SPECIFICATIONS

Schomberg Community Hall Renovations

325 Main Street,
Schomberg, Ontario

Issued for Tender – September 11th 2020

Alaimo Architecture Inc.
Project: 2019-004

DIVISION 00 - PROCUREMENT AND CONTRACTING REQUIREMENTS

DIVISION 01 - GENERAL REQUIREMENTS

DIVISION 03 - CONCRETE

DIVISION 05 - METALS

DIVISION 06 - WOOD, PLASTICS, AND COMPOSITES

DIVISION 07 - THERMAL AND MOISTURE PROTECTION

DIVISION 08 - OPENINGS

DIVISION 09 - FINISHES

DIVISION 10 - SPECIALTIES

DIVISION 32 - EXTERIOR IMPROVEMENTS

END OF DOCUMENT

1 GENERAL

1.1 The requirements of the Articles of Agreement, Conditions of the Contract, Division 1 apply to and form all Sections of the Contract Documents and the Work.

1.2 Work in this Specification is divided into descriptive sections which are not intended to identify absolute contractual limits between Subcontractors, nor between the Contractor and their Subcontractors. The Contractor is responsible for organizing division of labour and supply of materials essential to complete the Contract. The Consultant assumes no liability to act as an arbiter to establish subcontract limits between Sections or Divisions of Work.

1.3 It is intended that Work supplied under these Contract Documents shall be complete and fully operational in every detail for the purpose required. Provide all items, articles, materials, services and incidentals, whether or not expressly specified or shown on Drawings, to make finished Work complete and fully operational, consistent with the intent of the Contract Documents.

1.4 Work designated as “N.I.C.” is not included in this Contract.

1.5 Specifications, Schedules and Drawings are complementary and items mentioned or indicated on one may not be mentioned or indicated on the others.

1.6 Contractors finding discrepancies or ambiguities in, or omissions from the Drawings, Specifications or other Contract Documents, or having doubt as to the meaning and intent of any part thereof shall contact the Consultant for clarification. If the Consultant is not contacted for clarification, execute the Work in accordance with the most stringent requirements.

1.7 Mention in the specifications 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 noted; perform according to the conditions stated in each operation prescribed; and provide labour, materials, Products, equipment and services to complete the Work.

1.8 Where the singular or masculine is used in the Contract Documents, it shall be read and construed as if the plural, feminine or neuter had been used when the context or the statement so requires and as required to complete the Work, and the rest of the sentence, clause, paragraph, or Article shall be construed as if all changes in grammar, gender or terminology thereby rendered necessary had been made.

1.9 The terms “approved”, “review”, “reviewed”, “accepted”, “acceptance”, “acceptable”, “satisfactory”, “selected”, “directed”, “instructed”, “required”, “submit”, “permitted” or similar words or phrases are used in standards or elsewhere in Contract Documents, it shall be understood, that words “by (to) the Consultant” follow, unless context provides otherwise.

1.10 Where the words 'submit', 'acceptable' and 'satisfactory' are used in the Contract Documents, they shall be considered to be followed by the words 'to the Consultant' unless the context provides otherwise.

1.11 The terms “exposed” or “exposed to view” refers to surfaces that are within the line of vision of persons from any accessible viewpoint, both within and without the building. Where any part of a surface is exposed to view, all other portions of that surface shall also be considered as exposed to view.

2 **DEFINITIONS**

2.1 “Agreement to Bond” means a letter or form issued by a licensed bonding agency advising that, if the Bidder is successful, the bonding agency will issue required bonds.

2.2 “Award” means the acceptance of a Tender in accordance with this Contract.

2.3 “Bidder” means a person or company who submits a Tender.

2.4 “Budget” means an amount approved for operating expenses or capital projects.

2.5 “Certificate of Insurance” means a certified document issued by an insurance company licensed to operate by the Government of Canada or the Province of Ontario, certifying that the Bidder is insured in accordance with the Owner’s requirements.

2.6 “Change Order” means a written order issued from the Owner that changes the scope or specifications of the Work.

2.7 “Consultant” means the provider of a Service who, by virtue of professional expertise or service, is contracted by the Owner to undertake a specific task or assignment. Examples include: an architect or engineer drawing plans and managing construction for a particular building or project; a lawyer representing the Owner for a particular legal matter; an appraiser providing an opinion of value on an asset; etc.

2.8 “Contract Administrator” or “Engineer” or “Project Manager” means the Consultant, or such other officer, as may be authorized by the Owner to act in a particular capacity.

2.9 “Contractor” means the person, partnership or corporation, and any employee or agent thereof that has been successful in the award of a Tender and thereby agrees to supply the goods and/or services under the terms of the Contract and is undertaking the Work as identified in the Contract.

2.10 “Goods and/or Services” means supplies, equipment, maintenance, and professional services.

2.11 “Irrevocable Letter of Credit” means an irrevocable document on a financial institution’s standard form requesting that the party to whom it is addressed pay the bearer or a person named therein money as a result of failure to perform or to fulfill all the covenants, undertakings, terms, conditions and agreements contained in the Contract.

2.12 “Material Safety Data Sheets (MSDS)” means Material Safety Data Sheets that must be submitted by the Contractor for all hazardous materials, including an index of chemical compounds, with details of properties, handling details, precautions and first-aid procedures.

2.13 "Owner" or "Authority" or "Corporation" means Township of King.

2.14 "Place of Work" means 325 Main Street, Schomberg, Ontario, both building and grounds.

2.15 "Request for Tenders (RFT)" means a solicitation from the Owner to potential contractors to submit a Tender.

2.16 "Surety" means a specified dollar amount in the form of certified cheque, bid bond, performance bond, labour and materials bond, letter of credit or any other form as deemed necessary and stated in a quotation, tender or proposal request issued by the Owner.

2.17 "Tender" means a written offer, in the specified form, received from a Bidder in response to a invitation to provide goods and/or services based on an approved format of the Owner containing terms and conditions.

2.18 "Work" means the goods and/or services supplied by the Contractor pursuant to the Contract and includes all labour, materials, equipment, and any other items, which are required to execute the Contract.

3 **CONTRACT ADMINISTRATION**

3.1 The Contract Administration office functions performed by the General Contractor are to be done through the web based contract administration software "Procore" https://www.procore.com/en-ca

3.2 The Contractor will be required to participate with the balance of the project team by using Procore for the duration of the project.

3.3 Suppliers and Subcontractors are to be provided with access to Procore. The distribution of information issued by the General Contractor and/or Consultant, and coordination of that information, remains the responsibility of the Contractor.

3.4 Procore is to be used for issuing electronic project related documents, including Requests for Information, Supplemental Instructions, Proposed Change Orders, Change Orders, Change Directives, Progress Claims, Certificates of Payment, Submittal Reviews, and other forms as may be required. At the discretion of the Consultant, Procore may also be used for the distribution and filing of other project related documents, including but not limited to Field Review Reports, Test Reports, Meeting Minutes, and so on. Procore will also provide automatically generated logs of documents issued within Procore.

3.5 The Contractor will be required to print hard copies of all project related documents issued through Procore, and to maintain files of those documents on site at all times. At the conclusion of the project, the Contractor shall export digitally to PDF all

documents and files that have been issued through Procore and shall provide (3) three USB keys to the Owner in the Construction Close out Documentation package.

3.6 Notwithstanding that Procore does not require signatures for the issuance and approval of documents, adjustments to the Contract Price and Contract Time in a Change Order shall only be deemed to be agreed to by the Owner and Contractor when executed by hand, and that electronic acceptance does not satisfy the conditions of agreement under GC 6.2.2 of the CCDC2 2008 Stipulated Price Contract.

4 PROGRESS AND COMPLETION

4.1 Substantial Performance of the Work shall be on or before the date specified in the Contract Documents.

4.2 Contract Completion of the Work shall be on the date specified in the Contract Documents.

5 EXISTING SITE CONDITIONS

5.1 Make a careful examination of the site, 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 extent of the Work to be performed and any and all matters which are referred to in the Contract Documents.

5.2 Report any inconsistencies, ambiguities, discrepancies, omissions, and errors between Site conditions and Contract Documents to the Consultant prior to the commencement of Work. If inconsistencies, ambiguities, discrepancies, omissions, and errors are not reported and clarified, the most stringent requirement shall govern, as determined by the Consultant.

5.3 Before commencing the Work of any Section or trade, carefully examine the Work of other Sections and trades upon which it may depend, examine substrate surfaces, and report in writing to the Consultant, defects which might affect new Work. Commencement of Work shall constitute acceptance of conditions and Work of other sections, trades, and Other Contractors upon which the new Work depends. If repair of surfaces is required after commencement of specific work it shall be included in the work of the trade providing the specific system or finish.

6 USE OF SITE

6.1 Accept full responsibility for assigned work areas from the time of Contract award until Substantial Performance of the Work.

6.2 Check means of access and egress, rights and interests which may be interfered with. Do not block lanes, roadways, entrances of exits. Direct construction traffic and locate access to site as directed by municipality.

6.3 Where encroachment beyond property limits is necessary make arrangements with respective property owners.

7 ACCESS/PROPERTY CONSTRAINTS

7.1 No lanes of Main Street shall be used during constructions.

7.2 Adjacent limited area of park land permitted for temporary use must be restored at the Contractor's expense to pre-construction condition upon conclusion of the temporary use.

7.3 Provide and maintain access facilities as may be required for access to the Work.

7.4 Minimize disruption, noise and dust to the functions of existing operational areas of existing buildings. Times of entry, routes of access and time required to complete the Work shall be arranged and scheduled in cooperation with the Owner.

7.5 Confine Work and operations of employees to limits indicated by the Contract Documents. Do not unreasonably encumber the premises with products.

7.6 Organize delivery of materials/equipment to and removal of debris and equipment from place of Work to permit continual progress of work and suitable for restricted site conditions.

7.7 Determine and make arrangement as required for loading and unloading of equipment and Products at times that will not affect public traffic flow and that will be permitted by the Township of King. Conform to City by-laws with regard to parking restrictions and other conditions.

7.8 Make provisions and arrangements and provide allowances if times for loading and unloading allowed by the Township of King are other than regular working hours.

7.9 All Products, materials and equipment required on Site shall be portable and/or size suitable for access and movement on Site and without causing damage to buildings.

7.10 The Work shall be confined to the area defined on the drawings and by the property lines except that services connections and certain portions of landscaping, hard paving and curb work shall be executed on Municipal property under regulation of authorities.

7.11 Provide locked doors in barriers, permit access by Owner and Consultant to Work areas and to areas Contractor is responsible for.

8 **SECURITY**

8.1 Be responsible for security of all areas affected by Work of this Contract until taken over by Owner. Take steps to prevent entry to the Work by unauthorized persons and guard against theft, fire and damage by any cause.

8.2 Provide suitable surveillance equipment and /or employ guard services, as required to adequately protect the work.

8.3 Make provisions to permit Owner's security personnel to view areas where all Work is being performed.

8.4 Take acceptable precautions to guard Work site, premises, materials and the public during and after working hours due to the Work of this Contract.

8.5 Any security service provided by the Owner is for the protection of the Owner's interest in the Work on the Site and shall not relieve the Contractor of the responsibility to protect the Site and the Work of the Contract.

9 **WEATHER**

9.1 Incorporate into the Contract Schedule allowances for the number of working days lost due to inclement weather based on the analysis of information available from Environment Canada, for weather conditions on and near the site, over the time period 1971 - 2000.

9.2 The Contractor may be entitled to a schedule extension for those activities on the critical path which are delayed on account of inclement weather, assessed on a quarterly basis, by the number of days in excess of the anticipated number of working days for the quarter in question by more than 20%. No additional payment will be made on account of any such schedule extension.

10 **WASTE AUDIT/PLANS FOR WASTE REDUCTION**

10.1 Comply with requirements of authorities having jurisdiction.

10.2 Prepare and submit waste audit and waste reduction plan in accordance with Ontario Regulation 102/94 Waste Audits and Waste Reduction Workplans.

10.3 Prepare and submit source separation plan in accordance with Ontario Regulation 103/94 Industrial, Commercial and Institutional Source Separation Programs.

10.4 Deliver to nearest appropriate depot all materials accepted for recycling by the region or municipality having jurisdiction over the Place of Work, including but not limited to cardboard, paper, plastic, aluminum, steel, and glass. Deliver to nearest appropriate depot all scrap and excess gypsum wallboard for recycling of this material. Pay all costs for this work.

END OF SECTION

1) **GENERAL**

a) Allowances included herein are for items of Work which could not be fully quantified prior to Bidding.

b) Expend each allowance as directed by the Consultant in writing. Work covered by allowances shall be performed for such amounts and by such persons as directed by Consultant.

c) Each allowance will be adjusted to actual cost as defined hereunder and the Contract Price will be amended accordingly by Contract Change Order.

d) Progress payments for Work and Products authorized under allowances will be made in accordance with the payment terms set out in Conditions of the Contract.

e) A schedule shall be prepared jointly by the Consultant and Contractor to show when items called for under allowances must be authorized by the Consultant for ordering purposes so that the progress of the Work will not be delayed.

f) Where a Cash Allowance is for work performed under a Subcontract, the Contractor shall Bid the work involved and submit the Bids received, with the Contractor's recommendations, for approval.

2) **CASH ALLOWANCE(S)**

a) Cash allowances, unless otherwise specified, cover the net cost to the Contractor of services, Products, construction machinery and equipment, freight, handling, unloading, storage, installation where indicated, and other authorized expenses incurred in performing the Work. Cash allowances shall not be included by a Subcontractor in the amount for their Subcontract work.

b) Supply only allowances shall include:
- i) Net cost of Products.
- ii) Delivery to Site.
- iii) Applicable taxes and duties, excluding HST.

c) Supply and install allowances shall include:
- i) Net cost of Products.
- ii) Delivery to Site.
- iii) Unloading, storing, handling or Products on Site.
- iv) Installation, finishing and commissioning of Products.
- v) Applicable taxes and duties, excluding HST.

d) Inspection and testing allowances shall include:
- i) Net cost of inspection and testing services.
- ii) Applicable taxes and duties, excluding HST.

e) Other costs related to work covered by cash allowances are not covered by the allowance but shall be included in the Contract Price.

f) Where costs under a cash allowance exceed the amount of the allowance, the Contractor will be compensated for any excess incurred and substantiated plus an allowance for overhead and profit as set out in the Contract Documents.

g) Progress payments on accounts of work authorized under cash allowances shall be included in the monthly certificate for payment.

h) Submit, before application for final payment, copies of all invoices and statements from suppliers and Subcontractors for work which has been paid from cash allowances.

i) Include in the Bid Price the following cash allowance items:

i) Testing & Inspection (General Contractor to procure 3 quotations and co-ordinate).

ii) Hydro Connection Fee and Pole/Transformer (General Contractor to apply for and co-ordinate including all fees associated).

iii) Hardware including ADO & light/button kits. Mul-T-Lock System, cores shall be obtained from Town Vendor of Record – ACP Lock & Security Inc.
(Supply & Install - General Contractor to procure three quotations and coordinate)

iv) Millwork. (Supply & Install - General Contractor to procure three quotations and coordinate)

v) Interior Signage. (Supply & Install - General Contractor to procure three quotations and coordinate)

vii) Prefabricated Steel Shed 8’ x 10’ insulated single slope roof.
(Supply & Install - General Contractor to procure quotation from Kodiak Steel Buildings Llc. and two additional quotations and coordinate)

viii) Elevator
(Supply & Install - General Contractor to procure quotation from CITI Elevator Inc. & two additional quotations and coordinate)

ix) Contingency.

Total Cash Allowance: $ 275,000.00.

END OF SECTION

1) **GENERAL**

a) Coordination of the Work of all Sections of the specifications as required to complete the Project is the responsibility of the Contractor.

b) Cooperate and coordinate with Other Contractors including Other Contractor's employed by Owner.

c) Ensure that Subcontractors and trades cooperate with other subcontractors and trades whose work attaches to or is affected by their own work. Ensure that minor adjustments are made to make adjustable work fit fixed work.

d) Allow access of Owner's Other Contractors on site and to areas of Work. Cooperate and coordinate with such Other Contractors. Schedule work to complement work of such Other Contractors.

e) Entry by the Owner's own forces and by Other Contractors shall not mean acceptance of the Work and shall not relieve the Contractor of their responsibility to complete the Contract.

f) Placing, installation, application and connection of work by the Owner’s own forces or by Other Contractors on and to the Contractor's Work shall not relieve the Contractor of his responsibility to provide and maintain the specified warranties.

g) Coordinate with removals/installations specified in other Divisions and Other Contracts.

h) Coordinate the work of this Contract with work of designated substance removal work and demolition work under separate contract. No allowance shall be made subsequently by the Owner or Consultant for lack of coordination and no claim will be considered for circumstances and omissions which could have been coordinated, prevented or included for had these procedures been followed.

i) Coordination of the installation of systems specified in Divisions 13, 21, 22, 23 and 26, including the interrelating operation and functioning between components of a system and between systems, is the responsibility of those performing the work of those Divisions, with final coordination the responsibility of the Contractor.

j) Coordinate relocation of existing mechanical and electrical items with work specified in Divisions 13, 21, 22, 23, and 26.

k) Existing equipment shall remain in present locations unless designated otherwise. Protect from damage. Remove, store and reinstall existing fixed equipment, fixtures and components which interfere with construction and which are scheduled for relocation.

l) Pay particular attention to types of ceiling construction and clearances throughout, especially where recessed fixtures are required. Coordinate work with Other Contractors and Subcontractors wherever ventilation ducts or piping installations occur to ensure that conflicts are avoided.

m) Install ceiling mounted components in accordance with final ceiling plans. Inform Consultant of conflicting installations.

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

o) Make provision, without interference or restriction by items located within the ceiling space, for unrestricted relocation of light fixtures to replace ceiling panels at grid spaces of the same size.

p) Where supports or openings are to be left for the installation of various parts of the Work furnish the necessary information to those concerned in ample time so that proper provision can be made for such items. Have cutting, drilling and other remedial work, and the subsequent patching or other work required for failing to comply with this requirement, performed at a later date at no additional Cost to Owner.

q) Properly coordinate the work of the various Sections and trades, taking into account the existing installations to assure the best arrangement of pipes, conduits, ducts and mechanical, electrical and other equipment, in the available space. Under no circumstances will any extra payment be allowed due to the failure by the Contractor to coordinate the work. If required, in critical locations, prepare interference and/or installation drawings showing the work of the various Sections as well as the existing installation, and submit these drawings to the Consultant for review before the commencement of work. Proceed with work in these areas only as, and when directed by the Consultant.

r) Coordinate with mechanical and electrical trades to ensure protecting supporting, disconnecting, cutting off, capping, diverting, relocating or removing of existing services in areas of Work before commencement of alteration work.

s) Execute Work at times to ensure a minimum of disturbance to building occupants and in compliance with the Tenant Leasehold Improvement Manual.

t) In case of damage to active services on utilities, notify Consultant and respective authorities immediately and make all required repairs under direction of Consultant and respective authorities. Carry out repairs to such damaged services and utilities continuously to completion, including working beyond regular working hours. Costs to be borne by the Contractor.

u) Existing areas shall remain in use except where alteration work is actually in progress. Confine effects of Work to areas indicated on Drawings unless otherwise approved by Owner.

2) **METRIC DIMENSIONS**

a) Measurements in this specification are expressed in metric (SI) units and depending on the progress made in the various sectors of the industry are either hard or soft converted units.

b) All metric units specified shall be taken to be the minimum acceptable unless otherwise noted.

c) It is the Contractor's responsibility to check and verify with manufacturers and suppliers on the availability of materials and products in either metric or imperial sizes. Be responsible for coordinating products supplied in metric (SI) and imperial units into the overall layout.

d) Where both metric and imperial sizes or dimensions are shown, the metric size or dimension shall govern.

3) **BUILDING DIMENSIONS**

a) Take necessary job dimensions for the proper execution of the work. Assume complete responsibility for the accuracy and completeness of such dimensions, and for coordination.

b) Verify that work, as it proceeds, is executed in accordance with dimensions and positions indicated which maintain levels and clearances to adjacent work, as set out by requirements of the Drawings, and ensure that work installed in error is rectified before construction resumes.

c) Check and verify dimensions referring to the work and the interfacing of services.

d) Do not scale directly from the Drawings. If there is ambiguity or lack of information, immediately inform the Consultant. Changes required through the disregarding of this clause shall be the responsibility of the Contractor.

e) All details and measurements of any work which is to fit or to conform with work installed shall be taken at the building.

f) Advise Consultant of discrepancies and if there are omissions on Drawings, particularly reflected ceiling plans and jointing patterns for surfaces finishes, which affect aesthetics, or which interfere with services, equipment or surfaces. Do not proceed with work affected by such items without direction from the Consultant.

g) Provide written requirements for site conditions and surfaces necessary for the execution of respective work, and provide setting drawings, templates and all other information necessary for the location and installation of material, holes, sleeves, inserts, anchors, accessories, fastenings, connections and access panels. Inform respective contractors whose work is affected by these requirements and preparatory work.

4) **INTERFERENCE AND COORDINATION DRAWINGS**

a) Coordinate placement of equipment to ensure that components will be properly accommodated within the spaces provided prior to commencement of work.

b) Prepare interference and equipment placing drawings to ensure that all components will be properly accommodated within the spaces provided. Provide copies of interference drawings to Consultant when requested by Consultant.

c) Prepare drawings to indicate coordination and methods of installation of a system with other systems where their relationship is critical. Ensure that all details of equipment apparatus, and connections are coordinated.

d) Take complete responsibility for any remedial work that results from failure to coordinate any aspect of the Work prior to its fabrication/installation.

e) Ensure that accesses and clearance required by jurisdictional authorities and/or for easy maintenance of equipment are provided in the layout of equipment and services.

5) **SLEEVING AND INSERT DRAWINGS AND TEMPLATES**

a) Prepare sleeving drawings for work of Divisions 13, 21, 22, 23, and 26, showing size and location of all penetrations through load bearing elements. Submit sleeving drawings in the form of one transparency and 4 prints to Consultant for review not less than 15 days prior to construction of affected elements.

b) Prepare insert setting drawings for work to be cast into concrete and/or mortared into masonry elements. Submit insert setting drawings in the form of a transparency and 4 prints to Consultant for review not less than 15 days prior to construction of affected elements.

c) Ensure that setting drawings, templates, and all other information necessary for the location and installation of materials, fixtures, equipment, holes, sleeves, inserts, anchors, accessories, fastenings, connections, and access panels are provided by each Section whose work requires cooperative location and installation by other Sections, and that such information is communicated to the applicable installer.

d) Provide cutting, fixing and making good to the work of Other Contractors, Subcontractors and trades as required for sleeving and inserts and make up time lost as a result of failure to comply with this requirement, at no additional cost to the Owner.

END OF DOCUMENT

1 PRE-CONSTRUCTION MEETING

1.1 Attend pre-construction meeting(s), arranged and conducted by the Contractor.

1.2 Arrange and conduct pre-construction meeting(s).

1.3 Co-ordinate and organize attendance by representatives of major Subcontractors and parties in contract with the Contractor.

1.4 Consultant will arrange attendance of other interested parties not responsible to the Contractor.

1.5 Prepare and distribute copies of Agenda prior to meeting.

1.6 Agenda will include but not be limited to the following topics as are pertinent to the Contract.

.1 Review project communications procedures.

.2 Review contract administration requirements including submittals, payment, and change order procedures.

.3 Identify all critical points on construction schedule for positive action.

.4 Identify any product availability problems and substitution requests.

.5 Establish site arrangements and temporary facilities.

.6 Review Consultants inspection requirements.

.7 Review any points which, in Owner's, Consultants, and Contractor's opinion, require clarification.

1.7 Be prepared to provide specific information relative to agenda items as they are pertinent to the Contract.

1.8 Record minutes of meeting and distribute type written copies to all participants and other interested parties, within one week of meeting date.

2 PROGRESS MEETINGS

2.1 Attend regularly scheduled progress meetings to be held on Site at times and dates that are mutually agreed to by the Owner, Consultant, and Contractor.

2.2 Co-ordinate and organize attendance of individual Subcontractors and material suppliers when requested. Relationships and discussions between Subcontractor participants are not the responsibility of the Consultant and do not form part of the meetings content.

2.3 Ensure that Contractor representatives in attendance at meetings have required authority to commit Contractor to actions agreed upon. Assign same persons to attend such meetings throughout the contract period.

2.4 Inform the Consultant in advance of meetings regarding all items to be added to the agenda.

2.5 Prepare and distribute copies of Agenda prior to meeting.

2.6 Be prepared to provide specific information relative to agenda items at each meeting as they are pertinent to the Contract.

2.7 Agenda will include but not be limited to the following topics as are pertinent to the Contract.

.1 Review and agreement of previous minutes.

.2 Construction safety.

.3 Status of submittals.

.4 Quality control.

.5 Co-ordination.

.6 Contract Schedule

.7 Work plan up to next scheduled meeting.

.8 Requests for information/clarification.

.9 Contemplated changes.

2.8 Record minutes of meeting and distribute type written copies to all participants and other interested parties, within one week of meeting date.

3 MEETINGS WITH OTHER CONTRACTORS

3.1 Consultant will arrange and organize coordination meetings with Other Contractors working on the Project.

3.2 Attend all such meetings and ensure that representative has required authority to commit Contractor to actions agreed upon.

3.3 Consultant will document and distribute minutes to participants.

END OF SECTION

1) **GENERAL**

a) Be responsible for planning and scheduling of the Work. As a minimum, prepare and update the following schedules:

i) Contract Schedule.

ii) Detailed Construction Schedule.

b) Be responsible for ensuring that Subcontractors plan and schedule their respective portions of the Work. Subcontractor's schedules shall form part of the above mentioned schedules.

2) **CONTRACT SCHEDULE**

a) Prepare and submit the Contract Schedule within 14 days following award of Contract. This schedule, once it is reviewed by the Consultant and if it meets the Consultant's project requirements, will form part of the Contract.

b) The Contract Schedule shall be developed using a logic network technique for planning and scheduling.

c) The Contract Schedule shall be submitted for approval in its optimum levelled form. This presentation may be in either a time scaled network or a bar chart form. It shall be subdivided into either work areas or systems as applicable.

d) The Contract Schedule shall include the following information:

i) Starting and ending dates of each activity including the float periods;

ii) Manpower requirements for each activity;

iii) Order and delivery dates for major or critical equipment.

iv) Interdependency with activities of other Contractors;

v) Dates specified in the Contract Documents;

vi) Dates on which specific data will be required for submittal, i.e., Vendor data, shop drawings, samples, etc.

e) This schedule shall be reviewed and updated monthly by the Contractor so as to reflect any Contract changes as well as major changes to the schedule.

3) **DETAILED CONSTRUCTION SCHEDULE**

a) Prepare and submit a detailed construction schedule within 14 days of final review and acceptance of the Contract Schedule. This schedule, once reviewed and accepted by the Consultant, will be updated and submitted monthly with the Contract Schedule and weekly once the Contractor starts on Site.

b) This schedule shall cover the construction period. It will show, in detail, activities on a daily basis indicating durations, manpower and constraints. The activities shown on this schedule shall further clarify or detail the activities shown on the Contract Schedule.

c) The detailed construction schedule shall be presented in a bar chart form.

4) **CASH FLOW CHART**

a) within 7 days after award of Contract, submit, in form approved by Consultant, cash flow chart broken down on a monthly basis in an approved manner. Cash flow chart shall indicate anticipated Contractor's monthly progress billings from commencement of work until completion.

b) Update cash flow chart whenever changes occur to scheduling and in manner and at times satisfactory to Consultant.

END OF SECTION

1) **GENERAL**

a) Provide labour, Products, equipment, services tools and supervision necessary for submittals. Make submittals specified in this Section to Consultant unless otherwise specified.

i) Verify accuracy and completeness of submittals prior to submission.

ii) Verify field measurements, field construction criteria, catalogue numbers and similar data.

iii) Co-ordinate each submittal with requirements of the Work and the Contract Documents.

iv) Notify Consultant in writing at time of submission, of any deviation in submittals from requirements of the Contract Documents.

b) Submit in accordance with dates established under Section 01 32 13 for shop drawings, fabrication, manufacture, erection and installation to provide adequate time for reviews, securing necessary approvals, possible revisions and resubmittals, placing orders, securing delivery and to avoid construction delays.

c) Accompany each submittal with a letter of transmittal in duplicate containing all pertinent information required for identification and checking of submittals including but not limited to the following:

i) Date of initial submission and date of each subsequent submission if required.

ii) Project title and Consultant's project number.

iii) Names of:
(1) Contractor.
(2) Subcontractor.
(3) Supplier/manufacturer/fabricator as applicable.

iv) Specification section numbers to which submission is related.

v) Countersigned stamp of Contractor certifying that they have reviewed the submission.

d) Allow two weeks for the Consultant's review of each submission.

e) When submittals are resubmitted, transmit under a new letter of transmission.

f) Do not carry out Work until Consultants review of submittals has been completed.

g) Be responsible for payment of charges for delivery of submissions and resubmission to Consultant.

2) **PRODUCT DATA**

a) Before delivery of Products to the Site, submit Product data as specified in each section or as requested by the Consultant.

b) Submit manufacturer's Product data for systems, materials, and methods of installation proposed for use. Such literature shall identify systems, each component, and shall certify compliance of each component with applicable/specified standards.

3) **SAMPLES**

a) Before delivery of Products to the Site, submit samples of Products as specified or as requested by the Consultant. Label samples as to origin and intended use in the Work and in accordance with the requirements of the Specification Sections. Samples must represent physical examples to illustrate materials, equipment or work quality and to establish standards by which completed Work is judged.

b) Ensure samples are of sufficient size and quantity, if not already specified, to illustrate:

i) The quality and functional characteristics of Products, including integrally related parts and attachment devices.

ii) The full range of colours available.

c) Notify the Consultant in writing, at time of submission, of any deviations in samples from requirements of the Contract Documents, and state the reasons for such deviations.

d) Identify samples with Project name, Contract number, date, Contractor's name, number and description.

e) If samples are not acceptable, both samples will be returned. If samples are acceptable, one sample will be so indicated and returned. Be responsible for the cost of samples that are not accepted and for resubmission of samples.

f) Acceptable samples shall serve as a model against which the products incorporated in the work shall be judged.

g) Each Product incorporated in the Work shall be precisely the same in all details as the acceptable sample.

h) Should there be any change to the accepted sample, submit in writing for approval of the revised characteristics and resubmit samples of the Product for approval if requested.

i) When samples are very large, require assembly, or require evaluation at the Site, they may only be delivered to the Site with approval and as directed.

4) **SHOP DRAWINGS**

a) Arrange for the preparation of Shop Drawings as called for in the Contract Documents or as may be reasonably requested by the Consultant. The Contractor and each Subcontractor shall operate as experts in their respective fields and all Shop Drawings and samples shall conform to the requirements of the Contract Documents.

b) The term “Shop Drawings” means drawings, diagrams, schematics, illustrations, schedules, performance charts, brochures and other data which are required to illustrate details of the Work.

c) In addition to Shop Drawings specified in the specification sections, submit Shop Drawings required by jurisdictional authorities in accordance with their requirements.

d) Shop Drawings for openings, sleeving and conduit

i) Prior to preparation of Shop Drawings, coordinate sizes of all structural openings and sleeves with respective fabricators for mechanical ducting. Adjustments to the opening sizes indicated on the Contract Drawings shall not be made without the approval of the Consultant.

ii) Prior to detailing structural reinforcement on Shop Drawings, arrange for the Structural Engineer to review formed holes, recesses and sleeving. Completely dimension openings, recesses and sleeves and relate to appropriate grid line(s) and elevation(s).

iii) Prior to forming of the structure, arrange for the preparation of Shop Drawings for review by the Consultant showing embedded conduit to be cast within the structure. Shop Drawings shall include conduit from all sources.

e) Shop Drawings shall indicate the following minimum criteria and any additional criteria indicated in the individual specification sections requiring Shop Drawings:

i) Clear and obvious notes of any proposed changes from the Contract Documents.

ii) Fabrication and erection dimensions.

iii) Provisions for allowable construction tolerances and deflections provided for live loading.

iv) Details to indicate construction arrangements of the parts and their connections, and interconnections with other work.

v) Location and type of anchors and exposed fastenings.

vi) Materials, physical dimensions including thicknesses, and finishes.

vii) Descriptive names of equipment.
viii) Mechanical and electrical characteristics when applicable.

ix) Information to verify that superimposed loads will not affect function, appearance, and safety of the work detailed as well as of interconnection work.

x) Assumed design loadings, and dimensions and material specifications for load-bearing members.

f) Include in Shop Drawing submissions detailed information, templates, and installation instructions required for incorporation and connection of the Work.

g) Before submitting to the Consultant, review all Shop Drawings to verify that the Products illustrated therein conform to the Contract Documents. By this review, the Contractor agrees that it has determined and verified all field dimensions, field construction criteria, materials, catalogue numbers and similar data and that it has checked and coordinated each Shop Drawing with the requirements of the Work and of the Contract Documents. The Contractor's review of each Shop Drawing shall be indicated by stamp, date and signature of a qualified person possessing the appropriate authorization from the Contractor.

h) Be responsible for dimensions, confirmed at the Site, for information that pertains solely to fabrication processes or to techniques of construction and installation and for coordination of the Work of all subtrades.

i) Submit Shop Drawings for the Consultant's review with reasonable promptness and in orderly sequence so as to cause no delay in the Work nor in the work of Other Contractors. At the time of submission, notify the Consultant in writing of any deviations in the Shop Drawings from the requirements of the Contract Documents. The Contractor will be held responsible for changes made from the Contract Documents which are not indicated or otherwise communicated in writing with the submission.

j) Drawings submitted by the Contractor as required herein are the property of the Owner who may use and duplicate such drawings where required in association with the Work.

k) Submit Shop Drawings signed and sealed by a licensed Professional Engineer registered in the place of the Work where indicated in individual Sections.

l) Shop Drawings shall have distinct, uniform letters, numerals and line thicknesses that will ensure the production of clear legible prints at original as well as reduced size.

m) Provide submissions in electronic Portable Document Format (PDF) format delivered via electronic means as directed by the Consultant.

n) Shop Drawings shall contain the following identification:

i) Project name and Contract number.
ii) Applicable 6-digit Contract Specification number describing the item.

iii) Location (unit, level, room number, etc.).

iv) Name of equipment or Product.

v) Name of Subcontractor or supplier/fabricator.

vi) Signature of Contractor certifying that Shop Drawing is in conformance with Contract Documents.

vii) On submissions subsequent to the first, the following additional identification:
(1) The revised submission number.
(2) Identification of the item(s) revised.

o) Dimensions and designations of elements shall be shown in the same system of measurement used on the applicable Contract Drawings.

p) The Consultant reserves the right to refuse acceptance of drawing submissions not meeting the above requirements.

q) The Consultant's review will be for conformity to the design concept and for general arrangement only and such review shall not relieve the Contractor of responsibility for errors or omissions in the Shop Drawings or of responsibility for meeting all requirements of the Contract Documents unless a deviation on the Shop Drawings has been approved in writing by the Consultant. Review does not mean that Consultant approves detail inherent in Shop Drawings, responsibility which shall remain with Contractor submitting same.

r) The Contractor shall make any changes in Shop Drawings which the Consultant may require consistent with the Contract Documents and re-submit unless otherwise directed by the Consultant. When re-submitting the Shop Drawings, the Contractor shall notify the Consultant in writing of any revisions other than those requested by the Consultant.

s) Only drawings noted for revision and resubmission need be resubmitted.

t) File one copy of each submitted Shop Drawing at the Site.

5) **CERTIFICATES**

a) Submit certificates that are required by authorities having jurisdiction or that are requested in the applicable specification sections.

b) Clearly show on each certification the name and location of the Work, name and address of Contractor, quantity and date of shipment and delivery and name of certifying company.

c) Certificates shall verify that Products and/or methods meet the specified requirements and shall include test reports of testing laboratories approved to validate certificates.

d) Submit certificates in duplicate and signed by an authorized representative of the certifying company.

6) **CERTIFICATION OF TRADESMEN**

a) Provide certificates, at the request of the Consultant, to establish qualifications of personnel employed on the Work where such certification is required by authorities having jurisdiction, by the Consultant or by the Contract Documents.

7) **EXTENDED WARRANTIES**

a) Submit extended warranties as requested in sections of the Specifications showing title and address of Contract, warranty commencement date and duration of warranty.

b) Extended warranties shall commence on termination of the standard warranty specified in the conditions of the contract and shall be an extension of these provisions. Clearly indicate what is being warranted and what remedial action is to be taken under the warranty. Ensure warranty bears the signature and seal of the Contractor.

c) Submit each extended warranty on a form that is acceptable to the Owner and Consultant.

8) **INSPECTION AND TEST REPORTS**

a) Submit inspection and test reports as specified in the Sections of the specifications for “Source Quality Control” and “Field Quality Control” within 3 working days of inspection or testing. If immediate action is required by the Contractor or Consultant inform the Consultant immediately and submit inspection and testing report within one working day.

b) Submit 3 copies of reports submitted with certificates of compliance indicating but not limited to the following:

i) Project name and number.

ii) Date of inspection or test and date report is issued.

iii) Name and address of inspection and testing company.

iv) Name and signature of inspector or tester.

v) Identification of Product and Specification Section covering inspected or tested work.

vi) Specified requirements for which the inspection or testing was performed and results of inspections or tests.

vii) Location of inspection or from which tested material was derived.

viii) Overview of inspection and testing methods and procedures.

ix) Remarks and observations on compliance with Contract Documents.

c) Inspection and test reports shall be signed by a responsible officer of the inspection and testing company.

9) **PROGRESS PHOTOGRAPHS**

a) Concurrently with monthly application for payment submit 2 CD's or DVD's of digital pictures illustrating the progress of the Work as follows:

i) A minimum of 20 pictures that best illustrate the progress on the site.

ii) Pictures shall be in focus and properly illuminated; view shall be unobstructed.

iii) Pictures shall be taken with a minimum 5 megapixel camera or better such that quality and details can be discerned from photo.

iv) The Pictures shall either have an accurate date-stamp present in the photo, or be numbered and dated in the digital filename.

v) The CD or DVD containing the photo's shall be labeled with the following information: The project name, the period the pictures are taken in, the monthly application number which the pictures are associated with.

10) **PROGRESS REPORTS**

a) Prepare a monthly progress report current to the last Friday of each month. The report shall indicate the period covered and include but not be limited to the following:

i) Executive Summary.

ii) Areas of Concern/Action Required.

iii) Work Accomplished This Period.

iv) Work Planned Next Period.

v) Schedule Status.

vi) Budget Status.

vii) Status of Submittals.

viii) Quality Control.

ix) Contract Changes.

x) Outstanding Actions.

b) Submit the monthly progress report such that it is received by the Consultant no later than the Wednesday following the last Friday of the month, regardless of whether or not the Monday is a public holiday.

11) **OPERATION AND MAINTENANCE MANUALS**

a) Submit Operation and Maintenance Manuals in accordance with Section 01 78 23.

12) **RECORD DOCUMENTS**

a) Submit record documents in accordance with Section 01 78 39.

END OF SECTION

1) **CONSTRUCTOR**

a) For the purposes of the Contract, the term "Constructor", as defined in the Occupational Health and Safety Act, shall mean the Contractor who shall be responsible for ensuring that the provisions of the statutes, regulations and by-laws pertaining to the safe performance of the Work are to be observed. The "Constructor" shall submit the Notice of Project.

b) In the event of conflict between any of the provisions of Statues, Regulations and By-laws, and other requirements of authorities, the most stringent provision applies.

c) The Contractor's representative shall be responsible for ensuring that the provisions of statutes, regulations and by-laws pertaining to safe performance of the Work and the work of Other Contractors and Owner's own forces working on the Site are observed and that the methods of performing the Work do not endanger the personnel employed thereon nor the general public, and are in accordance with the latest edition of the Occupational Health and Safety Act. Include on the Joint Health and Safety Committee representatives of Other Contractors working on Site.

d) Prior to the Contractor's representative being absent from the Site for an extended period during execution of the Work, the Contractor's representative will name, in writing to the Consultant, another person who is competent to assume these responsibilities. The Contractor shall advise the Consultant of change of the individual identified as the Contractor's representative.

e) At the discretion of the Consultant, the "Constructor" designation may be transferred to/from a Contractor at any time at no additional cost to the Owner.

2) **PROJECT RESPONSIBILITIES**

a) The Contractor's representative shall ensure that:

b) All measures and procedures prescribed by the following Acts and Regulations are carried out on Site:

i) The Occupational Health and Safety Act;

ii) The Regulations for Construction Projects;

iii) WHMIS Regulations;

iv) The Environmental Protection Act and regulations,

v) All other legislation, regulations and standards as applicable.

c) Every employer and every worker performing Work on the Site must comply with the requirements referred to above.

d) Ensure that the health and safety of workers, employees of the Owner and the general public are protected in relation to the Work performed on the Site.

3) **WORKPLACE HAZARDOUS MATERIALS INFORMATION SYSTEM (WHMIS)**

a) Be familiar with and comply with WHMIS regulations.

b) Properly label controlled products. Provide proper warning labels and training at the Site.

c) Maintain on site for duration of Contract a hazardous materials log containing all required MSDS. Log shall be open for inspection by Owner, Consultant and all personnel on Site.

d) Provide copies of material safety data sheets (MSDS) for any controlled products prior to delivery to the Site.

e) Be responsible for all applicable requirements of the regulations.

f) Before commencing any Work on Site, attend the pre-construction meeting and provide the Consultant with a proposal as to how hazardous materials will be stored and dispensed on Site. In addition, specifically outline the measures which will be undertaken to prevent damage or injury in the event of an accidental spill.

g) Provide “Handling Procedure for Hazardous Materials”.

4) **JOINT HEALTH AND SAFETY COMMITTEE**

a) The Contractor shall be responsible for the establishment and operation of the Joint Health and Safety Committee as required by the Occupational Health and Safety Act.

5) **DELIVERABLES**

a) The Contractor shall deliver to the Consultant:

i) The Contractor's Occupational Health and Safety Policy.

ii) The Contractor's safety program to implement the Occupational Health and Safety Policy for the Contract, which will effectively prevent and control accidents for the Contract.

iii) A copy of all communications with, and including all orders by, the Ministry of Labour or other occupational health and safety enforcement authority.

iv) A copy of all accident/injury investigation reports, not just the WSIB Form 7. Each report must contain a statement of actions that will be taken to prevent a recurrence.

v) A copy of all inspection reports made by the Contractor in compliance with the employer's responsibility under the Occupational Health and Safety Act.

vi) A copy of all safety information pertaining to the Contract made and furnished by the Contractor's own "Safety Personnel" or outside consultants/advisers engaged for the purpose of inspecting the workplace for occupational health and safety.

vii) A verification that all workers in the employ of the Contractor on Site, have had a WHMIS training or refresher course within the last twelve months.

viii) A verification that all workers in the employ of the Contractor have had "Explosive Activated Tool Training" on the type of tools being used.

ix) A verification that the instruction manuals are on Site for all tools and equipment being used.

x) A copy of the most recent workers compensation experience rating account, i.e. CAD-7, NEER, and/or an insurance carrier's experience rating account.

xi) Statistical information for the purpose of determining injury frequency and severity rates (hours worked, first-aid injuries, medical aid injuries, lost time injuries, restricted workday injuries, near-miss accident/incident and significant occurrence data), in a timely manner as required by the Consultant.

xii) The immediate reporting to the Consultant of all instances that are defined in the Occupational Health and Safety Act as "Notices of Injuries" and "Occurrences" and any occasion that a worker exercises their "Right to Refuse Unsafe Work".

b) The Consultant reserves the right to require additional or amended deliverables pertaining to safety during the duration of the Work at no additional cost to the Owner.

c) Items specified above shall be delivered to the Consultant prior to the Contractor commencing Work on the Site.

6) **DUE DILIGENCE**

a) The Contractor acknowledges that it has read and understands the measures and procedures relating to occupational health and safety as prescribed above. The Contractor acknowledges and understands its duties as therein set out and hereby expressly undertakes and agrees to comply with all such requirements and standards in their entirety and at the Contractor's expense.

b) The Contractor further agrees to fully cooperate with all health and safety requirements, rules, regulations, standards and criteria set out in the Contract Documents, which agreement is in furtherance of the Contractor's duties and responsibilities under occupational health and safety legislation.

c) The Contractor agrees that if, in the opinion of the Consultant or Owner, the health and safety of a person or persons is endangered or the effective operation of the system put in place to ensure the health and safety of workers on the Site is not being implemented, the Consultant or Owner may take such action as it deems necessary and appropriate in the circumstances, including, without limitation, the following:

i) Require the Contractor to remedy the condition forthwith at its own expense;

ii) Require that the Site be shut down in whole or in part until such time as the condition has been remedied;

iii) Remedy the problem and the Owner shall back-charge the Contractor for the cost of such remedial work, together with an appropriate overhead factor as determined by the Owner in its sole discretion; and

iv) Terminate the Contract without further liability in the event the Contractor fails to comply with these provisions.

d) If a lien is registered, in respect to any monies held back, back-charged or assessed in accordance with these paragraphs, the Contractor shall consent to an order vacating such registration and shall indemnify the Owner for any and all loss, whereby direct or consequential which the Owner may sustain as a consequence of such registration.

7) **SITE SAFETY PERSONNEL**

a) In the event the Consultant deems it necessary, because of the Work, the Contractor shall assign a "Competent Safety Person" to assist the Contractor's representative in the discharging of safety responsibility, at no additional cost to the Owner.

END OF SECTION

1) **GENERAL**

a) Be responsible for inspection and testing as required by the Contract Documents, statutes, regulations, by-laws, standards or codes or any other jurisdictional authority. Give the Consultant timely notice of the readiness for inspection, date and time for such inspection for attendance by the Consultant.

b) Verify by certification that specified products meet the requirements of reference standards specified in the applicable specification sections.

c) Conduct testing, balancing and adjusting of equipment and systems specified in applicable mechanical and electrical specifications sections by independent testing company.

2) **INSPECTION AND TESTING BY THE OWNER**

a) The Consultant, on behalf of the Owner may appoint an independent inspection and testing company to carry out inspection and testing of the Work for conformance to the Contract Documents. Such costs for inspection and testing will be paid by the Owner. However, any additional inspection and testing due to non-conformance to the Contract Documents shall be at the Contractor's expense.

b) A list of inspection and testing agencies shall be submitted by the Contractor for approval by the Owner and Consultant. Inspection and testing services will be tendered by the Contractor and the results submitted to the Consultant for review and approval.

c) Inspections and testing by the independent inspection and testing company will be promptly made. Uncover for examination any Work covered up prior to inspection or without approval of the Consultant. Make good such Work at no cost to the Owner.

d) The Owner may inspect and test Products during manufacture, fabrication, shop testing, installation, construction and testing phases of the Contract. The Consultant will ascertain the quantity and quality of testing to be performed. Inspection and testing may be performed at the place of manufacture/fabrication, storage, or at the Site as designated by the Consultant. Where inspection and testing is done either during manufacture, fabrication, or at Site, ensure that proper facilities and assistance are provided.

3) **INSPECTION AND TESTING**

a) Source and Field Quality Control specified in Other Sections:

i) This Section includes requirements for performance of inspection and testing specified under Source Quality Control and Field Quality Control in other Sections of the specifications.

ii) Do not include in work of this Section responsibilities and procedures that relate solely to an inspection and testing company's functions that are specified in another Section which is paid for directly by the Owner. Such information is included in this Section for Contractor's information only.

b) Do not limit responsibility for ensuring that products and execution of the work meet Contract requirements, and inspection and testing required to this end, to specified inspection and testing.

4) **QUALIFICATIONS OF INSPECTION AND TESTING COMPANIES**

a) Inspection and testing companies to be certified by the Standards Council of Canada (SCC) or Canadian Council of Independent Laboratories (CCIL).

b) Companies engaged for inspection and testing shall provide equipment, methods of recoding and evaluation, and knowledgeable personnel to conduct tests precisely as specified in reference standards.

c) If requested, submit affidavits and copies of certificates of calibration made by an accredited calibrator to verify that testing equipment was calibrated and its accuracy ensured within the previous twelve months.

5) **RESPONSIBILITIES OF THE CONTRACTOR**

a) Be responsible for quality control methods and procedures to ensure performance of the work in accordance with the Contract Documents.

6) **RESPONSIBILITIES OF INSPECTION AND TESTING COMPANIES**

a) Determine from specifications and Drawings the extent of inspection and testing required for Work of the Contract. Subcontractors shall notify Consultant of any omissions or discrepancies in the work inspected and/or tested.

b) Perform applicable inspection and testing described in the Specifications and as may be additionally directed.

c) Provide competent inspection and testing personnel when notified by the Contractor that applicable work is proceeding. Inspection personnel shall cooperate with the Consultant and Contractor to expedite the Work.

d) Subcontractors shall notify the Consultant and Contractor of deficiencies and irregularities in the Work immediately when they are observed in the course of inspection and testing.

e) Inspection and testing companies shall not perform or supervise any of the Contractor's work, and shall not authorize:

i) Performance of work that is not in strict accordance with the Contract Documents.ii) Approval or acceptance of any part of the Work.

7) **INSPECTION AND TESTING PROCEDURES**

a) Perform specified inspection and testing only in accordance with specified reference standards, or as otherwise approved.

b) Observe and report on compliance of the Work to requirements of Contract Documents.

c) Ensure that inspectors are on site or at fabricator's operations for full duration of critical operations, and as otherwise required to determine that the Work is being performed in accordance with the contract Documents.

d) Identify samples and sources of materials.

e) Review and report on progress of the work. Report on count of units fabricated and inspected at fabricator's operations.

f) Observe and report on conditions of significance to work in progress at time of inspection or at fabricator's operations. Include where applicable and if critical to the work in progress:

i) Time and date of inspection.

ii) Temperature of air, materials, and adjacent surfaces.

iii) Humidity of air, and moisture content of materials and adjacent materials.

iv) Presence of sunlight, wind, rain, snow and other weather conditions.

g) Include in reports all information critical to inspection and testing.

h) Ensure that only materials from the work and intended for use therein are tested.

i) Determine locations for work to be tested.

8) **TOLERANCES FOR INSTALLATION OF WORK**

a) Unless specifically indicated otherwise, work shall be installed plumb, level, square and straight.

b) Unless acceptable tolerances are otherwise specified in specification sections or are otherwise required for proper functioning of equipment, site services, and mechanical and electrical systems:

i) "Plumb and level" shall mean plumb or level within 1 mm in 1 m.

ii) "Square" shall mean not in excess of 10 seconds lesser or greater than 90 degrees.

iii) "Straight" shall mean within 1 mm under a 1 m long straightedge.

iv) "Flush" shall mean within:
(1) 6 mm for exterior concrete, masonry, and paving materials.
(2) 1 mm for interior concrete, masonry, tile and similar surfaces.
(3) 0.05 mm for other interior surfaces.

c) Allowable tolerances shall not be cumulative.

9) **REFERENCE STANDARDS**

a) Perform inspection and testing in accordance with Standards quoted and as required by procedures described in specified reference standards that are applicable to the work being inspected and tested.

10) **DEFECTS**

a) Defective products, materials and workmanship found at any time prior to Contract Completion will be rejected regardless of previous inspections, testing, and reviews of the Work. Inspections, testing, and reviews shall not relieve the Contractor from their responsibility, but are a precaution against oversight or error. Remove and replace defective and rejected products, materials, systems, and workmanship. Be responsible for delays and expenses caused by rejection.

11) **MOCK UPS**

a) Where required by Contract Documents construct, unless indicated herein, mock-ups of work on Site, in size and at location directed by Consultant.

b) Construct mock-ups prior to start of affected work. Allow sufficient time for Consultant’s review. Work affected by mock-ups may not commence prior to acceptance of mock-ups.

c) Construct mock-ups to include all related specified materials and workmanship. Make revisions as directed by Consultant, in accordance with the intent of the Contract Documents, until mock-ups are acceptable.

d) Mock-ups, reviewed and accepted by Consultant, shall become the standard of quality against which installed work will be measured.

e) Mock-ups, by prior arrangement, may be incorporated into finished work if approved by Consultant only.

12) **EXTERIOR WALL MOCK-UP**

a) For exterior wall elements, construct a 10 m^2 mock-up of wall system incorporating all wall components specified. Construct mock-up on Site in a location acceptable to Consultant.

b) The mock-up shall include the work of all trades involved in exterior wall elements, complete in all respects including masonry, air/vapour retarders, zinc cladding, aluminum work, sealants, etc., and shall establish a minimum standard for the work of the exterior wall elements, clear up any misunderstandings and point out any possible problems.

c) Upon completion of mock-up, and after being notified by the Contractor, Consultant will inspect mock-up and if necessary prepare and issue a list of deficiencies. Once mock-up has been accepted, it will form the minimum standard of quality for exterior wall elements.

d) Mock-up will not form part of the work and will be independent of building. Remove and dispose of mock-up from Site during final clean-up, or when directed by Consultant.

13) **DOCUMENTS ON SITE**

a) Maintain at job site, one copy of each of the following:

i) Contract Documents including Drawings, Specifications, Addenda, and other modifications to the Contract.

ii) 'Reviewed' or 'Reviewed as Modified' Shop Drawings.

iii) Project Construction and Shop Drawing Schedules.

iv) Site Instructions and Change Orders.

v) Field Test Reports.

vi) Reports by Authorities having Jurisdiction.

vii) Building and other applicable permits.

viii) Daily log including:
(1) Weather conditions.
(2) Excavation conditions
(3) Start and finish date of each Trade Contractor.
(4) Erection and removal dates of formwork.
(5) Date, quantities and particulars of each concrete pour.
(6) Dates and quantities and particulars of roofing and waterproofing work.
(7) Visits to the Site by Owner, Consultants, Jurisdictional Authorities, Testing and Inspection companies, and material and equipment supplier representatives.

ix) Material Safety Data Sheet pursuant to WHMIS (Occupational Health & Safety Act).

x) As-built drawings recording as-built conditions, instructions, changes for structure, equipment, wiring, plumbing, etc., as called for in Section 01 78 39 and Divisions 22 and 26, prior to being concealed.

xi) Copies of applicable codes.

b) The above material shall be made available to the Consultant at their request.

14) **BUILDING ENVELOPE**

a) Requirements specified herein apply to all elements of the exterior building envelope.

b) Continuity of air barrier/vapour retarder and insulation components is critical and must be maintained at all locations. Where different systems meet, ensure proper interface and continuity between adjacent components by implementing suitable construction sequences and by using compatible materials only.

c) Maximum air leakage shall be 0.10 L/(sAm^2) when measured with a warm-side relative humidity of 27-55% at 21^{0}C and a measured air pressure difference of 75Pa.

d) Anchor exterior cladding components to structure in manner suitable to accommodate structural deflection and creep and to withstand loads from expected temperature gradients. Design anchorage to withstand expected wind loads, positive and negative, in accordance with applicable regulations.

e) Ensure that air spaces within exterior building components are firestopped in accordance with applicable regulations.

f) Ensure that air spaces on the outside of vertical air barrier/vapour retarder (walls), window systems, and curtain wall systems are constructed with adequate drainage provisions to the exterior.

g) Owner may complete a thermographic scan upon completion of the building envelope. Contractor will be responsible to correct identified thermal anomalies.

15) **DRAINAGE**

a) Layout and construct work to ensure that positive drainage is provided to floor drains, ditches, site drains and catch basins, as set in their final position, preventing undrained areas and ponding.

b) Ensure that allowable construction tolerances and structural deflection do not cause ponding of water.

c) Report to Consultant in writing prior to executing work affected, in case adequate drainage cannot be provided.

END OF SECTION

1) **GENERAL**

a) Provide Labour, Products, equipment, services, tools and Supervision to ensure that Work complies with minimum acceptable standards of materials and performance of Work in accordance with codes and standards referenced in the Specification.

b) Consider contract forms, codes, Specifications, standards, manuals, and installation and application instructions referred to in these specifications to be the latest published editions at the date of submission of the bid unless otherwise stated in the Specifications or otherwise required by the authorities having jurisdiction.

2) **BY-LAWS, PERMITS, AND FEES**

a) The Building Code - Ontario Regulation 332/12, including all amendments, shall govern the construction of the Work.

b) Comply with all By-Laws and regulations of authorities having jurisdiction. These codes and regulations constitute an integral part of the Contract Documents.

c) If required, pay for construction damage deposit required by authorities having jurisdiction.

d) Where permits, licences, and inspection fees are required by authorities having jurisdiction for specific trade functions, they shall be obtained by particular subtrade responsible for that work.

e) Arrange for inspection, testing of Work and acceptance required by the authorities having jurisdiction. Be responsible for necessary preparations, provisions and pay all associated costs.

f) Be responsible for ensuring that no work is undertaken which is conditional on permits, approvals, reviews, licences, fees, until all applicable conditions are met. No time extension will be allowed for delay in obtaining necessary permits.

g) Any additional work or changes to the materials due to Work not complying with the Ontario Building Code and Regulations as indicated by the Building Inspector shall be changed. All costs involved shall be borne by Contractor.

h) Obtain permit required to work on Municipal rights of way. Provide damage deposits for sidewalks, roads and services work, as applicable.

i) Give notice of completion of project prior to occupancy, as required by applicable legislation.

3) **RIGHT OF WAY PERMIT**

a) The Owner will be required to obtain approval from the Transportation Services Division for any work within the public right-of-way.

b) In order to obtain approval for work in the City's right-of-way the Owner will be required to provide up to date stake out information for most construction related work.

c) The application is require to obtain building location and access permits prior to constructing this project. Other permits associated with construction activities (such as hoarding, piling/shoring, etc.) may also be required.

4) **SITE SERVICING CONNECTIONS**

a) The owner will be required to make an application to King City water Division for the installation of any proposed services within the right-of-way after acceptance of the stormwater management report and site servicing plan.

5) **CONSTRUCTION MANAGEMENT PLAN**

a) The Owner will be required to provide the City with a Construction Management Plan outlining the following:

i) Dust/mud control on and offsite;

ii) Location of truck loading points, trailer parking;

iii) Location of temporary material storage areas;

iv) Access/truck routing;

v) Provision of hoarding, temporary fencing & covered walkways;

vi) Location and extent of aerial crane operations; and

vii) Parking for construction trades;

6) **OFF-STREET VEHICULAR LOADING AND PARKING FACILITIES AND ACCESS/DRIVEWAYS**

a) Provide and maintain off-street vehicular loading and parking facilities and access driveways in accordance with the approved plans and drawings, to the satisfaction of the Executive Director, Technical Services.

b) All on-site driveways and parking areas must be surfaced and maintained with asphalt, concrete or interlocking stone.7) **FACILITIES FOR THE LANDSCAPING OF THE LANDS OR THE PROTECTION OF ADJOINING LANDS**

a) The owner shall maintain the sod covered portion within the City's Right-of-Way fronting and/or flanking the site in accordance with the approved plans and drawings to the satisfaction of the City.

8) **EXISTING PUBLIC SERVICE LINES**

a) Where existing public services are indicated to be removed and/or relocated, perform Work in compliance with authorities having jurisdiction.

b) Make good public roads, walkways and curbs soiled or damaged due to construction to the requirements of local authorities.

9) **CODES**

a) Reference is made to standards in the specifications to establish minimum acceptable standards of materials, products and workmanship. Ensure that materials, products and workmanship meet or exceed requirements of the reference standards specified.

b) In the event of conflict between documents specified herein, execute the Work in accordance with the most stringent requirements.

10) **STANDARDS**

a) Where a material or product is specified in conjunction with a referenced standard, do not supply the material or product if it does not meet the requirements of the standard. Supply another specified material or product, or an acceptable material or product of other approved manufacture which does meet the requirements of the standard, at no additional cost to the Owner.

b) Where no standard is referred to, provide materials, products and workmanship which meet requirements of the applicable standards of the Canadian Standards Association, Canadian General Standards Board, Ontario Provincial standard specifications (OPSS), Ontario Provincial Standard Drawings (OPSD) and the applicable building code. References to "Measurement for Payment" and "Basis of Payment" in OPSS standard documents are not applicable to this Contract.

c) If there is question as to whether a material, product or system is in conformance with applicable standards, the Consultant reserves the right to have such materials, products or systems tested to prove or disprove conformance. The cost for such testing will be paid by the Owner in the event of conformance with contract Documents or by the Contractor in the event of non-conformance.

d) Where application, installation and workmanship standards are cited, it is intended that referenced standards form the basis for minimum requirements of the specified item and specifications supplement the standards unless specified otherwise.

e) Matters may be dealt with in part by these specifications which are also dealt with, under the same or similar headings in cited standard. It is not intended that

these specifications take the place of the standards but supplement them, unless specified otherwise.

f) Where reference is made to manufacturer's directions, instructions or specifications they shall include full information on storing, handling, preparing, mixing, installing, erecting, applying, or other matters concerning the materials pertinent to their use and their relationship to materials with which they are incorporated.

g) Where standards, specifications, associations, and regulatory bodies are listed in the Specifications by their abbreviated designations. These are but not limited to the following:

AA	The Aluminum Association
AAMA	Architectural Aluminum Manufacturers Association
AASHTO	American Association of State Highway and Transportation Officials
ACI	American Concrete Institute
AFBMA	Anti-Friction Bearing Manufacturer's Association
AIEE	American Institute of Electrical Engineers
AISI	American Iron and Steel Institute
AMCA	Air Movement and Control Association
AMEU	Association of Municipal Electric Utilities
ANSI	American National Standards Institute
ARI	Air-Conditioning and Refrigeration Institute
ASA	American Standards Association
ASHRAE	American Society of Heating, Refrigeration and Air Conditioning Engineers
ASME	American Society of Mechanical Engineers
ASTM	American Society of Testing and Materials
AWMAC	Architectural Woodwork Manufacturers Association of Canada
AWWA	American Water Works Association
CEMA	Canadian Electrical Manufacturer's Association
CGA	Canadian Gas Association
CGSB	Canadian General Standards Board
CISC	Canadian Institute of Steel Construction
CMHC	Canadian Mortgage and Housing Corporation
CMPA	Canadian Paint Manufacturers Association
COFI	Council of Forest Industries of British Columbia
CRCA	Canadian Roofing Contractors Association
CSA	Canadian Standards Association
CSSBI	Canadian Sheet Steel Building Institute
CWB	Canadian Welding Bureau
CWC	Canadian Wood Council
EEMAC	Electrical and Electronic Manufacturers Association Canada
FM	Factory Mutual
IEEE	Institute of Electrical and Electronic Engineers

MFMA	Maple Flooring Manufacturers Association
MIL	Military Standards
MSS	Manufacturer's Standardization Society
MTO	Ministry of Transportation Ontario
NAAMM	National Association of Architectural Metal Manufacturers
NFPA	National Fire Protection Association
NEMA	National Electrical Manufacturer's Association (U.S.A.)
NLGA	National Lumber Grades Authority
NRC	National Research Council of Canada
OCBA	Ontario Concrete Block Association
OHESC	Ontario Hydro Electrical Safety Code
OPSS	Ontario Provincial Standard Specification
PEI	Porcelain Enamel Institute
PDI	Plumbing Drainage Institute
PHA	Public Health Act
SMACNA	Sheet Metal and Air Conditioning Contractors National Association
SSPC	Steel Structures Painting Council
TEMA	Tubular Exchange Manufacturer's Association
TTMAC	Terrazzo, Tile and Marble Association of Canada
UL	Underwriters Laboratories Inc. (U.S.)
ULC	Underwriters Laboratories of Canada

11) **FIRE RATINGS, ASSEMBLIES AND SEPARATIONS**

a) Where a material, component, assembly, or separation is required to be fire rated, the fire rating shall be as determined or listed by one of the following testing authorities acceptable to the authorities having jurisdiction:

i) Underwriters' Laboratories of Canada.

ii) Underwriters' Laboratories Inc.

iii) Factory Mutual Laboratories.

iv) The National Research Council of Canada.

v) The National Board of Fire Underwriters.

vi) Intertek Testing Services.

b) Where reference is made to only one testing authority an equivalent fire rating as determined or listed by another of the aforementioned testing authorities is acceptable if approved by authorities having jurisdiction. Obtain and submit such approval of authorities, in writing when requesting acceptance of a proposed equivalent rating or test design.

c) Fire rated door assemblies shall include doors, frame, anchors, and hardware and shall bear label of fire rating authority showing opening classification and rating.

d) Material having a fire hazard classification shall be applied or installed in accordance with fire rating authorities printed instructions.

e) Fire rated assemblies shall be constructed in accordance with applicable fire test report information issued by fire rating authority. Deviation from fire test report will not be allowed.

f) Construct fire separations as continuous, uninterrupted elements except for permitted openings. Extend fire rated walls and partitions from floor to underside of structural deck above.

g) Fire separations may be pierced by openings for electrical and similar service outlets provided such boxes are non-combustible and are tightly fitted and sealed with a ULC approved sealant for the assembly being sealed.

h) Construction that abuts on or is supported by a non-combustible fire separation shall be constructed so that its collapse under fire conditions will not cause the collapse of the fire separation.

i) Do not use combustible members, fastenings, attachments and similar items to anchor electrical, mechanical or other fixtures to fire separations.

j) At penetration through fire rated walls, ceilings or floors, completely seal voids with ULC approved firestopping material; full thickness of the construction element. In locations that require a smoke seal, provide appropriate ULC approved system installed in accordance with the manufacturer's recommendations.

END OF SECTION

1) **TEMPORARY CONTROLS**

a) Hoarding and barriers:

i) Before commencing operations, supply, erect and maintain hoarding around entire perimeter of Site. Paint outside of hoarding in a colour selected by the Consultant and mark with "POST NO BILLS" signs.

ii) Provide temporary enclosures as required to protect the building in its entirety or in its parts, against the elements, to maintain environmental conditions required for work within the enclosure, and to prevent damage to materials stored within.

iii) Provide lockable gates through hoarding and barriers for access to Site by workers and vehicles.

b) Prevent unauthorized entry to the Site. Barricade, guard or lock access points to the satisfaction of the Consultant and post "NO TRESPASSING" signs.

c) Provide hoarding, barriers and covered walkways required by governing authorities for public safety, public rights-of-way and for access to buildings. Snow fencing is not allowed as protection for sidewalk.

d) Install signs for movement of people around Work Site as required and directed by the Consultant.

e) Provide secure, rigid guide rails and barricades around deep excavations, open shafts, open stair wells, open edges of floors and roofs as required for protection of Work, workers, and the public.

f) Remove hoarding, barriers, building enclosures, guide rails and barricades upon Contract Completion unless otherwise noted on the Contract Drawings or as directed by the Consultant.

2) **SERVICE AND UTILITY SYSTEMS**

a) Consult with utility companies and other authorities having jurisdiction to ascertain the locations of existing services on or adjacent to site.

b) Information as to the location of existing services, if shown on the Drawings, does not relieve the Contractor of his responsibility to determine the exact number and location of existing services.

c) Give proper notices for new services as may be required. Make arrangements with authorities and utilities for service connections required.

d) Pay any charges levied by utilities or authorities for work carried out by them in connection with this Contract, unless specified otherwise.

e) Operate and maintain all utility systems affected by work of this Contract, until the building or specific portions thereof have been accepted by the Owner.

f) Report existing unknown services encountered during excavation to Consultant for instructions; cut back and cap or plug unused services. Be responsible for the protection of all active services encountered and for repair of such services if damaged.

3) **SCAFFOLDING AND HOISTS**

a) Select, operate, and maintain scaffolding, hoisting equipment and cranes as may be required.

b) Do not erect or operate equipment that will endanger existing structures, local municipalities hydro installations, or traffic signals.

c) Design and construct scaffolding in accordance with CAN/CSA S269.2-M.

4) **TEMPORARY WORKS**

a) Installation and Removal: Provide temporary utilities, facilities and controls in order to execute the Work expeditiously. Remove from Site all such Work after use.

b) Arrange for connections with appropriate utility company and pay all costs for installation, maintenance and removal.

c) Arrange for connections with Owner and pay all costs for installation, maintenance and removal.

d) Be responsible for the careful and reasonable use of Owner supplied water and power.

e) Temporary Power and Lighting Systems:

i) Supply, install and maintain electrical power and necessary electrical equipment including overhead and underground feeders, transformers, motors, starters, panels, protective devices and equipment. Connections will be made available to any part of the Work within distance of a 30 m extension.

ii) Provide temporary lighting inside and outside structure of adequate intensity to illuminate construction activities. Provide temporary pedestrian lighting for sidewalk areas affected by the Work.

iii) Supply and install the type and quantity of minimum lighting equipment in each location to ensure adequate, continual illumination 24 hours per day, 7 days per week for the following:
(1) Emergency evacuation, safety and security throughout the Project at intensity levels required by jurisdictional authorities.
(2) General lighting for performance of the Work throughout the Project, evenly distributed, and at intensities to ensure that proper installations and applications are achieved.
(3) Performance of finishing trades in area as required evenly distributed, and of an intensity of at least 50 Lux.

iv) In locations approved by the Consultant. install and support the electrical plant, distribution and temporary lighting systems including service equipment and local hydro authority meter energized by the local hydro circuits. Installations shall be approved by the Consultant and shall be carried out in a neat manner to avoid interference with the application of finish material and to facilitate removal when the installed permanent lighting system is in operation.

v) Make all necessary arrangements for and pay all costs for a temporary electrical service of sufficient capacity to supply temporary lighting, operation of power tools, cranes and equipment for all construction, implementation, and inspection and testing purposes. Supply and install necessary temporary cables and other electrical equipment and make all temporary connections as required.

vi) Temporary power distribution wiring shall comply with Ontario Hydro Electrical Safety Code. Obtain inspection certificates for temporary electrical work.

vii) Maintain the lighting systems in operation during the life of the Contract. Replace burned or missing lamps immediately.

viii) Upon Contract Completion, remove electrical plant and temporary lighting from the Site.

f) Water Supply:

i) Provide and pay for a continuous supply of potable water for construction use. Provide as a minimum one water connection on each floor level.

ii) Provide and maintain all temporary lines, extensions and hoses as required. Remove all temporary connections and lines on completion of the Work and make good any damage.

g) Temporary Heating:

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

ii) Construction heaters used inside buildings must be vented to the outside or be flame less type. Solid fuel salamanders are not permitted.

iii) Maintain temperatures of minimum 10^{o}C in areas where construction is in progress unless otherwise indicated in the Contract Documents. Protect exposed and adjacent services from freezing. Repair at no cost to the Owner any such services, buildings or other utilities disrupted by freezing.

iv) Ventilate heated areas and keep structures free from exhaust combustion gases.

v) The permanent heating system of the building or portions thereof may be used when available only upon written permission by Consultant. If permission to use heating system is obtained:

(1) Before using air handling systems, ensure that dust/debris is removed from the premises and install temporary filters to prevent construction dust/debris

from entering via return air or intake openings. keep unused ducts sealed to prevent entry of dust/debris. Replace filters frequently during construction.

(2) On competition of work remove temporary filters and install new filters in accordance with Division 23. After temporary use of air handling system is complete and before turning over system to Owner, vacuum internally to ensure all dust/debris is removed.

h) Elevators: Elevators may not be used by construction personnel.

i) Temporary Telephone and facsimile: Provide and pay for separate telephones and facsimile services, for local call only, as required for own use and use of the Consultant and Owner. Long distance call shall be paid by party making call.

j) Sanitary Facilities: Provide sanitary facilities in accordance with occupational health and safety requirements in the place of the Work. Use of Owner's existing sanitary facilities or new sanitary facilities is not allowed.

5) **PROTECTION**

a) Protection of Public Area: Protect surrounding private and public property from damage during performance of the Work.

b) Take all necessary precautions to prevent damage to work affected by temperature, water, weather and other environmental conditions.

c) Protection of Building Finishes and Equipment:

i) Provide protection for existing structure, finished and partially finished building finishes, waterproofing systems, and equipment during performance of the Work.

ii) Cover Owner's equipment and plant within the Site with 6 mil PVC sheet, or equal, taped to make it dust-tight. Equipment and existing work moved or altered to facilitate construction, movement of Products or equipment shall be stored, protected with dust-tight covers and subsequently returned to its original location.

iii) Obtain approval from the Consultant prior to the installation of temporary supporting devices into existing roof, ceiling, or wall members for the erecting of equipment or machinery. Repair roof, ceiling, and wall members used for this purpose to the satisfaction of the Consultant.

iv) Provide necessary screens, covers and hoarding as required.

v) Provide temporary weather tight, dust tight, and lockable partitions within the building where work is performed. Provide weather tight closures to unfinished door and window openings, top of shafts and other openings in floors and roofs.

vi) Any Products or equipment damaged while carrying out the Work shall be restored with new Products or equipment matching the original equipment. Damage shall include harm resulting from all construction work, such as falling objects, wheel and foot traffic, failure to remove debris, operation of machinery and equipment, and scaffolding and hoisting operations.

vii) Protect finished surfaces of new work from damage by restriction of access or by use of physical means suitable to the material and surface location. Where construction operations must be performed or traffic routed over finished floors, lay 6 mm plywood coverings tightly fitted and secured over surface in such areas.

d) Fire Protection:

i) Take precautions to prevent fires. Provide and maintain temporary fire protection equipment of a type appropriate to the hazard anticipated in accordance with authorities having jurisdiction, governing codes, regulations, by-laws and to the satisfaction of the Consultant and insurance authorities.

ii) Excessive storage of flammable liquids and other hazardous materials is not allowed on Site. Flammable liquids must be handled in approved containers. Remove combustible wastes frequently.

iii) Inspect temporary wiring, drop cords, extension cables for defective insulation or connections frequently.

iv) Open burning of rubbish is not permitted on the Site.

v) Handle, transport, store, use and dispose of gasoline, benzine or other flammable materials with good and safe practice as required by authorities having jurisdiction.

vi) Provide fire extinguishers of the non-freezing chemical type in each temporary building, enclosure and trailer. Use only fire-proofed tarpaulins.

vii) A fire watch shall be required for each of the following activities regardless of the number, duration or size of the activity in operation:
(1) any open flame activities (e.g., soldering and welding);
(2) shutdown of fire detection system;
(3) shutdown of sprinkler system.

e) Maintain adequate cover over services as required by Utility Authorities.

f) Report any discharge of a contaminant to the Authorities having jurisdiction.

6) **TEMPORARY BUILDINGS**

a) Provide, and maintain until contract completion a temporary office as required for work, large enough to accommodate site administrative activities and site meeting, complete with lighting, heating, and air conditioning equipment to maintain 21 ^{0}C. Ventilation, telephone, facsimile machine on a separate line, copier (not combination fax/copier), table and chairs. Do not store materials, tools. equipment in meeting area; keep clean and tidy.

b) For all trailers and temporary buildings, provide wood stairs, platform and boardwalk, painted and repainted as required with non-skid abrasive paint.

c) Do not locate any buildings, structures or equipment in a manner that interferes with surveys along the control line and reference line tangents.

d) Remove temporary buildings upon Contract Completion. Restore area(s) to match the existing surrounding area.

7) **PEST CONTROL**

a) Be responsible to provide control measures, restraining procedures, and treatments to prevent infestation and spread of insects, rodents and other pests deemed to be present at Site and/or noticed during course of the Work. Carry out fumigation, pest control procedure, and posting of warning signs, notices including contents of such notices in accordance with requirements of Pesticides Act and any other authorities having jurisdictions. Pesticides used shall be in accordance with Canada Pest Control Products Act, and provincial and municipal regulations.

8) **FIRST-AID FACILITIES**

a) Provide site equipment and medical facilities necessary to supply first-aid service to injured personnel in accordance with regulations of the Workmen's Compensation Act. Maintain facilities for duration of Contract.

9) **USE OF NEW PERMANENT SERVICE & EQUIPMENT**

a) Do not use any new permanent service or equipment without Owner's written approval.

b) Where permission is granted to use permanent services and equipment provide competent persons to operate services and equipment; inspect frequently and maintain facilities in proper operating condition at all times.

c) Permanent services and equipment shall be turned over to Owner in "as new" and perfect operating condition.

d) Use of permanent systems and equipment as temporary facilities shall not affect the warranty conditions and warranty period for such systems and equipment. Make due allowance to ensure that Owner will receive full benefits of equipment manufacturers warranty after project takeover.

10) **PROJECT IDENTIFICATION (ARCHITECT'S SIGN)**

a) If required, obtain approvals from jurisdictional authorities for temporary signs.

b) Prior to submitting first claim for payment, provide minimum 8' x 16' x 5/8" aluminum/foam panel composite sign, complete with aluminum framing, supports, and foundations. Graphics, in electronic format, for sign to be provided by Consultant. Sign background and rear face of sign shall be white. Submit sign sketch for Consultant's approval before fabrication. Sign shall be executed with exhibit lettering produced by a professional sign manufacturer/painter. Locate sign as directed by Consultant.

c) Maintain sign in good condition for duration of work. Clean periodically. Remove immediately after Substantial Performance of the Contract, or at Completion of Contract as defined in applicable lien legislation as directed by the Consultant.

d) No other signs or advertisements, other than warning signs, or signs required by law, are permitted on site, without Owner's consent.

11) **SITE MAINTENANCE**

a) Maintain the Site and adjacent premises in a clean and orderly condition, free from debris and other objectionable matter. Immediately remove rubbish and surplus Products, equipment and structures from the Site. If the Site is not cleaned (within 48 hours after the Contractor has been instructed to do so), the Consultant may clean the Site and retain the cost from monies due, or to become due, to the Contractor.

b) When the Work is substantially performed, remove surplus Products, tools, construction machinery and equipment not required for the performance of the remaining Work.

12) **SITE STORAGE AND OVER LOADING**

a) Confine the Work and operations of employees to limits indicated by the Contract Documents. Do not unreasonably encumber the Site with Products.

b) Products shall be stored only in areas designated or approved by the Consultant, and shall not be left lying on streets, sidewalks, boulevards or elsewhere within public view. Products which the Consultant may permit to be stored elsewhere than in the Contractor's storage areas shall be neatly stacked or otherwise disposed and shall be so maintained.

c) Fabrication shops shall not be set up within the structure except as directed by or with the permission of the Consultant.

d) Do not load or permit to be loaded any part of the Work with a weight or force that it is not calculated to bear safely. Be solely responsible and liable for damages resulting from violation of this requirement. Provide temporary supports as strong as permanent support.

e) Do not cut, drill or sleeve load bearing members unless shown on drawings or otherwise approved by the Consultant in writing for each location.

f) Site storage and loading requirements to be in accordance with the Ontario Occupational Health and Safety Act and Regulations for Construction Projects.

13) **PUBLIC CONVENIENCE AND SAFETY**

a) Maintain sidewalks at and adjacent to the Site in a safe condition throughout the Contract. Promptly remove ice and snow.

b) Keep haul routes free at all times from Products spilled on highway or street surfaces and clean highways and streets of deposits due to performance of the Work to the

satisfaction of the Consultant and the highway and street authorities. Clean highways and streets within 24 hours of Consultant's instruction.

c) The Consultant may inspect haul routes, the Site and adjacent premises daily and may halt operations, withhold payment or carry out such additional operations as necessary, deducting the cost from monies due, or to become due, to the Contractor.

14) **ACCESS AND EGRESS TO SITE**

a) Where construction requirements demand, construct access roads capable of withstanding construction equipment and haul traffic. Maintain access roads in good condition at all times. Remove access roads prior to completion of the Work unless otherwise noted and restore area as shown on the Contract Drawings.

15) **PUBLIC TRAFFIC FLOW**

a) Provide and maintain flag persons, Police Officers, traffic signals, barricades and illumination as required by Authorities having jurisdiction and/or as necessary to perform the Work and protect the public.

16) **PUBLIC UTILITIES AND SERVICES**

a) Verify limitations imposed on project work by presence of utilities and services, and ensure no damage occurs to them.

b) Notify service authorities concerned so that they protect, remove, relocate, or discontinue them, as they may require.

c) Make arrangements and pay for connection charges for services required for project work.

d) Locate poles, pipes, conduit, wires, fill pipes, vents, regulators, meters, and sanitary services work in inconspicuous locations. If not shown on Drawings, verify location of service work with Consultant before commencing installation.

17) **ROADS, CURBS, GUTTERS, AND WALKS**

a) Include all curb cuts and making good of existing curbs, walks and paving on Municipal property to provide fully paved and finished approaches to requirements of authorities having jurisdiction.

18) **CONSTRUCTION PARKING**

a) Parking may be permitted on Site provided it does not disrupt the performance of Work , Site safety or the movement of vehicular or pedestrian traffic and is acceptable to the Consultant.

19) **SITE VISITORS**

a) During the progress of the Work, afford access to visitors duly authorized by the Consultant and facilitate inspections or tests they may desire to make. Record site visitors in log book maintained on site.

b) Ensure Site visitors wear appropriate safety apparel.

20) **EROSION AND SEDIMENTATION CONTROL**

a) Control drainage on site to prevent flooding, erosion and run-off onto adjacent properties as a result of construction operations.

b) Dispose of water containing silt in suspension in accordance with requirements of jurisdictional authorities.

c) Conform to sedimentation and erosion control requirements of the conservation and/or municipal authority having jurisdiction. Provide and maintain until completion of work or until directed by Consultant to be removed, sediment control devices at catch basins, drainage courses and at other locations on site as directed. Comply with requirements of the local Conservation Authority.

d) Provide storm drain inlet protection consisting of a sediment control barrier or an excavated ponding area around storm drain inlet or curb inlet; add bracing where necessary to withstand high flow volumes and depth. Inspect inlet protection after each rainfall and repair damage. Sweep up accumulated sediment and dispose of in a controlled area. Remove inlet protection after area has been stabilized with permanent vegetation.

e) Prevent tracking of mud and dirt from site onto paved roads. Provide stabilized vehicle access/egress points, constructed of coarse granular material. Place additional granular material as required to maintain access/egress points in proper working order. Clean mud and dirt from paved roads at end of each day by shoveling or sweeping and subsequent washing. Dispose of mud dirt in a controlled disposal area.

21) **TEMPORARY DRAINAGE AND DEWATERING**

a) Drainage lines and gutters shall be kept open at all times. No flow of water shall be directed across or over pavements except through pipes or properly constructed troughs. Keep all portions of Work properly and efficiently drained during construction and until completion. Be responsible for all disturbances, dirt and damage which may be caused by or result from water backing up or flowing over, through, from or along any part of Work, or due to operations which may cause water to flow elsewhere.

b) Keep trenches and other excavations free of water at all times. Employ adequate means to remove water in a manner that will prevent loss of soil, and maintain the stability of excavation.

c) Dispose of such water in a manner that will not be dangerous to public health, private property or to any portion of Work completed or under construction, nor which causes an impediment to the use of streets by the public.

d) Drainage of trenches or other excavation through newly laid storm drainage pipe will be allowed only with the express permission of the authority having jurisdiction.

e) When drainage is directed to existing catch basins, regularly inspect and clean such catch basins of debris and sediment.

22) **SNOW REMOVAL**

a) Allow no accumulation of ice and snow on Site, and on roof deck when roofing operations are scheduled to take place.

b) Remove snow from access road, Site circulation paths and elsewhere as required to permit access to Work, parking and uninterrupted construction progress.

23) **POLLUTION (DUST, DEBRIS, AND NOISE) CONTROL**

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

b) Keep premises free of waste material.

c) Arrange and pay for removal of all waste generated by the work in manner acceptable to authorities having jurisdiction.

d) Limit noise levels in accordance with requirements of authorities having jurisdiction.

e) Maintain temporary erosion and pollution control features installed under this contract.

f) Control emissions from equipment and plant to local authorities emission requirements.

g) Prevent abrasive-blasting and other extraneous materials from contaminating air beyond application area, by providing temporary enclosures.

24) **TREE PROTECTION**

a) Within Contractor's assigned work and storage areas and adjacent to designated access routes, protect existing trees and other plants scheduled to remain. Provide minimum 1.8 m high chain link fencing outside of dripline of trees or groups of trees and other plants.

b) Leave fenced areas undisturbed; do not use areas for storage, stockpiling or any other purpose. Do not dump or flush any contaminants in areas of tree feeder roots.

c) Do not attach rigging cables to trees.

d) Where limbs or portions of plants are required to be removed to accommodate new work, they shall be removed in accordance with accepted arboricultural practice.

e) Where root systems of protected trees adjacent to construction are exposed or damaged, they shall be neatly trimmed and the area backfilled with suitable material to prevent desiccation.

f) Where necessary give plants an overall pruning to restore the balance between roots and top growth and/or to restore appearance.

g) Except at locations where specific procedures are included in Contract Documents do not alter grades around existing trees/plants without first obtaining Consultant's consent and directions.

END OF SECTION

1) **SPECIFIED PRODUCTS**

a) Work of this Contract is based on Products specified by:

i) Manufacturer's catalogued trade names and/or;

ii) References to standards (i.e. CAN, CGSB, CSA, ASTM) or;

iii) Prescriptive Specifications or;

iv) Performance Specifications.

b) When one or more manufacturer's trade name is specified for a Product, any one of the specified Products will be acceptable. Products by other manufacturers are subject to the Consultant's acceptance as an equivalent substitution in accordance with the specified requirements of substitutions.

c) When more than one manufacturer's catalogued trade name Product is specified along with a referenced standard, any one of the specified Products will be acceptable on condition the Product complies with the referenced standard.

d) When a Product is specified by reference to a standard only, the Contractor may select any Product that meets or exceeds the specified standard for the intended purpose. The onus shall be on the Contractor to establish that such Products meet the reference standard requirements. Products exceeding minimum requirements established by reference standards will be accepted for the Work if such Products are compatible with the Work with which they are incorporated.

e) When a Product is specified by prescriptive or performance Specification, any Product meeting or exceeding the Specification will be accepted.

f) When a Product is specified by reference to a standard or by prescriptive or performance Specification, upon request of the Consultant, obtain from the manufacturer, an independent testing laboratory report showing that the Product meets or exceeds the specified requirements.

g) Unless otherwise indicated in the Specifications, maintain uniformity of manufacture for any particular or like item throughout the Work.

2) **SUBSTITUTIONS**

a) Requests for substitutions will not be accepted prior to the Notification of Award. Substitutions will be considered by the Consultant provided that:

i) The proposed substitutions have been investigated and complete data are submitted which clearly includes highlighting all aspects that meet the specifications. Consultant will only review data submitted. Incomplete data will be grounds for non-acceptance.

ii) Data relating to changes in the Contract Schedule, if any, and relation to other Work have been submitted.

iii) Same warranty is given for the substitution as for the original Product specified.

iv) All claims are waived for additional costs related to the substitution which may subsequently arise.

v) Installation of the accepted substitution is co-ordinated into the Work and that full responsibility is assumed when substitutions affect other work. Make any necessary changes required to complete the Work. Revisions to the drawings for incorporation of the substitutions shall be made by the Consultant and all costs associated with the revisions shall be borne by the Contractor.

b) Substitutions to methods or process described in the Specifications or drawings, may be proposed for the consideration of the Consultant. Ensure that such substitutions are in accordance with the following requirements:

i) Time spent by the Consultant in evaluating the substitution shall not be the basis for a claim by the Contractor for extensions to the Contract Time.

ii) Clearly indicate how the proposed substitutions would be advantageous to the Owner or in the opinion of the Contractor would improve the operation of the installation.

iii) Be responsible for substitutions to methods or processes concerning such Work and ensure that the warranty covering all parts of the Work will not be affected.

iv) The cost of all changes in the work of Other Contractors, necessitated by the substituted methods or processes, if accepted, is borne by the Contractor.

v) The substituted methods or processes fit into space allotted for the specified methods or processes. Revisions to the drawings for incorporation of the substitutions shall be made by the Consultant and all costs associated with the revisions shall be borne by the Contractor.

c) Substitutions will not be considered if:

i) They are indicated or implied on shop drawings or Product data without formal request.

ii) Acceptance will require substantial revision of the Specifications and Drawings.

d) Do not substitute Products or methods or processes into the Work unless such substitutions have been specifically approved for the Work by the Consultant.

e) Approved substituted Products shall be subject to the Consultant's inspection and testing procedures. Approved substituted Products shall only be installed after receipt of the Consultant's written approval.

f) The Contract Price will be adjusted accordingly to any and all credits arising from the substitutions mentioned above.

3) **APPROVAL OF PRODUCTS AND INSTALLATION METHODS**

a) Wherever in the Specifications it is specified that Products and installation methods shall meet approval of Authorities having Jurisdiction, underwriters, the Consultant, or others, such approval shall be in writing.

4) **PRODUCT DELIVERY CONTROL**

a) It is the responsibility of the Contractor to ensure that the supplier or distributor of materials specified or alternatives accepted, which he intends to use, has materials on the site when required. The Contractor shall obtain confirmed delivery dates from the supplier.

b) The Contractor shall contact the Consultant immediately upon receipt of information indicating that any material or item, will not be available on time, in accordance with the original schedule, and similarly it shall be the responsibility of all subcontractors and suppliers to so inform the Contractor.

c) The Consultant reserves the right to receive from the Contractor at any time, upon request, copies of actual purchase or work orders of any material or products to be supplied for the work.

d) If materials and products have not been placed on order, the Consultant may instruct such items to be placed on order, if direct communication in writing from the manufacturer or prime suppliers is not available indicating that delivery of said material will be made in sufficient time for the orderly completion of the Work.

e) The Consultant's review of purchase orders or other related documentation shall in no way release the Contractor, or his subcontractors and suppliers from their responsibility for ensuring the timely ordering of all materials and items required, including the necessary expediting, to complete the work as scheduled in accordance with the Contract Documents.

f) In the event of failure to notify the Consultant at commencement of Work and should it subsequently appear that Work may be delayed for such reason, the Consultant reserves the right to direct the Contractor to take the following measures at no increase in Contract Price:

i) Substitute more readily available Products of similar or better quality and character, or

ii) Temporarily install another Product until such time as the specified Product becomes available, at which time the temporarily installed product shall be removed and the specified Product installed.

5) **TRADEMARKS AND LABELS**

a) Permanent labels, trademarks and nameplates on Products are not acceptable in the finished Work, except where required by authorities having jurisdiction, for operating instructions, or when located in service rooms.

b) Remove trademarks and labels by grinding, if necessary, painting out where the particular surface is being painted, or if on plated parts, replace with new plain plated or non-ferrous metal parts.

6) **DELIVERY, STORAGE, HANDLING AND PROTECTION**

a) Be responsible for handling and delivery of Products. Protect Products from damage during handling, storage and installation. Deliver store and handle items in accordance with manufacturer's instructions and as specified. Be responsible for all costs of delivery, loading and off-loading, and for transportation back to its origin for correction, if required, due to damage or defect. Reject materials and Products delivered to the Site which are damaged.

b) Manufacture, pack, ship, deliver, and handle Products so that no damage occurs to structural qualities and finish appearance, nor in any other way which is detrimental to their function and appearance.

c) Ensure that Products, while transported, are not exposed to an environment which would increase their moisture content beyond the maximum specified.

d) Organize delivery of materials, Products and equipment to, and removal of debris and equipment from, the site and surrounding property.

e) Schedule early delivery of Products to enable Work to be executed without delay. Before delivery, arrange for receiving at the Place of the Work.

f) Coordinate mechanical and electrical equipment and apparatus deliveries with the manufacturer's and suppliers such that equipment and apparatus is delivered to the site when it is required, or so that it can be stored within the building and protected from the elements.

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

h) Deliver packaged Products, in original unopened wrapping or containers, with manufacturer's seals and labels intact.

i) Label packaged products to describe contents, quantity, and other information as specified.

j) Labels attesting that materials conform to specified reference standards will be acceptable as verification that contents meet specified requirements. In the absence of labels, submit affidavits to validate conformance of Product to reference standards, as requested by the Consultant.

k) Label fire-rated Products to indicate Underwriters' Laboratories approval.

l) 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.

m) Do not obstruct or disrupt local traffic flow during construction period.

n) Allocate an area within the limits of the Work acceptable to the Owner for storage of Products brought to the site by all trades. Keep storage area tidy at all times and do not use other parts of the property for storage. Arrange and pay for off-site storage when required.

o) Locate products on site in a manner to cause minimal interference with the Work and building activities.

p) Store Products off the ground, in a manner to prevent damage, adulteration, deterioration and soiling to the Products, other building components, assemblies, other products, the structure, the site and surrounding property, and in accordance with manufacturer's instructions when applicable.

q) Store packaged or bundled Products in original and undamaged condition complete with written application instructions. Keep manufacturer's seals and labels intact. Do not remove from packaging or bundling until required in the Work.

r) Do not place or store materials and Products in corridors, public areas, streets, lanes, passageways or similar locations.

s) Store Products so as not to create any overloading conditions to any part of the building, structure, falsework, form work and scaffolding.

t) Store Products subject to damage from weather in weatherproof enclosures.

u) Store cementitious Products clear of earth or concrete floors, and away from walls.

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

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

x) Store and handle flammable liquids and other hazardous materials in approved safety containers and as otherwise prescribed by safety authorities. Store no flammable liquids or other hazardous material in bulk within the Work.y) Store and mix paints in a heated and ventilated room or area assigned for this purpose. Keep this room or area locked when unattended. Remove oily rags and other combustible debris from the Place of the Work daily. Take every precaution necessary to prevent spontaneous combustion.

z) Protect prefinished metal surfaces by protective coatings or wrappings until time of final clean-up specified in Section 01 74 00. Protection shall be easily removable under work of Section 01 74 00 without damage to finishes. Do not permit strippable tape or coatings to become baked on surfaces which they protect.

aa) Touch-up damaged factory finished surfaces to Consultant's satisfaction. Use primer and paint to match original.

bb) Protect glass and other finishes against heat, slag and weld splatter by provision on adequate shielding. Do not apply Visible markings to surfaces exposed to view in finished state or that receive transparent finishes.

cc) Protect surfaces of completed work exposed to view from staining, disfigurement and all other damage by restriction of access or by use of physical means suitable of the material and surface location.

dd) Adequately protect trowelled concrete floors from damage. Take special measure when moving heavy loads or equipment on them.

ee) Keep finished concrete floors free from oils, grease or other material likely to damage or discolour them or affect bond of applied finishes. Once building is enclosed, keep floors as dry as possible after curing.

ff) Protect finished flooring from pedestrian traffic with reinforced kraft paper as a minimum, secured in place and with joints sealed by reinforced pressure sensitive tape. Maintain protection in place until contract completion.

gg) Protect finished flooring from continuing construction work and delivery of products with plywood panels of minimum 6 mm thickness with joints between panels sealed with reinforced pressure sensitive tape. Maintain protection in place until work and deliveries are complete.

hh) Make good or replace damaged materials to the satisfaction of the Consultant.

ii) Hazardous Materials Information:

i) Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of hazardous

materials; and regarding labelling and provision of material safety data sheets (MSDS) in accordance with jurisdictional authorities.

ii) Deliver copies of Material Safety Data Sheets (MSDS) to the Consultant on all Products intended for use in the Work and designated as a "controlled product."

7) **MANUFACTURER'S INSTRUCTIONS**

a) Unless otherwise indicated in the Specifications, fabricate, install, apply, connect, install, erect, use, clean, and condition Products in accordance with manufacturer's instructions except where more stringent requirements are specified. Do not rely on labels or enclosures provided with Products. Obtain written instructions directly from manufacturers.

b) Notify the Consultant in writing, of conflicts between the Specifications and manufacturer's instructions, so that the Consultant may establish the course of action. If requested, make a copy of those instructions available at the site.

c) In cases of improper installation or erection of Products, due to failure in complying with these requirements, the Consultant may direct removal and re-installation at no increase in Contract Price.

8) **WORKMANSHIP**

a) Do not employ any unfit person or anyone unskilled in their required duties. The Consultant reserves the right to require the dismissal from the Place of the Work, workers deemed incompetent, careless, insubordinate or otherwise objectionable.

b) Decisions as to the quality or fitness of workmanship in cases of dispute rest solely with the Consultant, whose decision is final.

c) Give particular attention to finished dimensions and elevations of the Work. Make finished Work fit indicated spaces accurately. Make finished Work flush, plumb, true to lines and levels and accurate in all respects.

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

e) Ensure that service poles, fill-pipes, vents, regulators, meters and similar service installations are located in inconspicuous locations. If not indicated on drawings, verify location of service installations with Consultant prior to commencing installation.

f) Ensure that integrity of fire separations is maintained where they are penetrated.

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

h) Keep surfaces, on which finished materials will be applied, free from grease, oil, and other contamination which would be detrimental in any way to the application of finish materials.i) Enforce fire prevention methods at site. Do not permit fires, open flame heating devices or accumulation or debris. Use flammable materials only if all safety precautions are taken. Provide and maintain in working order ULC labelled fire extinguishers of types suitable for fire hazard in each case, and locate them in prominent location and to approval of jurisdictional authorities.

j) Where flammable materials are being applied, ensure that adequate ventilation is provided, spark-proof equipment is used, and smoking and open flames are prohibited.

9) **DIMENSIONS**

a) Check all dimensions at the site before fabrication and installation commences and report discrepancies to the Consultant.

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

c) Prior to commencing work, ensure that clearances required by jurisdictional authorities can be maintained

d) Wall thicknesses and openings shown on the drawings may be nominal only; ascertain actual sizes at the site.

e) Verify dimensions of shop fabricated portions of the Work at the site before shop drawings and fabrications are commenced. The Owner will not accept claims for extra expense by reason of non-compliance with this requirement.

f) Fabricate and erect manufactured items, shop fabricated items, and items fabricated on or off site, to suit site dimensions and site conditions.

g) In areas where equipment is to be installed, check dimensional data on equipment to ensure that area and equipment dimensions are compatible with necessary access and clearance provided. Ensure that equipment supplied is dimensionally suitable for space provided.

h) The mechanical and electrical drawings are intended to show approximate locations of mechanical apparatus, fixtures, equipment, piping and duct runs, electrical apparatus, fixtures, outlets, equipment, units, and conduit in diagrammatic form and wherein the mechanical and electrical items are not dimensioned, consider their locations to be approximate. Check the drawings and confer with the Consultant to settle the actual locations of these items as may be required to suit aesthetic and site conditions. Such relocation shall be done without change to the Contract Price.

i) Leave areas clear where space is indicated to be reserved for future equipment, including access to such future equipment.

j) Whether shown on the Drawings or not, leave adequate space and provision for servicing of equipment and removal and reinstallation of replaceable items such as motors, coils and tubes.

10) **RELOCATION OF MECHANICAL AND ELECTRICAL ITEMS**

a) The Owner and the Consultant reserve the right to relocate outlets at a later date, but prior to installation, without additional cost to Owner, assuming that the relocation per outlet does not exceed 3000 mm from the original location. No credits will be anticipated where relocation per outlet of up to and including 3000 mm reduces materials, products and labour.

b) Should relocations per outlet exceed 3000 mm from the original location the Contract Price will be adjusted in accordance with the provisions for changes in the Contract Documents.

c) Alter the location of pipes and other equipment, without additional cost to the Owner, if approved, provided the change is made before installation.

d) Make necessary changes, due to lack of coordination, as required and when approved, at no additional cost, to accommodate structural and building conditions.

11) **EXPANSION, CONTRACTION, AND DEFLECTION**

a) Conform to manufacturer’s recommended installation temperatures. If items, components, assemblies, systems, and finishes are installed at temperatures different from operation or service temperatures, make provisions for expansion and contraction in service as acceptable to manufacturer and consultant. Repair all resulting damage should expansion and contraction provisions provide inadequate.

b) Make provisions for expansion and contraction due to temperature changes within components, Products and assemblies, and between adjacent components, Products and assemblies, and due to building movements including but not limited to creep, column shortening, deflection, sway and twist. Ensure provisions for expansion, contraction and building movements prevent damages from occurring to and within components, Products and assemblies.

c) Make adequate allowance at wall and partition heads for deflection of the structure above. Determine requirements from Consultant where additional information is required. Where partitions butt to underside of floor assembly, or structural framing, the clearance shall be based on the span of the members supporting the floor or structural framing. In making such allowance use methods which maintain the integrity of the wall or partition as a sound, and/or fire barrier.

d) Make provisions in pipes, plenums, ducts and vessels containing air and fluids as is necessary to prevent damage due to fluid and air induced pressure, surges and vibrations, to pipes, plenums, ducts and vessels and to adjacent components, assemblies and construction to which pipes, ducts, plenums and vessels are attached or pass through.

12) **DIELECTRIC SEPARATION**

a) Ensure that a dielectric separator is provided in a permanent manner over entire contact surfaces to prevent electrolytic action (galvanic corrosion) between dissimilar materials. Similarly, prevent corrosion to aluminum in contact with alkaline materials such as contained in cementitious materials.

13) **PRODUCTS AT SOUND ATTENUATING PARTITIONS**

a) Avoid sound transfer at sound attenuating partitions by careful location and treatment of mechanical and electrical equipments, ducts, grilles, diffusers, electrical outlets and boxes, and similar items. Where electrical boxes are back to back, serving each side, locate them at least 250 mm apart laterally and, if interconnected, use flexible connections.

14) **FASTENINGS**

a) Include in the work of each section necessary fastenings, anchors, inserts, attachment accessories, and adhesives. Where installation of devices is in work or other sections, deliver and locate devices in ample time for installation.

b) Do not install fibre, plastic or wood plugs or blocking for fastenings in masonry, concrete, or metal construction, unless specified or indicated on drawings.

c) Install work with fastenings or adhesives in sufficient quantity to ensure permanent secure anchorage of materials, construction, components and equipment under static conditions, and to resist building thermal movement, creep and vibration.

d) Provide metal fastenings and accessories in same material, texture, colour, sheen and finish as metal on which they occur, unless indicated otherwise.

e) Prevent electrolytic action between dissimilar metals and materials.

f) Use non-corrosive hot dip galvanized steel fasteners and anchors for securing exterior Work, and where attached to, or contained within, exterior walls and slabs, unless stainless steel or other material is specified. Leave steel anchors bare where cast in concrete.

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

h) Conceal fasteners where indicated. Keep exposed fastenings to a minimum, space evenly and in an organized symmetrical pattern.

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

j) Powder Actuated Fastenings:

i) Do not use powder actuated fasteners for the support of ceilings.

ii) Do not use powder actuated fastenings on any portion of the Work, unless written consent for a specific use is obtained from the Consultant.

iii) Only low velocity tools will be permitted under any condition. Operators to be qualified and to be in possession of a valid operator's certificate.

15) **ADJUSTING**

a) Ensure that all components of assemblies fit snugly, accurately and in true planes, and that moving parts operate positively and freely, without binding and scraping.

b) Verify that work functions properly and adjust it accordingly to ensure satisfactory operation. Lubricate Products as recommended by manufacturer.

END OF SECTION

1) **DEMONSTRATION AND INSPECTION OF PRODUCTS AND SYSTEMS**

a) Arrange for a demonstration of systems and operating Products upon the 100% completion of their installation and prior to certification for Substantial Performance.

b) Include in the arrangements for the attendance of the Consultant, Owner, jurisdictional authorities, and personnel assigned by the Owner for the operation of the systems and/or Products.

c) Demonstrations shall be conducted by the Subcontractor responsible for the installation of the systems and/or Product, assisted by representatives of the manufacturer or supplier. All personnel conducting the demonstration shall be completely knowledgeable of all conditions of the operating, functioning and maintenance of the systems and/or Products.

d) Owner's representative will acknowledge the successful completion of each demonstration on a form provided by the Contractor. The form shall be agreed to by the Owner, Consultant and Contractor prior to demonstration and testing.

e) Submit copies of letters from manufacturers of Systems and/or Products before making application for certificate of Substantial Performance to verify that the Products has been installed and connected correctly, and that it is operating in a satisfactory manner. The certification shall be based upon inspection and testing of the Products by competent technical personnel. Include in letter of certification the names of personnel conducting the testing and inspection, the methods of inspection utilized, and the location in the building of the Products certified.

f) Following submission of letters of certification and their acceptance by the Owner, the owner shall have the right to use the Products on a trial basis and for instructing their personnel in its use.

2) **FINAL INSPECTIONS AND CLOSE OUT**

a) Submit proposed closeout procedures and schedule of inspection to Consultant for approval before final demonstrations and inspections commence.

b) Submit layout and survey requirements required by Owner and Authorities having jurisdiction.

c) Arrange for, conduct and document final demonstrations, inspections, close-out and take-over at completion of the Work in accordance with procedures described in OAA/OGCA TAKE-OVER PROCEDURES, OAA/OGCA Document No. 100. Where "Architect" is referred to in Document No. 100 it shall mean Consultant.

3) **CERTIFICATE OF COMPLIANCE**

a) Submit Certificates of Compliance, prior to the application for Substantial Performance, for each of the following items.

i) An affidavit relative to the use of lead-free solder for all domestic water lines, regardless of location.

ii) Products for which Material Safety Data Sheets have been submitted and accepted.

iii) Other Work/Products identified in the Contract Documents as requiring a Certificate of Compliance.

b) Each Certificate of Compliance shall indicated names and addresses of the project, the Owner, the date of issue, product description including name, number, manufacturer, with a statement verifying that the Work/Product installed meets specified requirements and, if applicable, complies with the submitted and accepted Material Safety Data Sheets.

c) Each Certificate of compliance shall be issued on the subcontractor's letterhead, properly executed, under whose work the prospective Work/Product has been provided.

d) Each Certificate of Compliance shall be endorsed by the Contractor with his authorized stamp/signature. Ensure that submissions are made to allow sufficient time for review without delaying progress of scheduled completion.

END OF SECTION

1) **LAYOUT AND SURVEY**

a) Existing grades, lines, and site conditions shown on drawings were taken from survey information established by persons engaged directly by the Owner. The accuracy of survey information is not the Consultant's responsibility. The Contractor will establish location of property lines.

b) Be responsible for setting out the Work. Prior to setting out the Work, verify dimensions and elevations shown on the Contract Documents and report to the Consultant any unsatisfactory conditions that may adversely affect the proper completion of the Work.

c) Set up and maintain permanent reference points and be responsible for the accuracy of such reference points. Establish lines and levels required for the performance of the Work.

d) Accurately set out the Work from levels and lines. Where Work of this Contract is dependent upon grades and elevations of existing structures or facilities, such grades or elevations shall take precedence over those determined by reference to established elevations. Advise the Consultant of any discrepancies.

e) During any activity of the Work, employ a Land surveyor licensed to practice in the place of Work to layout and check all features, including but not limited to the following:

i) Lay out building on the Site.

ii) Establish a permanent bench mark, or markers as widely separated as possible

iii) Establish and maintain temporary bench marks set in suitable locations.

iv) Provide general dimensions, lines and elevations required by Subcontractors.

v) Verify elevations of floor and roof levels as construction proceeds and relate to bench mark datum.

vi) Verify that present or known future restrictions are not violated by construction on the site or lines of traverse to all public utilities.

vii) Correlate geodetic elevation of bench mark datum with elevations in use by public utilities adjacent to Project.

viii) Verify accuracy of site dimensions shown on Drawings.

ix) Provide a survey to verify location of footings immediately adjacent to property lines, before construction of footings proceeds.

x) Provide a survey to verify location of building related to property lines when foundation walls are completed to grade level.

xi) Provide a survey prior to placement of asphalt and concrete paving to confirm that grades conform to grades indicated on drawings.

xii) Provide a survey to verify location of completed building on Site.

f) Examine, preserve and protect established bench marks. Re-establish a lost or displaced bench mark by a Land Surveyor licensed to practice in the place of Work at no cost to the Owner. Accept responsibility for setting out the Work.

g) In the event of a discrepancy between the Owner and the Contractor regarding horizontal and/or vertical alignment conditions, that are beyond allowable specified tolerance, the Owner may engage the services of an independent Land Surveyor. The surveyor shall investigate the disputed condition and the results of the independent investigation shall determine the bearer of costs for this service, being either the Owner or the Contractor.

h) If the Contractor is found to be in error, all costs incurred to correct the condition shall be assumed by the Contractor.

END OF SECTION

1) **PROGRESS CLEANING**

a) Remove from finish work, spatters, droppings, soil, labels, and debris, before they set up.

b) Ensure that only cleaning materials are used which are recommended for the purpose by both the manufacturer of the surface to be cleaned and of the cleaning material.

c) Maintain building work areas "broom clean" at least on a daily basis, but shall also be done immediately before finishing work.

d) No waste material may be burned or buried at site. Remove as often as required to avoid accumulation, no less than, at the end of each working day.

e) Remove packaging materials and debris from the site immediately after product and equipment is unwrapped or uncrated.

f) Ensure that volatile fluid wastes are not disposed of in storm or sanitary sewers, in open drain courses, or anywhere on site.

g) Do not allow waste material and debris to accumulate in an unsightly or hazardous manner. Sprinkle dusty accumulations with water. Provide containers in which to collect waste material and debris. Dispose of hazardous products in accordance with requirements of jurisdictional authorities.

h) Conform to Regulatory Requirements article, in Quality Requirements, Section 01 40 00.

i) Ensure that cleaning operations are scheduled to avoid deposits, of dust or other foreign matter on surfaces during finishing work and until wet or tacky surfaces are cured.

j) Provide instructions for final cleaning of finishing work, and for inclusion in Maintenance and Operating Manuals.

2) **FINAL CLEANING**

a) Before final inspection, replace glass and mirrors broken, damaged, and etched during construction, or which are otherwise defective.

b) In addition to requirements for progress cleaning, Work shall include final cleaning by skilled cleaning specialists on completion of construction.

c) Remove temporary protections and make good defects before commencement of final cleaning.

d) Final cleaning shall remove dust, stains, paint spots, soil, grease, fingerprints, and accumulations of construction materials, interior and exterior to the building for all new work throughout new and existing Building. Work shall be done in accordance with manufacturer's instructions for each material. This work shall include:

i) Washing of exterior paved surfaces, and of interior stone, brick, and concrete floors.

ii) Cleaning and polishing of glass, mirrors, porcelain, enamel and finish metals.

iii) Vacuum cleaning of ceilings, walls and floors.

iv) Cleaning and polishing of terrazzo and ceramic and quarry tile floors.

v) Cleaning of resilient flooring.

vi) Buffing of resilient flooring followed by two light coats of wax, each buffed.

vii) Washing clean of glazed wall surfaces.

viii) Cleaning of hardware, mechanical fixtures, plumbing fixtures, lighting fixtures, cover plates, and equipment, including polishing of their finish metal, porcelain, vitreous, and glass components.

ix) Cleaning of windows and entrances, both interior and exterior surfaces.

e) Maintain cleaning until Owner has taken possession of building or portions thereof.

END OF SECTION

1) **GENERAL**

a) Hand over to the Consultant three (3) copies of a comprehensive operations and maintenance manual and material suitable for the Owner's maintenance employees. Manuals shall cover all Products supplied and installed under the Contract.

b) Submit draft of the operation and maintenance manuals for the Consultant's review at least 15 days before testing systems and equipment. Incorporate alterations and additions, as found to be necessary during testing, and prepare the final version of the manual from the corrected draft.

c) Submit final version of operation and maintenance manuals prior to Contract Completion.

d) Testing of systems and equipment will not be deemed to be complete until the requisite number of copies of the final version of the manuals has been handed over to the Consultant.

e) If standard literature is incorporated into the operations and maintenance manual, any irrelevant information shall be deleted, or suitably noted.

f) The manuals shall have sufficient detail in order that the Owner can totally maintain the equipment without outside help.

g) Submit all material in English.

2) **FORMAT**

a) Organize data in the form of an instructional manual.

b) Binders: Commercial quality, 219 x 279 mm, maximum "D" ring size.

c) When multiple binders are used, correlate data into related consistent groupings.

d) Cover: Identify each binder with type or printed title "Contract Record Documents"; list title of Contract, identify subject matter of contents.

e) Arrange content by systems or process flow, under Section numbers and sequence of Table of Contents.

f) Provide tabbed fly leaf for each separate Product and system, with typed description of Product and major component parts of equipment.

g) Text: Manufacturer's printed data, or typewritten data on 20 pound paper.

h) Drawings: Provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.

3) **CONTENTS**

a) Operation and maintenance manuals shall contain the following minimum information and data:

i) Table of contents: Provide title of Contract; names, addresses, and telephone numbers of Consultants and Contractor with name of responsible parties; schedule of Products and systems, indexed to content of the volume.

ii) For each Product or system: List names, addresses and telephone numbers of Subcontractors, suppliers and service representatives, including local source of replacement supplies and parts including telephone numbers.

iii) Warranties: Warranties are between the Contractor and Owner. Warranties shall include, as a minimum:
(1) Description of warranty coverage.
(2) Date warranty starts (being date of Contract Completion).
(3) Date warranty expires.
(4) Contact name, address and phone number (the Contractor shall also be responsible for advising the Owner of changes in contact information during the warranty period).
(5) Equipment and components performance curves.
(6) Hydro certificates.

iv) Reports: For each Product or system provide the following:
(1) Manufacturer's certified reports
(2) Factory test reports.
(3) Field testing reports.

v) Details of design, construction and/or fabrication features, component function and maintenance requirements, to permit effective start-up, operation, maintenance, repair, modification, extension and expansion of any portion or feature of the installation.

vi) Technical data, Product data, supplemented by bulletins, component illustrations, detailed views, technical descriptions of items and parts lists.

vii) Schematics, interconnection lists: Manuals shall be complete with schematic and wiring diagrams, wiring interconnection lists and diagrams fully cross referenced and coordinated, printed circuit board layouts including the component identification, component parts list with electronic substitution equivalent. Provide cross referenced components lists and sequence of operations.

viii) Trouble shooting and fault location guide: Instructions to facilitate quick return of malfunctioning equipment to operation.

ix) Routine servicing and preventative maintenance schedule for Products and/or estimated hours required for routine servicing and preventative maintenance tasks.

x) List of recommended spare parts and recommended quantity of each item to be stocked based on spare part availability and re-order time.

xi) Complete set of reviewed shop drawings.

xii) Product data: Mark each sheet to clearly identify specific Products and component parts, and data applicable to installation; delete inapplicable information.

xiii) Drawings: Supplement Product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams and as required in the Specifications.

xiv) Typed text: As required to supplement Product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions and as required in the Specification.

4) **DRAWINGS**

a) Prepare all required drawings on CAD, using Autocad. Autocad version to suite Owner's CAD requirements.

b) Prepare CAD drawings to meet the requirements of the Owners or Consultant's CAD Standards and Procedures.

c) Supply and hand over to the Consultant, one original photographic reproduction for each final drawing prepared under this Contract, including but not limited to circuit drawings, equipment layout drawings, and shop drawings.

d) Prior to Contract Completion, supply and hand over to the Consultant, one complete set of CAD Drawing Files in Autocad format on compact disk (CD) for each final drawing prepared under this Contract and one complete 11" x 17" hard copy set, including but not limited to circuit drawings, equipment layout drawings, and shop drawings.

e) Text files shall be written in word processing program acceptable to Owner.

5) **TRANSMITTAL**

a) Forward storage media to the Owner through the Consultant with a transmittal form. Transmittal shall contain the list of file names contained on the storage media.

b) Data forwarded to the Owner shall contain the following files in addition to the design information:

i) Library parts/cells used in the design files.

ii) Level convention used for each design file.

iii) Plotting instructions used to prepare hard copies including colour tables, pen tables and plot scale.

iv) Working units of the design files.

v) Font library, if the standard is not used.

END OF SECTION

1) **PROGRESS RECORDS**

a) Maintain on site, permanent written records of daily progress of the Work. Records shall be open to review by Consultant and Owner at all times and a copy shall be furnished to Consultant on a weekly basis.

b) Records shall show dates of commencement, progress and completion of various trades and items of work. Particulars pertaining to number of employees of various trades and type and quantity of equipment employed daily, temperature, protection methods and other such data shall be noted.

2) **AS-BUILT DRAWINGS**

a) Authorized deviations from drawings shall be marked in red accurately on one set of drawing prints in a neat, legibly printed manner and shall be dated. Prior to final inspection, neatly transfer the recorded information to a second set of drawing prints of the most recent revision to the drawings and submit both sets to the Consultant.

b) Maintain as-built drawings up to date as Work progresses. Status of maintained as-built drawings may be considered as a condition for validation of applications for payment.

c) Identify each as-built drawing as "As-Built Copy" and maintain the as-built drawings in good condition. Make as-built drawings available to the Consultant at all times.

d) As-built drawings shall include accurate dimensioned record of deviations and changes in Work from drawings.

e) As-built drawings shall be signed and dated by Contractor.

f) Submit as-built drawing to Consultant for review and make corrections as directed by Consultant.

g) Record accurately all deviations in the Work.

h) Accurately record locations of concealed structure, mechanical and electrical services and similar Work not clearly in view, the location of which is required for maintenance, alteration Work and future additions. Do not conceal such Work until the location has been recorded.

i) Accurately record locations of equipment bases, anchors, concrete pads and roof curbs, sleeves, piping, conduits, ducts, maintenance holes and valves, etc. located either below, outside or within structure.

j) Where piping, conduits and ducts are underground, underfloor, embedded in concrete or otherwise in inaccessible locations, accurately record with respect to structure column lines or walls and elevations with respect to finished floor levels or grades referenced to the centre line of components.

k) Accurately record any components which will be in inaccessible locations for Consultant's review before the component is covered, or buried, or made inaccessible.

l) CAD drawings of Contract Drawings can be obtained from Consultant at a cost of $50.00 plus HST per drawing.

m) Clearly and prominently mark each drawing “AS-BUILT DRAWING prepared by _____ (name of Contractor)”

END OF SECTION

1) General

a) **SECTION INCLUDES**

i) Design, labour, Products, equipment and services necessary for concrete falsework and formwork Work in accordance with the Contract Documents.

b) **REFERENCES**

i) ACI 347, Guide to Formwork for Concrete.

ii) Canadian Wood Council, Wood Reference Handbook.

iii) CAN/CSA A23.1/A23.2, Concrete Materials and Methods of Concrete Construction/ Test Methods and Standard Practices for Concrete.

iv) CAN/CSA G40.20/G40.21, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steels.

v) CAN/CSA G164-M, Hot Dip Galvanizing of Irregularly Shaped Articles.

vi) CAN/CSA O86, Consolidation-Engineering Design in Wood (Limit States Design).

vii) CSA O121, Douglas Fir Plywood.

viii) CAN/CSA S136, North American Specification for the Design of Cold Formed Steel Structural Members.

ix) CAN/CSA-S157, Strength Design in Aluminum.

x) CAN/CSA S269.1, Falsework for Construction Purposes.

xi) CAN/CSA S269.3, Concrete Formwork.

c) **DESIGN REQUIREMENTS**

i) Be responsible for design and engineering of falsework and formwork including shoring and bracing to resist loads due to wet concrete, forms, wind, and forces arising from use of equipment to place concrete without differential settlement between them and to ensure finished concrete is within specified tolerances.

d) **SUBMITTALS**

i) Shop drawings:
(1) Submit shop drawings of formwork and falsework in accordance with Section 01 33 00. Indicate on shop drawings method and sequence of construction, materials, arrangement of joints, ties, shores, liners, opening block-outs and location of items embedded in concrete.
(2) Prepare shop drawings in accordance with CSA S269.1 for falsework and CAN/CSA S269.3 for formwork.
(3) Indicate sequence of erection and removal of falsework and formwork

(4) Include following information on falsework drawings:
- (a) Longitudinal, lateral, vertical, dead, live and impact loads used in design.
- (b) Maximum column, post and support loads.
- (c) Deflection diagrams for beams having a deflection of 9.5 mm or more.
- (d) Grade of structural steel.
- (e) Indicate steel posts, girders, beams, connections, bracing and welding, in sufficient detail for safe performance of falsework.
- (f) Fully detailed steel frame shoring.
- (g) Species, grades, and sizes of wood.
- (h) Sequence, methods, and rate of concrete placement.
- (i) Proprietary equipment, adequately identified for checking purposes.
- (j) Full details and locations of splices.

e) **QUALITY ASSURANCE**

i) Retain a Professional Engineer, licensed in the Province of Ontario, with experience in formwork design of comparable complexity and scope, to perform following services as part of Work of this Section:
(1) Design of falsework and formwork.
(2) Review, stamp, and sign shop drawings, design calculations, and amendments thereto.
(3) Conduct on-site inspections, and prepare and submit written inspection reports verifying that this part of Work is in accordance with Contract Documents and accepted shop drawings.

ii) Tolerances: In accordance with ACI 347 and as indicated. A variation permitted by Consultant in one part of construction or in other parts of Specifications is not to be construed as permitting violation of more stringent requirements for any other part of construction, or in any other parts of Specifications.

f) **DELIVERY, STORAGE, AND HANDLING**

i) Store materials on Site in a manner to prevent damage. Protect from weather. Comply with CAN/CSA A23.1.

2) Products

a) **MATERIALS**

i) Forms:
(1) Plywood: CSA O121, G1S; Douglas Fir plywood, sheets as large as practical, minimum 19 mm thick, seven ply, exterior grade, waterproof glue, edges sealed with oil based sealer.
(2) Prefabricated steel forms: CAN/CSA S136; Free of irregularities, dents, sags, rust, and materials that can discolour concrete finish.

ii) Falsework materials: CSA S269.1, where patented accessories, fabricated forms, shoring or scaffolding units are to be used, follow manufacturer's instructions for load

carrying capacity and bracing. Support recommended load carrying capacities by test results from qualified and recognized testing laboratories.

iii) Form ties: Removable or snap-off water resistant ties, fixed or adjustable length, free of devices leaving holes in concrete larger than 25 mm in diameter, formed to break 25 mm from surface of concrete after form removal and a minimum working strength of 13 kN. Do not use wire ties.

iv) Form release agent: Chemically active, non-staining, VOC compliant, release agents containing compounds that react with free lime present in concrete forming water insoluble soaps, preventing concrete from sticking to forms.

v) Form tape: Pressure sensitive plastic form tape.

vi) Chamfer strips: 25 mm x 25 mm triangular fillets milled from clear, straight grain pine, surfaced each side, or extruded vinyl type, with or without nailing flange.

vii) Accessories and embedded items:
(1) To details indicated and in accordance with manufacturer's instructions.
(2) Steel accessories and embedded items to conform to CAN/CSA-G40.20/G40.21, Grade 300W.
(3) Hot dip galvanize, in accordance with CAN/CSA G164-M, hardware and embedded items that are left in place exposed or embedded in concrete within 19 mm of its surface.

3) Execution

a) **GENERAL**

i) Exercise care in design of forms, setting and holding in position during placing and curing of concrete. Remove and replace any finished portions of a structure that vary outside acceptable tolerances from dimensions, elevation or position.

ii) Incorporate continuous full size form panels for concrete surfaces which will be exposed to view by public in completed structures. Construct forms rigidly, unyielding, tied and supported such that they will not shift or bulge under weight or pressure of concrete or of superimposed loads.

b) **ERECTION**

i) Verify lines, levels and column centres before proceeding with falsework and formwork.

ii) Construct falsework in accordance with CSA S269.1.

iii) Construct formwork in accordance with CAN/CSA S269.3 to produce finished concrete conforming to shape, dimensions, locations and elevations indicated with tolerances specified herein.

iv) Obtain Consultant's acceptance for use of earth forms.

v) Do not set falsework, shoring or scaffolding on frozen subgrade. Design falsework, shoring and scaffolding to prevent movement on frost susceptible subgrades during periods of freezing and thawing.

vi) Obtain Consultant's permission before framing openings not indicated on Contract Drawings.

vii) Use form tape on inside of forms to ensure that form joints are sufficiently smooth and tight to prevent leakage.

viii) Use 25 mm chamfer strips on external corners of concrete and 25 mm fillets at interior corners of concrete members except at following locations:
(1) Where otherwise shown on Contract Drawings.
(2) Curbs.

ix) Use full size form sheeting panels wherever possible. Ensure contact surfaces of formwork produce neat and symmetrical joint patterns. Joints shall be either vertical or horizontal and, where possible, staggered to maintain structural continuity. Back vertical and horizontal joints solidly and fasten edges of abutting sheets to same stud. Take care to ensure adjacent form panels fit accurately, tight and flush. Use straight lumber.

x) Take particular care in forming corners and openings. Ensure formwork is tight and braced so no movement occurs.

xi) Form chases, slots, reglets, openings, depressions, drips, recesses, and control joints as indicated.

xii) Align form joints and make watertight. Keep form joints to a minimum. Ensure no visible defects appear on exposed finished Work.

xiii) If internal ties are used, arrange them so that when forms are removed, no metal shall be within 25 mm of any exposed surface.

xiv) Internal ties will not be permitted in exposed concrete walls and in locations shown.

c) **EMBEDDED ITEMS**

i) Install necessary pipe sleeves and wall castings and construct openings for piping.

ii) No sleeves, ducts, pipes or other openings may pass through slabs, walls, beams and columns except where acceptable to Consultant.

iii) Install and support forms for openings, pipe sleeves, conduits, frames, castings, anchors, structural shapes, bolts and other fixtures which are to be wholly or partially embedded in concrete.

iv) Obtain approval before boxing out for bracing. Deferred setting of inserts will not be allowed.

v) Place anchor bolts and straps to templates under supervision of trade supplying anchor bolts and straps prior to placing concrete.

vi) If slip forming or flying forms are used, submit details of equipment and procedures for Consultant's review.

d) **PREPARATION OF FORMS**

i) Remove debris, sawdust and frozen matter from space to be occupied by concrete.

ii) Remove water from excavations before concrete is deposited. Divert any flow of water through proper side drains to a sump or remove by other approved methods that will avoid washing freshly deposited concrete. Fill drains with grout after concrete has thoroughly hardened.

iii) Trim sides and bottoms and remove loose earth from earth forms before placing concrete.

iv) Clean formwork in accordance with CAN/CSA A23.1 before placing concrete.

v) Apply release agent by spray in accordance with manufacturer's recommendations. Ensure form surfaces receive a uniform coating.

vi) Notify Consultant at least 2 working days prior to placing concrete to allow for inspection of formwork.

e) **JOINTS**

i) Form watertight construction joints where required and as indicated on accepted shop drawings. Obtain Consultant's acceptance to install construction joints in locations other than those shown.

ii) In accordance with CAN/CSA A23.1.

iii) Re-tighten forms before depositing new concrete on or against concrete that has set.

f) **REMOVAL OF FORMS**

i) Do not disturb forms until concrete has hardened and developed sufficient strength to safely support its own weight and load on it.

ii) Strip formwork in accordance with CAN/CSA A23.1.

iii) In hot weather, remove or loosen wood forms so concrete surfaces may be kept moist or coated with a curing agent.

iv) In cold weather, defer removal of formwork or replace formwork with insulation blankets, to avoid thermal shock and consequent cracking of concrete surfaces.

v) Be responsible for safety of structure, both before and after removal of forms until concrete has reached its specified 28-day compressive strength. Employ methods and sequences of removal of formwork and falsework that will permit concrete to gradually take up stresses involved.

vi) Take particular care when removing forms to ensure no damage occurs at corners, arises and similar locations.

vii) To help avoid colour variations in concrete, ensure length of time between concrete pouring and form removal is approximately same for each portion of Work.

viii) When concrete is dry, install temporary polyethylene rope in reglets to prevent contamination of same.

ix) When forms are stripped, obtain Consultant's permission before repairing voids, stone pockets, honeycombing and other defects.

x) Re-use of formwork and falsework in concealed areas is subject to requirements of CAN/CSA A23.1, CAN/CSA S269.3 and acceptance by Consultant.

END OF SECTION

1) General

a) **SECTION INCLUDES**

i) Labour, Products, equipment and services necessary for cast-in-place concrete Work in accordance with the Contract Documents.

b) **REFERENCES**

i) ASTM C156, Standard Test Method for Water Loss [from a Mortar Specimen] Through Liquid Membrane-Forming Curing Compounds for Concrete.

ii) ASTM C260/C260M, Standard Specification For Air-Entraining Admixtures For Concrete.

iii) ASTM C309, Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.

iv) ASTM C494/C494M, Standard Specification for Chemical Admixtures For Concrete.

v) ASTM C881/C881M, Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete.

vi) ASTM C1059/C1059, Standard Specification for Latex Agents for Bonding Fresh to Hardened Concrete.

vii) ASTM D1752, Standard Specification for Preformed Sponge Rubber Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction.

viii) ASTM E1155, Standard Test Method for Determining FF Floor Flatness and FL Floor Levelness Numbers.

ix) CAN/CSA A23.1/A23.2, Concrete Materials and Methods of Concrete Construction/ Test Methods and Standard Practices for Concrete.

x) CAN/CSA A3000, Cementitious Materials Compendium.

xi) CAN/CSA G30.18, Billet-Steel Bars for Concrete Reinforcement.

c) **SUBMITTALS**

i) Certificates:
(1) Minimum 8 weeks prior to placement of concrete, submit to Consultant manufacturer's test data and certification by a qualified independent inspection and testing laboratory that the following materials will meet the specified requirements:
(a) Portland cement.
(b) Blended hydraulic cement.
(c) Supplementary cementing materials.
(d) Admixtures.

(e) Aggregates.
(f) Curing Compound.

(2) Submit certification that plant, equipment, and materials to be used in concrete Work comply with requirements of CAN/CSA A23.1/A23.2.

(3) Ready mix concrete supplier: Member in good standing of Ready Mix Concrete Association of Ontario (RMCAO). Batching plant facilities are required to maintain RMCAO special seal of quality.

ii) Reports:

(1) Submit following proposed quality control procedures for the Consultant's approval.
(a) Uniform finishes.
(b) Cold weather protection.
(c) Hot weather protection.
(d) Concrete curing.

(2) Mix design:
(a) Minimum 8 weeks prior to placement of concrete, submit proposed mix designs.
(b) Alkali aggregate reactivity problems may occur under certain circumstances. Ensure mix design is adjusted suitably to prevent such problems.
(c) Do not place concrete before Consultant has reviewed proposed mix designs.
(d) Do not vary the approved mix without written approval.
(e) Submit mix design for patching material to Consultant for written acceptance.

d) **QUALITY ASSURANCE**

i) Tolerances:

(1) Make concrete in place plumb, level and true. Have maximum variations (not accumulative) conform to CAN/CSA A23.1/A23.2, unless noted otherwise.

(2) Do not construe variation permitted by Consultant in one part of construction or in one Section of Specifications as permitting violation of more stringent requirements for other part of construction, or in other Specification Sections.

ii) Do concrete floor finishing to CAN/CSA-A23.1/A23.2, ASTM E1155, and recommendations of Concrete Floor Contractor's Association, except where specified otherwise.

iii) Floor finishing Company must be a member, in good standing prior to Bid closing, of The Concrete Floor Contractors Association - Ontario Chapter.

iv) Pre-installation meetings: Arrange with concrete floor contractor, finish flooring manufacturer representatives and Consultant four weeks prior to pouring to review responsibilities of all parties, site conditions, methods and materials, concrete mixes and inspection procedures.

v) Defective concrete:

(1) Consider concrete defective if concrete cylinder test for any section of Work fails to meet specified strength. In such cases concrete in that section may be

checked by Consultant by core specimens drilled and tested in accordance with CAN/CSA A23.2.

(2) If core specimen has compressive strength less than specified strength, Consultant has the right to require either replacement or strengthening of defective section of structure. Bear costs, including coring, testing, strengthening, demolishing, and replacing even if further evaluation of design allows unit to be classed acceptable.

(3) Consider concrete defective if it is structurally unsound, not watertight, honeycombed or improperly finished, as determined by Consultant. Consultant has the right to require replacement, strengthening or correction of defective section of structure to acceptance of Consultant.

vi) Records:

(1) Before unloading at Site, have concrete producer submit to Consultant a delivery ticket (with each batch of concrete) on which is printed, stamped or written the following information:

(a) Name and location of batch plant.
(b) Date and serial number of ticket.
(c) Name of Contractor.
(d) Specific designation of job (name and location).
(e) Approved mix code, specified strength, cement content and specific class or designation of concrete indicated in Concrete Mixes article specified.
(f) Amount of concrete in cubic meters.
(g) Truck number, cumulative total, and/or load number.
(h) Time loaded or time of first mixing of cement and aggregate.

(2) Include the following information, which is to be registered by producer's representative on at least two copies of the delivery ticket, after discharge has been completed:

(a) Time that load arrived on Site.
(b) Time that discharge of load was started.
(c) Time that discharge of load was completed.
(d) Type and amount of admixtures, if added at Site.

(3) Maintain accurate records of cast-in-place concrete elements. Include in records the following information:

(a) Date of placing concrete element.
(b) Location of concrete element.
(c) Specified strength of concrete.
(d) Air temperature when concrete was placed.
(e) Test samples taken and results of test samples.

(4) Submit additional information designated by Consultant and required by Specifications upon request.

e) **DELIVERY, STORAGE, AND HANDLING**

i) Deliver and store materials on Site in accordance with CAN/CSA A23.1/A23.2.

f) **SITE CONDITIONS**

i) Conform to CAN/CSA A23.1/A23.2.

ii) Do not place concrete during or prior to rain. If rain occurs after placing and prior to initial set of concrete, prevent rain water from reaching newly placed concrete.

iii) Cold weather protection:
(1) Maintain protection equipment, in readiness on Site. Use such equipment when the ambient temperature is at or below 5°C, or when, in the opinion of the Consultant the temperature may fall below 5°C before concrete has cured.
(2) Do not place concrete upon or against surface which is at temperature lower than 5°C.
(3) Obtain Consultant's acceptance of method of maintaining minimum temperatures.

iv) Hot weather protection: When ambient temperature is at or above 27°C, protect concrete from direct sunlight and keep forms moist by sprinkling with cool water, applying wet burlap, or other accepted methods which will not affect concrete adversely.

v) Protection from drying:
(1) When surface moisture evaporation may exceed 0.75 kg/(m^2/h), erect windbreaks around sides of structural element.
(2) When surface moisture evaporation may exceed 1.0 kg/(m^2/h), take additional measures accepted by Consultant to prevent rapid loss of moisture from surface of concrete.

2) Products

a) **MATERIALS**

i) General:
(1) Use admixtures for concrete from single manufacturer, unless otherwise acceptable to Consultant.
(2) Have manufacturer certify that admixtures are compatible.
(3) Use Products in accordance with manufacturer's instructions unless otherwise acceptable to Consultant.

ii) Cement: CAN/CSA A3000; Portland, Type(s) as shown in Mix Data Schedule specified.

iii) Supplementary Cementing Materials: CAN/CSA A3000.
(1) Ground granulated slag: May be used as partial cement replacement up to maximum of 30% of volume of cement, with written acceptance of Consultant.

(2) Fly ash: Product and volume of cement replacement to be approved by the Consultant.

iv) Blended hydraulic cement: CAN/CSA A3000.

v) Coarse and fine aggregate: CAN/CSA A23.1/A23.2.

vi) Water: CAN/CSA A23.1/A23.2.

vii) Water reducing admixture: ASTM C494, Type A.

viii) Set retarding admixture: ASTM C494, Type D.

ix) Set accelerating admixture: ASTM C494, Type C.

x) Air entraining admixture: CAN/CSA A23.1/A23.2 and ASTM C260/C260M; 5-7%.

xi) Superplasticizer: ASTM C494, Type A or F.

xii) Curing and sealing compound: ASTM C309, Type 1, minimum 25% solids content, containing no VOC's.

xiii) Joint filler: ASTM D1752, Type I; Flexible foam, firm grade, Sealtight Ceramar 3250-242 by W.R. Meadows Ltd.; Closed Cell Foam Joint Filler by CPD Services, in thickness shown on Contract Drawings. Supply manufacturer's recommended adhesive for securing joint filler to abutting adjacent structures.

xiv) Sawcut joint sealant: Epoxy modified joint sealant, cold-applied, two component, pour grade, self-levelling compound with minimum Shore A Hardness of 80 and Shore D Hardness of 50:
(1) Loadflex by Sika Canada Inc.
(2) Reziweld-Flex by W.R. Meadows Ltd.

xv) Joint sealant: 2 component chemically reactive polyurethane modified sealant, self-levelling type, grey colour:
(1) Sealtight Pourthane by W.R. Meadows.
(2) Eucolastic II by Euclid Admixture Inc.
(3) 2C/SL by Sika Canada.

xvi) Sealant primer: As recommended by sealant manufacturer.

xvii) Epoxy bonding agent: ASTM C881/C881M, 'Anvil-Bond' by BASF or 'Sika-Dur 32, Hi-Mod' by Sika Canada.

xviii) Latex bonding agent: ASTM C1059/C1059M.

xix) Non-shrink grout: Pre-mixed, flowable, non-shrink grout without aggregate fillers; Masterflow 713' by BASF or Sika Grout 212' by Sika Canada Inc.

xx) Anchoring bolt dowels: 'HIT HY 150 Max Anchoring System' by Hilti Ltd. or approved alternative.

xxi) Bond breakers: 410-02 by Henry or approved alternative.

xxii) Steel dowels: CAN/CSA G30.18, Grade 400.

b) **CONCRETE MIXES**

i) Produce concrete in strengths and in locations indicated on drawings.

ii) Design concrete so that material will not segregate and excessive bleeding will not occur.

iii) Acceptance of any concrete mix proportion or material, does not preclude its future rejection if it is subsequently found to lack uniformity, or if it fails to conform to requirements specified, or if its field performance is found to be unacceptable.

iv) Mix ready-mixed concrete and concrete proportions in accordance with CAN/CSA A23.1/A23.2.

v) Mix concrete in accordance with CAN/CSA A23.1/A23.2. When combinations of Portland cement and supplementary cementing materials are used, prove to acceptance of Consultant that concrete will withstand exposure conditions outlined in Contract Documents.

vi) Class of exposure: Class C2 in accordance with Tables 7 and 8 of CAN/CSA A23.1/A23.2.

c) **ADMIXTURES**

i) Add admixtures to concrete mix in accordance with manufacturer's recommendations. Have admixture manufacturer make available, at no cost to the Owner, upon 72 hours notice, services of qualified, full-time field representative to assure proper use of admixtures.

ii) Except as specified otherwise, comply with requirements of CAN/CSA A23.1/A23.2.

iii) Use of calcium chloride or additional admixtures, other than those specified, is not acceptable.

d) **DRY PACK**

i) Material: 1 part cement and 3 parts sand (fine aggregate) by volume. Add water to obtain a consistency that when a sample is squeezed, only enough water will come to surface to moisten hand. Maximum water content: 4.5 litres to 23 kg of cement.

3) Execution

a) **GENERAL**

i) Give Consultant at least 2 working days notice prior to placement of concrete to permit a review of placement of formwork, reinforcing steel, and associated items embedded in concrete for conformance to accepted shop drawings and Contract Documents. At time of notification of Consultant, give Consultant estimated time, location and volume of concrete that will be placed.

ii) Prior to placing concrete, obtain Consultant's acceptance of proposed method for protection of concrete during placing and curing in adverse weather.

iii) Do not place concrete on surfaces which contain frost, water or debris.

iv) Ensure that reinforcement and associated items embedded in concrete are not disturbed during placement of concrete.

v) Install premoulded joint filler for full depth of concrete at abutting structures where shown. Knife score joint filler through 75% of its thickness at a location equal to its thickness from top of joint filler. Set premoulded joint filler in adhesive. Set scored face of filler against existing structure.

vi) Ensure concrete cover over reinforcing steel is as indicated on Contract Drawings.

vii) Do not load new concrete until authorized by the Consultant.

b) **INSERTS**

i) Tolerance for placing embedded items: CAN/CSA A23.1/A23.2, unless otherwise indicated in Contract Documents.

ii) Set and build in inserts, anchors, frames, angles, sleeves, plates, etc. supplied by other trades. Advise trades well in advance of scheduled pours to allow adequate time for supply of items to be built in. Have respective trades verify location of items supplied by them.

iii) Do not pass sleeves, ducts, pipes or other openings through joists, beams, column capitals or columns, except where indicated or acceptable to Consultant.

iv) Keep embedded items free of deleterious material.

v) Set sleeves, ties, nosings, pipe hangers and other inserts and openings specified or indicated to be cast-in concrete. Make sleeves and openings greater than 100 mm x 100 mm not indicated on Contract Drawings, acceptable to Consultant.

vi) Do not eliminate, cut or displace reinforcement to accommodate hardware. If inserts cannot be located as specified, obtain approval of modifications from Consultant before placing concrete.

vii) Check locations and sizes of sleeves and opening shown on structural and civil Contract Drawings with architectural, mechanical and electrical drawings.

viii) Anchor bolts:
(1) Prior to placing concrete, place anchor bolts in locations shown on accepted shop drawings under supervision of trade supplying anchor bolts and templates in accordance with the manufacturer's instructions and CAN/CSA A23.1/A23.2.
(2) Allowable anchor bolt height tolerance: Within plus or minus 13 mm maximum.

ix) As concrete is being placed, ensure that items embedded in concrete are checked from time to time for position, alignment and elevation. Take special care to ensure dense, watertight concrete around items set in concrete.

x) Keep embedded items free of deleterious material.

c) **PLACING OF CONCRETE**

i) Place concrete in accordance with CAN/CSA A23.1/A23.2.

ii) Ensure that placing equipment, if supported by falsework or formwork, does not impart harmful vibration to freshly placed concrete or cause deformation or misalignment of formwork.

iii) Slope concrete to levels shown on Contract Drawings.

iv) Do not place concrete at such a rate as to endanger formwork or to prevent proper compaction. Cover each layer of concrete with fresh concrete within 45 minutes.

v) Obtain acceptance of pneumatic or mechanical concrete placing equipment before using.

vi) Do not use pipe, hoppers, elephant trunks, placing equipment, and similar items manufactured of aluminum.

vii) Place concrete to prevent cold joints and segregation and vibrate sufficiently to ensure thorough compaction, maximum density in accordance to CAN/CSA A23.1/A23.2.

viii) Check Work frequently with accurate instruments during placing of concrete.

d) **CONSOLIDATING**

i) Consolidate concrete in accordance with CAN/CSA A23.1/A23.2.

ii) Work concrete into complete contact with forms and embedded items. Consolidate concrete adjacent to side forms and along entire length of forms to ensure a smooth surface finish after stripping of formwork.

e) **CURING AND PROTECTION**

i) Cure and protect concrete in accordance with CAN/CSA A23.1/A23.2.

ii) Protect freshly deposited concrete from elements and from defacement due to building operations and from premature drying and excessively hot and cold temperatures. Supply and install when necessary, enough tarpaulin or other suitable materials to completely cover or enclose forms and working areas during placing and curing. Have this equipment on hand and ready for use before placing is started.

iii) In areas indicated, apply curing compound after finishing operations have been completed, at rate recommended by compound manufacturer. Ensure compound application is uniform and continuous over entire area being cured. Where surfaces are to be exposed to sunlight, use compound with white pigment. Do not use curing compounds, on surfaces where a bond is required for additional concrete, or where a bonded surface coating such as paint, tile and similar item is to be applied.

iv) Unless otherwise indicated, cover horizontal surfaces with at least 2 layers of wet burlap or other approved moisture-retaining covering. Do not permit intermittent drying. Supply and install suitable weights to prevent blow-off or displacement of burlap. Remove burlap after minimum of 7 consecutive days and allow to air dry until concrete has developed design strengths.

f) **CONSTRUCTION JOINTS**

i) Obtain Consultant's acceptance to install construction joints in locations other than those shown.

ii) Construct construction joints to CAN/CSA A23.1 and as shown. Supply and install dowels in construction joints unless otherwise detailed.

g) **BONDING CONCRETE TO HARDENED CONCRETE**

i) Bond concrete in accordance with CAN/CSA A23.1/A23.2.

ii) Roughen surface of set concrete and clean thoroughly to remove foreign matter and laitance. Saturate roughened surfaces with water for 4 hours prior to concreting.

iii) At horizontal construction joints strike off horizontal joints and float finish from reinforcing steel to face of form. Slope concrete down slightly towards form. Ensure that leading edge of joint is straight and horizontal.

iv) Carry out initial clean-up of lift surface by brushing with stiff wire brooms or by using an air-water jet with an intensity of 0.7 MPa before concrete has taken its final set that it removes any inert and porous material without disturbing coarse aggregate. Remove cuttings dislodged by brooming or jetting operation.

v) If initial clean-up is not effective, or if concrete surface has become seriously contaminated, remove deleterious layer by wet aggregate blasting immediately before placing next lift.

vi) Use 1.5 m^3 minimum of dried, sized sand passing the 5 mm sieve and retained on 1.25 mm sieve for cleaning each 100 m^2 of surface. After aggregate blasting wash or blow loose particles from surface of joint.

vii) Obtain Consultant's acceptance of joint preparation before placing subsequent concrete.

viii) Prior to placing fresh concrete apply epoxy bonding agent in accordance with manufacturers instructions or a neat cement wash consisting of 1-part latex bonding agent mixed with 2 parts and in accordance with manufacturers instructions.

h) **FINISHING**

i) Treat and finish exposed formed surfaces in accordance with CAN/CSA A23.1/A23.2.

ii) Unless noted otherwise, after screeding and compaction with a wooden float. Bring surface to smooth level and dense finish free from trowel marks, ridges and depressions by means of steel trowels operated either by hand or by mechanical means. Do not sprinkle dry cement or sand on the surface during the trowelling process.

iii) In locations indicated, before floated surface has fully hardened, brush surface with a stiff broom in one direction to leave a rough “Broom Finish” surface.

iv) Maintain ambient temperature at a minimum of 10ºC, when steel trowelling is in progress.

v) Grout tie holes in concrete flush to concrete surface. Grout with finishing cement mortar using same sand and cement as used in concrete. Pack grout into place to fill tie hole; finish to match adjacent concrete surface.

vi) After removal of forms, strike off projections, fill honeycombing and defects to CAN/CSA A23.1/A23.2. Refer to honeycombed areas for inspection and designation as structural or non-structural and repair as directed by Consultant.

vii) Production of smooth surfaces by means of cement plaster is not permitted.

i) **LOADING OF STRUCTURE**

i) Do not load any portion of structure prior to achieving 70% of specified strength and only with acceptance of Consultant.

j) **SAWCUT JOINTS**

i) Time sawing of joints to set of concrete. Start sawing as soon as concrete has hardened sufficiently to prevent aggregates from being dislodged by saw and completed before drying shrinkage stresses become large enough to produce cracking. Sawcut joints in straight lines and extend joint into slab to depth one-fourth slab thickness, unless otherwise indicated on Contract Drawings. Ensure that reinforcing steel is not cut or damaged.

ii) Spray water on saw blade at all times during sawing. Grind edges of sawcuts to eliminate burrs; do not grind to bevel or chamfer joint edges.

iii) After sawing and grinding, clean joints with jet of water, and blow-out with compressed air. Broom clean residue caused by sawing operation.

iv) In most instances, correct time for cutting varies from 6 to 18 hours after placement of concrete. Do not postpone sawing operations beyond these time limitations.

v) To minimize uncontrolled cracking, divide slab at intervals shown on Contract Drawings or as determined by Consultant. Give special consideration to areas of restraint to shrinkage such as at columns, re-entrant corners and sudden changes in width.

k) **GROUTING**

i) Grout column base plates in accordance with grout manufacturer's printed instructions to obtain 100% contact over grouted area. Form around bases, place grout to ensure positive bearing of entire area of the steel plate on top of supporting surface. Thoroughly compact, leaving no voids.

l) **REPAIRING CRACKS IN CONCRETE SLAB**

i) After concrete has set for 28 days, examine surfaces carefully for cracks. Rout larger cracks at discretion of Consultant.

ii) Fill cracks with non-shrink grout. Match surface to existing surfaces in quality, texture, colour and elevation.

m) **PATCHING**

i) Make good temporary openings left in concrete for pipes, conduits, ducts, shoring and other Work during construction. Reinforce with welded wire fabric as required, and finish to match surrounding Work. Carry out patching as specified in CAN/CSA A23.1/A23.2.

n) **SEALANT APPLICATION**

i) Do not fill joints sooner than 30 days after concrete pours. Comply with curing and sawcutting requirements. Execute joint sealing during cool, dry ambient conditions when slab is in contracted state to minimize future joint separation at sealant filled joints.

ii) Fill sawn joints in concrete slabs full depth with sawcut joint sealant.

iii) Seal over premoulded joint filler with joint sealant.

iv) Comply with sealant manufacturer's primer, application and temperature requirements. Mask floor to edge of joints and fill joint with sealant. After initial set, prime sealant surface and refill joints with sealant as required to produce slightly convex joint surface.

END OF SECTION

1) General

a) **SECTION INCLUDES**

i) Labour, Products, equipment and services necessary for concrete reinforcement Work in accordance with the Contract Documents.

b) **REFERENCES**

i) ASTM A82/A82M, Standard Specification for Steel Wire, Plain, for Concrete Reinforcement.

ii) CAN/CSA A23.1/A23.2, Concrete Materials and Methods of Concrete Construction/ Test Methods and Standard Practices for Concrete.

iii) CSA A23.3, Design of Concrete Structures.

iv) CAN/CSA G30.18, Billet-Steel Bars for Concrete Reinforcement.

v) CSA W186, Welding of Reinforcing Bars in Reinforced Concrete Construction.

vi) RSIC, Reinforcing Steel Institute of Canada, Manual of Standard Practice.

c) **SUBMITTALS**

i) Shop drawings:
(1) Submit shop drawings in accordance with Section 01 33 00. Submit placing drawings, bar lists, quantities and bar bending details. Bar bending details to include details of standard bends. Indicate name of epoxy coating applicator, name of bent bar fabricator, name of bulk steel supplier and steel grade.
(2) On placing drawings, indicate bar sizes, spacing, location and quantities of reinforcement, dowels, splines, splice lengths, coating designations, location of expansion, control and construction joints, with identifying code marks to permit correct placement. Indicate sequence of placing concrete. Indicate type, sizes, spacings and locations of chairs, spacers and hangers. Prepare reinforcing drawings in accordance with Reinforcing Steel Institute of Canada (RSIC) Manual of Standard Practice.
(3) Design and detail lap lengths to CSA A23.3. Supply Class B splices unless shown otherwise. Splices are to be staggered unless otherwise shown.
(4) Show position and size of openings in walls. Cooperate with trades requiring openings to ascertain necessary information.
(5) Substitution of different size bars may be permitted upon written acceptance of Consultant.

ii) Testing: Submit certified copies of mill test reports for reinforcing steel showing physical and chemical analysis, minimum thirty (30) days prior to commencing Work.

d) **DELIVERY, STORAGE, AND HANDLING**

i) Store reinforcing steel off the ground and kept free of mud, dirt, oil and any contaminants which may adversely affect performance of reinforcing steel. Comply with CAN/CSA A23.1.

ii) Store and handle reinforcing steel before, during and after placement to prevent contamination with dust, grease, form release agents and other bond-breaking coatings.

2) Products

a) **MATERIALS**

i) Reinforcing steel and dowels: CAN/CSA G30.18; Billet-steel bars, deformed unless indicated otherwise, Grade 400R.

ii) Weldable reinforcing steel: CAN/CSA G30.18; Weldable low alloy steel bars, deformed unless indicated otherwise, Grade 400W.

iii) Cold drawn annealed steel wire ties: ASTM A82/A82M, minimum 1.5 mm diameter, with coating for use with uncoated and coated reinforcing steel.

iv) Chairs, bolsters, supports, spacers: CAN/CSA A23.1 with sufficient strength to rigidly support weight of reinforcement and construction loads. Manufactured by NCA/Acrow - Richmond or Dayton Superior.

b) **FABRICATION**

i) Fabricate and bend reinforcing steel in accordance with CAN/CSA A23.1, RSIC Manual of Standard Practice and in accordance with accepted placing drawings.

ii) Obtain Consultant's acceptance for locations of reinforcement splices other than those shown on placing drawings.

iii) Bend bars cold, heating of bars will not be permitted.

iv) Verify elevations before cutting and bending reinforcing bars.

v) Ensure cutting and bending tolerances are sufficiently accurate to comply with placing tolerances shown.

vi) Ship bundles of bar reinforcement, clearly identified in accordance with bar bending details and lists. Clearly indicate mill run for which bars were fabricated.

3) Execution

a) **SPLICES AND LAPS**

i) Make splices in locations shown on Drawings. Lap lengths in accordance with CSA A23.3 unless otherwise shown.

ii) Upon acceptance of Consultant weld bars 45M and 55M in accordance with CSA W186. Do not weld bars smaller than 45M.

b) **PLACING**

i) Prior to installation of reinforcing steel, inspect installed Work of other trades and verify that Work is complete for installation of reinforcement.

ii) Place reinforcing steel and dowels as shown on reviewed placing drawings and in accordance with CAN/CSA A23.1. Make bars as long as possible.

iii) Place reinforcing steel accurately and secure with soft steel binding wire. Support reinforcing steel, with spacers, chairs or hangers, in as close spacing as possible to prevent displacement of reinforcement from intended bar position. Bottom steel for slabs resting on granular materials may be supported on concrete chairs.

iv) Tie bars at least at every fourth intersection minimum. Make maximum untied length 900 mm.

v) Straighten kinks and bends.

vi) Do not eliminate or displace reinforcement to accommodate hardware to be embedded in concrete.

vii) Do not field bend bars partially embedded in concrete except as shown on Contract Drawings or as accepted by Consultant.

viii) Prior to placing concrete or closing wall and column forms, obtain Consultant's acceptance of reinforcing steel and position.

c) **CLEANING**

i) Ensure that reinforcing steel is free from loose mill scale, excessive rust, dirt, oil or paint.

END OF SECTION

1) General

a) **SECTION INCLUDES**

i) Design, labour, Products, equipment and services necessary for the structural steel Work in accordance with the Contract Documents.

b) **REFERENCES**

i) ASTM A307, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.

ii) ASTM A325M, Standard Specification for Structural Bolts, Steel, Heat Treated 830 Mpa Minimum Tensile Strength (Metric).

iii) ASTM A563M, Standard Specification for Carbon and Alloy Steel Nuts [Metric].

iv) ASTM C1107/C1107M, Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Non-Shrinkable).

v) ASTM F436M, Standard Specification for Hardened Steel Washers [Metric].

vi) CAN/CSA-G40.20/G40.21, General Requirements for Rolled or Welded Structural Quality Steel / Structural Quality Steels.

vii) CAN/CSA G164-M, Hot Dip Galvanizing of Irregularly Shaped Articles.

viii) CAN/CSA S16, Limit States Design of Steel Structures.

ix) CAN/CSA S136, North American Specification for the Design of Cold Formed Steel Structural Members.

x) CSA W47.1, Certification of Companies for Fusion Welding of Steel Structures.

xi) CSA W55.3, Resistance Welding Qualification Code for Fabricators of Structural Members Used in Buildings.

xii) CSA W59, Welded Steel Construction (Metal Arc Welding) (Metric Version).

xiii) CAN/CGSB 1.181, Ready Mixed Organic Zinc-Rich Coating.

xiv) CISC Handbook of Steel Construction.

xv) SSPC Steel Structures Painting Council.

c) **DESIGN REQUIREMENTS**

i) Design details and connections in accordance with requirements of CAN/CSA S16 and CSA S136 to resist forces, moments, shears indicated or implied and handling, transportation, erection loads and as indicated on the Contract Drawings.
   (1) Include in design for connections between columns, beams, girders, trusses and braces, and between such members as spandrel angles and beams, hangers, stiffeners and their supporting members.
   (2) Standard connections such as connections for shear only:
      (a) Select shear connections from the CISC Handbook of Steel Construction.
      (b) If forces are not indicated, select or design connections to support reaction from maximum uniformly distributed load that can be safely supported by beam in bending, if no point loads act on beam, assuming fully supported compression flange.
   (3) All connections: Designed and stamped by a Professional Engineer licensed in the Province of Ontario.

ii) Structural design to accommodate active loads including live, dead, lateral, wind, seismic, handling, transportation, and erection loads.

iii) Design connections:
   (1) To safely withstand the combined effects of shear, moment, and torque at applicable design stresses.
   (2) Not to interfere with architectural clearance lines or finishes.
   (3) Of base plate and cap plate bearing on column to column section by welding or grinding column to bear.
   (4) Taking into account any eccentricity.
   (5) With direct fastening to flanges of spandrel beams to restrain twisting.
   (6) Single angle and fish-plate type connections are not permitted, except for secondary, lightly loaded elements.
   (7) Make single angle connections of wrapped type.

d) **SUBMITTALS**

i) Shop drawings:
   (1) Submit shop drawings in accordance with Section 01 33 00.
   (2) Include shop and field splices, cuts, copes, camber, connection details, holes, reinforcements, bearing plates, welds, anchors, identification marks, surface preparation and finishes.
   (3) Indicate welds in accordance with CSA W59 welding symbols standard.
   (4) Submit sketches and design calculations for structural members and connections with the corresponding shop drawings.

ii) Erection drawings:
   (1) Submit erection drawings in accordance with Section 01 33 00.
   (2) Indicate details and information necessary for assembly and erection

purposes such as description of methods, member identification, sequence of erection, type of equipment used in erection, and temporary bracings.

(3) Reproduction of the Contract Drawings for use as erection drawings is not permitted without the approval of the Consultant.

iii) Test reports: 4 weeks minimum, prior to structural steel fabrication, submit 2 copies of mill test reports by steel manufacturer indicating chemical and physical properties of steel to be used in the Work and confirming that tests completed conformed to the requirements of CAN/CSA-G40.20/G40.21.

iv) Certifications:

(1) Submit certifications for welding companies under division 1 or 2.1 of CSA W47.1 for fusion welding of steel structures and CSA W55.3 for resistance welding of structural components.

(2) Submit confirmation by the design Consultant that fabrication and erection complies with the Contract Documents.

v) Inspection reports: Submit field reports of shop and field inspections.

e) **QUALITY ASSURANCE**

i) Retain a Professional Engineer, licensed in the Province of Ontario, with experience in design, fabrication, and erection of structural steel Work of comparable complexity and scope, to perform following services as part of Work of this Section:

(1) Design of structural members and connections.

(2) Stamp, and sign shop and erection drawings, design calculations, and amendments.

(3) Conduct fabrication and erection inspections, and prepare and submit written inspection reports verifying that the Work is in accordance with the Contract Documents and reviewed shop and erection drawings.

f) **DELIVERY, STORAGE, AND HANDLING**

i) Exercise care in handling galvanize finished materials. Use nylon slings for handling and a combination of wood or polystyrene blocking between units, in stockpile and in transit. Schedule and sequence the Work so a minimum of handling occurs prior to erection.

2) Products

a) **MATERIALS**

i) Rolled structural steel shapes, and flat hot-rolled steel Products: CAN/CSA G40.20/G40.21, Grade: 350W.

ii) Hollow structural sections: CAN/CSA G40.20/G40.21, Grade 350W, Class H.

iii) Beam connections, columns, base plates, beams, purlins, and girts: CAN/CSA G40.20/G40.21.

iv) Surface preparation: Remove moisture, oil, grease, dirt, excessive rust, loose mill scale, and clean to SSPC SP6 - Commercial aggregate blast.

v) Grating: In accordance with Section 05 50 00.

vi) Hot dip galvanizing: CSA G164-M; minimum zinc coating of 600 g/m^2.

vii) Touch-up primer (galvanized steel): CAN/CGSB-1.181.

viii) Welding materials: CSA W59 and certified by the Canadian Welding Bureau.

ix) Anchor bolts and rods: ASTM A307, Grade C, with hexagon heads and nuts, lengths shown with a minimum of 13 mm projecting beyond the nut. Nuts: ASTM A563M.

x) High strength bolts: ASTM A325M, Type 1, heavy hexagon high strength bolts, of standard size, of lengths required for thickness of members joined and for type of connection.
(1) Lock washers, lock nuts, burr thread to prevent bolts from working loose.
(2) ASTM A563; Hexagon semi-finished nuts.
(3) ASTM F436M; Flat, smooth hardened washers, quenched and tempered.

b) **FABRICATION**

i) Fabricate structural steel in accordance with CAN/CSA S16 and CISC Handbook of Steel Construction fabrication tolerances except as indicated otherwise.

ii) Splicing of members is not permitted except as shown on the Contract Drawings or as accepted by the Consultant.

iii) Clean, prepare surfaces and galvanize structural steel in accordance with CAN/CSA S16.

iv) Continuously weld structural steel members where indicated. Galvanize vent / weep holes for structural steel members.

v) Grind shop fabrication welds smooth.

vi) Fabricate structural steel members true and without twists or open joints.

vii) Weld in accordance with CSA W59.

viii) Fabricate properly sized holes to accommodate other parts of the Work including holes required for attachment; locate holes to prevent appreciable reduction of structural member strength. Reinforce openings as necessary to maintain strength of structural members.

ix) Fabricate HSS members with sufficient holes to prevent the accumulation of water.

3) Execution

a) **EXAMINATION**

i) 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.

ii) Obtain the Consultant's written approval prior to field cutting or altering of structural members.

b) **MARKING**

i) Mark materials in accordance with CAN/CSA G40.20/G40.21; do not use die stamping.

ii) Match marking: Mark bearing assemblies and splices in shop for fit and match.

c) **STRUCTURAL STEEL ERECTION**

i) Supply and coordinate the location and placement of anchor bolts, and base plates.

ii) Erect structural steel in accordance with accepted shop and erection drawings and tolerances of CAN/CSA S16 and CISC Handbook of Steel Construction tolerances except restrict the maximum variation in elevation to 6 mm.

iii) Splicing of members is not permitted except as shown on the Contract Drawings or as accepted by the Consultant.

iv) Set steel accurately to lines and elevations indicated. Set column bases and shim to proper elevations. Install structural grouting in accordance with details and the manufacturer's recommendations.

v) Assemble structural steel members true, plumb, and level, free of twist and open joints.

vi) Make high strength bolted connections in accordance with CSA S16.

vii) Weld in accordance with CSA W59.

d) **FIELD TOUCH-UP**

i) Upon completion of erection, mechanically brush clean bolts, rivets, welds, and burned or scratched surfaces.

ii) Touch up damaged surfaces with galvanized touch-up primer in accordance with manufacturer's written instructions.

END OF SECTION

1) General

a) **SECTION INCLUDES**

i) Design, labour, Products, equipment and services necessary for the miscellaneous and metal fabrication Work in accordance with the Contract Documents.

b) **REFERENCES**

i) ANSI, H35.1M Alloy and Temper Designation Systems for Aluminum (Metric).

ii) ASTM A53, Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.

iii) ASTM A123, Specification for Zinc (Hot Dip Galvanized) Coatings on Iron & Steel Products.

iv) ASTM A153, Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.

v) ASTM A480/A480M-15, Standard Specification for General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet and Strip.

vi) ASTM A307, Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength.

vii) ASTM A653/A653M, Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvanealed) by the Hot-Dip Process.

viii) CISC/CPMA 1.73a, A Quick-Drying One-Coat Paint for Use on Structural Steel.

ix) CAN/CSA-G40.20/G40.21-M, General Requirements for Rolled or Welded Structural Quality Steel/ Structural Quality Steels.

x) CAN/CSA S16.1-M, Limit States Design of Steel Structures.

xi) CSA S136.1-M, Commentary on CAN/CSA S136-M, Cold Formed Steel Structural Members.

xii) CSA W47.1, Certification of Companies for Fusion Welding of Steel Structures.

xiii) CSA W48, Filler Metal and Allied Materials for Metal Arc Welding.

xiv) CSA W59-M, Welded Steel Construction (Metal Arc Welding).

xv) CAN/CSA W117.2-M, Safety in Welding, Cutting and Allied Processes.

xvi) CAN/CGSB 1.40-M, Primer, Structural Steel, Oil Alkyd Type.

xvii) CGSB 1-GP-181, Organic Zinc Rich Primer.

xviii) CGSB 85-GP-16M, Painting Galvanized Steel.

xix) NAAMM, The National Association of Architectural Metal Manufacturers.

xx) Steel Structures Painting Council (SSPC), Steel Structures Painting Manual, Vol. 2.

c) **DESIGN REQUIREMENTS**

i) Design details and connections, where not shown on Drawings, in accordance with CAN/CSA-S16.1 and CSA S136.1.

d) **SUBMITTALS**

i) Shop drawings:
(1) Submit shop drawings for fabrication and erection of miscellaneous and metal items in accordance with Section 01 33 00 indicating:
(a) Materials, core thicknesses, class of finish (AMP 555), connections, joints, method of anchorage, number of anchors, supports, reinforcement, details, and accessories.
(b) Ensure shop drawings are of one uniform size and based on field measurements.

e) **QUALITY ASSURANCE**

i) Retain a Professional Engineer, licensed in the Province of Ontario, with experience in Work of comparable complexity and scope, to perform the following services as part of the Work of this Section:
(1) Design metal fabrication items that are required to resist live, dead, lateral, wind, or seismic loads.
(2) Review, stamp, date and sign shop drawings.

ii) Workmanship: Fabricate Work of this Section to meet the required class of workmanship indicated below in accordance with AMP 555, Section 8.
(1) Class 2: for use on exposed to view (at a distance) fabricated items.
(2) Exposed surfaces retain mill marks and moderate irregularities not visible by naked eye at 10 metres. Ensure burrs and sharp edges are filed down or ground off.
(3) Exposed welds are ground with uniform sized cove.
(4) Minor distortions are permitted.
(5) Exposed joints have a maximum gap of 1.5 mm.

iii) Execute welding by firms certified in accordance with CSA W47.1 Division 1 or 2.1. Ensure welding operators are licensed per CSA W47.1 for types of welding required by Work.

iv) Perform stainless steel work in accordance with NAAMM, Code of Standard Practice for the Metal Industry, Workmanship, Class 1.

2) Products

a) **MATERIALS**

i) General:
(1) All materials under Work of this Section, including but not limited to, primers and paints are to have low VOC content limits.
(2) Unless detailed or specified herein, standard products will be acceptable if construction details and installation meet intent of Drawings and Specifications.
(3) Include all materials, products, accessories, and supplementary parts necessary to complete assembly and installation of Work of this Section.
(4) Incorporate only metals that are free from defects which impair strength or durability, or which are visible. Install only new metals of best quality, and free from rust or waves and buckles, and that are clean, straight, and with sharp defined profiles.

ii) Structural shapes, plates, and similar items: CAN/CSA-G40.20/G40.21-M, Grade 350W. Hollow structural sections: CAN/CSA-G40.20/G40.21-M, Grade 350W, Class H.

iii) Galvanized sheet steel: ASTM A653/A653M Grade A, Z275 Commercial Quality zinc coating, size and shape as shown.

iv) Stainless steel sheet and plate: ASTM A480/A480M, Type 316L, finish to AISI No. 4. Size as shown.

v) Protection Posts: ASTM A53/A53-M, Schedule 40 standard weight steel pipe in quantity and sizes shown.

vi) Welding materials: CSA W48 and CSA W59-M.

vii) Fasteners: Conforming to ASTM A307, Grade A, in areas not exposed to view, use unfinished bolts with hexagon heads and nuts. In areas exposed to view, use bolts, nuts, washers, rivets, lock washers, anchor bolts, machine screws and machine bolts Z275 zinc coated in accordance with ASTM A653/A653M. Supply bolts of lengths required to suit thickness of material being joined, but not projecting more than 6 mm beyond nut, without the use of washers.

viii) Primer paint: CAN/CGSB-1.40-M or CPMA 1.73a.

ix) Galvanized primer paint: Inorganic zinc rich primer. For use on galvanized fabrications where touch up is to remain unpainted in finished work; Carbozinc 11WB by Carboline Company, Catha-Coat 305 by Devoe Coatings or Zinc Clad XI by Sherwin Williams.

x) Drilled inserts: Mega by ITW Construction Products or HSL by Hilti Inc. heavy-duty anchors, sizes as shown.

b) **FABRICATION**

i) Verify dimensions of existing Work before commencing fabrications and report any discrepancies to the Consultant.

ii) Fit and assemble Work in shop where possible. Execute Work in accordance with details and reviewed shop drawings.

iii) Use self-tapping shake-proof screws on items requiring assembly by screws or as indicated. Use screws for interior metal work. Use welded connections for exterior metal Work unless otherwise found acceptable by the Consultant.

iv) Ensure exposed welds are continuous for length of each joint. File or grind exposed welds smooth and flush. Seal exterior steel fabrications against corrosion in accordance with CAN/CSA S16.1-M.

v) Execute shop welding to requirements specified.

vi) Carefully make and fit details. Take special care with exposed finished Work to produce a neat and correct appearance to the Consultant's acceptance.

vii) Assemble members without twists or open joints.

viii) Correctly size holes for connecting Work of other trades where such can be determined prior to fabrication. Where possible, show holes on shop drawings. Place holes not to cause appreciable reduction in strength of member.

ix) Draw mechanical joints to hairline tightness and seal countersunk screw and access holes for locking screws with metal filler where these occur on exposed surfaces.

c) **FABRICATED ITEMS**

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

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

iii) Provide metal fabrication items indicated below and items not indicated to be supplied under other Sections. The following items includes miscellaneous and metal fabrication including but not limited to the items listed below.

iv) Lintels: Fabricated from CAN/CSA-G40.20/G40.21-M, Grade 350W, size and location as shown, width to be not less than 25 mm less than width of wall and extend 200 mm beyond opening at each end. Unless otherwise shown, fabricate lintels in block walls of steel sections.

v) Masonry lateral support angles:
(1) Supply only, to Section 04 20 00 for installation, all horizontal lateral support anchors at top of non-load-bearing masonry walls.

(2) Refer to Structural Drawings for size and spacing of required support anchors. Provide drilled holes as required for anchorage.
(3) Galvanized for all exterior wall and unheated and high humidity locations.

vi) Shelf Angles: Of size indicated on Drawings and as specified in structural steel specifications, with adjustable inserts for vertical adjustment and slotted holes for horizontal; galvanized.

vii) Steel ladders:
(1) Fabricate complete with steel stiffeners, rungs, angle rails, bent plate straps or angle brackets as shown.
(2) Provide safety cages around ladders where indicated on Drawings, in accordance with Ministry of Labour requirements.
(3) Provide hot dipped galvanized exterior ladders and primed and painted regular steel interior ladders.

viii) Bollards:
(1) Provide protection posts as indicated on drawings. Posts to be 150 mm diameter with a wall thickness of 8 mm. Place posts into a 1500 mm foundation, fill with 20 Mpa concrete and round top. Project pipes 1500 mm above finished grade. Finish prime coat.
(2) Material: Type 316L Stainless steel.
(3) Finish: Primed and painted in colour to be selected by Consultant.

ix) Brake shape trim elements:
(1) Provide brake shape trim elements around overhead doors and entrance tower openings as indicated on drawings.
(2) Material: Type 316L Stainless steel.
(3) Finish: Primed and painted in colour to be selected by Consultant.

x) Miscellaneous steel brackets, supports and angles
(1) Supply and install or supply for installation by trades responsible, all loose steel brackets, supports and angles where indicated, except where such brackets, supports and angles are specified under work of other Sections. Drill for countersunk screws, expansion anchors and anchor bolts.
(2) Unless otherwise specified, prime paint for interior installation; galvanized finish for exterior installation.

d) **ANCHORS AND FASTENING**

i) Use weld studs of size not larger than 10 mm for attaching miscellaneous materials and equipment to building steel. If weight of item requires larger fasteners use clips or brackets and secure by welding or through bolting.

ii) Use self-drilling expansion type concrete anchors for attaching to masonry and concrete

iii) Do not secure items to steel deck.

iv) Use steel beam clamps of two bolt design to transmit load to beam web. Do not use C and I clamps.

e) **WELDING**

i) Perform welding by electric arc process.

ii) Execute welding to avoid damage or distortion to Work. Execute welding in accordance with following standards:
(1) CSA W48 - for Electrodes. If rods are used, only coated rods are allowed.
(2) CSA W59-M and CSA W59S1-M for design of connections and workmanship.
(3) CAN/CSA W117.2-M - for safety.

iii) Thoroughly clean welded joints and expose steel for a sufficient distance to perform welding operations. Finish welds smooth. Supply continuous and ground welds which will be exposed to view and finish paint.

iv) Test welds for conformance and remove Work not meeting specified standards and replace to Consultant's acceptance.

f) **SHOP PAINTING**

i) Clean steel to SSPC SP6 and remove loose mill scale, weld flux and splatter.

ii) Shop prime steel with one coat of primer paint to dry film thickness of 0.07 mm. Paint on dry surfaces, free from rust, scale, grease. Do not paint when temperature is lower than 7 deg C. Paint items under cover and leave under cover until primer is dry. Follow paint manufacturer's recommendations regarding application methods, equipment, temperature, and humidity conditions.

iii) Shop prime galvanized steel in accordance with CGSB 85-GP-16M.

iv) Clean but do not paint surfaces being welded in field.

v) Do not paint surfaces embedded in concrete, but clean as if they were to be primed.

vi) Do not prime steel to be fireproofed or to receive intumescent paint coating.

vii) Do not prime machine finished surfaces, but apply an effective anti-rust compound.

viii) Take precautions to avoid damage to adjacent surfaces.

g) **HOT DIP GALVANIZING**

i) After fabrication, hot dip galvanize specific miscellaneous steel items as indicated. After galvanizing, plug relief vents air tight with appropriate aluminum plugs as suitable and required for intended metal fabricated item. Straighten shapes and assemblies true to line and plane after galvanizing. Repair damaged galvanized surfaces with zinc rich primer in accordance with manufacturer's printed directions.

ii) Hot-dip galvanize members in accordance with requirements of the following ASTM, with minimum coating weights or thicknesses as follows:
(1) Rolled, pressed and forged steel shapes, plates, bars and strips: ASTM A123; average weight of zinc coating per square/metre of actual surface, for 4.8 mm and less thickness members 600 g/m^2 for 6 mm and heavier members 640 g/m^2.
(2) Iron and steel hardware: ASTM A153; minimum weight of zinc coating, in ounces per square foot of surface, in accordance with ASTM A153, Table 1 for the various classes of materials used in the Work.

3) Execution

a) **EXAMINATION**

i) Examine previously installed Work, upon which this Section depends, verify dimensions and condition of existing Work, and coordinate repairs, alterations, and rectification if necessary. Commencement of Work of this Section is deemed to signify acceptance of existing, prior conditions.

ii) Obtain Consultant's written approval prior to field cutting or altering of structural members.

b) **ERECTION**

i) Install metal fabrications in accordance with reviewed shop drawings and manufacturer's written instructions.

ii) Fit joints and intersecting members accurately. Make Work in true planes with adequate fastenings. Build and erect Work plumb, true, square, straight, level and accurate to sizes detailed, free from distortion or defects detrimental to appearance or performance.

iii) Perform drilling of concrete and steel as required to fasten Work of this Section.c) **TOUCH UPS**

i) Paint bolt heads, washers, nuts, field welds and previously unpainted items. Touch up shop primer damaged during transit and installation, with primer to match shop primer.

END OF SECTION

1) General

a) **SECTION INCLUDES**

i) Labour, Products, equipment and services necessary for rough carpentry Work in accordance with the Contract Documents.

b) **REFERENCES**

i) ASTM A153, Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.

ii) ASTM A325, Specification for Bolts Quenched/Tempered Steel Nominal Thread Diameter M16 - M36 For Structural Steel Joints.

iii) ASTM A653, Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

iv) ASTM E84, Standard Test Method for Surface Burning Characteristics of Building Materials.

v) ASTM F1667, Driven Fasteners: Nails, Spikes and Staples.

vi) CAN/CSA O80 Series M, Wood Preservation.

vii) CSA O121-M, Douglas Fir Plywood.

viii) CAN/CSA O141, Softwood Lumber.

ix) CSA O151-M, Canadian Softwood Plywood.

x) NLGA, Standard Grading Rules for Canadian Lumber, National Lumber Grades Authority.

c) **QUALITY ASSURANCE**

i) Lumber identification: Grade stamp of an agency certified by the Canadian Lumber Standards Accreditation Board.

ii) Plywood identification: Grade mark in accordance with applicable CSA standards.

iii) Lumber quality: Carefully select individual pieces so that knots and obvious defects will not interfere with placing bolts, proper nailing or making proper connections.

iv) Moisture Content of wood at time of construction shall be 19% maximum.

v) Each piece of fire retardant treated lumber shall be shop marked with the pressure treatment brand and ULC monogram respectively, in accordance with CAN/CSA O80-M.

vi) Dimensions of lumber shall conform to dressed sizes specified in CAN/CSA-0141 unless actual dimensions are otherwise indicated or specified.

vii) Dimensional references to lumber on Drawings and in Specifications are to nominal sizes unless actual dimensions are indicated. Such actual dimensions shall be dry size.

viii) Lumber defects: Discard wood with defects which will render a piece unable to serve its intended function. Lumber will be rejected by Consultant for excessive warp, twist, bow, crook, mildew, fungus, or mould, as well as for improper cutting and fitting, whether or not it has been installed.

d) **ENVIRONMENTAL REQUIREMENTS**

i) When it is required that wood maintain dimensional stability and tolerances to ensure accurate installation of later work, store and install it only in dry areas, and where no further installation of moist materials is contemplated.

e) **PRODUCT DELIVERY, STORAGE AND HANDLING**

i) Store materials in a dry area. Cover materials with tarpaulins or polyethylene sheets to prevent moisture absorption and impairment of structural and aesthetic properties. Vent to allow air movement. Tie covering to keep in place.

2) Products

a) **MATERIALS**

i) General: All materials under Work of this Section, including but not limited to, adhesives are to have low VOC content limits.

ii) Lumber: Softwood, G4S, moisture content 19% or less at time of installation, in accordance with the following:
(1) Lumber shall be of same species and grade, equally seasoned and shall be processed and stamped at same mill.
(2) CSA O141 and NLGA Standard Grading Rules for Canadian Lumber.
(3) Board quality: Construction or better.
(4) Dimension quality:
(a) Structural joists, planks, and framing: No. 1 Select Structural.
(b) Light framing: Construction.

iii) Plywood: CSA O121-M, G1S, T & G, standard construction, laminated with waterproof adhesive, exterior grade, Thickness as indicated on drawings.

iv) Sheathing: Douglas Fir, CSA 0121-M or CSA O151-M; Select-Tight Face, exterior grade, T & G.

v) Roof lumber: NLGA, Construction grade light framing, Jack Pine, S4S, pressure treated to CAN/CSA-O80 series using copper based waterborne preservative treatment, impregnated to a net retention of 4 kg/ m^3 of preservative unless otherwise specified by preservative manufacturer.

vi) Surface applied wood preservative: Green coloured copper napthenate or 5% pentachlorophenol solution, water repellant preservative or same copper based preservative as used for shop impregnation, in accordance with CAN/CSA O80.

vii) Fire retardant treatment of lumber and plywood (interior and protected locations): 'Dricon FRT' fire retardant treatment by Biewer Lumber or approved alternative, conforming to ASTM E84, to provide a flame spread rating of 25 or less.

viii) Rough hardware: Conforming to ASTM F1667; Nails, bolts, screws, anchors, expansion shields, and other fastenings required to frame and fix rough carpentry as follows:
(1) Nails, spikes and staples: Spiral type.
(2) Bolts: ASTM A325; 12.7 mm diameter minimum with nuts and washers unless noted otherwise.
(3) Screws: Countersunk head, full thread type.
(4) Proprietary fasteners: Toggle bolts, expansion shields, lag bolts, screws, inorganic fibre plugs, recommended for purpose by manufacturer.
(5) Galvanize rough hardware used in fire treated wood and hardware exposed to the atmosphere.

ix) Fasteners for use in pressure treated wood: Provide hot dipped galvanized fasteners complying to ASTM A153 and connectors in accordance with ASTM A653, Class G185 for non-structural members. Provide type 304 or 316 stainless steel fasteners and connectors for use in Structural, pressure treated wood.

3) Execution

a) **EXAMINATION**

i) 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.

b) **GENERAL**

i) Lay out work carefully and to accommodate work of others. Cut and fit accurately: erect in position indicated by Drawings.

ii) Install rough carpentry to allow for expansion and contraction of the materials.

iii) Cut work into lengths as long as practicable and with square ends. Align, level, square, plumb, and secure work permanently in place. Brace work temporarily as required. Join work only over solid backing.

iv) Bore holes true to line and to same size as bolts. Drive bolts into place for snug fit, and use plates or washers for bolthead and nut bearings. Turn up bolts and lag screws tightly when installed, and again just before concealed by other work or at completion of Work.

v) Provide anchors, bolts, and inserts required for attachment of the work of this Section, to those performing the work of other Sections and who are responsible for their installation.

vi) Do not attach work by wood plugs or blocking in concrete or masonry. Use lead shields, expansion shields, or similar methods only as approved by Consultant.

c) **MISCELLANEOUS WOODWORK**

i) Fit and install wood furring, strapping, grounds and blocking. Adequately size, correctly place and conceal members for finishes, fitments and for Work under other Sections. Do not assume that Drawings show required work exactly or completely. Anchor wood members securely in place.

ii) Install rough bucks, nailing strips and linings to rough openings as required for backing for frames and other Work.

iii) Except where steel supports are specifically shown, provide wood blocking and supports in metal stud partitions for fastening of items such as casework and other wall mounted accessories. Have respective trades approve the location of such wood blocking.

iv) Bolt wood blocking or nailing strips to steel framing.

v) Align and plumb faces of furring and blocking to tolerance of 1:600.

vi) Use fire retardant lumber for blocking/framing in ceiling\ spaces, partitions and bulkheads.

d) **ROOF WOODWORK**

i) Install continuous wood nailers around roof perimeters, curbs and roof openings larger than 150 x 150 mm, and at edges of insulation as detailed. Install cut cant strips and continuous nailers on copings and curbs as detailed.

ii) Install wood backing, dressed, tapered and recessed slightly below top surface of roof insulation and roof hopper.

e) **BACKBOARDS**

i) Install plywood backboards, primed and painted white on both sides, with fire retardant paint.

ii) Use minimum 19 mm thick plywood on 19 x 38 mm furring around perimeter and at maximum 300 mm intermediate spacing.

f) **FASTENERS**

i) Frame, anchor, fasten, tie and brace members for required strength and rigidity.

ii) Use hot dipped galvanized fasteners for exterior Work and Work below grade.

iii) Countersink bolts and bolt heads as required for clearance of other Work.

iv) Size fasteners to penetrate base member by half of fastener length minimum. Minimize splitting of wood members by staggering nails in direction of grain.

v) For plywood use spiral, annular or resin coated nails and staples.

g) **SURFACE-APPLIED WOOD PRESERVATIVE**

i) Treat raw surfaces, drilled holes and cut ends of pressure treated wood with 2 coats of wood preservative immediately after cutting.

ii) Apply preservative by dipping, by brush or by pouring into plugged holes to completely saturate surface.

END OF SECTION

1) General

a) **SECTION INCLUDES**

i) Labour, Products equipment and services necessary for the finish carpentry Work in accordance with the Contract Documents.

b) **REFERENCES**

i) ANSI A208.1, Particleboard.

ii) ANSI A208.2, Medium Density Fibreboard for Interior Use.

iii) ANSI/NEMA LD 3, High-Pressure Decorative Laminates.

iv) ASTM F1667, Driven Fasteners: Nails, Spikes and Staples.

v) Architectural Woodwork Manufacturers Association of Canada (AWMAC).

vi) Architectural Woodwork Standards (AWS) - Quality Standards for Architectural Woodwork.

vii) CSA O115-M, Hardwood and Decorative Plywood.

viii) CAN/CSA O141, Softwood Lumber.

ix) CSA O151-M, Canadian Softwood Plywood.

x) National Hardwood Lumber Association (NHLA) Rules for the Measurement and Inspection of Hardwood and Cypress.

xi) National Lumber Grades Authority (NLGA) Standard Grading Rules for Canadian Lumber.

c) **SUBMITTALS**

i) Shop drawings: Submit shop drawings of finish carpentry Work in accordance with Section 01 33 00 indicating materials, thicknesses, sizes, finishes, wood species, grades, profiles, connection attachments, shop jointing, field jointing, reinforcing, anchorage, fastener types and sizes, location of exposed fastenings, mechanical and electrical service routes, service outlets, cutout locations, and sizes. Include erection drawings, plans, elevations, sections, and details as applicable.

ii) Samples: Submit samples of the following in accordance with the requirements of Section 01 33 00:
(1) Two representative pieces of each type of wood to receive a stained or natural finish.
(2) Two representative pieces of each type of wood finished as specified.

(3) Two of each colour, pattern, gloss, and texture of plastic laminate, in manufacturer's standard tag size.
(4) Two samples of laminated plastic joints, edging, cutouts and postformed profiles.
(5) Two of each solid surface, in 100 x 75 x 10 mm samples.
(6) Two samples of melamine surfaced board, edging and postformed profiles.
(7) One of each item of finish carpentry hardware.

d) **QUALITY ASSURANCE**

i) Execute Work of this Section by member of AWMAC, with 5 years' experience in finish carpentry Work of comparable complexity and scope. Submit proof of experience upon Consultant's request.

ii) Fabricate finish carpentry Work in accordance with AWS Quality Standards, Premium Quality materials and installation unless otherwise indicated. Perform Work in accordance with the definition of Good Workmanship as defined in the AWS Quality Standards.

iii) Remove and replace finish carpentry Work which does not conform to the AWS Quality standards or as amended by these Specifications.

iv) Mock-up:
(1) Shop fabricate one mock-up of a base cabinet, wall cabinet, and counter top for each type of surfacing specified, complete with hardware and shop applied finishes, installed in location acceptable to Consultant.
(2) Arrange for Consultant's review and acceptance, allow 48 hours after acceptance before proceeding with Work.
(3) When accepted, mock-up will demonstrate minimum standard for this work. 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.

e) **DELIVERY, STORAGE, AND HANDLING**

i) Deliver, store, and handle finish carpentry in accordance with the AWS Quality Standards. Control the temperature and humidity in accordance with the AWS recommendations, before, during, and after finish carpentry delivery, and also during storage and installation.

ii) Cover finished plastic laminated work with heavy kraft paper or put in cartons during shipment. Protect installed surfaces by approved means. Do not remove until immediately before final inspection.

f) **EXTENDED WARRANTY**

i) Submit a extended warranty for plastic laminate work of this Section in accordance with General Conditions, except that warranty period is extended to 2 years from date of Substantial Performance of the Work.
(1) Warrant against defects in material and workmanship including but not limited to opening of joints, cracking, shrinkage, warpage, and delamination of plastic laminate.
(2) Coverage: Complete replacement including affected adjacent Work.

2) Products

a) **MATERIALS**

i) General: All materials under Work of this Section, including but not limited to, adhesives and mastics, are to have low VOC content limits.

ii) Concealed framing lumber and plywood:
(1) Eastern Spruce, Balsam Fir, or Jack Pine, to CAN/CSA O141, NLGA, and AWS Custom Grade, S4S, average moisture content 7% +/- 2% at installation.
(2) Softwood plywood: CSA O151-M; 19 mm unless indicated otherwise, (G2S). Provide exterior grade at stainless steel counters or counters with plumbing fixtures.

iii) Hardwood lumber: Maple, unless otherwise indicated, to NHLA and AWS Premium Grade, S4S, average moisture content 7% +/- 2% at installation.

iv) Softwood plywood: CSA O151-M; 19 mm unless indicated otherwise, (G2S).

v) Wood veneer:
(1) Maple as indicated, conforming to ANSI/HPVA HP-1 having finishes and meeting grades as follows:
(a) Opaque finish, Grade B.
(b) Transparent finish, Grade AA.
(2) Face veneer cut: As indicated.
(3) Sizes, thickness, and shapes as indicated.

vi) Plastic laminate: Provide plastic laminates conforming to ANSI/NEMA LD 3 as follows:
(1) Flatwork face sheet: 1.2 mm thick, heavy wear resistance.
(2) Vertical interior face sheets: 0.8 mm thick.
(3) Postformed face sheet: 0.8 mm thick.
(4) Backing sheet: thickness to match face sheet, high pressure laminate, manufactured by same manufacturer as face sheet.
(5) Plastic laminate: As manufactured by Arborite, Formica, Forbo, Nevamar, Pionite and Wilsonart.

(6) Colours: To the later selection of the Consultant from manufacturer's standard colour range.

vii) Melamine Surfaced Particleboard: ANSI A208.1, Grade M2 particleboard with a melamine impregnated decorative paper thermofused onto the surface. Edging to be done in thin PVC to match melamine colour. 'Panval Thermofused Melamine Panels' by Uniboard Canada Inc. Colours as follows:
(1) White for interior millwork surfaces.
(2) Colour and pattern as selected by Consultant for exterior millwork surfaces.

viii) Solid Surfacing: 12 mm thick sheet stock, provide with bullnose edge and all cutouts as required. 'Corian' solid surfacing by DuPont or approved alternative in colour selected by Consultant. Installation and seam adhesives to be as recommended by solid surfacing manufacturer, colour matched to solid surfacing.

ix) Medium Density Fibreboard (MDF): ANSI A208.2; omnidirectional, light coloured with uniform density throughout 'Superior MDF' by G-P Flakboard Ltd. or 'Panfibre Excel MDF' by Uniboard Canada Inc., meeting the following minimum criteria:
(1) Density: 740 kg/m^3.
(2) Internal bond: 0.8 N/mm^2.
(3) Modulus of rupture: 30 N/mm^2.
(4) Modulus of elasticity: 3400 N/mm^2.
(5) Face screw holding: 1450 N.
(6) Core screw holding: 1300 N.
(7) Moisture content: 4-7%

x) Particle board core: ANSI A208.1, Grade M2 of thickness indicated. Particleboard to be bound with waterproof adhesive and meeting the following minimum criteria:
(1) Density: minimum 705 kg/m^3.
(2) Internal bond: 0.45 N/mm^2.
(3) Modulus of rupture: 14.5 N/mm^2.
(4) Modulus of elasticity: 2250 N/mm^2.
(5) Face screw holding: 1000 N.
(6) Edge screw holding: 900 N.

xi) Solid phenolic core: Composed of melamine resin impregnated decorative paper over layers of phenolic resin impregnated kraft paper; ThickLam Solid Phenolic Core Compact Laminate by Nevamar and supplied by Mercury Wood Products. Finish: Nevamar W163 Looks Likatre.

xii) Laminating adhesive: CSA O112 Series, water resistant type, low VOC content, selected by laminate manufacturer for intended end use.

xiii) Draw bolts and splines: Type as recommended by fabricator.

xiv) Nails and staples: Conforming to ASTM F1667; Size and type to suit application, galvanized for exterior work, interior humid areas and for treated lumber; plain finish elsewhere.

xv) Bolts, nuts, washers, blind fasteners, lags and screws: Size and type to suit application. Stapling is not acceptable.

xvi) Adhesive and bituminous mastic: Selected by the millwork fabricator with low VOC content.

xvii) Miscellaneous metals: In accordance with Section 05 50 00.

.19 Fire retarded coating: Provide clear fire retardent coating to decorative wood panels as indicated. Two component, VOC free coating providing Class A Flame Spread rating to ASTM E84. 'Safecoat Clear Fire Retardant Coating' as manufactured by Quantum Group of Companies or approved alternative.

xviii) Finishing: In accordance with Section 09 91 00.

b) **HARDWARE**

i) The following hardware is the minimum quality standard for the work of this Section. Alternatives may be considered provided they are approved by Consultant prior to ordering of products.

ii) Drawer slides: Full extension, 8400 Series by Knape & Vogt.

iii) Pilasters: Clear anodized aluminum recessed shelf standards with 12 mm divisions, Model 233 by Knape & Vogt.

iv) Clips: Bright zinc plated, adjustable height shelf supports, Model 256 by Knape & Vogt.

v) Cabinet hinges: Heavy duty, concealed 170 degree, clip, self closing, Model UC71650180 by Blum.

vi) Drawer and cabinet pulls: 10 mm dia. x 106 mm wide, stainless steel with matt finish, 115.61.601 by Hafele.

vii) Magnetic catches: Model 918 by Knape & Vogt.

viii) Locks: Cam locks/deadbolt locks complete with lock core by Hafele, type to suit application and installation.

ix) Closet rail: 27 mm diameter wardrobe rail stainless steel finish Model 660 Round Tubing' and tubing flange Model 734' by Knape & Vogt.

c) **PLASTIC LAMINATE WORK**

i) Perform plastic laminate Work in accordance with AWS Quality Standards and ANSI/NEMA LD 3.

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

iii) Laminate plastic laminates to core materials in accordance with manufacturer's instructions.

iv) Fabricate core surfaces and profiles with continuous support and bond over entire surface to receive plastic laminate.

v) Apply plastic laminate backing sheets to balance shrinkage stresses induced by plastic laminate face sheets.

vi) Minimize joints in plastic laminate Work; do not install joints in plastic laminate Work in less than 2400 mm o.c. Locate joints minimum 610 mm from cut-outs. Offset core and plastic laminate facing joints.

vii) Form shaped profiles and bends as indicated, using postformed grade laminate to laminate manufacturer's instructions.

viii) Use straight self-edging laminate strip to match adjacent colour, finish, gloss, and pattern to cover exposed edge of core material. Chamfer exposed edges uniformly at approximately 20 degrees. Do not mitre laminate edges.

ix) Apply laminated plastic liner sheet to interior of cabinetry and where indicated.

x) Fabricate units by solid surfacing manufacturer's certified or approved fabricator/ installer. Fabricate built-up profiles as indicated.

d) **FABRICATION**

i) Be responsible for methods of construction and for ensuring that materials are rigidly and securely attached and will not be loosened by the work of other sections.

ii) Coordinate locations of concealed supports and blocking with other parts of Work. Provide cutouts for outlet boxes and other fixtures.

iii) Fabricate work in a manner which will permit expansion and contraction of the materials without visible open joints. Conceal joints and connections in wherever possible.

iv) Set nails and countersink screws, apply wood filler to indentations, sand smooth and leave ready to receive finish.

v) Mitre exposed corners, no end grain shall be visible in completed installation.

vi) Finish millwork in accordance with Section 09 91 00. Finished millwork shall be free from bruises, blemishes, mineral marks, knots, shakes and other defects and shall be selected for uniformity of colour, grain and texture.

vii) Shelving to cabinetwork to be adjustable unless otherwise noted.

viii) Recess shelf standards, unless noted otherwise. Stagger recessed shelf standards on opposite sides of divider.

ix) Do not exceed maximum 760 mm unsupported span for 19 mm thick shelving. House fixed shelving into gables and divisions.

x) Shop assemble finish carpentry to accommodate delivery and handling and to ensure passage through building openings.

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

xii) Fabricate base from paint grade wood 100 mm high x 16 mm thick, finished in accordance with Section 09 91 00.

xiii) Fabricate sills, screens, frames and moldings to profiles shown.

3) Execution

a) **EXAMINATION**

i) 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.

b) **INSTALLATION**

i) Install Work in accordance with AWS Quality Standards and tolerances for Architectural Woodwork. Set and secure finish carpentry in place, rigid, plumb, square, and level.

ii) Scribe and cut as required, fit to abutting walls, and surfaces, fit properly into recesses and to accommodate columns, fixtures, outlets, or other projecting, intersecting or penetrating objects leaving a 0.8 mm gap maximum.

iii) Coordinate cutouts for plumbing fixtures, inserts, appliances, outlet boxes, and other fixtures, in finish carpentry. Round internal corners of cut-outs and seal exposed cores.

iv) Form joints to conceal shrinkage.

v) Install draw bolts and splines in laminated plastic counter top joints at maximum spacing 450 mm o.c., and 75 mm from edge. Make joints flush, hairline butt joints.

vi) Install finishing hardware accurately and securely in accordance with manufacturer's directions, adjust and clean.

vii) Install prefinished millwork at locations shown on drawings. Position accurately, level, plumb straight.

viii) Apply bituminous coating over wood framing members in contact with masonry or cementitious construction.

ix) Melamine panels: Assemble melamine millwork using dowelled/wafered-and-glue construction. Installed melamine panels shall not show any exposed fasteners on finished/exposed surfaces.

x) Mouldings: Install in locations indicated on Drawings in accordance with manufacturer's recommendations. Fill holes with wood putty and sand for finishing material.

xi) Install solid surfacing in accordance with manufacturer's instructions.

xii) Install wood panelling in locations indicated on drawings and ensuring that it is securely fastened in true vertical and horizontal manner.

xiii) Install window sills level, plumb and even in locations as indicated and ensure that sills are securely fastened.

xiv) Fastening:
- (1) Coordinate wall securement, anchorage, and blocking for finish carpentry items.
- (2) Position items of finished carpentry work accurately, level, plumb, true and fasten or anchor securely.
- (3) Design and select fasteners to suit size and nature of components being joined. Use proprietary devices as recommended by manufacturer.
- (4) Provide heavy duty fixture attachments for wall mounted cabinets.
- (5) Set finishing nails to receive filler. Where screws are used to secure members, countersink screw in round cleanly cut hole and plug with wood plug to match material being secured.

xv) Remove and replace damaged, marked, or stained finish carpentry.

END OF SECTION

1) General

a) **SECTION INCLUDES**

i) Labour, Products, equipment and services necessary for the thermal insulation Work in accordance with the Contract Documents.

b) **REFERENCES**

i) CAN/ULC-S702, Mineral Fibre Thermal Insulation for Buildings.

ii) CAN/ULC-S704, Thermal Insulation, Polyurethane and Polyisocyanurate, Boards, Faced.

c) **SUBMITTALS**

i) Product data: Submit manufacturer's Product data in accordance with Section 01 33 00 indicating characteristics, performance criteria, and limitations. Indicate installation requirements and techniques, storage, and handling criteria and installation procedure acceptable to manufacturer.

ii) Certification: Submit installer's certification verifying compliance with specification requirements.

d) **QUALITY ASSURANCE**

i) Qualifications: Execute Work of this Section by company specializing in thermal insulation Work with minimum of three years, recent, documented experience, on Work of comparable complexity and scope.

2) Products

a) **MATERIALS**

i) All materials under Work of this Section, including but not limited to, adhesives are to have low VOC content limits.

ii) Batt Insulation: CAN/ULC-S702, Type 1, friction fit. ‘ComfortBatt’ by Roxul, or approved alternative.

iii) Semi-rigid insulation: Semi-rigid mineral wool conforming to CAN/ULC-S702, Type 1, minimum density 70 kg/m^3, thickness as indicated. ‘CavityRock MD’ by Roxul.

iv) Cavity wall insulation: Mineral wool fibre insulation conforming to CAN/ULC-S702, Type 1, minimum density 100 kg/m^3, thickness as indicated. ‘CavityRock DD’ by Roxul.

v) Polyisocyanurate Board Insulation: CAN/ULC S704; Type 2, Class C, Rigid polyisocyanurate foam core board to meet specified requirements, faced both sides

with glass fibre reinforced polymer facers or foil faces. 'Energy Shield' by Atlas Roofing Corporation or approved alternative.

vi) Acoustic Insulation: In accordance with Section 09 21 16.

vii) Insulation retainers: In accordance with Section 04 20 00.

3) Execution

a) **EXAMINATION**

i) Verify condition of previously installed Work upon which this Section depends. Report defects to Consultant. Commencement of Work means acceptance of existing conditions.

ii) Ensure substrate surfaces are dry, clean, suitable to receive adhesive and free from other deleterious substances.

b) **INSTALLATION**

i) Install thermal insulation in longest panel sizes possible in accordance with manufacturer's instructions.

ii) Butt insulation with moderate contact and, cut and fit them tightly around other construction elements. Offset single layer vertical joints and both vertical and horizontal joints in multiple layer applications.,

iii) Make thermal insulation continuous, maintain thermal protection continuity and secure to prevent displacement. Ensure that insulation is tight to substrate without air gaps.

iv) Cut and fit thermal insulation tightly around electrical boxes, plumbing and heating pipes and ducts, exterior doors and windows, and other protrusions.

v) Leave 75 mm separation between thermal insulation and heat emitting devices such as recessed light fixtures.

vi) Cut and trim thermal insulation neatly to fit spaces; do not excessively compress insulation to fit. Install only thermal insulation boards which are free from chipped or broken edges.

vii) Pack miscellaneous cavities with insulation to maintain continuity of thermal barrier.

viii) Arrange for Consultant to review thermal insulation before it is enclosed.

ix) Ensure compatibility and continuity of the vapour barrier at smoke seal and firestop location.

c) **SECUREMENT**

i) Batt insulation: Install batt insulation in partitions, between studs, and as indicated on Contract Drawings and in accordance with the manufacturer's instructions. Fill stud cavities to full height of partitions and carefully cut and fit batt insulation around services and protrusions.

ii) Cavity wall insulation:
(1) Provide insulation tight to the inner wythe starting at the base of the wall in parallel courses with tight butt joints. Stagger end joints in adjacent course.
(2) Provide finish work level, plumb and true.
(3) Provide securement for cavity wall insulation with wedge type retainers in accordance with manufacturer’s written instructions.

iii) Rigid insulation: Apply adhesive to thermal insulation foam boards in accordance with manufacturer's recommendations. Omit adhesive bonding of foam board insulation over expansion and control joints.

iv) Perimeter foundation insulation:
(1) Exterior application: unless otherwise indicated, extend boards from finish grade down to top of footing. Install on exterior face of perimeter foundation wall with clips and adhesive. Protect entire face of insulation exposed to backfill with protection board. Terminate protection board 100 mm below finish grade level.

v) Underslab insulation:
(1) Install insulation boards in locations shown in accordance with manufacturer’s instructions.
(2) Protect insulation board from damage by placing 200 mm layer of 19 mm crusher-run limestone over insulation board.
(3) In drainage trenches, place insulation board to size and location as shown in Contract Drawings, with joints butted tight.

END OF SECTION

1) General

a) **SECTION INCLUDES**

i) Labour, Products, equipment and services necessary for vapour retarders Work in accordance with the Contract Documents.

b) **REFERENCES**

i) ASTM E1643, Standard Practice for Selection, Design, Installation, and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs.

ii) ASTM E1745, Standard Specification for Water Vapour Retarders used in contact with Soil or Granular Fill under Concrete Slabs.

iii) CAN/CGSB 19.21-M, Sealing and Bedding Compound, Acoustical.

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

c) **SUBMITTALS**

i) Product data:
(1) Submit duplicate copies of manufacturer's Product data in accordance with Section 01 33 00 indicating:
(a) Performance criteria, compliance with appropriate reference standard, characteristics, and limitations.
(b) Product transportation, storage, handling and installation requirements.

ii) Samples: Submit following samples in accordance with Section 01 33 00:
(1) Two 300 x 300 mm samples of vapour retarders.
(2) Two samples, 300 mm long, of fastening bar.
(3) Duplicate samples of pipe and conduit boot.

d) **QUALITY ASSURANCE**

i) Mock-up:
(1) Construct one 10 m^2 mock-up of each type vapour retarder in location acceptable to Consultant indicating as a minimum one lap joint, one inside corner, one window interface, and one electrical box.
(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.

e) **SITE CONDITIONS**

i) Do not install the Work of this Section outside of environmental ranges as recommended by manufacturer without Consultant's and Product manufacturer's written acceptance.

ii) Supply and install temporary protection and facilities to maintain Product manufacturer's, and above specification, environmental requirements before, during, and after installation.

2) Products

a) **MATERIALS**

i) All materials under Work of this Section, including but not limited to, primers and sealants are to have low VOC content limits.

ii) Membrane vapour retarder: 1.0 mm thick, single-ply, self-adhering, self-sealing, rubberised asphalt, bonded to a cross-laminated high density polyethylene film.
(1) 'CCW 705' by Carlisle Coatings & Waterproofing.
(2) 'Blueskin SA' by Henry Company Canada Inc.
(3) 'Sopraseal Stick 1100 T' by Soprema.
(4) 'Exo-Air 110' by Tremco.
(5) 'Air-Shield' by W. R. Meadows.

iii) Primer:
(1) 'CCW-AWP Primer' by Carlisle Coatings & Waterproofing.
(2) 'Aquatac' by Henry Company Canada Inc.
(3) 'Elastocol Stick H20' by Soprema.
(4) 'ExoAir WB Primer' by Tremco
(5) 'Mel-Prime Water Base' by W.R. Meadows.

iv) Mastic:
(1) 'CCW 704 Mastic' by Carlisle Coatings & Waterproofing.
(2) 'Polybitume 570-05' by Henry Company Canada Inc.
(3) 'Sopramastic' by Soprema.
(4) 'Acoustical Sealant' by Tremco
(5) 'Sealtight Pointing Mastic' by W.R. Meadows.

v) Fastening bar: Continuous 25 mm wide x 3 mm thick aluminum bar, predrilled for mechanical attachment.

vi) Fasteners: As specified herein or manufacturer's recommended fastener for attaching to Substrate.

vii) Sheet vapour retarder 'Super Six' Polyethylene film to CAN/CGSB-51.34, 0.15

mm (6 mil) thick.

viii) Joint sealing tape: Air resistant pressure sensitive adhesive tape, type recommended by sheet vapour retarder manufacturer, 50 mm wide for lap joints and perimeter seals, 25 mm wide elsewhere.

ix) Sealant: CAN/CGSB 19.21; One-part, non-sag, non-bleeding, non-drying, non-hardening, sealant shall remain tacky for permanent bonding to all surfaces; 'Tremco Acoustical Sealant' by Tremco Ltd. or approved alternative.

x) Vapour retarder (under slab): ASTM E1745, Class A, 0.38 mm (15 mil) thick; 'Stego Wrap Vapor Barrier' by Stego Industries or 'Perminator' by W.R. Meadows.
(1) Joint sealing tape: High density polyethylene tape with pressure sensitive adhesive with minimum width 100 mm. Type recommended by sheet vapour retarder manufacturer.
(2) Pipe and conduit boots: Construct pipe and conduit boots from vapour retarder material and pressure sensitive tape as recommended by manufacturer.

3) Execution

a) **EXAMINATION AND COORDINATION**

i) 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.

ii) Verify that existing substrates to receive vapour retarder are clean, dry, sound, smooth, and continuous.

iii) Coordinate installation of vapour retarders with work of other Sections to achieve a vapour tight building envelope.

b) **SHEET VAPOUR RETARDER INSTALLATION**

i) Ensure substrates and services are installed and inspected prior to installation of retarder.

ii) Install sheet vapour retarder on the warm side of roof assembly, prior to installation of roof insulation to form a continuous vapour retarder.

iii) Use sheets of largest practical size to minimize joints.

iv) Inspect for continuity. Repair punctures and tears with sealing tape before work is concealed.

v) At exterior surface openings, cut vapour retarder to form openings and ensure material is lapped and sealed to frame.

vi) Ensure continuity of vapour retarder is maintained at junctures with other materials.

vii) At perimeter seals, seal perimeter of sheet vapour retarder as follows:
(1) Apply continuous bead of sealant to substrate at perimeter of sheets.
(2) Lap sheet over sealant and press into sealant bead.
(3) Install fasteners through lapped sheets at sealant bead into substrate.
(4) Ensure that no gaps exist in sealant bead. Smooth out folds and ripples occurring in sheet over sealant.

viii) Seal lap joints of sheet vapour retarder as follows:
(1) Attach first sheet to substrate.
(2) Apply continuous bead of sealant over solid backing at joint.
(3) Lap adjoining sheet minimum 150 mm and press into sealant bead.
(4) Install fasteners through lapped sheets at sealant bead into substrate.
(5) Ensure that no gaps exist in sealant bead. Smooth out folds and ripples occurring in sheet over sealant.

ix) Seal electrical switch and outlet device boxes that penetrate vapour retarder as follows:
(1) Wrap boxes with film sheet providing minimum 300 mm perimeter lap flange.
(2) Apply sealant to seal edges of flange to main vapour retarder and seal wiring penetrations through box cover.

c) **MASTIC AND PRIMER**

i) Fill substrate voids, gaps, depressions, cracks, and joints with mastic until continuous, smooth, substrate for vapour retarder is achieved.

ii) Prime substrate surfaces to receive vapour retarder in accordance with manufacturer's instructions, at recommended application rate, allow to dry. Vary coverage to suit surface porosity.

iii) Prime surfaces. Re-prime surfaces if not covered with vapour retarder within 4 hours.

d) **UNDER SLAB VAPOUR RETARDER INSTALLATION**

i) Install sheet vapour retarder under the floor slab prior to installation of floor slab, to form a continuous vapour retarder in accordance with ASTM E1643 and manufacturer’s written instructions.

ii) Lap vapour barrier over footings and seal to foundation walls.

iii) Overlap joints 150 mm and seal with manufacturer approved sealing tape.

iv) Seal all penetrations (including conduits and pipes) with manufacturer's pipe boot.

v) Use sheets of largest practical size to minimize joints.

vi) Inspect for continuity. Repair punctures and tears with sealing tape before work is concealed.

vii) Ensure continuity of vapour retarder is maintained at junctures with other materials.

e) **MEMBRANE VAPOUR RETARDER INSTALLATION**

i) Install mastic where required to ensure integrity of vapour retarder installation at protrusions and other complex details.

ii) Install vapour retarder in accordance with manufacturer's instructions in locations indicated.

iii) Lap vapour retarder ends and edges 50 mm minimum. Roll vapour retarder and laps for continuous adhesion over entire substrate area; use manufacturer's recommended roller.

iv) Extend vapour retarder as required to connect to roof parapets, windows, doors frames, aluminum work and other components of Work comprising vapour retarder system.

v) Cut and fit vapour retarder as required for passage of protrusions, ensuring continuous adherence to substrate.

vi) At end of days' Work, trowel mastic water cut-off along uppermost edge of incomplete vapour retarder assembly, to prevent loss of adhesion and damage to vapour retarder.

f) **FASTENING BARS**

i) Supply and install continuous mechanical fastening bar to clamp vapour retarder both sides of unfilled gaps, cracks, and joints.

g) **FIELD QUALITY CONTROL**

i) Inspect vapour retarder continuity immediately prior to installation of subsequent construction. Repair punctures, rips and tears to ensure continuity of vapour retarder.

ii) Where punctures and tears are extensive, replace entire damaged section.

iii) Do not cover or permit to be covered any portion of vapour retarder until it has been inspected by Consultant.

END OF SECTION

1) General

a) **SECTION INCLUDES**

i) Labour, Products equipment and services necessary for spray applied air/vapour barrier Work in accordance with the Contract Documents.

b) **SUBMITTALS**

i) Product data:
(1) Submit manufacturer's Product data in accordance with Section 01 33 00 indicating:
(a) Materials list of items to be provided under this Section.
(b) Manufacturer's specifications and other data needed to ensure compliance with the specified requirements including but not limited to installation details and physical properties.
(c) Manufacturer's current recommended installation procedures.

ii) Shop drawings: Submit shop drawings in accordance with Section 01 33 00 indicating locations and extent of air/vapour barrier system including details for terminations flashings, penetrations, window and door openings and treatment of substrate joints and cracks.

iii) Certificates:
(1) Submit manufacturer's certification that air/vapour barrier system materials and accessories supplied are compatible, meet Specification requirements and that installer is licensed/approved by membrane manufacturer.
(2) Submit manufacturer's certification that air/vapour barrier components are approved for use as complete air/vapour barrier system.
(3) Submit inspection reports and certification by manufacturer confirming that installations are in accordance with manufacturer's requirements.

c) **QUALITY ASSURANCE**

i) Qualifications: Perform Work of this Section by a company that has a minimum of five years proven experience in installations of a similar size and nature and that is approved by manufacturer.

ii) Mock-up:
(1) Construct one 10 m^2 mock-up of spray applied air/vapour barrier in location acceptable to Consultant.
(2) Demonstrate verify details, tie-ins and to demonstrate the required quality of materials and installation.
(3) Arrange for Consultant's review and acceptance, allow 48 hours after acceptance before proceeding with Work.
(4) 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.
(5) Upon acceptance, mock-up shall serve as a minimum standard of quality for the balance of the work of this Section.

iii) Pre-installation meetings:
(1) Minimum 48 hours in advance of installation, arrange a meeting with manufacturer's representative, Consultant and all Subtrades affected by the

work of this Section. Agenda should include but not be limited to the following:

(2) Review of submittals
(3) Review of surface preparation, minimum curing period and installation procedures
(4) Review of special details and flashings.
(5) Sequence of construction, responsibilities and schedule for subsequent operations.
(6) Review of inspection, testing, protection and repair procedures.

d) **DELIVERY, STORAGE, AND HANDLING**

i) Deliver materials to job site in manufacturer's unopened containers with all labels intact and legible at time of use.

ii) Maintain the products in accord with manufacturer's recommendations with proper precautions to ensure fitness of material when installed.

iii) Comply with pertinent provisions of Section 01 60 00.

e) **SITE CONDITIONS**

i) Maintain air and substrate temperature at air/vapour barrier installation area above -4˚F (25˚C) for 24 h before, during and 24 hrs after installation.

ii) Do not apply air/vapour barrier in wet weather.

2) Products

a) **MATERIALS**

i) All materials under Work of this Section, including but not limited to, sealants and primers are to have low VOC content limits.

ii) Spray applied air/vapour barrier: One component, water-based coating, 100% silicone elastomeric air and weather-barrier. No primer required. 'Defendair 200' by Dow Corning or 'Air-shield LMP' by WR Meadows.

iii) Joint Treatment:
(1) Joint Tape: Self-adhered fiberglass mesh tape as recommended by weather barrier manufacturer.
(2) Joint Compound: Fluid-applied, vapour permeable, elastomeric flashing material; trowel applied.

iv) Flashing: Vapour permeable fluid-applied elastomeric flashing.
v) Sealant: Elastomeric; non-vapor permeable sealant; compatible with weather barrier

3) Execution

a) **EXAMINATION**

i) Verify condition of previously installed Work upon which this Section depends. Verify conformance with manufacturer's requirements. Report defects to Consultant. Commencement of Work means acceptance of existing conditions.

ii) New concrete should be cured for a minimum of 14 days and must be dry before membrane installation.

iii) Verify that existing substrates to receive air/vapour barrier are clean, dry, sound, smooth, continuous, sound and free of voids, spalled areas, loose aggregate, and sharp protrusions. Remove contaminants such as grease, oil and wax from exposed surfaces. Remove dust, dirt, loose stone and debris. Use repair materials and methods that are acceptable to membrane manufacture.

iv) Coordinate sealing of interruptions in, and protrusions through air/vapour barrier. Verify that other Work items projecting through air/vapour barrier are in place and are securely installed.

b) **SUBSTRATE PREPARATION AND PROTECTION**

i) Verify substrate surfaces are solid, free from surface water, frozen matter, dust, oil, grease, scaling or laitance, projections and foreign matter detrimental to the adhesion of the hot rubberized asphalt.

ii) Clean all deck surfaces to receive membrane system in accord with manufacturer's instructions; vacuum clean or blow clean with oil-free compressed air all surfaces to receive air/vapour barrier membrane and accessories. Protect adjacent surfaces not being waterproofed.

iii) Rout, clean, prepare and detail surface cracks form tie holes, honeycombed areas, and other voids and holes which may impair performance of air/vapour barrier membrane in accord with manufacturer's instructions; install backer rod where required.

iv) Clean metal surfaces to bright metal by wire brushing or mechanical etching; scuff-sand lead flashing and plastic surfaces.

v) Install detail cants, detail coats, joint and crack treatments, and liquid flashings in accord with manufacturer's instructions.

vi) Allow detail applications to cure in accord with manufacturer's instructions prior to general application of membrane.

vii) Joints between panels of exterior grade gypsum, plywood and other panel type substrates shall be sealed prior to the application of membrane.

viii) Prime surfaces in accord with manufacturer's instructions. Apply primer to all areas to receive transition membrane.

ix) Supply and install temporary protection to adjacent surfaces to prevent damage resulting from Work of this Section.

c) **APPLICATION**

i) Apply air/vapour barrier in accordance with reviewed shop drawings and manufacturer's written instructions in locations indicated.

ii) Grid surfaces to assure proper coverage rates and verify membrane wet-film mil thickness with gauges as work progresses.

iii) Apply membrane in uniform passes by spray to recommended wet film thickness unless more stringent requirements are indicated in submitted data.

iv) Extend air/vapour barrier as required to connect to other components of Work comprising air/vapour barrier system.

v) Ensure complete coverage to substrate, around flashings and protrusions and at changes in direction of surface. Re-spray thin spots and voids to obtain proper thickness. Work material into any fluted rib forming indentations.

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

d) **FIELD QUALITY CONTROL**

i) Do not cover or permit to be covered any portion of the membranes until they have had full cure of 48 hours and been inspected by the Consultant or by an inspection agency appointed by the Consultant.

e) **PROTECTION AND CLEAN-UP**

i) Promptly remove overspray of membrane system material from adjacent surfaces with cleaner approved by membrane manufacturer. Leave work area in broom clean condition.

ii) Prohibit traffic over completed work and protect against work overhead until protection course is installed.

END OF SECTION

1) General

a) **SECTION INCLUDES**

i) Labour, Products, equipment and services necessary for firestopping and smoke seals Work in accordance with the Contract Documents.

b) **REFERENCES**

i) ASTM C303, Standard Test Method for Dimensions and Density of Preformed Block and Board□Type Thermal Insulation.

ii) ASTM C920, Standard Specification for Elastomeric Joint Sealants.

iii) ASTM C1104, Standard Test Method for Determining the Water Vapor Sorption of Unfaced Mineral Fiber Insulation.

iv) ASTM E814, Test Method for Fire Tests of Through-Penetration Fire Stops.

v) ASTM E2174, Standard Practice for On-Site Inspection of Installed Fire Stops.

vi) ASTM G21, Standard Test for Determining Resistance of Synthetic Polymeric Materials to Fungi.

vii) CAN/CGSB 19.13, Sealing Compound, One Component, Elastomeric, Chemical Curing.

viii) CAN/ULC S102, Surface Burning Characteristics of Building Materials and Assemblies.

ix) CAN/ULC S114, Standard Method of Test for Determination of Non-Combustibility in Building Materials.

x) CAN/ULC S115, Standard Method of Fire Tests of Firestop Systems.

xi) CAN/ULC S129, Standard Method Of Test For Smoulder Resistance Of Insulation (Basket Method).

xii) CAN/ULC S702, Thermal Insulation, Mineral Fibre for Buildings.

c) **DEFINITIONS**

i) Fire Separation: A construction assembly, plane or device, either vertical or horizontal, which is required to prevent the passage of fire and smoke for a prescribed period of time. Proof of compliance to required time rating shall be by ULC, Warnock Hersey (or similar approved) certification or shall be as listed in the Ontario Building Code Supplementary Standard SB-2.

ii) Smoke Separation: A construction assembly, plane or device, either vertical or horizontal, which is not required to prevent the passage of fire for a prescribed period

of time but is required to prevent the passage of smoke. A "Smoke Separation" is also known as a "Fire Separation with No Rating" or a "Zero Hour Rated Separation".

iii) Non-Rated Separation: A construction assembly, plane or device, either vertical or horizontal, which is not required to prevent the passage of fire for a prescribed period of time and is not required to prevent the passage of smoke.

d) **SYSTEM DESCRIPTION**

i) 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.

ii) Firestop applications that exist for which no ULC or cUL tested system is available through a manufacturer, a manufacturer's engineering judgment derived from similar ULC or cUL 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.

iii) 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.

iv) 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.

v) Firestopping and smoke seals located at movement joints shall be designed with movement capability.

vi) Provide penetration firestoppping with mould and mildew resistance rating of 0 in accordance with ASTM G21.

vii) 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.

e) **SUBMITTALS**

i) Product data:
(1) Submit copies of manufacturer's Product data in accordance with Section 01 33 00 indicating:
(a) Performance criteria, compliance with appropriate cUL or ULC reference standard, characteristics, limitations.
(b) Product transportation, storage, handling and installation requirements.
(c) Submit firestop and smoke seal manufacturer's Product data for materials and prefabricated devices, including manufacturer's printed installation instructions.

ii) Shop drawings:
(1) Submit shop drawings in accordance with Section 01 33 00 indicating:

(a) Fire rated and smoke sealed systems for each typical application.
(b) Construction details, accurately reflecting actual job conditions.
(c) ULC or Intertek Testing assembly listing.
(d) Each floor and wall assembly requiring firestop system with each corresponding ULC firestop system.

iii) Certification:
(1) Submit certified documentation from manufacturer for each worker performing Work of this Section.
(2) Submit installer's and Product manufacturer's certification verifying compliance with the Contract Documents and conformance with ASTM E814 and CAN/ULC S115.

f) **QUALITY ASSURANCE**

i) Installers qualifications: Perform Work of this Section by a company that has a minimum of five years proven experience in the installation of firestopping and smoke seal Work of a similar size and nature and that is approved by manufacturer. Submit to Consultant, applicator's current certificate of approval by the material manufacturer as proof of compliance.

ii) Manufacturer's direct representative and/or fire protection specialist shall be on-site during initial installation of firestop systems to train appropriate contractor personnel in proper selection and installation procedures conforming to manufacturer's written recommendations published in their literature and drawing details.

iii) Pre-construction meetings: Arrange with manufacturer's representative, Contractor, Consultant and Field Engineer to determine responsibility for handling such issues as FT rated partitions, firestop custom details, compatibility, mixed penetrations, and to review installation procedures 48 hours in advance of installation.

g) **DELIVERY STORAGE AND HANDLING**

i) Deliver materials to Place of Work in manufacturer's unopened containers, containing classification label with labels intact and legible at time of use.

ii) Do not use damaged or adulterated materials exceeding their expiry date.

h) **SITE CONDITIONS**

i) Conform to manufacturer's requirements and maintain a minimum temperature of 5^0 C for a minimum period of 24 h before application, during, and until application is fully cured.
ii) Maintain sealant at a minimum 18E C for best workability.

2) Products

a) **ACCEPTABLE MANUFACTURERS**

i) Acceptable manufacturers of rated systems include:

(1) AD Fire Protection Systems Inc.
(2) Hilti Canada Corporation.
(3) 3M Canada Inc.
(4) Tremco Ltd.

b) **GENERAL SYSTEM REQUIREMENTS**

i) All materials under Work of this Section, including but not limited to, primers and sealants are to have low VOC content limits.

ii) Do not use Products containing asbestos.

iii) Firestopping components shall not contain volatile solvents or require special application to protect plastic pipe from firestopping compound.

iv) Provide smoke seal sealant in following colours: Rust Red, unless indicated otherwise.

v) Smoke sealant for overhead and vertical joints for floor to be self-levelling and non-sagging sealant.

vi) Smoke sealant at vertical through penetrations in areas with floor drains shall be waterproof type.

c) **MATERIALS**

i) Following materials have been provided for convenience. Contractor shall provide complete system with all components and accessories as required for fire resistant and smoke seal installation.

ii) Firestop sealant: single component, low modulus, silicone rubber, moisture curing sealant to ASTM C920, ULC labelled to CAN/ULC S115.

iii) Pre-Installed firestop devices for use with non-combustible and combustible pipes, conduit and/or cable bundles penetrating concrete floors and walls.
(1) Cast-in place firestop device complete with aerator adaptor when used in conjunction with aerator system. Model CP 680-P by Hilti or approved alternative.
(2) Cast-in place firestop device for use with noncombustible penetrants. Model CP 680-M by Hilti or approved alternative.
(3) Speed sleeve for use with cable penetrations. Model CP 653 by Hilti or approved alternative.
(4) Firestop block. Model CFS-BL by Hilti or approved alternative.

iv) Re-penetrable, round cable management devices for use with new or existing cable bundles penetrating walls:
(1) Speed sleeve with integrated smoke seal fabric membrane. Model CP 653 by Hilti or approved alternative.
(2) Firestop Sleeve. Model CFS-SL SK by Hilti or approved alternative.
(3) Retrofit sleeve for use with existing cable bundles. Model CFS-SL RK by Hilti or approved alternative.

(4) Gangplate for use with multiple cable management devices. Model CFS-SL GP by Hilti or approved alternative.
(5) Gangplate Cap for use at blank openings in gangplate for future penetrations. Model CFS-SL GP CAP by Hilti or approved alternative.

v) Firestop insulation: to CAN/ULC S702, Type 2; mineral fibre manufactured from rock or slag, suitable for manual application.
(1) Density: Minimum 64 kg/m^3 when tested to ASTM C303.
(2) Combustibility: Noncombustible to CAN/ULC S114.
(3) Melt temperature: >1175 degrees C.
(4) Surface burning characteristics: to CAN/ULC S102, maximum flame spread of 0, smoke developed of 0.
(5) Moisture Absorption: 0.04 percent when tested to ASTM C1104.
(6) Smoulder Resistance: 0.01 percent when tested to CAN/ULC S129.

vi) Damming, back-up, supports, and anchorage: In accordance with manufacturer's fire rated systems and to acceptance of authorities having jurisdiction.

vii) Primer: As recommended by firestopping sealant manufacturer.

3) Execution

a) **EXAMINATION**

i) 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.

ii) Verify that substrates and surfaces to receive firestopping and smoke seals are clean, dry, and frost free.

b) **PREPARATION**

i) Prepare, modify, and adjust void sizes, proportions, and conditions to conform to fire rated and smoke sealed assembly requirements such as assembly opening size and dimensional restrictions.

ii) Clean surfaces to remove material detrimental to bond including dust, paint, rust, oil, grease, moisture, frost and other foreign matter to manufacturers recommendations.

iii) Mask adjacent surfaces to avoid spillage and over-coating of adjacent surfaces. Remove stains from adjacent surfaces.

c) **INSTALLATION**

i) Install firestopping and smoke seal systems in accordance with reviewed Shop Drawings, manufacturer's instructions and fire rated assembly to establish continuity and integrity of fire separations.

ii) Install firestop insulation in compacted thicknesses required by ULC design. Compress insulation approximately 50 percent.

iii) Install primers as recommended by firestop and smoke seal Product manufacturers.

iv) Install temporary forming, damming, back-up as required, remove after materials have achieved initial cure and will resist displacement.

v) Install firestop and smoke seal filler in horizontal joints providing 25% compression fit.

vi) Use resilient, elastomeric firestopping and smoke seal systems in following locations:
(1) Openings and sleeves for future use.
(2) Penetration systems subject to vibration or thermal movement.
(3) Penetration systems in acoustical containment enclosures.

vii) Trowel and tool exposed firestop and smoke seal. Product surfaces to uniform, smooth finish.

viii) Seal joints to ensure an air and water resistant seal capable of withstanding compressions and extensions due to thermal wind or seismic joint movement.

ix) Taped joints will not be acceptable.

x) Repair damaged firestopped and smoke sealed surfaces to acceptance of Consultant.

xi) Identify each firestop and smoke seal penetration assembly with permanent label listing following:
(1) Assembly and rating in hours.
(2) Date of installation.
(3) Installing company's name and telephone number.

xii) Do not cover materials until full cure has taken place.

d) **INSPECTION AND TESTING**

i) 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.

e) **CLEAN-UP**

i) Clean all surfaces adjacent to sealed holes and joints to be free of excess firestop materials and soiling as work progresses.

ii) Remove excess materials and debris immediately after application.

f) **SCHEDULE OF FIRESTOP AND SMOKE SEAL LOCATIONS**

i) Following firestop and smoke seal location schedule is included for convenience and may not be complete. Examine Contract Drawings and other specification sections and determine entire extent of Work of this Section. Generally provide systems with required fire and smoke ratings at following locations:
(1) Gaps at intersections of fire-resistance rated walls and partitions.
(2) Control and sway joints in fire-resistance rated walls and partitions.
(3) Gaps at top of fire-resistance rated partitions and walls.
(4) Penetrations through fire-resistance rated walls and partitions including mechanical and electrical services and openings and sleeves for future use.
(5) Penetrations through fire-resistance rated floor slabs, ceilings, and roofs.
(6) Gaps at edge of floor slabs at exterior walls.
(7) Perimeter of retaining angles on rigid ducts greater than 0.012 m^2, firestopping material between retaining angle and fire separation and between retaining angle and duct, on each side of fire separation.
(8) Where indicated on drawings.
(9) At non-rated assemblies that require a smoke seal.
(10) Where required by Ontario Building Code.

END OF SECTION

1) General

a) **SECTION INCLUDES**

i) Labour, Products, equipment and services necessary for sealant Work in accordance with the Contract Documents.

ii) Work of this Section does not include sealants in firestopping and smoke sealed assemblies.

iii) Work of this Section does not include sealant work identified in individual specification sections.

b) **REFERENCES**

i) ASTM C834, Specification for Latex Sealants.

ii) ASTM C920, Specification for Elastomeric Joint Sealants.

iii) ASTM C1330, Specification for Cylindrical Sealant Backing for Use with Cold Liquid Applied Sealants.

c) **SUBMITTALS**

i) Product data: Submit copies of Product data in accordance with Section 01 33 00 describing type, composition and recommendations or directions for surface preparation, material preparation and material installation.

ii) Samples:
(1) Submit following samples in accordance with Section 01 33 00.
(a) Two samples of sealant/caulking, for colour selection.
(b) Two samples of back-up material and primer for physical characteristics.

d) **QUALITY ASSURANCE**

i) Qualifications: Work of this Section shall be executed by trained applicators approved by sealant manufacturer and having a minimum of 5 years proven experience.

e) **SITE CONDITIONS**

i) Do not install materials when ambient air temperature is less than 5EC, when recesses are wet or damp.

ii) Install materials to manufacturer's recommendations.

f) **DELIVERY, STORAGE AND HANDLING**

i) Arrange delivery of materials in original, unopened packages with labels intact, including batch number, and ensure that on-site storage is kept to a minimum. Do not store materials on site where there exists any danger of damage from moisture, direct sunlight, freezing and other contaminants.

g) **EXTENDED WARRANTY**

i) Submit an extended warranty for Sealant Work in accordance with General Conditions, except that warranty period is extended to 2 years from date of Substantial Performance of the Work.
(1) Warrant against leakage, cracking, crumbling, melting, shrinkage, running, loss of adhesion and staining adjacent surfaces.
(2) Coverage: Complete replacement including affected adjacent Work.

2) Products

a) **MATERIALS**

i) General:
(1) All materials under Work of this Section, including but not limited to, primers and sealants are to have low VOC content limits.
(2) Use materials as received from manufacturers, without additives or adulterations. Use one manufacturer's Product for each kind of Product specified.

ii) Sealant **Type A**: ASTM C920, Type S, Grade NS, Class 25; One-part, non-sag type, silicone sealant, in standard colours selected.
(1) 'DC CWS' by Dow Corning Inc.
(2) 'Sikasil 305CN' by Sika.
(3) 'Tremsil 400' by Tremco.

iii) Sealant **Type B**: ASTM C920, Type S, Grade NS; One-part mildew-resistant silicone, in standard colours selected.
(1) '786 Mildew Resistant Silicone Sealant' by Dow Corning Inc.
(2) 'Sikasil GP Mildew Resistant' by Sika.
(3) 'Tremsil 200 Silicone Sealant' by Tremco Ltd.

iv) Sealant **Type C**: ASTM C834; Pure acrylic siliconized sealant; in standard white colour (paintable).
(1) 'Tremflex 834 Silconized Sealant' by Tremco Ltd.

b) **ACCESSORIES**

i) Primers: Type recommended by material manufacturers for various substrates, primers to prevent staining of adjacent surfaces encountered on project.

ii) Joint backing: ASTM C1330; Round, solid section, closed cell, skinned surface, soft polyethylene foam gasket stock, compatible with primer and sealant materials, 30 to 50% oversized, Shore A hardness of 20, tensile strength 140 to 200 kPa. Bond breaker type surface.

iii) Bond breaker: Type recommended by material manufacturers.

iv) Void filler around the window frames to be one part expanding polyurethane foam.

v) Cleaning agents: As recommended by material manufacturer, non-staining, harmless to substrates and adjacent finished surfaces.

c) **MIXING**

i) Follow manufacturers instructions on mixing, shelf and pot life.

3) Execution

a) **EXAMINATION**

i) 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.

b) **PREPARATION**

i) Protect adjacent exposed surfaces to prevent smearing, staining or other damage, by masking or other means, prior to performing Work. Make good any damage caused by sealant application. Remove protection upon completion and clean adjacent, exposed surfaces of any compound deposited upon such surfaces.

ii) Erect scaffolding and rigging required to perform sealant Work in accordance with reviewed Shop Drawings.

iii) Prepare joints to receive sealants to manufacturer's instructions. Ensure that joints are clean and dry and ferrous surfaces are free from rust and oil.

iv) Clean recesses to receive sealant, to be free of dirt, dust, loose material, oil, grease, form release agents and other substances detrimental to sealant's performance.
(1) Remove lacquer or other protective coatings from metal surfaces, without damaging metal finish, using oil-free solvents. Remove rust, mill scale and coatings from ferrous metals by wire brush, grinding or sand blasting.
(2) Ensure recess is dry.
(3) Do not apply sealants to joint surfaces treated with sealer, curing compound, water repellent, or other coatings. Remove incompatible coatings as required.

v) Ensure that all materials in contact with sealant are compatible. Test substrate for adhesion.

vi) Depth of recess: Maintain depth to joint width up to a maximum of 13 mm and not less than 6 mm at centre of joint. For greater depth, use joint backing under. Where recess is less than specified depth, cut back surface of recess to specified recess depth.

vii) Install polyethylene backing rod in joints 6 mm or more in width. Roll backing rod into joint. Do not stretch or bend backing rod. Install bond breaker to back of recess.

viii) Prime sides of recess, in accordance with sealant manufacturer's instructions.

ix) Condition products for use in accordance with manufacturer's recommendations.

c) **INSTALLATION**

i) Apply sealant immediately after adjoining Work is in condition to receive such Work. Apply sealant in continuous bead using gun with correctly sized nozzle. Use sufficient pressure to evenly fill joint.

ii) Ensure sealant has full uniform contact with, and adhesion to, side surfaces of recess. Superficial painting with skin bead is not acceptable. Tool sealant to smooth surface, free from ridges, wrinkles, sags, air pockets, embedded impurities, dirt, stains or other defects.
   (1) At recesses in angular surfaces, finish sealant with flat profile, flush with face of material at each side.
   (2) At recesses in flush surfaces, finish compound with concave face, flush with face of material at each side.

iii) Make sealant bead uniform in colour.

iv) Cure sealants in accordance with sealant manufacturer's instructions. Do not cover up sealants until proper curing has taken place.

v) Immediately remove excess compound or droppings which would set up or become difficult to remove from adjacent finished surfaces, using recommended cleaners, as work progresses. Do not use scrapers, chemicals or other tools which could damage finished surfaces. Remove defective sealant.

vi) Clean recesses and re-apply sealant.

vii) Remove masking tape immediately after joints have been sealed and tooled.

d) **CLEANING**

i) Clean surfaces adjacent to joints, remove sealant smears or other soiling resulting from application of sealants. At metal surfaces, remove residue. Do not mar or damage finishes on materials adjacent to joints. Repair or replace marred or damaged materials.

e) **SCHEDULE OF LOCATIONS**

i) Following sealant location schedule is included for convenience and may not be complete. Examine Contract Drawings and other specification sections and determine entire extent of Work of this Section. Generally seal following locations:
(1) Concrete, masonry and wood to metal.
(2) Wood to masonry and concrete.
(3) Metal to metal.
(4) All dissimilar materials.
(5) Where ‘sealant’ or ‘caulking’ is indicated on drawings.

ii) Sealant **Type A**:
(1) Exterior joints between masonry and steel or aluminum.
(2) Exterior joints between masonry and shelf angle.
(3) Exterior joints between steel or aluminum and concrete or masonry.
(4) Interior and exterior control joints, except in floors.
(5) Door frames, louvre frames, interior and exterior side.
(6) Protrusions through interior and exterior walls and floors, interior and exterior side, except where fire rated seals are required.
(7) Seal thresholds.

iii) Sealant **Type B:**
(1) Control joints in tiled areas.
(2) Between vanity and tile.
(3) Between vanity and mechanical fixtures/fittings.
(4) Between access panels and tile.
(5) Between tiles and adjacent materials.

iv) Sealant **Type C:**
(1) Perimeter of kitchen counters.
(2) Perimeter of interior windows.
(3) Perimeter of firehose cabinets.
(4) Junction between drywall and masonry.

END OF SECTION

1) General

a) **SECTION INCLUDES**

i) Labour, Products, equipment and services necessary for the metal doors and frames Work in accordance with the Contract Documents.

b) **REFERENCES**

i) ASTM A653/A653M, Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvanealed) by the Hot-Dip Process.

ii) ASTM A568/A568M, Specification for General Requirements for Steel, Carbon and High-Strength Low-Alloy, Hot-Rolled Sheet and Cold-Rolled Sheet.

iii) CAN4-S104M, Standard Method for Fire Test of Door Assemblies.

iv) CAN4-S105M, Standard Specification for Fire Door Frames, Meeting the Performance Required by CAN4-S104M.

v) CAN/CGSB-1.198, Cementitious Primer, (for Galvanized Surfaces).

vi) CGSB 41-GP-19Ma, Rigid Vinyl Extrusions for Windows and Doors.

vii) CAN/ULC-S702, Thermal Insulation, Mineral Fibre for Buildings.

viii) CSA W47.1, Certification of Companies for Fusion Welding of Steel Structures.

ix) CSA W59-M, Welded Steel Construction (Metal Arc Welding).

x) NFPA 80, Standard for Fire Doors and Other Opening Protectives.

c) **DESIGN REQUIREMENTS**

i) Design exterior frame assemblies to accommodate expansion and contraction when subjected to minimum and maximum surface temperature of -35EC to 35EC.

d) **SUBMITTALS**

i) Product data: Submit manufacturer's Product data in accordance with Section 01 33 00 indicating door and frame construction.

ii) Shop drawings:
(1) Submit shop drawings in accordance with Section 01 33 00 for each type of door and frame indicating:
(a) Thickness and type of steel.
(b) Thickness and type of core.
(c) Thickness and type of steel stiffeners and location of them within the door.
(d) Thickness and type of metal facing on edges of door and method of fastening.

(e) Location of mortises, reinforcement, anchorages, joining, welding, sleeving, exposed fasteners, openings and arrangement for hardware.

(2) Include schedule identifying each unit with door marks and numbers relating to numbering on Contract Drawings and in door schedule. Indicate doors and frames to be fire rated.

e) **QUALITY ASSURANCE**

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

ii) 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 CAN4-S104M and CAN4-S105M for ratings indicated, Labelling shall be in accordance with NFPA 80.

2) Products

a) **ACCEPTABLE MANUFACTURERS**

i) Baron Metal Industries Inc.

ii) Daybar Industries Limited

iii) Fleming Doors Products.

b) **MATERIALS**

i) General: All materials under Work of this Section, including but not limited to, primers are to have low VOC content limits.

ii) Steel: ASTM A568/A568M, Class 1; Commercial grade steel, hot dip galvanized to ASTM A653/A653M, ZF120 galvanized coating.

iii) Minimum base steel thickness:

(1)	Frames	1.6 mm
(2)	Typical doors	1.2 mm
(3)	Lock/strike reinforcements	1.6 mm
(4)	Hinge reinforcements	2.7 mm
(5)	All other reinforcement	1.6 mm
(6)	Top and bottom channels	1.2 mm
(7)	Glazing stops	0.9 mm
(8)	Guard boxes	0.9 mm
(9)	Jamb spreaders	0.9 mm

iv) Top caps and thermal breaks: CGSB 41-GP-19Ma; Rigid PVC extrusions.

v) Primer: CAN/CGSB 1.198.

vi) Core material:
(1) Interior doors: Mineral fibre insulation with a minimum face density of 24 kg/m^3.
(2) Exterior doors: Rigid poly/isocyanurate, closed cell insulation, 32 kg/m^3, thermal value: RSI 1.9.
(3) Fire rated doors: Mineral fibre insulation to CAN/ULC S702, Type 1A; 24 kg/m^3.

vii) Screws: Stainless steel screws with countersunk flat head.

viii) Door silencers: Type 6-180, black neoprene.

ix) Frame anchors:
(1) Frames in masonry: 1.2 mm minimum, adjustable T-strap jamb anchors.
(2) Labelled frames: In accordance with ULC requirements.

x) Floor anchors: 1.6 mm minimum adjustable floor clip angles with 2 holes for anchorage to floor.

xi) Labels for fire doors and door frame: Brass plate, riveted to door and door frame.

xii) Glass and glazing: In accordance with Section 08 80 00.

c) **FABRICATION**

i) General
(1) Fabricate doors and frames in accordance with reviewed shop drawings.
(2) Welding: CSA W59-M to produce a finished unit with no visible seams or joints, square, true and free of distortion.
(3) Welding: Continuous unless specified otherwise. Execute welding by a firm fully acceptable to the Canadian Welding Bureau to requirements of CSA W47.1.
(4) Form profiles accurately to details shown on Contract Drawings.
(5) Ream and remove burrs from drilled and punched holes.
(6) Grind welded corners and joints to a flat plane and fill with metallic filler and sand to a uniform smooth finish. Apply one coat of primer.
(7) Provide weather strip for exterior doors in accordance with Section 08700 and door manufacturer.

ii) Frames, windows, and screens:
(1) Fabricate frames of welded construction. Cut mitres and joints accurately and weld continuously on inside of frame profile. Exterior frames to be thermally broken.
(2) Construct large frame sections with provision for on Site assembly to suit Site conditions.
(3) Blank, reinforce, drill and tap frames for mortised, templated hardware. Protect mortised cut-outs with guard boxes.
(4) Reinforce frames where required for surface mounted hardware.

(5) Reinforce frames over 1200 mm wide with roll formed steel channels or hollow structural sections specified in Section 05 50 00 and as indicated on drawings.
(6) Furnish exterior door frames with a continuously welded integral steel weather drip at head of frame.
(7) Prepare each door opening for single stud rubber door silencers, 3 for single door openings located in strike jamb, and 2 for double door openings located in head.
(8) Install 2 channel or angle spreaders per frame, to ensure correct frame alignment. Install stiffener plates or spreaders between frame trim where required, to prevent bending of trim and to maintain alignment when setting in place.
(9) Form channel glazing stops minimum 16 mm height, accurately cut, mitred, fitted and fastened to frame sections with stainless steel counter-sunk, flat head screws spaced at maximum 450 mm throughout and 50 mm from each end.

iii) Anchorage:
(1) Anchor units to floor and wall construction. Locate each wall anchor immediately above or below each hinge reinforcement on hinge jamb and directly opposite on strike jamb, minimum number of anchors for each jamb:
(a) Frames up to 2285 mm 3 anchors.
(b) Frames from 2285 mm to 2440 mm 4 anchors.
(2) Where frames are to be set in masonry or concrete, supply adjustable anchors to trade installing frame.

iv) General Door Requirements:
(1) Hollow steel construction, flush swing type, of sizes to conform to details, schedules and reviewed shop drawings with provisions for cut-outs for glass and reinforced to receive hardware fastenings.
(2) Blank, reinforce, drill and tap doors for mortised, templated hardware. Where required, reinforce doors for surface mounted hardware and door closers.
(3) Reinforce oversized doors with steel channels and plates specified in Section 05 50 00 and as indicated on drawings.
(4) Where openings are required, form integral cut-outs with framing, glass stop moldings and division bars.
(5) Bevel both stiles of single doors 1 in 16.
(6) Reinforce doors with galvanized metal stiffeners at 150 mm o.c.

v) Interior Doors:
(1) Supply and install inverted, recessed, mechanically interlocked with tack welded channels at top and bottom of doors.
(2) Fabricate doors with joints between front and back panels meeting on stile edges. Make joints mechanically interlocked and tack welded for entire height of door. After welding has been completed, grind joints smooth to match metal. Ensure that no filler is used in joints.
(3) Fill hollow space within door and vertical stiffeners from top to bottom with mineral fibre batt insulation.

vi) Exterior Doors:

(1) Supply and install inverted, recessed, mechanically interlocked with tack welded channels at top and bottom of doors. Supply and install PVC top caps.
(2) Fabricate doors with joints between front and back panels meeting on stile edges. Make joints mechanically interlocked and tack welded for entire height of door. After welding has been completed, grind joints smooth to match metal. Ensure that no filler is used in joints.
(3) Fill hollow space within door from top to bottom with rigid polyisocyanurate insulation.

vii) Fire Rated Doors:
(1) Supply and install inverted, recessed, spot welded channels at top and bottom of doors. Supply and install steel flush top caps on exterior doors.
(2) Fabricate doors with joints between front and back panels meeting on stile edges. Make joints mechanically interlocked and tack welded for entire height of door. After welding has been completed, grind joints smooth to match metal. Ensure that no filler is used in joints.
(3) Fabricate doors to achieve fire rating as indicated on drawings and in accordance with ULC. Provide ULC label plate on door at hinged edge midway between top hinge and head of door.

3) Execution

a) **EXAMINATION**

i) 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.

b) **HOLLOW METAL DOOR, FRAME, WINDOW AND SCREEN INSTALLATION**

i) Install hollow metal doors, frames, windows, and screens plumb, square, level, secure, and at correct elevation.

ii) Install doors clear of floor finishes, and with the correct rebate opening for the door installation. Install door silencers.

iii) Secure anchorages and connections to adjacent construction. Brace frames rigidly in position while building-in. Remove temporary steel shipping jamb spreaders. Install wood spreaders at third points of frame rebate height to maintain frame width. Supply and install vertical supports as indicated on drawings for openings over 1200 mm in width. Remove wood spreaders after frames have been built-in.

iv) Allow for structural deflection and prevent structural loads from being transmitted to hollow metal frames.

v) Touch-up areas where galvanized coating has been removed or damaged with primer.

vi) Install fire rated doors and frames in accordance with requirements of NFPA 80.

c) **ADJUSTING AND CLEANING**

i) Adjust doors for smooth and balanced door movement.

ii) Clean doors, frames and screens.

END OF SECTION

1) General

a) **SECTION INCLUDES**

i) Labour, Products, equipment and services necessary for finish hardware Work in accordance with the Contract Documents.

b) **REFERENCES**

i) BHMA, Builders Hardware Manufacturing Association.

ii) NFPA 80, Standard for Fire Doors and Other Opening Protectives.

c) **SUBMITTALS**

i) Product data: Submit manufacturer's Product data in accordance with Section 01 33 00 indicating compliance with reference standards, transportation, storage, handling and installation requirements.

ii) Shop Drawings:
(1) Submit Shop Drawings and 3 complete hardware lists in accordance with Section 01 33 00 indicating:
(a) Door locations, sizes, hardware manufacturer's catalogue numbers, finish symbols and quantities required.
(b) Locations and mounting heights of each type of hardware.
(2) Supply templates and required information to door and frame manufacturer to enable accurate sizes, locations of cut-outs and reinforcement for hardware.
(3) Submit templates to required trade to arrange for provisions for accurate setting and fitting of hardware.

iii) Samples:
(1) Submit 2 samples in accordance with Section 01 33 00 of each item that is different from hardware specified and include manufacturer's parts lists and installation instructions.
(2) Submit hardware component samples illustrating style, colour and finish. Tag samples identifying applicable Specification article number, brand name and number, finish, building location, date and catalogue number.
(3) Do not order hardware until samples have been accepted. Submit new samples to replace rejected samples. Supply hardware and finishes identical to each accepted sample.

iv) Closeout submittals:
(1) Submit the following in accordance with Section 01 78 23 for each Product for incorporation into Operation and Maintenance Manual:
(a) Maintenance data.
(b) Operating instructions and safety precautions.
(c) Parts list with name and address of supplier.
(d) Lubrication schedule and type of lubricant recommended.
(e) Keys, tools and special devices.
(f) Inspection procedures related to preventive maintenance.

d) **QUALITY ASSURANCE**

i) General:
(1) Manufacturers: Companies specializing in manufacturing door hardware and registered with BHMA.
(2) Hardware supplier: Company specializing in supplying commercial door hardware and acceptable to manufacturer.

ii) Certifications:
(1) Employ an Architectural Hardware Consultant to inspect completed installation and certify that hardware has been installed in accordance with manufacturer's printed instructions, Authorities having Jurisdiction and as specified.
(2) Submit manufacturer's certificate that finish hardware and fire rated hardware meets specified requirements.

e) **DELIVERY, STORAGE, AND HANDLING**

i) Be responsible for packaging of hardware, on a set by set basis. As material is received from various manufacturers identify it to correspond to Hardware List symbols.

ii) Label packages legibly, indicating manufacturer's number, types, sizes, opening number and Hardware List reference number. Wrap hardware and include in package, screws, bolts and fastening necessary for correct installation. If hardware package is not complete, pay additional charges incurred by installer.

iii) Deliver hardware to Site packaged, labelled and cross-referenced to hardware list for each item and its scheduled installation location.

iv) Accept Products of this Section on Site and ensure that each item is undamaged.

v) Catalogue and store hardware in secure area.

2) Products

a) **GENERAL**

i) Aluminum door hardware: Supplied and installed under the Work of Section 08 44 00.

Township of King Vendor of Record & authorized Mul-T-Lock dealer:

ACP Lock and Security Inc.
500 Alden rd. 12 A
Markham, ON
L3R5H5
Office 289-204-1180

ii) Carefully check and verify Hardware List against Contract Drawings to ensure that hardware listed can be used as specified. Inform Consultant of concerns regarding quality, quantity, operation or function of hardware selected:
   (1) Verify hand of doors, examine details on Contract Drawings and at Site to ensure hardware supplied can be correctly installed and is correct for Work as constructed.
   (2) Select hardware in accordance with applicable codes and regulations and to approval of local Fire Marshal.
   (3) Replace and pay for defective hardware including hardware which was incorrectly selected, and remedial and installation costs.

iii) Ensure that hardware selected will function correctly, meets Contract requirements and Ontario Building Code and authorities having jurisdiction.

iv) Ensure that each hardware item is of same type, design and by same manufacturer.

v) Manufacturer's names or trademarks are not permitted on exposed surfaces of hardware.

vi) Include in packing slip a list of parts, name of supplier and door number in which lock is to be installed.

vii) Hardware for fire rated and labelled door and frame assemblies: ULC listed or as accepted by authorities having jurisdiction.

viii) Fire rated assemblies:
   (1) Hardware: Selected and installed in accordance with applicable codes and regulations, NFPA-80 and to approval of Ontario Fire Marshal.
   (2) Fire rated doors: ULC labelled hardware. Submit written certification of conformance to ULC requirements for each type of hardware prior to delivery.
   (3) Locksets and latchsets on fire rated doors: 19 mm throw minimum.

ix) Permanent Cores shall be provided by Royal Security Solutions, per City Standards. General Contractor shall provide temporary construction cores for use during construction.

b) **ACCESSORIES**

i) Items to be attached to masonry or concrete with expandable shields, lag screws, bolts or other fastening devices as required. Exposed screws: Stainless steel, Phillips or Robertson heads.

c) **FINISHES**

i) Metal finishes: Free from defects, clean, unstained and of a uniform colour for each type of finish required. Exposed surfaces and anchors: Specified finish symbol of item.

3) Execution

a) **EXAMINATION**

i) 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.

b) **INSTALLATION**

i) Install hardware in accordance with reviewed Shop Drawings, manufacturer's installation instructions, and applicable Codes and regulations.

ii) Install hardware in accordance with hardware templates.

iii) Adjust fixed and operable hardware for correct clearances and function.

iv) Mount hardware measured from finished floor to centre of hardware, unless indicated otherwise or required by Code:
(1) Top hinge: 250 mm from head of door to top.
(2) Bottom hinge: 265 mm from finished floor to bottom of hinge.
(3) Intermediate hinge: Equal distance between top and bottom hinge.
(4) Locksets, latchsets: 1000 mm.
(5) Panic device crossbar: 1000 mm.
(6) Push plates: 1100 mm to bottom of plates.
(7) Guard bars: 1100 mm.
(8) Door pulls: 1100 mm to bottom of pulls.
(9) Blank strike: 1450 mm.
(10) Blank fronts: 1450 mm.

v) Include for supply and installation of wiring for electric strikes from electrical junction box to electric strike hardware.

vi) Locate door stops to contact doors 75 mm from latch edge.

vii) Install hardware and trim square and plumb to doors.

viii) Replace wrappings for hardware provided by manufacturer after installation.

ix) Safeguard keys to keep them out of unauthorized hands, tag them with door number, and deliver them to person designated by Consultant at building completion.

c) **FIELD QUALITY CONTROL**

i) Have hardware inspected after installation by hardware supplier's representative, obtain certification in writing that hardware has been supplied and installed in accordance with Specifications and hardware manufacturer's instructions and is functioning correctly.

ii) Inspect fire rated openings to ensure they are installed in compliance with NFPA 80 requirements and Authorities having Jurisdiction.

iii) Test access control system and electrified hardware devices for proper operation. Verify electric door release hardware operates properly upon activation of fire alarm system.

d) **ADJUSTING**

i) Verify under work of this Section, that installed hardware functions properly.

ii) Adjust hardware so that latches and locks operate smoothly and without binding, and closers act positively with the least possible resistance in use. Lubricate hardware if required by manufacturer's instructions.

iii) Adjust doors with self-closing devices or automatic closing devices for proper operation after the HVAC system is balanced and adjusted. Verify spring power of non-sized door closers is properly adjusted.

e) **CLEANING**

i) Remove wrappings at completion of the Project and clean hardware in accordance with manufacturer's instructions.

f) **HARDWARE SCHEDULE**

i) Hardware groups/schedule: Hardware Vendor to prepare & Submit Hardware schedule for review and acceptance prior to finalizing supply list.

END OF SECTION

1) General

a) **SECTION INCLUDES**

i) Design, labour, Products, equipment, tools, and services necessary for glass and glazing Work in accordance with the Contract Documents.

b) **REFERENCES**

i) ASTM C920, Specification for Elastomeric Joint Sealants.

ii) ASTM D2240, Test Method for Rubber Property - Durometer Hardness.

iii) CAN/CGSB-12.1-M, Tempered or Laminated Safety Glass.

iv) CAN/CGSB-12.3-M, Flat, Clear Float Glass.

v) CAN/CGSB-12.8, Insulating Glass Units.

vi) CAN/CGSB-12.9-M, Glass, Spandrel.

vii) CAN/CGSB-12.11-M, Wired Safety Glass.

viii) CAN/CGSB-12.20-M, Structural Design of Glass for Buildings.

ix) Glass Association of North America (GANA) Glazing Manual.

x) NFPA 80, Standard for Fire Doors and Other Opening Protectives.

c) **DESIGN REQUIREMENTS**

i) Glass Design:
(1) Design glass using a probability of breakage of 8 lites per 1000 at the first application of design load.
(2) Design glass to CAN/CGSB-12.20-M. Perform stress analysis. Design units to accommodate live, dead, lateral, wind, seismic, handling, transportation, and erection loads.
(3) 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.
(4) Perform a thermal stress analysis on each insulating thermal unit and provide heat strengthening and/or tempered units as necessary to prevent thermal breakage.
(5) Where required, design glazing units so as not to allow thermal stress fracture due to heat build-up behind insulating units.

ii) Structural Glazing:
(1) Carry out design of structural silicone joints by rational analysis including all movements specified herein. Maximum stress shall not exceed 138 kPa (20 psi) in tension or shear for short term loading. Maximum stress in shear for long term loading due to the dead load of glass shall not exceed 7 kPa (1 psi) or the limit imposed by sealant manufacturer, whichever is less.
(2) The joint shall be essentially rectangular in shape and shall include no internal corners which could precipitate tearing or create high local stresses.
(3) Single Source Responsibility for Sealants, Gaskets and Other Glazing Accessories: In order to ensure consistent quality of performance, provide all glazing sealants and seals from a single manufacturer.
(4) Preconstruction Compatibility and Adhesion Testing: Submit to sealant manufacturer, samples of each glass, gasket, glazing accessory and glass-framing member that will contact or affect glazing sealants for compatibility and adhesion testing. Schedule submission of test samples to provide sufficient time for testing and analysis of results to prevent delay in the progress of work.

iii) Limit glass deflection to flexural limit of glass with full recovery of glazing materials.

iv) Utilize inner light of multiple light sealed units for continuity of air and vapour seal.

d) **SUBMITTALS**

i) Shop drawings: Submit shop drawings in accordance with Section 01 33 00 for fabrication and erection of glazing elements indicating materials, thicknesses, finishes, connections, joints, method of anchorage, number of anchors, supports, reinforcement, details, and accessories.

ii) Samples:
(1) Submit following samples in accordance with Section 01 33 00.
(2) Submit one sample of each type of glass.
(a) 300 x 300 mm of each type of insulating glass unit, complete with each different Low-E coating.
(b) 300 x 300 mm of each colour of spandrel glass.

(3) Certificates: Submit manufacturer's certification that glass and glazing materials are compatible.

iii) Submit compatibility and adhesion test reports from sealant manufacturer indicating that glazing materials were tested for compatibility and adhesion with glazing sealants. Include sealant manufacturer’s interpretation of test results relative to sealant performance and recommendations for primers and substrate preparation needed for adhesion.

iv) Compatibility test report from manufacturer of insulating glass edge sealant, indicating that glass edge sealants were tested for compatibility with other glazing materials including sealants, setting blocks, edge blocks and any other material that contacts or can affect the edge seal.

v) IGMA Compliance Audit: Submit in accordance with Section 01 78 23, a written certification of successful completion of a Compliance Audit within the last six months.

e) **QUALITY ASSURANCE**

i) 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.

ii) Installers qualifications: Perform Work of this Section by a company that has a minimum of five years proven experience in the installation of glazing units of a similar size and nature.

f) **SITE CONDITIONS**

i) Glaze with compounds, sealants, or tapes only when glazing surfaces are at temperatures over 4EC, and when positive that no moisture is accumulating on them from rain, mist, or condensation.

ii) When temperature of glazing surfaces is below 4EC, obtain from Consultant approval of glazing methods and protective measures which will be used during glazing operations.

g) **EXTENDED WARRANTY**

i) In accordance with Section 08 44 00.

2) Products

a) **ACCEPTABLE MANUFACTURERS**

i) Glass manufacturers:
(1) AGC Flat Glass.
(2) Cardinal Glass Industries.
(3) Guardian Industries.
(4) PPG Industries Ltd.
(5) Viracon Inc.

b) **MATERIALS**

i) All materials under Work of this Section, including but not limited to, primers, coatings, sealers, sealants, adhesives and cleaners are to have low VOC content limits.

ii) Float glass **(FGL)**: CAN/CGSB-12.3-M; clear, glazing quality, minimum 6 mm thick. Clear or tinted as indicated. Heat strengthened as required.

iii) Tempered glass **(TGL)**: CAN/CGSB-12.1-M, Type 2, Class B, Category II, clear or opaque, minimum 6 mm thick.

iv) Fire-lite glass **(FIGL)**: ULC Standard CAN4-S104, S106, NFPA 80, 257, FireLite® as manufactured by Nippon Electric Glass Company, Ltd., 5 mm thick or as otherwise noted on Door Schedule, clear polished glass. 1 Hour Fire Resistance Rating Required

v) Insulating glass units: To CAN/CGSB-12.8-M and IGMA requirements utilizing approved metallic stainless steel edge spacer. Dual seal with a PIB primary seal and silicone secondary seal.

vi) Argon gas: 100% pure. Argon gas to be used to fill air space at all insulated glass units.

vii) Low-E coating (Soft coat): High performance sputtered low-E coating. Provide insulating glass units with low-E coating edge deletion and low-E coating. Apply low-E coating to second surface unless otherwise indicated. 'Solarban 67' by PPG Atlantica.

viii) Glazing types:
(1) Type 1 (Double glazing): TGL outside, air space, FGL inside. Standard throughout unless noted otherwise. 25 mm overall thickness.
(2) Type 2: FIGL used at interior glass lites in fire-rated doors.

ix) Glazing and rebate primers, sealants, sealers, and cleaners: Compatible with each other. Type as recommended by glass manufacturer.

x) Glazing sealant: Silicone sealant as recommended by glazing manufacturer. Verify compatibility with insulating glass unit secondary sealant.

xi) Glazing Sealant (Structural Glazing):
(1) Silicone, One Part in accordance with ASTM C920, Type S or M, Grade NS, Class 25.
(2) Structural glazing tensile bead: 'Spectrem 2 Sealant' by Tremco or 'Dow 795' by Dow Corning.
(3) Structural glazing weather bead: 'Spectrem 2 Sealant' by Tremco or 'Dow 795' by Dow Corning.
(4) Structural glazing (factory glazed): Two-part, neutral cure silicone sealant, 'Proglaze ll' by Tremco or 'Dow 983' by Dow Corning.
(5) Colour to later selection of Consultant.

xii) Heel & toe bead: Silicone sealant as recommended by glazing manufacturer.

xiii) Glazing gasket: 'Visionstrip' by Tremco Ltd., extruded composite glazing seal, size as recommended by manufacturer.

xiv) Glazing tape: 'Polyshim II' glazing tape EPDM shim.

xv) Glazing splines: EPDM or neoprene, extruded shape to suit glazing channel retaining slot, colour as selected.

xvi) Setting blocks (regular): EPDM, 80 - 90 Shore A durometer hardness to ASTM D2240, sized to suit glazing method, glass unit weight and area.

xvii) Setting Block (Structural Glazing): Silicone setting blocks with Shore, Type A durometer hardness of 85, plus or minus 5 to ASTM D2240, sized to suit glazing method, glass unit weight and area.

xviii) Edge blocks: EPDM, 60-70 Shore A Durometer hardness, sized with 3 mm clearance from glass edge and spanning glass thickness(es). Capable of withstanding weight of glass unit, self-adhesive on face.

xix) Glass presence markers: Easily removable, non-residue depositing.

xx) Screws, bolts and fasteners: Type 304 stainless steel.

c) **FABRICATION**

i) Verify glazing dimensions on Site.

ii) Clearly label each glass lite with maker's name and glass type. Ensure labels are easily removable, non-residue depositing type. Do not remove labels until after Work is accepted by Consultant.

iii) Fabricate glazing not less than 3 mm smaller than rebate size in either dimension; allow for edge spacers, shims, and setting blocks as necessary.

iv) Work shall have smooth finished surfaces free from distortion and defects detrimental to appearance and performance.

v) Carefully make and fit details. Take special care with exposed finished Work to produce a neat and correct appearance to the Consultant's acceptance.

vi) Fabricate argon filled thermal units with air space filled minimum 90% with argon gas.

3) Execution

a) **EXAMINATION**

i) 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.

ii) Verify that openings for glazing are correctly sized and within tolerance.

iii) Verify that surfaces of glazing channels or recesses are clean, free of obstructions, and ready to receive glazing.

b) **PREPARATION**

i) Clean contact surfaces with solvent and wipe dry.

ii) Seal porous glazing channels or recesses with substrate compatible primer or sealer.

iii) Prime surfaces scheduled to receive sealant.

c) **INSTALLATION**

i) Provide glazing in accordance with IGMA recommendations. Provide continuous contact between glazing tapes and gasket to the glazing.

ii) Install glazing to the Work of Sections 08 11 13 and 08 44 00.

iii) Provide neat, straight sight lines. Trim excess glazing material flush with top of stops and fixed leg of frames.

iv) Remove protective coatings, glazing stops, clean rebate and glass contact surfaces with solvent, wipe dry.

v) Apply primer/sealer to contact surfaces, prior to glazing.

vi) Apply glazing tape as per manufacturer’s instructions including recommended corner sealant.

vii) Use setting blocks at 1/4 points and spacers to centre glass unit in frame.

viii) Install glazing in accordance with reviewed shop drawings and manufacturer's written instructions. Install glazing with full contact and adhesion at perimeter. Maintain edge clearance recommended by glass manufacturer.

ix) Apply a continuous heel bead of sealant around perimeter of inboard lite of the sealed unit and the metal framing.

x) Re-install glazing stops ensuring continuous contact and rattle-free installation. Do not distort glass. Trim tape protruding more than 2 mm above stop.

xi) Install glazing gasket in accordance with manufacturer’s recommendations.

xii) Do not cut or abrade tempered, heat treated, or coated glass.

xiii) Install glass presence markers in two cross stripes extending from diagonal corners. Maintain markers until final clean-up.

xiv) Remove, dispose of, and replace broken, cut, abraded glass, and defective glass including but not limited to production dimples, ‘tiger-stripping’, chips, cracks, etc.

xv) Exterior glass: Glaze units with gasket on exterior side and glazing tape on interior side. Seal gap between glazing and stop with sealant to depth equal to bite of frame. Apply cap head of sealant along void between stop and glazing, to uniform line, flush with sight line. Tool or wipe sealant surface smooth.

xvi) Exterior glass (Structural Glazing): Glaze units in accordance with reviewed shop drawings and in accordance with manufacturer’s written instructions.

xvii) Interior glass: Glaze interior glass using glazing gasket glazing tape.

xviii) Wire glass: Install wired glass in fire rated metal doors with 5 mm gap between glazing stops, in accordance with ULC and NFPA 80 requirements. Strike and point exposed joints between metal and glass.

d) **CLEANING**

i) Immediately remove sealant and compound droppings from finished surfaces.

ii) Remove labels, protective material, and glass presence markers from prefinished surfaces.

iii) Clean glass surfaces with cleaning agents and methods in accordance with Manufacturer's written instructions.

END OF SECTION

1) General

a) **SECTION INCLUDES**

i) Design, labour, Products, equipment and services necessary for louvres Work in accordance with the Contract Documents.

b) **REFERENCES**

i) American Architectural Manufacturers Association (AAMA) Aluminum Association Designation System for Aluminum Finishes.

ii) ASTM B209M Specification for Aluminum and Aluminum-Alloy Sheet and Plate.

iii) ASTM B211M Specification for Aluminum and Aluminum-Alloy Bar, Rod and Wire.

iv) ASTM C920, Specification for Elastomeric Joint Sealants.

v) CAN/CGSB-1.108-M, Bituminous Solvent Type Paint.

c) **DESIGN REQUIREMENTS**

i) Design louvre Work in accordance with OBC and to withstand live, dead, lateral. wind, seismic, handling, transportation and erection loads.

ii) Aerodynamic performance: 46% free area minimum.

iii) Limit deflection of louver members to not more than 1/180 of span between supports when subjected to wind load of 1 Kpa applied horizontally to louvre face.

iv) Design louvers to accommodate expansion and contraction of components due to temperature changes.

d) **SUBMITTALS**

i) Shop drawings: Submit shop drawings in accordance with Section 01 33 00 indicating fabrication and erection details, including anchorage, accessories, thicknesses, profiles, finishes, pressure drop, face area, and free area.

ii) Samples: Submit duplicate 600 x 600 mm samples of louvres in accordance with Section 01 33 00 indicating frame and reinforcing, bird screens finished in selected colours.

iii) Certification: Submit certified data from independent laboratory substantiating aerodynamic performance.

iv) Close-out submittals: Submit operation and maintenance data for incorporation into Operations and Maintenance Manual in accordance with Section 01 78 23.

2) Products

a) **MANUFACTURED UNITS**

i) Fixed aluminum louvre:
   (1) Acceptable products and manufacturers: 'Model A4115' by Construction Specialties Inc., 'Model SP445' by MW McGill Ltd. or 'Model H4451' by Ten Plus Architectural Products Ltd. or an approved alternate.
   (2) Aluminum sheet: ASTM B209M.
   (3) Depth: 100 mm or as required for wall thickness.
   (4) Frame and mullion: ASTM B211M; Extruded aluminum alloy Aluminum Association alloy 6063-T5 assembled with fastenings. 3 mm thickness minimum for head, sill, and jamb. Mullions: Concealed at 1500 mm maximum centres.
   (5) Blade: Stormproof with centre watershed in blade, 2.0 mm thick minimum; maximum blade length: 1500 mm.
   (6) Finish: Clear anodized to AAMA 611 per Aluminum Association Designation System for Aluminum Finishes AA-M12C22A31.
   (7) Options:
      (a) Duct collars.
      (b) Extended sill, finished to match louvre.

b) **ACCESSORIES**

i) All materials under Work of this Section, including but not limited to, sealants are to have low VOC content limits.

ii) Isolation coating: CAN/CGSB-1.108-M; Bituminous solvent type paint.

iii) Bird screen: Crimped 2.90 mm diameter aluminum wire cloth secured to 3 mm minimum thick extruded aluminum U frame mitred at corners. Mesh size: 18 mm at air intake.

iv) Anchors and fasteners: AISI Type 304 stainless steel.

v) Sealant: ASTM C920, Type M, Grade NS, Class 25; Two-part, polyurethane non-sag type. Dymeric by Tremco Ltd., Sikaflex 2C-NS by Sika Inc., colour as selected by Consultant. Primer and joint backing as recommended by sealant manufacturer.

3) Execution

a) **INSTALLATION**

i) Coordinate framing and anchorage for louvres with other parts of the Work.

ii) Install bird screen to inside face of louvres.

iii) Install louvres in accordance with manufacturer's instructions and accepted shop drawings. Securely anchor into opening.

iv) Apply isolation coating to separate dissimilar metals, and metals and masonry or concrete unless neoprene washers are shown.

v) Install duct collars as required and extended sills as indicated.

vi) Seal louvre perimeter with sealant and joint backing for weather tight seal in accordance with requirements of Section 07 92 00.

b) **CLEANING**

i) Maintain louvre work in clean condition throughout construction period. Remove all corrosive or foreign materials or droppings resulting from work of this Section or other trades.

END OF SECTION

1) General

a) **SECTION INCLUDES**

i) Design, labour, Products, equipment and services necessary for gypsum board Work.

b) **REFERENCES**

i) ASTM A653/A653M, Specification for Steel Sheet, Zinc-coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvanealed) by the Hot-Dip Process.

ii) ASTM C475, Specification for Joint Compound and Joint Tape for Finishing Gypsum Board.

iii) ASTM C645, Specification for Nonstructural Steel Framing Members.

iv) ASTM C665, Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.

v) ASTM C754, Specification for Steel Framing Members to Receive Screw-Attached Gypsum Board.

vi) ASTM C834, Standard Specification for Latex Sealants.

vii) ASTM C840, Specification for Application and Finishing of Gypsum Board.

viii) ASTM C1002, Specification for Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs.

ix) ASTM C1177, Specification for Glass Mat Gypsum Substrate for Use as Sheathing.

x) ASTM C1178, Specification for Glass Mat Water-Resistant Gypsum Backing Board.

xi) ASTM C1278, Specification for Fiber-Reinforced Gypsum Panel.

xii) ASTM C1396, Specification for Gypsum Board.

xiii) ASTM E84, Standard Test Method for Surface Burning Characteristics of Building Materials.

c) **DESIGN REQUIREMENTS**

i) Design ceiling suspension system in accordance with manufacturer's printed directions and ASTM C754.

ii) Design ceiling system for adequate support of electrical fixtures as required by the current bulletin of the Electrical Safety Authority.

iii) Design hanger anchor and entire suspension system static loading not to exceed 25% of their ultimate capacity including lighting fixture dead loads.

iv) Design suspension system to support weight of mechanical and electrical items such as air handling boots and lighting fixtures, and with adequate support to allow rotation/relocation of light fixtures.

v) Design subframing as necessary to accommodate, and to circumvent, conflicts and interferences where ducts or other equipment prevent the regular spacing of hangers.

vi) Design steel stud framing system for wall assemblies with a height greater than 3000 mm and those assemblies incorporating non-standard gypsum board assemblies including, but not limited to cement board.

d) **REGULATORY REQUIREMENTS**

i) Provide fire separations and fire protection exactly as specified in test design specification that validates the specified rating. Verify that work specified in other Sections, as a part of the entire assembly, meets applicable validating test design specification.

e) **SUBMITTALS**

i) Product data:
(1) Submit copies of manufacturer's Product data in accordance with Section 01 33 00 indicating:
(a) Performance criteria, compliance with appropriate reference standard, characteristics, and limitations.
(b) Product transportation, storage, handling and installation requirements.

ii) Shop Drawings: Submit Shop Drawings in accordance with Section 01 33 00 indicating wall assemblies, suspension systems, adjacent construction, elevations, sections and details, dimensions, thickness, finishes and relationship to adjacent construction.

iii) Certifications: Submit written certification stating that suspended ceiling system is designed for adequate support of electrical fixtures as required by the current bulletin of the Electrical Safety Authority.

f) **QUALITY ASSURANCE**

i) Qualifications: Execute the Work of this Section by skilled, qualified, and experienced workers trained in the installation of the Work of this Section.

ii) Retain a Professional Engineer, licensed in Province of Ontario, with experience in Work of comparable complexity and scope, to perform following services as part of Work of this Section:
(1) Design of wall systems with height greater than 3000 mm and at non-standard gypsum board assemblies including, but not limited to, assemblies incorporating cement board.
(2) Design of suspended gypsum board assemblies.
(3) Review, stamp, and sign Shop Drawings and design calculations.
(4) Conduct shop and on-site inspections, prepare and submit written inspection reports verifying that this part of Work is in accordance with Contract Documents and reviewed Shop Drawings.

g) **SITE CONDITIONS**

i) Do not begin Work of this Section until:
(1) Mechanical and electrical Work above the ceiling is complete.
(2) Substrate and ambient temperature is above 15˚C.
(3) Relative humidity is below 80 %.
(4) Ventilation is adequate to remove excess moisture.

ii) Install temporary protection and facilities to maintain Product manufacturer's, and above specification, environmental requirements 24 h before, during, and 24 h after installation.

2) Products

a) **MATERIALS**

i) General: All materials under Work of this Section, including but not limited to, sealants, adhesives, and primers are to have low VOC content limits.

ii) Steel framing: ASTM C754; ASTM A653/A653-M, Z275; cold rolled, galvanized steel sheet.
(1) Bailey Metal Products Limited.
(2) Corus Metal Profiles.

iii) Steel studs and track runners: ASTM C645; Galvanized steel studs and runners, 32 mm wide x depth as indicated on Contract Drawings. Formed from galvanized steel sheet, thicknesses as follows:
(1) Studs less than 3000 mm: Minimum 0.53 mm (25 ga.).
(2) Studs greater than 3000 mm and non-standard assemblies: Minimum 0.91 mm (20 ga.), unless stud thickness of greater thickness is required to accommodate intended condition.
(3) Track runners and ancillary components to match stud thickness.

iv) Main carrying channels: ASTM C645; Formed from galvanized steel sheet, 38 x 19 mm cold rolled, channels.

v) Resilient channel: ASTM C645; 0.5 mm thick galvanized metal, 57 mm wide x 12 mm deep for walls and ceiling to reduce sound transmission.

vi) Furring channels: ASTM C645; Formed from galvanized steel sheet, 22 mm winged flange type, cold rolled.

vii) Furring channels (hat type): ASTM C645; 0.5 mm base steel thickness, galvanized. 70 mm wide x 22 mm deep hat shaped channel.

viii) Heavy duty furring channels: ASTM C645; 0.9 mm steel thickness, galvanized hat shaped channel with a wider and deeper size as required by manufacturers.

ix) Hanger wires: 4.1 mm minimum diameter galvanized pencil rod.

x) Tie wire: 1.6 mm thick minimum diameter, soft annealed, galvanized steel wire.

xi) Corner bead, casing bead, and special shapes: Formed from 0.6 mm thick minimum, galvanized steel sheet, designed to be concealed by joint compound.

xii) Control joint strip: Roll formed from galvanized steel sheet, with a tape protected recess, 6 mm wide x 11 mm deep.

xiii) Screw fasteners: ASTM C1002 Type S; Corrosion resistant.

xiv) Concrete anchors: tie wire sleeve anchors, 'Redi-Drive Anchors' by ITW Red Head or approved alternative.

xv) Acoustic/Fire insulation: ASTM C665, Paperless, semi-rigid, spun mineral fibre mats, of thickness as indicated on Contract Drawings, 'Sustainable Insulation, NoiseReducer' by CertainTeed, 'EcoTouch Quiet Zone Pink Fiberglas Acoustic Insulation' by Owens Corning Inc. or 'Roxul AFB' by Roxul Inc.

xvi) Acoustical sealant:
- (1) Non-rated assemblies: ASTM C834; Acrylic, mould resistant sealant, paintable. 'Smoke and Acoustic Sealant CP506' by Hilti or approved alternative.
- (2) Fire-rated assemblies: ASTM E84; Acrylic based firestop sealant, colour: red or white as selected by Consultant. 'Flexible Firestop Sealant CP606' by Hilti or approved alternative.

xvii) Gypsum board: ASTM C1396; gypsum board 12.7 mm thick of maximum practical lengths to minimize end joints, unless indicated otherwise. Furnish Board by Certainteed Gypsum Canada, CGC Inc., or G-P Products.

xviii) Fire rated gypsum board: ASTM C1396; gypsum board 15.9 mm thick of maximum practical lengths to minimize end joints, unless indicated otherwise. Furnish Type X Board by Certainteed Gypsum Canada, CGC Inc., or G-P Products.

xix) Moisture and mould resistant board: 12.7 mm thick of maximum practical lengths to minimize end joints, unless indicated otherwise; 'M2Tech Moisture and Mould Resistant' by Certainteed Gypsum Canada, 'Sheetrock Mold Tough' by CGC Inc. or 'DensArmor Plus High Performance Interior Panel' by G-P Products.

xx) Tile Backer: Water resistant tile backer board meeting ASTM C1178 or ASTM C1278, thickness as indicated. 'Diamondback Tile Backer' by Certainteed Gypsum Canada, 'Fiberock Aqua-Tough Underlayment' by CGC Inc. or 'Dens Shield' by G-P Products.

xxi) Primer: Where indicated by board manufacturer, provide primer as required to achieve finishes as defined in ASTM C840.

xxii) Joint reinforcing tape:
(1) Standard gypsum board: ASTM C475; 50 mm wide x 0.25 mm thick, perforated paper, with chamfered edges.
(2) Moisture resistant and tile backer boards: ASTM C475; fibreglass mat joint tape as recommended by board manufacturer to suit location.

xxiii) Bonding adhesive: Type for purpose intended and as recommended and approved by manufacturer.

xxiv) Joint and patching compound: ASTM C475; Asbestos-free, supplied by manufacturer of gypsum board used.

xxv) Fast setting patching compound: ASTM C475; Asbestos-free, Sheetrock or Durabond by CGC Inc., 'Moisture and Mold Resistant Setting Compound with M2Tech' by Certainteed Gypsum Canada or approved alternative.

xxvi) Access doors: Supplied by other Sections for installation as part of the Work of this Section.

3) Execution

a) **EXAMINATION**

i) 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.

b) **SUSPENSION FRAMING**

i) Install ceiling systems in accordance with reviewed Shop Drawings and manufacturer's written instructions.

ii) Install hanger wires plumb and securely anchored to the building structural framing, independent of walls, pipes, ducts, and metal deck; install additional framing and hangers to bridge interference items.

iii) Install hanger wires at 1200 mm maximum centres along carrying channels, not less than 25 mm, and not more than 150 mm from channel ends.

iv) Install additional hangers at lighting fixture and ductwork locations. Do not attach hanger wires to mechanical or electrical equipment. Do not support mechanical and electrical fixtures and fitting on ceiling without the ceiling manufacturer's written acceptance.

v) Install main carrying channels transverse to structural framing members. Lap main carrying channels 200 mm minimum at splices and wire each end with two loops and prevent clustering or lining-up of splices.

vi) Install furring channels at 400 mm o.c., not less than 25 mm, and not more than 150 mm from perimeter walls, at openings, at interruptions in ceiling continuity, and at change in plane. Install furring channels to a tolerance of 3 mm maximum in 3600 mm.

vii) Install additional main carrying and furring channels to frame and to reinforce openings such as recessed lighting fixtures, access hatches, ceiling grilles, outlet boxes, ventilating outlets and similar items.

c) **STEEL STUDS AND FURRING**

i) Install steel studs and furring in accordance with reviewed Shop Drawings and manufacturer's written instructions.

ii) Install steel stud partitions to underside of structure unless indicated otherwise.

iii) Install track runners at floors, ceilings, and underside of structure; align track runners accurately and secure to structure at 600 mm centres maximum.

iv) Install double top track runner assembly to prevent the transmission of structural loads to steel studs.

v) Install steel studs vertically at 400 mm o.c., unless otherwise indicated, and not more than 50 mm from abutting walls, at openings, and at each side of corners. Install studs securely to track runners.

vi) Schedule and coordinate steel framing installation with mechanical and electrical services installation.

vii) Install full height, double studs at door and service openings, fastened together and stiffened back to the structure to prevent vibration when doors close.

viii) Provide double studs boxed together at all openings, sill, head and jambs and at door jambs, fastened together and stiffened back to the structure to prevent vibration. At each opening exceeding 900 mm in width, double studs shall be 20 ga. extending to structure above, and adequately anchored at each end. Provide steel studs above and below openings spaced at 400 mm oc maximum. All metal stud partitions above doors and screens over 1220 mm wide shall be secured to structure over and reinforced with sway bracing to stabilize walls to prevent lateral movement.

ix) Erect three studs at corner and intermediate intersections of partitions. Space 50 mm apart and brace together with wired 19 mm channels.

x) Stiffen partitions over 2440 mm high or 3000 mm long, or both, with horizontal bracing extended for full length of partitions. Provide one line of bracing in partitions. Space lines to provide equal unbraced panels. Provide bracing for portions of partitions over door openings in partitions over 3000 mm high, and bracing both above and below openings in partitions located no greater than 150 mm from top and bottom of opening, and extending two stud spaces beyond each edge of opening for both doors and windows. Wire tie or weld bracing to studs.

xi) Frame control joints using back to back double studs at abutting structural elements, at dissimilar backup interface, at dissimilar walls and ceilings, at structural expansion and control joints, at door and other openings, and at 9000 mm maximum spacing in continuous runs. Install control joint strips and secure in place.

xii) Install additional support framing at openings and cutouts for built-in equipment, upper cabinet support, access panels and similar items.

xiii) Attach to framing adequate steel reinforcing members or an 18 ga. steel stud mounted horizontally and notched around furring members to support the load of, and to withstand the withdrawal and shear forces imposed by, items installed upon the work of this Section. Such items include, but are not restricted to, coat hooks, washroom accessories, handrail anchors, rub rails, grab bars, guards, wall-hung cabinets and fitments, shelving, curtain and drape tracks; Owner supplied equipment; and minor mechanical and electrical work. Heavy mechanical and electrical equipment shall be self-supporting in Divisions 21, 22, 23 and 26.

xiv) Provide for support and incorporation of flush-mounted and recessed mechanical and electrical equipment and fixtures only after consultation and verification of methods with those performing the work of Divisions 21, 22, 23 and 26.

xv) Install cross bracing in accordance with the steel stud manufacturer's recommendations.

d) **FIRE RATED ASSEMBLIES**

i) Install Products in fire rated assemblies in strict accordance with applicable ULC tested and approved designs.

ii) Stiffen fire rated walls over 3.66 m high, where linear length of wall is greater than 2.44 m between perpendicular wall supports, with diagonal bracing above the ceiling extending perpendicular to wall at a 45E angle to structure above. Locate diagonal bracing at maximum 2.44 m o.c.

iii) Where double layers of gypsum board are shown, and required for fire rating, screw first layer to studs and furring and laminate the second layer to the first using joint filler as an adhesive. Stagger joints between first and second layers.

e) **ACOUSTICAL INSULATION**

i) Install acoustic insulation in partitions, between steel studs, and as indicated on Contract Drawings and in accordance with the manufacturer's instructions. Fill stud cavities to full height of partitions and carefully cut and fit acoustic insulation around services and protrusions.

f) **ACOUSTICAL SEALANT**

i) Install acoustical sealant to acoustically insulated partitions in accordance with the manufacturer's instructions and Contract Drawings.

ii) Install acoustical sealant under floor runner track, at partition perimeter both sides and at openings, cut-outs, and penetrations, concealed from view in the final installation.

iii) Install firestop fill material behind fire rated acoustical sealant and provide firestop identification tag.

iv) Smooth acoustical sealant with trowel prior to skin forming.

g) **GYPSUM BOARD**

i) Comply with ASTM C840. Install gypsum board in accordance with reviewed Shop Drawings and manufacturer's written instructions.

ii) Install gypsum board vertically or horizontally, whichever results in fewer end joints. Locate end joints over supporting members.

iii) Install gypsum board in lightly butted contact at edges and ends and with 1.6 mm maximum open space between boards; do not force gypsum board into place. Do not install imperfect, damaged or damp boards.

iv) Install gypsum board butting paired tapered edge joints, and mill-cut or field-cut end joints; do not place tapered edges against cut edges or ends.

v) Install vertical joints minimum 300 mm from the jamb lines of openings and stagger vertical joints over different studs on opposite sides of partitions.

vi) Do not locate joints within 200 mm of corners or openings, except where control joints occur at jamb lines or where openings occur adjacent to corners. Where necessary, place a single vertical joint over the centre of wide openings.

vii) Install gypsum board over concrete and concrete masonry units with adhesive as recommended by gypsum board manufacturer where indicated on Drawings.

viii) Cut, drill and patch gypsum board as may be necessary to accommodate the Work of other trades.

ix) Fire Separations:
(1) Construct gypsum board assemblies, where located, in accordance with tested assemblies to obtain required or indicated fire rated assemblies. As a minimum fire separations shall consist of metal framing covered on both sides by fire-rated gypsum board.
(2) Install assemblies tightly to enclosing constructions to maintain integrity of the separations. Install casing beads at all perimeter edges.

h) **CORNER, CASING BEADS AND TRIM**

i) Corner reinforcing bead: Install along all external angles, erect plumb, level and with a minimum of joints. Secure with screws at 225 mm o.c. apply filler over flanges flush with nose of the bead and extending at least 75 mm onto surface of board each side of corner. When filler dries, apply a thin coat of topping cement and blend onto adjoining surfaces.

ii) Casing bead: Install where wallboard butts against a surface having no trim concealing the juncture and where shown on drawings. Erect casing beads plumb or level, with minimum joints, and secure with screws at 300 mm o.c. apply filler over flange flush with bead and extending at least 75 mm onto surface of board. When dry, apply a thin coat of topping cement and blend onto adjoining surfaces.

iii) Recess channels and trim: Install recess channels and special metal trim where shown. Secure to substrate. Provide casing beads full height on wallboard edges at recess channels and metal trim.

i) **JOINT TAPING AND FINISHING**

i) Install reinforcing tape and a minimum of 3 coats of joint compound over gypsum board joints, metal trim and accessories, and screw fasteners in accordance with the gypsum board manufacturer's instructions.

ii) Fill gaps between, and any imperfections in, gypsum boards with joint compound, allow to dry, and sand smooth ready for painting.

iii) Install finished gypsum board Work smooth, seamless, plumb, true, flush, and with square, plumb, and neat corners.

iv) Finish gypsum board in accordance with ASTM C840 to the following grades:
   (1) Level 0: No taping, finishing, or accessories required. Use above suspended ceilings and within other concealed spaces, unless the assembly is fire rated, sound rated, sound or smoke controlled, or unless the space serves as an air plenum.
   (2) Level 1: At joints and interior angles embed tape in joint compound. Leave surface free of excess joint compound. Tool marks and ridges are acceptable. Use above suspended ceilings and within other concealed spaces if the gypsum board assembly is fire rated, sound rated, sound or smoke controlled, or the space serves as an air plenum.
   (3) Level 2: At joints and interior angles embed tape in joint compound with one separate coat of joint compound applied over joints, angles, fastener heads, and accessories. Use for water resistant gypsum board indicated for use as a substrate for ceramic tile.
   (4) Level 3: At joints and interior angles embed tape in joint compound with two separate coats of joint compound applied over all joints, angles, fastener heads, and accessories. Apply joint compound smooth and free of tool marks and ridges. Use where heavy grade wall coverings are the final decoration.
   (5) Level 4: At joints and interior angles embed tape in joint compound with three separate coats of joint compound applied over all joints, angles, fastener heads, and accessories. Apply joint compound smooth and free of tool marks and ridges. Use for all locations except those indicated for other finish levels.
   (6) Level 5: At joints and interior angles embed tape in joint compound with three separate coats of joint compound applied over all joints, angles, fastener heads, and accessories. Apply a thin skim coat of joint compound, or a material manufactured especially for this purpose, to the entire surface. Leave surface smooth and free of tool marks and ridges. Use where semi-gloss or gloss finish coatings are the final decoration.

j) **ACCESS DOORS**

i) Install access doors, supplied as part of other parts of the Work, in accordance with manufacturer's written instructions.

k) **SITE TOLERANCES**

i) Install metal support systems to ensure that, within a tolerance of +3 mm and -1.5 mm for plaster thickness, finish surfaces will be flat within 3 mm under a 3 m straightedge, and with no variation greater than 1.5 mm in any running 300 mm, and that surface planes shall be within 3 mm of dimensioned location.

l) **REPAIR**

i) Make good cut-outs for services and other work, fill in defective joints, holes and other depressions with joint compound.

ii) Make good defective work, and ensure that surfaces are smooth, evenly textured and within specified tolerances to receive finish treatments.

END OF SECTION

1 General

1.1 **SECTION INCLUDES**

.1 Design, labour, Products, equipment and services necessary for acoustical ceilings Work in accordance with the Contract Documents.

1.2 **REFERENCES**

.1 ASTM A653/A653M, Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvanealed) by the Hot-Dip Process.

.2 ASTM C635, Specification for the Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings.

.3 ASTM C636, Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels.

.4 ASTM C645, Specification for Non-Load Bearing (Axial) Steel Studs, Runners (Tracks), and Rigid Furring Channels for Screw Application of Gypsum Board.

.5 ASTM E1264, Classification for Acoustical Ceiling Products.

1.3 **DESIGN REQUIREMENTS**

.1 Design ceiling suspension systems in accordance with ASTM C636 and manufacturer's printed directions.

.2 Design tile ceiling system for adequate support of electrical fixtures as required by the current bulletin of the Electrical Safety Authority. Acoustic panel system is not designed to carry the weight of electrical equipment.

.3 Design hanger anchor and entire suspension system static loading not to exceed 25% of their ultimate capacity including lighting fixture dead loads.

.4 Design tile suspension system to support weight of mechanical and electrical items such as air handling boots and lighting fixtures, and with adequate support to allow rotation/relocation of light fixtures. Acoustic panel system is not designed to carry the weight of mechanical and electrical equipment.

.5 Design subframing as necessary to accommodate, to avoid conflicts and interferences where ducts or equipment prevent regular spacing of hangers.

1.4 **SUBMITTALS**

.1 Shop drawings:
  .1 Submit shop drawings in accordance with Section 01 33 00 indicating:
    .1 Suspension system layout including hangers and supports for acoustic tile system.

.2 Acoustic panel system including suspension system, hangers, supports and panel sizes and locations.
.3 Conditions at abutting, intersecting, and penetrating construction.
.4 Dimensioned locations of lighting fixtures, diffusers, sprinkler heads and other items that pierce the ceiling plane.

.2 Samples:
.1 Submit following samples in accordance with Section 01 33 00:
.1 One full-size sample of each type of tile panels to be used.
.2 One of each type of suspension system members.

.3 Certificates: Submit written certification stating that suspended ceiling system is designed for adequate support of electrical fixtures as required by the current bulletin of the Electrical Safety Authority.

1.5 QUALITY ASSURANCE

.1 Mock-up:
.1 Construct one 10 m^2 mock-up for each type of ceiling system incorporating typical light fixture and other typical mechanical and electrical fixtures.
.2 Test the adequacy of the suspension system to support the fixtures without deflection of ceiling or failure of hanging wire anchorage. Supply copy of Test Results to Consultant.
.3 Change materials and installation methods if tests indicate proposed system is inadequate and re-test as necessary until system approved.
.4 Give early notice to Consultant and Mechanical and Electrical Trades and co-operate with them in selecting suitable location for sample ceiling and timing of installation and test.
.5 Do not commence general installation work until sample ceiling approved, then install ceiling to conform with approved samples.
.6 Mock-up may form part of final Work, if acceptable to Consultant. Remove and dispose of mock-ups which do not form part of Work.

1.6 SITE CONDITIONS

.1 Do not install the Work of this Section until:
.1 Mechanical and electrical Work above the ceiling is complete.
.2 Relative humidity is below 80 %.
.3 Ventilation is adequate to remove excess moisture.
.4 Areas are closed and protected against weather, and maintained at no less than 10 degrees Celsius.

.2 Install temporary protection and facilities to maintain Product manufacturer's, and above specification, environmental requirements 24 h before, during, and after installation.

1.7 **MAINTENANCE**

.1 Submit extra acoustic ceilings amounting to 2% of gross ceiling area, allowing proportionately for each pattern and type specified to nearest full carton. Submit Products which are part of same production run as installed Products. Store maintenance Products as directed by Consultant.

1.8 **DELIVERY, STORAGE AND HANDLING**

.1 Transport, handle and store material in manner to prevent warp, twist, damage to panel edges and surfaces in accordance with Manufacturer's recommendations.

.2 Any warped and/or damaged panels and trim shall be rejected and be replaced by new, straight, undamaged and acceptable material at no cost to Owner.

.3 Bent, twisted or otherwise damaged Tee grid suspension components shall not be used under any circumstances. Replace such damaged items with new undamaged material at no additional cost to Owner.

.4 Store material in warm, dry place away from water and the elements. Protect against undue loading stresses and shock.

.5 All packaged material shall be delivered in original manufacturers wrappers and containers with labels and seals intact. All cartons shall bear U.L. label.

2 Products

2.1 **MATERIALS**

.1 Galvanized steel sheet: ASTM A653/A653-M, Z275; cold rolled, galvanized steel sheet.

.2 Main carrying channels: ASTM C645; Channels formed from galvanized steel sheet, 38 x 19 mm cold rolled.

.3 Subframing: ASTM C645; Channels formed from galvanized steel sheet, dimensions and spans as required.

.4 Hangers: 2.6 mm minimum diameter, galvanized steel wire.

.5 Tie wire: 1.6 mm minimum diameter, soft annealed galvanized steel wire.

.6 Concrete anchors: tie wire sleeve anchors, >Redi-Drive Anchors' by ITW Red Head or approved alternative.

.7 Wall mouldings and accessories, including but not limited to, corner caps, edge mouldings, panel hold over clip, metal closures, and trim. Finish and colour: same as main tees.

.8 Exposed main, cross tees, and relocatable cross tees: ASTM C635, 38 mm high steel, bulb tee design double steel web, rectangular single spans without exceeding a deflection of 1/360 of the span. Splices to be integral and reversible; cross tee interlocking into main tee. Colour and finish: Manufacturer's standard white.

.1 Suspension system:

.1 'Prelude XL' by Armstrong World Industries Inc.

.2 'Donn DXT' by CGC Inc.

.3 'Classic Hook' by Certainteed Ceilings Canada.

.9 Acoustic tile **(ACT-1)**: All Areas

.1 Basis of Design: Subject to compliance with project requirements, the design is based on the following: USG Interiors, LLC, "Mars High-NRC/High-CAC with plant based binder".

.2 Classification: Provide ceiling panels complying with ASTM E 1264 for type, form and pattern as follows:

.1 Type: IV, mineral base with membrane faced overlay

.2 Form: 1 & 2, Nodular and water felted

.3 Pattern: E & G, smooth and light texture

.3 Color: **Flat White 050**

.4 LR: Not less than 0.90

.5 NRC: Not less than **0.80**

.6 CAC: Not less than **40**

.7 Edge/Joint Detail: **SQ Square.**

.8 Suspension Grid/Width: **DXT [9/16 inch (14 mm)**

.9 Panel Thickness: **7/8 inch (23 mm).**

.10 Modular Size: **24 by 48 inches (610 by 1220 mm)**

.11 Recycled Content: **81%.**

.12 High Recycled Content: Classified as containing greater than 50% total recycled content. Total recycled content is based on product composition of post-consumer and pre- consumer post-industrial recycled content per FTC guidelines.

.13 VOC Emissions: Meets CA Specification 01350, GreenGuard Gold certified Low VOC.

.14 ClimaPlus™ 30 year warranty performance: Contains a broad spectrum antimicrobial additive on the face and back of the panel that provides resistance against the growth of mold and mildew. Includes sag resistance performance.

.12 Trim:

.1 Trim Channel: Extruded aluminum, alloy 6063.

.2 Hanging Clip: Commercial quality aluminum.

.3 T-Bar Connector Clip: Commercial quality aluminum.

.4 Splice Plate: Galvanized steel.

.5 Finish: Factory-applied baked polyester paint finish.

.6 'Axiom Knife Edge Trim' by Armstrong or approved alternative.

.13 Wall mouldings: To match acoustical ceiling suspension system.

3 Execution

3.1 **EXAMINATION**

.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.

3.2 **SUSPENSION SYSTEM**

.1 Coordinate locations and openings of mechanical and electrical services support, and penetration through the acoustical ceilings. Coordinate field conditions, clearances, measurements, and mechanical and electrical services testing and commissioning, above the acoustical ceilings.

.2 Install hanger wires plumb and securely anchored to the building structural framing, independent of walls, pipes, ducts, and metal deck; install additional framing and hangers to bridge interference items.

.3 Install acoustical ceiling systems in accordance with manufacturer's written instructions, reviewed shop drawings, and ASTM C636, listed in order of precedence.

.4 Install hanger wires at 1200 mm maximum centres along carrying channels, not less than 25 mm, and not more than 150 mm from channel ends.

.5 Install additional hangers at lighting fixture and air distribution ductwork locations. Do not attach hanger wires to mechanical or electrical equipment. Do not support mechanical and electrical fixtures and fitting on ceiling without the ceiling manufacturer's written acceptance.

.6 Install acoustical ceiling suspension system to a tolerance of 1:1200 of span and 0.4 mm maximum between adjacent metal members. Tolerances are not cumulative. Refer to Electrical Contract Drawings for fixture layout.

.7 Do not bend or twist hangers as a means of levelling. Form double loops tightly and lock to prevent vertical movement or rotation within the loop.

.8 Install edge moulding at intersection of ceiling and vertical surfaces.

.9 Centre acoustical ceiling suspension systems on room axis; install equal border pieces. Install hangers onto the ends of main tee runners at not more than 150 mm from ends of runners, adjacent and perpendicular to walls.

.10 Support the suspension system independently of walls, columns, ducts, pipes and conduits.

.11 Install main runners in maximum available lengths. Layout joints in suspension members to avoid the perimeters of recessed fixtures. Lock grid members to form a

rigid assembly. Install additional tee, suspension system framing around recessed fixtures, diffusers, grilles and other items for a complete assembly.

3.3 ACOUSTIC LAY-IN TILES

.1 Install acoustic tile in grid and trim system openings supported by bottom flanges of members. Provide special shapes and sizes to provide a complete installation by cutting tile to fit into openings. Fit tile moderately tight between upright legs of members.

.2 Carefully cut and trim acoustic tiles to accommodate items piercing the finished ceiling plane.

.3 Remove and replace acoustic tiles with broken edges, or damaged, marked, discoloured, soiled, or stained faces.

3.4 ADJUSTMENTS AND CLEANING

.1 Clean soiled or discoloured surfaces of exposed work on completion of work.

.2 Replace components which are visibly damaged, marred or uncleanable.

END OF SECTION

PART 1 – GENERAL

1.1 SUMMARY

A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 01 - GENERAL REQUIREMENTS which are hereby made a part of this Section of the Specifications. Section includes: Resilient Stair Treads and Risers and Stringers and accessories.

1.2 DESCRIPTION OF WORK

A. **Work Included:** Provide labor, materials and equipment necessary to complete the work of this Section, including but not limited to the following:

i. Section 09 65 13.23 Rubber Stair Treads and accessories

ii. Section 09 65 13.33 Resilient Accessories

iii. Section 09 01 60 Maintenance of Flooring

B. **Related Work:** The following items are not included in this Section and are specified under the designated Sections:

i. Section 03 30 00 Cast-In-Place Concrete, Substrate Preparation

ii. Section 06 10 00 Rough Carpentry, Substrate Preparation

C. References (Industry Standards):

i. ASTM International (ASTM):

a. ASTM F2169, Standard Specification for Resilient Stair Treads

b. ASTM E648, Standard Test Method for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source

c. ASTM E662, Standard Test Method for Specific Optical Density of Smoke Generated by Solid Materials

d. ASTM F386, Standard Test Method for Thickness of Resilient Flooring Materials Having Flat Surfaces

e. ASTM F925, Standard Test Method for Resistance to Chemicals of Resilient Flooring

f. ASTM F1514, Standard Test Method for Measuring Heat Stability of Resilient Flooring by Color Change

g. ASTM D2240, Standard Test Method for Rubber Property—Durometer Hardness

h. ASTM D2047, Standard Test Method for Static Coefficient of Friction as Measured by the James Machine

i. ASTM D3389, Standard Test Method for Coated Fabrics Abrasion Resistance (Rotary Platform Abrader)

j. ASTM F710, Standard Practice for Preparing Concrete to Receive Resilient Flooring

k. ASTM F1482, Standard Guide to Wood Underlayments products Available for Use Under Resilient Flooring

ii. National Fire Protection Association (NFPA):

a. NFPA 253, Test Method for Critical Radiant Flux of Floor Covering Systems Using a Radiant Energy Source

b. NFPA 258, Test Method for Specific Density of Smoke Generated by Solid Materials

1.3 SUBMITTALS

A. **General:** Submit listed submittals in accordance with Conditions of the Contract and Division 1 Submittal Procedures.

B. **Product Data:** Submit manufacturer's technical data sheet, care & maintenance document, submittal and/or warranty for each material and accessory proposed for use.

C. **Samples:** Submit representative samples of each product specified for verification, in manufacturer's standard size samples of each resilient product color, texture and patter required.

1.4 QUALITY ASSURANCE

A. **Manufacturer Qualifications:** Provide resilient stair treads and accessory materials manufactured in the United States of America by a firm with a minimum of 10 years' experience with resilient flooring materials of type equivalent to those specified.

i. Provide resilient stair tread products, including risers, stringers, and subfloor preparation products from one manufacturer to ensure color matching and compatibility.

ii. Manufacturer shall be capable of providing technical training and technical field service representation.

B. **Installer Qualifications:** Installer must be professional, licensed, insured and acceptable to manufacturer of resilient stair tread materials. Project Managers or Field Supervisors must be INSTALL (International Standards & Training Alliance) certified CFI (Certified Floorcovering Installers) Certified and/or an FCICA (The Flooring Contractors Association) CIM (Certified Installation Manager) for the requirements of the project.

C. Sustainable Design Requirements:

i. Rubber Stair Tread must be easily cleaned and do not require coatings and strippers, or use chemicals that may be hazardous to human health.

ii. Rubber Stair Tread must have a published EPD.

iii. Rubber Stair Tread must have a published HPD.

iv. Rubber Stair Tread must have is 100% Recyclable.

v. Rubber Stair Tread must have be SCS FloorScore® Certified and meets California Specifications Section 01350.

vi. Rubber Stair Tread must be manufactured in a Facility that is ISO 14001 Certified.

vii. Rubber Stair Tread must be free of materials known to be teratogenic, mutagenic or carcinogenic including halogens, asbestos and chlorines.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in labeled packages. Store and handle in strict compliance with manufacturer's recommendations. Protect from damage due to weather, excessive temperatures, and construction operations.

B. Deliver materials sufficiently in advance of installation to condition materials to the required temperature for 48-hours prior to installation.

1.6 PROJECT CONDITIONS

A. Install Rubber Stair Treads after other finishing operations, including painting, have been completed.

B. Maintain temperature at service levels and/or the ambient temperature must remain steady (± 10° F) between 65° F and 85° F for at least 48-hours prior to, during and until substantial completion.

C. Maintain relative humidity at service levels, or between 40% and 65% RH.

D. Avoid conditions in which dew point causes condensation on the installation surface.

1.7 WARRANTY

A. Provide manufacturer's standard limited commercial warranty to cover manufacturing defects.

PART 2 - PRODUCTS

2.1 MANUFACTURER

A. Basis-of-Design: Roppe Corporation | 1602 N Union St. | Fostoria, OH 44830 | P: (800) 537-9527

B. Substitutions: No substitutions permitted

2.2 PRODUCTS

A. ROPPE RUBBER STAIR TREADS **(ST-1):**

i. Specify Profile by number and description: *Profile #93 Textured c/w Teak Brown 'T' grit strip.*

ii. Specify Profile by Dimension - thickness (nominal thickness shall conform to industry standards and shall contain no asbestos fiber): *Thickness based on manufacturer's standard thickness for rubber stair treads.*

iii. Specify Profile by Dimension - length (length, style number, with riser, without riser shall all be specified here. Material shall conform to all standards and shall contain no asbestos fiber): *Dimensions to suit existing stair treads. G.C./Subtrade to verify on site prior to ordering.*

iv. Specify Color Shade with Square or Round Nose: *Square Nose: Tread colour shall be: 'M413 amarillo' c/w Teak Brown 'T' grit strip.*

v.

a. Roppe Raised Design rubber stair treads, risers and stringers are solid, homogeneous, vulcanized rubber.

b. ASTM F2169, Standard Specification for Resilient Stair Treads; Complies, Type TS, Class 1 & Group 1 & 2, Grade 1

c. ASTM E648, Standard Test Method for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source; Class I

d. ASTM E662, Standard Test Method for Specific Optical Density of Smoke Generated by Solid Materials; Pass <450

e. ASTM F386, Standard Test Method for Thickness of Resilient Flooring Materials Having Flat Surfaces, Passes

f. ASTM F925, Standard Test Method for Resistance to Chemicals of Resilient Flooring; Passes

g. ASTM F1514, Standard Test Method for Measuring Heat Stability of Resilient Flooring by Color Change; Passes

h. ASTM D2240, Standard Test Method for Rubber Property—Durometer Hardness; Passes >85 Shore A

i. ASTM D2047, Standard Test Method for Static Coefficient of Friction as Measured by the James Machine, >0.6

j. ASTM D3389, Standard Test Method for Coated Fabrics Abrasion Resistance (Rotary Platform Abrader), Passes <1 gram loss.

k. ASTM F710, Standard Practice for Preparing Concrete to Receive Resilient Flooring

l. ASTM F1482, Standard Guide to Wood Underlayments products Available for Use Under Resilient Flooring

m. NFPA 253, Test Method for Critical Radiant Flux of Floor Covering Systems Using a Radiant Energy Source

n. NFPA 258, Test Method for Specific Density of Smoke Generated by Solid Materials

2.3 INSTALLATION AND MAINTENANCE MATERIALS

A. **Moisture Mitigation:** Moisture testing is required for all Raised Design Rubber Stair Treads installations. Mitigation should be performed if results indicate high levels of moisture. Recommended Moisture Mitigation Product:

i. Excelsior MM-100, Moisture Mitigation provided by Roppe

a. Unit Size: 2.5 Gallons

b. Coverage: 1000 square feet per unit with one coat

c. MM-100 is a water, solvent and VOC free, polyurethane-based moisture mitigation product used to treat concrete slabs with excessive moisture levels beyond what flooring adhesives allow.

d. MM-100 can block moisture up to 20 lbs. MVER or 99% RH.

e. MM-100 is a single component product, eliminating extensive mix times and concerns regarding pot life.

f. MM-100 does not require aggressive concrete preparation, such as shot blasting or diamond grinding.

g. MM-100 is a two coat system that is incredibly easy to apply and does not require any specialized equipment, its excellent coverage rates also make it incredibly cost effective.

h. Despite being a two coat system, MM-100 is incredibly fast drying.

i. Flooring or subsequent coatings can be installed in less than two hours.

j. Backed by a 10 year material and labor warranty, MM-100 is a fast and easy solution for the moisture issues that commonly plague flooring installations.

B. **Substrate Preparation Products:** Substrates should be prepared to properly receive the resilient flooring products being specified. Trowelable leveling and patching compounds that are latex-modified, Portland cement based or blended hydraulic cement based formulation. Recommended Substrate Preparation Products:

i. Excelsior NP-230, Non-Porous Substrate Primer provided by Roppe

a. Unit Size: 2.5 Gallons

b. Coverage: 1000 Square Feet per unit with one coat

c. Used over MM-100 to promote adhesion of cementitious materials

d. Single component and fast drying to allow for quick and easy installation

e. Contains an aggregate to provide mechanical bond for cementitious materials

ii. Excelsior CP-300, Cementitious Patch provided by Roppe

a. Unit Size: 10 lb. Pail

b. Coverage: 33 Square Feet per unit @ 1/8”

c. Doesn’t require primer over porous substrates

d. Install flooring in as little as 30 minutes

iii. Excelsior SU-310, Self-Leveling Underlayment provided by Roppe

a. Unit Size: 50 lb. Bag

b. 5500 PSI Compressive Strength after 28 days

c. Install flooring within 12 hours

d. Pumpable

C. **Adhesives:** Adhesives should be selected based on the site conditions and use of the space being installed. Recommended Adhesive Products:

i. Excelsior AW-510, Acrylic Wet-Set Adhesive provided by Roppe

a. Unit Size: 1 Gallon & 4 Gallon

b. Coverage: 150 Square Feet

c. Standard installations over porous and non-porous substrates

d. Hard set adhesive adding to dimensionally stable materials

e. Excellent sheer strength

f. Approved for Hill-Rom Beds

g. Installation Limits

(1) 90% RH, ASTM F2170

(2) 6 lbs. MVER, ASTM F1869

(3) 7-10 pH

ii. Excelsior EN-610, Epoxy Nose Filler Adhesive provided by Roppe

a. Unit Size: 13.5 oz. Cartridge

b. Coverage: 25 linear feet with ½” bead / 50 linear feet with ¼” bead

c. Standard installations over porous and non-porous substrates

d. Directly install over concrete, metal or wood

e. Excellent sheer strength

f. Installation Limits

(1) 90% RH, ASTM F2170

(2) 6 lbs. MVER, ASTM F1869

(3) 7-10 pH

iii. Excelsior C-630, Contact Adhesive provided by Roppe

a. Unit Size: 1 Quart

b. Coverage: 20 – 40 sq. ft.

120-140 lin. ft. per unit

c. Vertical or Horizontal installations over porous and non-porous substrates

d. Hard set adhesive adding to dimensionally stable materials

e. Superior sheer strength

f. Installation Limits

(1) 85% RH, ASTM F2170

(2) 6 lbs. MVER, ASTM F1869

(3) 7-10 pH

iv. Excelsior TP-620, Pressure Sensitive Tape based adhesive provided by Roppe

a. Unit Size: 1” x 164’ (6 per case)

4” x 164’ (3 per case)

9.5” x 164” (1 per case)

b. Easy installations over porous and non-porous substrates

c. No Clean-up, Limited Waste

d. Superior sheer strength

e. Installation Limits

(1) 80% RH, ASTM F2170

(2) 5 lbs. MVER, ASTM F1869

(3) 7-10 pH

v. Excelsior MS-700, Modified Silane Wet-Set Adhesive provided by Roppe

a. Unit Size: 3 Gallon

b. Coverage: 480-705 Square Feet per unit

c. Standard installations over porous and non-porous substrates

d. Excellent green grab

e. Hard set adhesive adding to dimensionally stable materials

f. Excellent sheer strength

g. Approved for Hill-Rom Beds

h. Superior bond strength

i. Great for environments with topical moisture

j. Great for exterior applications

k. Installation Limits, Indoor Installations only

(1) 95% RH, ASTM F2170

(2) 10 lbs. MVER, ASTM F1869

vi. Excelsior EW-710, Epoxy Wet-Set Adhesive provided by Roppe

a. Unit Size: 1 Gallon

b. Coverage: 150 Square Feet per unit

c. Standard installations over porous and non-porous substrates

d. Excellent green grab

e. Hard set adhesive adding to dimensionally stable materials

f. Excellent sheer strength

g. Approved for Hill-Rom Beds

h. Superior bond strength

i. Great for environments with topical moisture

j. Great for exterior applications

k. Installation Limits, Indoor Installations only

(1) 90% RH, ASTM F2170

(2) 6 lbs. MVER, ASTM F1869

(3) 7-10 pH

D. **Accessories:** Items recommended for installation:

i. Roppe Risers

a. Height: 7” (177.8 mm)

b. Thickness: .100” (2.5 mm)

c. Toe Length: 9/16” (14.28 mm)

d. Specify Riser Length: *Riser height and length shall be verified on site by G.C. & Subtrade prior to ordering.*

e. Color Shall be: ‘M407 Tierra’

ii. Roppe Stringers

a. Height: 10” (254 00 mm)
12” (304.8 mm)

b. Thickness: .080” (2 mm)

c. Colour: Shall match stair treads.

iii. Roppe Landings

a. Supply & install Roppe rubber landing mats at mid landing to match stair tread colour.

E. **Maintenance Materials:** Proper maintenance of the installation is critical to the long term performance of the flooring products being specified. Using the appropriate chemicals to maintain the product according to the environment in which it is specified is critical. Recommend maintenance products:

i. Excelsior NC-900, All-Purpose Neutral pH Cleaner provided by Roppe

a. For initial maintenance.

b. For daily and routine maintenance.

ii. Excelsior CM-910, Cleaner/Maintainer provided by Roppe

a. For daily or long-term maintenance.

b. Has a slight polymer to restore the luster of the product while providing cleaning efficacy.

iii. Excelsior MF-940 for ease of floor maintenance, provided by Roppe

a. Creates protective wear layer that protects flooring and eases maintenance.

iv. Excelsior GF-950, Gloss Acrylic Floor Finish, for ease of floor maintenance, provided by Roppe

a. Creates protective wear layer that protects flooring and eases maintenance.

v. Excelsior PF-960, High Performance Floor Finish for ease of floor maintenance, provided by Roppe.

a. Creates a protective wear layer that protects flooring and eases maintenance.

vi. Excelsior PR-930, High Performance Finish Remover, provided by Roppe.

PART 3 – EXECUTION

3.1 GENERAL

A. **General Contractor Responsibilities:**

i. Supply a safe, climate controlled building and subfloor as detailed in Roppe Technical Data Sheets.

ii. Ensure substrate meets the requirements of ASTM F2169, Roppe Technical Data Sheets and Excelsior Technical Data Sheets.

iii. Provide a secure storage area that is maintained permanently or temporarily at normal operating temperature and humidity conditions between 65° F and 85° F and between 40% and 65% relative humidity, for at least 48-hours prior to and during the application of the flooring, so the flooring contractor can acclimate the flooring materials per manufacturer's instructions.

iv. Provide an installation area that is weather tight and maintained either permanently or temporarily at ambient service temperature and humidity. Normal operating temperature and humidity conditions are between 65° F and 85° F and between 40% and 65% relative humidity, for at least 48-hours prior to and during the application of the flooring per the manufacturer's instructions.

v. Ensure areas with direct prolonged exposure to sunlight are protected with protective UVA/UVB restrictive coatings or films.

vi. Areas of the flooring that are subject to direct sunlight through doors or windows should have them covered using blinds, curtains, cardboard or similar for the time of the installation and 72-hours after the installation to allow the adhesive to cure. Note: These areas should be installed using wet adhesives only.

vii. Conduct initial maintenance prior to final usage per the Roppe Care & Maintenance Documents. Do not conduct initial maintenance until adhesive has cured per the adhesive technical data.

B. **Flooring Contractor Responsibilities**:

i. Provide trained installers that are professional, licensed, insured and acceptable to manufacturer of resilient stair tread materials.

ii. Ensure installers or installation teams meet one of the following requirements:

iii. Have completed INSTALL (International Standards & Training Alliance) or CFI (Certified Floorcovering Installers) training programs and/or are certified by INSTALL or CFI.

iv. Are being supervised by Project Managers or Field Supervisors that are INSTALL (International Standards & Training Alliance) certified, CFI (Certified Floorcovering Installers) Certified and/or an FCICA (The Flooring Contractors Association) CIM (Certified Installation Manager).

v. Follow all requirements in the appropriate Roppe and/or Excelsior Technical Data Sheets, Care & Maintenance Documents, Warranties and other technical documents or instructions.

3.2 EXAMINATION

A. **General**: Follow guidelines laid out in Division 01, Section 01 71 00 – Examination and Preparation, as well as Section 01 43 00 – Quality Assurance.

B. **Verification of Conditions:** Inspect all substrates to ensure they are clean, smooth, permanently dry, flat, and structurally sound. Confirm all areas are properly sealed and acclimated per manufacturer's requirements.

C. **Verification of Products:** In accordance with manufacturer's installation requirements, visually inspect material for size, color or visual defects prior to installing. Any material that is incorrect or visually defective shall not be installed.

3.3 SUBSTRATE PREPARATION

A. **General**: Follow guidelines laid out in Division 01, Section 01 71 00 – Examination and preparation. All work required ensuring substrate or subfloor meets manufacturers' guidelines are the responsibility of the general contractor.

i. Ensure surface is troweled flush with surface of concrete.

ii. Follow material manufacturer's as well as adhesive manufacturer's instructions for installation.

B. **Preparation**: Ensure substrate meets the requirements of ASTM F710 for concrete substrates and ASTM F1482 for wood substrates and/or Roppe Technical Data Sheets and Excelsior Technical Data Sheets.

i. Substrates must be free of visible water or moisture, dust, sealers, paint, sweeping compounds, curing compounds, residual adhesives and adhesive removers, concrete hardeners or densifiers, solvents, wax, oil, grease, asphalt, visible alkaline salts or excessive efflorescence, mold, mildew and any other extraneous coating, film, material or foreign matter.

ii. Acclimate all products to be used during the installation and the installation environment prior to installation according to the manufacturers written instructions.

C. **Concrete Substrates:**

i. **Moisture Testing:** Perform moisture testing per the manufacturer's recommendations to determine conditions, it is recommended to treat new and existing slabs a little bit different to ensure adequate conditions exist for installation.

a. New concrete substrates: it is recommended to perform ASTM F2170 Relative Humidity testing no more than a week prior to installation to determine the levels present and when to proceed with the installation.

b. Existing concrete substrates: in addition to ASTM F2170 testing, existing slabs that have previously had floor covering installed, must be tested to ASTM F1869 Calcium Chloride test kits to determine the MVER of the concrete.

ii. Mechanically remove contamination on the substrate that may cause damage to the flooring material, this includes paint, permanent and non-permanent markers, pens, crayons, etc. Leaving these on the substrate or marking with them on the back of the material could cause bleed through and damage the flooring.

iii. Fill cracks, holes, depressions and irregularities in the substrate to prevent transferring through to the surface of the resilient flooring. Use a high-quality Portland cement based product such as Excelsior installation products provided by Roppe.

D. **Wood Substrates:** wood substrates must have a minimum 18" (45.7 cm) of cross ventilated space beneath the joist.

i. Wood substrates must be a minimum 1" thick with a double layer construction.

ii. Wood substrates must be rigid and free of movement.

iii. Wood substrates must not be OSB (Oriented Strand Board), particle board, chipboard, lauan or composite type underlayments.

3.4 INSTALLATION

A. **General**: Follow all relevant guidelines detailed in Division 01, as well as flooring and adhesive manufacturer's technical data sheets.

B. **Resilient Rubber Treads:** Install material in accordance with manufacturer's recommendations.

i. Select the appropriate adhesive for the application and job site conditions.

ii. Install material is installed according to installation instructions.

iii. Ensure material is rolled appropriately into the adhesive.

C. **Resilient Rubber Risers:** Install in accordance with manufacturer's installation recommendations.

i. Dry fit Risers to the required lengths.

ii. Scribe glue line on back of riser and at edge of Riser material.

iii. Apply adhesive in full spread for complete coverage of the Riser material.

iv. Apply **Rubber Risers** to the prepared surface as level and straight as possible.

v. Hand roll Riser material onto wall and floor surface and remove excess adhesive.

D. **Resilient Rubber Stringers:** Install in accordance with manufacturer's installation recommendations.

i. Substrates must be smooth, flat, flush, full and complete for the entire stairwell,

ii. Ensure adhesive is approved for use with stringer material and that proper trowel or applicator type and size is used.

iii. Hand roll Stringer material onto wall surface and remove excess adhesive.

E. **Interface with Other Work:** If caulking or sealing is required after installation, please contact the manufacturer for a suitable, color matching caulk.

3.5 CLEANING & MAINTENANCE

A. **General**: Clean up installation area and sweep, dust or wipe material to remove any dirt, dust or debris.

B. **Initial Maintenance**: Conduct initial maintenance per the manufacturer's recommended procedures stated in the Maintenance Documents. All documentation is available upon request or from the Roppe website. Excelsior Cleaning products and floor finishes are the recommended products for use. All can be found linked to the product on the Roppe website or at www.excelsiorproducts.net.

C. **Regular Maintenance**: Conduct maintenance on regular intervals as needed. Insufficient cleaning will reduce the wear life of the flooring and alter the dissipative properties of the tiles. The amount of maintenance depends directly upon the amount of dirt and particulates the floor is subjected to.

3.6 CLOSEOUT ACTIVITIES

A. **General**: Follow all federal, state and local requirements and Division 01 Section 01 76 00 – Protecting Installed Construction and Section 01 78 00 – Closeout Submittal requirements for these activities.

B. **Protection**: Protect newly installed material with construction grade paper or protective boards, such as Masonite or Ram Board, to protect material from damage by other trades. Be sure all construction debris is swept up and removed prior to the protective material being installed and does not get trapped underneath. Limit usage and foot traffic according to the adhesive's requirements. When moving appliances or heavy furniture, protect wall base from scuffing and tearing using temporary floor protection as well.

END OF SECTION

PART 1 – GENERAL

1.1 GENERAL PROVISIONS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions of Division 01 General Requirements, Specification Sections, apply to this section.

1.2 SUMMARY

A. Section includes:

i. Resilient Wall Base

1.3 SUBMITTALS, RELATED DOCUMENTS

A. **General:** Submit listed submittals in accordance with Conditions of the Contract and Division 1 Submittal Procedures.

B. **Product Data:** Submit manufacturers documentation for each material and accessory proposed for use.

i. Installation Instructions and Technical Data

ii. Care & maintenance document

iii. Warranty

iv. Product Submittal

C. **LEED Submittals:**

i. Product Data for Credit EQ 4.1: For adhesives, including printed statement of VOC content and chemical components.

D. **Samples for Initial Selection**: For each type of product indicated.

E. **Samples for Verification**: For each type of product indicated, in manufacturer's standard- size samples of each resilient product color, texture and pattern required.

F. **Product Schedule**: For resilient products. Use same designations indicated on Drawings.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: Provide resilient wall base materials manufactured in the United States of America by a firm with a minimum of 10 years' experience with resilient rubber materials of type equivalent to those specified.

B. Provide resilient wall base, flooring materials, adhesives, accessories and subfloor preparation products from one manufacturer to ensure color matching and compatibility.

C. Manufacturer shall be capable of providing technical training and technical field service representation.

1.5 RELATED WORK

A. **Installer Qualifications:** Installer must be professional, licensed, insured and familiar with the resilient flooring material to be installed. Project Managers or Field Supervisors must be INSTALL (International Standards & Training Alliance) certified CFI (Certified Floorcovering Installers) Certified and/or an FCICA (The Flooring Contractors Association) CIM (Certified Installation Manager) for the requirements of the project.

B. Sustainable Design Requirements:

i. Rubber Base must be easily cleaned and does not require coatings and strippers, or use chemicals that may be hazardous to human health.

ii. Rubber Base must have a published EPD.

iii. Rubber Base must be 100% Recyclable.

iv. Rubber Base must have be SCS FloorScore® Certified and meets California Specifications Section 01350.

v. Rubber Base must be free of materials known to be teratogenic, mutagenic or carcinogenic including halogens, asbestos and chlorines.

1.6 DELIVERY, STORAGE AND HANDLING

A. Store resilient products and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within the range recommended by Roppe of 65 degrees F (18 degrees C) and 85 degrees F (29 degrees C).

1.7 PROJECT CONDITIONS

A. Install resilient products after other finishing operations, including painting, have been completed.

B. Maintain ambient temperatures within range of (± 10 degrees) 65 degrees F (18 degrees C) and 85 degrees F (29 degrees C) in the spaces to receive the resilient products during:

i. 48 hours before installation.

ii. During installation.

iii. 48 hours after installation.

C. Maintain relative humidity between 40% and 65% during installation.

D. Avoid conditions in which dew point causes condensation on the installation surface.

1.8 WARRANTY

A. Provide manufacturer's standard limited commercial warranty to cover manufacturing defects.

PART 2 - PRODUCTS

2.1 MANUFACTURER

A. Basis-of-Design: Roppe Corporation| 1602 North Union Street | Fostoria, OH 44830 | P: (800) 537-9527

B. Substitutions: No substitutions permitted

2.2 PRODUCTS

A. ROPPE PINNACLE TS RUBBER WALL BASE - specify rubber wall base with the following characteristics: **Meets the performance requirements for the following Industry Standards:**

i. ASTM F1861, Standard Specification for Resilient Wall Base, Type TS (rubber, vulcanized thermoset), Group 1 (solid, homogeneous)

ii. Specify style by Alpha and name: A- Cove

iii. Specify size by name and description: Roppe Pinnacle Rubber Wall Base height: 5" (127 mm)

iv. Specify size by name and description: Roppe Pinnacle Rubber Wall Base 120' Rolls (36.58 m)

v. Specify Color by Color Number and Name: 131 'Bisque'

vi. ASTM E84, Standard Test Method for Surface Burning Characteristics of Building Materials, **Class B**

vii. ASTM E648 (NFPA 253), Standard Test Method for Critical Radiant Flux, **Class 1, >0.45 W/cm²**

viii. ASTM E662 (NFPA 258), Standard Test Method for Smoke Density, Passes, **<450**

ix. ASTM F137, Standard Test Method for Flexibility of Resilient Flooring Materials Protocols, **Passes**

x. ASTM F925, Standard Test Method for Resistance to Chemicals of Resilient Flooring, **Excellent**

xi. ASTM F1515, Standard Test Method for Measuring Light Stability of Resilient Flooring protocols, **Passes**

xii. NFPA 253, Test Method for Critical Radiant Flux of Floor Covering Systems Using a Radiant Energy Source

xiii. NFPA 255, Standard Method of Test of Surface Burning Characteristics of Building Materials

xiv. NFPA 258, Test Method for Specific Density of Smoke Generated by Solid Materials

xv. PINNACLETS RUBBER WALL BASE is SCS FloorScore® Certified and meets California Specifications Section 01350

xvi. PINNACLETS RUBBER WALL BASE and accessories do not contain chemicals that may be hazardous to human health

xvii. PINNACLE (TS) RUBBER WALL BASE meets NSF 332 Gold Criteria

xviii. PINNACLE (TS) RUBBER WALL BASE meets CHPS Criteria

xix. PINNACLE (TS) RUBBER WALL BASE is manufactured in the U.S.A.

xx. PINNACLE (TS) RUBBER WALL BASE is free of materials known to be teratogenic, mutagenic or carcinogenic

xxi. PINNACLE (TS) RUBBER WALL BASE is free of Halogens

xxii. PINNACLE (TS) RUBBER WALL BASE is free of Asbestos

xxiii. PINNACLE (TS) RUBBER WALL BASE is free of Phthalates

xxiv. PINNACLE (TS) RUBBER WALL BASE is free of Heavy Metals

xxv. PINNACLE (TS) RUBBER WALL BASE is free of any Red List Chemicals

2.3 INSTALLATION AND MAINTENANCE MATERIALS

A. Substrate/Background Preparation Products: Adhesives: Adhesives should be selected based on the site conditions and use of the space being installed.

B. Recommended Adhesive Products:

i. Excelsior WB-600 Acrylic Wall Base Adhesive provided by Roppe

a. Unit Size: 30 oz. cartridge, 1 Gallon & 4 Gallon

b. Coverage: 30 – 70 linear feet per cartridge, 180 – 340 linear feet per gallon

c. Standard installations over porous backgrounds

d. 100 % solids, solvent free and low VOCs

e. Hard set adhesive adding to dimensionally stable materials

f. Excellent sheer strength

ii. Excelsior C-630 Contact Adhesive provided by Roppe

a. Unit Size: 1 Quart

b. Coverage: 20 – 40 Square Feet per unit / 120 – 140 Linear Feet per unit

c. Standard installations over porous and non-porous substrates

d. Hard set adhesive adding to dimensionally stable materials

e. Excellent sheer strength

f. Superior bond strength

g. Great for environments with topical moisture

C. **Accessories:** Items needed to complete the installation. Recommended accessory products:

i. Roppe Factory Inside Corners

ii. Roppe Factory Outside Corners

iii. Roppe Factory Rubber Corner Blocks

iv. Roppe Factory Mini-Rubber Corners

v. Color-matched Caulks

D. **Maintenance Materials:** Proper maintenance of the installation is critical to the long term performance of the rubber wall base products being specified. Using the appropriate chemicals to maintain the product according to the environment in which it is specified is critical. Recommended maintenance products:

i. Excelsior NC-900, All-Purpose Neutral pH Cleaner provided by Roppe

a. For initial maintenance

b. For daily and routine maintenance

ii. Excelsior PR-930 Performance Finish Remover

a. For removal of finish that has been accidentally applied to material

PART 3 – EXECUTION

3.1 GENERAL

A. **General Contractor Responsibilities:**

i. Supply a safe, climate controlled building as detailed in Roppe Technical Data Sheets.

ii. Ensure substrate/background meets the requirements of ASTM F1861, Roppe Installation Instructions and Technical Data Sheets and Excelsior Maintenance Products Installation Instructions and Technical Data Sheets.

iii. Provide a secure storage area that is maintained permanently or temporarily at normal operating temperature and humidity conditions between 65 degrees F and 85degrees F and between 40% and 65% relative humidity, for at least 48-hours prior to and during the application of the wall base, so the contractor can acclimate the rubber base materials per manufacturer's instructions.

iv. Provide an installation area that is weather tight and maintained either permanently or temporarily at ambient service temperature and humidity. Normal operating temperature and humidity conditions are between 65degrees F and 85degrees F and between 40% and 65% relative humidity, for at least 48-hours prior to and during the application of the wall base per the manufacturer's instructions.

v. Ensure areas with direct prolonged exposure to sunlight are protected with protective UVA/UVB restrictive coatings or films.

vi. In areas where the walls are subject to direct sunlight through doors or windows, the doors and windows should be covered using blinds, curtains, cardboard or similar for the time of the installation and 72-hours after the installation to allow the adhesive to cure. Note: These areas should be installed using wet adhesives only.

vii. Conduct initial maintenance prior to final usage per the Roppe Care & Maintenance Documents. Do not conduct initial maintenance until adhesive has cured per the adhesive technical data.

viii. Provide trained installers that are professional, licensed, insured and acceptable to manufacturer of resilient rubber wall base materials.

ix. Ensure installers or installation teams meet one of the following requirements:

a. Have completed INSTALL (International Standards & Training Alliance)

b. CFI (Certified Floorcovering Installers) training programs

c. Certified by INSTALL or CFI.

d. Are being supervised by Project Managers or Field Supervisors that are INSTALL (International Standards & Training Alliance) certified, CFI (Certified Floorcovering Installers) Certified and/or an FCICA (The Flooring Contractors Association) CIM (Certified Installation Manager).

x. Follow all requirements in the appropriate Roppe and/or Excelsior Technical Data Sheets, Care & Maintenance Documents, Warranties and other technical documents or instructions.

3.2 EXAMINATION

A. **General**: Follow guidelines laid out in Division 01, Section 01 71 00 – Examination and Preparation, as well as Section 01 43 00 – Quality Assurance.

B. **Verification of Conditions:** Inspect all substrates/backgrounds to ensure they are clean, smooth, permanently dry, structurally sound and without voids. Confirm all areas are properly sealed and acclimated per manufacturer's requirements.

C. **Verification of Products:** In accordance with manufacturer's installation requirements, visually inspect material for size, style, color or visual defects prior to installing. Any material that is incorrect or visually defective shall not be installed.

3.3 SUBSTRATE/BACKGROUND PREPARATION

A. **General**: Follow guidelines laid out in Division 01, Section 01 71 00 – Examination and preparation. All work required ensuring substrate/background meets manufacturers' guidelines are the responsibility of the general contractor.

B. **Preparation**: Ensure substrate/background meets the requirements of ASTM F1861 for resilient wall base and/or Roppe Technical Data Sheets and Excelsior Technical Data Sheets.

i. Substrates/backgrounds must be free of visible water or moisture, dust, sealers, paint, residual adhesives and adhesive removers, solvents, wax, oil, grease, mold, mildew and any other extraneous coating, film, material or foreign matter.

ii. Acclimate all products to be used during the installation and the installation environment prior to installation according to the manufacturers written instructions.

iii. Fill cracks, holes, depressions and irregularities in the substrate/background to prevent transferring through to the surface of the resilient wall base.

3.4 INSTALLATION

A. **General**: Follow all relevant guidelines detailed in Division 01, as well as wall base and adhesive manufacturer's technical data sheets.

B. **Resilient Rubber Wall Base:** Install material in accordance with manufacturer's recommendations.

i. Select the appropriate adhesive for the application and job site conditions.

ii. Install material according to roll sequence or with like run numbers.

iii. Ensure material is rolled appropriately into the adhesive using a hand roller.

3.5 CLEANING & MAINTENANCE

A. **General**: Clean up installation area and vacuum dust or wipe material to remove any dirt, dust or debris.

B. **Initial Maintenance**: Conduct initial maintenance per the manufacturer's recommended procedures stated in the Maintenance Documents. All documentation is available upon request or from the Roppe website: www.roppe.com.

C. **Regular Maintenance**: Excelsior Cleaning products are the recommended products for use when performing maintenance. All can be found linked to the product on the Roppe website or at www.excelsiorproducts.net.

Conduct maintenance on regular intervals as needed. Insufficient cleaning will reduce the wear life of the wall base and alter the aesthetic properties of the wall base. The amount of maintenance depends directly upon the amount of dirt and particulates the area is subjected to.

3.6 CLOSEOUT ACTIVITIES

A. **General**: Follow all federal, state and local requirements and Division 01 Section 01 76 00 – Protecting Installed Construction and Section 01 78 00 – Closeout Submittal requirements for these activities, protecting installed construction.

B. **Protection**: Protect newly installed material from damage by other trades. Be sure all construction debris is picked up and vacuumed or removed prior to leaving the area. Limit usage and foot traffic according to the adhesive's requirements. When moving appliances or heavy furniture, protect wall base from scuffing and tearing using temporary floor protection as well.

END OF SECTION

GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

A. This section includes the following Resilient Vinyl Tile Flooring:
   1. Allura Wood and Allura Stone

B. Sections related to this section include:
   1. Concrete: Refer to Division 3 Concrete Sections for cast-in-place concrete, concrete toppings, and cementitious underlayments.
   2. Wood Subflooring: Refer to Division 6 Carpentry Section for wood subflooring and wood underlayment.
   3. Finishes: Refer to Division 9 Finishes Section for maintenance of flooring.
   4. Resilient Flooring Accessories: Refer to Division 9 Finishes Sections for resilient wall bases, reducer strips, metal edge strips and other resilient flooring accessories.
   5. Expansion Joint Covers: Refer to Division 10 Specialties Section for expansion joint covers to be used with resilient flooring.

1.03 REFERENCES

A. Forbo Techncial Data Sheets

B. Forbo Installation Guide

C. Forbo Floor Care Guide

D. Safety Data Sheets (MSDS or SDS)

E. American Society for Testing and Materials (ASTM):
   1. ASTM E 492 – Standard Test Method for Laboratory Measurement of Impact Sound Transmission through Floor-Ceiling Assemblies Using the Tapping Machine
   2. ASTM E 648 – Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source
   3. ASTM E 662 – Standard Test Method for Specific Optical Density of Smoke Generated by Solid Materials
   4. ASTM E 989 – Standard Classification for Determination of Impact Insulation Class (IIC)
   5. ASTM E 1745 – Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs
   6. ASTM F 141 – Standard Terminology Relating to Resilient Floor Coverings
   7. ASTM F 710 – Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring
   8. ASTM F 1482 – Standard Practice for Installation and Preparation of Panel Type Underlayments to Receive Resilient Flooring
   9. ASTM F 1700 – Standard Specification for Solid Vinyl Floor Tile
   10. ASTM F 1861 – Standard Specification for Resilient Wall Base
   11. ASTM F 1869 – Standard Test Method for Measuring Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride
   12. ASTM F 2170 – Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes
   13. ASTM F 2419 – Standard Practice for Installation of Thick Poured Gypsum Concrete Underlayments and Preparation of the Surface to Receive Resilient Flooring

14. ASTM F 2471 – Standard Practice for Installation of Thick Poured Lightweight Cellular Concrete Underlayments and Preparation of the Surface to Receive Resilient Flooring
15. ASTM F 2678 – Standard Practice for Preparing Panel Underlayments, Thick Poured Gypsum Concrete Underlayments, Thick Poured Lightweight Cellular Concrete Underlayments, and Concrete Subfloors with Underlayment Patching Compounds to Receive Resilient Flooring

F. National Fire Protection Association (NFPA):
1. NFPA 253 – Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source
2. NFPA 258 – Test Method for Specific Optical Density of Smoke Generated by Solid Materials

G. Standards Council of Canada:
1. CAN/ULC S102 – Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies

1.04 SUBMITTALS

A. General: Submit each item in this Article according to the "Conditions of the Contract" and Division 1 Specification Sections.

B. Product Data: Submit three (3) copies of the manufacturer's technical data and installation recommendations for each type of flooring and accessory products specified.

C. Shop Drawings:
1. Submit shop drawings showing layout, locations of seams, edges, columns, doorways, enclosing partitions, built-in furniture, cabinets, and cutouts.
2. Show details of profiles and product components, including anchorage, accessories, finish colors, patterns and textures.

D. Samples: Submit three (3) sets of samples of each type, color and finish of flooring and accessory products specified, with an indication of full range of color, pattern and texture variation. Provide samples with a minimum size of 6" x 9" for flooring products and 6" in length for accessories.

E. Quality Assurance Submittals:
1. Submit three (3) copies of the manufacturer's Product Technical Data Sheet, specifying performance characteristics, criteria and physical requirements.
2. Submit three (3) copies of the manufacturer's written installation recommendations.

F. Closeout Submittals:
1. Submit three (3) copies of the maintenance and operations data. This should include methods for maintaining the installed products and any precautions against cleaning materials or methods that are detrimental to the product and their performance.
2. Submit three (3) copies of the warranty as specified herein.
3. Installer Certification: Submit proof of certification from the manufacturer certifying that the installers comply with the specified requirements.

G. Replacement Material: After completion of work, deliver to project site replacement materials from the same manufactured lot as materials installed. Package materials with protective covering and identify each with descriptive labels.
1. Flooring Materials: No less than 50 square feet of each type, pattern and color installed.
2. Accessories: No less than 10 linear feet for each 500 linear feet or fraction thereof each different type and color installed.
3.

1.05 QUALITY ASSURANCE

A. Manufacturer: Whenever possible, provide each type of flooring as provided by a single manufacturer, including recommended primers, adhesives, sealants, patching and leveling compounds.

B. Pre-Installation Meetings: Conduct pre-installation meeting to verify project requirements, substrate conditions, manufacturer's installation and floor care recommendations and manufacturer's warranty requirements. Comply with requirements according to the “Project Management and Coordination” in Division 1 Project Meetings Section.

C. Pre-Installation Testing: Conduct and document pre-installation testing as specified by manufacturer in accordance with the latest version of the specified test methods.
   1. pH testing: ASTM F 710 – Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring.
   2. In-situ Relative Humidity Testing: ASTM F 2170 – Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes.
   3. Calcium Chloride Testing: ASTM F 1869 – Standard Test Method for Measuring Moisture Vapor Emissions Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.
   4. Bond Testing: Conduct testing and document results in accordance with the manufacturer’s recommendations.

D. Flooring Contractor Qualifications:
   1. The awarded flooring contractor shall be an established firm, experienced in the installation of the specified product and shall have access to all manufacturer’s required specifications, technical, installation and maintenance related documents.

E. Installer Qualifications: Installer experienced in performing work of this section who has specialized in installation of work similar to that required for this project.
   1. Engage installers certified by Forbo as a “Forbo Certified Modular Technician.”
   2. Proof of valid certification must be submitted to the General Contractor and verified by Forbo prior to the start of the project.
   3. Forbo Certified Modular Technicians must be present on the jobsite daily.

F. Regulatory Requirements: Provide flooring products with the following fire performance characteristics as determined by testing identical products in accordance with the latest version of ASTM method indicated below by a certified testing laboratory or another testing and inspecting agency acceptable to authorities having jurisdiction.
   1. ASTM E 648 – Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source or NFPA 253 – Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source.
   2. ASTM E 662 – Standard Test Method for Specific Optical Density of Smoke Generated by Solid Materials or NFPA 258 – Test Method for Specific Optical Density of Smoke Generated by Solid Materials.
   3. CAN/ULC S102 – Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies.

G. Standard of Quality Mock-Up: For the purpose of evaluating the quality of workmanship, install a mock-up of the specified flooring completed by the pre-qualified installers following the manufacturer’s installation recommendations. Obtain Owner's and Architect's acceptance of finish color, texture and pattern, and workmanship standard. Comply with requirements according to the “Quality Control” in Division 1 Mock-Up Requirements Section.
   1. Size and Location of Mock-Up: 1M X 1M at Architect’s location of choice.
   2. Maintenance of Mock-Up: Maintain mock-up during construction for workmanship comparison; remove and legally dispose of mock-up when no longer required.
   3. Approval of Mock-Up: Upon approval of the mock-up, this installation shall be considered the standard of quality and basis of comparison for the balance of the project. Areas to be found deficient by specification standards or application procedures shall be repaired or replaced at the contractor’s expense.
   4. Incorporation of Mock-Up: The mock-up may be incorporated into final construction upon Owner's approval.

H. Post-Installation Meetings: Conduct post-installation meetings to review methods and procedures related to floor care and warranty requirements.

1.06 WARRANTY

A. Project Warranty: Comply with requirements according to the "Conditions of the Contract" in Division 1 Closeout Submittals Warranty Section for project warranty provisions.

B. Manufacturer's Warranty: Submit the manufacturer's standard warranty document executed by authorized company official for Owner's acceptance. Manufacturer's warranty is in addition to, and not a limitation of, other rights Owner may have under Contract Documents.
   1. Warranty Period: Ten (10) year limited warranty commencing on Date of Original Purchase from manufacturer.

C. Installation Warranty: Submit the flooring contractor's installation warranty signed by the General Contractor and Installer for Owner's Acceptance, agreeing to repair or replace work which has failed a as result of defects in workmanship. Failure shall include, but not limited to, tearing, cracking, separation, deterioration or loosening from substrate, seam failure, ripples, bubbling or puckering. Upon notification of such installation deficiencies, within the warranty period, make necessary repairs or replacement at the convenience of the Owner. Other guaranties or warranties may not be substituted by the Contractor for the terms of this warranty. Installation warranty is in addition to, and not a limitation of, other rights Owner may have under Contract Documents
   1. Warranty Period: Two (2) year limited warranty commencing on Date of Substantial Completion from flooring contractor.

1.07 DELIVERY, STORAGE, AND HANDLING

A. General: Comply with the Division 1 Product Requirements Sections.

B. Ordering: Comply with the manufacturer's ordering instructions and lead time requirements to avoid construction delays.

C. Delivery: Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.

D. Storage and Protection: Store materials protected from exposure to harmful weather conditions and at temperature and humidity conditions recommended by manufacturer.
   1. All materials (flooring, adhesives, weld rod and accessories) should be stored in areas that are fully enclosed and weathertight. The permanent HVAC should be fully operational and controlled and set at a minimum temperature 65° F (18.3° C). If this is not possible, the areas should be acclimated and controlled by means of temporary HVAC to the service level conditions expected during occupancy. The temperature and humidity should range from 75° F ± 10°F (23.9° C ± 5.5° C) with a 50% ± 10% ambient relative humidity.
   2. Store modular cartons stacked per the manufacturer's recommendations.
   3. Comply with the manufacturer's recommendation for the acclimation of all materials in the space where they will be installed for at least 48 hours prior to the installation unless longer conditioning periods are required by the manufacturer.

1.08 PROJECT CONDITIONS

A. Environmental Requirements/Conditions:
   1. Areas to receive material should be clean, fully enclosed and weather tight. The permanent HVAC should be fully operational and controlled and set at a minimum temperature 65° F (18.3° C). If this is not possible, the areas should be acclimated and controlled by means of temporary HVAC to the service level conditions expected during occupancy. The temperature and humidity should range from 75° F ± 10°F (23.9° C ± 5.5° C) with a 50% ± 10% ambient relative humidity. These conditions **MUST** be established at least seven days prior to beginning the installation, maintained during the installation, and continued for at least seven days following the installation.
   2. The flooring material should be conditioned in the same manner for at least 48 hours prior to the installation.

3. Substrate evaluation and preparation should not begin until a stable, conditioned environment has been established as described in this section.
4. Areas to receive flooring must have adequate lighting to allow for proper inspection and preparation of the substrate, installation of the flooring and final inspection.

B. Temperature Requirements: Maintain air temperature in spaces where products will be installed for time period before, during, and after installation as recommended by manufacturer.
1. Temperature Conditions: 65° F (18.3° C) for at least seven days prior to beginning the installation, maintained during the installation, and continued for at least seven days following the installation.

C. Substrate Conditions:
1. Existing Conditions: [Specify existing conditions affecting product use and installation.]
2. Concrete Curing: Do not install flooring over concrete substrates until substrates have cured and are dry to bond with adhesive as determined by the concrete and flooring manufacturer's recommendations.
   a. [Owner assigned responsibility.]
   b. [Flooring Contractor assigned to report responsibility back to Owner and/or Architect.]
3. Testing Results: Conduct and document pre-installation testing as specified by manufacturer in accordance with the latest version of the specified test methods.
   a. pH testing: ASTM F 710 – Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring.
   b. In-situ Relative Humidity Testing: ASTM F 2170 – Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes.
   c. Calcium Chloride Testing: ASTM F 1869 – Standard Test Method for Measuring Moisture Vapor Emissions Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.
   d. Bond Testing: Conduct testing and document results in accordance with the manufacturer's recommendations.
4. Close spaces to traffic during flooring installation and for time period after installation recommended in writing by the manufacturer.
5. Installation should not begin until the work of all other trades has been completed, especially overhead trades.
6. Where demountable partitions and other items are indicated for installation on top of flooring material, install flooring material before these items are installed.

D. Field Measurements: Verify actual measurements/openings by field measurements before fabrication; show recorded measurements on shop drawings. Coordinate field measurements and fabrication schedule with construction progress to avoid construction delays.

PART 2 PRODUCTS

2.01 RESILIENT VINYL TILE FLOORING – FORBO FLOORING SYSTEMS

A. Manufacturer Address:
1. Canada Headquarters
   3983 Nashua Dr., Unit 1
   Mississauga, ON L4V 1P3
   Phone: 1-800-268-8108
   www.forbofloorингNA.com]

B. Proprietary Product Information:
1. Material Name: Allura Wood
2. Description: Heterogeneous luxury vinyl tile comprised of a vinyl wear layer with a high performance PUR topcoat with a calendared wear layer on a thick glass interlayer and a solid vinyl backing.
3. Size: Approximately 59.1" x 11" (150 cm x 28 cm)

1. Gauge: 2.5mm (1/10”)
2. Wear Layer: 27.56mils (0.03” or 0.7mm)
3. Color and Pattern: W60302 deep country oak
4. Adhesive: As recommended by Forbo

2.02 ACCESSORIES

A. Resilient Edge Strips: Strips shall be homogeneous vinyl or rubber composition with a tapered or bull nose edge no less than 1” wide, colored to match flooring or as selected by Architect from standard colors available.
   1. Colour: Black

B. Metal Edge Strips: Strips shall be of width shown and of required thickness to protect the exposed edge of the flooring with units in maximum length available to minimize the number of joints.
   1. Colour: Brushed Stainless Steel

C. Floor Care Products: Provide products as required in Section 3.7 Cleaning.
   1. Cleaning chemicals and equipment as recommended by manufacturer.

2.03 PRODUCT SUBSTITUTIONS

A. Substitutions: No substitutions permitted.

2.04 RELATED MATERIALS

A. Related Materials: Refer to other sections for related materials as follows.
   1. Concrete: Refer to Division 3 Concrete Sections for cast-in-place concrete, concrete toppings, and cementitious underlayments.
   2. Wood Subflooring: Refer to Division 6 Carpentry Section for wood subflooring and wood underlayment.
   3. Finishes: Refer to Division 9 Finishes Section for maintenance of flooring.
   4. Resilient Flooring Accessories: Refer to Division 9 Finishes Sections for resilient wall bases, reducer strips, metal edge strips and other resilient flooring accessories.
   5. Expansion Joint Covers: Refer to Division 10 Specialties Section for expansion joint covers to be used with resilient flooring.

2.05 SOURCE QUALITY

A. Source Quality: Obtain flooring product materials from a single manufacturer.

PART 3 EXECUTION

3.01 MANUFACTURER'S RECOMMENDATIONS

A. Compliance: Comply with manufacturer's product technical data, including product technical bulletins, installation recommendations and floor care recommendations.

3.02 INSPECTION

A. Site Verification of Conditions: The Flooring Contractor and Installer shall examine and verify conditions previously described in other sections under which flooring and accessories are to be installed to be in accordance with the manufacturer’s installation recommendations and must notify the General Contractor in writing of conditions detrimental to proper and timely completion of work.

Work shall not proceed until all unsatisfactory conditions are corrected to acceptable conditions to the Owner and Architect.

B. Material Inspection: Visually inspect all materials prior to installation in accordance with the manufacturer's installation recommendations. Material with visual defects shall not be installed and shall not be considered as a legitimate claim if they are installed.

3.03 PREPARATION

A. General: Comply with manufacturer's written installation recommendations for preparing substrates indicated to receive flooring products and accessories.

B. Adjacent Surfaces Protection: Protect adjacent work areas and finish surfaces from damage during product installation.

C. Surface Preparation:
   1. General: Prepare substrate in accordance with manufacturer's recommendations and ASTM industry standards. Work shall not proceed until all unsatisfactory conditions are corrected to acceptable conditions to the Owner and Architect.
   2. Substrate: Substrates to receive flooring must be structurally sound, rigid, smooth, flat, clean, and permanently dry. The substrates must be free of all foreign materials including, but not limited to, dust, solvent, paint, wax, oils, grease, residual adhesive, adhesive removers, film-forming curing compounds, silicate penetrating curing compounds, sealing, hardening or parting compounds, alkaline salts, excessive carbonation or laitance, mold, mildew, and other foreign materials that might affect the rate of moisture dissipation from the concrete, the adhesion of flooring to the concrete or cause a discoloration of the flooring from below.
   3. Concrete Substrate: Concrete substrates shall be cured per the concrete manufacturer's recommendations. They must have a minimum compressive strength of 3,000 psi and a minimum dry density of 150 pounds per cubic foot. Refer to Division 3 Concrete Sections for patching, repairing crack materials and leveling compounds with Portland cement based compounds.
      a. Refer to Division 3 Concrete Sections for cast-in-place concrete, concrete toppings, and cementitious underlayments.
      b. Reference Standard: Comply with the latest version of ASTM F 710 – Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring.
   4. Wood Substrates: Wood substrates must be double construction with a minimum total thickness of 1 inch. Wood substrates must be rigid, free from movement and have at least 18" of well-ventilated air space below. Forbo products should not be installed over wooden subfloors built on sleepers over on or below grade concrete floors without first making sure that adequate precautions have been taken to ensure the structural integrity of the system, and to prevent moisture migration from the concrete slab.
      a. Refer to Division 6 Carpentry Section for wood substrates and wood underlayment.
      b. Reference Standard: Comply with the latest version of ASTM F 1482 – Standard Practice for Installation and Preparation of Panel Type Underlayments to Receive Resilient Flooring.

D. Substrate Testing: In order to ensure that the moisture condition of concrete substrates is within acceptable limits, it is essential that moisture testing be conducted and documented on ALL concrete substrates regardless of age or grade level, including those where resilient flooring has already been installed. Moisture testing should only be conducted once a stable, conditioned environment has been established in accordance with the latest version of the specified test methods. All other testing types shall be conducted on all substrate types. A diagram of the area showing the location and results of each test should be submitted to the Architect, General Contractor or End User. If at the time of testing the test results exceed the limitations set forth by the flooring manufacturer, the installation must not proceed until the problem has been corrected. The Contractor responsible for the substrate shall be responsible for the costs associated with analysis of the substrate and subsequent remediation requirements.

1. In-situ Relative Humidity Testing: ASTM F 2170 – Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes.
   a. Conduct three (3) tests for the first 1,000 square feet (100 square meters) and at least one additional test for each additional 1,000 square feet (100 square meters).
   b. The concrete internal relative humidity must not exceed 75% when using Forbo T940 adhesive.
   c. The concrete internal relative humidity must not exceed 85% when using Forbo Sustain 885m adhesive.
   d. The concrete internal relative humidity must not exceed 80% when using Forbo 660 adhesive.
2. Calcium Chloride Testing: ASTM F 1869 – Standard Test Method for Measuring Moisture Vapor Emissions Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.
   a. Conduct three (3) tests for the first 1,000 square feet (100 square meters) and at least one additional test for each additional 1,000 square feet (100 square meters).
   b. The concrete moisture vapor emissions must not exceed 5.0 lbs. per 1,000 square feet in 24 hours when using Forbo T 940 adhesive.
   c. The concrete moisture vapor emissions must not exceed 8.0 lbs. per 1,000 square feet in 24 hours when using Forbo Sustain 885m adhesive.
   d. The concrete moisture vapor emissions must not exceed 6.0 lbs. per 1,000 square feet in 24 hours when using Forbo 660 adhesive.
3. pH testing: ASTM F 710 – Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring.
   a. Conduct testing at each calcium chloride test location as the calcium chloride tests are removed.
   b. The surface pH of the concrete must not exceed a pH of 10.0 when using Forbo [T 940] [Sustain 885m] adhesive. Concrete surfaces with pH readings less than 7.0 or above 10.0 will require remediation prior to installation.
   c. The surface pH of the concrete must not exceed a pH of 9.0 when using Forbo 660 adhesive. Concrete surfaces with pH readings less than 7.0 or above 9.0 will require remediation prior to installation.
4. Bond Testing
   a. Conduct testing in accordance with the manufacturer's recommendations in various locations throughout the area where flooring is to be installed. Although the number of tests required may vary, enough tests should be performed to allow an evaluation of the entire area where material will be installed.
   b. When evaluating adhesive mat bond tests using Forbo [T940] [Sustain 885m] adhesive, significant force should be required to remove the test sample. The bond failure should occur within the adhesive layer when the test sample is removed. There should be approximately the same amount of adhesive on the substrate and the material backing.]
   c. When evaluating adhesive mat bond tests using Forbo 660 adhesive, the point of failure during bond testing should be in the material. The anticipated result is that the material will be destroyed when removing the sample.

3.04 INSTALLATION

A. Material Installation: Measure the area to be installed and determine the direction in which the material will be installed. Allura LVT flooring products are fit using conventional tile fitting techniques. It is customary to start from the center of the room. In corridors and small spaces, it may be simpler to work lengthwise from one end, using the center line as a guide. After establishing the starting lines, spread the adhesive using a 1/16" x 1/16" x 1/16" square notch trowel. Be sure to spread adhesive all the way to the starting line without leaving any voids. Begin laying tiles at the starting point, ensuring that the tile is placed exactly along the layout lines. If the first few tiles are not installed accurately, the entire installation will be affected. The tiles must be installed into wet adhesive. Do not spread adhesive in an area larger than can be installed while ensuring 100% wet transfer to the backing of the material. Immediately roll the flooring in all directions using a 100 lb. roller to ensure proper adhesive transfer. Additional rolling is required

during adhesive setup to ensure that the material is flat and fully adhered. The use of a three-section wall roller or steel seam roller is required at walls, under toe kicks or anywhere the full weight of a 100 lb. roller cannot access or be applied.

B. Adhesive Application: Use trowel recommended by flooring manufacturer for Forbo [T 940] [Sustain 885m] adhesive.
   1. 1/16" x 1/16" x 1/16" square notch trowel
   2. Spread rate is approximately 125 ft^2/gallon]

C. Adhesive Application: Use trowel recommended by flooring manufacturer for Forbo 660 adhesive.
   1. 1/16" x 1/16" x 1/16" square notch trowel
   2. Spread rate is approximately 110-120 ft^2/gallon]

D. Installation Techniques:
   1. Where demountable partitions and other items are indicated for installation on top of finished flooring, install flooring before these items are installed.
   2. Scribe, cut, fit flooring to butt tightly to vertical surfaces, permanent fixtures and built-in furniture, including pipes, outlets, edgings, thresholds, nosings, and cabinets.
   3. Extend flooring into toe spaces, door reveals, closets, and similar openings.
   4. Install flooring on covers for telephone and electrical ducts, and similar items occurring within finish floor areas. Maintain overall continuity of color and pattern with pieces of flooring installed on these covers.
   5. Do not install resilient flooring over expansion joints. Use expansion joint covers manufactured for use with resilient flooring. Refer to other specification sections for expansion joint covers.
   6. Adhere resilient flooring to substrate without producing open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, or other surface imperfections in completed installation.
      a. Use adhesive applied to the substrate in compliance with the flooring manufacturer's recommendations, including those for proper spreading of the adhesive, adhesive missing and adhesive open and working times.
   7. Immediately roll the flooring in all directions using a 100 lb. roller to ensure proper adhesive transfer. Additional rolling is required during adhesive setup to ensure that the material is flat and fully adhered. The use of a three-section wall roller or steel seam roller is required at walls, under toe kicks or anywhere the full weight of a 100 lb. roller cannot access or be applied.

3.05 FIELD QUALITY REQUIREMENTS

A. Manufacturer's Field Services: Upon request of the Owner, General Contractor or Architect, and with at least 72 hours' notice, provide manufacturer's field service consisting of product use recommendations and periodic site visit for inspection of product installation in accordance with manufacturer's recommendations.
   1. Site Visits: 2 visits for 30 minutes each.

3.06 PROTECTION

A. Protection: Do not allow heavy traffic or rolling loads for at least 72 hours following the installation. Additional time may be necessary if the installation is over a non-porous substrate. Protect installed product and finish surfaces from damage during construction. Remove and legally dispose of protective covering at time of Substantial Completion.

3.07 CLEANING

A. Initial Maintenance: In order to allow the adhesive to dry and cure properly, wait a minimum of five days following the installation before conducting wet cleaning procedures or initial maintenance. Additional time may be necessary if the installation is over a non-porous substrate.

B. Procedure:

1. Remove temporary coverings and protection of adjacent work areas. Repair or replace damaged installed products. Clean installed products in accordance with manufacturer's recommendations prior to Owner's acceptance. Remove construction debris from project site and legally dispose of debris.
2. Remove visible adhesive and other surface blemishes using cleaning methods recommended by floor manufacturer.
3. Remove all surface soil, debris, sand and grit by dust mopping, sweeping or vacuuming the floor.
4. Mix a neutral pH cleaning solution according to the label directions and apply the solution to the floor. Do NOT flood the floor. Allow the solution to dwell on the floor for 5 – 10 minutes.
5. Scrub the floor using a 3M™ Red Buffer Pad #5100 or equivalent.
6. Pick up the scrubbing solution with a wet vacuum or an automatic scrubber.
7. Rinse the entire floor surface with a clean mop using clean, cool water.
8. Allow the floor to dry thoroughly before allowing traffic.

3.08 INITIAL MAINTENANCE PROCEDURES

A. General: Include in Contract Sum Amount cost for initial maintenance procedures, and execute procedures after flooring installation as recommended by flooring manufacturer.

B. Initial maintenance to be conducted by awarded Flooring Contractor.
   1. Engage floor care professionals who are certified by Forbo as a “Forbo Certified Floor Care Technician.”

END OF SECTION

1) General

a) **SECTION INCLUDES**

i) Labour, Products, equipment and services necessary for concrete floor sealer Work in accordance with the Contract Drawings.

b) **SUBMITTALS**

i) Product data: Submit manufacturer's Product data in accordance with Section 01 33 00 indicating:
(1) Two copies of manufacturer's Product data on characteristics, performance criteria, and limitations.
(2) Preparation, installation requirements and techniques, Product storage, and handling criteria.

ii) Samples: Submit samples in accordance with Section 01 33 00 indicating coating and final concrete finish.

iii) Reports: Submit manufacturer's acceptance of substrate prior to installation in writing. Submit verification of moisture content of floor prior to installation.

iv) Close-out submittals: Submit maintenance data for incorporation into Operations and Maintenance manuals.

c) **QUALITY ASSURANCE**

i) Perform Work of this Section by a company that has a minimum of five years proven experience in installations of a similar size and nature and that is approved by manufacturer. Submit to Consultant, applicator’s current certificate of approval by the material manufacturer as proof of compliance.

ii) Mock-up:
(1) Construct one 10 m^2 mock-up of floor sealer in location acceptable to Consultant.
(2) Arrange for Consultant's review and acceptance, allow 48 hours after acceptance before proceeding with Work.
(3) Mock-up may remain as part of Work if accepted by Consultant. If sealer application is unacceptable to Consultant, rework sealer in accordance with manufacturer’s recommendations to provide a sealed concrete surface acceptable to Consultant.
(4) Upon acceptance, mock-up shall serve as a minimum standard of quality for the balance of the work of this Section.

iii) Pre-installation meetings: Arrange with manufacturer's representative and Consultant to inspect substrates, and to review Mock-up and installation procedures 48 hours in advance of installation.

d) **SITE CONDITIONS**

i) Do not install the Work of this Section outside of environmental ranges as recommended by the manufacturer without Product manufacturer's written acceptance and as follows:
(1) Relative Humidity: In accordance with manufacturers' requirements.
(2) When no dust is being raised.
(3) In well-ventilated and broom clean areas.

ii) Install temporary protection and facilities to maintain the Product manufacturer's, and the above specification, environmental requirements for 24 hours before, during, and 24 h after installation.

iii) Post do not enter and appropriate warning signs at conspicuous locations.

e) **DELIVERY, STORAGE, AND HANDLING**

i) Store materials at site in an area specifically set aside for purpose that is locked, ventilated, and maintained at a minimum temperature of 16ºC.

ii) Ensure that health and fire regulations are complied with in storage area, and during handling and application.

f) **EXTENDED WARRANTY**

i) At completion of this work, provide a signed Sealant and Waterproofing Association warranty to the Owner covering defects of workmanship and materials for a period of 2 years commencing from Contract Completion. Agree to make good promptly any defects which occur or become apparent within the warranty period in conjunction with the membrane manufacture’s warranty. Defects shall include but not be limited to leakage, deformation and failure to stay in place. Coverage includes complete replacement including affected adjacent Work at no cost to Owner.

2) Products

a) **MATERIALS**

i) All materials under Work of this Section, including but not limited to, sealers and coatings are to have low VOC content limits.

ii) Each material used in the application of each flooring system shall be as recommended or manufactured by the supplier of the flooring system.

iii) Concrete floor sealer: Alkali-silicate, water-soluble, inorganic concrete hardener and dustproofer; ‘Kure-N-Harden’ by BASF Building Systems or approved alternative by Sika Canada Inc.

3) Execution

a) **EXAMINATION**

i) Verify condition of previously installed Work upon which this Section depends. Report defects to Consultant. Commencement of Work means acceptance of existing conditions.

ii) Verify that concrete floor has cured 28 days minimum and that substrate is acceptable to sealer manufacturer.

iii) Test surfaces for moisture content to ensure that they are suitable for application.

b) **PREPARATION**

i) Prepare substrate in accordance with manufacturer's written instructions. Diamond grind and vacuum substrate free of debris and dust.

ii) Project adjacent surfaces from damage resulting from Work of this section. Mask and/or cover adjacent surfaces, fixtures, and equipment as necessary.

c) **APPLICATION**

i) Spray apply concrete sealer to entire surface and keep from drying for 30 minutes as recommended by manufacturer.

ii) Sprinkle surface with water as sealer begins to penetrate (after 30 minutes).

iii) Flush surface with water and drying begins to remove excess material. Allow to harden for 24 hours.

iv) Lightly buff floor with a commercial floor buffer and non-aggressive pad to bring up required sheen.

v) Apply second coat of concrete sealer following same procedures as first layer.

d) **CLEANING**

i) Remove promptly as work progresses spilled or spattered materials from surfaces of work performed under other Sections. Clean floors on completion of work. Do not mar surfaces while removing.

e) **PROTECTION**

i) Erect barriers to prevent the entry and presence of personnel not performing work of this Section during application of floor sealer, and for 48 hours following completion of application.

END OF SECTION

1) General

a) **SECTION INCLUDES**

i) Labour, Products, equipment and services necessary for painting Work in accordance with the Contract Documents.

b) **REFERENCES**

i) CAN/CGSB 85.10, Protective Coatings for Metals.

ii) CAN/CGSB-85.100, Painting.

iii) Master Painters Institute (MPI), Painting Specification Manual.

iv) SSPC Steel Structures Painting Council, Standards.

c) **SUBMITTALS**

i) Product data:
(1) Submit copies of manufacturer's Product data in accordance with Section 01 33 00 indicating:
(a) Performance criteria, compliance with appropriate reference standard, characteristics, limitations.
(b) Product transportation, storage, handling and installation requirements.
(2) Submit listing of manufacturer's Product types, Product codes, and Product names, number of coats, and dry film thicknesses, corresponding to each Painting Schedule code; submit listing minimum of 8 weeks before materials are required.

ii) Samples:
(1) Submit following samples in accordance with Section 01 33 00.
(a) Three 300 x 150 mm drawdowns of each colour minimum 4 weeks before paints are required.
(b) Identify each sample with Contract number and title, colour reference, sheen, date, and name of applicator.

iii) Certificates:
(1) Submit certification from paint manufacturer, on company letterhead, indicating each product proposed for use is Manufacture's premium grade, first line Product.
(2) Submit certified documentation to confirm each airless spray painter has minimum of 5 years' experience on applications of similar complexity and scope.
(3) Submit certified documentation to confirm each worker has Provincial Tradesman Qualification certificate of proficiency.

iv) Reports:
(1) Submit written field inspection and test report results after each inspection.
(2) Submit Field Quality Control test result reports for alkali content, substrate moisture, and dry film thickness.
(3) Submit electronic moisture meter manufacturer's specifications including tolerances. Submit record of latest meter calibration to meet manufacturer's recommendations.

d) **QUALITY ASSURANCE**

i) Finishing Work: Perform work to MPI requirements for premium grade.

ii) Supervision: Have Work supervised by a full-time qualified foreperson who has 10 years minimum experience on Contracts of similar complexity and scope.

iii) Mock-up:
(1) Construct three 4 m^2 mock-ups of different Paint Schedule code systems, selected by Consultant, in locations acceptable to Consultant to demonstrate installation workmanship, colour, and hiding power of Products.
(2) Obtain Consultant's acceptance in writing before proceeding with the Work of this Section.
(3) Mock-ups may remain as part of the Work if acceptable to Consultant and will serve as a standard for similar code systems.
(4) Repaint over mock-ups which do not form part of the Work.

e) **DELIVERY, STORAGE, AND HANDLING**

i) Install correct, safe temporary storage for paint, thinner, solvents, and other volatile, corrosive, hazardous, and explosive materials in accordance with requirements of authorities having jurisdiction.

ii) Post hazard warning signage in areas of storage and mixing. Install and maintain sufficient CO_2 fire extinguishers of minimum 9 kg capacity, accessible in each storage mixing and storage areas.

iii) Maintain storage enclosures at minimum 10°C ambient temperature and to manufacturer's instructions.

f) **SITE CONDITIONS**

i) Apply coatings under the following conditions:
(1) Exterior coatings (except Latex): 5° C minimum.
(2) Exterior latex coatings: 10°C minimum.
(3) 24 hours minimum after rain, frost, condensation, or dew.
(4) When no condensation is possible (unless specifically formulated against condensation).
(5) Interior coatings: 7°C minimum.
(6) Relative humidity: 85% maximum.
(7) Not in direct exposure to sun light.

ii) Maintain temperature conditions indicated above for 24 hours before, during and 24 hours after painting.

iii) Install clean plywood sheets to protect floors and walls in storage and mixing areas, from paint drips, spatters, and spills.

iv) Apply sufficient masking, clean drop cloths, and protective coverings for full protection of Work not being painted including, but not limited to, the following:
(1) Light fixtures, fire and smoke detectors.
(2) Sprinkler heads.
(3) Prepainted diffusers and registers.
(4) Prepainted equipment.
(5) Fire rating labels and equipment specification plates.
(6) Finished surfaces.

g) **ENVIRONMENTAL PERFORMANCE REQUIREMENTS**

i) Provide paint products meeting MPI "Green Performance Standard GPS-1-05".

h) **MAINTENANCE**

i) Deliver to Owner's place of storage on completion of work, sealed containers of each finish painting material applied, and in each colour. Label each container as for original, including mixing formula. Provide the following:
(1) 1 L of extra materials when less than 50 L are used for Project;
(2) 3.78 L of extra stock when 50 to 200 L are used;
(3) 7.57 L of extra stock when over 200 L are used.

2) Products

a) **MATERIALS**

i) Paint:
(1) All materials under Work of this Section, including but not limited to, primers, stains, and paints are to have low VOC content limits.
(2) Products in accordance with the MPI Painting Specification Manual, Exterior and Interior Systems;
(a) For each MPI paint code, manufacture's premium grade, first line Products is to be use.
(b) Uniform dispersion of pigment in a homogeneous mixture.
(c) Ready-mixed and tinted whenever possible.
(3) Products within each MPI paint system code: From single manufacturer.
(4) Acceptable manufacturers:
(a) Benjamin Moore.
(b) Dulux Paints/PPG.
(c) Para Painting & Coatings.
(d) Sherwin Williams.

ii) Epoxy floor coating: In accordance with Section 09 67 23.

iii) Epoxy wall coating: In accordance with Section 09 96 56.

b) **COLOUR SCHEDULE**

i) 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.

ii) Refer to Colour Schedule for selected colour references.

iii) Conform to gloss reflectance definitions listed in MPI Specification Manual.

c) **PAINTING AND FINISHING SCHEDULE**

i) Refer to Table 1, MPI Painting and Finishing Schedule coded systems, comply with MPI Painting Specification Manual.

Table 1: Painting and Finishing Schedule

EXTERIOR SUBSTRATES	Typical substrates (Including but not limited to)	MPI Manual Ref.	MPI Finish System Code	Topcoat
Structural steel and metal fabrications		EXT 5.1	EXT 5.1D	Alkyd
Galvanized steel	HM doors & frames	EXT 5.3	EXT 5.3B	Alkyd
INTERIOR SUBSTRATES	Typical substrates (Including but not limited to)	MPI Manual Ref.	MPI Finish System Code	Topcoat
Concrete floors		INT 3.2	INT 3.2C	Epoxy
Concrete block masonry		INT 4.2	INT 4.2A	Latex
Structural steel (Factory primed)		INT 5.1	INT 5.1R	High performance latex
Steel (High heat)	Boilers, pipes, flues, heat exchangers	INT 5.2	INT 5.2A	Heat resistant enamel
Galvanized steel	Ducts, pipes, metal deck	INT 5.3	INT 5.3A	Latex
Galvanized metal		INT	INT	

Table 1: Painting and Finishing Schedule				
	HM doors & door frames	5.3	5.3B	WB light industrial coating
Dressed lumber	Doors and frames requiring paint finish	INT 6.3	INT 6.3A	High performance latex
Wood paneling & casework	Millwork	INT 6.4	INT 6.4C	Semi-transparent stain
Wood paneling & casework	Millwork	INT 6.4	INT 6.4E	Poly-urethane
Gypsum board,	Drywall, walls, ceilings	INT 9.2	INT 9.2A	Latex
Gypsum board,	Wet areas	INT 9.2	INT 9.2F	Epoxy-modified latex

3) Execution

a) **EXAMINATION**

i) Verify condition of previously installed Work upon which this Section depends. Report defects to Consultant. Commencement of Work means acceptance of existing conditions.

b) **PREPARATION**

i) General:
(1) Clean substrate surfaces free from, dust, grease, soiling, or extraneous matter, which are detrimental to finish.
(2) Patch, repair, and smoothen minor substrate defects and deficiencies e.g. machine, tool and sand paper marks, shallow gouges, marks, and nibs.
(3) Clean, sweep, and vacuum floors and surfaces to be painted, debris and dust-free prior to painting.
(4) Refer to MPI Painting Specification Manual for surface preparation requirements of substrates not listed here.

ii) Where finish hardware has been installed remove, store, re-install finish hardware, to accommodate painting. Do not clean hardware with solvent that will remove permanent lacquer finishes.

iii) Alkali Content tests and neutralization:

(1) Test for ph level using litmus paper on dampened substrate.
(2) Neutralize surfaces over 8.5 ph with 4% solution of Zinc Sulphate for solvent based systems and tetrapotassium pyrophosphate for latex based systems, to below 8.0 ph, and allow to dry.
(3) Brush-off any residual Zinc Sulphate crystals.
(4) Coordinate paint system primer / sealer to be alkali-resistant.

iv) Substrate moisture tests:
(1) Test for moisture content over entire surface to be painted, minimum one test/ 2 m^2 in field areas and one test/600 mm along inside corners including at ceiling to wall juncture.
(2) If any test registers above 10% allow entire substrate surfaces, within the plane, to dry further before paint system application. Install temporary drying fans if necessary.
(3) Re-test employing same criteria.

v) Mildew removal: Scrub with solution of trisodium phosphate and sodium hypochlorite (Javex) bleach, rinse with water, and allow to dry completely.

vi) Cementitious and masonry (Concrete, block):
(1) Allow 28 days cure before painting.
(2) Coordinate repair of protrusion-chipping and grinding, and honeycomb filling with responsible trades.
(3) Remove dirt, loose mortar, scale, powder, efflorescence, and other foreign matter.
(4) Remove form oil and grease with trisodium phosphate, rinse, and allow to dry thoroughly.
(5) Prepare surfaces in accordance with CAN/CGSB-85.100.
(6) Remove rust stains with solution of sodium metasilicate after thorough wetting; allow to dry thoroughly.

vii) Concrete floors:
(1) Allow 28 days cure before painting.
(2) Remove contamination, acid etch, rinse with water, and allow to dry completely. Test and adjust for neutral ph.
(3) Prepare surfaces in accordance with CAN/CGSB-85.100 acid etch.

viii) Galvanized steel sheet:
(1) Z275 (Satin & Spangled Sheet): SSPC SP7 brush blast.
(2) ZF075 (Wiped Coat): Remove contamination, wash with Xylene solvent.
(3) Touch-up damaged galvanized areas with organic zinc rich primer.

ix) Galvanized iron and steel: Prepare galvanized and ungalvanized metal surfaces according to CAN/CGSB-85.10.
(1) Unpassivated, unweathered and weathered: Remove contamination, wash with Xylene or Toluol solvent, allow to dry thoroughly. Make paint system primer/sealer an etching type primer.
(2) Manufacturer pre-treated (including passivated): SSPC SP7.
(3) Touch-up damaged galvanized areas with organic zinc rich primer.

x) Structural steel and miscellaneous metal fabrications:
(1) Coordinate the following with the responsible trades:

(a) Rust, mars, mill scale, and weld-burn touch-ups.
(b) Oil, grease, weld flux and other residue removal.

(2) Prime paint items, not otherwise indicated to be primed as part of another Section.
(3) Touch-up damaged galvanized areas with organic zinc rich primer.

xi) Wood and Millwork:
(1) Wood surfaces to be clean and dry with a moisture content of less than 15%.
(2) Remove foreign matter prior to prime coat; spot coat knots, pitch streaks and sappy sections with sealer.
(3) Fill nail holes and fine cracks after primer has dried.
(4) Backprime interior and exterior woodwork.

xii) Factory primed surfaces:
(1) Touch up damaged areas.
(2) Clean as required for top coat.

xiii) Gypsum board:
(1) Apply primer/sealer paint to reveal defects and deficiencies and to equalize absorption areas.
(2) Coordinate repairs and touch-ups with the responsible trade.
(3) Re-prime repairs.

xiv) Coordinate with other trades to prevent:
(1) Damage, and inadvertent activation of fire and smoke detectors.
(2) Odour and dust distribution by permanent HVAC systems including fouling of ducts and filters.

xv) Field-mix Products in accordance with manufacturer's written instructions.

c) **APPLICATION**

i) Apply painting systems in accordance with the MPI Painting Specification Manual. Apply each Product to manufacturer's recommended dry film thickness.

ii) Painting systems listed are required minima, apply additional coats if necessary to obtain substrate hiding acceptable to the Consultant.

iii) Tint intermediate coats lighter than final top coats for identification of each succeeding coat and to facilitate inspections. Include only manufacturer's recommended reducing and tinting accessories. Do not add adulterants.

iv) Primer to be specialized primer coating system as required by manufacturer for selected colour. Standard primer being tinted shall be tinted to a maximum of 1.5% by volume.

v) Sand lightly between coats to achieve a tooth or anchor for subsequent coats.

vi) Apply paint uniformly in thickness, colour, texture, and gloss, as determined by the Consultant under adequate illumination and viewed at a distance of 1500 mm. Apply finishes free of defects in materials and application which, in the opinion of the

Consultant, affect appearance and performance. Defects include, but are not limited to:

(1) Improper cleaning and preparation of surfaces.
(2) Entrapped dust, dirt, rust.
(3) Alligatoring, blisters, peeling.
(4) Scratches, blemishes.
(5) Uneven coverage, misses, drips, runs, and poor cutting in.

vii) Do not apply coatings on substrates which are not sufficiently dry. Unless indicated otherwise, allow each painting system coat to cure dry and hard before following coats are applied.

viii) Repaint entire areas of damaged or incompletely covered surfaces, to the nearest inside or outside corner; patching will not be permitted.

ix) Miscellaneous painting requirements:

(1) Paint projecting ledges, and tops, bottoms and sides of doors both above and below sight lines to match adjacent surfaces.
(2) Paint door frames, access doors and frames, door grilles, prime coated butts, and prime coated door closers to match surface in which they occur.
(3) Finish closets and alcoves as specified for adjoining rooms.
(4) Paint light coves white whether a light lense is installed or not, unless otherwise indicated.
(5) Paint interior columns to match walls of room.
(6) Allow for:
    (a) 2 wall colours per room, one ceiling colour per room.
    (b) Different door colours in each functionally different area.
    (c) Different colours on both sides of same door.

x) Mechanical, electrical and other painting coordination:

(1) Paint mechanical services in accordance with Mechanical Identification Division 21, 22 and 23.
(2) Coordinate painting of pipes, ducts, and coverings with the Work of Division 21, 22 and 23 to precede pipe colour banding, flow arrows, and other pipe identification labeling installation.

(3) Paint exposed conduit, pipes, hangers, ductwork, grilles, gratings, louvres, access panels, fire hose cabinets, registers, convector and radiator covers, enclosures, and other mechanical and electrical equipment including services concealed inside cupboard and cabinet Work; apply colour and sheen to match adjacent surfaces, except as noted otherwise.

(4) Paint portions of surfaces such as duct interiors, piping, ductwork, hangers, insulation, walls, and similar items, visible through grilles, louvres, convector covers etc., matte black in colour.

(5) Remove the following to accommodate painting, carefully store, clean, then re-install on completion of each area and when dry:

(a) Switch and receptacle plates, fittings and fastenings, grilles, gratings, louvres, access panels, convector covers, and enclosures.

d) **FIELD QUALITY CONTROL**

i) Dry film thickness tests:

(1) Test for film thickness over entire surface to be painted, minimum one test/2 m^2 in field areas and one test/600 mm along inside corners including at ceiling to wall juncture.

(2) If any test registers below specified thickness, re-apply paint to entire surface to nearest inside and outside corners.

(3) If test registers more than 50% above specified thickness, consult with paint manufacturer, determine if problem exists, offer solutions to Consultant, and repair as directed.

(4) Re-test employing same criteria after repair.

e) **CLEANING**

i) Remove spilled, splashed, and spattered paint promptly as Work proceeds and on completion of Work. Clean surfaces soiled by paint spillage and paint spatters. Repair or replace damaged Work, as directed by Consultant.

f) **PROTECTION**

i) Post Wet Paint signs during drying and restrict or prevent traffic where necessary.

ii) Post sign, after Consultant's inspection and acceptance of each room, reading: PAINTING COMPLETE - NO ADMITTANCE WITHOUT CONTRACTOR'S PERMISSION.

END OF SECTION

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Solid plastic toilet compartments including the following: (Eclipse)
   1. Floor mounted overhead-braced toilet compartments.
   2. Floor mounted urinal screens.

1.2 RELATED SECTIONS

A. Section 06 10 00 - Rough Carpentry.

1.3 REFERENCES

A. ASTM B 85 - Standard Specification for Aluminum-Alloy Die Castings.

B. ASTM B 221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.

C. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

D. National Fire Protection Association (NFPA) 286 - Standard Methods of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth.

1.4 SUBMITTALS

A. Submit under provisions of Section 01 30 00 - Administrative Requirements.

B. Product Data: Manufacturer's data sheets on each product to be used, including:
   1. Preparation instructions and recommendations.
   2. Storage and handling requirements and recommendations.
   3. Installation methods.

C. Shop Drawings: Provide layout drawings and installation details with location and type of hardware required.

D. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.

E. Verification Samples: For each finish product specified, two samples representing actual product, color, and patterns.

F. Sustainable Design Submittals:
   1. Recycled Content: Certify percentages of post-consumer and pre-consumer recycled content.
   2. Regional Materials: Certify distance in miles between manufacturer and Project and between manufacturer and extraction or harvest point.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: A company regularly engaged in manufacture of products specified in this section, and whose products have been in satisfactory use under similar service conditions for not less than 5 years.

B. Installer Qualifications: A company regularly engaged in installation of products specified in this Section, with a minimum of 5 years experience.

C. Performance Requirements:
1. Fire Resistance: Partition materials shall comply with the following requirements, when tested in accordance with the ASTM E 84: Standard Test Method for Surface Burning Characteristics of Building Materials:
a. Class A flame spread/smoke developed rating, tested to ASTM E84.
b. Class B flame spread/smoke developed rating, tested to ASTM E84.
2. Material Fire Ratings:
a. National Fire Protection Association (NFPA) 286: Pass.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.

1.7 PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.8 WARRANTY

A. Manufacturer guarantees its plastic against breakage, corrosion, and delamination under normal conditions for 25 years from the date of receipt by the customer. If materials are found to be defective during that period for reasons listed above, the materials will be replaced free of charge. (Labor not included in warranty.)

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturer: Scranton Products, which is located at: 801 E. Corey St.; Scranton, PA 18505; Toll Free Tel: 800-445-5148; Fax: 855-376-6161; Email:request info (info@scrantonproducts.com); Web:http://www.scrantonproducts.com

B. Substitutions: Not permitted.

C. Requests for substitutions will be considered in accordance with provisions of Section 01 60 00 - Product Requirements.
1. MATERIAL
a. Plastic Panels: High density polyethylene (HDPE) suitable for exposed applications, waterproof, non-absorbent, and graffiti-resistant textured surface;
b. Recycled Content (Post Industrial): 25 %.
c.

D. Aluminum Extrusions: ASTM B221, 6463-T5 alloy and temper.

E. Aluminum Die Castings: ASTM B85, A380 alloy.

F. Stainless Steel Castings: ASTM A167, Type 304.

G. Rubber: Abrasion resistant Styrene Butadiene Rubber, 65 to 80 Shore A durometer, black.

2.2 SOLID PLASTIC TOILET COMPARTMENTS AND SCREENS

A. Basis of Design: Eclipse Toilet Partitions as manufactured by and supplied by Scranton Products.
   1. Style: Floor mounted overhead-braced toilet compartments.

B. Doors and Panels: High density polyethylene (HDPE), fabricated from SEQ CHAPTER 1extruded polymer resins, forming single thickness panel.
   1. Waterproof and nonabsorbent, with self-lubricating surface, resistant to marks by pens, pencils, markers, and other writing instruments.
   2. Thickness: 1 inch (25 mm).
   3. Edges: Shiplap.

C. Panel Color: Warm Series:
   1. Linen - Orange Peel.

D. Doors and Dividing Panels:
   1. Extra Privacy:
      a. Height: 71-1/2 inches (1816 mm) high and mounted at 4 inches (102 mm) above the finished floor.
      b. Doors: 60 degree angle on two opposite edges for enhanced privacy.
      c. Dividing Panels: Two modular pieces, both slotted on one edge to accept wall bracket.

E. Metal Posts: 82.75 inches (2102 mm) high, heavy duty extruded aluminum, clear anodized finish, fastened to foot with stainless steel tamper resistant screw.

F. Hidden Shoe (Foot): One-piece molded polyethylene invisible shoe inserted into metal post and secured to metal post with stainless steel tamper resistant screw.

G. Headrail Cap and Corner Cap: One-piece molded polyethylene secured to metal post with stainless steel tamper resistant screw; adjustable to level headrail to finished floor.

H. Hidden Wall Brackets: Continuous heavy duty extruded aluminum, clear anodized finish, inserted into slotted panel and fastened to panels with stainless steel tamper resistant screws.
   1. Type: Single Ear bracket aluminum.
   2. Type: Double ear bracket aluminum.
   3. Length: 71 inches (1803 mm).

I. Headrail: Heavy duty extruded aluminum, designer anti-grip design, clear anodized finish, fastened to headrail bracket with stainless steel tamper resistant screw and to headrail cap or corner cap with stainless steel tamper resistant screw.
   1. Headrail Brackets: Heavy duty extruded aluminum, clear anodized finish, secured to wall with stainless steel tamper screws.

J. Door Hardware:
   1. Hinges:
      a. Edge-mounted stainless steel continuous hinge.
   2. Door Keeper:
      a. Fabricated from heavy duty extruded aluminum, clear anodized finish.
      b. Length: 3-1/2 inches (89 mm).
      c. Mount in gap between dividing panel and door.
   3. Latch and Housing:
      a. Fabricated from heavy duty extruded aluminum.

b. Latch housing: Clear anodized finish.
c. Slide bolt and button: Black anodized finish.
d. Provide occupancy indicator.

4. Door Pulls:
   a. Fabricated from heavy duty extruded aluminum, clear anodized finish.
   b. Single component providing door pull capability on outswing doors.
5. Door Stop: Coat hook bumper.
6. Door Stop: Wall stop.
7. Push Plates: Fabricated from heavy duty extruded aluminum, clear anodized finish.

PART 3 EXECUTION

3.1 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

C. Examine areas to receive toilet partitions, screens, and shower compartments for correct height and spacing of anchorage/blocking and plumbing fixtures that affect installation of partitions. Report discrepancies to the architect.

3.3 INSTALLATION

A. Install in accordance with manufacturer's instructions and approved Shop Drawings.

B. Install partitions rigid, straight, plumb, and level.

C. Locate bottom edge of doors and panels 4 inches above finished floor.

D. Clearance at vertical edges of doors shall be uniform top to bottom and shall not exceed 3/8 inch (9.5 mm).

E. No evidence of cutting, drilling, and/or patching shall be visible on the finished work.

F. Finished surfaces shall be cleaned after installation and be left free of imperfections.

3.4 ADJUSTING

A. Adjust doors and latches to operate correctly.

3.5 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

1) General

a) **SECTION INCLUDES**

i) Labour, Products, equipment and services for washroom accessories Work in accordance with the Contract Documents.

b) **REFERENCES**

i) ASTM A167, Specification for Stainless Steel and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.

ii) ASTM A312, Specification for Seamless and Welded Austenitic Stainless Steel Pipes.

iii) ASTM A653/A653M, Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvanealed) by the Hot-Dip Process.

iv) CAN/CSA B651-M, Barrier Free Design.

c) **SUBMITTALS**

i) Product data: Submit Product data to requirements of Section 01 33 00 indicating each washroom accessory describing size, finish, details of function, attachment methods, hardware and locks, description of rough-in frame, and building-in details of anchors for grab bars.

ii) Closeout submittals:
(1) Submit for each Product operation and maintenance instructions for incorporating into the Operations and Maintenance Manuals in accordance with Section 01 78 23.
(a) Supply 2 keys for each lockable washroom accessory to Consultant.
(b) Master key washroom accessories which are keyed.

d) **DELIVERY, STORAGE AND HANDLING**

i) Deliver materials in sealed cartons and containers with manufacturer’s name and product description clearly marked.

e) **EXTENDED WARRANTY**

i) Submit an extended warranty for washroom accessories Work in accordance with the General Conditions, except that the warranty period is extended to 10 years.
(1) Against cracked or scratched mirrors, spoiling or deterioration of silvering or backing, loosening of fastenings or adhesive
(2) Coverage: complete replacement including effected adjacent Work.

f) **MAINTENANCE**

i) Maintenance Tools: Provide special tools necessary for accessing, assembly/disassembly or removal of toilet, bath and cleaning accessories in accordance with requirements specified in Section 01 78 23.

2) Products

a) **MATERIALS**

i) Stainless steel:
(1) Sheet metal: ASTM A167, Type 304.
(2) Tubing: ASTM A312, Type 304.

ii) Sheet steel: ASTM A653M, Z275; Cold rolled, commercial quality, surface preparation and pretreatment as required for applied finish.

iii) Fasteners, screws and bolts: ASTM A167, Type 304 stainless steel, tamper-proof.

b) **ACCESSORIES**

i) Refer to drawings for quantity and location of washroom accessories.

ii) Grab bar **(GB-1)**:
(1) Series B-6806-99 by Bobrick or #3800-P Series by ASI Group Canada; 38 mm diameter, 1.2 mm thick, concealed mounting with snap flange, complete with escutcheons.
(2) Dimensions: 600 mm long.
(3) Finish: Type 304 stainless steel with a satin finish and peened grip.

iii) L-shaped grab bar **(GB-2)**:
(1) 3800-P Series by ASI Group Canada or approved alternative by Bobrick; 38 mm diameter, 1.2 mm thick, 'L' shaped configuration concealed mounting with snap flange, complete with escutcheons.
(2) Dimensions: 760 mm x 760 mm.
(3) Finish: Type 304 stainless steel with a satin finish and peened grip.

iv) Mirror with shelf **(MIR-1)**: 6 mm thick, mirror quality float glass
(1) #B-292 by Bobrick or #20655 series by ASI Group Canada; mitred corners welded, and polished smooth.
(2) Shelf: 1.2 mm thick stainless steel with 19 mm return edge on front. Corners are welded, ground and polished smooth.
(3) Dimensions: Sizes and locations as indicated on the Contract Drawings.

(4) Frame finish: Type 304 stainless steel satin finish.

v) Tilted Mirror **(MIR-2)**: 6 mm thick, mirror quality float glass.
(1) #B-293 Series by Bobrick or #0535 Series by ASI Group Canada; mitred corners welded, and polished smooth.
(2) Dimensions: Sizes and locations as indicated on the Contract Drawings.
(3) Frame finish: Type 304 stainless steel satin finish.

vi) Backrest assembly **(BS-1)**:
(1) Provide barrier-free backrest assemblies for floor mounted water closets.
(2) Backrest assembly to be fabricated from 32 mm o.d. stainless steel tubing with a satin finish, concealed mounting with snap on flanges complete with two white solid phenolic component panels.
(3) 'Model W-1401-T2-8' by ASI Group Canada or approved alternative.

3) Execution

a) **EXAMINATION**

i) 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.

b) **INSTALLATION**

i) Verify and coordinate templates, inserts, and rough-in frames and verify exact location of washroom accessories for installation.

ii) Verify there is adequate supports and/or blocking in gypsum wall assemblies prior to installation of washroom accessories.

iii) Provide fastening and mounting kits for washroom accessories.

iv) Locate washroom accessories where indicated on Drawings and where directed by Consultant.

v) Install washroom accessory fixtures, accessories, and items in accordance with manufacturer's instructions and CAN/CSA B651-M. Provide exposed tamper-proof screws of stainless steel to match units.

vi) Install washroom accessories plumb, level, and securely and rigidly anchored to substrate surfaces and framing. Adjust accessories for proper operation and verify mechanisms function smoothly.

vii) Install grab bars to withstand minimum 408 kg downward pull. Provide necessary reinforcements as required.

viii) Clean and polish exposed surfaces and fill accessories with necessary supplies prior to acceptance by Consultant.

END OF SECTION

1) General

a) **SECTION INCLUDES**

i) Labour, Products, equipment and services necessary for miscellaneous specialties Work in accordance with the Contract Documents.

b) **SUBMITTALS**

i) Product data:
(1) Submit duplicate copies of manufacturer's Product data for each Product specified in accordance with Section 01 33 00 indicating:
(a) Performance criteria, compliance with appropriate reference standard(s), characteristics, and limitations.
(b) Product transportation, storage, handling and installation requirements.

ii) Shop drawings: Submit shop drawings in accordance with Section 01 33 00 indicating elevations, sections, details, dimensions, materials, gauges, and finishes.

iii) Closeout submittals: Submit cleaning and maintenance instructions for miscellaneous specialties for incorporation into Operations and Maintenance Manuals in accordance with Section 01 78 23.

c) **DELIVERY, STORAGE, AND HANDLING**

i) Package or crate, and brace products to prevent distortion in shipment and handling. Label packages and crates, and protect finish surfaces by sturdy wrappings.

2) Products

a) **MANUFACTURED UNITS**

i) Janitor’s shelf with mop and broom holders and hooks **(MHLDR-1)**:
(1) #B-239 x 34 by Bobrick Washroom Equipment of Canada or approved alternative.
(2) 330 mm H by 205 mm deep. Shelf constructed of minimum 1.2 mm stainless steel, mop and broom holders to have spring loaded rubber cam to grip handles up to 30 mm in diameter, and stainless steel hooks positioned below shelf.
(3) Finish: Type 304 stainless steel with satin finish.

1) General

a) **SECTION INCLUDES**

i) Labour, Products, equipment and services necessary for miscellaneous specialties Work in accordance with the Contract Documents.

b) **SUBMITTALS**

i) Product data:
(1) Submit duplicate copies of manufacturer's Product data for each Product specified in accordance with Section 01 33 00 indicating:
(a) Performance criteria, compliance with appropriate reference standard(s), characteristics, and limitations.
(b) Product transportation, storage, handling and installation requirements.

ii) Shop drawings: Submit shop drawings in accordance with Section 01 33 00 indicating elevations, sections, details, dimensions, materials, gauges, and finishes.

iii) Closeout submittals: Submit cleaning and maintenance instructions for miscellaneous specialties for incorporation into Operations and Maintenance Manuals in accordance with Section 01 78 23.

c) **DELIVERY, STORAGE, AND HANDLING**

i) Package or crate, and brace products to prevent distortion in shipment and handling. Label packages and crates, and protect finish surfaces by sturdy wrappings.

2) Products

a) **MANUFACTURED UNITS**

i) Prefabricated Insulated Steel Shed:

(1) Supply & Install prefabricated steel shed with the following minimum requirements:
a) 8'x10' Steel C-channel building
b) Roof and wall 26G prefinished metal cladding
c) Internal Roof and Wall Liner prefinished Panel 26G
d) R30 roof infill insulation
e) R20 wall infill insulation
f) Prefinished Gutters and downspouts
g) Single Slope Roof
h) 1x 6'x7'2" Steel Fire Rated Metal Man Door Painted white

1) General

a) **SECTION INCLUDES**

i) Design, labour, Products, equipment and services necessary for concrete curbs and pavements Work in accordance with the Contract Documents.

b) **REFERENCES**

i) ASTM A53/A53-M, Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.

ii) ASTM A185/A185-M, Specification for Steel Welded Wire Reinforcement, Plain, for Concrete.

iii) ASTM C260, Specification for Air-Entraining Admixtures for Concrete.

iv) ASTM C309, Specification for Membrane-Forming Compounds for Curing Concrete.

v) ASTM C494/C494-M, Specification for Chemical Admixtures for Concrete.

vi) ASTM D994, Specification for Preformed Expansion Joint Filler for Concrete (Bituminous Type).

vii) CAN/CSA A23.1/A23.2-M, Concrete Materials and Methods of Concrete Construction/Methods of Tests for Concrete.

viii) CAN/CSA A3000, Cementitious Materials Compendium.

ix) CAN/CSA G30.18-M, Billet-Steel Bars for Concrete Reinforcement.

x) CSA O121, Douglas Fir Plywood.

xi) CAN/CSA S269.3-M, Concrete Formwork.

c) **DESIGN REQUIREMENTS**

i) Concrete: 30 Mpa unless otherwise indicated on drawings. Exterior concrete to have 5-7% entrained air.

ii) Design concrete so that material will not segregate and excessive bleeding will not occur.

iii) Comply to the MTC Manual of Uniform Traffic Control Devices for signs and flagging when working within existing road ways. Any requirements to restrict local traffic due to the contractors works, must be reviewed and approved by the Consultant.

d) **SUBMITTALS**

i) Product data:
(1) Submit duplicate copies of manufacturer's Product data in accordance with Section 01 33 00 for each material indicating:
(a) Performance criteria, compliance with appropriate reference standard(s), and characteristics.
(b) Product transportation, storage, handling and installation requirements.

ii) Shop drawings: Submit shop drawings in accordance with Section 01 33 00 indicating elevations, sections, details, materials, joint assemblies, finishes and relationships to adjacent construction.

e) **QUALITY ASSURANCE**

i) Inspection and testing:
(1) Materials: CAN/CSA A23.1/A23.2-M; Inspect and test for conformance to requirements of this Standard and to Specifications.
(2) Tests will be made in accordance with CAN/CSA A23.2-M.
(3) Remove defective materials and completed Work which do not conform to the Contract Documents.

f) **DELIVERY, STORAGE, AND HANDLING**

i) Deliver and store materials on Site in accordance with CAN/CSA A23.1/A23.2-M.

g) **SITE CONDITIONS**

i) Conform to CAN/CSA A23.1/A23.2-M.

ii) Do not deposit concrete on frozen ground. When deposited in forms concrete shall have a temperature between 10EC and 30EC and these limits shall be maintained for 72 hours.

2) Products

a) **MATERIALS**

i) Forms: Plywood to CSA O121, G1S; Douglas Fir plywood, seven ply, exterior grade, waterproof glue, edges sealed with oil based sealer.

ii) Form ties: Adjustable snap ties, formed to break 25 mm or more from surface of concrete after form removal, with a minimum working strength of 1360 kg.

iii) Form release agent: Chemically active, non-staining, VOC compliant, release agents containing compounds that react with free lime present in concrete forming water insoluble soaps, preventing concrete from sticking to forms.

iv) Reinforcing steel: CAN/CSA G30.18-M; Billet-steel bars, deformed unless indicated otherwise, Grade 400R.

v) Welded steel wire fabric: ASTM A185/A185-M; Resistance welded in size and spacing shown for smooth wire fabric, in flat sheets only.

vi) Chairs, bolsters, supports, spacers: CAN/CSA A23.1-M with sufficient strength to rigidly support weight of reinforcement and construction loads. Manufactured by NCA/Acrow - Richmond or Dayton Superior.

vii) Cement: CAN/CSA A3000; Portland, Type 10.

viii) Coarse and fine aggregate: CAN/CSA A23.1/A23.2-M.

ix) Water: CAN/CSA A23.1/A23.2-M.

x) Water reducing admixture: ASTM C494/C494-M, Type A.

xi) Set retarding admixture: ASTM C494/C494-M, Type D.

xii) Air entraining admixture: CAN/CSA A23.1/A23.2-M and ASTM C260.

xiii) Pigmented curing compound: ASTM C309, Type 2, Class B; White pigmented resin based.

xiv) Joint filler: ASTM D994, Asphalt impregnated; 'Asphalt Joint Expansion Joint Filler' by W. R. Meadows Ltd., in thickness shown on Contract Drawings. Furnish kraft paper or polyethylene sheet as bond breaker between sealant and joint filler

xv) Joint Sealant: Two component, non-tracking, chemically reactive urethane/coal tar modified sealant; 'Sealtight Gardox' by W. R. Meadows Ltd. or 'Vulkem 202' by Tremco.

xvi) Bonding Agent: Furnish 'Sika-Dur' by Sika, or 'Intralock' by W. R. Meadows.

b) **MIXES**

i) Acceptance of any concrete mix proportion or material, does not preclude its future rejection if it is subsequently found to lack uniformity, or if it fails to conform to requirements specified, or if its field performance is found to be unacceptable.

ii) Mix concrete and concrete proportions in accordance with CAN/CSA A23.1/A23.2-M.

c) **ADMIXTURES**

i) Use admixtures for concrete from single manufacturer, unless otherwise acceptable to Consultant.

ii) Have manufacturer certify that admixtures are compatible.

iii) Add admixtures to concrete mix in accordance with manufacturer's recommendations.

iv) Except as specified otherwise, comply with requirements of CAN/CSA A23.1/A23.2-M.

v) Use of calcium chloride or additional admixtures, other than those specified, is not acceptable.

3) Execution

a) **EXAMINATION**

i) 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.

b) **GENERAL**

i) Give Consultant at least 2 working days notice prior to placement of concrete to permit a review of compaction, placement of formwork, reinforcing steel, and associated items embedded in concrete for conformance to reviewed shop drawings and Contract Documents.

ii) Do not place concrete on surfaces which contain frost, water or debris.

iii) Provide concrete curb cuts and sidewalk handicap access ramps as indicated, in accordance with the authorities having jurisdiction.

c) **PREPARATION**

i) Verify grades of items set in paving area for conformity with elevations and sections before placing granular base and subbase material.

ii) Obtain approval of subgrade by Consultant before placing granular subbase and base.

iii) Set out work from lines and levels shown on drawings.

iv) Prevent damage to adjacent and/or existing buildings and/or properties, and existing curbs, sidewalks and asphalt paving.

v) Accurately saw-cut and modify existing sidewalks to nearest adjacent dummy/expansion joint as directed on site by Consultant.

vi) Remove and dispose of debris from the work of this section in accordance with authorities having jurisdiction.

vii) Fine grade, shape and compact subgrade to minimum of 95% Standard Proctor Density.

viii) Wet base immediately in advance of concreting to ensure a firm moist surface without ponding.

ix) Repair damage to base resulting from hauling or equipment operations.

d) **FORMWORK**

i) Construct formwork in accordance with CAN/CSA S269.3-M to produce finished concrete conforming to shape, dimensions, locations and elevations indicated. Ensure no lumber remains in concrete.

ii) Set forms true to line and grade, join neatly and tightly, and stake securely to resist concrete pressure and impact from tampers without springing.

iii) Apply release agent by spray in accordance with manufacturer's recommendations. Ensure form surfaces receive a uniform coating.

e) **REINFORCING**

i) Place reinforcing steel as shown on reviewed shop drawings and in accordance with CAN/CSA A23.1-M. Make bars as long as possible.

ii) Make splices in locations shown on Drawings. Lap lengths in accordance with CSA A23.3 unless otherwise shown.

iii) Lap ends and sides of wire fabric not less than 150 mm.

f) **PLACING OF CONCRETE**

i) Before placing fresh concrete against set or partially set concrete, clean surfaces to remove dirt, scum, shavings, debris, laitance, etc. on set surfaces, brush generously with bonding agent.

ii) Place concrete in accordance with CAN/CSA A23.1/A23.2-M.

iii) Slope concrete to levels shown on Contract Drawings.

iv) Do not place concrete at such a rate as to endanger formwork or to prevent proper compaction.

v) Place concrete to prevent cold joints and segregation and vibrate sufficiently to ensure thorough compaction, maximum density in accordance to CAN/CSA A23.1/A23.2-M

vi) Check Work frequently with accurate instruments during placing of concrete.

vii) When completing concrete placement for day, carry placement through to a scheduled joint location.

viii) Where concrete placement is stopped for more than 30 minutes due to breakdowns, weather or any other reasons, construct extra bulkhead and construction joint as directed.

g) **CONCRETE CURBS**

i) Align concrete curbs with curves and tangents indicated on drawings. Concrete curb to be in accordance to details indicated on drawings.

ii) Where existing curb is met, the contractor must make the required transition to style and grade of existing curb to the satisfaction of the Consultant.

iii) Curbs shall have expansion joints at minimum 4500 mm o.c. and in accordance with authorities having jurisdiction. Place reinforcing bars at top and base of curb, with minimum 50 mm concrete cover.

iv) All restoration of the existing road structure for the transition to existing curb is the responsibility of the contractor.

v) Finish edges of dummy joints and expansion joints with 3 mm radius edging tool.

h) **CONCRETE PAVEMENTS**

i) Concrete sidewalk to be in accordance with details indicated on drawings.

ii) Concrete for standard sidewalk to be 150 mm thick, except through entrances where the concrete shall be 200 mm thick with wire mesh. The compacted granular ‘A’ is to be 150 mm thick at all locations.

iii) Where existing sidewalk is met, make the required transition to grade, to the satisfaction of the Consultant. Furthermore, co-ordinate with the City and Consultant, to insure compatibility of existing and or future adjacent works by City forces.

iv) All structural concrete, such as but not limited to, concrete walkway adjacent to building, concrete pads for loading docks, and concrete slabs for loading areas to be constructed in accordance with reviewed shop drawings.

v) Dummy joints: 6 mm deep at 1500 mm o.c. Tool joints with 6 mm wide steel trowel, radiusing edges 6 mm.

vi) Expansion joints: 6000 mm o.c. maximum.

vii) Tool edges of sidewalk with 50 mm wide steel trowel, radiusing edges 6 mm.

viii) Install sealant in expansion/isolation joints as shown and specified.

i) **CONSOLIDATING**

i) Consolidate concrete in accordance with CAN/CSA A23.1/A23.2-M

ii) Work concrete into complete contact with forms and embedded items. Consolidate concrete adjacent to side forms and along entire length of forms to ensure a smooth surface finish after stripping of formwork.

j) **CURING AND PROTECTION**

i) Cure and protect concrete in accordance with CAN/CSA A23.1/A23.2-M.

ii) Apply curing compound after finishing operations have been completed, at rate recommended by compound manufacturer. Ensure compound application is uniform and continuous over entire area being cured.

k) **CONSTRUCTION JOINTS**

i) Obtain Consultant's acceptance to install construction joints in locations other than those shown.

ii) Construct construction joints to CAN/CSA A23.1-M and as shown. Supply and install dowels in construction joints unless otherwise detailed.

iii) Joints at building face or other abutments: place 12 mm joint filler keeping top 12 mm below concrete surface; apply kraft paper or polyethylene bond over filler and fill with self-levelling sealant applied in accordance with manufacturer’s printed instructions.

iv) For sawn joints:
(1) Do sawn joints in accordance with drawing details. Prepare sample sawn joint for approval by Consultant.
(2) Ensure joints are straight. Mark alignment with chalk line or other suitable guide. Layout to be approved by Consultant.
(3) Saw joints using approved equipment and methods to produce joint dimensions indicated.
(4) Supply sufficient men and equipment including standby equipment, to maintain a satisfactory sawing schedule.
(5) Schedule sawing operations on 24 hour basis and consistent with concrete placing.
(6) Make initial saw cuts in a progressive manner and as soon as possible without excessive ravelling.
(7) If a crack occurs ahead of saw cut, stop immediately. Move ahead several joints and cut one or more joints before returning to saw intermediate joints. Where cracking persists, make 1060 mm saw cut from one edge and complete sawing from opposite edge. Adjust sawing schedule accordingly.
(8) If uncontrolled cracking or other surface damage results from inadequate or improper sawing techniques suspend further concrete operations until situation is corrected and immediately remove and replace damaged slabs.

(9) Immediately on completion of sawing, flush joints with water to remove laitance.

l) **FINISHING**

i) When striking off concrete surface, maintain a uniform roll of concrete ahead of first screed for its full length when finishing machine is on first pass.

ii) Where joints are formed rather than sawn, form longitudinal and transverse joints after final pass of finishing machine.

iii) Hand finish areas inaccessible to finishing machine to same quality and surface characteristics as machine finished surfaces.

iv) Finish concrete surface with an approved float at proper time. Operate from edge to edge with a wiping motion while advancing, with each succeeding pass overlapping previous one.

v) Check surface with approved straightedge 4500 mm long. Correct irregularities exceeding 5 mm before concrete takes initial set.

vi) Finish edges of slabs with edging tool to form a smooth squared surface. Do not patch with cement paste.

m) **IDENTIFICATION STAMP**

i) For sidewalks in the public right-of-way, mark concrete at each end of the work and at least every 18000 mm or such other places as the Consultant may select.

ii) The stamp shall be located on the centre of the bay of walk, next to and parallel to a transverse joint.

iii) The size and shape of the stamp shall be as shown on City of Mississauga Drawings.

iv) The imprint shall be clear and legible and satisfactory to the Consultant.

n) **BROOM FINISH**

i) Commence texturing immediately after float finishing.

ii) Use soft bristled broom to produce an approved light, non-slip concrete surface finish with fine granular or sandy texture free from disfigurations. Finishes to be approved by Consultant.

iii) Apply broom finish at right angles to curb and parallel to joints. All trowel and tool marks to be removed with broom. Do not contaminate joints by over-brooming.

iv) Finish to match existing striped concrete sidewalk to remain, and to Consultant's approval.

o) **REMOVAL OF FORMS**

i) Do not disturb forms until concrete has hardened and developed sufficient strength to safely support its own weight and load on it.

ii) Strip formwork in accordance with CAN/CSA A23.1-M.

p) **DEFECTIVE CONCRETE**

i) Concrete is defective when:
(1) Containing excessive honeycombing or embedded debris.
(2) Concrete damaged by freezing or which is unsatisfactory due to placement at too high a temperature.
(3) Average 28 day strength of any three consecutive strength tests is less than specified minimum 28 day strength.
(4) Any 28 day strength test result is less than 80% of specified minimum 28 day strength.
(5) Surface texturing, joint type and placement and tolerances are unacceptable in the opinion of the Consultant.

ii) Repair of defective concrete work:
(1) Repair defective areas while concrete is still plastic, otherwise wait until curing is completed. Use repair methods approved by Consultant.
(2) Grind off high surface variations where directed.

iii) Remove and replace defective concrete where directed.
(1) Remove minimum 3000 mm of pavement by sawing through concrete across full lane width.
(2) Replace with new concrete to this specification.
(3) Construct dummy contraction joint between sawn face of existing concrete and face of new concrete.

q) **PROTECTION**

i) Do not open concrete pavement to traffic or construction equipment until concrete reaches 70% of specified strength or until approved by Consultant.

END OF SECTION