 25% by volume, free from subsoil, roots, grass, weeds, toxic materials, stones, foreign objects and with an acidity range (pH) of 5.5 to 7.5. Topsoil containing crabgrass, couch grass or other noxious weeds is not acceptable.

2.1.5 Silt Fence

- .1 Structural Quality Steel Shapes for Silt Fence Posts: CAN/CSA-G40.20/G40.21-M, Grade 300W.
- .2 Wire Fencing: Standard wire fence, max mesh spacing 150 mm, min wire dia 2mm.
- .3 Geotextile Filter Cloth: OPSS 1860, Class 1.
- .4 Filter Aggregate: 19 mm crushed stone.

PART 3 - EXECUTION

3.1 PREPARATION

- 3.1.1 **Lines and Levels:** Establish accurate lines and levels as required and supply batter boards, line stakes and templates and establish permanent reference lines and bench marks required.

3.2 EXECUTION

3.2.1 General

- .1 Visit site to determine existing conditions. Refer to Geotechnical Report.

- .2 Where excavation has to be below level of footings of adjacent existing building and within angle of repose of local soil as drawn from bottom of footing, then such excavation design shall be by professional engineer.
- .3 Excavate to extent, elevations and depths required for completion of work, leaving sufficient space for removal of formwork, application of waterproofing and installation of foundation drains.
- .4 Keep excavation free of water by bailing, pumping or system of drainage as required and provide pumps, suction and discharge lines or well points of sufficient capacity and maintain until such time as permanent drainage system is installed. Take necessary measures to prevent flow of water into excavation.
- .5 Water discharged from dewatering systems shall be equal to or better in quality than receiving stream or sewer storm water and shall be free of pollutants. Provide settling ponds and/or other treatment facilities as required to treat discharges in accordance with authorities having jurisdiction. Obtain permit from authority having jurisdiction for temporary diversion of water course.
- .6 Protect bottom and sides of excavations and trenches from freezing and from exposure to wet weather to prevent cave-ins and softening of bed upon which concrete or drains rest.
- .7 Keep bottoms of excavations clean and clear of loose materials, levelled and stepped at changes of levels with exception of excavations made for drainage purposes and those to slope as required.
- .8 Excavate areas under concrete slabs on grade and where permanent roads and walks will occur to depth required and sufficient to expose firm undisturbed subsoil, free of organic matter.
- .9 If removal of earth causes displacement of adjacent earth, remove disturbed earth at no additional cost to Owner.
- .10 Remove soft unconsolidated soils, muskeg and organic material encountered in excavations and fill void and any wells, slumps, cesspools or similar pits with well compacted clean dry fill of quality as herein specified. Where these conditions occur under or near footings obtain direction before proceeding.
- .11 After completion of excavation and prior to placing any concrete on bearing strata or placing of fill, notify the testing company to inspect exposed bearing surfaces. Do not proceed without authorization.
- .12 Should nature of subsoil at depths indicated prove to be unsatisfactory to the testing company for placing of structural work thereon, excavate to greater depth until satisfactory bottom is reached.
- .13 Keep surfaces against which concrete or fill is placed free of frost.
- .14 Thaw out frozen surfaces beneath concrete slabs, paving or structure requiring firm foundation to unfrozen depth. Remove thawed softened material to firm base and fill void with well compacted clean dry fill of quality as herein specified.
- .15 If excavations reveal seepage zones, springs or other unexpected subsurface conditions which may necessitate revisions or additions to the Contract Documents, inform consultant and obtain written instructions.

3.2.2 **Silt Fencing**

- .1 Provide silt fence in locations indicated on Drawings.
- .2 Space posts at 3 m max spacing and drive in ground min 500 mm. Do not space posts more than 2 m if wire fencing is not used for support.
- .3 Excavate trench for anchor (300 x 300 mm) along post line on upslope side of barrier.
- .4 Fasten wire fence to upslope side of posts with tie wires or hog rings. Extend wire fence min 50 mm into trench. Height of fence above ground shall be 1000 mm.
- .5 Extend filter fabric 800 mm into trench and over wire fence and tie to wire fence as indicated on Standard Drawing. Fabric shall not extend more than 1000 mm above ground. Stapling filter fabric to trees shall not be acceptable.

- .6 Backfill trench and filter aggregate over filter fabric. Ensure that no gaps exist between fabric and ground.
- .7 Conduct inspection of silt fence immediately after rainfall and daily during prolonged rainfall. Repair damage immediately.
- .8 Remove sediments trapped in filter after each storm and/or when deposits reach one half height of barrier.

3.2.3 Rock Excavation

- .1 Contract Sum shall include for excavation in all types of strata.

3.2.4 Trench Excavating for Mechanical and Electrical Work

- .1 Include all types of strata in Contract Sum for trench excavation.
- .2 Excavation for mechanical and electrical work shall be carried out in accordance with requirements specified herein and indicated on Drawings. Such work shall be laid out under supervision of mechanical and electrical Sections. Coordinate mechanical and electrical work with respective Sections before commencement.
- .3 Commence excavating of service trenches at low point; evenly pitch trenches and maintain trenches in dry condition. Excavate with suitable machinery or by hand as may be necessary to depths and dimensions required for work. Unless otherwise indicated on Drawings, excavate trenches to depth sufficient to provide minimum frost cover of 1500 mm over pipe when laid.
- .4 Cut and trim sides of trenches evenly and as near vertical as possible and shore as required to prevent cave-in.
- .5 Keep bottom of trenches clean and clear of loose material and slope or grade as required. Hand trim last 100 mm of trench excavation to ensure minimum disturbance to load bearing value of trench bottoms.

3.2.5 Backfilling

- .1 Proceed promptly with backfilling as building progresses after obtaining consultants approval.
- .2 Backfill evenly on both sides of foundation walls to avoid unequal fill pressures on walls whenever backfilling on both sides is possible, in locations where backfilling is only on 1 side of structure ensure that structure is properly shored and braced.
- .3 Remove shoring material during backfilling.
- .4 Place fill around foundation wall so that footings will have minimum of 1.5 m coverage, measured at 45° from bottom of footing to protect against frost until final grading is complete.
- .5 Place backfill and fill in 150 mm thick maximum layers. Compact each layer before placing next.
- .6 Areas adjoining vulnerable building components which cannot be thoroughly compacted by drawn equipment, shall receive equivalent compaction with mechanical tampers.
- .7 Fill shall be free of snow and ice and in no instance shall fill be placed on frozen snow, or ice covered ground.

3.2.6 Exterior Filling and Rough Grading

- .1 Cut and fill as required, areas of Site to be landscaped or which will require changes of contours outside building and rough grade to levels required to accommodate finishes indicated on Drawings.
- .2 Before commencing grading remove debris from Site and place approved fill as specified and cut, grade and compact by approved methods.
- .3 Provide minimum slope of 2% for distance of 3 m away from building to provide drainage. Provide uniform slopes between points where elevations are given and between given elevations and existing grade levels.

- .4 Graded surfaces shall be free from coarse material and stones greater than 100 mm in diameter and left in satisfactory condition.
- .5 Should settlement occur make good as soon as possible to avoid ponding and interruption of traffic around building.

3.2.7 Granular Fill Under Concrete Slabs

- .1 Immediately after foundation walls are completed to floor level and backfill over mechanical and electrical services is completed, place and compact fill as required to bring level up to elevation of underside of porous fill.
- .2 Inspect moisture content of fill prior to placing. Limit addition of water only to extent required to provide optimum moisture content for compaction. Puddling or flooding with water to compact fill is not permitted.
- .3 Deposit fill in layers so equipment being used for compacting can produce specified density. If lumps are present in material each layer shall be continuously disked in order to ensure proper compaction.
- .4 During and immediately after levelling and disking, compact each layer of fill using approved mechanical equipment until required compaction and level is reached. Carry out compaction within 1 m of walls, where grade difference is 0.5 m or more on other side of wall by hand tamping unless otherwise approved in writing by the consultant.

3.2.8 Mechanical and Electrical Work

- .1 Excavate, backfill and rough grade for:
 - .1 Mechanical: bases, curbs, trenches, piping, thrust blocks, maintenance holes, valves, etc.
 - .2 Electrical: bases, underground distribution system, trenches, electrical maintenance holes, etc.
- .2 Cooperate with Mechanical and Electrical Divisions and carry out work promptly, avoiding disruption of their work sequence.

3.2.9 Compaction Density

- .1 Minimum Standard Proctor Density ASTM D698 of compacted fill in place shall be:

<u>Location</u>	<u>Densities Required</u>
Fill both sides of foundation walls	95% Standard
Under concrete slabs or paving	98% Standard
Under sodding and all other areas	95% Standard or as otherwise specified.

3.3 RAMPS

- 3.3.1 Construct and maintain temporary access roads and ramps as required leading into each excavated area.
- 3.3.2 Design ramps of sufficient size to provide stability and to support movement of both haulage vehicles, construction equipment and concrete trucks. Construct such ramps and roads from Site excavated material where available, provided they meet design requirements and construction schedule.
- 3.3.3 Remove temporary ramps and other access roads to suit construction schedule. Hand excavated areas clean for work to progress as required.

3.4 FIELD QUALITY CONTROL

3.4.1 Water on Prepared Surfaces

- .1 On surfaces to receive paving or concrete slabs, immediately remove any ponding water by approved methods.

- .2 Where prepared subgrade soil under structural work, and any compacted fill under concrete slabs or paving, is softened or disturbed by water, remove unsatisfactory material and replace with compacted fill as specified for respective work and locations.

3.4.2 Inspection and Testing

- .1 Testing of materials and compaction may be carried out by Owner's Inspection and testing company.

END OF SECTION

PART 1 - GENERAL

1.1 WORK INCLUDED

- 1.1.1 Provide labour, materials, products, equipment and services to complete the metal fabrication work.

1.2 LAYOUT

- 1.2.1 Set out grade stakes, clearly marked with existing and proposed grade elevations and the height by which existing levels are to be raised or levelled.
- 1.2.2 All layout work is to be inspected to the Consultant's approval.

1.3 INSPECTION

- 1.3.1 Ensure sub-grade levels are inspected before materials are placed thereon.
- 1.3.2 Give timely notice when fine grading has been completed and grade levels are ready for inspection.

PART 2 - PRODUCTS

2.1 MATERIALS

- 2.1.1 Topsoil: Friable natural loam with an acidity range from 6.0 pH to 7.5 pH; containing 4% organic matter for clay loams and a minimum of 2% for sandy loams; and free of stones and roots over 50 mm dia., vegetation, toxic materials, subsoil, clay lumps and other solid materials.

PART 3 - EXECUTION

3.1 SITE EXAMINATION

- 3.1.1 Prior to commencement of work on the site, check all site conditions and verify existing rough grade.
- 3.1.2 Report immediately in writing, all discrepancies and conditions which are at variance with drawings and specifications, to the Landscape Architect.
- 3.1.3 Failure to do so will imply acceptance by the Contractor of surfaces and site conditions and no claim, made thereafter, for damages of extras, resulting from such discrepancies, will be accepted, unless such damages or extras are the result of sub-surface conditions which could not be definitely ascertained before commencement of work.

3.2 PROTECTION

- 3.2.1 Prevent damage to fencing, gateposts, trees, landscaping, bench marks, existing buildings, existing pavement and surface or underground utility lines which are to remain. Make good any damage.

3.3 PREPARATION OF SUBGRADE

- 3.3.1 Grade soil, eliminating uneven areas and low spots, ensuring positive drainage. Remove soil contaminated with toxic materials.
- 3.3.2 Cultivate entire area which is to receive topsoil to depth of 100 mm. Repeat cultivation in those areas where equipment used for hauling and spreading has compacted soil.
- 3.3.3 Remove surface debris, roots, vegetation branches and stones in excess of 50 mm diameter.

3.4 FINISH GRADING

- 3.4.1 Spread topsoil after Consultant has inspected and approved grades.
- 3.4.2 Place topsoil in loose layers not exceeding 225 mm in depth. Allow for settlement and ensure that finished grades are as shown.
- 3.4.3 Do not grade when soil is wet or frozen or subgrade is frozen.
- 3.4.4 For sodded areas keep topsoil 15 mm below finished grade.
- 3.4.5 Apply topsoil to following minimum depths unless otherwise indicated:
 - .1 150 mm for sod areas.
 - .2 600 mm for annual beds.
 - .3 600 mm for shrub beds.
- 3.4.6 Note that existing grade contours, where shown on drawings, are approximate only and may require adjustment to suit site conditions.
- 3.4.7 Fine grade and loosen top soil. Eliminate rough spots and low areas to ensure positive drainage. Prepare loose friable bed by means of cultivation and subsequent raking.
- 3.4.8 Roll to consolidate topsoil for areas to be sodded leaving surface smooth, uniform, firm against deep foot printing, and with a fine loose texture to approval of Consultant.

3.5 SURPLUS MATERIAL

- 3.5.1 Remove surplus material from site as directed.

END OF SECTION

PART 1 - GENERAL

1.1 WORK INCLUDED

- 1.1.1 Provide labour, materials, products, equipment and services to complete the concrete paving work.
- 1.1.2 Obtain and pay for permits and inspections required by authorities for work of this Section.

1.2 REFERENCE DOCUMENTS

- 1.2.1 Canadian Standards Association (CSA):
 - .1 CSA A23.1/A23.2, Concrete materials and methods of concrete construction / Test methods and standard practices for concrete.
- 1.2.2 Ontario Provincial Standard Specification (OPSS):
 - .1 OPSS 1010, Material Specification For Aggregates - Base, Subbase, Select Subgrade, And Backfill Material.

1.3 QUALITY ASSURANCE

- 1.3.1 Paving work shall be done only by skilled workmen, with suitable machinery, Supervised by foremen experienced in type of Work specified herein.
- 1.3.2 Execute the Work of this Section by a Subcontractor with skilled tradesmen who has equipment adequate for project, and is known to have been responsible for satisfactory installations similar to that specified during a period of at least five years, so that work is performed expeditiously.

1.4 SITE EXAMINATION

- 1.4.1 Verify all site conditions which may adversely affect the performance of this Section.
- 1.4.2 Report in writing all conditions which may adversely affect the performance of this Section.
- 1.4.3 Commencement of work implies acceptance of surfaces and conditions. Claims for damages or extras resulting from such conditions will be rejected, unless due to conditions which could not be determined prior to or during the course of construction.

1.5 PROTECTION

- 1.5.1 Prevent damage to adjacent buildings, adjacent properties, and existing curbs, sidewalks and paving to remain.
- 1.5.2 Keep traffic of any kind off the work of this Section until the work has cured and reached its design strength.

1.6 ALLOWABLE TOLERANCES

- 1.6.1 Grade base courses with surfaces within 13 mm of established elevations and within a tolerance of 13 mm under a 3000 mm long straightedge.
- 1.6.2 Finish concrete paving with surfaces within 13 mm of established elevations and locations, within 3 mm of other surfaces at junctions, and within a tolerance of 6 mm under a 3000 mm long straightedge.

1.7 INSPECTIONS

- 1.7.1 The locations of all sidewalks and curbs are to be staked out by the Contractor under the direction of the Consultant prior to commencing with work.
- 1.7.2 All form works to be inspected and approved by Consultant prior to pouring of concrete.
- 1.7.3 All base courses are to be approved by the Consultant prior to the installation of finished surfaces.
- 1.7.4 Give timely notice when ready for stake out and inspections.

PART 2 - PRODUCTS

2.1 MATERIALS

- 2.1.1 Clear Stone Drainage Course: 19mm clear crushed limestone free of any deleterious materials and in accordance with specified requirements of OPSS 1010.
- 2.1.2 Granular Sub-base Course: Granular 'B' in accordance with specified requirements of OPSS 1010.
- 2.1.3 Granular Base Course: Granular 'A' in accordance with specified requirements of OPSS 1010.
- 2.1.4 Concrete:
 - 1 Redi-Mix Concrete from an approved source. CSA A23.1/A23.2, 0.45 max. water: cement ratio, 5-8% air. Refer to drawing for required slab thickness.
 - 2 Concrete: Strength for curbs and walks to be 30 MPa, Class 2 exposure.
- 2.1.5 Curing Compound: Poly-Alphamethylstyrene Concrete Curing compound '2200-White' by W.R. Meadows of Canada, or approved alternative.
- 2.1.6 Concrete Surface Sealer: Sealing – curing compound 'VOCOMP-30' by W.R. Meadows of Canada, or approved alternative.
- 2.1.7 Expansion Joint Filler: Blend of asphalt and mineral fillers formed under heat and pressure between two asphalt saturated liners 'Asphalt Expansion Joint' by W.R. Meadows or approved alternative.
- 2.1.8 Expansion Joint Sealer: Single component, cold applied rubber asphalt joint sealant 'Model #158' by W.R. Meadows or approved alternative.
- 2.1.9 Welded Wire Fabric – 6 x 6 x 6/6

PART 3 - EXECUTION

3.1 EXAMINATION

- 3.1.1 Ensure that grading and backfilling has been completed in accordance with Specification, and that subgrade conditions are satisfactory for placing of sub-base, base and pavements before commencing Work.
- 3.1.2 Commence Work upon Consultant's verification that subgrade densities, as specified, have been attained under pavement locations.

3.2 PLACING BASE COURSES

- 3.2.1 Where applicable subgrade to be compacted to 98% Standard Proctor Maximum Dry Densities prior to placement of base courses. Specified base and sub-base course thickness of sidewalks and curbs shall be

the thickness after compaction to density of 98% Standard Proctor Density.

- 3.2.2 Lay base course of Granular 'A' aggregate, 150 mm thick, compacted to density of 98% Standard Proctor unless indicated otherwise.

3.3 **PLACING OF FINISH PAVEMENTS**

3.3.1 General:

- .1 Finish pavement surfaces to elevations indicated on Drawings.
- .2 Maintain accuracy of elevations to within specified tolerances.
- .3 Ensure that drainage is effected from all areas without formation of puddles.
- .4 Inform Consultant if slopes to drains are less than 1% before commencing work in order those corrective methods any be considered.

3.4 **CONCRETE PAVING**

- 3.4.1 Portland Cement Concrete Work to be done in accordance with CSA A23.1/A23.2, except where specified otherwise.
- 3.4.2 Form curbs to profiles as shown on Drawings and in accordance with OPSS Standards.
- 3.4.3 Locate 8 mm wide expansion joints at no further than 6000 mm O.C., or where otherwise indicated on Drawings, and where walks abut vertical construction.
- 3.4.4 Spacing of saw cut control joints as indicated on Drawings or as directed by Consultant on site at a maximum of 1500 mm on centre.
- 3.4.5 Screed slabs to provide drainage of minimum slope of 2.5% unless shown otherwise on Drawings.
- 3.4.6 Finish all concrete slabs wood float finish and light textured brooming. The square accent paver should be polished surface.
- 3.4.7 Steel trowel 50mm borders only at edges of slabs and form rounded edge.
- 3.4.8 Apply curing compound as per manufacturer's directions as soon as concrete has set.
- 3.4.9 Remove dirt, dust and grease from sidewalk surfaces and apply two coats of concrete surface sealer, the second applied after the first has dried. Apply sealer only after concrete has cured for minimum of two weeks, it is thoroughly dry and the air temperature is 21°C or over.

3.5 **JOINTS**

- 3.5.1 Construction Joints: Co-ordinate pouring of concrete slabs so that construction joints will correspond to sawcuts or expansion joints shown on drawings.
- 3.5.2 Expansion Joints: Set joint filler 13mm below top of slabs, for full depth of slabs and fill joints to surface of slab with joint sealer. Apply sealant with squeegee. Immediately remove all sealant from surface, maximum spacing: 600 0mm.
- 3.5.3 Sawcuts: Saw cut concrete as soon as it can be cleanly cut and before shrinkage cracks can form. Saw cuts shall be 5 mm wide x 25 mm deep, maximum spacing: 1500 mm

3.6 ADJUSTMENT AND CLEANING

3.6.1 Replace defective concrete paving with patches covering entire area between scored joints.

3.6.2 Protection After Completion

- .1 Protect paving from vehicular traffic for a period of at least seven (7) days, unless directed otherwise.
- .2 Pedestrian traffic shall not be allowed on paving for at least three (3) days, unless directed otherwise.
- .3 Be responsible for the repair of all damages until inspected and approved by the Consultant and traffic is allowed onto pavement.

3.7 CLEAN-UP

3.7.1 After completion of paving, clean all areas and structures such as curbs, walls, catch basin gratings, manhole covers, etc. from all contamination resulting from paving operations.

END OF SECTION