

**DAVENPORT SHELTER
348 DAVENPORT ROAD
TORONTO, ON**

FOR

CITY OF TORONTO

PROJECT MANUAL

**WORKSHOP ARCHITECTURE INC
1157 DAVENPORT ROAD
TORONTO, ON**

**ISSUED FOR CONSTRUCTION
04 SEPTEMBER 2018**

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1.1 Work Under This Contract

- .1 It is intended that Work supplied under this Specification shall be complete in every detail for purpose required. This Contract shall include by Contractor, materials not herein mentioned, but which may be found necessary to complete or perfect any portion of Work in accordance with requirements of this Specification.

1.2 Use of Premises and Site

- .1 Confine Work to the area of the Project only.

1.3 Specifications

- .1 Each Section of Division 1 is complementary to other Sections of Division 1 and shall be read together with other Sections.
- .2 This Section co-ordinates, relates and governs Work of other Sections of the Specification.
- .3 The Specifications are apportioned into Divisions and Sections for convenience but shall be read as a whole and neither such apportionment nor anything else contained in the Contract Documents places responsibility upon the Consultant to settle disputes among Subcontractors in respect thereof.

1.4 Examination of Site, Documents, Surfaces and Conditions

- .1 Carefully examine Place of the Work and investigate, at no cost or risk to Owner, matters relating to nature of Work, means of access and egress, obstacles, rights and interests of other parties which may be interfered with during the execution of Work, conditions and limitations including obstructions, existing structures or facilities, local conditions, actual levels, character and nature of the Project, and any other consideration which may affect performance of the Work.
- .2 Carefully examine extent of Work to be performed and matters which are referred to in the Contract Documents prior to start of Work.
- .3 Examine Work to which Work is to be applied, anchored or connected, and relevant as-built conditions.
- .4 Do not Work until unsatisfactory conditions are corrected to acceptance of Consultant, Contractor and concerned Subcontractors. Commencement of Work implies acceptance of surfaces and conditions.

1.5 Quantity of Items

- .1 Where a component, device, item or part of materials or equipment is referred to in the singular number, such reference shall require the provision of as many components, devices, items or parts of material or equipment necessary to complete the Work.

1.6 Standards and Codes

- .1 Contract Forms, codes, Specifications, standards, manuals and installation, application and maintenance instructions referred to in these Specifications, unless otherwise specified, amended or date suffixed, shall be latest published editions at Bid Closing Date.

1.7 Discrepancies

- .1 Advise Consultant of any contradictions, discrepancies or errors that are found or noted.
- .2 Advise Consultant if there is any doubt as to meaning or intent thereof in Contract Documents.
- .3 Do not proceed until instructions/clarifications have been confirmed by Consultant. A failure to notify Consultant shall result in Contractor incurring responsibility for any resulting circumstances, conditions, expenses or cost.

1.8 Additional Definitions

Also refer to Definitions in CCDC 2 2008.

- .1 Wherever words "approved", "review", "acceptance", "acceptable", "satisfactory", "selected", "directed", "required", "submit", 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.
- .2 "Others" Defined: Others in Contract Documents refers to other trades within framework of this Contract. Any Work or material executed outside Contract is designated "NIC" (Not in Contract), "By Owner", or "By Other Contractors".

1.9 Setting Out the Work

- 1 Assume full responsibility for and execute complete layout of Work to required locations, lines and elevations.

1.10 Documents On Site

- .1 Maintain at job site, one copy of each of following:
 - .1 Contract Documents including Drawings, Specifications, Addenda, and other modifications to the Contract.
 - .2 'Reviewed' or Reviewed as Modified Shop Drawings.
 - .3 Project Construction and Shop Drawing Schedules.
 - .4 Site Instructions, Change Orders, and Change Directives.
 - .5 Field Test Reports.
 - .6 Reports by Authorities having Jurisdiction.
 - .7 Building and other applicable permits.
 - .8 Material Safety Data Sheet pursuant to WHMIS (Occupational Health & Safety Act).
 - .9 As-built Drawings recording as-built conditions, instructions, changes for structure, equipment, wiring, plumbing and Divisions 15 and 16, prior to being concealed.
 - .10 Copies of applicable codes and standards.
- .2 Make above material available to Consultant at their request.

1.11 Overloading

- .1 Take precautions and preclude overloading of any part of structure, falsework, formwork or scaffolding during progress of the Work, and make good damage resulting from such overloading.

1.12 Inserts, Anchors and Fasteners

- .1 Use only factory made, threaded or toggle type inserts as required for supports and anchors, properly sized for load to be carded. Place inserts only in members of main structure and not in any finishing material.
- .2 Where inserts cannot be placed, use factory made expansion shields for light weights only.
- .3 Fasteners stressed in withdrawal are not acceptable, except where otherwise specifically shown.
- .4 Ensure that metal fastenings are of same materials as metal components being anchored or of a metal which will not set up a galvanic action causing damage to the fastening or metal component under moist conditions.
- .5 Fastenings for prefinished materials shall be of concealed type unless otherwise indicated.
- .6 Metal fastenings and accessories shall be same texture, colour and finish as material on which they occur.

1.13 Trademark and Labels

- .1 Trademarks and labels, including applied labels, shall not be visible in finished Work in finished areas.
- .2 Remove trademarks or labels by grinding, if necessary, paint out where particular surface is being painted or, if on plated parts, replace with new plain plated or non-ferrous metal parts.
- .3 The exceptions to this requirement are trademarks and labels which are essential to obtain identification of mechanical, electrical or other equipment for maintenance and replacement purposes and for mandatory fire ratings.

1.14 Powder Actuated Fasteners

- .1 The use of Powder Actuated Fasteners is not acceptable without prior consent from the Owner.

1.15 Use of Premises Prior to Substantial Performance

- .1 Owner shall have right to enter and occupy building, in whole or in part, for purpose of placing fittings and equipment, or for other use, prior to Substantial Performance if, in opinion of the Consultant, such entry and occupancy does not prevent or interfere with the Contractor in performance of the Work. Such entry shall in no way be considered as an acceptance of Work in whole, or in part, nor shall it imply acknowledgement that terms of Agreement are fulfilled.

1.16 Interferences

- .1 Coordinate placement of equipment to ensure that components will be properly accommodated within spaces Provided prior to commencement of Work.
- .2 Take complete responsibility for remedial Work that results from failure to coordinate any aspect of Work prior to its fabrication/installation.
- .3 Ensure that accesses and clearance required by jurisdictional authorities and/or for easy maintenance of equipment are Provided in layout of equipment and services.

END OF SECTION

1.0 General

- .1 Erect Work in compliance with Contract Documents and be responsible for delays or costs resulting from failure to inspect or co-ordinate, and for any replacement or corrective work required.

1.1 Superintendence

- .1 Provide full time on site superintendent personnel and supporting staff with proven experience in erecting, supervising, testing and adjusting projects of comparable nature and complexity.
- .2 Site superintendent shall have overall authority to speak for Contractor and represent Contractor.

1.2 Dimensions

- .1 Verify dimensions on Site before commencing shop drawings. Before fabrication commences report discrepancies to Consultant in writing. Incorporate accepted variances on shop drawings and As-Built records.

1.3 Coordination

- .1 Coordinate and co-operate with work forces to ensure that Work will be carried out expeditiously and in proper sequence.
- .2 Make adjustments to allow adjustable work fit to fixed Work.

1.4 Dimension and Coordination

- .1 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.
- .2 Verify that work, as it proceeds, is executed in accordance with dimensions and positions indicated and maintain levels and clearances to adjacent work, as set out by requirements of Drawings, and ensure that work installed in error is rectified before construction resumes.
- .3 Check and verify dimensions referring to work and interfacing of services. Verify with trade concerned such dimensions, when pertaining to work of other trades.
- .4 **DO NOT SCALE** directly from Drawings. Obtain clarification from Consultant if there is ambiguity or lack of information on Drawings.
- .5 Details and measurements of any work which is to fit or to conform with work installed shall be taken at Place of Work.
- .6 Advise Consultant of discrepancies and omissions on Drawings and specifications which affect aesthetics, or which interfere with services, equipment or surfaces. Do not proceed with work affected by such items without clarification from Consultant.

END OF SECTION

1.1 Laws, Notices, Permits and Fees

- .1 Refer to GC 10.2.
- .2 The Building Code including amendments, shall govern the construction of the Work.
- .3 Comply with Codes, By-Laws, and Regulations of authorities having jurisdiction. Codes and regulations constitute an integral part of the Contract Documents.
- .4 Owner will apply and pay for Municipal Building Permit. Contractor shall apply and pay for other permits, licenses, deposits and certificates of inspection as part of the Contract Price.
- .5 Arrange for inspection, testing of Work and acceptance required by the authorities having jurisdiction. Be responsible for necessary preparations, provisions and pay costs.
- .6 Obtain permit required to work on Municipal rights of way. Obtain damage deposits for sidewalks, roads and services work at Contractor's expense.

END OF SECTION

1 General

- .1 Cash Allowances included in this Section are for items of Work which could not be fully quantified prior to Bidding.
- .2 Expend each allowance as directed by the Consultant in writing.
- .3 Each allowance will be adjusted to actual cost as defined hereunder and the Contract Price will be amended accordingly by Contract Change Order.
- .4 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.
- .5 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.
- .6 Consultant may direct Contractor to obtain bids, at no additional cost to Owner, for work for which payment is made from cash allowances.

2 CASH ALLOWANCE(S)

- .1 Cash allowances, unless otherwise specified, cover the net cost to the Contractor of services, Products, construction machinery and equipment, freight, handling, unloading, storage, installation 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.
- .2 Include in the Bid Price the below cash allowances
 - .1 CCTV Scan of Storm Sewer \$1,000
 - .2 Concrete Testing \$1,500
 - .3 Masonry Testing \$1,500
 - .4 Structural steel/welding Inspection \$1,500
 - .5 Mechanical System Testing/Adjusting/Balancing \$3,000
 - .6 Fire Alarm Panel Upgrade \$3,000
 - .7 Telecommunication/Data allowance \$5,000
 - .8 Intercom P/A allowance \$3,500
 - .9 Security allowance \$2,500
 - .10 Building Automation Controls \$3,000
- .3 The Contract Price, and not the cash allowance, includes the Contractor's overhead and profit in connection with such cash allowance.
- .4 Where the actual cost of the Work under any cash allowance exceeds the amount of the allowance, any unexpended amounts from other cash allowances shall be reallocated, at the Consultant's direction, to cover the shortfall, and, in that case, there shall be no additional amount added to the Contract Price for overhead and profit. Only where the actual cost of the Work under all cash allowances exceeds the total amount of all cash allowances shall the Contractor be compensated for the excess incurred and substantiated, plus an amount for overhead and profit on the excess only, as set out in the Contract Documents.
- .5 Progress payments on accounts of work authorized under cash allowances shall be included in the monthly certificate for payment.
- .6 Submit, with application for payments, copies of all invoices and statements from suppliers and Subcontractors for work which has been paid from cash allowances.

- .7 Include in the Bid Form the amount of each cash allowance, for Work specified in the respective specification Sections.
- .8 The net amount of any unexpended cash allowances, after providing for any reallocations as contemplated in Clause 2.4, shall be deducted from the Contract Price by Change Order without any adjustment for the Contractor's overhead and profit on such amount.
- .9 The Contractor shall prepare schedule that shows when the Owner must authorize ordering of items called for under cash allowances to avoid delaying the progress of the work.
- .10 The Owner reserves the right to call, or to have the Contractor call, for competitive bids for portions of the Work, to be paid for from cash allowances.

3 CONTINGENCY ALLOWANCE

- .1 Expend contingency allowance only on Architect's written instructions.
- .2 Include in each expenditure from contingency allowance, applicable taxes as specified in the General Conditions of the Contract, GC 10.1; but, excluding Harmonized Sales Tax, which shall be shown as a separate amount and not part of contingency allowance amount.
- .3 Credit the Owner with unused portion of contingency allowance in statement for final payment.
- .4 Include in the Total Stipulated Price, a total contingency allowance sum of **\$50,000.00** for the work indicated below (3.5.1 to 3.5.8 inclusive). Total contingency allowance indicated does not include HST, total contingency allowance sum shall be included in the Stipulated Price prior to calculating HST. No change in Contract Price will be considered until total contingency allowance sum is depleted.
- .5 Contingency Conditions:**
 - .1 Unforeseeable existing building construction variances and conditions.
 - .2 Unforeseeable soils conditions.
 - .3 Unforeseeable demolition conditions.
 - .4 Unforeseeable site conditions.
 - .5 Unforeseeable Hazardous Materials/Substances.
 - .6 Unforeseeable Mechanical Conditions.
 - .7 Unforeseeable Electrical Conditions.
 - .8 Additional requirements by the Owner.

END OF SECTION

PART 1 - GENERAL

1.1 Approved Alternates and Approved Equals

- .1 Named Product alternates or equals, indicated by the phrases “or approved alternate by XYZ Manufacturing” or “or approved equal by XYZ Manufacturing”, shall be interpreted to mean that named Product alternate or equal, if selected for use in lieu of indicated or specified Product, meets or exceeds performance, appearance, general arrangement, dimensions, availability, code and standards compliance, and colour of specified Product. Be responsible for costs and modifications associated with the inclusion of named Product alternate or equal at no additional cost to the Owner.
- .2 The process for proposing and approving alternates or equals shall be the same process as for proposing and approving substitutions (refer to paragraph 1.2 below)
- .3 Confirm delivery of specified items prior to proposing alternates or equals.

1.2 Substitutions

.1 Submission of substitutes

- .1 Proposal for substitutions of Products and materials must be submitted in accordance with procedures specified in this section.
- .2 Consultant may review submissions, if directed by Owner, but in any case with the understanding that the Contract Time will not be altered due to the time required by the Consultant to review the submission and by the Contractor to implement the substitution in the Work.
- .3 Consultant’s services to review substitutions will be performed on an additional services basis to their contract with the Owner. Costs of these services will be discounted from any reductions in the Contract Price that might be forthcoming from the substitution. Therefore, to be acceptable, a substitution must present a reduction in the construction cost at least equal to the cost to the Owner of the Consultant’s additional services to review the substitution. Contractor shall cover directly costs and administration associated with courier services, reproduction costs, and other direct costs associated with these substitution reviews.

.2 Submission requirements

- .1 Description of proposed substitution, including detailed comparative specification of proposed substitution with the specified Product.
 - .2 Manufacturer’s Product data sheets for proposed Products.
 - .3 Respective costs of items originally specified and the proposed substitution.
 - .4 Confirmation of proposed substitution delivery, in writing by Product manufacturer.
 - .5 Compliance with the building codes and requirements of authorities having jurisdiction.
 - .6 Affect concerning compatibility and interface with adjacent building materials and components.
 - .7 Compliance with the intent of the Contract Documents
 - .8 Effect on Contract Time
 - .9 Reasons for the request
- .3 Substitutions submitted on shop drawings without following requirements of this section prior to submission of the affected shop drawings will cause the shop drawings to be rejected.
 - .4 Proposed substitutions shall include costs associated with modifications necessary to other adjacent and connecting portions of the Work.
 - .5 Consultant’s decision concerning acceptance or rejection of proposed substitutions is final. Should it appear to the Consultant that the value of services required to evaluate the substitution exceeds

the potential reduction, the Consultant will advise the Owner that the substitution does not merit consideration before proceeding with a full evaluation. If the substitution will produce a reduction commensurate with or exceeding the value of Consultant's services to evaluate the substitution, the Consultant will request the Owner's direction to proceed with evaluation.

END OF SECTION

PART 1 - GENERAL

- 1.1 Provide labour, Products, equipment, services tools and supervision necessary for submittals. Make submittals specified in this Section to Consultant unless otherwise specified.
 - .1 Verify accuracy and completeness of submittals prior to submission.
 - .2 Verify field measurements, field construction criteria, catalogue numbers and similar data.
 - .3 Co-ordinate each submittal with requirements of the Work and the Contract Documents.
 - .4 Notify Consultant in writing at time of submission, of any deviation in submittals from requirements of the Contract Documents.
- 1.2 Prepare a schedule identifying all submittals requested within the Contract Documents and corresponding issued dates for review by the Consultant.
- 1.3 Submit in accordance with dates established under Schedule of Submittals, 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.
- 1.4 Accompany each submittal with a letter of transmittal containing all pertinent information required for identification and checking of submittals including but not limited to the following:
 - .1 Date of initial submission and date of each subsequent submission if required.
 - .2 Project title and Consultant's project number.
 - .3 Names of:
 - .1 Contractor.
 - .2 Subcontractor.
 - .3 Supplier/manufacturer as applicable.
 - .4 Specification section numbers to which submission is related.
 - .5 Countersigned stamp of Contractor certifying that they have reviewed and accepted the submission.

PART 2 - PRODUCT DATA

- 2.1 Before delivery of Products to the Site, submit Product data for approval as specified in each section or as requested by the Consultant.
- 2.2 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 standards.

PART 3 - SAMPLES

- 3.1 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.
- 3.2 Ensure samples are of sufficient size and quantity, if not already specified, to illustrate:
 - .1 The quality and functional characteristics of Products, with integrally related parts and attachment devices.
 - .2 Full range of colours available.
- 3.3 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.

- 3.4 Identify samples with Project name, Contract number, date, Contractor's name, number and description.
- 3.5 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.
- 3.6 Acceptable samples shall serve as a model against which the products incorporated in the work shall be judged.
- 3.7 Each Product incorporated in the Work shall be precisely the same in all details as the acceptable sample.
- 3.8 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.
- 3.9 When samples are very large, require assembly, or require evaluation at the Site, they may be delivered to the Site, but only with approval and as directed by Consultant.

PART 4 - SHOP DRAWINGS

- 4.1 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.
- 4.2 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.
- 4.3 In addition to shop drawings specified in the specification sections, submit shop drawings required by jurisdictional authorities in accordance with their requirements.
- 4.4 Shop drawings for openings, sleeving and conduit
 - .1 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.
 - .2 Prior to detailing structural reinforcement on shop drawings, arrange for the Engineer of structure to review formed holes, recesses and sleeving. Completely dimension openings, recesses and sleeves and relate to suitable grid lines and elevation.
 - .3 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.
- 4.5 Shop drawings shall indicate the following minimum criteria and any additional criteria indicated in the individual specification sections requiring shop drawings:
 - .1 Clear and obvious notes of any proposed changes from the Contract Documents.
 - .2 Fabrication and erection dimension.
 - .3 Provisions for allowable construction tolerances and deflections provided for live loading.
 - .4 Details to indicate construction arrangements of the parts and their connections, and interconnections with other work.
 - .5 Location and type of anchors and exposed fastenings.
 - .6 Materials, physical dimensions including thicknesses, and finishes.
 - .7 Descriptive names of equipment.
 - .8 Mechanical and electrical characteristics when applicable.
 - .9 Information to verify that superimposed loads will not affect function, appearance, and safety of the work detailed as well as of interconnection work.
 - .10 Assumed design loadings, and dimensions and material specifications for load-bearing members.

- 4.6 Include in shop drawing submissions detailed information, templates, and installation instructions required for incorporation and connection of the Work.
- 4.7 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 and responsible person possessing the appropriate authorization.
- 4.8 Be responsible for dimensions to be confirmed and correlated 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.
- 4.9 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.
- 4.10 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.
- 4.11 Submit shop drawings, as indicated in each section of the Work, signed and sealed by a licensed Professional Engineer registered in the place of the Work.
- 4.12 Shop drawings shall have distinct, uniform letters, numerals and line thicknesses that will ensure the production of clear legible prints and also facilitate microfilming and reduced reproduction.
- 4.13 Submissions shall be on 8.5" x 11" or 11" x 17" page format. However, in instances where catalogue items are specified, three clean copies of the manufacturer's catalogue may be submitted.
- 4.14 Shop drawings shall contain the following identification:
 - .1 Project name and Contract number.
 - .2 Applicable 5-digit Contract Specification number describing the item.
 - .3 Location (unit, level, room number, etc.).
 - .4 Name of equipment or Product.
 - .5 Name of Subcontractor or supplier.
 - .6 Signature of Contractor certifying that Shop drawing is in conformance with Contract Documents.
 - .7 On submissions subsequent to the first, the following additional identification:
 - .1 The revision number.
 - .2 Identification of the item(s) revised.
- 4.15 Dimensions and designations of elements shall be shown in the same system of measurement used on the applicable Contract Drawings.
- 4.16 The Consultant reserves the right to refuse acceptance of drawing submissions not meeting the above requirements.
- 4.17 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.
- 4.18 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.**

- 4.19 Only drawings noted for revision and resubmission need be resubmitted.
- 4.20 File one copy of each submitted shop drawing at the Site.
- 4.21 Shop drawings submitted to Consultant that do not bear a stamp or are incomplete will not be reviewed and will be returned to Contractor, any delay in Construction Schedule as a result will be the full responsibility of the Contractor.

PART 5 - CERTIFICATES

- 5.1 Submit certificates that are required by authorities having jurisdiction or that are requested in the specification sections.
- 5.2 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.
- 5.3 Certificates shall verify that Products and/or methods meet the specified requirements and shall include test reports of acceptable testing laboratories to validate certificates.
- 5.4 Submit certificates in duplicate and signed by an authorized representative of the certifying company.

PART 6 - CERTIFICATION OF TRADESMEN

- 6.1 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.

END OF SECTION

PART 1 GENERAL

.1 GENERAL INSTRUCTIONS

- .1 Read and be governed by Conditions of the Contract and other Sections of Division 1.
- .2 The purposes of the special project procedures are as follows:
 - .1 Special project procedures shall ensure the Contractor provides full accessibility to the existing building(s) under renovation or alteration forming the Work of the Contract to the patrons, staff suppliers, other contractors, visitors and the Public.

.2 RULES AND REGULATIONS FOR CONSTRUCTION PERSONNEL

- .1 Fundamental to any and/or all rules and regulations, whether written and/or unwritten, is the fact that the Owner is the guardian of, and has full responsibility for the welfare and well-being of the patrons and staff.
- .2 The following rules and regulations shall be construed as being general in nature and designed a guide for behavior of all construction personnel, including suppliers and their employees while performing the Work of this Contract in and/or on the properties of the Owner.
- .3 Communication with the Owner's personnel and staff shall all be routed through the Consultant
- .4 Where the Work of this Contract causes results which are detrimental to the operations of the Owner, or is distressing or disturbing to patrons, staff and personnel, to the point where the Project Manager feels that such work should stop until conditions change, then such work shall stop on order of the Project Manager.
- .5 Where construction personnel perform Work of this Contract in more than one area of the building(s), such work shall be scheduled so that occupied areas are avoided during scheduled class times and activities. Where the aforementioned regulation is not possible, the Contractor shall have a frank discussion with the Project Manager and Consultant, and amicable arrangements shall be made.
- .6 Objectionable work as deemed by the Owner must cease upon notification by the Owner. Said work must be rescheduled to after hours and/or weekends as approved by the City or actions are taken by the contractor to control/eliminate the deemed objectionable work. Objectionable work includes but is not limited to the following: chipping, hammer drilling, coring, grinding of steel/concrete, torquing, or any other activities that disturb the normal function of the building.

.3 RESTRICTIONS

- .1 The Work shall be confined to the Place of the Work (Site) limits indicated on Drawings and/or within area defined by property lines. Work on the Municipal property shall be carried out under regulations of respective Municipality and authorities having jurisdiction including without any limitations any associated fees, permits, insurance or bonding required.
- .2 Assume responsibility for care, custody and control of the Place of the Work (Site) and perform the Work to extent covered in Contract Documents. Make good damage to the existing Site and existing building(s) (if any) due to the Work of this Contract.
- .3 Bring the following restrictions to the attention of the construction personnel and workers on the Work and enforce them;
- .4 Restrict construction personnel and workers to Place of the Work and necessary access routes to it. Restrict non-construction personnel from the Place of the Work (Site), except for Contractor authorized visitors.
- .5 Restrict construction activities in public, in Owner occupied areas, in locations designated to off-hours agreed in Preconstruction Meeting without additional cost to the Owner, and return these areas to normal operations as soon as possible.

4 OCCUPANCY OF THE EXISTING BUILDING(S)

- .1 The existing building(s) will remain in full use and occupancy throughout the duration of construction of the Work of this Contract. Contractor shall schedule and perform the Work of this Contract so that conflict is minimized. The approximate extent of the building that will be made available to the Contractor is identified within the Contract Documents.
- .2 Contractor shall perform the Work of this Contract in and around the existing building(s) at approved times and as mutually agreeable to the Owner, so not to inconvenience or hinder the occupation of the building(s) by the Owner, the Owner's personnel/staff and patrons.
- .3 Give the Owner a minimum of seven (7) working days written notice of intention to commence work in a room, or area(s) of existing building outside of the areas identified for Contractor us so that he may prepare the space(s). Any disruption to the operation of the facility must be requested at least 48 hours in advance of the proposed work being carried out.
- .4 Before the Work of this Contract begins and on a routine basis, construction personnel shall be thoroughly informed of the necessity to exercise **extreme** caution in any of their activities, which may interrupt an essential service serving the "occupied areas" for which an alternate supply, service or facility has not been provided.
- .5 The Owner and/or his separate contractors reserve the right to enter the area(s) of Work of this Contract for the purpose of placing and/or fitting equipment before completion of the Work of this Contract. Such entry shall not interfere with or prevent the Contractor from performing the Work of this Contract. Also, such entry shall not in any way be considered as acceptance of the Work of this Contract by the Owner, or in any way relieve the Contractor from responsibilities under Work of this Contract.
- .6 Any interruption(s) of mechanical and electrical services to "occupied areas" **must** be pre-arranged with the Consultant. Where any such interruption(s) is impossible to avoid, it shall be of the shortest duration possible and restricted to times acceptable to the Project Manager in writing. Contractor shall apply in writing to the Consultant well in *advance* of any contemplated and/or intended interruption(s).
- .7 Construction personnel shall be confined to the enclosed construction areas except when absolutely necessary to perform work and duties directly connected to the Work of this Contract. Contractor shall make arrangements with the Consultant well in advance of work and/or duties required outside the enclosed construction areas.
- .8 In order to reduce to a minimum the period of time required for Work of this Contract within the existing building(s), each area of Work of this Contract shall be pre-planned in complete detail and all materials for the entire work within the area shall be on hand or readily available. Before work in each area of the work of this Contract begins, the Contractor shall well in advance make arrangements to measure and review the areas to be *renovated* for the purposes of pre-planning.

5 RELOCATED COMPONENTS

- .1 Disconnect services on items for relocation forms part of the work of Divisions 15 and 16.
- .2 Disconnect fastening and anchorage of items to be relocated. Patch abandoned fastening and anchorage holes to match with and flush with adjacent surfaces.
- .3 Carefully relocate items indicated and repair any damage received as a result of relocation in accordance with the Owner's written directions. Install relocated items level, plumb, square and in accordance with manufacturer's instructions. Re-fasten and anchor securely in place. Services re-connection of relocated items shall form part of the work of Divisions 15 and 16.
- .4 Take delivery of existing components from the Owners storage to be incorporated in locations indicated. Modify existing items to suit new design requirements. Where modifications of the existing components is not possible to suit new locations, then augment and supply new components matching existing in every respect. Contract Price shall include for such conditions.

6 DUST FREE ENVIRONMENT

- .1 It is imperative that the Owner's operational areas remain clean and dust free. It will be the Contractor's responsibility to insure this. If the Contractor fails to maintain these conditions, the Owner reserves the right to retain the services of a professional maintenance company to fine clean the areas in question, and the invoiced costs for the cleaning services of the professional maintenance company shall be deducted from the Contractor's next progress payment.
 - .2 Be responsible to keep operational areas clean and dust free. Prevent contamination of and nuisance to adjacent areas and properties near the Work from dust by taking appropriate dust control measures. Take measures to prevent dust and dirt rising and migrating to occupied areas including return air systems and/or adjacent properties. Respond immediately to complaints of dust received from the Public, authorities having jurisdiction and the Owner.
 - .3 Adjacent work areas remaining in use by the Owner during construction period shall have furnishings and equipment covered and protected from dust under this Contract. Completely install the dust covers and prior to commencement of each of the Contractor's working periods and shall be also be removed upon the end of the Contractor's work period. If required by the Owner, the Contractor shall also provide additional dust covers and keep them in clean and usable conditions.
 - .4 Before the Work proceeds, the Contractor shall provide temporary dust-proof partitions and screens constructed as specified in this Section, sealed at the floor, walls, ceilings, or intersecting members in a manner to prevent dust and dirt infiltration into adjacent areas of the building(s).
 - .5 Contractor shall leave work area(s) remaining in use by the Owner clean and ready for use between each work period.
- 7 Temporary Rigid Dust Tight Partitions and Screens
- .1 Provide temporary dust tight partitions and screens where nature of Work requires access to floor areas above or below the floor being worked on to control dust migration and/or as specified herein and noted on Drawings. Maintain area of Work under negative pressure to prohibit migration of dust into other areas of the building. Refer also to Division 15 requirements for isolation of existing mechanical systems.
 - .2 Separate construction areas from occupied areas. Construct dust tight and wind proof screens as required to completely enclose the Work areas and the access passages to the Work areas from the other areas of the existing building(s). Maintain passage for Fire Department if required.
 - .3 Coordinate location of dust tight partitions, screens, weather barriers and doors with the Owner. Obtain the Owner's approval of installed dust tight partitions, screens, weather barriers, protective coverings and protection methods before proceeding with the renovation/alteration work.
 - .4 Protective coverings shall be fire retardant coated, dust-proof fabric of premium grade, weighing minimum of 4.3 oz/sq.yd. (145 g/m²), Polyweave® Flame -Retardant Fabric by Polytrap Products, or P9M Fire Retardant Fabric by Inland Plastics Ltd., or other manufacturer acceptable to the Owner.
 - .5 Fabricate and erect screens of 3-5/8" (92mm) metal studs at 16" (450mm) O.C., with 1/2" (13mm) gypsum board on both sides with closed joints.
 - .6 Tape or seal between adjacent boards and provide painted finish.
 - .7 Seal perimeter of cutouts around fixtures, fittings and penetrations.
 - 8 Extend screens from floor to underside of structure above unless otherwise shown, noted or approved otherwise.
 - .9 Where applicable, construct screen partitions to provide required fire resistance ratings and smoke-tight separation to the approval of the authorities having jurisdiction.
 - .10 Where exposed to the weather, fully cover the temporary screens with a heavy waterproof and dust proof fabric or polyethylene with lapped and sealed joints. Where required to have sound attenuation, fill spaces between studs with 4" (100mm) thick, glass fibre or mineral fibre insulation batts to deaden sound.

- .11 Thoroughly pack framing at junctions of screens with floors, walls and underside of structure with batt insulation and seal in a manner to prevent infiltration of dust, dirt, etc. Ensure that rooms within closed off areas which are not being altered are kept dust free.
- .12 Install temporary packing at bottom of doors through screens and to elevator entrances not being used during demolition and construction. Prevent dust seepage into existing adjacent spaces and occupied areas.
- .13 Remove screens and other temporary protection and make good damaged or blemished adjoining work when directed by the Owner and/or Consultant.
- .14 Provide daily vacuuming of construction dust from corridors and connecting areas as the Work progresses. This shall be considered a minimum requirement; increase vacuuming as necessary.

8 Protection

- .1 Protect existing services, structures, landscaping and other items required to remain and newly installed Work during construction with secure and durable coverings, barricades, hoardings or guards suitable for the various conditions and as specified herein. Protect adjacent surfaces and structures against damage which may occur from falling debris or other causes. Perform the Work in a manner to avoid damage.
- .2 The Owner's patrons, staff, personnel shall be occupying the existing building(s) during the Performance of the Work. Provide for the safety of the existing building occupants and for the security of occupied areas. Provide protection and keep clear areas that are required for access to, and exit from, occupied areas. Maintain free, safe, protected, clear passage to and from the building(s) and the work area(s), refer to the Drawings for any specific hoarding or temporary partition locations. Maintain clear and safe fire exit routes as specified herein.
- .3 Particular attention will be paid to the prevention of fire and the elimination of fire hazards which would endanger the work or adjacent building and premises. Contractor will provide and maintain all necessary fire extinguishers during the Work at all times, located at convenient and accessible points, and meeting the approval of the Owner.
- .4 Where construction operations must be executed or traffic routed over finished floors, lay minimum ¼" (6mm) thick plywood coverings tightly fitted over surface in such areas. Secure plywood to prevent movement in a manner which will not damage finished surfaces.
- .5 Where construction operations must be performed over finished roofs and waterproofed areas lay minimum ½" (13mm) thick plywood covering. Secure plywood to prevent damage and penetration of roof and waterproofed surfaces. Provide means to prevent wind uplift.
- .6 Protect, relocate and maintain active building services to adjoining areas of building(s) without interruptions, except those required for connection for the Work which shall be coordinated with the Owner as specified herein. Make good all damage.
- .7 It is essential that the existing building(s) be both water and weather-tight at all times. Therefore, the Contractor shall furnish all temporary protective enclosures, tarpaulins, etc... as may be required to protect openings made by the Work of this Contract.
- .8 Protect the existing work to remain. Provide coverings and other protection materials.
- .9 Where hoarding is required, as indicated on drawings, it shall consist of minimum 12mm plywood on temporary framing to minimum 2400mm above finished floor. Refer also to section 7.
- .10 Cover openings in equipment, ducts and pipes until final connections are made.
- .11 Protect exposed live electrical equipment during construction for personal safety.
- .12 Shield and mark live electrical parts with appropriate warnings.
- .13 Provide temporary doors for rooms containing electrical distribution equipment. Keep doors locked except when under the direct supervision of a qualified electrician.
- .14 Wherever practical lock or barricade finished areas.

- .15 As soon as construction is sufficiently advanced, enclose accessible openings to provide security. Provide temporary doors with security hardware.
 - .16 Ensure continuous security of the Work and construction equipment.
 - .17 Provide protection against the elements to maintain products and installations from damage and deterioration.
 - .18 Remove snow and ice immediately from parts of the Work except finished roofs. Do not use salt and avoid mechanical damage.
- 9 Design and Safety Requirements for Temporary Facilities
- .1 Be responsible for design, erection, operation, maintenance and removal of temporary structural and other temporary facilities.
 - .2 Engage and pay for registered professional engineering personnel skilled in the appropriate disciplines to perform these functions where required by law or by the Contract Documents, and in all cases where such temporary facilities and methods of construction are of such a nature that professional engineering skill is required to produce safe and satisfactory results.
 - .3 Submit shop drawings bearing the seal and signature of registered professional engineering personnel skilled in the appropriate disciplines, indicating and showing temporary structural and other temporary facilities and methods of construction intended for the Work.
- 10 HOURS OF WORK
- .1 Work shall be performed between the hours of 7:00am and 6:00pm, Monday to Friday.
 - .2 Work outside of the hours outlined above may be requested in advance by the Contractor for review/acceptance by the Owner.
- 11 Waste Containers and Bins
- .1 Provide waste containers and bins for the disposal of demolition waste and construction materials waste in compliance with the Owner's waste management requirements.
 - .2 Waste containers and bins shall be "closed box" type to prevent the waste materials from being wind blown and contaminating the Owner's property, adjacent private and Public properties.
 - .3 Sizes of the waste containers and bins shall be to fit the location(s) at the Place of the Work to the acceptance of the Project Manager and/or Consultant.
 - .4 The location(s) of the waste containers and bins shall be to the acceptance of the Owner. The Owner reserves the right to have the location(s) of the waste containers and bins re-located as required to suit the operations of the Owner and the building(s) at no additional cost to the Owner.
 - .5 Contractor and/or his subcontractors shall not use the Owner's and or the existing building's waste containers and bins for disposal of demolition waste and/or construction waste. If after investigation by the Owner, it is discovered that the Contractor and/or his subcontractors have used the Owner's and or the existing building(s) waste containers and bins for disposal of demolition waste and/or construction waste, the Owner reserves the right to back charge the said Contractor, deduct the equivalent costs from the Contractor's next progress payment for the use of the said waste containers and bins.
 - .6 If waste containers must be located on Municipal property, the Contractor shall be responsible for obtaining all necessary permissions/permits and bearing all associated costs.

END OF SECTION

PART 1- GENERAL

1.1 General Instructions

- .1 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.
- .2 Verify by certification that specified products meet the requirements of reference standards specified in the applicable specification sections. Preserve all original labels, containers and packaging of products for review by Consultant.
- .3 Conduct testing, balancing and adjusting of equipment and systems specified in applicable mechanical and electrical specifications sections by independent testing company.

1.2 Inspection and Testing by the Owner

- .1 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.
- .2 Inspections and testing by the Owner 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.
- .3 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.

1.3 Inspection and Testing

- .1 Source and Field Quality Control specified in Other Sections:
 - .1 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.
 - .2 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.
- .2 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.

1.4 Qualifications of Inspection and Testing Companies

- .1 Inspection and testing companies to be certified by the Standards Council of Canada.
- .2 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.
- .3 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.

1.5 Tolerances for Installation of Work

- .1 Unless specifically indicated otherwise, work shall be installed plumb, level, square and straight.
 - .2 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:
 - .1 "Plumb and level" shall mean plumb or level within 1 mm in 1 m.
 - .2 "Square" shall mean not in excess of 10 seconds lesser or greater than 90 degrees.
 - .3 "Straight" shall mean within 1 mm under a 1 m long straightedge.
 - .4 "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.
 - .3 Allowable tolerances shall not be cumulative.
- 1.6 Reference Standards
- .1 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.
- 1.7 Responsibilities of the Contractor
- .1 Be responsible for quality control methods and procedures to ensure performance of the work in accordance with the Contract Documents.
- 1.8 Responsibilities of Inspection and Testing Companies
- .1 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.
 - .2 Perform applicable inspection and testing described in the Specifications and as maybe additionally directed.
 - .3 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.
 - .4 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.
 - .5 Inspection and testing companies shall not perform or supervise any of the Contractor's work, and shall not authorize:
 - .1 Performance of work that is not in strict accordance with the Contract Documents.
 - .2 Approval or acceptance of any part of the Work.
- 1.9 Inspection and Testing Procedures
- .1 Perform specified inspection and testing only in accordance with specified reference standards, or as otherwise approved.
 - .2 Observe and report on compliance of the Work to requirements of Contract Documents.
 - .3 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.
 - .4 Identify samples and sources of materials.

- .5 Review and report on progress of the work. Report on count of units fabricated and inspected at fabricator's operations.
- .6 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:
 - .1 Time and date of inspection.
 - .2 Temperature of air, materials, and adjacent surfaces.
 - .3 Humidity of air, and moisture content of materials and adjacent materials.
 - .4 Presence of sunlight, wind, rain, snow and other weather conditions.
- .7 Include in reports all information critical to inspection and testing.
- .8 Ensure that only materials from the work and intended for use therein are tested.
- .9 Determine locations for work to be tested.

1.10 Defects

- .1 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.

END OF SECTION

1.0 GENERAL

1.1 DOCUMENTS

- .1 This Section of the Specifications forms part of the Contract Documents and is to be read, interpreted and coordinated with all other parts.

1.2 REQUIREMENTS INCLUDED

- .1 Barriers.
- .2 Environmental Controls.
- .3 Construction Aids.
- .4 Use of the work.
- .5 Traffic controls.
- .6 Utilities.
- .7 Protection.
- .8 Office and sheds.
- .9 Signs.

1.3 REMOVAL OF TEMPORARY CONSTRUCTION

- .1 Temporary office facilities, toilets, barricades, storage sheds, utilities and other construction of temporary nature erected by the Trade Contractor shall be removed from the site by the Trade Contractor as soon as the progress of the Work will permit.

1.4 BARRIERS

- .1 Exterior Hoarding: The Contractor will -
 - .1 Erect and maintain hoarding around perimeter of work site as required by governing authorities to protect the public, workers, public and private property from injury or damage.
 - .2 Provide barricades and covered walkways required by governing authorities for public rights-of-way.
 - .3 Provide barriers around trees and plants designated to remain. Protect from damage.
- .2 Guard Rails & Barricades:
 - .1 The Contractor will administer and maintain a health and safety program. Contractor shall provide all perimeter guard rails and/or barricades to the building and at all floor openings, shafts and stairwells, etc. within the building as required by the Work. Such protection will be to the requirements of the Workers' Safety Insurance Board (WSIB).
 - .2 Trade Contractor shall remove and replace such guard rails and barricades, to accommodate the Work.
 - .3 Trade Contractor shall provide, maintain and adjust any other guard rails, barricades or safety platforms required by law and authorities having jurisdiction for protection of the Work and the workmen and for protection of the public.

1.5 ENVIRONMENTAL CONTROLS

- .1 Weather Enclosures: The Contractor will provide weathertight closures to unfinished door and window openings, tops of shafts and other openings in floors and roofs as necessary to expedite the work.
- .2 Dust Tight Screens:

- .1 The Contractor will provide dust tight screens or partitions as necessary to localize dust generating activities, and for the protection of workers and finished areas of Work and the public.
- .2 Trade Contractor shall relocate and maintain to accommodate the Work.
- .3 Dust Prevention: Trade Contractor, where necessary, shall effectively water-sprinkle and dampen the workings, and roads used in the operation, and involved portions of the site with such frequency as will satisfactorily allay any dust during all hours that work is being performed.
- .4 Noise Abatement: Trade Contractor shall comply with the requirements of Municipal and/or Provincial by-laws regarding noise abatement and shall take all necessary steps to ensure the generation and transmission of noise and vibration due to the work is kept to a minimum. Any such noise or vibration which is found to be objectionable shall be corrected at no additional cost to the Owner and to the satisfaction of the Contractor and the Consultant.
- .5 Refer to specification 01350 for assembly requirements for dust proof screens.

1.6 USE OF THE WORK

- .1 Site Storage/Loading:
 - .1 Contractor shall confine the Work and the operations of employees to limits indicated by the Contract Documents and as directed by the Owner and shall not unreasonably encumber the premises with products and materials.
 - .2 Contractor shall confine activities relevant to the work to areas within the designated working area. No fires, explosions or similar dangerous activities permitted on the site.
 - .3 Contractor shall conduct construction operations with minimum interference to adjacent roadways, sidewalks and access facilities in general and shall keep such areas free from materials, debris and equipment at all times.
 - .4 Contractor shall not load or permit to be loaded any part of the Work and existing structure with a weight or force that will endanger the Work and existing structure.

1.7 TRAFFIC CONTROL

- .1 Access to Site:
 - .1 The Contractor will provide and maintain access road, sidewalk crossings, ramps and construction runways as may be required for access to the Work.
 - .2 Contractor shall co-operate and co-ordinate his operations with the Owner.
 - .3 Access to the site for all deliveries and removals shall be from Davenport Road only; access is not permitted from Designer's Walk Lane to the east.
 - .4 Contractor is responsible for obtaining municipal Street Occupation Permit to temporarily occupy any portion of the public right of way during the Work.
- .2 Public Traffic Flow:
 - .1 Contractor shall provide and maintain flagpersons, traffic signals, barricades and flares/lights/lanterns as required to perform the Work and protect the public.
- .3 Construction Parking:
 - .1 Contractor shall be responsible for arranging their own parking requirements; parking shall not be provided by Owner.

1.8 TEMPORARY UTILITIES

- .1 Sanitary Facilities:
 - .1 Contractor is permitted to use Owner's sanitary facilities.
- .2 Temporary Water

- .1 Use of existing building water service shall be made available to the Contractor and shall be coordinated with the Owner prior to commencing work.
- .3 Temporary Heating & Enclosure:
 - .1 Provide for the proper heating and drying out of the building until completion by the use of appropriate heating equipment. Do not use "salamanders". Use forced hot air type heaters operated in well-ventilated locations. Protect the floors, walls and ceilings around the heating units. Ensure that no damage by staining result to finished floors during operation, servicing and refueling.
 - .2 Maintain the heated parts of the building(s) or temporary enclosures at not less than 50°F (10°C), or at such temperature specifically stated in the sections of the Specifications, for the proper installation of the various Products.
 - .3 Provide at the Place of the Work and ready for operation between at least October 15th and April 30th, temporary plant and equipment for heating materials and forms and for maintaining the proper temperature and humidity of the concrete during curing. Refer to and comply with the requirements of CSA A23.1/A23.2-00.
 - .4 Duct carbon dioxide gas (CO₂) or other noxious or harmful gases from heaters to the exterior of the building(s).
- .4 Temporary Power & Light:
 - .1 Use of existing electrical power shall be made available to the Contractor by the Owner.
 - .2 Comply with the requirements of codes, by-laws and regulations governing temporary power and lighting at the location of the Work.
 - .3 Contractor will provide a power source on each floor in a central location. Each Subcontractor shall provide required extension cords from location where power is provided to location where it is needed.
 - .4 Contractor will arrange for general temporary lighting throughout Work areas. Each Subcontractor shall provide special task lighting required in the execution of the Work.
 - .5 Provide sufficient lighting to ensure sufficient visibility for the proper execution, safety and inspection of the Work.
 - .6 Comply with Construction Safety Association's "Temporary Wiring Standards on Job Sites", the Ontario Electrical Code, and other authorities having jurisdiction.
- .5 Temporary first Aid Facilities
 - .1 Provide site equipment and medical facilities necessary to supply first-aid service to injured personnel in accordance with regulations of the Worker's Compensation Act.

1.9 PROTECTION

- .1 Protection for Off-Site & Public Property:
 - .1 Protect surrounding private and public property from damage during performance of Work.
 - .2 Be responsible for damage incurred.
- .2 Fire Protection:
 - .1 Contractor shall provide and maintain temporary fire protection equipment during performance of Work required by insurance companies, governing codes, regulations, bylaws and authorities having jurisdiction.
 - .2 Open fires and burning of rubbish are not permitted on the site.
 - .3 Contractor shall take all necessary precautions to eliminate fire hazards and instruct Superintendent to make periodic inspections to ensure proper preventative measures are being complied with by all personnel working on the site.
 - .4 Paint and/or oil covered rags shall be stored in covered metal containers. Rubbish shall be removed daily, from building and site.

- .5 Contractor shall comply with Provincial and Municipal fire safety requirements during the period of construction and other regulations pertaining to fire protection during construction work.
- .6 Where torch cutting and electric welding are required by the Work, the trade concerned shall provide additional fire safety measures considered necessary to protect existing facilities from fire. A suitable fire extinguisher shall be provided by the applicable Trade Contractor adjacent to all welding operations.
- .7 Precautions shall be taken at all times to prevent fire by spontaneous combustion.
- .3 Protection of Building Finishes & Equipment:
 - .1 Contractor shall adequately protect his work at all stages of the operations and shall maintain the protection until his work is completed. Contractor shall remove and replace at his own expense any work and materials damaged, that cannot be repaired or restored to the Consultant's approval, due to inadequate protection being provided.
 - .2 Contractor shall be responsible for protection of existing work. If during the work, any existing work is damaged by the Trade Contractor, it shall be replaced without cost to the Owner and to the approval of the Consultant.
 - .3 Contractor shall provide, erect, and maintain adequate temporary barricades, warning signs, and lights for the protection of the public at all excavations, closures, detours, and points of danger where his work occurs outside the hoarding area.
- .4 Security:
 - .1 Security for buildings and grounds will be provided by the Contractor.

1.10 OFFICES & SHEDS

- .1 Offices & Sheds:
 - .1 Any temporary buildings, or other structures required by the Contractor, shall be provided by him in a condition and location acceptable to Owner. Contractor shall provide at his own expense, his own equipment for heating, lighting, plumbing and telephone for such buildings, subject to the approval of the Owner. Contractor may be required, at his own expense, to relocate his temporary building or buildings as often as required by the Owner to facilitate the efficient prosecution of the Work.
 - .2 First Aid: First aid facilities, including attendant, will be provided on the site by the Construction Manager, completely equipped in accordance with the requirements of the Workplace Safety Insurance Board (WSIB).

1.11 SIGNS & PUBLICITY

- .1 Signs:
 - .1 Contractor will control the use of signs. Signs or advertising shall not be placed on site without the written prior approval of Owner.
 - .2 Trade signage shall not be erected or applied prior to approval of design and placement.
- .2 Publicity: All publicity relating to this project is subject to the approval of the Owner and no mention of the project in advertising or articles in any publication will be permitted unless cleared through the Owner. Publicity or advertising implying endorsement of a product by the Owner will not be permitted.

END OF SECTION

PART 1 - GENERAL

1.1 Section Includes

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

1.2 Reference Standards

- .1 Canadian Construction Documents Committee (CCDC)
 - .1 CCDC 2-2008, Stipulated Price Contract.
- .2 Within text of specifications, reference may be made to additional reference standards.
- .3 Conform to these standards, in whole or in part as specifically requested in specifications.
- .4 If there is question as to whether any product or system is in conformance with applicable standards, Consultant reserves right to have such products or systems tested to prove or disprove conformance.
- .5 The cost for such testing will be born by Owner in event of conformance with Contract Documents or by Contractor in event of non-conformance.
- .6 Conform to latest date of issue of referenced standards in effect on date of submission of Bids except where specific date or issue is specifically noted.

1.3 Quality

- .1 Refer to CCDC 2, GC 3.9.

1.4 Availability

- .1 Immediately upon signing Contract, review product delivery requirements and anticipate foreseeable supply delays for any items. If delays in supply of products are foreseeable, notify Consultant of such, in order that substitutions or other remedial action may be authorized in ample time to prevent delay in performance of Work.
- .2 In event of failure to notify Consultant at commencement of Work and should it subsequently appear that Work may be delayed for such reason, Consultant reserves right to substitute more readily available products of similar character, at no increase in Contract Price or Contract Time.

1.5 Storage, Handling and Protection

- .1 Handle and store products in manner to prevent damage, adulteration, deterioration and soiling and in accordance with manufacturer's instructions when applicable.
- .2 Store packaged or bundled products in original and undamaged condition with manufacturer's seal and labels intact. Do not remove from packaging or bundling until required in Work.
- .3 Store products subject to damage from weather in weatherproof enclosures.
- .4 Store cementitious products clear of earth or concrete floors, and away from walls.
- .5 Keep sand, when used for grout or mortar materials, clean and dry. Store sand on wooden platforms and cover with waterproof tarpaulins during inclement weather.
- .6 Store sheet materials, lumber on flat, solid supports and keep clear of ground. Slope to shed moisture.
- .7 Store and mix paints in heated and ventilated room. Remove oily rags and other combustible debris from site daily. Take every precaution necessary to prevent spontaneous combustion.

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

1.6 Transportation

- .1 Pay costs of transportation of products required in performance of Work.
- .2 Transportation cost of products supplied by Owner will be paid for by Owner. Unload, handle and store such products.

1.7 Manufacturer's Instructions

- .1 Unless otherwise indicated in specifications, install or erect products in accordance with manufacturer's instructions. Do not rely on labels or enclosures provided with products. Obtain written instructions directly from manufacturers.
- .2 Notify Consultant in writing, of conflicts between specifications and manufacturer's instructions, so that Consultant may establish course of action.
- .3 Improper installation or erection of products, due to failure in complying with these requirements, authorizes Consultant to require removal and re-installation at no increase in Contract Price or Contract Time.

1.8 Quality of Work

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

1.9 Co-Ordination

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

1.10 Concealment

- 1 In finished areas, conceal pipes, ducts and wiring in floors, walls and ceilings, except where indicated otherwise.
- .2 Before installation, inform Consultant if there is interference. Install as directed by Consultant.

1.11 Remedial Work

- .1 Refer to CCDC 2, GC 3.13.

1.12 Protection of Work in Progress

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

1.13 Existing Utilities

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

END OF SECTION

PART 1 - GENERAL

1.1 Section Includes

- .1 Progressive cleaning.
- .2 Final cleaning

1.2 Related Section

- .1 Section 01770 - Closeout Procedures.

1.3 Reference Standards

- .1 Canadian Construction Documents Committee (CCDC)
 - .1 CCDC2 2008, Stipulated Price Contract
- .2 Additional references as per documents/contract.

1.4 Project Cleanliness

- 1 Maintain Work in tidy condition, free from accumulation of waste products and debris, including that caused by Owner or other Contractors.
- .2 Remove waste materials from site at regularly scheduled times or dispose of as directed by Consultant. Do not burn waste materials on site, unless approved by Consultant.
- .3 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.
- .4 Provide on-site containers for collection of waste materials and debris.
- .5 Provide and use clearly marked separate bins for recycling.
- .6 Remove waste material and debris from site and deposit in waste container at end of each working day.
- .7 Dispose of waste materials and debris off site.
- .8 Clean interior areas prior to start of finish work, and maintain areas free of dust and other contaminants during finishing operations.
- .9 Store volatile waste in covered metal containers, and remove from premises at end of each working day.
- .10 Provide adequate ventilation during use of volatile or noxious substances. Use of building ventilation systems is not permitted for this purpose.
- .11 Use only cleaning materials recommended by manufacturer of surface to be cleaned, and as recommended by cleaning material manufacturer.
- .12 Schedule cleaning operations so that resulting dust, debris and other contaminants will not fall on wet, newly painted surfaces nor contaminate building systems.

1.5 Final Cleaning

- .1 Refer to CCDC2, GC 3.14.

END OF SECTION

PART 1 - GENERAL

1.1 Section Includes

- 1 Administrative procedures preceding preliminary and final inspections of Work.

1.2 Related Sections

- .1 Section 01780 - Closeout Submittals

1.3 References

- .1 Canadian Construction Documents Committee (CCDC)
 - .1 As per documents CCDC 2-2008, Stipulated Price Contract.
 - .2 Additional references as per documents/contract.

1.4 Inspection and Declaration

- .1 Contractor's Inspection: Contractor and all Subcontractors shall conduct an inspection of Work, identify deficiencies and defects, and repair as required to conform to Contract Documents.
 - .1 Notify Consultant in writing of satisfactory completion of Contractor's Inspection and that corrections have been made.
 - .2 Request Consultant's Inspection.
- .2 Consultant's Inspection: Consultant and Contractor will perform inspection of Work to identify obvious defects or deficiencies. Contractor shall correct Work accordingly.
- .3 Completion: submit written certificate that following have been performed:
 - .1 Work has been completed and inspected for compliance with Contract Documents.
 - .2 Defects have been corrected and deficiencies have been completed.
 - .3 Equipment and systems have been tested, adjusted and balanced and are fully operational.
 - .4 Certificates required by Boiler Inspection Branch Fire Commissioner Utility companies have been submitted.
 - .5 Operation of systems have been demonstrated to Owner's personnel.
 - .6 Work is complete and ready for Final Inspection.
- .4 Final Inspection: when items noted above are completed, request final inspection of Work by Owner, Consultant, and Contractor. If Work is deemed incomplete by Owner and Consultant, complete outstanding items and request re-inspection.
- .5 Declaration of Substantial Performance: when Owner and Consultant consider deficiencies and defects have been corrected and it appears requirements of Contract have been substantially performed, make application for certificate of Substantial Performance. Refer to CCDC 2, General Conditions Article GC 5.4 - Substantial Performance of Work for specifics to application.
- .6 Commencement of Lien and Warranty Periods: date of Owner's acceptance of submitted declaration of Substantial Performance shall be date for commencement for warranty period and commencement of lien period unless required otherwise by lien statute of Place of Work.
- .7 Final Payment: When Owner and Consultant consider final deficiencies and defects have been corrected and it appears requirements of Contract have been totally performed, make application for final payment. Refer to documents CCDC 2, General Conditions Article GC 5.7 and terms of the documents/contract for specifics to application. If Work is deemed incomplete by Owner and Consultant, complete outstanding items and request re-inspection.
- .8 Payment of Holdback: After issuance of certificate of Substantial Performance of Work, submit an application for payment of holdback amount as per documents CCDC 2, General Conditions Article 5.5 and per the terms of the documents/contract.

END OF SECTION

PART 1- GENERAL

Work Included in Section

- .1 Various demolition and removals of existing and for provision of new work, as shown on architectural drawings.
- .2 Restoration of damaged or disturbed Work.
- .3 Removal of surplus materials from the site.

1.2 Related Sections

- .1 Architectural demolition requirements for existing and new work - Divisions 2 through 16.

1.3 Qualifications

- .1 Work of this Section shall be executed by a company having a minimum of five (5) years continuous experience and able to deploy adequate equipment and skilled personnel to complete Work expediently in an efficient and orderly manner.

1.4 Examination

- .1 Examine existing property. Determine nature and extent of materials to be removed.
- .2 Examine adjacent properties. Determine extent of protection required.

1.5 Salvage

- .1 Unless otherwise noted, materials from demolition shall become property of Contractor who shall promptly remove all salvageable material and debris from Site.
- .2 Do not sell material on Site.
- .3 The Owner will review Site prior to commencement of demolition and instruct the Contractor, in writing, as to the items to be retained for re-use or be turned over to the Owner.
- .4 Store material to be salvaged, neatly on wooden pallets, where directed by Owner.
- .5 Remove and store indicated items for future use by Owner. Remove, handle and transport such items to storage area designated on Drawings or to an area within the site designated by Owner. Perform such work carefully and with diligence to prevent any damage to the items during removal and in storage.

1.6 Maintaining Traffic Hauling Operations

- .1 Maintain and preserve Owner's access requirements within, to and from existing building in areas where demolition and removal work is being carried out.
- .2 Do not close, obstruct, place or store material in Owner's driveways and passageways. Conduct operations with minimum interference with roads, streets, driveways, user traffic and passageways.

1.7 Hauling Operations

- .1 Maintain roadways and paving in the hauling areas clean on a daily basis and as required by Municipal authorities.

1.8 Safety Requirements

- .1 Undertake Work and effect arrangements required by authorities having jurisdiction for protection of public.

- .2 Coordinate posting of danger signs conspicuously around property. Close doorways and thoroughfares giving access to area of demolition with barricades.
- .3 Provide a competent, experienced supervisor in charge of the Work and on Site while Work is in progress.
- .4 Demolition of spray or trowel-applied asbestos can be hazardous to health. Stop work and notify the Construction Manager immediately should material resembling spray or trowel-applied asbestos be encountered in the course of demolition work, which has not already been identified. Do not proceed until written instructions have been received from the Owner.
- .5 Should any suspect designated substance not already identified, be encountered, cease work in the immediate area and immediately report, to the Owner. Owner is responsible for removal of designated substances.

1.9 Life and Fire Safety

- .1 Provide fire extinguishers in acceptable locations to fire prevention authorities and of type suitable to enable personnel to cope with fire occurring during progress of Work.

1.10 Demolition Drawings

- .1 Submit for approval; drawings, diagrams or details showing sequence of disassembly work and supporting structures.
- .2 Submissions, if required, are to bear stamp of qualified professional engineer registered in Province of Ontario.

1.11 Protection

- .1 Prevent movement, settlement or damage of adjacent structures, services, walks, paving, parts of existing building to remain. Make good damage caused by demolition.
- .2 Take precautions to support affected structures and, if safety of building being demolished or adjacent structures or services appears to be endangered, cease operations and notify Owner.
- .3 Provide temporary weather enclosures to requirements of Division 1.
- .4 Prevent debris from blocking surface drainage system, elevators, mechanical and electrical systems which must remain in operation.
- .5 Provide and maintain necessary fire extinguishers throughout the work to the approval of the Fire Marshal, and located at convenient and accessible points.
- .6 Protect work to remain against damage of any kind.
- .7 Protect building floors and roofing against damage from operations under this Section, including lifting, moving, rolling, etc., of materials. Use 12.7 mm (1/2") thick plywood covers with ends mechanically joined, over floor for any such handling. Over roof, provide 19 mm (3/4") thick plywood under laid with 1" thick polystyrene insulation board adhered to same. Provide same when working from, or over roof surfaces. Be responsible for repairs to flooring or roofing for any damage caused. Execute such repairs to the satisfaction of, and at no cost to Owner.

PART 2 - PRODUCTS

Not applicable

PART 3 - EXECUTION

3.1 INSPECTION

- .1 Visit and examine the site and note all characteristics and features affecting the Work of this Section.
- .2 Ensure all services, whether buried; built-in or exposed are properly identified as to position, type of service, size, direction of flow.
- .3 Inspect materials, equipment, components to be re-used or turned over to the Owner. Note their condition and advise the Consultant in writing of any defects or conditions which would affect their removal and re-use.

3.2 PREPARATION

- .1 Prevent movement, settlement or damage of elements of the existing building which are to remain. Provide bracing, shoring and supports as required. Protect existing surfaces not to be restored from damage during concrete removal procedures.
- .2 Cut and/or cap existing services within the work area, if any, prior to start of Work as required, but do not affect the services of areas not under construction or essential to the ongoing operation of the building.
- .3 In all cases, exercise all reasonable care during removal operations to avoid damaging items to be salvaged, re-used, or items that are not part of the Scope of Work.
- .4 Seal off all work areas to prevent dust and debris from affecting other areas outside of work area. Prevent public access to areas being repaired.
- .5 Tape and/ or seal and provide protection to all mechanical and electrical services and all fire alarm and security devices still functioning adjacent to the work areas to prevent damage resulting from dust, water, or impact.
- .6 Cover floor drains as required to prevent concrete, abrasive blasting debris or any other material from entering the drains. Ensure that all drains continue to operate as required during construction.
- .7 Remove or protect in place all surface mounted or permanent fixtures not to be demolished from damage during demolition procedure.
- .8 Apply filter cloth to all exhaust and ventilation vents within work area to prevent dust generated by the construction activity from escaping.
 - .1 Contractor shall clean, or replace filter cloth if the filter cloth becomes unsuitably dirty as determined by Consultant.

3.3 Demolition

- .1 Execute Work in accordance with requirements of authorities having jurisdiction.
- .2 At end of each day's work, leave Site in a safe condition and erect safety barriers and lights as required. Ensure that no parts of existing structure are in danger of collapsing.
- .3 Perform demolition work where not specifically indicated, but required to make provisions for new Work.
- .4 Provide any additional materials, labour and services required, not specifically mentioned or shown on Drawings, but necessary for proper completion of Work.
- .5 Dispose of demolished materials except where noted otherwise and in accordance with authorities having jurisdiction.
- .6 Leave work in safe condition so that no part is in danger of toppling or falling. Protect interiors of areas not to be demolished from exterior elements.
- .7 Demolition of concrete shall be performed by percussive techniques to prevent damage to the embedded reinforcing to remain and the supporting structural steel framing below.

- .8 Provide shoring to support the slab when removals reduce its load-carrying capacity, as directed by the Consultant. No payment will be made for such shoring as it is to be included in the cost of repair as outlined in these documents.
- .9 Materials forming permanent part of the building that require removal become contractor's property and must be removed from site daily, unless such materials are otherwise specified or shown on Drawings to be reused under this Contract (or turned over to Owner). Remove materials not suitable for reuse as shown on Drawings (as specified) from site.
- .10 Leave building in a "broom-clean" condition on completion of work to Owner's satisfaction.
- .11 Clean existing surfaces specified to receive new applied finishes to assure proper adherence.
- .12 Clean existing surfaces to receive paint finish to paint manufacturer's written specifications and/or recommendations.
- .13 Confine operations and workers to those parts of the building which are defined on Drawings, and exercise great care not to damage existing construction beyond that necessary for the carrying out new work and make good any such damage in every respect.
- .14 Do not disturb adjacent items designated to remain in place.
- .15 All required re-painting due to damage, overspray, etc. is the Contractor's responsibility.

3.4 WASTE DISPOSAL

- .1 Disposal of waste products and material is to be in strict accordance with the product manufacturer's material safety data sheets and in accordance with the governing waste control regulations.
- .2 The existing drainage system is not to be used to dispose of project wastes and / or materials
- .3 Store volatile wastes or material in covered metal containers. All wastes which create hazardous conditions must be removed from the premises daily.

END OF SECTION

1.0 GENERAL

1.1 DOCUMENTS

- .1 This Section of the Specifications forms part of the Contract Documents and is to be read, interpreted and coordinated with all other parts.

1.2 SUMMARY

- .1 Section Includes: Furnishing of all labour, materials, services and equipment necessary for the supply and installation of unit pavers as indicated on drawings. Work shall include, but shall not necessarily be limited to, the following:
 - .1 Unit pavers set with sand bed and jointing on gravel base and sub-base.

1.3 REFERENCES

- .1 CSA-A231.1, "Precast Concrete Pavers".

1.4 SUBMITTALS

- .1 Make submittals in accordance with Section 01330 - Submittals.
- .2 Samples: Submit full size sample of each type and colour of paving unit for Consultant's review and final selection.

1.5 QUALITY ASSURANCE

- .1 Concrete unit pavers shall conform to CSA-A231.1.
- .2 Installer shall be skilled in this type of work and have a minimum of three (3) years proven experience.

1.6 DELIVERY, STORAGE & HANDLING

- .1 Deliver and store unit pavers on pallets, metal strapped in cubes, packaged by paver manufacturer.
- .2 Protect unit pavers during delivery, storage and handling to prevent chipping, breaking, staining or other damage.
- .3 Replace damaged unit pavers with no additional costs to Contract.
- .4 Storage of aggregates shall be in accordance with the requirements of CSA-A23.1-94.

1.7 SITE CONDITIONS

- .1 Do not carry out work during rain or inclement weather. Do not lay pavers on frozen surfaces.

2.0 PRODUCTS

2.1 UNIT PAVERS

- .1 Concrete Unit Pavers: Manufactured in accordance with CSA A231.1, uniform in material, colour, size and from one manufacturer. All units sound and free of defects that would interfere with proper placing of unit or impair strength or permanence of construction. Compressive Strength: 55 MPa (8000 psi), Water Absorption: <5%.
 - .1 Type 1 (at grade) Size: 300 mm x 300 mm x 70 mm (12" x 12" x 2.73"). Colour and texture, as selected by Consultant from manufacturer's available range. Allow for 2 colours.
Accepted Products: Series 3000 by Unilock or equivalent.

- .2 Type 2 (at roof deck) Size: 450 mm x 450 mm x 45 mm (17.75" x 17.75" x 1.75"). Standard colour and texture, as selected by Consultant. Accepted Products: Diamond Texture by Brooklin Concrete Products or equivalent.

2.2 BASE COURSE

- .1 Base Course: 150 mm (6"), combined crushed aggregate (mulch), uniform quality, crushed to size as necessary and consisting of sound, tough, durable, mechanically crushed fragments with the portion retained on a 9.5 mm (3/8") sieve not being less than 60% crushed, with following gradation limits:

Aggregate Sieve Size	% Passing (by weight of total mix)
20.0 mm	100
9.5 mm	60-95
4.75 mm	40-70
2.36 mm	30-60
1.18mm	20-45
300 µm	8-20
75 µm	2-9

2.3 BEDDING SAND COURSE

- .1 Bedding Sand Course: Clean sharp sand with following gradation limits:

Aggregate Sieve Size	% Passing (by weight of total mix)
9.52mm	100
4.75mm	95-100
2.36mm	80-100
1.18mm	50-85
600 µm	25-60
300 µm	10-30
150 µm	5-15
75 µm	0-10

Sand material used to fill joint spacing between paving units shall be slightly finer material than bedding sand. Gradation for this material shall be 100% passing 1.18 mm sieve and 10% passing 75 µm sieve.

2.4 PEDESTALS

- .1 Height adjustable plastic pedestal support for pavers installed over roof deck. Accepted product:
 - .1 Bison adjustable deck supports by Brooklin Concrete Products.
 - .2 Or approved equivalent as per Spec 01250.

2.5 OTHER MATERIALS

- .1 Edge Restraint: As detailed and located as noted on drawings. Accepted Products:
 - .1 "Pave Edge Paver Edge Restraint System" as manufactured by Pave Tech Inc. and distributed by Westcon Pavers & Retaining Walls.
 - .2 Or approved equivalent as per Spec 01250.

3.0 EXECUTION

3.1 SUBSURFACE INSPECTION

- .1 Examine sub-base to receive unit paving work to assure they are free from conditions that will adversely affect execution, permanence or quality of Work.
- .2 Ensure surface drainage with minimum grades of at least 1:50 (2%).

3.2 BASE COURSE

- .1 Spread base course in layers to achieve total minimum thickness as detailed when compacted. Soft and weak areas shall be excavated and replaced with approved fill material.
- .2 Compact base course while at optimum moisture content to a minimum 95% Modified Proctor Density.
- .3 Shape base course to grade and cross section with an allowable local tolerance of 9.5 mm (3/8"). Allow for surface drainage with minimum grades of at least 1:50 (2%).

3.3 BEDDING SAND COURSE

- .1 Spread bedding sand course evenly over working area and screed accurately to a uniform thickness of 40 - 50 mm (1-5/8" - 2"). Allow for height loss in screeded level due to compaction when paving units are vibrated. Place only sufficient area to complete a single day's installation of pavers at one time.
- .2 Do not vibrate or disturb bedding sand course in any way once screeded and levelled.

3.4 PAVING UNITS INSTALLATION (AT GRADE)

- .1 Install unit paving maintaining desired pattern throughout as indicated and directed by Consultant, level true to grade and free of movement. Joints not to exceed 9.5 mm (3/8").
- .2 Fill perimeter of paved surface with standard edge pieces wherever practical. Provide whole pavers against all main walls. Cut units where required with approved cutter or saw to fit accurately, neatly with straight even surfaces and without cracks, chipped or damaged edges. Fractured or broken pavers will not be accepted.
- .3 Vibrate unit pavers to their final level by not less than two passes of a hand operated vibrating plate compactor having a plate surface of 0.3 m² (3.25 ft²). Flush unit pavers with all curbs, thresholds, grilles, covers, and other restraint. Do not use roller type vibrator.
- .4 Sweep sand containing 30% - 3.2 mm (1/8") particles over surface and vibrate into joints with additional passes of plate vibrator, completely filling joints.
- .5 Surface shall be true to grade and shall not vary by more than 9.5 mm (3/8") when tested with a 3 m (10'-0") straight edge at any location on surface. Ponding shall not occur after rainfall.
- .6 Sweep excess sand from surface and leave site clean.

3.5 PAVING UNITS INSTALLATION (AT ROOF DECK)

- .1 Locate pedestals according to manufacturer's recommendations and as indicated on the drawings.
- .2 Place paving slabs on pedestals so they are supported according to pedestal manufacturer's recommendations.
- .3 Align pedestals in all directions and shim elevations of slabs as work progresses and according to the manufacturer's recommendations.
- .4 Trim and remove uncovered portion of pedestals to fit tightly with slabs against parapets, walls, and protrusions in the roof. Cut paving slabs with a masonry saw to fit in these areas. Cut slabs

without damage to exposed faces and edges. Cut units should be no smaller than [1/2] of a whole slab.

- .5 Maintain consistent joint widths and joints aligned in all directions as indicated on the drawings.
- .6 Do not install cracked or broken paving slabs.
- .7 Remove cut pieces and other debris from the surface and on the roof deck. Sweep surfaces clean.

3.6 EDGE RESTRAINT

- .1 All edges of the installation shall be restrained. The type of edge restraint shall be as detailed and located as noted on the drawings.
- .2 Edge restraint shall be:
 - .1 Specified purpose-made edging.
 - .2 Buildings.
 - .3 Cast-in-place concrete curbs and bands.
 - .4 Cast-in-place concrete sidewalks.

3.6 CLEAN-UP & PROTECTION

- .1 At completion of unit paving work, excess material, rubbish and equipment resulting from these operations shall be removed from the site and the site left clean and tidy.
- .2 Protect adjacent surfaces and work from damage during cleaning process. Protect work of other sections from damage resulting from work of this section.

END OF SECTION.

1.0 GENERAL

1.1 WORK INCLUDED

- .1 Provide all labour, materials, equipment and services necessary to supply, erect, and strip all formwork and falsework for poured-in-place concrete shown or indicated on the Contract Drawings and Specifications.

1.2 REFERENCE STANDARDS

- .1 Ontario Building Code
- .2 CSA-A23.1-14 Concrete Materials and Methods of Concrete Construction
- .3 CSA-A23.2-14 Methods of Test for Concrete
- .4 CSA-S269.1-16 Falsework and Formwork
- .5 ACI SP-004-R14: (8th) Ch.5 Formwork for Concrete
- .6 ACI 347-R14 Recommended Practice for Concrete Formwork
- .7 CSA-O86-14 Engineering Design in Wood (Limit States Design)
- .8 CSA-O121-08 R2013 Douglas Fir Plywood
- .9 CSA-O153 -13 Poplar Plywood

1.3 HANDLING REQUIREMENTS

- .1 Protect formwork materials before, during, and after installation. Protect installed work and materials of other Sections.
- .2 In the event of damage, make required repairs or replacements to Consultant's requirements at no additional cost to the Owner.

2.0 PRODUCTS

2.1 FORMWORK MATERIALS

- .1 Form Material:
 - .1 Exposed surfaces: Use metal forms, plywood forms, or plywood lined forms of sufficient structural strength. Plywood to be to CSA O121-08 R2013 – Douglas Fir Plywood or CSA O153-13 – Poplar Plywood. Plywood lining to be new GIS exterior grade fir plywood manufactured with waterproof glue.
 - .2 Unexposed surfaces: Use metal forms, plywood forms, or wood lumber. Plywood to be to CSA O121-08 R2013 – Douglas Fir Plywood or CSA

- O153-13 – Poplar Plywood. Wood lumber to be to CAN/CSA O86-14 – Engineering Design in Wood.
- .3 Plywood and wood formwork materials: Material to be to CSA-S269.1-16 - Falsework and Formwork. Material is to be free from warping and sawn straight so that lines and shapes are accurately retained.
- .4 Formwork for unexposed surfaces shall be made with a good grade of lumber or plywood and fitted so that there is no leakage of mortar.
- .2 Ties and Spreaders:
- .1 Form ties shall be adjustable in length to permit tightening of forms. Use only the snap-off type of form tie that will leave no metal within 25-mm of the concrete surface after removal. Twisted wire form ties are not acceptable.
- .3 Form Release Agent:
- .1 Form release agent shall be a Consultant-approved chemical agent that is not an oil based product.
- .4 Void Form:
- .1 Void form shall be of a deteriorating material such as Wax-Mat as supplied by National Concrete Accessories Ltd. or approved alternate.

3.0 EXECUTION

3.1 FORMWORK

- .1 Lines and Levels:
- .1 Verify lines, levels, and column centers before proceeding with work and ensure that dimensions agree with Drawings.
- .2 Co-ordinate forming and setting of recesses, chases, sleeves, inserts, bolts, and hangers.
- .2 Design:
- .1 Design, construct, and erect formwork in accordance with CSA A23.1-14, CSA-S269.1-16, ACI 347R-14, and all applicable construction safety regulations at the Place of Work.

- .2 Build forms sufficiently strong and rigid to sustain the weight or fluid pressure of the concrete without noticeable deflection. Ensure forms are fitted sufficiently tight to prevent mortar leakage.
 - .3 The Contractor shall be responsible for design and construction of falsework.
 - .4 Do not exceed the safe live load of the structure, considering the strength and age of the concrete, with any construction or shoring loads.
 - .5 Provide 20mm x 20mm chamfer strips at exposed corners or edges of columns, walls, beams, and slabs.
- .3 Construction:
- .1 Construct forms so that the finished concrete will conform to the shape and dimensions shown on the Drawings.
 - .2 Construct forms so that they may be dismantled and removed without damaging the concrete.
 - .3 Set shores on wedges or use adjustable shores so they may be removed without causing undue strains in the concrete.
 - .4 Notify the Consultant when formwork is completed and cleaned to allow for review.
- .4 Treatment of Forms:
- .1 Install form release agent on form surfaces and allow to dry before placing reinforcing steel, anchoring devices, and embedded parts.
 - .2 Keep untreated forms wetted down to prevent shrinkage before placing concrete and wet surfaces without allowing ponding at time of placing concrete.
- .5 Alignment:
- .1 Provide suitable means for checking the alignment and elevation of formwork and check frequently during concrete placement.
 - .2 Carry out corrective wedging as required until concrete is in place.

- .3 Remove concrete that becomes misaligned during placing to satisfaction of Consultant.
- .4 Align forms to ensure movement and deflections of the finished product are confined.
- .5 Tolerances for all concrete work shall conform to the requirements of CSA Standard CSA-A23.1-14 and ACI 347-R14.
- .6 Stripping:
 - .1 Do not remove shoring or strip formwork until the concrete has gained sufficient strength to carry dead loads and construction loads that are likely to be imposed. Notify the Consultant before removing formwork.
 - .2 Remove Falsework progressively in accordance with CSA S269.1-16. Ensure that no shock loads or unbalanced loads are imposed upon the structure during removal.
 - .3 Loosen forms carefully using a method that prevents spalling and damage to the concrete surface and edges. Do not use wedge pry bars, hammers, or other tools against exposed concrete surfaces.
 - .4 Leave forms loosely in place for protection until curing requirements are complete.
 - .5 Completely remove forms from under steps and within void spaces. Provide temporary openings, if necessary.
 - .6 Remove metal spreader ties on exposed concrete by removing or snapping off inside the wall surface. Point up and patch the resulting pockets flush to surrounding areas.
- .7 Re-Use of Formwork:
 - .1 Forms may be re-used after adequate cleaning if the surfaces are not cracked or roughened. The formwork shall be trimmed and properly patched to provide a smooth surface.

3.2 INSERTS AND EMBEDDED ITEMS

- .1 Confirm the location of sleeves, openings, etc. that are shown on the Structural Drawings against Architectural and Mechanical drawings. Any sleeves, openings, etc. that are not shown on the Structural Drawings must be approved by the Consultant.

- .2 Accurately locate and set in place items that are to be cast directly into concrete slabs and walls. Coordinate forming and setting of ties, anchor bolts, pipe hangers, accessories, inserts, recesses, openings, sleeves, etc., as required by work of other Sections.

END OF SECTION

1.0 GENERAL

1.1 WORK INCLUDED

- .1 Provide all labour, materials, equipment and services necessary to supply and install new reinforcing steel work shown on indicated in all the Contract Drawings and Specifications including accessories such as hanger bars, spirals, wire ties, support bars, chairs, spacers supports or other devices required to position reinforcing properly.

1.2 REFERENCE STANDARDS

- .1 Ontario Building Code
- .2 CSA-A23.1-14 Concrete Materials and Methods of Concrete Construction
- .3 CSA-G30.5-M1983 R98 Welded Steel Wire Fabric for Concrete Reinforcement (**Withdrawn**)
- .4 CSA-G30.18 09 Carbon Steel Bars for Concrete Reinforcement
- .5 ASTM A775/A775M-07b Standard Specification for Epoxy-coated Reinforcing Steel Bars
- .6 ACI Manual of Standard Practice for Detailing – 28th Edition
- .7 Reinforcing Steel Manual of Standard Practice – June 2010
- .8 CSA – S413-07 Parking Structures
- .9 SP-71(08): ASTM Standards in 318-08
- .10 CSA-23.3-04 Design of Concrete Structures
- .11 CSA W186-M1990 (R2007) Welding of Reinforcing Bars in Reinforced Concrete Construction

1.3 SUBMITTALS

- .1 Mill Tests:
 - .1 Upon request, provide the Consultant with a certified copy of mill tests of steel supplied, showing physical and chemical analysis, minimum 2-weeks prior to commencing reinforcing work.

1.4 PRODUCT DELIVERY, STORAGE AND HANDLING

- .1 Store and protect reinforcement in a manner to prevent excessive rusting and fouling with dirt, grease, form-oil and other bond-breaking coatings.
- .2 Reinforcement at the time concrete is placed shall be free from excessive rusting, mud, oil or other coatings that adversely affect its bonding capacity.

2.0 **PRODUCTS**

2.1 **MATERIALS**

- .1 Reinforcing steel bars shall conform to CSA G30.18-09 (grade 400 MPa) unless otherwise specified herein or on the drawings, Plain finish.
- .2 Reinforcing bars to be welded shall conform to CSA G30.18-09.
- .3 Welded wire fabric shall conform to CSA G30.5 (**Withdrawn**). Sizes and gauges as shown on the drawings.
- .4 Bar supports shall conform to ACI 316 unless otherwise approved by the Consultant.
- .5 Chairs, bolsters, bar supports, spacers shall be epoxy coated or plastic. The use of pebbles, pieces of broken stone or brick, pipe, or wooden blocks will not be permitted.
- .6 Tie wire for coated reinforcing shall be plastic-coated.

2.2 **FABRICATION**

- .1 Fabricate reinforcing to CSA-A23.1.
- .2 Fabricate reinforcing steel within the following tolerances:
 - .1 Sheared length plus or minus 25 mm
 - .2 Depth of truss bar plus or minus 10 mm
 - .3 Outside dimension of stirrups, ties and spirals, plus or minus 10 mm
 - .4 Other bends plus or minus 25 mm
- .3 Colour-code each bar to correspond with code mark appearing on bar list.
- .4 Ship bundles of bar reinforcement clearly identified in accordance with bar lists.
- .5 Bars shall not be field bent, straightened, or re-bent, except where indicated or authorized by the Consultant. When field bending is authorized, bend without heat, applying slow and steady pressure. Replace bars that develop cracks or splits.
- .6 Splicing of reinforcing bars, unless indicated on the drawings, is prohibited except with the written approval of the Consultant. Such splices shall conform to the splice length for that class of splice according to CAN3-A23.3-04. Splices, where possible, shall be staggered.
- .7 Fabrication, handling and shipping of epoxy-coated steel shall conform with MTO Form 905. and CSA-S413-07.

3.0 **EXECUTION**

3.1 **INSTALLATION**

- .1 Reinforcement shall be accurately placed in the positions shown on the drawings, firmly tied, and supported by bar supports and side form spacers to assure proper concrete cover and spacing within allowable tolerances before and during placing of concrete.
- .2 Bar supports shall be sufficient in number and strength to carry the reinforcement they support and prevent displacement by workers or equipment before and during concreting. Bars shall be tied at all intersections, except where spacing is less than 250-mm in each direction, when alternate intersections shall be tied.
- .3 Bars shall be placed to the following tolerances unless noted otherwise.
 - .1 Clear concrete protection of reinforcement 5 mm \pm .
 - .2 Where the depth of a flexural member, thickness of a wall or smallest dimension of a column is:
 - .1 200 mm or less 5 mm \pm .
 - .2 larger than 200 mm but less than 600 mm 10 mm \pm .
 - .3 600 mm or larger 20 mm \pm .

Lateral spacing of these bars shall be within 30 mm \pm of the specified spacing.

 - .3 For longitudinal location of bends and ends of bars 50 mm \pm .
 - .4 As Item 3 at discontinuous ends of members 20 mm \pm .
 - .5 Specified spacing between bars 10 mm \pm .
- .4 Bars may be moved as necessary to avoid interference with other reinforcing steel, conduits or embedded items. If bars are moved more than one bar diameter or enough to exceed the specified tolerances, the resulting arrangement of bars shall be subject to approval of the Consultant.

3.2 **WELDING**

- .1 Any welding of reinforcing steel shall be in accordance with CSA W186-M1990 (R2007).

- .2 Copies of the Canadian Welding Bureau approved welding procedure and certificate of current operator qualification shall be submitted to the Consultant prior to commencement of welding.

3.3 INSPECTION AND TESTING

- .1 No concrete shall be placed until the Consultant has completed his review of reinforcing in place. The Contractor shall provide a minimum of 24 hours notice of the time when the reinforcement will be substantially in place and ready for the Consultant's review.

END OF SECTION

1.0 GENERAL

1.1 WORK INCLUDED

- .1 Cast-in-place concrete materials, including production, mixing, handling, testing, transporting, placement and curing of concrete.
- .2 Cast-in-place sloped concrete ramp topping base transition.
- .3 Fabricated components, anchorages, grating supports, snowmelt system components, vehicle sensors, and other items to be embedded into concrete.
- .4 Substrate repairs to the surface of the existing ramp and exterior slabs, in preparation for application of waterproof membrane materials.

1.2 REFERENCE DOCUMENTS

- .1 Ontario Building Regulations
- .2 CSA - A23.1-09 Concrete Materials and Methods of Concrete Construction
- .3 CSA - A23.2-09 Methods of Test for Concrete
- .4 CSA-A3000-08 Cementitious Material
- .5 CSA – S413-07 Parking Structures
- .6 ASTM C1202-10 Standard Test Method for Electrical Indication of Concrete's Ability to Resist Chloride Ion
- .7 ACI-305R-12 Guide to Hot Weather Concreting

1.3 WORK INSTALLED BUT FURNISHED BY OTHERS

- .1 Anchor bolts, designated electrical and mechanical components, and other inserts for casting into concrete shall be supplied by applicable trades. Build in and/or set these items and assume full responsibility for correct positioning.

1.4 PERFORMANCE REQUIREMENTS

- .1 The surfaces shall not crack, scale, pit, dust or unduly deteriorate or wear.
- .2 Cracks in toppings are to be repaired and sealed at Contractor's expense.

1.5 SUBMITTALS

- .1 Concrete Mix Design:
 - .1 The proposed mix designs shall be submitted to the Consultant for review,

a minimum of 2-weeks prior to placement. Do not proceed with concrete placement until review is complete and mix design has been accepted by the Consultant.

- .2 Provide concrete to meet the minimum structural design requirements and the minimum durability requirements indicated in this Section and as defined in CSA A23.1-09. The most severe exposure requirement governs over the design requirements and other less severe exposure conditions.
- .2 Concrete Test Results:
 - .1 One copy of the results shall be submitted directly from the Testing Agency to each of the Owner, the Contractor, and the Consultant.
- .3 Transit-Mix Delivery Slips and Placing Records:
 - .1 Keep a record at the job site showing time and place of each pour of concrete, together with a transit-mix delivery slip certifying contents of pour. Make the record available to the Owner for his inspection upon request. Upon completion of this portion of work, submit placing records and delivery slips to the Owner.
- .4 Curing Procedures:
 - .1 Submit details of proposed methods of concrete curing and provisions for weather protection to the Consultant for review.
- .5 Construction Joints:
 - .1 Submit plan locations and details of construction joints for the Consultant's review.
- .6 Mix Design and Testing Requirements for Low-Permeability, Silica Fume Concrete:
 - .1 Low permeability concrete shall meet the requirements of CSA Standard S413-07. It shall have a Coulomb rating not exceeding 1500 after 56-days, based on three (3) specimens tested in accordance with ASTM Standard C1202-10, and CSA-S413-07.
 - .2 The qualification of low-permeability concrete shall be established prior to construction. Contractor shall submit samples of proposed low-permeability concrete mix for 28-day and 56-day permeability testing, to qualify properties of proposed mix. Testing shall also include slump, air

content and 28-day compressive strength. The Contractor shall be responsible to ensure that sufficient time is provided in the project schedule for testing and qualification of the low-permeability concrete mix.

- .3 Once testing has confirmed that proposed mix design meets the specified requirements, submit mix design for the qualified concrete mix, and the results of 28-day and 56-day testing for Consultant's review a minimum of 2-weeks prior to placement.
- .4 The Contractor shall perform a trial slab placement of the proposed concrete mix on-site a minimum of 4-weeks prior to initial placement in the structure, in order to demonstrate placing, finishing and curing requirements. Trial placement shall include all specified curing requirements, using the materials, plant, and personnel to be used in the Contract work. Minimum trial slab size: 2 cu.m. Consultant to be present during trial placement.
- .5 The constituents and proportions of the qualified concrete mix shall not be changed without the Consultant's approval. A minimum of 1 week prior to placement.

2.0 PRODUCTS

2.1 GENERAL

- .1 Cast-in-place concrete shall satisfy the requirements of the Reference Standards unless where specified otherwise, herein or on the Drawings.

2.2 MATERIALS

- .1 Materials shall conform to the following requirements:
 - .1 Portland Cement to CSA-A3000-08.
 - .2 Aggregate: Natural stone to CSA-A23.1-09.
 - .3 Water: Potable and to CSA-A23.1-09.
 - .4 Air entraining agents to CSA A3000-08.
 - .5 Chemicals admixtures to CSA A3000-08
 - .6 Pozzolanic mineral admixtures to CSA A3000-08.

2.3 MIX PROPORTION – SLOPED RAMP BASE TRANSITION BONDED TOPPING CONCRETE MIX

- .1 Concrete shall be homogeneous and when hardened shall have the required strength, resistance to deterioration, durability, resistance to abrasion, water-tightness, appearance and other specified properties.
- .2 Mix design is the responsibility of the Contractor. Concrete mixes shall be proportioned by the supplier to meet the requirements for cement type, compressive strength, class of exposure, maximum aggregate size, slump, air content, and admixtures specified herein. All concrete shall be normal weight. Proportioning mixing and delivery to the site shall meet the requirements of CSA Standard CSA-A23.1-09.

.3 Concrete Properties:

.1	Compressive strength (28 days)	30 MPa minimum
.2	Class	N Exposure
.3	Air content	5.0% to 8.0%
.4	Aggregate size	20 mm maximum*
.5	Slump: prior to superplasticizer	50 mm maximum **
	after superplasticizer	125 mm maximum **
.6	Water/cementing materials ratio	0.45 maximum
.7	Cement content	335 kg/m ³ minimum
.8	Cement	Type GU -Normal Portland Cement
.9	Concrete density	Normal weight (2400 kg/m ³)

* The intent of this mix proportion is to provide a low-shrinkage concrete mix.

** Non-chloride based plasticizers may be used to facilitate concrete placement.

- .4 The use of fly ash shall not be permitted.
- .5 Note that although a maximum slump is specified, the Contractor shall endeavour to provide concrete at the minimum slump that permits placement and handling.
- .6 Concrete requirements specified may require the use of superplasticizers, set retardants. Costs associated with the use of such materials shall be included in the contract price.

2.4 ADMIXTURES

- .1 Use only compatible admixtures and add to mix in strict accordance with Manufacturer's recommendations.

- .2 Use of calcium chloride not permitted.

2.5 SUBSTRATE SURFACE PREPARATION AND SURFACE PATCHING AT ROUGH AREAS

- .1 Clean surfaces of all dust and loose material with an oil and water free compressed air source.
- .2 Repair substrate surface concrete defects/deterioration as per Section 03700 Concrete Restoration.

3.0 EXECUTION

3.1 GENERAL

- .1 All phases of concrete work shall be in accordance with the standard unless otherwise specified herein or on the drawings. The work shall be done by workers who are skilled and experienced in their trade.

3.2 SUBSTRATE SURFACE PREPARATION AND PATCHING REPAIRS

- .1 Preparation of a mock-up test sample is required to review the quality and standard of workmanship for the substrate surface repair materials. Mock-up sample to include surface cleaning, primer application, patch material application, curing and membrane application. Materials and methods used in the approved mock-up sample shall serve as the minimum standard for the remaining surface preparation applications. The Consultant will inspect Work at the various stages of the installation.
 - .1 Testing will include evaluation of bonding of the completed surface patches; bond testing of torch-applied membrane bonding; and re-testing of patch material bond after removal of test membrane material.
 - .2 The Consultant shall evaluate bonding of patch material to existing concrete after the fresh patch material has cured sufficiently. The evaluation shall be performed by sounding, using a “chain-drag”, hammer sounding or other techniques. Detection of hollow sound in any area shall be reason to suspect inadequate bonding.
- .2 After removal of all deteriorated, damaged, scaled and unsound concrete, prepare concrete surfaces by abrasive blasting, and thoroughly clean substrate surfaces of all dust and debris prior to application of surface patching materials.

- .3 Prepare surfaces, prime and place patch materials in strict accordance with Manufacturer's recommendations. Protect the prepared and cleaned surfaces. In the event that the prepared surfaces become contaminated after surface blasting, the contractor shall repeat the preparation and cleaning procedures at his own expense.
- .4 Repaired substrate surfaces shall be trowelled smooth, flush with existing surfaces, leaving no voids at patch edges.
- .5 Ensure all substrate surface repair patches are protected and cured in accordance with Manufacturer's recommendations.

3.3 INSERTS AND EMBEDDED ITEMS

- .1 The Contractor shall notify all trades sufficiently in advance to ensure that provision is made for casting anchor bolts, embedded snow-melt system components, vehicle sensors, designated electrical and mechanical components, and other inserts into the concrete topping. Ensure that all of inserts and embedded items are secure and not displaced during the placing of concrete.
- .2 Junction boxes, and other services cast in the concrete shall be plastic or galvanized metal. All inserts, embedded items and related components must be of corrosion-resistant materials.

3.4 CONCRETE MIXING AND PLACING

- .1 Concrete shall be machine mixed. Mixing and placing shall be in accordance with CSA Standard CSA-A23.1.
- .2 Concrete shall be conveyed from the mixer to the place of deposit by methods that will ensure the required quality of concrete. Equipment for conveying the concrete shall be of such size and design as shall ensure a practically continuous flow of concrete at the delivery end without separation of materials.
- .3 Concrete shall be deposited as nearly as practicable to its final position to avoid rehandling.
- .4 Depositing shall be continuous throughout each division and the concrete shall be so placed and worked that a uniform texture will be produced.
- .5 No concrete shall be placed later than one half hour after leaving the mixer. No re-tempered concrete shall be permitted.

- .6 Cement slurry used to prime a concrete pump shall be discarded and not placed into the structure.

3.5 ADDITION OF WATER

- .1 To conform to CSA – A23.1-09, clause 5.2.4.3.2.
- .2 No water shall be added after the initial introduction of the mixing water for the batch except when, at the start of discharge, the measured slump of the concrete is less than that specified and no more than 60 minutes have elapsed from the time of batching to the start of discharge. In this case water may be added only under the direction of the producer's Quality Control Inspector who shall be dispatched from the plant to the site. In no case shall an amount of water exceeding 16 litres per cubic metre be added. The resulting concrete must satisfy the specified requirements. The responsibility for the product will remain with the producer.

3.6 COMPACTION AND VIBRATION

- .1 All concrete shall be thoroughly consolidated during and immediately after depositing, by internal vibration. Concrete shall be consolidated by means of sufficient vibrators of adequate size operated by competent workmen that have been instructed in their use.
- .2 The use of vibrators to transport concrete shall not be permitted.
- .3 Concrete shall be thoroughly worked around reinforcement, around embedded items and into corners, eliminating all air or stone pockets that may cause honeycombing, pitting or planes of weakness.

3.7 FINISHING

- .1 Concrete ramp topping surfaces shall be bull floated, trowelled and light broom finished perpendicular to traffic direction, as necessary to provide a non-slip surface suitable for vehicle and pedestrian traffic.

3.8 CONSTRUCTION JOINTS

- .1 Contractor shall establish pour breaks and control joints locations. Location and detail of construction, phasing and construction pour joints not indicated on the drawings shall be submitted to the Consultant for review.
- .2 Construction joints shall be located and designed to least impair the strength and appearance of the topping assembly. The reinforcement shall continue through the joint unless noted otherwise.

- .3 The existing concrete surface at construction joints shall be wetted thoroughly prior to placement of new concrete.
- .4 Seal all construction joints, pour breaks and control joints as per Section 07 92 10.

3.9 CURING

- .1 As soon as possible after the concrete has sufficiently set, and no later than 30 minutes after finishing, wet curing with pre-saturated mats shall be initiated on the concrete surfaces.
 - .1 Wet curing procedures shall ensure that the concrete surfaces shall be kept continuously wet for a period of at least seven (7) consecutive days at a minimum temperature of 10 deg. Celsius. Water shall not be permitted to evaporate from the concrete surfaces at any time within the wet cure period.
 - .2 Minimum acceptable wet curing method on topping surfaces is pre-saturated filter fabric, burlap, or cotton mats; covered with soaker hoses and plastic sheeting. Wet-curing mats shall be overlapped 150-mm and held in place without marring the surface of the concrete. Use of chemical curing compounds shall not be permitted.
 - .3 Prevent airflow in the space between the wet-curing mats and the plastic sheeting. Protect wet-curing assembly from freezing during cold weather.
- .2 When the air temperature is below 5°C or when in the opinion of the Consultant, there is a possibility of its falling below 5°C no concrete shall be placed until after the Consultant has approved the provisions made to ensure proper curing of concrete. These provisions shall conform to the requirements of CSA Standard CSA-A23.1-09, Section 7.
- .3 Adequate equipment shall be provided for heating the concrete materials and protecting the concrete from freezing or near freezing temperatures. No frozen materials or materials containing ice shall be used. All concrete materials and all reinforcement, forms, existing concrete and ground with which the concrete is to come into contact, shall be free from frost. Whenever the temperature of the surrounding air is below 5°C all concrete placed shall have a temperature of between 15°C and 32°C and adequate means shall be provided for maintaining a temperature of not less than 21°C for 3 days of 10°C for 5 days except when high early strength concrete is used, the temperature shall be maintained at not less than 32°C for 2 days or 10°C for 3 days or for as much more as is necessary to ensure proper curing of the concrete. Under no circumstances may dry heat be used. Means shall be taken to humidify the air within the enclosure and to ensure

that the moisture requirements for curing are maintained. No dependence shall be placed on calcium chloride or other chemicals for the prevention of freezing.

- .4 In extreme weather conditions, either hot, windy or freezing, all topping surfaces shall receive a protective covering to prevent respectively, excessive evaporation or freezing.

3.10 PATCHING AND CUTTING

- .1 Honeycomb, exposed reinforcement, deviations in formwork and other defects of a minor nature that have occurred as a result of poorly consolidated concrete may be patched by the Contractor, at his cost, using materials and procedures pre-approved by the Consultant. Cut out defect to sound concrete and fill with a mortar to the same proportions of cement and sand as in the concrete.
- .2 Grind off or otherwise remove fins, ridges, and other imperfections immediately after removal of forms. Remove segregated concrete aggregate to sound material. Repair as directed by the Consultant.
- .3 Holes shall not be permitted to be drilled or cored through in-place concrete unless specifically directed by the Consultant. Care shall be taken to ensure that no embedded reinforcement is cut.

3.11 TOPPING CRACKS - REPAIR

- .1 All cracks in the concrete topping, with widths equal to or greater than 0.5-mm, shall be repaired by sawcutting and sealing. Other cracks may also be designated for repair by the Consultant as required for project requirements.
- .2 13 mm x 13-mm straight-sided joints shall be sawcut or ground into the topping surface at crack locations designated for repair.
- .3 Do not overcut beyond actual extent of crack.
- .4 Lightly sandblast sawcut surfaces.
- .5 All cracks and joints are to be primed.
- .6 Sealant material to fill sawcut profile flush with slab surface, leaving a slight depression after curing.

3.12 TESTING

- .1 Concrete testing will be as required by CSA-A23.1-09 unless noted otherwise. Testing methods shall conform to CSA-A23.2-09.
- .2 Testing agency shall be selected and paid for by the Owner. The contractor shall arrange with the Testing Agency for performing all required testing.
- .3 The Contractor shall notify the Consultant at least 24 hours before any concrete is placed to allow the Consultant to review the work.
- .4 Contractor shall provide casual labour to the testing agency's field personnel for the purpose of obtaining and handling sample materials. Provide suitable access to the Work for obtaining samples. Provide and maintain facilities for storage of concrete test cylinders for the first 24-hours.
- .5 Take at least one concrete test (3 cylinders) for each 60 cubic meters or fraction thereof, of each type of concrete placed in any one day. One moist cured cylinder to be tested in 7 days and two tested in 28 days. Take one slump test and one test for air entrainment for each concrete test.
- .6 Results of concrete tests shall be forwarded to the Owner, Consultant, and Contractor. Included with the test results shall be the following information: Name of Project, Date of sampling, Name of supplier, Delivery truck number, Identification of sampling and testing technicians, Exact location in the structure of the concrete sampled, Air temperatures and concrete temperature, Design strength of concrete sampled, Admixtures, cement type, maximum aggregate size.
- .7 Testing Agency personnel are not authorized to revoke, relax, enlarge, or release any requirements of the specification, nor to approve or disprove any portion of the Work.
- .8 If additional testing is required to demonstrate the adequacy of any concrete not meeting the requirements for strength or which has been placed before formwork and reinforcement have been reviewed by the Consultant, the Contractor shall pay the cost of such testing.

3.13 REJECTION OF DEFECTIVE WORK

- .1 In the event that concrete tests do not conform to the requirements of this specification, or when conditions are such to cause doubt about the safety of the structure, test that portion of the structure in accordance with CSA-A23.1-09. Such test shall be made at the expense of the Contractor and to the satisfaction of the Consultant.

- .2 Where, in the opinion of the Consultant, material or workmanship fails to meet the requirements of the specification, such work may be rejected. Work rejected shall be replaced or repaired to the approval of the Consultant and at no additional cost to the Owner.

END OF SECTION

1.0 GENERAL

1.1 WORK INCLUDED

- .1 Provide all labour, materials, equipment and supervision necessary to prepare and place new concrete as outlined in this Section.
 1. The installation of a cast-in-place concrete access ramp on the ground floor.
 2. The installation of a new sloped bonded concrete topping at the base of the access ramp slab on the ground floor.
 3. Localized concrete repairs at new suspended floor and roof level slabs as required to accommodate the new slab openings.

1.2 REFERENCE STANDARDS

- .1 Ontario Building Code
- .2 CSA-A23.1-14 Concrete Materials and Methods of Concrete Construction
- .3 CSA-A23.2-14 Methods of Test for Concrete
- .4 CAN/CSA-A3000-13 Cementitious Materials Compendium
- .5 CSA-S413-14 Parking Structures
- .6 ASTM C260/C260M-10A Standard Specification for Air-Entraining Admixtures for Concrete
- .7 ICRI 310.2R-2013 Selecting and Specifying Surface Preparation for Sealers, Coatings, Polymer Overlays, and Concrete Repair

1.3 PERFORMANCE REQUIREMENTS

- .1 New concrete surfaces shall not scale or crack excessively.
- .2 The new concrete materials shall not spall or debond from the existing concrete.

1.4 SUBMITTALS

- .1 Submit all mix designs, product specifications, and Manufacturer's recommendations for review by the Consultant a minimum of two weeks prior to placement or use of products.
- .2 Do not commence placement of concrete until review is complete and proposed products and procedures are accepted by Consultant.

1.5 QUALIFICATIONS

- .1 Use only qualified concrete placers and finishers, with a minimum of two years' experience in similar work.

2.0 PRODUCTS

2.1 MATERIALS

- .1 Portland Cement to be type GU to CSA-A3000-13
- .2 Aggregate: Natural stone to CSA-A23.1-14
- .3 Water: Potable and to CSA-A23.1-14
- .4 Air entraining agents to ASTM C260/C260M-10A
- .5 Chemicals admixtures to CSA-A3000-13. Calcium chloride is not permitted.
- .6 Pozzolanic mineral admixtures to CSA-A3000-13
- .7 Curing materials to CSA-A23.1-14
- .8 Blended hydraulic cementing material to be type 10SF to CSAA3000-13.
- .9 Supplementary cementing material to be to CSA-A3000-13.
- .10 Superplasticizing admixture to be to CSA-A3000-13.

2.2 ACCESS RAMP SLAB AND SLAB REPAIRS CONCRETE MIX – SILICA FUME

- .1 Normal weight “ready mixed” Portland cement/silica fume modified concrete mixed in accordance with Section 15, CSA-A23.1-14 class of exposure N with the following requirements:

	<u>Description</u>	<u>Requirements</u>
.1	Compressive strength (28 days)	25 MPa minimum
.2	Air content	6.0% to 9.0%
.3	Aggregate size	13 mm
.4	Slump	
	Prior to superplasticizer	50 mm maximum +/- 20mm
	After superplasticizer	125 mm maximum +/- 25mm
.5	Water/cementing materials ratio	0.40 maximum
.6	Cement content	335 kg/m ³ minimum
.7	Cement –Type GU	Normal Portland Cement
.8	Silica Fume – Type U	Minimum 7.5 % Silica Fume by mass of cement (25 kg/m ³ min.)
.9	Fly Ash – Type F	Maximum 15% by mass of cement (50 kg/cu. m. max)
.10	Concrete density	Normal weight (2360 kg/m ³)

1.0 **GENERAL**

1.1 **WORK INCLUDED**

- .1 Provide all labour, materials, equipment and supervision necessary to place new concrete material as outlined in this Section.
 1. The installation of a new cast-in-place concrete access ramp slab on the ground floor.
 2. The installation of a new sloped bonded concrete topping at the base transition of the new access ramp slab on the ground floor.
 3. Localized concrete repairs at new suspended floor and roof level slabs as required to accommodate new slab openings.
 4. Grout for concrete masonry unit blocks of ground floor access ramp.

1.2 **REFERENCE STANDARDS**

- .1 Ontario Building Code
- .2 CSA-A23.1-14 Concrete Materials and Methods of Concrete Construction
- .3 CSA-A23.2-14 Methods of Test for Concrete
- .4 CAN/CSA-A3000-13 Cementitious Materials Compendium
- .5 CSA-S413-14 Parking Structures
- .6 ASTM C260/C260M-10A Standard Specification for Air-Entraining Admixtures for Concrete
- .7 ICRI 310.2R-2013 Selecting and Specifying Surface Preparation for Sealers, Coatings, Polymer Overlays, and Concrete Repair

1.3 **PERFORMANCE REQUIREMENTS**

- .1 New concrete surfaces shall not scale or crack excessively.
- .2 The concrete repair materials shall achieve a minimum compressive strength of 20MPa within 24 hours.

1.4 **SUBMITTALS**

- .1 Submit Manufacturer's product specifications and data sheets for the following products:
 - .1 Cement slurry bonding agent and Manufacturer's recommendations
 - .2 Access Ramp Slab Pre-Packaged concrete material

- .2 Submittals to be provided for review by the Consultant a minimum of two weeks prior to placement or use of products.
- .3 Do not commence placement of repair products until review is complete and proposed products and procedures are accepted by Consultant.
- .4 If requested by Consultant, provide a certificate signed by the Contractor and pre-packaged material manufacturer certifying the following:
 - .1 Surfaces to receive pre-packaged material were acceptable and satisfactory to receive the materials per the Manufacturer's requirements and these Specifications. Application of pre-packaged materials shall imply acceptance of surfaces.
 - .2 Pre-packaged materials were installed in accordance with Manufacturer's recommendations and these Specifications.

1.5 QUALIFICATIONS

- .1 Use only qualified concrete placers and finishers, with a minimum of two years' experience in similar work.

2.0 PRODUCTS

2.1 MATERIALS

- .1 Portland Cement to be type GU to CSA-A3000-13
- .2 Aggregate: Natural stone to CSA-A23.1-14
- .3 Water: Potable and to CSA-A23.1-14
- .4 Air entraining agents to ASTM C260/C260M-10A
- .5 Chemicals admixtures to CSA-A3000-13. Calcium chloride is not permitted.
- .6 Pozzolanic mineral admixtures to CSA-A3000-13
- .7 Curing materials to CSA-A23.1-14
- .8 Blended hydraulic cementing material to be type 10SF to CSA-A3000-13.
- .9 Supplementary cementing material to be to CSA-A3000-13
- .10 Superplasticizing admixture to be to CSA-A3000-13.

2.2 CEMENT SLURRY BONDING AGENT

- .1 Cement slurry grout consisting of a mixture of one part cement to one part fine aggregate and enough water to make a "heavy cream" consistency. Aggregate to conform to CSA Standard CSA-A23.1-14 Clause 4.2.3.

- .2 Contractor to provide written confirmation of manufacturer’s recommended slurry bonding agent prior to placement of repair material.

2.3 ACCESS RAMP SLAB, SLOPED BONDED CONCRETE TOPPING, AND SURFACE REPAIRS – PRE-PACKAGED CONCRETE MATERIALS

- .1 Proportion patch materials with specially graded aggregate to give the following properties in accordance with CSA-A23.2-14:

	<u>Description</u>	<u>Requirements</u>
.1	Compressive strength (24 hours)	20 MPa minimum
.2	Compressive strength (7 days)	30 MPa minimum
.3	Flexural Strength (7 days)	5 MPa minimum
.4	Slant/Shear Bond Strength (7 days)	5 MPa minimum
.5	Linear shrinkage	0.08% max.
.6	Rapid chloride permeability	less than 1,000 coulombs
.7	Thermally compatible with concrete substrate under all applicable service conditions.	

- .2 The patch materials listed below may conform to the specified properties and linear shrinkage requirements. Manufacturer’s latest product data sheets for proposed patch materials shall demonstrate that the patch material conforms to the specified requirements. Where product data is incomplete, manufacturer is to provide supplementary independent test data that demonstrates conformance.

- .3 Patch materials:

	<u>Product Name</u>	<u>Manufacturer</u>
.1	MasterEmaco T1060	BASF
.2	MasterEmaco T1061	BASF
.3	MasterEmaco S 466 CI	BASF
.4	MasterEmaco T415	BASF
.5	MasterEmaco T430	BASF
.6	MasterEmaco T240	BASF
.7	Blue-Line Rapid Repair Grout	Con-Spec
.8	CPD Rapidcrete	CPD
.9	Eurocrete	Euclid Chemical
.10	Versaspeed	Euclid Chemical
.11	HP-S6	King
.12	HP-S10	King
.13	MS-S6	King
.14	MS-S10	King
.15	Planitop 18	Mapei
.16	SikaTop 111 Plus with Sikacem Accelerator	Sika
.17	SikaQuick 1000	Sika

.18	Structuroc H	Solhydroc
.19	Traffic Patch (with Silica Fume)	Target

2.4 NON-SHRINK GROUT

- .1 Premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents, of pouring consistency, capable of developing compressive strength of 35 MPa at 28 days.
- .2 Non-shrink grout materials:

	<u>Product Name</u>	<u>Manufacturer</u>
.1	In-Pakt Pre-Mix	CC Chemicals Ltd.
.2	Sika Grout 212 Plus	Sika Canada
.3	Masterflow 100	BASF
.4	CPD Non-Shrink Grout (Pre-Mix)	CPD Construction Products

2.5 ADMIXTURES

- .1 Use only compatible admixtures and add to mix in strict accordance with manufacturer's recommendations.
- .2 Use of calcium chloride not permitted.

3.0 EXECUTION

3.1 CONCRETE SURFACE PREPARATION

- .1 All concrete surfaces to receive new concrete repair material shall have a minimum No. 6 CSP per ICRI 310.2R-2013 and be thoroughly abrasive-blast, sandblast or shot blast prior to concrete placement to remove laitance, debris, and loose aggregate.
- .2 Clean all existing concrete or steel surfaces to receive new concrete of foreign material, dust, debris, grease and oil as directed by Consultant. Emulsifiers shall be required for surfaces containing grease or oil.
- .3 Contractor to notify Consultant to review surfaces prior to concrete placement.

3.2 CONCRETE PLACEMENT – SURFACE REPAIRS

- .1 Prepare patch surface, mix patch material, and apply, finish, and cure in strict accordance with the more rigorous requirements of Contract Specifications and manufacturer's recommendations.

- .1 The patch area shall be thoroughly wetted as required to achieve a saturated surface dry (SSD) state prior to placing concrete repair material.
- .2 Puddles of free water shall be blown from the patch area and the surface is to be permitted to dry to a saturated surface dry (SSD) state prior to application of cement slurry.
- .3 Apply a cement slurry bonding agent to the surface of the concrete just prior to placing new concrete.
- .4 The cement slurry bonding agent shall be broomed or scrubbed into the deck to fully saturate the surface but not to be allowed to puddle.
- .5 Pre-wet burlap shall be available on site prior to placement of concrete to allow for immediate placement overtop of new concrete patches after their initial set.
- .6 Prepare pre-packaged concrete mix per Manufacturer's specifications.
- .7 Contractor to confirm the minimum and maximum application lift thickness prior to placement of concrete. If required and permitted by the Manufacturer, the concrete repair material can be extended with aggregate. **Contractor to submit proposed aggregate extension mix design to the Consultant prior to proceeding with Work.**
- .8 On slab top surfaces place new dense concrete thoroughly compacted and vibrated into place to ensure good bond.
 - .1 Ensure reinforcing steel is secured in place and is not disturbed during placement.
 - .2 Vibrators are to be used for consolidation purposes only and are not to be used to an extent that causes segregation of the concrete.
 - .3 Internal vibrators shall conform to CSA A23.1-14 Clause 7.2.5.2 and Table 19: Internal Vibrators for Various Applications.
 - .4 Vibrators shall be inserted into concrete perpendicular to concrete surface.
 - .5 Vibrators shall be inserted such that zones of consolidation always overlap.
- .9 Concrete surfaces to be flush with existing surfaces, free of voids and cracks, and have a uniform surface and transition to the existing surface.

- .10 Finish concrete in accordance with CSA A23.1/A23.2. Initial finish shall be completed before any bleeding or free water is present on the surface of the concrete. Final finishing shall commence after the bleed water has disappeared and when the concrete has stiffened sufficiently to prevent the working of excess mortar to the surface. **Do not add water to finish.**
- .11 Do not overwork concrete surface. Wood float finish is acceptable.
- .12 Do not use steel trowels with air-entrained concrete. For air-entrained concrete, the surface can be further levelled and consolidated with a magnesium bull float for larger repairs or a magnesium trowel for smaller repairs. One or more passes shall be made at suitable time intervals to obtain a level finish free of float marks. Do not work bleed water on the concrete surface into the concrete during finishing.
- .13 Cure concrete per manufacturer's written instruction.
- .14 Where a waterproof membrane is to be installed, do not cover concrete repair patches with waterproof membrane until curing period of repair patch material is complete and the surface is completely dry. Concrete shall be considered sufficiently dry if no moisture is visible on the underside of 18" x 18" sheet of polyethylene plastic taped to the slab surface for 16 hours.
- .15 Areas of concrete repair completely through the thickness of the slab shall be patched with concrete, well consolidated and vibrated into place on to smooth plywood forms with suitable release agents adequately shored from the slab below, to the approval of the Consultant. Once forms have been removed edges of through slab repair are to be grinded, hand patched, etc. as required to produce smooth (form like) transition from new patch material to the existing slab.
- .16 Do not allow traffic on newly placed repair patches until 75% of the specified 28 day strength has been reached.

3.3 CONCRETE MIXING AND PLACING

- .1 Concrete shall be machine mixed unless otherwise stipulated by the Manufacturer. Mixing and placing shall be in accordance with CSA-A23.1-14.
- .2 Concrete shall be conveyed from the mixer to the place of deposit by methods that will ensure the required quality of concrete. Equipment for conveying the concrete shall be of such size and design as shall ensure a practically continuous flow of concrete at the delivery end without separation of materials.

- .3 Concrete shall be deposited in the forms as nearly as practicable to its final position to avoid re-handling.
- .4 Depositing shall be continuous throughout each division and the concrete shall be so placed and worked that a uniform texture will be produced.
- .5 No concrete shall be placed later than one half hour after leaving the mixer. No re-tempered concrete shall be allowed.
- .6 Mix concrete in accordance with the Manufacturer's written instructions.

3.4 COMPACTION AND VIBRATION

- .1 Concrete shall be consolidated by means of sufficient vibrators of adequate size operated by competent workmen.
- .2 The use of vibrators to transport concrete shall not be allowed.
- .3 Concrete shall be thoroughly worked around reinforcement, embedded items, and into corners.
- .4 Compaction and vibration is to eliminate all air and stone pockets that may cause honeycombing, pitting or planes of weakness.

3.5 CONCRETE CURING

- .1 Ensure Manufacturer's recommended curing conditions are maintained. The more stringent curing conditions between the Manufacturer's recommendations and those outlined in this section will govern unless otherwise agreed upon by the Consultant in writing.
 - .1 Initiate slab surface concrete wet curing as soon as possible after the concrete has sufficiently set, and no later than 30 minutes after finishing.
 - .1 Minimum acceptable wet curing method on slab surfaces is installation of pre-saturated filter fabric, burlap, or cotton mats that are covered with soaker hoses and plastic sheeting. Overlap wet-curing mats 150-mm and ballast in place without marring the concrete surface.
 - .2 Wet curing procedures to be in accordance with manufacturer's written requirements, but shall be no less than a one (1) day period at a minimum temperature of 10° C. Water shall not be permitted to evaporate from the concrete surfaces at any time within the wet cure period.

- .3 Prevent airflow in the space between the wet-curing mats and the plastic sheeting. Protect wet-curing assembly from freezing during cold weather.
- .2 The use of chemical curing compounds is not permitted.
- .3 Protect concrete from the harmful effects of heat, cold, running or surface water, and mechanical shock.
- .4 Do not place concrete when air temperature is below 10° C, or without implementing provisions to ensure proper curing of concrete when -- in the opinion of the Consultant -- there is a possibility of air temperature falling below 10° C. These provisions shall be reviewed by the Consultant and conform to the requirements of CSA-A23.1-14.
- .5 Maintain concrete material and forms between 15° C and 32° C until concrete placement whenever the surrounding air is below 5° C. No frozen material or material containing ice shall be used. All existing concrete, reinforcement, forms, and ground that the concrete will contact is to be free from frost.
- .6 Maintain a curing temperature above 10° C for 10 days or longer to ensure proper concrete curing. Under no circumstances may dry heat be used. Provide means to humidify the air within the heated enclosure and ensure that moisture requirements for curing are maintained.
- .7 Do not allow pedestrian traffic onto new concrete until material has adequately cured to its specified 24-hour compressive strength.
- .2 The Consultant will have cause to not certify payment for repairs undertaken without adequate wet-curing procedures or that become surface dry during the specified curing period.

3.6 INSPECTION AND TESTING

- .1 To conform to CSA-A23.2-14.
- .2 Inspection and testing to be conducted by a testing agency designated by the Owner. The Owner will pay costs of inspection and testing described in this section.
- .3 Contractor to inform testing agency 24 hours in advance of concrete placement.
- .4 Testing shall include:

- .1 Preparation and testing of concrete grout cubes or cylinders for compressive strength.
- .2 Review manufacturer product data sheets submitted by the Contractor.
- .3 Bond testing of concrete repair patches to existing concrete where designated by the Consultant.
- .4 Submission of test results to the Owner, the Consultant, and the Contractor.
- .5 A minimum of one set of concrete grout cubes (9 cubes) or cylinders (4 cylinders) shall be taken for compressive strength testing for of concrete patch material used each day unless otherwise directed by Consultant. Concrete test samples are to be placed in an area with similar curing conditions to that of the cast concrete.
- .5 Testing procedures for concrete shall conform to the following requirements:
 - .1 Compression tests on concrete shall be carried out in accordance with CSA Standard A23.1 and A23.2. Strength test on approved grout shall consist of nine grout cubes with three cubes tested at seven (7) days and the remainder tested at 28 days. For cylinders, strength tests shall be undertaken on one cylinder each at 3 and 7 days with the remaining 2 tested at 28 days.
- .6 The Contractor shall provide at no additional costs to the Owner:
 - .1 Samples of all material required for testing.
 - .2 Co-operation with the execution of concrete testing which shall include protection against injury or loss of grout cubes or cylinders.
 - .3 Access for the Testing Company to test and/ or inspect materials.
 - .4 Site storage facilities meeting requirements of CSA A23.2-14 for concrete test specimens prior to removal to laboratory.
- .7 Bond Strength:
 - .1 After the concrete or grout has cured, the Testing Company may perform bond strength tests if requested by Consultant.
 - .2 These cores are to be used for the evaluation of the bond strength of the new concrete to the existing by direct tensile force. Testing Company will drill through patches selected by Consultant.

- .3 Failure to achieve a minimum tensile bond strength of 0.9 MPa shall constitute failure of patches.
- .4 Contractor to fill all core holes with non-shrink cementitious grout upon completion of the tests.
- .8 Contractor shall pay for costs of additional testing as follows:
 - .1 If Contractor fails to notify testing agency in event of pour cancellation.

3.7 FIELD QUALITY CONTROL

- .1 The Consultant shall evaluate bonding of fresh patch material to existing concrete after the fresh patch material has cured sufficiently.
- .2 The evaluation shall be performed by sounding, using a "chain-drag" or other techniques.
- .3 Hollow sounds detected in repair area provide reason to suspect inadequate bonding. Contractor to core these areas to determine bonding adequacy where requested by the Consultant.
- .4 Coring shall be through the new concrete and into the existing concrete. Core diameter shall be 75-mm, or as required by the Consultant. Length of cores shall be twice the core diameter or twice the thickness of new concrete, unless otherwise requested by the Consultant.
- .5 Cores will be visually inspected after removal and any further testing that is required will be determined by the Consultant.
- .6 Contractor to patch core holes.

3.8 REJECTION OF DEFECTIVE WORK

- .1 The Consultant shall have the right to order additional concrete testing of any portion of repairs in accordance with CSA Standard A23.1-14 if previous testing demonstrates non-conformance with specified requirements. The testing company shall be selected by the Consultant and shall deal directly with the Consultant. Payment for costs associated with the additional concrete testing will be at the Contractor's expense.
- .2 Where it is the Consultant's opinion that material or workmanship fails to meet the specified requirements, the work shall be replaced or repaired to the approval of the Consultant at no additional cost to the Owner.

- .3 Bond failure between repair material and the existing concrete, or failure to meet compressive strength requirements based on compression testing of concrete cylinders, will result in drilling of additional core samples at the Contractor's expense. Failure of these additional samples will require the work to be replaced or repaired to the approval of the Consultant at no additional cost to the Owner.

3.9 RECORD DRAWINGS

- .1 Maintain accurate records of the location, size, and concrete placement date for each concrete pour.
- .2 Records to be kept up-to-date and made available to Consultant throughout the duration of the Work.
- .3 Prior to Substantial Performance provide a plan showing location, size, and date of concrete pours.

END OF SECTION

- .2 The intent of this mix design is to provide a low permeability, high electrical resistivity concrete mix with a coulomb rating less than 1500 when 28-day samples are tested using rapid chloride permeability testing.
- .3 Non-chloride based plasticizers shall be used to facilitate concrete placement as required. Costs associated with the use of such materials shall be included in the contract price. Plasticizer shall be compatible with the air entrainment agent.
- .4 Note that although a maximum slump is specified, the Contractor shall endeavour to provide concrete at the minimum slump that permits placement and handling.
- .5 Mix design is the responsibility of the Contractor.
- .6 Do not add calcium chloride to concrete.
- .7 Addition of water to the concrete mix shall not be permitted on-site. The Contractor shall be permitted to adjust only the quantities of superplasticizer and air entraining agent on-site.
- .8 No concrete shall be placed later than two (2) hours after the time of batching. No re-tempered concrete shall be allowed.
- .9 The Contractor shall use superplasticizers to facilitate concrete placement and must demonstrate to the satisfaction of the Consultant that such admixtures will have no deleterious effect on the durability or strength of the proposed concrete mix (i.e. freeze/thaw durability).

2.3 AIR ENTRAINMENT

- .1 Air entraining chemical admixtures shall be according to ASTM C260. Ensure chemical admixtures are compatible with one-another and that they will not negatively impact performance of the concrete.
- .2 The total fresh air content of air entrained concrete will be tested via the pressure method with an air meter prior to the placement of concrete in accordance with CSA A23.2-4C.
- .3 Air content in hardened concrete shall meet the requirements of CSA A23.1 and this specification and, if directed by the Consultant, will be tested and determined in accordance with ASTM C457 as outlined in CSA A23.1.

2.4 CEMENT SLURRY BONDING AGENT

- .1 Cement slurry grout consisting of a mixture of one part cement to one part fine aggregate and enough water to make a “heavy cream” consistency. Aggregate to conform to CSA Standard CSA-A23.1-14 Clause 4.2.3.

3.0 EXECUTION

3.1 CONCRETE SURFACE PREPARATION

- .1 All concrete surfaces to receive new concrete shall have a minimum No. 6 CSP per ICRI 310.2R-2013 and be thoroughly abrasive-blast, sandblast or shotblast prior to concrete placement.
- .2 Clean all existing surfaces to receive new concrete of foreign material, dust, debris, grease and oil as directed by Consultant. Emulsifiers shall be required for surfaces containing grease or oil.
- .3 Contractor to notify Consultant to review surfaces prior to concrete placement.

3.2 CONCRETE PLACEMENT - READY-MIXED CONCRETE

- .1 The patch area shall be thoroughly wetted for a period of not less than three (3) hours, and longer where required to achieve a saturated surface dry (SSD) state, prior to placing of concrete.
- .2 Puddles or free water shall be blown from the patch area and the surface is to be permitted to dry to a saturated surface dry (SSD) state prior to application of cement slurry.
- .3 Apply a cement slurry bonding agent to the surface of the concrete just prior to placing new concrete.
- .4 The cement slurry bonding agent shall be broomed or scrubbed into the deck to fully saturate the surface but not to be allowed to puddle.
- .5 Pre-wet burlap shall be available on site prior to placement of concrete to allow for immediate placement overtop of new concrete patches after their initial set.
- .6 **Do not add extra water to the concrete.**
- .7 On slab top surfaces place new dense concrete thoroughly compacted and vibrated into place to ensure good bond.

- .1 Ensure reinforcing steel is secured in place and is not disturbed during placement.
- .2 Vibrators are to be used for consolidation purposes only and are not to be used to an extent that causes segregation of the concrete.
- .3 Internal vibrators shall conform to CSA A23.1-14 Clause 7.2.5.2 and Table 19: Internal Vibrators for Various Applications.
- .4 Vibrators shall be inserted into concrete perpendicular to concrete surface.
- .5 Vibrators shall be inserted such that zones of consolidation always overlap.
- .8 Concrete surfaces to be flush with existing surfaces, free of voids and cracks, and have a uniform surface and transition to the existing surface.
- .9 Finish concrete in accordance with CSA A23.1/A23.2. Initial finish shall be completed before any bleeding or free water is present on the surface of the concrete. Final finishing shall commence after the bleed water has disappeared and when the concrete has stiffened sufficiently to prevent the working of excess mortar to the surface. **Do not add water to finish.**
- .10 Do not overwork concrete surface. Wood float finish is acceptable.
- .11 Do not use steel trowels with air-entrained concrete. For air-entrained concrete, the surface can be further leveled and consolidated with a magnesium bull float for larger repairs or a magnesium trowel for smaller repairs. One or more passes shall be made at suitable time intervals to obtain a level finish free of float marks. Do not work bleed water on the concrete surface into the concrete during finishing.
- .12 If mechanical floats are to be used for final finishing of larger air entrained concrete surfaces, the mechanical floating of the concrete surface shall commence as soon as the concrete surface has reached initial set and will support the weight of a power float machine equipped with magnesium float blades and the operator.
- .13 Cure concrete as outlined in this section.
- .14 Areas of concrete repair completely through the thickness of the slab shall be patched with concrete that is well consolidated and vibrated into place on smooth plywood forms with suitable release agents adequately shored from the slab below, to the approval of the Consultant. Once forms have been removed edges of through slab repair are to be grinded, hand patched, etc. as required to produce smooth (form like) transition from new patch material to the existing slab.
- .15 Do not allow traffic on newly placed surfaces until 75% of the specified 28 day strength has been reached.

3.3 BONDED TOPPING INSTALLATION

- .1 The minimum topping installation thickness is to be 32 mm.
- .2 Prepare concrete surface of existing slabs by light jackhammering or scarification followed by blasting, including up vertical surfaces to the height of the new overlay thickness. The minimum ICRI concrete surface profile is to be 6.
- .3 Preparation includes removal and disposal of existing surface finishes, all unsound and delaminated concrete; all oil, grease, paint, and surface contaminants.
- .4 In the event of excessive concrete removal beyond that required to achieve the desired concrete surface profile, the Contractor is responsible for the cost of additional concrete overlay material, repairs to damaged and delamination repairs at areas with sound concrete and exposed reinforcing.
- .5 Protect the prepared and cleaned surfaces. In the event that the prepared substrate surfaces become contaminated after surface preparation, the Contractor shall repeat the preparation and cleaning procedures at his own expense.
- .6 The prepared concrete surfaces shall be thoroughly wetted down for a period of not less than three (3) hours, and longer where required to achieve a saturated surface dry (SSD) state, prior to concrete placement.
- .7 Just prior to concrete placement, excess water shall be blown clear of the concrete surface and the surface shall be permitted to reach a saturated surface dry (SSD) state.
- .8 Apply a cement slurry bonding agent, scrubbed into the substrate surfaces, immediately prior to concrete placement, and in accordance with CSA-A23.1-14. Cement slurry bonding agent shall be mixed in a mechanical mixer and be of a consistency that it can be applied with a stiff brush or broom to the existing concrete surface in a thin, even coating that does not run or puddle. In no case shall the cement slurry bonding agent be permitted to pond or dry prior to concrete placement.
- .9 Place and consolidate plastic patch material on prepared surfaces in accordance with CSA-A23.1-14 to ensure full bonding of new concrete topping/ overlay. Placement of concrete shall be continuous for the duration of the pour.
- .10 Surfaces shall be bull floated, trowelled and light broom finished perpendicular to traffic direction to provide a non-slip surface suitable for vehicle and pedestrian traffic. Light broom finish may be omitted where the topping is to be coated with a waterproofing system.

- .11 Location and detail of control and construction pour joints not indicated on the drawings shall be submitted to the Consultant for review.
- .12 Protect and cure bonded concrete toppings in accordance with requirements of this section.
- .13 Do not allow traffic on topping unit concrete has reached 75% of its design strength.

3.4 CONCRETE MIXING AND PLACING

- .1 Concrete shall be machine mixed. Mixing and placing shall be in accordance with CSA-A23.1-14.
- .2 Concrete shall be conveyed from the mixer to the place of deposit by methods that will ensure the required quality of concrete. Equipment for conveying the concrete shall be of such size and design as shall ensure a practically continuous flow of concrete at the delivery end without separation of materials.
- .3 Concrete shall be deposited into patch repairs as near as practicable to its final position to avoid re-handling.
- .4 Depositing shall be continuous throughout each division and the concrete shall be so placed and worked that a uniform texture will be produced.
- .5 No concrete shall be placed later than one half hour after leaving the mixer. No re-tempered concrete shall be placed.

3.5 COMPACTION AND VIBRATION

- .1 Concrete shall be consolidated by means of sufficient vibrators of adequate size operated by competent workmen.
- .2 The use of vibrators to transport concrete shall not be allowed.
- .3 Concrete shall be thoroughly worked around reinforcement, embedded items, and into corners.
- .4 Compaction and vibration is to eliminate all air and stone pockets that may cause honeycombing, pitting or planes of weakness.

3.6 CONCRETE CURING (SILICA FUME)

- .1 Incorporate fog-mist curing methods or evaporation retarder in order to prevent loss of moisture from concrete repair surfaces in all rapid drying conditions. In these conditions, fog-mist curing shall be initiated immediately after initial finishing, and

continued until concrete is covered with wet-curing mats. Rapid-drying conditions may include any of the following:

- .1 High concrete ambient temperatures
 - .2 Low humidity
 - .3 High winds
 - .4 Direct sunlight
 - .5 Heated interiors during cold weather.
- .2 Initiate surface concrete repair wet curing as soon as possible after the concrete has sufficiently set, and no later than 30 minutes after finishing.
- .1 Minimum acceptable wet curing method on slab surfaces is installation of pre-saturated filter fabric, burlap, or cotton mats that are covered with soaker hoses and plastic sheeting. Overlap wet-curing mats 150-mm and ballast in place without marring the concrete surface.
 - .2 Wet curing procedures are to keep the concrete surfaces continuously wet for a period of at least ten (10) consecutive days at a minimum temperature of 10° Celsius. Do not permit water to completely evaporate from the concrete surfaces at any time within the wet cure period.
 - .3 Prevent airflow in the space between the wet-curing mats and the plastic sheeting.
- .3 Vertical repair patches are also to be wet cured for the duration of the ten (10) day wet-curing period by either:
- .1 Maintaining formwork in place with form ties loosened and water applied to run down the inside form face after the concrete has hardened to keep the repair surfaces wet.
 - .2 Removing formwork from vertical surfaces and providing fog misting, light water spray, or application of wet burlap covered with polyethylene to keep the repair surfaces continually wet.
- .4 Continuous water curing of exposed beam and slab soffit repairs is not required; however, exposed concrete soffit surfaces shall be misted with a water spray on a daily basis during the wet-curing period, or as often as necessary to prevent surface dusting.
- .5 Provide the Consultant with proposed fog-curing and wet-curing procedures at least 2-weeks prior to concrete placement. Any revisions to the proposed procedures must be submitted to the Consultant for review a minimum of one week prior to concrete placement.

- .6 The use of chemical curing compounds is not permitted.
- .7 Protect concrete from the harmful effects of heat, cold, running or surface water, and mechanical shock.
- .8 Do not place concrete when air temperature is below 10° C, or without implementing provisions to ensure proper curing of concrete when -- in the opinion of the Consultant -- there is a possibility of air temperature falling below 10° C. These provisions shall be reviewed by the Consultant and conform to the requirements of CSA-A23.1-14.
- .9 Maintain concrete material and forms between 15° C and 32° C until concrete placement whenever the surrounding air is below 5° C. No frozen material or material containing ice shall be used. All existing concrete, reinforcement, forms, and ground that the concrete will contact is to be free from frost.
- .10 Maintain a curing temperature above 10° C for 10 days or longer to ensure proper concrete curing. Under no circumstances may dry heat be used. Provide means to humidify the air within the heated enclosure and ensure that moisture requirements for curing are maintained.
- .11 Do not allow traffic onto patch until material has adequately cured to 75% of its specified 28-day compressive strength.
- .12 The Consultant will have cause to not certify payment for repairs undertaken without adequate wet-curing procedures or that become surface dry during the specified curing period.

3.7 INSPECTION AND TESTING

- .1 To conform to CSA-A23.2-14.
- .2 Inspection and testing to be conducted by a testing agency designated by the Owner. The Owner will pay costs of inspection and testing described in this section.
- .3 Contractor to inform testing agency 24 hours in advance of concrete placement.
- .4 Testing shall include:
 - .1 Preparation and testing of concrete cylinders for compressive strength.
 - .2 Establishment of slump and the percentage of entrained air for each concrete truck, unless otherwise directed by Consultant.
 - .3 Review of concrete mix designs submitted by the Contractor.

- .4 Bond testing of concrete repair patches to existing concrete where designated by the Consultant.
- .5 Submission of test results to the Owner, Consultant, and the Contractor.
- .6 A minimum of one set (4 cylinders) of concrete cylinders shall be taken for compressive strength testing of concrete patch material used each day unless otherwise directed by Consultant. Concrete cylinders are to be placed in an area with similar curing conditions to that of the cast concrete.
- .5 Testing procedures for concrete shall conform to the following requirements:
 - .1 Compression tests on concrete shall be carried out in accordance with CSA Standard A23.2-14 and A23.1-14 except that a Strength Test shall consist of four test cylinders and one cylinder shall be tested at the age of three (3) days, the second cylinder shall be tested at the age of seven (7) days and the remaining two at an age of 28 days.
 - .2 Slump and air entrainment test shall be conducted at the time of sampling concrete for compressive tests and shall be conducted in conformity with CSA Standard A23.2-14. Slump and air entrainment tests shall be performed on all loads used each day.
- .6 The Contractor shall provide at no additional costs to the Owner:
 - .1 Samples of all material required for testing.
 - .2 Co-operation with the execution of concrete testing, which shall include protection against injury or loss of cylinders.
 - .3 Access for the Testing Company to test and/ or inspect materials.
 - .4 Site storage facilities meeting requirements of CSA A23.2-14 for concrete test specimens prior to removal to laboratory.
- .7 Bond Strength:
 - .1 After the concrete repairs have cured, the Testing Company may perform bond strength tests where requested by the Consultant.
 - .2 These cores are to be used for the evaluation of the bond strength of the new concrete to the existing by direct tensile force. Testing Company will perform the required drilling through patches selected by Consultant.
 - .3 Failure to achieve a minimum tensile bond strength of 0.9 MPa shall constitute failure of patches.

- .4 Contractor to fill all core holes with non-shrink cementitious grout upon completion of the tests.
- .8 Contractor shall pay for costs of additional testing as follows:
 - .1 Additional standby time required due to late delivery by concrete supplier.
 - .2 Additional slump and/ or air tests if first tests indicate that concrete properties are outside of specified requirements and the Contractor wishes to modify the mix and retest. All modifications are to be approved by the Consultant.
 - .3 If the Contractor fails to notify the testing agency of pour cancellation.

3.8 FIELD QUALITY CONTROL

- .1 The Consultant shall evaluate bonding of fresh patch material to existing concrete after the fresh patch material has cured sufficiently.
- .2 The evaluation shall be performed by acoustical sounding, using a "chain-drag" or other techniques.
- .3 Hollow sounds detected in repair area provide reason to suspect inadequate bonding. Contractor to core these areas to determine bonding adequacy where requested by the Consultant.
- .4 Coring shall be through the new concrete and into the existing concrete. Core diameter shall be 75-mm, or as required by the Consultant. Length of cores shall be twice the core diameter or twice the thickness of new concrete, unless otherwise requested by the Consultant.
- .5 Cores will be visually inspected after removal and any further testing that is required will be determined by the Consultant.
- .6 Contractor to patch core holes.

3.9 REJECTION OF DEFECTIVE WORK

- .1 The Consultant shall have the right to order additional concrete testing of any portion of repairs in accordance with CSA Standard A23.1-14 if previous testing demonstrates non-conformance with specified requirements. The testing company shall be selected by the Consultant and shall deal directly with the Consultant. Payment for costs associated with the additional concrete testing will be at the Contractor's expense.

- .2 Where it is the Consultant's opinion that material or workmanship fails to meet the specified requirements, the work shall be replaced or repaired to the approval of the Consultant at no additional cost to the Owner.
- .3 Bond failure between repair material and the existing concrete, or failure to meet compressive strength requirements based on compression testing of concrete cylinders, will result in drilling of additional core samples at the Contractor's expense. Failure of these additional samples will require the work to be replaced or repaired to the approval of the Consultant at no additional cost to the Owner.

3.10 RECORD DRAWINGS

- .1 Maintain accurate records of the location, size, and concrete placement date for each concrete pour.
- .2 Records are to be kept up-to-date and made available to the Consultant for review throughout the duration of the Work.
- .3 Provide a plan showing location, size, and date of concrete pours prior to Substantial Performance.

END OF SECTION

1.0 GENERAL

1.1 WORK INCLUDED

- .1 Supply, install, and remove shores as required to support the structure during the modification of the existing structural steel framing and open-web steel joists, and subsequent introduction of new slab openings in the suspended floors and roof level concrete slabs and slab-on-deck.
- .2 Structural shoring costs are included in the prices to introduce new slab openings in the suspended floor and roof level concrete slabs and slabs-on-deck.

1.2 SUBMITTALS

- .1 Provide shoring shop drawings that include a shoring design and layout designed by a Professional Engineer licensed to practice in Ontario a minimum of two weeks prior to starting demolition Work. Professional Engineer is to be retained by the Contractor at no additional cost to the Owner.

1.3 REFERENCE STANDARDS

- | | | |
|----|---------------------------|---|
| .1 | CSA S269.1-16 | Falsework and Formwork |
| .2 | CSA S269.2-16 | Access Scaffolding for Construction Purposes |
| .3 | CSA S350-1980 (Rev. 2003) | Code of Practice for Safety in Demolition of Structures |

2.0 PRODUCTS

2.1 EQUIPMENT

- .1 Post shores with a minimum capacity of 24 kN at 2.5 metre height. Approved Products:
 - .1 Anthes Type 1 post shore
 - .2 UMACS No. 1 vertical post shore
- .2 Standard scaffold frames with a minimum capacity of 22 kN per leg. Approved products:
 - .1 Anthes Standard Scaffolding
 - .2 UMACS Standard Scaffold Frame
- .3 Heavy Duty Scaffold Frames with a minimum capacity of 44 kN per leg. Approved products:
 - .1 Anthes Heavy Duty Shoring System
 - .2 UMACS Alumacs 10K Shoring Towers

- .4 Slabs are to be shored for a minimum of two levels or to the slab-on-grade level unless otherwise indicated on the shoring shop drawings or the issued for construction project drawings.

3.0 EXECUTION

3.1 STRUCTURAL SLAB SHORING

- .1 Support the structure during the Work. Supply and install all shoring and bracing necessary to prevent movement, settlement, or damage to the structure, services, and property.
- .2 Provide additional shoring prior to concrete removal where the Consultant deems it necessary to prevent movement, settlement, or damage to the structure, services, and property based on identified concrete delamination repair locations.
- .3 Provide additional shoring to support suspended sprinkler, piping and mechanical systems during the Work.
- .4 Provide additional shores at the Contractor's expense where it is necessary to support stockpiled rubble and equipment.
- .5 Formwork shoring requirements are in addition to structural shoring requirements.
- .6 Install and arrange slab shoring in a manner that prevents sharp projections that may cause personnel injury.
- .7 Modify the position of shores if requested by the Consultant at no additional cost to Owner.
- .8 Manage and maintain shoring by regularly inspecting and checking installed shoring and bracing components to ensure that supports, fastenings, wedges, ties, and parts are secure.
- .9 Tighten all shores below the level being repaired prior to placement of new concrete repair material.
- .10 Do not strip shores until modification and reinforcement of open-web steel joists is complete, and/or new reinforcing steel plates have been installed.
- .11 Concrete repair material has reached 75% of design strength, and no sooner than seven (7) days after concrete placement for full-depth slab repairs or three (3) days for top surface delamination repairs.

END OF SECTION

1.0 GENERAL

1.1 WORK INCLUDED

- .1 Remove concrete from suspended concrete slabs for new mechanical shaft and skylight openings as described in the Contract Documents and Drawings.

2.0 PRODUCTS

2.1 EQUIPMENT

- .1 Provide hand-held jackhammers for concrete removal that are capable of efficiently removing sound and unsound concrete without causing excessive or unwanted removal.
- .2 Maximum jackhammer size is 15 kg. Light chipping hammers are to be used where the Consultant deems it necessary to reduce the amount of concrete breakage. Maximum light chipping hammer size is 7 kg. The use of light chipping hammers is at no additional cost to the Owner.
- .3 Equipment located outside shall be muffled or placed within an acoustic enclosure to produce maximum operating noise levels of 70 dBA at 3.0 metres. Noise levels are also to be in accordance with all local and municipal by-laws and regulations.
- .4 Use "Silenced" compressors.
- .5 Compressors and all diesel-powered equipment are to be fitted with a diesel exhaust scrubber.

3.0 EXECUTION

3.1 FULL SLAB DEPTH CONCRETE REMOVAL AT NEW SLAB OPENINGS

- .1 All slab concrete is to be removed at new slab openings indicated on the Contract Drawings and Documents.
- .2 Use light chipping hammers at patch perimeters to minimize damage to sound concrete.
- .3 Upon exposure of visibly corroded or debonded reinforcement, additional concrete removal shall be performed until bars appear to be rust-free for a minimum length

of 75mm and perimeter of designated area is sound or until otherwise directed by the Consultant.

- .4 Excess or unnecessary concrete removal to be at no extra cost to the Contract.
- .5 Outline patch area with a 13-mm deep vertical sawcut at surface and soffit of slab as close as possible to limits of concrete already removed. Reduce sawcut depth if necessary to avoid cutting reinforcement. Remove concrete to sawcut taking precautions to avoid damaging sawcut edge. Edges with spalls or chips will be rejected and shall be resawcut at Contractor's expense.
- .6 Call for review by Consultant to confirm acceptability of through-slab openings.

3.2 EXISTING EXPOSED ELECTRICAL SERVICES

- .1 The Contractor shall perform temporary removal, replacement, and/or relocation of existing electrical wiring, conduit, equipment, fixtures, or hardware in designated concrete delamination repair areas as required for completion of the Work.
- .2 All exposed conduit, fixtures, attached devices, wet-sprinkler fire system piping, heads and pull stations, fire extinguishers, mechanical system components, louvers and ducts are to be protected or Contractor to correct damages at his own expense. The Contractor shall promptly report any damage to the Owner and the Consultant.
- .3 Prior to commencing the Work, the Contractor shall contact the Owner to locate all protective or alarm systems and sensors. All services shall be protected against damage or interruption. The Contractor shall provide the Owner with minimum 48 hours advance notice of any necessary interruption. All claims resulting from damage shall be the responsibility of the Contractor.

3.3 EXISTING EMBEDDED ELECTRICAL SERVICES

- .1 It is the Contractor's responsibility to ensure that all potential areas of buried conduit be identified and that all high voltage systems located in the area of work are switched off to prevent possible injury. Co-ordinate requirements with Owner.
- .2 The Contractor shall take the utmost caution during concrete removal operations in order to prevent damage to embedded conduits. Any damage caused to such conduits will be immediately reported to the Owner and Consultant. In no instance will damaged or deteriorated conduits be covered up by the Contractor without specific approval from the Owner.
- .3 Contractor to repair or abandon damaged conduit within the slab at the discretion of the Consultant. Owner to pay for repairs provided that damage did not result from Contractor's negligence.

- .4 Contractor to coordinate required repairs with designated Electrical Sub-Contractor. Contractor shall designate Electrical Sub-Contractor for the Work.

END OF SECTION

1.0 GENERAL

1.1 WORK INCLUDED

- .1 Provide all labour, materials, equipment and services to supply and erect concrete unit masonry required and/or indicated on the drawings or specified herein.

1. Block wall for new accessibility ramp

1.2 REFERENCES

- .1 Referenced standards are latest editions.
- .2 Ontario Building Code
- .3 CSA-A371 Masonry Construction for Buildings
- .4 CSA-S304.1 Masonry Design for Building
- .5 CSA A165 Series Solid Load Bearing Concrete Masonry Units
- .6 CSA A13002 Mortar and Grout for Unit Masonry
- .7 CSA-A370 Connectors for Masonry
- .8 CSA-A3001 Cementitious Materials

1.3 QUALITY ASSURANCE

- .1 Use qualified experienced journeyman masons for placing masonry units and to personally direct the execution of all phases of this Work including mortar mixes.
- .2 Do masonry work in accordance with CAN3-A371 except where specified otherwise.
- .3 Do masonry reinforcing and tying in accordance with CSA A371 and CSA-S304 unless specified otherwise.
- .4 **SAMPLES:** Submit samples of brick, block, mortar, masonry accessories, and copper counterflashing, for Consultant's approval before commencing work.
- .5 Before commencing masonry work verify the site conditions will allow construction of masonry within required limitations for wall heights, wall thicknesses, openings, bond, anchorage, lateral support, and compressive strengths of masonry units and mortars.
- .6 Source quality control:
 - .1 Perform tests on masonry units to determine compressive strength as required by jurisdictional authorities in accordance with CSA Standard CAN3-A165.1.

1.4 DELIVERY, STORAGE, AND HANDLING

- .1 Deliver materials to job site in dry condition in manufacturer's original protective packaging and store on a dry level area.
- .2 Keep materials dry until use.
- .3 Store under waterproof cover on pallets or plank platforms held off ground by means of plank or timber skids.
- .4 Handle and store all mortar materials to prevent contamination by foreign materials, and damage by freezing or excessively high temperature.
- .5 Isolate masonry units from contact with ground and other materials until laid, to prevent staining.
- .6 Ensure that moisture content of concrete masonry units is maintained within specified limits from time of shipment from plant to completion of Work.
- .7 Cover masonry unit stockpiles, when work is not in progress to prevent exposure to weather.
- .8 Handle and store masonry units to prevent soiling and chipping.
- .9 Deliver products to the place on site or as directed by the Contractor, and to meet installation schedule.
- .10 If material is stored on suspended slabs make sure the slab is not overloaded.
- .11 Stored bagged products such as lime, cement and metal accessories in dry, waterproof sheds.

1.5 PROTECTION

- .1 Provide temporary bracing of masonry work during and after erection until permanent lateral support is in place.

1.6 EXAMINATION OF SITE

- .1 The bidders shall visit the site and examine the site conditions and location of masonry construction. No extras shall be entertained for the removal and

reinstallation or any preparation work required to accommodate the replacement of damaged and/or deteriorated block.

1.7 SITE CONDITIONS FOR MORTAR AND GROUT

1. Heat materials as follows: to produce mortar temperature between 4°C and 50°C.
 1. When air temperature is between 4°C and 0°C, heat either sand or water to produce specified mortar temperature.
 2. When air temperature is below 0°C, heat both sand and water to produce specified mortar temperature.
2. Do not heat water or sand above 50°C.
3. Produce mortar batches subsequent to the first within plus 6°C of the first.

2.0 PRODUCTS

2.1 MASONRY UNITS

- .1 Standard concrete block units produced with the autoclave or bubble process, high pressure steam cured, conforming to CAN3-A165.1 Series M94 smooth faced concrete masonry hollow, linear shrinkage and moisture movement not to exceed 0.045% to modular metric sizes indicated on drawings and as follows:
 - .1 Classification: H/15/C/O
 - .2 Size: 20
 - .3 Special shapes: provide bull-nosed units for exposed corners. Provide purpose-made shapes for lintels and bond beams. Provide additional special shapes as indicated.
- .2 Where concrete block walls are required as fire separations or barriers, the aggregate used in units and equivalent thickness values of units are to conform to the Supplement to the National Building Code of Canada 1995, Chapter 2 for fire-resistance ratings indicated.

2.2 ACCESSORY MATERIALS

- .1 Horizontal ladder reinforcement to ASTM A82-79 galvanized 3.75 mm side and cross rods. Width 50 mm less than wall thickness.
- .2 Metal ties and anchors to CSA-S304.1.

- .3 Corrosion protection to CSA-S304.1 for metal ties and horizontal reinforcing.

2.3 MORTAR MATERIALS

- .1 Mortar materials shall conform to CSA A179. Reinforcing shall conform to CSA G30.18M Grade 400.
- .2 Only use materials that meet the specified requirements of CAN3-S304 and CSA-A179.
- .3 Portland Cement to CAN3-A5 Type 10.
- .4 Hydrated Lime to CSA A179 Type S.
- .5 Water is to be clean and potable.
 - .1 Provide minimum 12.5 MPa (Type S) mortar for all masonry construction.
 - .2 Thoroughly mix mortar ingredients, in quantities needed for immediate use.
 - .3 Do not use anti-freeze compounds to lower the freezing point of mortar.
- .6 Mix Type S mortar conforming to CSA A179 for all unit masonry by proportion using only Portland cement, sand, lime and water.
- .7 Mix only as much as can be used within 1 hour.
- .8 **DO NOT RE-TEMPER MORTAR.**
- .9 Do not use any additives in the mix without written permission from the consultant.

3.0 EXECUTION

3.1 PREPARATION

- .1 Should discrepancies be found in the Work of other trades affecting the proper performance of masonry work, do not work in such areas until discrepancies have been resolved.
- .2 Establish all lines, levels, coursing and ensure co-ordination with other trades.
- .3 Provide waterproof protection over construction surfaces at mixing areas to prevent deposit of mortar and mortar materials on them.

- .4 Ensure surfaces to receive new mortar are cleaned of all laitance, grease oil and previous mortar where required.
- .5 No new mortar is to be applied until the surface preparation has been inspected and accepted by the Owner's Representation.
- .6 Ensure all damaged and/or deteriorated concrete block and mortar has been removed.
- .7 Remove any additional concrete blocks as required to accommodate the installation of the new block wall. All additional removed blocks are to be replaced.
- .8 The Contractor shall be responsible to replace all metal corner protection angles if removed to facilitate the required block wall repairs.

3.2 WORKMANSHIP

- .1 Build masonry plumb, level, and true to line, with vertical joints in proper alignment.
- .2 Layout coursing and bond to achieve correct coursing heights, and continuity of bond above and below openings, with minimum of cutting.

3.3 PLACING OF MASONRY UNITS

- .1 Lay masonry units in running bond or to match existing, unless otherwise specified.
- .2 Remove laitance, loose rust, scale and other foreign materials from supporting bed surfaces to ensure bonding.
- .3 Use chipped and blemished units only where concealed. Do not use defective or broken units.
- .4 Remove masonry units with non-matching colour variations, chipped, cracked or other wise damaged units in exposed masonry and replace with undamaged units.
- .5 Strike flush all joints concealed in walls and joints in walls to receive plaster, tile, insulation or other applied contiguous material, except paint or a similar thin finish coating.
- .6 Keep deflection spaces at jambs and at head, free of mortar or other obstruction where masonry adjoins other materials unless it supports them.
- .7 Tool joints to conform with existing masonry construction.
- .8 Concrete block units.

- .1 Bond: stack.
- .2 Coursing height: 200 mm for one block and one joint.
- .3 Jointing: concave where exposed or where paint or other finish coating is specified.

3.4 TOLERANCES

- .1 Comply with tolerances as required and recommended in CSA-CAN3-A371.

3.5 EXPOSED MASONRY

- .1 Do not lay chipped, cracked, and otherwise damaged units in exposed masonry. Return same to manufacturer.
- .2 Remove chipped, cracked, and otherwise damaged units in exposed masonry and replace with undamaged units.
- .3 Remove masonry units of non-matching colour variation.

3.6 JOINTING

- .1 Tool with round jointer to provide smooth, compressed, uniformly concave joints except as shown on drawings.
- .2 Strike flush all joints concealed in walls and joints in walls to receive plaster, tile, insulation, or other applied material except paint or similar thin finish coating.

3.7 ADJUSTMENT AND CLEANING

- .1 Point all voids in concrete unit masonry faces.
- .2 Cut out defective mortar joints and repoint.
- .3 Clean concrete masonry units with brushes and as otherwise recommended by the supplier to remove mortar and stains.
- .4 Do not use wire brushes for cleaning.
- .5 Should specified cleaning methods be insufficient, proceed with other methods only with acceptance.
- .6 Protect adjacent materials and Work from damage while cleaning.

- .7 Ensure that all efflorescence and mortar deposits are removed from surfaces to receive coating.
- .8 Exercise particular care during construction to prevent mortar smears on the face of the block.
- .9 Remove mortar droppings that adhere to the exposed face of a unit with a wooden paddle after being allowed to dry and harden. Remove remaining mortar with a stiff fibre brush.
- .10 Clean clay or dirt from wall surfaces by dry brushing followed by scrubbing with water and a small amount of detergent.
- .11 Remove efflorescent salts by dry brushing followed by flushing with clean water.
- .12 For more difficult to remove stains, or unusual stains, or cleaning condition, consult with the manufacturer.

END OF SECTION

1.0 GENERAL

1.1 WORK INCLUDED

- .1 Provide all labour, materials, equipment and services to supply and erect structural steel required and/or indicated on the drawings or specified herein:
 - .1 Installation of new structural steel HSS column and beam for overhead rolling shutter at front reception.
 - .2 Installation of new structural steel rods and angle member reinforcing to existing open-web steel joists (OWSJ) and W-section beams.
 3. Installation of new structural steel canopy framing on rooftop terrace.
 4. Installation of new reinforcing steel plates on ground floor concrete slab soffit.
 5. Installation of new structural steel HSS columns between dormitory beds on upper levels.

1.2 REFERENCE STANDARDS

- .1 Reference Standards are to be latest editions.
- .2 Ontario Building Code
- .3 CAN/CSA-S16.1-09 Design of Steel Structures
- .4 CSA S136-07 North American Specification for the Design of Cold-Formed Steel Structural Members.
- .5 CSA W47.1-09 Certification of Companies for Fusion Welding of Steel Structures.
- .6 CSA W59-03(R2008) Welded Steel Construction (Metal-Arc Welding).
- .7 CSA-G40.20-04 (R2009) General Requirements for Rolled or Welded Structural Quality Steel.
- .8 CSA-G40.21-04 (R2009) Structural Quality Steels.

1.3 QUALIFICATIONS

- .1 Structural steel fabricator shall have not less than five (5) years experience in the fabrication of structural steel.
- .2 Erector shall have not less than five (5) years experience in erection of structural steel.
- .3 The steel fabricators and erectors must be certified under the requirements of CSA W47.1 as required by CSA-S16-09.

- .4 Welding procedures, welders and welding operations shall be qualified in accordance with the Canadian Welding Bureau Standards.
- .5 All connections shall be designed by a C.I.S.C. approved Fabricator unless otherwise noted.

1.4 EXAMINATIONS

- .1 All dimensions taken from the Drawings are to be confirmed on site prior to fabrication. Contractor is to be responsible for the correctness of such measurements and report to the Consultant in writing all discrepancies between measurements at building and those shown on drawings prior to commencing work. Verify location of anchor bolts and embedded steel and ensure that work prepared by other trades is at a proper elevation, on-line, level, and true.
- .2 Contractor to locate all mechanical/electrical openings required in structural members for existing systems prior to fabrication.
- .3 Contractor responsible for all costs associated with site location of existing strands and embedded conduits.

1.5 SHOP DRAWINGS SUBMITTAL

- .1 Drawings, which accompany these specifications, are to be used for estimating purposes only, and show in general the type of construction that shall be followed, but must not be considered as fabrication drawings.
- .2 Submit detailed erection and shop drawings prepared under the supervision of a Registered Professional Engineer in accordance with the General Requirements. Where pre-engineered or fabricator designed elements are part of the shop drawings, the shop drawings shall be stamped by a Professional Engineer licensed in Ontario.
- .3 The shop drawings shall clearly show all shop and erection details, including cuts, copes, connections, holes, threaded fasteners, splices and welds. All welds, both shop and field, shall be indicated by AWS welding Symbols as specified in CSA W59 Appendix D and E.
- .4 Shop drawings shall be submitted in an orderly sequence and sufficiently in advance of the work proceeding so as to not affect the schedule of the Work. The Contractor and the Consultant shall jointly determine the schedule for which the shop drawing submissions shall occur.
- .5 The Consultant's review of the shop drawings is for general conformance only and does not relieve the Contractor of the responsibility for errors or omissions that may be present in the shop drawings.

- .6 Upon request by the Consultant, the Contractor shall revise and resubmit the shop drawings.
- .7 Provide setting drawings, templates and directions for the installation of anchor bolts, plates and other devices.
- .8 Structural drawings are not prepared to be used in sepia form as erection drawings.
- .9 Shop drawings shall show complete details necessary for fabrication and erection of the component parts of the structure, including location, type, size and extent of all welds, as well as all mechanical/electrical openings required. Splices not shown on the shop drawings will not be accepted.
- .10 Prior to starting erection work, submit a description of the methods, sequence of erection and type of equipment proposed for use in erecting structural steel.

1.6 INSPECTION AND TESTING

- .1 The Owner will engage and pay for the services of a welding Engineer and a testing agency.
- .2 Allow free access to all parts of the work area for the purposes of inspection at all times.
- .3 Prior to commencement of work provide a schedule of shop fabrication.
- .4 Submit certified results of testing in accordance with CSA-G40.20 properly correlated to the elements being fabricated.
- .5 High tensile bolts will be tested in accordance with Section 23 of CSA-S16-09.
- .6 For the purpose of bidding, assume all welds will be examined by a non-destructive testing method.
- .7 Testing of all connections and splices not indicated on the design drawings shall be undertaken by the Owner's testing agency and will be to the Contractor's account.
- .8 The Contractor shall advise the testing agency of the scheduling of all shop and field work pertaining to this Project. The Contractor shall permit the testing agency full access to the fabrication shop and the site for the purpose of carrying out his work and he shall provide assistance required to aid in the performance of the inspection and testing.

- .9 If more than 5% re-inspection is required due to faulty workmanship, the Contractor will be required to pay for this re-inspection.
- .10 The Engineer may reject at any time during the progress of the work a piece of material for any member which he may find defective or not in accordance with the detailed drawings. This material may be rejected notwithstanding any previous acceptance and components so rejected shall be replaced at no expense to the Owner. In case of dispute, the decision of the Engineer shall be final.

1.7 STORAGE AND HANDLING

- .1 The Contractor shall be responsible for the protection of all steel work during fabrication, shipping, storage, and construction. All small bends and damage shall be reported to the Engineer for instruction. Steel work, which is bent, broken, or otherwise damaged, shall be replaced by the Contractor prior to erection, to the satisfaction of the Engineer, at no cost to the Owner.
- .2 The Contractor shall be responsible for proper scheduling of delivery and erection for the structural steel, all in accordance with the construction schedule.
- .3 Structural steel members shall be stored at the site above ground on platforms, skids, or other devices.
- .4 Steel shall be protected from corrosion.
- .5 Other material shall be stored in a weather tight and dry place until ready for use in the Work.
- .6 Package materials shall be stored in their original unbroken packages or container.

1.8 SUPPLY OF ALTERNATE PRODUCTS

- .1 Should the rolled sections shown on the drawings not be procurable from Canadian Mills, or should substitution for those sections be desired, sections of equivalent strength, may be substituted if approved by the Consultant. In each case full particulars thereof must be submitted prior to the closing of Bid. Material substitutions after the closing of Bid, if accepted, will be at the Contractor's cost.

1.9 CO-ORDINATION WITH OTHER TRADES

- .1 Supply all necessary instructions and drawings to other trades for setting bearing plates, anchor bolts, and other members that are built in with the work of other trades. Supply the necessary material in accordance to the construction schedule.

2.0 PRODUCTS

2.1 MATERIALS

- .1 Rolled shapes, rolled plate, and welded wide flange sections shall be to CSA-G40.21-300W.
- .2 Hollow structural sections shall be to CSA-G40.21-350W Class C.
- .3 High strength bolts shall be to ASTM A325M or A490.
- .4 Welding material shall be in accordance with CSA W59.
- .5 Anchor bolts and nuts to ASTM A307.
- .6 Structural steel (exterior exposure) not to receive shop or field paint shall be hot Dip galvanized to Z275 G90 designation.
- .7 Touch-up primers for exterior exposure not to receive a shop or field paint finish shall be zinc chromate Type - 1, conforming to CGSB 1-GP-40D.
- .8 Primers used in a multi-coat system where a final shop or field paint finish is to be applied shall be selected and pre-approved based on surface preparation, exposure conditions and compatibility with subsequent coatings.

2.2 DESIGN

- .1 All connections and beam web openings shall be designed by the fabricator to the reference standards unless otherwise noted.

3.0 EXECUTION

3.1 FABRICATION

- .1 Verify all dimensions and take necessary field measurements before fabrication.
- .2 All fabrication shall be to CAN3-S16-09.
- .3 All welding shall be to CSA W59.
- .4 All fabricated units shall be straight and true and without sharp kinks or bends.

- .5 All hollow structural sections shall be closed airtight with end plates sealed with welds.
- .6 All plates and shapes shall be inspected visually for laminations. Repair plates or shapes that contain laminations in a manner approved by the Consultant.
- .7 Provide punched holes for the convenience of other trades in attaching wood blocking or other materials. Co-ordinate with drawings of other disciplines for location and details.
- .8 Obtain Consultant's approval for holes required through structural steel that are not shown on the drawings.

3.2 CLEANING AND PRIMING

- .1 All steel shall be thoroughly cleaned of all loose mill scale, loose rust, oil, or dirt.
- .2 All steel shall be primed (exterior exposure) except for steel to be encased in concrete, steel to be fireproofed, steel which will receive shear studs, and fraying surfaces of friction connections.
- .3 Structural steel to be primed for exterior exposure or to receive a shop or field paint finish shall be cleaned in accordance with SSPC-SP6 "Commercial Blast Cleaning".
- .4 All primers shall be applied strictly in accordance with the Manufacturers' instructions. Apply one (1) coat of primer thoroughly and evenly and work well into the joints and other open spaces.
- .5 After erection and after connections are completed, provide a field touch up coat of primer to all surfaces that had no shop coat, or have been chipped or scraped.

3.3 SHOP PAINTING

- .1 Steel shall be painted with shop primer meeting the requirements of CSA Standard CSA-S16-09 unless noted otherwise.
- .2 Architecturally Exposed Steel:
- .3 Cleaning, preparation of steel and the paint product shall be compatible with requirements of finish painting.
- .4 Use paint as prepared by manufacturer without thinning or adding admixtures. Execute painting on dry surfaces, free from rust, scale, and grease. Do not paint in temperatures lower than 8 deg C.

- .5 Interior structural steel - steel surfaces to be encased in concrete, welded, fireproofed, zinc coated, galvanized or to receive shear connector studs or embedment anchors shall not be painted.
- .6 Clean contact surfaces by effective means before assembly but do not paint.
- .7 Where shop painting is required give two coats of paint (preferably of different colours) to parts inaccessible after final assembly.
- .8 Touch-up welds, bolts, and burnt or scratched surfaces of painted steel after completion of erection.

3.4 COLUMNS AND BASES

- .1 All flame cut steel columns shall have their ends milled. Steel base plates supporting columns shall be flat.
- .2 Base plates and cap plates are to be seal welded to HSS columns.

3.5 CONNECTIONS

- .1 Use connections of the type and detail shown on the Drawings. Modifications to the specified connection types and details will not be permitted without prior approval from the Consultant.
- .2 Connections designed by the fabricator shall be in accordance with CSA Standard CAN/CSA-S16.1 and stamped and sealed by a Professional Engineer registered in the Province of Ontario.
- .3 All connections shall be designed to carry the loads specified on the Drawings. If loads are not given, the connection shall have the capacity not less than the members being connected.
- .4 Column to beam and girder connections shall allow for a horizontal stability force in all directions equal to 2% of the design column axial load in addition to all other loads.
- .5 Structural steel members spliced for ease of fabrication or transportation shall have splices designed to develop the full strength and stiffness of the member. Splices shall be subject to non-destructive testing as directed by the Consultant. The cost for such testing shall be borne by the Contractor.
- .6 Use standard connection types where possible.

- .7 Provide stiffeners in beam webs at all locations of beam continuity. Unless noted otherwise web stiffeners shall be 12 mm minimum.
- .8 All bolted connections may be snug tight except connections for:
 - .1 Bracing, trusses and drag struts.

These shall be designed as slip connections and pretensioned.

3.6 SEPARATORS AND MISCELLANEOUS SUPPORTS

- .1 Provide separators for all double members in accordance with CSA-S16-09.
- .2 Provide plates and / or angles for support of masonry where required.

3.7 ERECTION

- .1 Supervise the setting of bases, anchor bolts, and other steel to concrete connections. Cutting of base plates to accommodate anchor bolts shall be cause for rejection of base plates.
- .2 Install all temporary bracing that is required to stabilize the work against wind, earthquake, and construction loads. Keep structure true and plumb until completion of the building.
- .3 As erection progresses, the work shall be securely bolted up to take care of all dead loads, wind, and erection stresses. Any failure to make proper and adequate provisions for stresses during erection shall be solely the responsibility of the Contractor.
- .4 The structural steel erector shall be responsible for the design of all hooks, erection connections and handling gear.
- .5 Whenever piles of materials, erection equipment, or other loads are carried during erection, proper provision shall be made to take care of stresses resulting from it.
- .6 All structural steel shall be assembled and erected in accordance with the approved erection drawings and specified reference standards.
- .7 Structural steel work shall be carefully located at the proper grade and rigidly secured in place, using steel shims. All spaces under the steel shall then be filled with non-shrink pre-mix grout.

- .8 Plumb, level and align individual members of steel work as specified in the latest CSA S16-09.
- .9 Structural steel frames shall be accurately assembled to the lines and elevations indicated within the specified tolerances.
- .10 The various members forming parts of complete frame of structure after being assembled shall be aligned and adjusted accurately before being fastened.
- .11 Bearing surfaces and surfaces that will be in permanent contact shall be cleaned before the members are assembled.
- .12 Temporary bolts, clips and angles etc. used to facilitate the erection shall be removed unless noted otherwise on the drawing.

3.8 TEMPORARY FLOORING

- .1 Provide all temporary flooring, planking and scaffolding necessary in connection with erection of structural steel, or support of erection machinery in accordance with governing regulations or by-laws.

3.9 COMPLETION

- .1 The Registered Professional Engineer responsible for the shop drawings, or his representative shall visit to review in place connections and components designed by that Registered Professional Engineer as required to substantiate compliance with his sealed shop drawings. He shall then submit a letter of compliance provide a seal and signed letter to the Consultant and Engineer.
- .2 On completion of the work of this section, all protection erected in conjunction with the structural steel work shall be removed, all damage to this work and adjoining work shall be made good and all surplus materials and debris and all tools and equipment shall be removed from the site.

3.10 WELDING

- .1 All welding shall be done by the shielded metal-arc method in accordance with the requirements CSA W59. The welding operators shall have passed within the preceding six (6) months, the qualifications test as set forth in CSA W47.1.
- .2 Submit welding procedures prepared and sealed by a Professional Engineer registered in Ontario, and familiar with this discipline to the Consultant for his examination and comments.

- .3 Surface to be welded shall be free from loose scale, rust, paint, or other foreign matter. Where weld material is deposited in two or more layers, each layer shall be cleaned before the next layer is deposited. Care shall be taken to minimize stresses due to heat expansion, contraction and distortion by using proper sequence in welding and by approved methods.
- .4 Welding consumables for all processes shall be fully approved by the Canadian Welding Bureau and certified by the manufactures as complying with the requirement of this specification. Such certificates shall be not more than two years old.
- .5 Electrode strengths to be equal to E480XX (E70xx) or better.
- .6 Embedment anchors, shear stubs and deformed bar anchors shall be automatically end welded with suitable stud welding in accordance to the manufacture's recommendations. Fillet welding of anchors will be rejected.

3.11 FIELD QUALITY CONTROL

- .1 Structural steel work (material and workmanship) shall be subject to review and tested by a testing agency retained by the Owner.
- .2 Construction review by the testing agency or the Consultant does not relieve the Contractor of his responsibility to furnish materials and workmanship in accordance with the Drawings and Specifications.

END OF SECTION

1.0 GENERAL

1.1 DESCRIPTION OF WORK INCLUDED

- .1 Provide all labour, materials, closures, equipment and services necessary to design, supply, fabricate, erect and install the steel deck and field welded shear connectors to structural steel as indicated on the drawings and as hereinafter specified. Provide gauge metal formwork at all deck edges for composite deck or concrete filled deck and reinforcement for deck openings as required herein.
- .2 Coordinate with Section 05 10 00 (Structural Steel) for the design, supply, and installation of headed stud shear connections for composite beams and girders and where required on other beams, girders, and drag struts.

1.2 REFERENCE STANDARDS

- .1 Structural Steel Deck shall conform to the requirements of the following standards unless otherwise required by the specification:
 - .1 Ontario Building Code 2012.
 - .2 CSA W47-1-09 Certification of Companies for Fusion Welding of Steel Structures.
 - .3 CSA W59-03 (R2008) Welded Steel Construction (Metal-Arc Welding).
 - .4 CSA S136-07 Cold Formed Steel Structural Members.
 - .5 ASTM A653/A653M-11 “Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvanized) by the Hot-Dip Process”
 - .6 CSSBI 10M-08 Standard for Steel Roof Deck
- .2 Where the standard is referred to in this specification it shall mean the documents specified in this clause and their referenced documents.

1.3 QUALIFICATIONS

- .1 All steel deck welders must possess current Canadian Welding Bureau Certificates of Qualification for light gauge structural welding.
- .2 The deck erectors must be certified under the requirements of CAN/CSA W47.1.

1.4 EXAMINATION

- .1 Examine and verify all necessary measurements and dimensions of previously executed work that may affect the work of this contract.
- .2 Examine surfaces that the work is to be placed on or against to ensure that they are square, true, level, plumb, of correct slope or shape, and of proper surface to receive such work.
- .3 Report any discrepancies to the Consultant and Engineer immediately so that instructions may be given for the necessary remedial work.
- .4 Commencement of work shall be construed as acceptance of all conditions and surfaces.

1.5 SHOP DRAWINGS

- .1 Submit shop drawings prepared under the supervision of a Specialty Structural Engineer. Drawings of components designed by the Contractor shall be sealed and signed by this Specialty Structural Engineer.
- .2 Shop drawings shall show the position, extent, type and arrangement of the units, their relationship to other materials, depth, core thickness, coating thickness, connections, openings, accessories, closures, light gauge formwork and reinforcement for openings, and complete stud shear connector details for composite beams.
- .3 Calculations and/or test data may be requested with the shop drawings to justify deck design and shear connector design.
- .4 Show deck load capacities, including point load capacities, and for composite deck confirm that these load capacities are compatible with the zinc coating.

2.0 PRODUCTS

2.1 GENERAL

- .1 Products shall satisfy the requirements of the standard unless otherwise specified herein or on the drawings.

2.2 MATERIALS

- .1 Steel deck units shall be formed of zinc-coated sheet steel minimum Grade A with a base steel Nominal Thickness of 0.76 mm or greater. Unless noted otherwise, zinc coatings shall be:

- .2 Deck thickness, spacing of puddle welds and type and extent of side connections shall be proportioned to resist forces and loads shown on the drawings, or be as designated on the drawings.
- .3 Unless noted otherwise, the deflection under live load alone shall be limited to span/360 for floors; for roof deck the deflection shall be limited to span/240.
- .4 Decking to be used as formwork shall conform to formwork requirements of all applicable governing safety standards.
- .5 Shear stud connectors shall be designed for the forces indicated on the drawings. If the capacities of the individual studs are reduced because of the geometry of the particular deck profile used, provide additional studs so that the total shear transfer capacity provided is at least that indicated on the drawings.

3.0 EXECUTION

3.1 ERECTION

- .1 The erection of the steel deck shall be carried out by personnel experienced in the installation of steel deck.
- .2 Steel deck shall be placed on the supporting steel framework and adjusted to final position before being permanently fastened. Each section shall be brought to proper bearing. If the supporting framework is not in proper alignment or at the proper level, the Contractor shall so advise the Consultant and Engineer of such irregularities and shall not make final placement until corrections are made.
- .3 For steel deck that will not receive a concrete topping, immediately after the steel deck is welded in place, the steel deck surface shall be inspected, and all areas where zinc coating has been burned by welding shall be covered by a suitable zinc enriched paint, applied to the paint manufacturer's instructions.
- .4 Cut all openings in metal decking at locations shown on the project drawings. These openings shall be located and dimensioned in cooperation with the various trades at the time of erecting the steel deck. Unless noted otherwise, openings up to 150 mm (6") need not be reinforced. Openings between 150 mm (6") to 400 mm (16") in size shall be reinforced by this trade, using 75 mm x 75 mm x 5.0 mm x 1200 mm (48") steel angles welded to the flutes on either side of those cut.
- .5 The Contractor shall accommodate the erection and welding sequence of the structural steel as required.

- .6 Shear stud connectors shall be applied in strict accordance with the manufacturer's instructions and the standards. Procedural control to be in accordance with W59 as a minimum.
- .7 Studs shall be placed in bottom flutes of steel deck on the side closest to the nearest end of the beam.
- .8 After welding studs, the ceramic ferrule shall be removed and the stud fillet visually inspected by the operator. If the fillet is less than 360° around the base of the stud, then the stud is to be hammer tested by the operator by bending the stud 15° from the vertical away from the side of no fillet. If the weld fails, the stud is to be replaced. Bent studs may be left bent.
- .9 If studs are welded to steel plates or members with temperature below 0°C, one stud in each 100 is to be tested by the operator by bending 15° from the vertical.
- .10 No stud welding is to be done when the base metal temperature is below - 15°C or when the steel surface is wet.

3.2 COVER PLATES AND CLOSURES

- .1 Furnish, install, and weld in position, sheet metal cover plates to close openings between deck sections and columns and to cover gaps where deck sections abut or change direction.
- .2 For deck with concrete topping, install all light gauge metal closures and edge strips necessary as formwork for the concrete.
- .3 Install all closures as required by the architectural drawings and specifications.

3.3 CLEAN UP

- .1 All steel deck cuttings, strappings, packaging material, and other debris pertaining to steel deck units shall be cleaned up.
- .2 Remove all debris and excess material at completion of erection of steel deck and leave work ready for other trades.
- .3 Repair any defects. Leave steel deck free of all oil, grease, paint, and dirt.

3.4 TESTING

- .1 The Owner will appoint and pay for a Testing Agency who will inspect and test steel deck, steel deck welding and stud welding in accordance with the standards and as noted below.
- .2 Two percent of randomly selected studs will be tested to destruction by bending.
- .3 Failure of the weld of any stud will be cause for rejection of the stud welding and cause for further testing at the Contractor's expense.
- .4 A ten percent or greater failure rate at the welds of the tested studs will be cause for rejection of all the studs.
- .5 All studs tested to destruction shall be replaced by the Contractor.
- .6 Replacement of failed or rejected studs shall be at the Contractor's expense.

END OF SECTION

1.0 GENERAL

1.1 REFERENCE STANDARDS

- .1 Ontario Building Code 2012.
- .2 CSA S16-09: Limits States Design of Steel Structures.
- .3 CSA S136-07: Cold Formed Steel Structural Members.
- .4 CSA W47.1-09: Certification of Companies for Fusion Welding of Steel Structures.
- .5 CSA W59-03 (R2008): Welded Steel Construction (Metal-Arc Welding).
- .6 CSA W178.1-08: Certification of Welding Inspection Organization.
- .7 CSA G40.20 (R2009): General Requirements for Rolled or Welded Structural Quality Steel.
- .8 CSA G40.21 (R2009): Structural Quality Steel.
- .9 ASTM A653/A653M-11: Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
- .10 CSSBI 10M-08: Standard for Steel Roof Deck
- .11 Where the standard is referred to in this specification it shall mean the documents specified in this clause, and their referenced standards.

1.2 APPOINTMENT OF TESTING AGENCY

- .1 The Owner will appoint a Testing Agency approved under W178.1 (Building Category).
- .2 Testing will be paid for from cash allowance.
 - .1 Testing as outlined in Section 3.0.
- .3 Testing paid for by the Contractor.
 - .1 Testing of pre-approved connections not on the structural drawings and required by the contractor for ease of fabrication, transportation or erection.
 - .2 Costs for retesting or additional testing due to work having failed to meet the specified requirements.

- .3 For the purpose of bidding, assume all welds will be examined by a non-destructive testing method. Non-destructive testing will be performed on samples of the work at the discretion of the Engineer as well as outlined in this specification. Any repair and retesting costs shall be borne by the contractor.

2.0 DUTIES

2.1 RESPONSIBILITY OF THE CONTRACTOR

- .1 The Contractor shall cooperate fully with the Testing Agency. Allow free access to all parts of the work for the purpose of testing and review at all times.
- .2 Notify the Testing Agency and Engineer when work is ready for review.
- .3 Prior to commencement of work, provide a schedule of shop fabrication and erection to the Testing Agency and Engineer.
- .4 Provide mill certificates in accordance with the standard properly correlated to the elements being fabricated.
- .5 It is the Contractor's responsibility to provide a finished product that meets the specifications. If initial tests indicate that the work failed to meet specification, the Engineer shall decide if any additional testing is necessary. This testing shall be done by a CSA-approved Testing Agency, but need not be the Owner's agency. The proposed additional testing shall have prior approval of the Engineer.

2.2 RESPONSIBILITY AND DUTIES OF THE TESTING AGENCY

- .1 The Testing Agency is responsible to the Owner and has the authority to, and is expected to; reject any work not meeting the specifications.
- .2 Provide testing as per the standards and as per this specification.
- .3 Provide timely test reports to the Engineer, Consultant, and Contractor.

3.0 TESTING – STRUCTURAL STEEL AND DECK

3.1 GENERAL

- .1 The Engineer may reject at any time during the progress of the work a piece of material or any member which the Engineer may find defective or not in accordance with the detailed drawings. This material may be rejected notwithstanding any previous acceptance and components so rejected shall be replaced at no expense to the Owner. In case of dispute, the decision of the Engineer shall be final.
- .2 Testing in general shall conform to CSA S16-09 and CSA W59. Acceptance criteria for welding to be for statically loaded structures as per CSA W59.
- .3 Confirm that the fabricator and erector are certified to CSA-W47.1 and that all welders are properly qualified.
- .4 Review welding procedures.
- .5 Confirm welding consumables are properly stored in shop and field.
- .6 Non-destructive testing operators to have Level II qualifications as a minimum.

3.2 TESTING OF STRUCTURAL STEEL

- .1 Randomly check and record structural steel member sizes - 15% of columns and 10% total of beams and girders.
- .2 Check grade markings on structural steel in fabricator's plant-prior to fabrication where possible. Collect mill certificates and forward to Structural Engineer.
- .3 Provide a visual review of 50% of all welds and 50% of workmanship.
- .4 Randomly select shop welds for magnetic particle inspection - 10 % of connections.
- .5 Randomly select field welds for magnetic particle inspection - 10 % of connections.
- .6 Review all snug tight bolted connections to determine that plates are in contact. Check 10% of bolts for snugness, including anchor bolts.
- .7 For pre-tensioned bolted connections check 10% of bolts, minimum two (2) per connection. Pre-tensioned connections are:

- .1 Seismic brace connections.
 - .2 Seismic drag strut connections.
 - .3 Wind bracing.
 - .4 All bolted connection on main truss/frames.
- .8 For the following critical welds observe 20% being welded and provide suitable non-destructive testing to:
- .1 Tension chord splices in trusses - 100%.
 - .2 Moment frame beam - column welds - 100%.
 - .3 Base welds at mainframe columns - 100%.
 - .4 Truss to columns connections (including stiffness in the main frame columns – 100%).
 - .5 Main truss gusset plates – 100% visual – mag. particle on 20%.

3.3 TESTING OF JOIST REINFORCING

- .1 Review the manufacturers quality control measures, including any testing reports.
- .2 Visually review 10% of randomly selected welds.
- .3 Visual inspection at site for shipping and handling damage
- .4 Joist modifications - 100%

3.4 TESTING OF STRUCTURAL STEEL DECK

- .1 Visual review of 100% of deck welds and button punching.
- .2 Verify galvanizing as per specification.
- .3 Visual inspection of 100% of deck to confirm deck type and profile.
- .4 Random inspection of 10% of deck for required thickness.

END OF SECTION

PART 1 - GENERAL

1.1 General Instructions

- .1 Read and be governed by Conditions of the Contract and Sections of Division 1.

1.2 Section Includes:

- .1 Design, labour, Products, equipment and services necessary for the miscellaneous and metal fabrication Work in accordance with the Contract Documents. See Architectural Drawings and Details

1.3 Quality Assurance

- .1 Execute Work of this Section only by a Subcontractor who has adequate plant, equipment, and skilled workers to perform Work expeditiously, and is known to have been responsible for satisfactory installations similar to that specified during a period of at least the immediate past five years.

1.4 Reference

- .1 ASTM A123, Specification for Zinc (Hot Dip Galvanized) Coatings on Iron & Steel Products.
- .2 ASTM A153, Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
- .3 ASTM A307, Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength.
- .4 ASTM A653/A653M, Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc- Iron Alloy-Coated (Galvanealed) by the Hot-Dip Process.
- .5 CAN/CSA-G40.20/G40.21-M, General Requirements for Rolled or Welded Structural Quality Steel/ Structural Quality Steels.
- .6 CAN/CSA G164-M, Hot Dip Galvanizing of Irregularly Shaped Articles.
- .7 CAN/CSA S16.1-M, Limit States Design of Steel Structures.
- .8 CSA S136.1-M, Commentary on CAN/CSA S136-M, Cold Formed Steel Structural Members.
- .9 CSA W47.1, Certification of Companies for Fusion Welding of Steel Structures.
- .10 CSA W48, Filler Metal and Allied Materials for Metal Arc Welding.
- .11 CSA W59-M, Welded Steel Construction (Metal Arc Welding).
- .12 CAN/CSA W117.2-M, Safety in Welding, Cutting and Allied Processes.
- .13 CAN/CGSB 1.40-M, Primer, Structural Steel, Oil Alkyd Type.
- .14 CGSB 1-GP-181, Organic Zinc Rich Primer.
- .15 CGSB 85-GP-16M, Painting Galvanized Steel.
- .16 ASTM B209M, Specification for Aluminum and Aluminum-Alloy Sheet and Plate
- .17 Steel Structures Painting Council (SSPC), Steel Structures Painting Manual, Vol. 2.
- .18 National Association of Metal Manufacturers (NAAMM) Metal Finishes Manual, 2006

1.5 Design Criteria

- .1 Work of this Section which functions to resist forces imposed by dead and liveloads shall conform to requirements of jurisdictional authorities.
- .2 Design work of this Section and applicable shop drawings shall be carried out by a qualified professional engineer licensed to practice in the Place of Work.

- .3 Design details and connections, where not shown on Drawings, in accordance with CAN/CSA-S16.1 and CSA S136.1.

1.6 Submittals

- .1 Submit shop drawings in accordance with Section 01330.
- .2 Clearly indicate materials, core thicknesses, finishes, connections, joints, method of anchorage, number of anchors, supports, reinforcement, details, and accessories.
- .3 Shop drawings shall be sealed by a qualified professional engineer licensed to design structures and registered in Place of the Work.

1.8 Delivery, Storage and Handling

- .1 Label, tag or otherwise mark Work supplied for installation by other Sections to indicate its function, location in building and shop drawing designation.
- .2 Protect Work from damage during delivery, storage and handling

PART 2 - PRODUCTS

2.1 Materials

- .1 General:
 - .1 Unless detailed or specified otherwise, standard products will be acceptable if construction details and installation meet intent of Drawings and Specifications.
 - .2 Include materials, products, accessories, and supplementary parts necessary to complete assembly and installation of Work of this Section.
 - .3 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 sharply defined profiles.
- .2 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.
- .3 Welding materials: CSA W48 and CSA W59-M.
- .4 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 concealed fasteners or as indicated on drawings/details.
 - .1 Stainless steel fasteners to be used at all stainless steel fabrications
- .5 Primer paint: CAN/CGSB-1.40-M or CPMA 1.73a.
- .6 Drilled inserts: Mega by ITW Construction Products or HSL by Hilti Inc. heavy-duty anchors, sizes as shown, or as per Structural.
- .7 All stainless steel to be Type 304, Blend S Finish, analysis 18-8.
 - .1 Stainless steel countertops to be 14GA (1.8mm)

2.2 FABRICATION

- .1 Verify dimensions of existing Work before commencing fabrications and report any discrepancies to the Consultant.
- .2 Fit and assemble Work in shop where possible. Execute Work in accordance with details and reviewed shop drawings.
- .3 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.

- .4 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.
- .5 Execute shop welding to requirements specified.
- .6 Carefully make and fit details. Take special care with exposed finished Work to produce a neat and correct appearance to the Consultant's acceptance.
- .7 Assemble members without twists or open joints.
- .8 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.
- .9 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.

2.3 FABRICATED ITEMS

- .1 Refer to Drawings for details of metal fabrication work and related items not specifically listed in this Section.
- .3 Where work is required to be built into work of other Sections supply such members to respective Sections.
- .4 Support posts at knee walls:
- .5 Stainless steel counters.
- .6 Miscellaneous steel brackets, supports, angles and fabrications
 - .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.

2.4 ANCHORS AND FASTENING

- .1 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.
- .2 Use self drilling expansion type concrete anchors for attaching to masonry and concrete
- .3 Use steel beam clamps of two bolt design to transmit load to beam web. Do not use C and I clamps.

2.5 WELDING

- .1 Perform welding by electric arc process.
- .2 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.
- .3 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.

- .4 Test welds for conformance and remove Work not meeting specified standards and replace to Consultant's acceptance.

2.6 SHOP PAINTING

- .1 Clean steel to SSPC SP6 and remove loose mill scale, weld flux and splatter.
- .2 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.
- .3 Shop prime galvanized steel in accordance with CGSB 85-GP-16M.
- .4 Clean but do not paint surfaces being welded in field.
- .5 Do not paint surfaces embedded in concrete, but clean as if they were to be primed.
- .6 Do not prime machine finished surfaces, but apply an effective anti-rust compound.
- .7 Take precautions to avoid damage to adjacent surfaces.

PART 3 - EXECUTION

3.1 Examination

- .1 Take site measurements to ensure that Work is fabricated to fit surrounding construction, around obstructions and projections in place, or as shown on Drawings, and to suit service locations.

3.2 Installation

- .1 Install Work plumb, true, square, straight, level, and accurately and tightly fitted together and to surrounding Work and as required for proper performance.
- .2 Include with Work of this Section anchor bolts, high tensile bolts, washers and nuts, expansion bolts, toggles, straps, sleeves, brackets, clips, and other items necessary for secure installation as required by loading and jurisdictional authorities. Weld to CAN/CSA-S16.1-94.
- .3 Countersink holes provided for wood screws where wood is attached to Work of this Section.
- .4 Attach Work to interior concrete and masonry with corrosion resistant expansion bolts to support load with a safety factor of three (3).
- .5 Attach Work to exterior concrete and masonry with non-shrink epoxy grout to support load with a safety factor of three (3).
- .6 Insulate between dissimilar metals or between metal, and masonry or concrete with bituminous paint to prevent electrolytic action.
- .7 Grout metal posts, pickets, balusters, and the like, in metal sleeves cast into concrete, with non-shrink quick setting epoxy anchor cement, unless detailed otherwise. Fabricate sleeves of 75 mm (3") minimum depth.
- .8 Hand items over for casting into concrete or building into masonry to appropriate trades together with setting templates.

3.3 Field Painting

- .1 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.

3.4 Adjustment and Cleaning

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

3.5 Protection

- .1 Maintain protection of Work of this Section from time of installation until final finishes are applied or to final cleanup.

END OF SECTION

1.0 GENERAL

1.1 REFERENCE STANDARDS

- .1 CSA O80 Series, Wood Preservation.
- .2 CAN/CSA O141, Softwood Lumber.
- .3 CSA O121, Douglas Fir Plywood.
- .4 CSA O151, Canadian Softwood Plywood.
- .5 CSA O153, Poplar Plywood.
- .6 CAN/CSA 0325.0 (R1998), Construction Sheathing.
- .7 CAN 0437 Series-93, Standard on OSB and Waferboard.
- .8 CSA B111, Wire Nails, Spikes and Staples.
- .9 National Lumber Grades Authority (NLGA) Standard Grading Rules for Canadian Lumber, Latest Edition.

1.2 INSTALLER QUALIFICATIONS

- .1 Maintain a qualified crew of carpenters for the work of this Section. Only qualified journeymen shall be engaged in framing and each journeyman shall have an Ontario Certificate of Proficiency.

1.3 DELIVERY, STORAGE AND HANDLING

- .1 Protect materials from moisture upon delivery.
- .2 Store materials on raised supports. Cover materials with waterproof covering. Provide adequate air circulation and ventilation.
- .3 Do not store seasoned materials in wet or damp areas.
- .4 Store all materials in a dry environment. Do not cover materials having a moisture content of over 15%.

2.0 PRODUCTS

2.1 LUMBER MATERIALS

- .1 Lumber: Except as otherwise specified, lumber shall be softwood, S-P-F, S4S, kiln-dried, moisture content 15% or less, not finger jointed, and in accordance with the following standards:

- .1 CAN/CSA O141.
- .2 Graded and stamped in accordance with the National Lumber Grades Authority (NLGA) Standard Grading Rules for Canadian Lumber and by an agency certified by Canadian Lumber Standards Accreditation Board.
- .2 Furring, Blocking, Strapping, Nailing Strips, Grounds, Rough Bucks: S-DRY, douglas fir species.
 - .1 Board Sizes: “Standard” grade to NLGA, Paragraph 114c.
 - .2 Dimension Sizes: “Standard” grade to NLGA, Paragraph 122c.
- .3 Roofing Curbs, Nailers, Blocking, Cants: as specified in 2.1.2 above.
- .4 Wood Trim: kiln-dried spruce, comb faced fascia material.

2.2 PANEL MATERIALS

- .1 Douglas Fir Plywood: to CSA O121 with applicable grade stamp.
 - .1 Balcony Deck Sheathing: double layer, untreated Tongue & Groove, 15.8 mm thick. Use Select Tight Face plywood under deck membrane.
 - .2 Wall Sheathing: untreated, 12.5 mm thick, standard construction.
- .2 Other Panel Products: marked with a recognized, visible grade stamp.

2.3 FASTENERS

- .1 Roof Nailers: CSP material, “Sheathing” grade.
- .2 Nail, Spikes and Staples: to CSA B111 and as follows:
 - .1 Use common spiral nails and spiral spikes, except where specified otherwise, for interior work.
 - .2 Fasteners in contact with borate treated lumber: hot-dipped galvanized finished steel.
 - .3 Fasteners in contact with ACQ treated lumber: stainless steel.
- .3 Underlayment Fasteners:
 - .1 Nails: galvanized, annular ringed, length to provide minimum 85% penetration into subfloor, but not enough to anchor underlayment to joists.

- .4 Bolt, Nut, Washer, Screw and Pin Type Fasteners: hot-dipped galvanized finished steel for all fasteners in contact with borate treated lumber or stainless steel for all fasteners in contact with ACQ treated lumber, unless specified otherwise.
- .5 Joist Hangers: hot-dipped galvanized finished steel for all hangers, plates, straps, etc. in contact with borate treated lumber or stainless steel for all such connectors in contact with ACQ treated lumber.
- .6 Do not combine stainless steel fasteners with galvanized hardware or vice-versa.

2.4 PRESERVATIVE TREATMENT

- .1 Treat following items in accordance with applicable CAN/CSA O80 commodity standard using alkaline copper quat type C (ACQ-C) or copper azole type B (CA-B) preservative to obtain minimum net retention of 4.0 kg/m³ of wood. Materials shall be kiln-dried after treatment.
 - .1 All dimension lumber and panel materials directly exposed to moisture (i.e. deck boards, trellis and similar such framing, exposed stairs).
- .2 Treat following items in accordance with applicable CAN/CSA 080 commodity standard using “Advance Guard” borate-pressure treatment to obtain minimum net retention of 2.7 kg/m³ of wood. Materials shall be kiln-dried after treatment. Lumber shall carry the Canadian Wood Preserver’s Bureau Quality Mark (“Advance Guard” quality mark).
 - .1 New lumber and panel materials inside, outside and crossing the wall moisture barrier.
 - .2 Items in contact with concrete or masonry.
 - .3 Furring, blocking, strapping, etc. for rainscreen cavity provisions.
 - .4 Roofing curbs, nailers, blocking, and cants.
- .3 Inspection of products treated with preservative by vacuum-pressure impregnation will be carried out by an accredited inspection agency of the Canadian Wood Preservers Bureau (CWPB).
- .4 All treated lumber and plywood shall bear an identifying stamp in accordance with the CWPB, CSA 080 or AWPB requirements.
- .5 Following water-borne preservative treatment, dry material to maximum moisture content of 15%.

2.5 ACCESSORIES

- .1 Subflooring Adhesive: to CAN/CGSB 71.26-M88, cartridge loaded.
- .2 Field Applied Wood Preservative:

- .1 For ACQ or CA preservative wood: Organic solvent, copper naphthenate, prepared in accordance with CSA O80.15, coloured green.
- .2 For borate preservative wood: Water-based, borate-based, prepared in accordance with CSA O80.15, tint green.
- .3 Polyethylene Film: to CAN/CGSB-51.34-M86, 100 micrometres thick.
- .4 Sealing Tape: minimum 60 mm width, polypropylene sheathing tape with acrylic adhesive, or duct tape of same width.
- .5 Sill Gaskets: closed-cell vinyl foam, with moisture-resistant properties.

3.0 EXECUTION

3.1 FIELD TREATMENT OF PRESERVATIVE TREATED AND EXISTING PRODUCTS

- .1 Field treat surfaces exposed by cutting, trimming or boring of preservative-treated items with liberal application of preservative and in accordance with AWWA M4.
- .2 Apply preservative in accordance with manufacturer's instructions. Apply by dipping, by brush or by spray to completely saturate and maintain wet film on surface for minimum three minute soak on lumber and one minute soak on plywood. Allow to dry 24 hours prior to covering.

3.2 ERECTION OF FRAMING MEMBERS

- .1 Install members true to line, levels and elevations, square and plumb. Space uniformly.
- .2 Construct continuous members from pieces of longest practicable length.
- .3 Install spanning members with "crown-edge" up.
- .4 Install blocking to facilitate installation of finishing materials, fixtures, specialty items and trim.
- .5 Select exposed framing for appearance. Install lumber and panel materials so that grade-marks and other defacing marks are concealed or are removed by sanding where materials are left exposed.
- .6 Frame, anchor, fasten, tie and brace members to provide necessary strength and rigidity.

- .7 Countersink bolts where necessary to provide clearance for other work.
- .8 Install foam sill gaskets between wood and concrete.

3.3 WOOD FURRING AND BLOCKING

- .1 Provide wood furring and blocking at locations indicated on Drawings and as specified.

3.4 NAILING STRIPS, GROUNDS AND ROUGH BUCKS

- .1 Install rough bucks, nailer and linings to rough openings as required to provide backing for frames and other work.
- .2 Erect all wood framing members level and plumb. Construct to framing member's full height without splices.

3.5 WOOD TRIM AND FASCIAS

- .1 Install wood trim and fascia boards using finishing nails set slightly below the surface.
- .2 Mitre joints to disguise shrinkage.

3.6 PANEL-TYPE SUBFLOORING

- .1 Install subflooring with panel end-joints located on solid bearing, staggered at least 800 mm.
- .2 Apply subflooring adhesive on wood framing to support panel-type subflooring. Place continuous single-bead on each framing member and double-bead on framing members supporting panel joints. Comply with adhesive manufacturer's installation instructions.
- .3 Fasten subfloor panels using common-spiral or annular-grooved nails spaced 150 mm O.C. along edges and 300 mm O.C. along intermediate supports. Do not use of staples.

3.7 PANEL-TYPE UNDERLAYMENT

- .1 Install only when environmental conditions in installation area conform to requirements for flooring installation. Comply with manufacturer's installation recommendations.
- .2 Acclimatize wood underlayment in installation area for at least 24 hours before installation. Store on edge, spaced to permit air movement between faces. Test

moisture content of underlayment and subfloor to ensure they are within acceptable range recommended by underlayment manufacturer.

- .3 Install underlayment panels over subflooring with grade stamp down.
- .4 Install with face grain at right angles to subfloor panels. Stagger underlayment panel joints. Offset underlayment and subfloor joints minimum 150 mm.
- .5 Lightly abut panels to eliminate joint gaps. Sand panel joints level until joints cannot be felt by hand.
- .6 Leave 3 to 6 mm gap between underlayment and abutting vertical surfaces such as columns and perimeter walls.
- .7 Fully fasten one panel at a time.
- .8 Nail or staple panels every 50 mm along edges, minimum 6 mm and maximum 10 mm from edges, and every 100 mm over remainder of panels. Do not use screws. Do not fasten underlayment to joists.
- .9 When stapling, ensure panels at staple gun are in firm contact with subfloor and that staples are installed parallel to panel face grain.

END OF SECTION

PART 1 - GENERAL

1.1 Definition

- .1 Architectural woodwork: Shall mean custom fabricated cabinetry, counters/countertops, wood door frames, custom fabricated wall/ceiling panels.

1.2 Quality Assurance

- .1 The "Quality Standards" of the Architectural Woodwork Manufacturers Association of Canada (AWMAC), Edition 2, 2014 together with authorized additions and amendments, shall be used as a reference standard and shall form part of this Project Specification.
- .2 Where modifications to the AWMAC Quality Standards contained within the Manual are included in this Project Specification, then such modifications shall govern in case of conflict.
- .3 Any reference in Custom or Premium grade in this Specification shall be as defined in the AWMAC Quality Standards.
- .4 Any item not given a specific quality grade shall be Premium grade as defined in the AWMAC Quality Standards.
- .5 All architectural woodwork to be used in the Project shall meet the requirements of the AWMAC Quality Standards for the particular grade specified.
- .6 References in this Specification to part and item numbers mean those parts and items contained within the AWMAC Quality Standards Manual.

1.3 Submittals

- .1 Shop Drawings:
 - .1 Prepare and submit to the Consultant for review Shop Drawings for architectural woodwork in accordance with 01330.
 - .2 Shop Drawings shall show wood and metal construction details of all architectural details of all general arrangements, locations of all service outlets: typical and special installation conditions; materials being supplied and all connections, attachments, anchorage and location of exposed fastenings, as applicable, field measured dimensions and coordination with other trade Contractors.
 - .3 Shop Drawings shall incorporate plans, elevations, sections and details for all architectural woodwork included in this Section.
 - .4 No Work shall be fabricated until the Shop Drawings have been reviewed and all other related submittals, and samples as required by the Specifications, have been approved by the Consultant.
 - .5 Submission of Consultant's Drawings for Shop Drawings is not acceptable.
- .2 Samples:
 - .1 Provide 3 samples of each plastic laminate, wood veneer and solid polymer surface to Consultant for review.
- .3 Brochures:
 - .1 Submit manufacturer's descriptive literature of specialty items not manufactured by the architectural woodwork manufacturer as required by the Consultant.

1.4 Product Handling and Storage

- .1 The architectural woodwork manufacturer and the Contractor shall be jointly responsible to make certain that architectural woodwork are not delivered until the building and storage areas are sufficiently dry so that the architectural woodwork will not be damaged by excessive changes in moisture content.

- .2 Architectural woodwork delivery, storage, and handling shall be in accordance with AWMAC Quality Standards.
- .3 Delivered, materials which are damaged in any way or do not comply with these Specifications will be rejected by the Consultant and shall be removed from the job site and replaced with acceptable materials.

1.5 Warranty

- .1 Warrant labour, materials and Workmanship against defects and deficiencies for a period of two (2) years after the date of Substantial Performance.

PART 2-PRODUCTS

2.1 Millwork

- .1 General: Use clean stock only and comply with AWMAC Quality Standards grades as indicated.
- .2 **Plastic Laminate (Plam):** 1.6 mm thick, (allow for a maximum of 5 colours)
 - .1 Manufacturer: Abet Laminati, Wilsonart, Nevemar, Pionite or Formica
 - .2 Colour: to be selected by Consultant from full colour range
- .3 **Quartz (QTZ):** Solid, mineral based, non porous surfacing material, acrylic; not coated, laminated or of composite construction; in accordance with ANSI Z124 Type 6 and meeting the following:
 - .1 Properties:
 - .1 Tensile strength (ASTM D638-84): 6000psi.
 - .2 Tensile modulus (ASTM D638-84): 1.5 x 10⁶ psi.
 - .3 Elongation (ASTM D638-84): 0.4%
 - .4 Hardness (Rockwell "M" Scale): 94.
 - .5 Hardness (Barcol Impressor): 60.
 - .6 Gloss – 60 deg. Gardner 9ANSI Z124-80, HUD Bulletin UM-73-84): 5 – 20.
 - .7 Colour stability (NEMA LD3): no change 200 hours.
 - .8 Wear, cleanability (ANSI Z124-80, HUD Bulletin UM-73-84): pass.
 - .9 Fire hazard (ASTM E84):
 - .1 Flame spread: maximum 15.
 - .2 Smoke developed: maximum 25.
 - .10 Water absorption (ASTM D570-81): 0.04% @ 24 hours/0.4% @ long term for 19 mm thickness sample.
 - .11 Stain resistance (ANSI Z124).
 - .2 Acceptable Manufacturers:
 - .1 Quartz by Caesarstone, Zodiaq by DuPont or equivalent.
 - .3 Colour: To be selected from Consultant from manufacturer's standard colour range (allow for 2 colours).
- .4 Hardwood lumber: moisture content 12 % or less in accordance with National Hardwood Lumber Association (NHLA) and AWMAC premium grade.
 - .1 Species: poplar where scheduled to receive paint finish, white oak where scheduled to receive stain finish.
- .5 Plywood: veneer core, softwood, 19 mm thick typical unless otherwise indicated.
 - .1 Softwood: to CSA 0151.
 - .2 Fir to CSA0121-M1978.

- .3 Hardwood plywood: to CSA O115.
 - .4 Poplar plywood (PP): to CSA O153, standard construction
 - .5 Where plywood is used for wall construction, the Flame Spread rating must be 150 or less on any exposed surface, or any surface that would be exposed by cutting through the material in any direction.
 - .6 Where plywood is used in ceiling construction, the Flame Spread rating must be 25 or less on any exposed surface, or any surface that would be exposed by cutting through the material in any direction.
 - .6 Particle board: not permitted
 - .7 Medium density fibreboard (MDF): to ANSI A208.2, density 769 kg/m. Medium density fibreboard must:
 - .1 meet the performance requirements of ANSI A208.2.
 - .2 be manufactured such that formaldehyde emissions do not exceed [0.15] ppm (180 g/m) when tested in accordance with ASTM E 1333.
 - .3 contain at least [15] % recycled materials by weight.
 - .4 Where MDF is used for wall construction, the Flame Spread rating must be 150 or less on any exposed surface, or any surface that would be exposed by cutting through the material in any direction.
 - .5 Where MDF is used in ceiling construction, the Flame Spread rating must be 25 or less on any exposed surface, or any surface that would be exposed by cutting through the material in any direction.
 - .8 Sealant: As per 07920.
- 2.2 Millwork Hardware
- .1 As per Drawings/details.
- 2.3 Millwork Finishing - General
- .1 Finish all interior millwork surfaces in plastic laminate, unless otherwise indicated.
- 2.4 Fabrication - General
- .1 Obtain all on-Site dimensions before fabricating items. Obtain all relevant data and incorporate provisions for items of equipment enclosed by millwork.
 - .2 Verify wall alignment prior to proceeding with fabrication. Site conditions at variance with reviewed Shop Drawings shall be specifically noted on reviewed Drawings and forwarded to Consultant. Variances, due to Site conditions necessitating revisions to Shop Drawings shall be accepted prior to fabrication.
 - .3 Fabricate running members in maximum standard lengths obtainable for the particular species wherever possible.
 - .4 Fit all joints tight. Locate joints at points which will not interfere with, affect strength or detract from appearance of materials.
 - .5 Securely fasten intersecting framing members together at corners in an approved manner. Reinforce as required for rigid assembly designed for applicable loads.
 - .6 Wherever practicable, install, fit and adjust all hardware specified, in shop.
 - .7 Incorporate adequate provisions for scribing and fitting to adjoining surfaces in a manner acceptable to Consultant.
 - .8 Provide for and incorporate provisions to recognize inherent shrinkage characteristics of materials specified.

- .9 Casework core material: 19 mm veneer core plywood.
- .10 Casework edge trim: Plastic laminate with plastic laminate millwork and solid wood lippings with wood veneer millwork.
- .11 Plastic laminate finish at all exposed surfaces, including cabinet/drawer interiors unless noted otherwise.

2.5 Accessories

- .1 Nails and staples: to CSA B111; galvanized to CAN/CSA-G164 for exterior work, interior humid areas and for treated lumber; stainless steel finish elsewhere.
- .2 Wood screws: to CSA B35.4 stainless steel, type and size to suit application.
- .3 Splines: wood.
- .4 Adhesive: recommended by manufacturer.
- .5 Use least toxic sealants, adhesives, sealers, and finishes necessary to comply with requirements of this section.

PART 3 - EXECUTION

3.1 Job Conditions

- .1 Job conditions for installation of architectural woodwork shall be as specified under AWMAC Quality Standards.

3.2 Installation

- .1 Cabinet and Casework: Install in accordance with Section 705 of the AWMAC Quality Standards.
- .2 Panelling and Trim: Install in accordance with Section 706 of the AWMAC Quality Standards.
- .3 Finish Hardware: Install finish hardware in accordance with Section 711 of the AWMAC Quality Standards.
- .4 All cutting and fitting of trim around fixtures and receptacles to be done as no extra cost to Contract.
- .5 Scribe countertops to wall during installation. Install silicone sealant at backsplash/wall junction at time of installation. Colour to Consultant's selection.

END OF SECTION

1.0 GENERAL

1.1 DOCUMENTS

- .1 This Section of the Specifications forms part of the Contract Documents and is to be read, interpreted and coordinated with all other parts.

1.2 SUMMARY

- .1 Section Includes: Furnishing of all labour, materials, services and equipment necessary for the supply and installation of firestopping as indicated on drawings and as specified.
- .2 Related Work:
 - .1 Cast-In-Place Concrete: Section 03300
 - .2 Concrete Masonry Units: Section 04220
 - .3 Joint Sealants: Section 07920
 - .4 Gypsum Wall Board: Section 09250
 - .5 Mechanical: Division 15
 - .6 Electrical: Division 16

1.3 REFERENCES

- .1 CAN4-S115-M85, "Standard Method of Fire Tests of Firestop Systems".

1.4 SUBMITTALS

- .1 Make submittals in accordance with Section 01330 - Submittals.
- .2 Product Data: Submit three copies of manufacturer's specification and installation instructions for each type of material required. Include data substantiating that materials comply with specified requirements.
- .3 Shop Drawings: Submit shop drawings to show proposed material, reinforcement, anchorage, fastenings and method of installation. Construction details should accurately reflect actual job conditions.
- .4 Samples: Submit duplicate 300 mm x 300 mm (12" x 12") samples showing actual firestop material proposed for project.

1.5 DELIVERY, STORAGE, & HANDLING

- .1 Comply with manufacturer's recommendations for handling, storage and protection during installation.
- .2 Do not allow materials to become wet or soiled, or covered with ice or snow.

1.6 JOB CONDITIONS

- .1 Examine substrate and the conditions under which the insulation work is to be performed. Do not proceed with firestopping work until unsatisfactory conditions have been corrected.

1.7 FIRE-RESISTANCE RATINGS

- .1 Ratings of firestop systems shall be not less than the fire-resistance ratings noted on drawings and required by authorities having jurisdiction for firestopping of the floor, wall, ceiling and roof assemblies involved.
- .2 Ratings of firestop assemblies for service penetrations shall be not less than the fire-resistance rating of the floor, wall, ceiling or roof assembly being penetrated.

- .3 Use only ULC tested firestopping assemblies as approved by the Consultant prior to firestop installations.

2.0 PRODUCTS

2.1 MATERIALS

- .1 Firestopping Systems: In accordance with CAN4-S115-M85. All firestopping systems installed shall be from single manufacturer. Trade Contractors shall coordinate with General Contractor.
 - .1 Accepted Products:
 - .1 "Fire & Smoke Containment Systems" by Tremco Ltd., Construction Division.
 - .2 "Firebarrier Firestop Systems" by A/D Fire Protection Systems Inc.
 - .3 "Fire Protection Products" by Electrical Products Division/3M.
 - .4 "Firestop Systems" by Hilti (Canada) Limited.
 - .5 Or approved alternative.
 - .2 Asbestos-free materials and systems capable of maintaining an effective barrier against flame, smoke and gases in compliance with requirements of CAN4-S115-M85 and not to exceed opening sizes for which they are intended.
 - .3 Firestop System Rating: Equal to fire separation rating as noted on drawings.
- .2 Service Penetration Assemblies: Certified by ULC in accordance with CAN4-S115-M85 and listed in ULC Guide No. 40 U19.
- .3 Service Penetration Firestop Components: Certified by ULC in accordance with CAN4-S115-M85 and listed in ULC Guide No. 40 U19.13 and ULC Guide No. 40 U19.15 under the Label Service of ULC.
- .4 Fire-resistance rating of installed fire stopping assembly not less than the fire-resistance rating of surrounding floor and wall assembly.
- .5 Firestopping at openings intended for ease of re-entry such as cables: Elastomeric or resilient seal; do not use cementitious or rigid seal at such locations.
- .6 Firestopping at openings around penetrations for pipes, ductwork and other mechanical items requiring sound and vibration control: Elastomeric or resilient seal; do not use a cementitious or rigid seal at such locations.
- .7 Primers: To manufacturer's recommendation for specific material, substrate, and end use.
- .8 Water (if applicable): Potable, clean and free from injurious amounts of deleterious substances.
- .9 Damming and backup materials, supports and anchoring devices: To manufacturer's recommendations, and in accordance with tested assembly being installed as acceptable to authorities having jurisdiction.
- .10 Sealants for vertical joints: Non-sagging.

3.0 EXECUTION

3.1 PREPARATION

- .1 Examine sizes and conditions of voids to be filled to establish correct thicknesses and installation of materials. Ensure that substrates and surfaces are clean, dry and frost free.
- .2 Prepare surfaces in contact with firestopping materials to manufacturer's instructions.
- .3 Maintain insulation around pipes and ducts penetrating fire separation without interruption to vapour barrier.

- .4 Mask where necessary to avoid spillage and over coating onto adjoining surfaces; remove stains on adjacent surfaces.

3.2 INSTALLATION

- .1 Install firestopping material and components in accordance with ULC certification and manufacturer's instructions.
- .2 Seal holes or voids made by through penetrations, poke-through termination devices, and unpenetrated openings or joints to ensure continuity and integrity of fire separation are maintained.
- .3 Provide temporary forming as required and remove forming only after materials have gained sufficient strength and after initial curing.
- .4 Tool or trowel exposed surfaces to a neat finish.
- .5 Remove excess compound promptly as work progresses and upon completion.

3.3 INSPECTION

- .1 Notify Consultant when ready for inspection and prior to concealing or enclosing firestopping materials and service penetration assemblies.

3.4 SCHEDULE

- .1 Firestop at:
 - .1 Edges of floor slabs and rated roof slabs at slab edge covers, aluminum windows/curtain wall.
 - .2 Deflection space at top of fire-resistance rated masonry and gypsum board walls.
 - .3 Intersections of fire-resistance rated masonry walls to concrete and to gypsum board walls and of fire-resistance rated gypsum board walls to concrete and to masonry.
 - .4 Penetrations through fire-resistance rated masonry, concrete and gypsum board walls.
 - .5 Penetrations through fire-resistance rated floors, ceilings and roofs.
 - .6 Openings and sleeves installed for future use through fire separations.
 - .7 Control and sway joints in fire-resistance rated masonry and gypsum board partitions and walls.
 - .8 Firestopping around mechanical and piping assemblies penetrating fire separations by Division 15 - Mechanical. Firestopping systems and products to be coordinated with this specification section.
 - .9 Firestopping around electrical assemblies penetrating fire separations by Division 16 - Electrical. Firestopping systems and products to be coordinated with this specification section.

3.5 CLEAN-UP

- .1 Remove excess materials and debris and clean adjacent surfaces immediately after application.
- .2 Remove temporary dams after initial set of fire stopping and smoke seal materials.

END OF SECTION.

PART 1 – GENERAL

1.1 SECTION INCLUDES

- .1 Labour, Products, equipment and services necessary for sealant Work in accordance with the Contract Documents.
- .2 Work of this Section does not include sealants in firestopping and smoke sealed assemblies.

1.2 REFERENCES

- .1 ASTM C834, Specification for Latex Sealants.
- .2 ASTM C920, Specification for Elastomeric Joint Sealants.
- .3 ASTM C1330, Specification for Cylindrical Sealant Backing for Use with Cold Liquid Applied Sealants.

1.3 SUBMITTALS

- .1 Product data: Submit copies of Product data in accordance with the Conditions of the Contract describing type, composition and recommendations or directions for surface preparation, material preparation and material installation.
- .2 Samples: Submit following samples in accordance with the Conditions of the Contract.
 - .1 Two samples of sealant/caulking, for colour selection.
 - .2 Two samples of back-up material and primer for physical characteristics.

1.4 QUALITY ASSURANCE

- .1 Qualifications: Work of this Section shall be executed by trained applicators approved by sealant manufacturer and having a minimum of 5 years proven experience.

1.5 SITE CONDITIONS

- .1 Do not install materials when ambient air temperature is less than 5°C, when recesses are wet or damp, or to manufacturer's recommendations.

1.6 DELIVERY, STORAGE AND HANDLING

- .1 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.

1.7 WARRANTY

- .1 Submit a warranty for Sealant Work in accordance with General Conditions, except that warranty period is extended to 2 years. Warrant against leakage, cracking, crumbling, melting, shrinkage, running, loss of adhesion and staining adjacent surfaces. Warranty shall be for complete replacement including affected adjacent Work.

PART 2 - PRODUCTS

2.1 Materials

- .1 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.
 - .2 Sealant **Type A**: ASTM C920, Type M, Grade NS, Class 25; Two-part, Polyurethane non-sag type, in standard colours selected.
 - .1 Sikaflex 2C-NS by Sika Canada Inc.
 - .2 Dymeric 240 by Tremco Ltd.
 - .3 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 Tremsil 200 Silicone Sealant by Tremco Ltd.
 - .4 Sealant **Type C**: ASTM C834; Pure acrylic siliconized sealant; in standard white colour (paintable).
 - .1 Tremflex 834 Siliconized Sealant by Tremco Ltd.
 - .2 CRL 800 Acrylic Latex Caulk with Silicone by CR Laurence Ltd
- 2.2 Accessories
- .1 Primers: Type recommended by material manufacturers for various substrates, primers to prevent staining of adjacent surfaces encountered on project.
 - .2 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.
 - .3 Bond breaker: Type recommended by material manufacturers.
 - .4 Void filler around the window frames to be one part expanding polyurethane foam.
 - .5 Cleaning agents: As recommended by material manufacturer, non-staining, harmless to substrates and adjacent finished surfaces.
- 2.3 Mixing
- .1 Follow manufacturers instructions on mixing, shelf and pot life.

PART 3 – EXECUTION

3.1 Preparation

- .1 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.
- .2 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.
- .3 Ensure that all materials in contact with sealant are compatible. Test substrate for adhesion.
- .4 Depth of recess: Maintain depth to ½ 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.

- .5 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.
- .6 Prime sides of recess, in accordance with sealant manufacturer's instructions.
- .7 Condition products for use in accordance with manufacturer's recommendations.

3.2 Installation

- .1 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.
- .2 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 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.
- .3 Make sealant bead uniform in colour.
- .4 Cure sealants in accordance with sealant manufacturer's instructions. Do not cover up sealants until proper curing has taken place.
- .5 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.
- .6 Clean recesses and re-apply sealant.
- .7 Remove masking tape immediately after joints have been sealed and tooled.

3.3 Cleaning

- .1 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.

3.4 Schedule of Locations

- .1 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, wood and stone to metal.
 - .2 Wood to masonry, concrete and stone.
 - .3 Metal to metal.
 - .4 All dissimilar materials.
- .2 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.
- .3 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.
- .4 Sealant **Type C**:
 - .1 Perimeter of interior windows.
 - .2 Perimeter of firehose cabinets.
 - .3 Junction between drywall and masonry.

END OF SECTION

PART 1 - GENERAL

1.1 Work Included

As detailed or scheduled in the contract documents, supply only of:

- .1 Steel frame products including frames, transom frames (glazed or paneled), sidelight and window assemblies, fire-rated and non-rated.
- .2 Steel panels, fixed or removable, flush or rabbetted, similar in construction to steel doors, for use in steel frame product.
- .3 Steel doors, swing type, flush, with or without embossed face sheets, with or without glazed or louvered openings, fire-rated, with or without temperature rise ratings, and non-rated.

1.2 References

- .1 ANSI/NFPA 80-1999, Standard for Fire Doors and Fire Windows
- .2 ASTM A653/A653M-05a, Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by the Hot-Dip Process
- .3 ASTM C553-02, Specification for Mineral Fiber Blanket Insulation for Commercial and Industrial Applications
- .4 ASTM C578-05, Specification for Rigid, Cellular Polystyrene Thermal Insulation
- .5 ASTM C591-01, Specification for Un-Faced Pre-formed Rigid Cellular Polyisocyanurate Thermal Insulation
- .6 ASTM C592-04, Specification for Mineral Fiber Batt and Blanket Thermal Insulation for Light Frame Construction
- .7 ASTM C1289-05a, Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board
- .8 CAN4-S104-M80, Standard Method for Fire Tests of Door Assemblies
- .9 CAN4-S106-M80, Standard Method for Fire Tests of Window and Glass Block Assemblies
- .10 CGSB 41-GP-19MA (1984), Rigid Vinyl Extrusions for Windows and Doors
- .11 CSA W59-2003, Welded Steel Construction (Metal Arc Welding)
- .12 CSDMA, Recommended Dimensional Standards for Commercial Steel Doors and Frames, 2000
- .13 CSDMA, Selection and Usage Guide for Steel Doors and Frames, 1990
- .14 CSDMA, Recommended Specifications for Commercial Steel Door and Frame Products – 08 11 00, 2006

1.3 Submittals

- .1 Submit shop drawings in accordance with Section 01330.
- .2 Indicate each type of door, frame, steel, construction and core.
- .3 Indicate material thickness, mortises, reinforcements, anchorages, locations of exposed fasteners, openings (glazed, paneled or louvered) and arrangement of standard hardware.
- .4 Include schedule identifying each unit, with door marks and numbers relating to numbering on drawings and door schedule of the Architect.
- .5 Contractor responsible for coordination and installation of products provided under this Section shall;

- .1 Verify and provide to the contractor responsible for the supply of steel door and frame products, actual opening sizes and field conditions by field measurement before fabrication. Submittal drawings shall reflect measurements and conditions provided, and product manufactured accordingly. Coordinate field measurements with fabrication and construction schedules to avoid delays.
- .2 Verify that substrate conditions, whether existing or installed under other Sections, are as detailed in the Architect's drawings, and are acceptable for product installation in accordance with the manufacturer's instructions.
- .6 Manufacturer shall not proceed with fabrication without receipt of approved submittal drawings and approved hardware schedule.

1.6 Warranty

- .1 Materials and workmanship shall be warranted by the manufacturer for a period of one (1) year from date of substantial performance.

PART 2 - PRODUCTS

2.1 Materials

- .1 Acceptable Materials: Steel doors and frame product manufactured in accordance with this Specification by CSDMA members, are eligible for use on this project.
- .2 Steel: Commercial grade steel to ASTM A653, CS, Type B, Coating Designation ZF75 (A25) minimum. Minimum steel thicknesses shall be in accordance with Appendix 1 of the CSDMA, "Recommended Specifications for Commercial Steel Door and Frame Products".
 - .1 Interior Doors: Face sheets shall be 0.042 in. (1.0 mm) minimum thickness.
- .3 Door Core Materials
 - .1 Fiberglass: Loose batt type, density 24 kg/m³ (1.5 pcf) minimum, conforming to ASTM C553 or ASTM C592.
- .4 Primers
 - .1 Rust inhibitive touch-up only.
- .6 Miscellaneous
 - .1 Door Silencers. Single stud rubber/neoprene type.
 - .2 Exterior Top Caps. Rigid polyvinylchloride extrusion conforming to CGSB 41-GP-19MA.
 - .3 Frame Thermal Breaks. Rigid polyvinylchloride extrusion conforming to CGSB 41-GP-19MA.

2.2 Fire/Impact Safety-Rated Glass

- .1 Performance Requirements:
 - .1 Clear and wireless glass ceramic and tempered or annealed float glass material; listed for use in fire-rated or fire/impact safety-rated insulated glass units in locations with fire rating requirements ranging from 20 to 90 minutes with required hose stream test.
 - .2 Passes positive pressure test standards UL 10C.
 - .3 Fire Protective Rated Glass: Each lite shall bear permanent, nonremovable label of UL certifying it for use in tested and rated fire protective assemblies.
 - .4 Fire Rating: Fire rating classified and labeled by UL for fire rating scheduled at opening locations on drawings, when tested in accordance with ASTM E2010-01; ULC Standards CAN4 S-104 and CAN4 S-106; NPFA 252 and NFPA 257; and UL 9 and UL 10B.
- .2 Properties:
 - .1 Thickness: 5/16 inch (8 mm) overall.
 - .2 Weight: 4 lbs./sq. ft.

- .3 Approximate Visible Transmission: 85 percent.
 - .4 Approximate Visible Reflection: 9 percent.
 - .5 Fire-rating: 20 minutes to 3 hours for doors; 20 minutes to 90 minutes for other applications (refer to drawings/details/schedules).
 - .6 Impact Safety Resistance: ANSI Z97.1 and CPSC 16CFR1201 (Cat. I and II).
 - .7 STC Rating: Approximately 38 dB.
 - .8 Surface Finish: polished.
 - .9 Positive Pressure Test: UL 10C; passes.
- .3 Acceptable products:
- .1 FireLite Plus® as manufactured by Nippon Electric Glass Company, Ltd., and distributed by Technical Glass Products.
 - .2 Equivalent products as per Specification 01250.

2.3 Fabrication - Frame Products

- .1 Interior frame product shall be 18 gauge. Interior frames and window assemblies shall be welded type construction. Interior transom frames shall be welded type construction. Interior sidelight assemblies shall be welded type construction.
- .2 Frame product shall be mortised, blanked, reinforced, drilled and tapped at the factory for templated hardware only, in accordance with the approved hardware schedule and templates provided by the hardware supplier.
- .3 Mortised cutouts shall be protected with steel guard boxes.
- .4 Frame product shall be reinforced only, where required, for surface mounted hardware, anchor hinges, thrust pivots, pivot reinforced hinges, or non-templated hardware. Drilling and tapping is by others, on site, at time of installation.
- .5 Provide anchorage appropriate to floor, wall and frame construction. Each wall anchor shall be located immediately above or below each hinge reinforcement on the hinge jamb and directly opposite on the strike jamb. For rebate opening heights up to and including 1520 mm (60") provide two (2) anchors, and an additional anchor for each additional 760 mm (30") of height or fraction thereof, except as indicated below. Frames in previously placed concrete, masonry or structural steel shall be provided with anchors located not more than 150 mm (6") from the top and bottom of each jamb, and intermediate anchors at 660 mm (26") on centre maximum. Fasteners for such anchors shall be provided by others.
- .6 Minimum reinforcing, anchor and other component gauges shall be in accordance with Table 1 of the CSDMA, "Recommended Specifications for Commercial Steel Door and Frame Products".
- .7 Each door opening shall be prepared for single stud rubber door silencers, three (3) for single door openings, two (2) for double door openings, except on gasketed frame product.
- .8 Provide factory-applied touch up primer at areas where zinc coating has been removed during fabrication.
- .9 Fire-rated frame products shall be provided for those openings requiring fire protection as determined and scheduled by the Architect. Frames, transom and sidelight assemblies shall be listed for conformance with CAN4-S104. Window assemblies shall be listed for conformance with CAN4-S106. All fire-rated frame products shall bear the label of, and be listed by a nationally recognized testing agency having a factory inspection service. Labeling shall be in accordance with NFPA 80, the listing authority's policies and label materials, and shall identify the manufacturer. Fire-rated frame products shall be constructed as listed for labeling in the Follow-Up Service Procedures/Factory Inspection Manuals issued by the listing agency to individual manufacturers
- .10 Provide grout guards fabricated from not less than 0.016 in. (0.4 mm) thick steel at all hardware mortises on frame product to be grouted.

2.2.1 Welded Type

- .1 Frame product shall be accurately mitered or mechanically jointed.
- .2 As defined in Appendix 2 of the CSDMA, "Recommended Specifications for Commercial Steel Door and Frame Products", frame product perimeter corner joints shall be:
 - .1 Face welded; continuously welded on the profile faces, with exposed faces filled and ground to a smooth, uniform, seamless surface.
- .3 Joints at mullions, sills and center rails shall:
 - .1 Be coped accurately, butted and tightly fitted.
 - .2 At intersecting flush profile faces, be securely welded, filled and ground to a smooth, uniform, seamless surface.
 - .3 At intersecting recessed profile faces, be securely welded to concealed reinforcements, with exposed hairline face seams.
 - .4 At all other intersecting profile elements, have exposed hairline face seams.
- .4 Welding shall conform to CSA W59.
- .5 Where frame product is to be installed prior to the adjacent partition, a floor anchor shall be securely attached to the inside of each jamb profile. Each floor anchor shall be provided with two (2) holes for securing to the floor. For conditions that do not permit the use of a floor anchor, an additional wall anchor, located within 150 mm (6") of the base of the jamb, shall be substituted.
- .6 Weld in two (2) temporary jamb spreaders per door opening to maintain proper alignment during shipment and handling, which shall not be used for installation.
- .7 Glazing stops shall be formed steel channel, minimum 16 mm (0.625") height, accurately fitted, butted at corners and fastened to frame sections with counter-sunk oval head sheet metal screws.
- .8 When required due to site access, when advised by the contractor responsible for coordination or installation, as specified on the Architect's drawings or due to shipping limitations, frame product for large openings shall be fabricated in sections as designated on the approved submittal drawings, with splice joints for field assembly and welding by others.
- .9 Prior to shipment, mark each frame product with an identification number as shown on the approved submittal drawings.
- .10 Refer to drawings/details/schedules for frame depth/throat opening sizes

2.3 Fabrication – Doors

- .1 General
 - .1 Interior doors shall be welded stiffener construction.
 - .2 Longitudinal edges shall be continuously welded, filled and sanded with no visible edge seams.
 - .3 Doors shall be mortised, blanked, reinforced, drilled and tapped at the factory for template hardware only, in accordance with the approved hardware schedule and templates provided by the hardware supplier.
 - .4 Holes 12.7 mm (0.5") diameter and larger shall be factory prepared, except mounting and through-bolt holes, which are by others, on site, at time of hardware installation. Holes less than 12.7 mm (0.5") diameter shall be factory prepared only when required for the function of the device (for knob, lever, cylinder, thumb or turn pieces) or when these holes over-lap function holes.
 - .5 Doors shall be reinforced only, where required, for surface mounted hardware, anchor hinges, thrust pivots, pivot reinforced hinges, or non-templated hardware. Drilling and tapping is by others, on site, at time of installation.

- .6 Top and bottom of doors shall be provided with inverted, recessed, welded steel channels. Exterior doors, and where otherwise scheduled by the Architect, shall be provided with flush steel top caps.
 - .7 Minimum reinforcing and component gauges shall be in accordance with Table 1 of the CSDMA, "Recommended Specifications for Commercial Steel Door and Frame Products".
 - .8 Provide factory-applied touch-up primer at areas where zinc coating has been removed during fabrication.
 - .9 Fire-rated doors shall be provided for those openings requiring fire protection and temperature rise ratings, as determined and scheduled by the Architect. Such products shall be listed for conformance with CAN4-S104. All fire-rated doors shall bear the label of, and be listed by a nationally recognized testing agency having a factory inspection service. Labeling shall be in accordance with NFPA 80, the listing authority's policies and label materials, and shall identify the manufacturer. Fire-rated doors shall be constructed as listed for labeling in the Follow-Up Service Procedures/Factory Inspection Manuals issued by the listing agency to individual manufacturers.
 - .10 Prior to shipment, mark each door with an identification number as shown on the approved submittal drawings.
- .2 Welded Stiffener Construction
- .1 Both face sheets for exterior doors shall be formed from a sheet of 18 gauge steel.
 - .2 Both face sheets for interior doors shall be formed from a sheet of 18 gauge steel.
 - .3 Doors shall be reinforced with vertical stiffeners, securely welded to each face sheet at 150 mm (6") on center maximum.
 - .4 Voids between vertical stiffeners shall be filled with fiberglass batt type insulation.

PART 3 - EXECUTION

- .1 Site Storage and Protection of Materials
- .1 Doors and frame product shall be removed from their wrappings or coverings upon receipt on site, be stored in a vertical position, and be spaced with blocking to permit air circulation between them.
 - .2 All materials shall be thoroughly inspected upon receipt and all discrepancies, deficiencies and/or damages shall be immediately reported, in writing, to the supplier.
 - .3 All damages incurred during shipment shall be noted on the carrier's Bill of Lading and immediately reported, in writing, to the supplier.
 - .4 Any scratches or disfigurement of doors or frame product caused by shipping or handling shall be promptly cleaned and touched-up with a zinc-rich primer.
 - .5 All materials shall be properly stored on planks or dunnage, out of water and covered to protect from damage from any cause.
- .2 Installation
- .1 Prior to installation, remove temporary shipping spreaders.
 - .2 Prior to installation, the area of floor on which the frame is to be installed, and within the path of the door swing, shall be checked and corrected for flatness.
 - .3 Door and frame product shall be checked for correct size, swing, rating and opening number.
 - .4 Caulk perimeter of frames between frame and adjacent material.
 - .5 Set frames plumb, square, level and at correct elevation.
 - .6 Fire-rated door and frame product shall be installed in accordance with the terms of their listings, NFPA-80, or the local Authority Having Jurisdiction (AHJ).

- .7 Secure anchorages and connections to adjacent construction.
- .8 Brace frames rigidly in position while building-in. Install wood spreaders at third points of frame rebate height to maintain frame width. Provide vertical support at centre of head for openings exceeding 1200 mm (48") in width.
- .9 During the setting of frame product, check and correct as necessary for opening width, opening height, square, alignment, twist and plumb, in accordance with the CSDMA, "Recommended Dimensional Standards for Commercial Steel Doors and Frames".
- .10 Grout guards and junction boxes are intended to protect hardware mortises and tapped holes from masonry grout of 4 in. (101 mm) maximum slump consistency that is hand troweled in place.
- .11 Frame products are not intended or designed to act as forms for grout or concrete. Grout hollow metal sections in "lifts" or take precautions otherwise to ensure that frames are not deformed or damaged by the hydraulic forces that occur during this process.
- .12 Keep hollow metal surfaces free of grout, tar, and/or other bonding materials or sealers. Promptly clean grout, tar, and/or other bonding materials or sealers off of frame product and doors.
- .13 Remove wood spreaders after frames have been built-in.
- .14 Make allowance for deflection to ensure structural loads are not transmitted to frame product.
- .15 Install doors, and hardware in accordance with hardware templates and manufacturer's instructions.
- .16 Adjust operable parts for correct clearances and function.
- .17 Install louvers, glazing and door silencers.
- .18 Finish paint in accordance with Section 09900.

END OF SECTION

PART 1 – GENERAL

1.1 References

- .1 ASTM A 653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- .2 ASTM A 666 - Standard Specification for Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.
- .3 ASTM A 924 - Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.
- .4 ASTM B 221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
- .5 ASTM B 221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric).

1.2 Submittals

- .1 Submit under provisions of Section 01330.
- .2 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 Details of construction and fabrication.
 - .4 Installation methods.
- .3 Shop Drawings: Include detailed plans, elevations, details of framing members, required clearances, anchors, and accessories. Include relationship with adjacent construction.
- .4 Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.
- .5 Verification Samples: For each finish product specified, two samples, minimum size 6 inches (150 mm) long, representing actual product, color, and patterns.
- .6 Manufacturer's Certificates: Certify products meet or exceed specified requirements.

1.3 Quality Assurance

- .1 Manufacturer Qualifications: Company specializing in performing Work of this section with a minimum of five years experience in the fabrication and installation of security closures.
- .2 Installer Qualifications: Company specializing in performing Work of this section with minimum three years and approved by manufacturer.

1.4 Delivery, Storage and Handling

- .1 Store products in manufacturer's unopened packaging until ready for installation.
- .2 Protect materials from exposure to moisture. Do not deliver until after wet work is complete and dry.
- .3 Store materials in a dry, warm, ventilated weathertight location.

1.5 Project Conditions

- .1 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.

1.6 Coordination

- .1 Coordinate Work with other operations and installation of adjacent finish materials to avoid damage to installed materials.

1.7 WARRANTY

- .1 Warranty: Manufacturer's limited door warranty for 2 years for all parts and components.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- .1 Acceptable Manufacturers:
 - .1 Overhead Door Company, at: 5450 Harvester Road, Burlington, ON. Tel: 905.333.1772, Fax: 905.333.8996. **Product: 640**
 - .2 CHI Overhead Doors, as distributed by Atlas Overhead Doors, 75 Wildcat Road, Toronto, ON. Tel: 416.663.1574, Email: info@atlasdoors.ca. Note: may be available through other distributors. **Product: 7522**
 - .3 Raynor Doors and Operators, as distributed by CanDoor Overhead Doors LTD, 5080 Timberlea Blvd, Unit 2 & 3, Mississauga, ON, Tel: 905.890.7777, Fax: 905.212.7781. Note: may be available through other distributors. **Product: FireCurtain Standard**
 - .4 Equivalent products as per Specification 01250.
- .2 Overhead Coiling Counter Fire Doors:
 - .1 Label: UL 1HR Class B Label for installation in non-masonry walls, between jambs.
 - .2 Wall Mounting Condition: Between jambs mounting.
 - .3 Curtain: Interlocking slats, Type F-158 fabricated of 22 gauge galvanized steel. Endlocks attached to alternate slats to maintain curtain alignment and prevent lateral slat movement.
 - .3 Finish:
 - .1 Galvanized Steel: Slats and hood galvanized steel to ASTM A 653 finished with a rust-inhibitive roll coating process, including bonderizing, a 0.2 mils thick baked prime paint, and a 0.6 mils thick baked top coat. Colour to be selected by Consultant from manufacturer standard colour range.
 - .2 Bottom Bar: Extruded aluminum tubular shape with astragal.
 - .3 Guides: Roll-formed black powder coated steel with brush smoke seals.
 - .4 Brackets: Steel plate to support counterbalance, curtain and hood.
 - .5 Counterbalance: Helical torsion spring type housed in a steel tube or pipe barrel.
 - .6 Hood: Provided with intermediate support brackets as required and fabricated of:
 - .1 Galvanized primed steel complete with UL listed brush smoke seal.
 - .7 Operation:
 - .1 Electric operator.
 - .8 Electric Motor Operation, interconnected with Fire Alarm to close in the event of alarm.
 - .1 Release device shall be used in conjunction with an appropriate UL 325-rated commercial door operator, either a gearhead, jackshaft, or hoist operator equipped with auxiliary open and close limit switches, to create a door closing system.
 - .2 Capable of operating on a voltage of 120VAC, and shall contain internal fuse and transient protection to guard against power surges; a red, enclosure-mounted LED shall indicate power to the device.
 - .3 Capable of holding and releasing up to a 40 lb. load imposed by a fusible link/sash chain assembly attached to a release mechanism within the door construction.

- .4 Provide with an internal battery backup system capable of providing up to 24 hours of battery power to support alarm logic, smoke detector, release capability and audible and visible signaling appliances. Device shall monitor battery charge and annunciate the need for battery replacement via an integral sounder; a green, enclosure-mounted LED that indicates the presence of the battery backup system.
 - .1 Battery backup/power system shall contain a management system providing trickle charge capabilities.
 - .2 During a power outage, and upon depletion of the battery, the device will initiate door closure by releasing the fusible link/sash chain assembly and initiating gravity closure of the door.
 - .3 A DIP-switch selectable feature shall provide the capability of operating on battery power upon loss of line power or closing the door through the release of the fusible link assembly initiating gravity closure of the door.
 - .4 Hold open/release device shall recognize that the door is in the closed position and where motor driven, be capable of sensing that power is available to the motor. The device will be wired to close on alarm.
- .5 Includes DIP-switch selectable delay settings of 10, 20, or 60 seconds upon alarm activation to allow for passageway clearance before initiating door closure.
- .6 Capable of receiving an alarm input from compatible 2-wire normally open smoke detectors, 4-wire normally open smoke detectors, or normally open heat detectors, or input from a fire alarm control panel via a relay module providing a Form C dry contact output to the release device.
- .7 Provide with optional audible and visual signaling appliances to operate during the alarm closing cycle. Device shall be capable of activating and powering a maximum of two audible/visible notification devices, e.g. strobes, horns or horn/strobes. Device shall recognize that the door is in the closed position via input received from a proximity switch, located underneath the door and activated when the door is in the closed position and resting upon the switch, to prevent accidental release of the fusible link/sash chain (or 1/16th cable) assembly; an amber, enclosure-mounted LED shall indicate activation of the proximity switch.
- .8 Provide with relay and trouble outputs to provide notification to a fire alarm control panel when an alarm or trouble state exists.
- .9 Circuit board shall have diagnostic LEDs to assist with field installation by indicating alarm or trouble conditions present within the smoke detector loops, as well as activation of the auxiliary close limit switch.
- .10 Includes an enclosure-mounted test switch that simulates an alarm condition when depressed and held for a length of time equal to the DIP-switch selectable delay setting, either 10, 20, or 60 seconds. A remote key test switch is also provided to simulate an alarm condition during testing procedures.
- .11 Upon alarm, the device shall offer the DIP-switch selectable feature of motorized door closure through the operator or bypassing the operator and initiating gravity door closure by releasing the fusible link assembly and engaging the door's release mechanism.
- .12 Audible and visual signaling appliances shall be provided to annunciate closure due to alarm or power loss conditions.

PART 3 - EXECUTION

3.1 EXAMINATION

- .1 Verify opening sizes, tolerances and conditions are acceptable.
- .2 Examine conditions of substrates, supports, and other conditions under which this work is to be performed.

- .3 If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

- .1 Clean surfaces thoroughly prior to installation.
- .2 Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

- .1 Install in accordance with manufacturer's instructions.
- .2 Use anchorage devices to securely fasten assembly to wall construction and building framing without distortion or stress.
- .3 Securely and rigidly brace components suspended from structure. Secure guides to structural members only.
- .4 Fit and align assembly including hardware; level and plumb, to provide smooth operation.
- .5 Coordinate installation of sealants and backing materials at frame perimeter as specified in Section 07900.
- .6 Install perimeter trim and closures.
- .7 Coordinate installation of electrical service with Division 16.
- .8 Install and test Fire Sentinel release device(s) in accordance with the manufacturer's instructions and in compliance with applicable regulations and codes of the local authority having jurisdiction.

3.4 ADJUSTING

- .1 Test for proper operation and adjust as necessary to provide proper operation without binding or distortion.
- .2 Adjust hardware and operating assemblies for smooth and noiseless operation.

3.5 CLEANING

- .1 Clean curtain and components using non-abrasive materials and methods recommended by manufacturer.
- .2 Remove labels and visible markings.
- .3 Touch-up, repair or replace damaged products before Substantial Completion.

3.6 PROTECTION

- .1 Protect installed products until completion of project.

END OF SECTION

PART 1 — GENERAL

1.1 SECTION INCLUDES

- .1 Curb mounted skylights.

1.2 REFERENCES

- .1 AAMA/WDMA/CSA 101/I.S.2/A440 - Standard Specification for Windows, Doors and Unit Skylights.
- .2 TAS 201-94 - Impact Test Procedures.
- .3 TAS 203-94 - Criteria for Testing Products Subject to Cyclic Wind Pressure Loading.
- .4 ASTM D 635 - Standard Test Method for Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position.
- .5 ASTM D 638 - Standard Test Method for Tensile Properties of Plastics.
- .6 ASTM D 746 - Test Method for Brittleness Temperatures of Plastics and Elastomers by Impact.
- .7 ASTM D 790 - Standard Test Method for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.
- .8 ASTM D 1929 - Standard Test Method for Determining Ignition Temperature of Plastics. I. ASTM D 2565 - Xenon-Arc Exposure of Plastics Intended for Indoor or Outdoor Applications (Weather-Ometer)
- .9 ASTM D 2843 - Standard Test Method for Density of Smoke from the Burning or Decomposition of Plastics.
- .10 ASTM D4226 - Standard Test Methods for Impact Resistance of Rigid PolyVinyl Chloride (PVC) Building Products.
- .11 ASTM D 4803 - Standard Test Method for Predicting Heat Buildup in PVC Building Products.
- .12 ASTM E 283 - Standard test method for rate of air leakage through exterior windows, curtain walls and doors.
- .13 ASTM E 330 - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure.
- .14 ASTM E 331 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference.
- .15 ASTM E 547 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Cyclic Static Air Pressure Difference.

1.3 PERFORMANCE REQUIREMENTS

- .1 General: Skylights tested in conformance with AAMA/WDMA/CSA 101/I.S.2/A440 - Standard Specification for Windows, Doors and Unit Skylights as follows.
 - 1. ASTM E 283: Air Infiltration at 1.57 psf (75 pa) and 6.24 psf (300pa) 0.01 sfm/sf (0.01 L/s/sm).
 - 2. ASTM E 547 and ASTM E331-00: Water resistance test, no leakage.
 - 3. ASTM E 330: Uniform load deflection, no damage 50 psf (2400 pa) positive/negative load with a measured 1.010 inch (1 mm) positive/negative deflection.
- .2 Fire Performance: Provide unit skylight glazing materials tested by UL or Intertek Testing Services (Warnock Hersey Listed) with labels indicating compliance.

1. Self-Ignition Test: 650 deg F (343.33 deg C) or greater when tested in accordance with ASTM D 1929.
2. Smoke Density: 75 or less when tested in accordance with ASTM D 2843.
3. Combustibility:
 - .1 Acrylics Average Burning Rate: Maximum 2.5 inch/minute (63.5 mm/minute), when tested in accordance with ASTM D 635.
 - .2 Polycarbonate Extent of Burning of Glazing: Maximum 1 inch (25.4mm), when tested in accordance with ASTM D 635.
- .3 Frame material ASTM D1929: Spontaneous ignition temperature, 680° F (360° C).
- .4 Frame material ASTM D 2565: Accelerated weathering tests: Exposure Time 2900 hours.
 1. ASTM D 638: Tensile properties, retained 88 percent tensile strength, 91 percent elongation.
 2. ASTM D 790: Flex modulus, retained 113 percent flexure modulus.
 3. ASTM D 4803: Heat build-up, 98 minutes to equilibrium.
- .5 ASTM D 4226: Impact resistance at 23 degrees C, 74 in-lbs (0.60 in-lbs/mil), passed.
- .6 ASTM D 746: Brittleness at minus 40 degrees C, passed.
- .7 ASTM G 1970 - Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection.

1.4 SUBMITTALS

- .1 Submit under provisions of Section 01330.
- .2 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.
- .3 Shop Drawings: Indicate configurations, dimensions, locations, fastening methods, and installation details.
- .4 Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.
- .5 Manufacturer's Certificates: Certify products meet or exceed specified requirements.

1.5 QUALITY ASSURANCE

- .1 Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum five years documented experience.
- .2 Installer Qualifications: Company specializing in installing products similar to those specified in this section with minimum five years documented experience.
- .3 Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.
 1. Finish areas designated by Architect.
 2. Do not proceed with remaining work until workmanship, color, and sheen are approved by Architect.
 3. Refinish mock-up area as required to produce acceptable work.

1.6 DELIVERY, STORAGE, AND HANDLING

- .1 Store products in manufacturer's unopened packaging until ready for installation.

- .2 Store and dispose of solvent-based materials, and materials used with solvent based materials, in accordance with requirements of local authorities having jurisdiction.

1.7 SEQUENCING

- .1 Ensure that locating curbs and other information required for installation of products of this section are furnished to affected trades in time to prevent interruption of construction progress.
- .2 Ensure that products of this section are supplied to affected trades in time to prevent interruption of construction progress.

1.8 PROJECT CONDITIONS

- .1 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.

1.9 WARRANTY

- .1 20 year Warranty on the complete system.

PART 2— PRODUCTS

2.1 MANUFACTURERS

- .1 Acceptable Manufacturer:
 - .1 Curb Mounted skylight by VTECH Industries
 - .2 Fixed Curb Mounted (FCM) skylight Velux
 - .3 ATCM-OF Curb Mounted skylight by Columbia Skylights

2.2 MATERIALS

- .1 The skylight base frame shall be mill finish aluminum extrusion alloy 6063-T5 or 6063-T6 with minimum wall thickness of .065" (1.65mm); within industry tolerances, and include a polyurethane thermal break. The corners shall be heli arc welded to ensure a leakproof frame. Four sided, large capacity sloped condensation gutter for positive drainage, with weep holes in all four (4) corners shall be an integral part of the unit. The (neoprene) gasket acts as a water and air tight seal between the base frame and the acrylic unit. Large exterior mounting flange includes pre-drilled fastening holes.
- .2 Base frame requires minimum 2" curb (actual measurement). Double sided 3/16" x 1/2" butyl tape provided for seal to curb.
- .3 Aluminum extruded frame shall be alloy 6063-T5 or 6063-T6 with minimum wall thickness of .062" (1.58mm); within industry tolerances. Exterior frame supplied with black baked enamel paint finish.
- .4 Insulated Glass Unit: Factory assembled with low emissivity exterior pane and clear interior pane separated by a stainless steel spacer sealing the space between panes with 95% argon gas.
 - .1 Exterior Pane: 0.16 inch (4mm)] thick tempered glass with interior surface coated with three layers of low emissivity silver (LoE3) coatings.
 - .2 Interior Pane: Laminated, Two clear 0.090 inch (2.3 mm) heat-strengthened panes with a 0.030 inch (0.76 mm) clear polyvinyl butyral interlayer sandwiched together
- .5 All exterior fasteners in frame shall be 300 series stainless steel.
- .6 The skylight assembly shall be air tight with no air paths to connect interior building to exterior elements.
- .7 A gasket shall be provided between all points of contact between glass, aluminum, and vinyl surfaces.

PART 3 EXECUTION

3.1 EXAMINATION

- .1 Do not begin installation until openings, curbs and substrates have been properly prepared.
- .2 If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

- .1 Clean surfaces thoroughly prior to installation.
- .2 Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

- .1 Install in accordance with manufacturer's instructions.
- .2 Waterproof the curb completely with self-adhering roofing under layment membrane.
 - .1 Begin by installing the first strip at bottom and extend up to the top of the curb.
 - .2 Next, install the two side strips, extending up to the top of the curb and overlapping the bottom strip.
 - .3 Install the top strip, extending up to the top of the curb and overlapping the side strips.
- .3 Flash the curb.
 - .1 Install the Base Flashing at the bottom of the curb.
 - .2 Install Step-Flashing on each side of the curb overlapping the base flashing.
 - .3 Install the Base Flashing at the top of the curb overlapping the step flashing on each side of the curb.
- .4 Apply a 1 inch (25.5 mm) bead of polyurethane mastic, to the top of the curb. Position the bead on the outer perimeter of the curb.
- .5 Set skylight on the curb and press firmly into place.
- .6 Secure skylight to the curb. Install all screws at the pre-marked anchor points on the skylight.
- .7 Should there be a gap 3/8 inch to 1/2 inch (9.5 mm to 12.5 mm) between the skylight and the curb, a shim made of pressure treated wood may be inserted in the gap, prior to installing the anchor screws. The shim length must be equal to the inside length of the skylight.
- .8 Remove labels and protective material from surfaces.
- .9 Wash down exposed surfaces; wipe surfaces clean.
- .10 Remove excess sealant.

3.4 PROTECTION

- .1 Protect installed products until completion of project.
- .2 Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

- .1 Comply with requirements listed in Division 1
- .2 Furnish, deliver and install finish hardware.
- .3 It is intended that the following list of hardware will cover finish hardware to complete the project. Bring to the Architect's attention any omissions, discrepancies that will affect work in this section during the bidding period.

1.2 QUALITY ASSURANCE

- .1 Meet all requirements of the local building code and all other applicable regulations.
- .2 Qualified suppliers must have in their employ a Certified A.H.C. (Architectural Hardware Consultant) as licensed by the Door and Hardware Institute. The supplier must have a minimum of two (2) years experience furnishing hardware for similar projects. Only firms that can extend manufacturers warranty to the project are to be considered as suppliers.
- .3 Inspection of supplied Finishing Hardware will be done by a Certified A.H.C. A complete Site Inspection Report will be issued to the Architect.

1.3 SUBMITTALS

- .1 Upon request, provide mounted samples of hardware items to be supplied.
- .2 Prepare and submit two (2) copies of a detailed hardware schedule listing product numbers, size and finishes. Include two (2) sets of catalog cuts.
- .3 Furnish other sections with two (2) complete sets of hardware templates for related fabricating and installation.
- .4 Submit for owner review and comments two (2) key schedules listing the door number, hardware heading or item, and the key group.
- .5 Where electrical hardware is to be supplied, provide wiring diagrams showing all wire termination points. Where electrical hardware is to be supplied and installed provide the contractor with riser diagrams listing the correct wire runs and back box sizes as well as 115 VAC requirements.
- .6 Where required in Division 1, provide two (2) operating manuals for the owners use. Include copies of the hardware schedule, templates, installation instructions and all maintenance data.

1.4 PRODUCT DELIVERY, HANDLING, AND STORAGE

- .1 Deliver each hardware item in its original package complete with all fasteners, keys, templates, and installation instructions required for installation.
- .2 Clearly mark each container with the door opening number and the hardware schedule item or heading number.
- .3 The contractor must store hardware delivered in a secure area. The storage area must contain adequate shelf space to hold all the hardware off the floor. Ensure the area is kept dry and clean.
- .4 When requested, package items of hardware separately for delivery to other fabricators for their installation.

1.5 WARRANTY

- .1 Provide a written warranty for a period of two (2) years for all hardware supplied and a five (5) year warranty for the door closers.
- .2 When requested provide extended warranties listed in Division 1.

PART 2 PRODUCTS

2.1 See Hardware Schedule

PART 3 EXECUTION

3.1 INSPECTION

- .1 The consultant will inspect all the door openings to ensure the specified products are supplied and installed in accordance with the manufacturers instructions. A written report will be furnished to the Architect detailing openings where products are missing, installed incorrectly or in need of proper adjustment.

3.2 INSTALLATION

- .1 The general contractor shall obtain a copy of ANSI/DHI A115.1G-94,"Installation Guide for Doors and Hardware". It is the intent of this document to be used as a reference guide in the proper handling, storage, and installation of finishing hardware, and doors and frames. This document can be obtained through the Door and Hardware Institute.
- .2 Other trades installing hardware must follow all manufacturers instructions including door closer adjustment, handing of locksets as required, and degree of door swing. Advise the consultant if door frames are not square and plumb and prevent proper door hardware installation.
- .3 Use only the original manufactures fasteners for the installation of all hardware products. Drill and tap doors and frames, where required, to properly install finishing hardware products.
- .4 Mount hardware to suit door elevations. Unless otherwise directed by the consultant, install hardware at the following mounting heights:

Locksets	40"	(1015mm)
Exit device	40"	(1015mm)
Push/Pull	42"	(1065mm)
Deadlock	48"	(1200mm)
- .5 Manufacturers of specified products are responsible to instruct hardware installers in the proper installation methods of their products.

3.3 FIELD QUALITY CONTROL

- .1 Verify each door leaf opens closes and latches. Inspect fire rated openings to ensure they are installed in compliance with NFPA 80 requirements. Test access control system and electrified hardware devices for proper operation, owner to sign off on verification of operation. Verify electric door release hardware operates properly upon activation of the fire alarm system.
- .2 Perform bi-monthly on-site inspections during hardware installation and provide inspection reports listing progress of work, unacceptable work and corrective measures. Repair or replace as directed by the Consultant.
- .3 Before completion of the work but after the hardware has been installed, submit a certificate to the architect stating that final inspection has been made and that hardware has been checked for installation and operation by a technician from the manufacturer and hardware consultant

3.4 ADJUSTING AND CLEANING

- .1 Check and make final adjustments to each operating item of hardware on each door to ensure proper operation and function.
- .2 Adjust doors with self-closing devices or automatic closing devices for operation after the HVAC system is balanced and adjusted. Adjust spring power of non sized door closers to close and latch the door.

		Heading 01			
1	PR	Door D100A	EXTERIOR / LOBBY		
Each Assembly to have:					
8	EA	HINGE	5BB1HW 127X114MM NRP	630	IVE
1	EA	Door Cord	798-18	626	SCE
2	EA	MANUAL FLUSH BOLT	FB458	626	IVE
1	EA	DUST PROOF STRIKE	DP1	626	IVE
1	EA	ELEC PANIC HARDWARE	SD-RX-QEL-98-NL-1609	626	VON
1	EA	MORTISE CYLINDER	BY OWNER	626	MED
			(CYLINDER DOGGING)		
1	EA	RIM CYLINDER	BY OWNER	626	MED
1	EA	SURFACE CLOSER	4040XP SCUSH	689	LCN
1	EA	SURF. AUTO OPERATOR	9542 MS	ANCLR	LCN
1	EA	WEATHER RING	8310-802	PLA	LCN
1	EA	KEYSWITCH	8310-806K	BLK	LCN
2	EA	ACTUATOR, WALL MOUNT	8310-852	630	LCN
2	EA	ESCUTCHEON	8310-876	689	LCN
1	EA	MOUNTING PLATE	9540-18	689	LCN
2	EA	JAMB SEAL	328AA (2 X H)	AA	ZER
2	EA	MEETING STILE	328AA-S	AA	ZER
1	EA	HEAD SEAL	429AA (1 X W)	AA	ZER
2	EA	DOOR SWEEP	8192AA (1 X W)	AA	ZER
1	EA	THRESHOLD	8655A (1 X W)	A	ZER
1	EA	PUSH BUTTON	621AL	626	SCE
2	EA	DOOR CONTACT	7766	628	SCE
1	EA	POWER SUPPLY	PS902 900-4RL	LGR	SCE
1	EA	CARD READER	BY SECURITY		UNK

Note: Verify hinges size and weight to suit existing door and frame.

Note: Card reader for future use.

Note: Push button to be mounted at reception desk

Note: Contractor to review existing door for compatibility with new hardware.

		Heading 02			
1	SGL	Door D100B	LOBBY / COMMUNITY ROOM		
Each Assembly to have:					
3	EA	HINGE	5BB1HW 127X114MM NRP	652	IVE
1	EA	POWER TRANSFER	EPT10 CON	689	VON
1	EA	ELEC PANIC HARDWARE	RX-QEL-98-L-NL-06-CON	626	VON
1	EA	RIM CYLINDER	BY OWNER	626	MED
1	EA	SURF. AUTO OPERATOR	9542 MS	ANCLR	LCN
2	EA	ACTUATOR, WALL MOUNT	8310-852	630	LCN
2	EA	ESCUTCHEON	8310-876	689	LCN
1	EA	MOUNTING PLATE	9540-18	689	LCN
1	EA	WIRE HARNESS	CON-6W		SCH
1	EA	WIRE HARNESS	CON-WIDTH		SCH
1	EA	PUSH BUTTON	621AL	626	SCE
1	EA	DOOR CONTACT	679-05HM	BLK	SCE
1	EA	MORTAR GUARD	TAC-LD1-DC		TAC
1	EA	POWER SUPPLY	PS902 900-4RL	LGR	SCE
1	EA	CARD READER	BY SECURITY		UNK

Note: Push button to be mounted at reception desk

Heading 03
LOBBY / RECEPTION

1 SGL Door D101

Each Assembly to have:

3	EA	HINGE	5BB1 127X114MM	652	IVE
1	EA	ENTRANCE/OFFICE LOCK	ND50LD RHO	626	SCH
1	EA	INTERFACE BOX	JB7		VON
1	EA	K/L CYLINDER	BY OWNER	626	MED
1	EA	MORTAR GUARD	TAC-LD1-ES	GRY	TAC
1	EA	ELECTRIC STRIKE	6211 FS CON	630	VON
1	EA	SURF. AUTO OPERATOR	9142 WMS	ANCLR	LCN
2	EA	ACTUATOR, WALL MOUNT	8310-852	630	LCN
2	EA	ESCUTCHEON	8310-876	689	LCN
1	EA	KICK PLATE	8400 200MM X LDW	630	IVE
1	EA	WALL STOP	WS406/407CCV	626	IVE
1	EA	ADVANCED LOGIC RELAY	CX-33		CAM
1	EA	WIRE HARNESS	CON-6W		SCH
1	EA	DOOR CONTACT	679-05HM	BLK	SCE
1	EA	MORTAR GUARD	TAC-LD1-DC		TAC

Heading 04
LOBBY / INTAKE ROOM

1 SGL Door D102AA

Each Assembly to have:

3	EA	HINGE	5BB1 127X114MM	652	IVE
1	EA	CLASSROOM LOCK	ND70LD RHO	626	SCH
1	EA	K/L CYLINDER	BY OWNER	626	MED
1	EA	WALL STOP	WS406/407CVX	626	IVE

Heading 05
COMMUNITY ROOM / INTAKE ROOM

1 SGL Door D102AB

Each Assembly to have:

3	EA	HINGE	5BB1 127X114MM NRP	652	IVE
1	EA	DBL CYL STORE LOCK	ND66LD RHO	626	SCH
2	EA	K/L CYLINDER	BY OWNER	626	MED
1	EA	SURFACE CLOSER	1450 EDA	689	LCN
1	EA	KICK PLATE	8400 200MM X LDW	630	IVE
1	EA	WALL STOP	WS406/407CVX	626	IVE

Heading 06
INTAKE ROOM / BF WC

1 SGL Door D102C

Each Assembly to have:

3	EA	HINGE	5BB1 127X114MM	652	IVE
0	EA	STOREROOM LOCK	ND80LD RHO	626	SCH
1	EA	INTERFACE BOX	JB7		VON
1	EA	K/L CYLINDER	BY OWNER	626	MED
1	EA	MORTAR GUARD	TAC-LD1-ES	GRY	TAC
1	EA	ELECTRIC STRIKE	6211 FS CON	630	VON
1	EA	SURF. AUTO OPERATOR	9142 WMS	ANCLR	LCN
2	EA	ACTUATOR, WALL MOUNT	8310-852	630	LCN
2	EA	ESCUTCHEON	8310-876	689	LCN
1	EA	KICK PLATE	8400 200MM X LDW	630	IVE

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1	EA	WALL STOP	WS406/407CVX	626	IVE
1	EA	ADVANCED LOGIC RELAY	CX-33		CAM
1	EA	WIRE HARNESS	CON-6W		SCH
1	EA	DOOR CONTACT	679-05HM	BLK	SCE
1	EA	MORTAR GUARD	TAC-LD1-DC		TAC
1	EA	PUSH TO LOCK	CM-AF550R		CAM

Heading 07

1 SGL Door D102D BF WC / HOT ROOM

Each Assembly to have:

3	EA	HINGE	5BB1 127X114MM NRP	652	IVE
1	EA	PASSAGE SET	ND10S RHO	626	SCH
1	EA	OH STOP	90S	630	GLY

Heading 08

1 SGL Door D103 STAFF / UNIVERSAL WC

Each Assembly to have:

3	EA	HINGE	5BB1 127X114MM	652	IVE
1	EA	STOREROOM LOCK	ND80LD RHO	626	SCH
1	EA	INTERFACE BOX	JB7		VON
1	EA	K/L CYLINDER	BY OWNER	626	MED
1	EA	MORTAR GUARD	TAC-LD1-ES	GRY	TAC
1	EA	ELECTRIC STRIKE	6211 FS CON	630	VON
1	EA	SURF. AUTO OPERATOR	9142 WMS	ANCLR	LCN
2	EA	ACTUATOR, WALL MOUNT	8310-852	630	LCN
2	EA	ESCUTCHEON	8310-876	689	LCN
1	EA	KICK PLATE	8400 200MM X LDW	630	IVE
1	EA	WALL STOP	WS406/407CVX	626	IVE
1	EA	ADVANCED LOGIC RELAY	CX-33		CAM
1	EA	EMERGENCY CALL KIT	CX-WEC10		CAM
1	EA	WIRE HARNESS	CON-6W		SCH
1	EA	DOOR CONTACT	679-05HM	BLK	SCE
1	EA	MORTAR GUARD	TAC-LD1-DC		TAC
1	EA	LED ANNUNCIATOR	CM-AF500		CAM
1	EA	PUSH TO LOCK	CM-AF550R		CAM

Heading 09

1 SL Door D106 PROGRAM ROOM / COMMUNITY ROOM

Each Assembly to have:

1	EA	HARDWARE	ALL HARDWARE BY DOOR SUPPLIER		UNK
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Heading 10

1 SGL Door D108A CORRIDOR / COUNSELLING
1 SGL Door D108B COUNSELLING / COUNSELLING
1 SGL Door D109 CORRIDOR / COUNSELLING

Each Assembly to have:

3	EA	HINGE	5BB1 127X114MM	652	IVE
1	EA	PASSAGE SET	ND10S RHO	626	SCH
1	EA	WALL STOP	WS406/407CVX	626	IVE

Heading 11
CORRIDOR / LAUNDRY

1 SGL Door D110

Each Assembly to have:

3	EA	HINGE	5BB1 127X114MM	652	IVE
1	EA	CLASSROOM LOCK	ND70LD RHO	626	SCH
1	EA	K/L CYLINDER	BY OWNER	626	MED
1	EA	OH STOP	90S	630	GLY
1	EA	SURFACE CLOSER	1450 DEL REG	689	LCN
1	EA	KICK PLATE	8400 200MM X LDW	630	IVE

Heading 12
LAUNDRY / LOADING AND RECEIVING

1 SGL Door D111

Each Assembly to have:

3	EA	HINGE	5BB1 127X114MM	652	IVE
1	EA	CLASSROOM LOCK	ND70LD RHO	626	SCH
1	EA	K/L CYLINDER	BY OWNER	626	MED
1	EA	SURFACE CLOSER	1450 DEL REG	689	LCN
1	EA	KICK PLATE	8400 200MM X LDW	630	IVE
1	EA	WALL STOP	WS406/407CVX	626	IVE

Heading 13
DORM / JANITOR'S CLOSET
DORM / JANITOR'S CLOSET
DORM / JANITOR'S CLOSET

1 SGL Door D201
1 SGL Door D301
1 SGL Door D401

Each Assembly to have:

3	EA	HINGE	5BB1 127X114MM	652	IVE
1	EA	STOREROOM LOCK	ND80LD RHO	626	SCH
1	EA	K/L CYLINDER	BY OWNER	626	MED
1	EA	SURFACE CLOSER	1450 DEL REG	689	LCN
1	EA	KICK PLATE	8400 200MM X LDW	630	IVE
1	EA	WALL STOP	WS406/407CVX	626	IVE

Heading 14
DORM / BF WC
DORM / BF WC

1 SGL Door D202
1 SGL Door D302

Each Assembly to have:

3	EA	HINGE	5BB1 127X114MM	652	IVE
1	EA	PASSAGE SET	ND10S RHO	626	SCH
1	EA	OH STOP	90S	630	GLY
1	EA	KICK PLATE	8400 200MM X LDW	630	IVE

Heading 15

1	SGL	Door D202A	BF WC / BF WC
1	SGL	Door D202B	BF WC / BF WC
1	SGL	Door D302A	BF WC / BF WC
1	SGL	Door D302B	BF WC / BF WC
1	SGL	Door D402A	WC / WC
1	SGL	Door D402B	BF WC / WC

Each Assembly to have:

1	EA	HARDWARE	BY PARTITION DOOR SUPPLIER	UNK
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Heading 16

1	SGL	Door D402	DORM / WC
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Each Assembly to have:

3	EA	HINGE	5BB1 127X114MM	652	IVE
1	EA	PASSAGE SET	ND10S RHO	626	SCH
1	EA	KICK PLATE	8400 200MM X LDW	630	IVE
1	EA	WALL STOP	WS406/407CVX	626	IVE

Heading 17

1	SGL	Door D403A	DORM / UNIVERSAL WC
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Each Assembly to have:

3	EA	HINGE	5BB1 127X114MM	652	IVE
1	EA	STOREROOM LOCK	ND80LD RHO	626	SCH
1	EA	MULTI-FUNCTION RELAY	CX-EMF-2		CAM
1	EA	INTERFACE BOX	JB7		VON
1	EA	K/L CYLINDER	BY OWNER	626	MED
1	EA	MORTAR GUARD	TAC-LD1-ES	GRY	TAC
1	EA	ELECTRIC STRIKE	6211 FSE CON	630	VON
1	EA	OH STOP	100S ADJ	630	GLY
1	EA	SURF. AUTO OPERATOR	9142 WMS	ANCLR	LCN
2	EA	ACTUATOR, WALL MOUNT	8310-852	630	LCN
2	EA	ESCUTCHEON	8310-876	689	LCN
1	EA	KICK PLATE	8400 200MM X LDW	630	IVE
1	EA	ADVANCED LOGIC RELAY	CX-33		CAM
1	EA	EMERGENCY CALL KIT	CX-WEC10		CAM
1	EA	WIRE HARNESS	CON-6W		SCH
1	EA	DOOR CONTACT	679-05HM	BLK	SCE
1	EA	MORTAR GUARD	TAC-LD1-DC		TAC
1	EA	LED ANNUNCIATOR	CM-AF500		CAM
1	EA	PUSH TO LOCK	CM-AF550R		CAM

Note: Door to be interlocking with D403B

Heading 18

1 SGL Door D403B DORM / ISOLATION ROOM

Each Assembly to have:

3	EA	HINGE	5BB1 127X114MM	652	IVE
1	EA	STOREROOM LOCK	ND80LD RHO	626	SCH
1	EA	INTERFACE BOX	JB7		VON
1	EA	K/L CYLINDER	BY OWNER	626	MED
1	EA	MORTAR GUARD	TAC-LD1-ES	GRY	TAC
1	EA	ELECTRIC STRIKE	6211 FSE CON	630	VON
1	EA	SURF. AUTO OPERATOR	9142 WMS	ANCLR	LCN
2	EA	ACTUATOR, WALL MOUNT	8310-852	630	LCN
2	EA	ESCUTCHEON	8310-876	689	LCN
1	EA	KICK PLATE	8400 200MM X LDW	630	IVE
1	EA	WALL STOP	WS406/407CVX	626	IVE
1	EA	ADVANCED LOGIC RELAY	CX-33		CAM
1	EA	WIRE HARNESS	CON-6W		SCH
1	EA	DOOR CONTACT	679-05HM	BLK	SCE
1	EA	MORTAR GUARD	TAC-LD1-DC		TAC
1	EA	LED ANNUNCIATOR	CM-AF500		CAM

Note: Door to be interlocking with D403B

Heading 19

1 SGL Door D404 DORM / ISOLATION ROOM

Each Assembly to have:

3	EA	HINGE	5BB1 127X114MM	652	IVE
1	EA	ENTRANCE/OFFICE LOCK	ND50LD RHO	626	SCH
1	EA	K/L CYLINDER	BY OWNER	626	MED
1	EA	SURFACE CLOSER	1450 REG	689	LCN
1	EA	KICK PLATE	8400 200MM X LDW	630	IVE
1	EA	WALL STOP	WS406/407CVX	626	IVE

Heading 20

1 SGL Door D406 DORM / VESTIBULE

Each Assembly to have:

3	EA	HINGE	5BB1 127X114MM	652	IVE
1	EA	PUSH PLATE	8200 100X405MM	630	IVE
1	EA	PULL PLATE	8302 150MM 100X405MM	630	IVE
1	EA	SURFACE CLOSER	4050 EDA	689	LCN
1	EA	KICK PLATE	8400 200MM X LDW	630	IVE
1	EA	WALL STOP	WS406/407CVX	626	IVE

Heading 21

1 SGL Door D407 PARTIALLY ENCLOSED TERRACE / VESTIBULE

Each Assembly to have:

3	EA	HINGE	5BB1HW 127X114MM NRP	630	IVE
1	EA	DEADBOLT	TD1850	689	TAH
1	EA	THUMBTURN	TT1025	689	TAH
1	EA	MORTISE CYLINDER	BY OWNER	626	MED
1	EA	PUSH/PULL BAR	9190EZHD-205MM-NS	630	IVE
1	EA	OH STOP	100S	630	GLY
1	EA	SURFACE CLOSER	4050 TOP JAMB	689	LCN
1	EA	MOUNTING PLATE	4050-18G	689	LCN
1	EA	WEATHER STRIPPING	BY DOOR AND FRAME SUPPLIER		UNK

1	EA	DOOR SWEEP	8192AA (1 X W)	AA	ZER
1	EA	THRESHOLD	8655A (1 X W)	A	ZER
1	EA	DOOR CONTACT	679-05HM	BLK	SCE

Note: Verify hinges size and weight to suit existing door and frame.

Heading 22

1	SGL	Door DB100	BASEMENT / IT CLOSET
1	SGL	Door DC100	UNIVERSAL WC / CHASE

Each Assembly to have:

3	EA	HINGE	5BB1 127X114MM NRP	652	IVE
1	EA	STOREROOM LOCK	ND80LD RHO	626	SCH
1	EA	K/L CYLINDER	BY OWNER	626	MED
1	EA	SURFACE CLOSER	1450 SCUSH	689	LCN

Heading 23

1	SGL	Door DS102	STAIRS / STAIR 2
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Each Assembly to have:

3	EA	HINGE	5BB1HW 114X114MM NRP	630	IVE
1	EA	PANIC HARDWARE	98-NL	626	VON
1	EA	RIM CYLINDER	BY OWNER	626	MED
1	EA	ELECTRIC STRIKE	6300 FSE	630	VON
1	EA	SURFACE CLOSER	4050 SCUSH	689	LCN
1	EA	KICK PLATE	8400 200MM X LDW	630	IVE
2	EA	JAMB SEAL	328AA (2 X H)	AA	ZER
1	EA	HEAD SEAL	429AA (1 X W)	AA	ZER
1	EA	DOOR SWEEP	8192AA (1 X W)	AA	ZER
1	EA	THRESHOLD	8655A (1 X W)	A	ZER
1	EA	POWER SUPPLY	PS902	LGR	SCE
1	EA	CARD READER	BY SECURITY		UNK

Note: Card reader for future use.

Note: Verify hinges size and weight to suit existing door and frame.

End of Schedule

- .3 Hardware to be left clean and free of disfigurements.
- .4 Instruct owner personnel in the proper operation, adjustment and maintenance of hardware.
- .5 Check locked doors against approved keying schedule.

3.5 PROTECTION

- .1 Protect hardware from damage during construction. Wrap locks, panic hardware, and fire exit hardware, door pull trim with kraft paper or plastic bubble materials to protect finish from damage until date of substantial completion. Remove and reinstall or where necessary, use temporary hardware to maintain finish in new condition and maintain manufacturer's warranty.

3.6 HARDWARE SCHEDULE

- .1 See attached Schedule of Finishing Hardware

END OF SECTION

PART 1 - GENERAL

1.1 Description of System

- .1 Non-load bearing steel framing includes non-load bearing steel studs framing members for interior framing systems (eg., partition walls, framed bulkheads, furring, etc.) as well as interior suspension systems (eg., supports for ceilings, suspended bulkheads, etc.).
- .2 Lightweight Steel Framing includes Axial Load Bearing Studs where indicated.

1.2 References

- .1 CSA S136 North American Specification for the Design of Cold-Formed Steel Structural Members
- .2 AISI North American Standard for Cold-Formed Steel Framing – Product Data
- .3 ASTM A653/A653M Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
- .4 ASTM A641/A641M Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire
- .5 ASTM A792/A792M Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process
- .6 ASTM A1003 Standard Specification for Steel Sheet, Carbon, Metallic- and Nonmetallic-coated for Cold-Formed Framing Members
- .7 ASTM C645 Standard Specification for Nonstructural Steel Framing Members
- .8 ASTM C754 Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products
- .9 ASTM E90 Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements]
- .10 ASTM E413 Classification for Rating Sound Insulation
- .11 ASTM E488 Standard Test Methods for Strength of Anchors in Concrete and Masonry Elements
- .12 ASTM E1190 Standard Test Methods for Strength of Power-Actuated Fasteners Installed in Structural Members
- .13 CAN/ULC S101 Standard Methods of Fire Endurance Tests of Building Construction and Materials
- .14 CSSBI LSF Technical Bulletin Volume 7, Number 1 Maximum Height Tables for Interior Non-Load Bearing Partitions.

1.3 Quality Assurance

- .1 Fire-Test-Response Characteristics: For fire-resistance-rated assemblies that incorporate nonload bearing interior steel framing, provide materials and construction identical to those tested in assembly indicated according to CAN/ULS-S101.
- .2 STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E90 and classified according to ASTM E413.
- .3 Retain a Professional Engineer registered in the province of Ontario to design the Lightweight Steel Framing System where indicated in drawings; to prepare, seal and sign all shop drawings; and to perform field review. Shop drawings shall show both design and installation requirements.

1.4 Design Criteria

- .1 Conform to the requirements of fire-rated assemblies as scheduled in drawings/details which have been tested in accordance with CAN/ULC-S101 and provide fire resistance ratings as indicated.
- .2 For Interior non-load bearing studs, conform to minimum design thickness, web depth and flange width as outlined in CSSBI Maximum Height Tables for interior non-load bearing partitions.
- .3 A non-load bearing (non-structural) member is defined as a member in a steel-framed system which is limited to transverse (out-of-plane) load of not more than 480 PA, a superimposed axial load, exclusive of sheathing materials, of not more than 1460 N/m, or a superimposed axial load of not more than 890 N.
- .4 A load bearing (structural) stud may be used in a non-load bearing application; however, non-load bearing members (studs or track) may never be used in a load bearing (axial and/or wind loading) applications.
- .5 Track for interior walls and non-load bearing walls located at exterior walls shall have a thickness of not less than the thickness of the corresponding studs and shall have not less than 31.8 mm flanges.
- .6 Connections between light steel framing members shall be by sheet metal screws, welding or crimping.
- .7 Load bearing assemblies/applications/details:
 - .1 Design shall be based on Limit States Design principles using factored loads and resistances.
 - .2 Loads and load factors shall be in accordance with the National Building Code of Canada.

1.5 Submittals

- .1 Make submittals in accordance with Section 01330 Submittals.
- .2 Product data: For each product indicated.
- .3 Submit shop drawings clearly indicating all construction details including connections and anchor requirements. Indicate type, size and spacing of fastening devices. Indicate design loads. Include seal and signature of Professional Engineer registered in the Province of Ontario for all components requiring structural design.

PART 2 - PRODUCTS

2.1 Materials

- .1 Non-load bearing Steel Framing, General
 - .1 Steel sheet components shall comply with ASTM C645 requirements for metal, unless otherwise indicated.
 - .2 Steel for non-load bearing members shall have metallic coatings that conform to ASTM A653M or ASTM A792M with minimum metallic coating weights (mass) of Z120 and AZM150 respectively. Alternative coatings shall be permitted to be used if proven to have equivalent corrosion protection.
 - .3 Framing members shall comply with the AISI North American Standard for Cold-Formed Steel Framing (Product Data) for conditions indicated.
- .2 Suspension System Components
 - .1 Tie wire shall comply with ASTM A641/A641M zinc-coated, soft-annealed, 1.21 mm minimum diameter, or of a material and size having equivalent corrosion resistance and strength.
 - .2 Hanger attachments to concrete: Anchors shall be fabricated from corrosion-resistant materials with holes or loops for attaching wire hangers and capable of sustaining, without failure, a load equal to 2 times that imposed by construction as determined by testing by an independent testing agency according to ASTM E488.

- .1 Type: Post-installed, expansion anchor
- .3 Power-actuated fasteners, suitable for application indicated, shall be fabricated from corrosion-resistant materials with clips or other devices for attaching hangers of type indicated, and capable of sustaining, without failure, a load equal to 2 times that imposed by construction as determined by testing by an independent testing agency according to ASTM E1190.
- .3 Hanger wire shall comply with ASTM A641/A641M zinc-coated, soft-annealed, 3.77 mm minimum diameter, or of a material and size having equivalent corrosion resistance and strength.
- .4 Carrying Channels
 - .1 Channels shall conform to ASTM C754 and shall be cold-firmed from steel with minimum 228 MPa yield strength and 1.37 mm base steel thickness.
 - .2 Channels shall have a minimum coating of Z120 galvanizing in accordance with ASTM A653/A653M. Other coatings (eg. Aluminum-zinc alloy to ASTM A792/A792M) providing equal or better corrosion protection may also be used.
 - .3 Carrying channels shall have minimum 12.7 mm wide flanges and minimum depth of 38 mm.
- .5 Furring Members
 - .1 Furring channels shall comply with the AISI North American Standard for Cold-Formed Steel Framing (Product Data) and shall have a minimum base steel thickness of 0.455 mm and with minimum 12.7 mm wide flanges and a depth of 19.1 mm.
 - .2 Steel stud shall be manufactured from steel in accordance with the AISI North America Standard for Cold-Formed Steel Framing (Product Data) and shall have a minimum base Steel thickness of 0.455 mm and depth as indicated on drawings.
 - .3 Hat-shaped, rigid furring channels shall comply with the AISI North American Standard for Cold-Formed Steel Framing (Product Data) and shall have a minimum base steel thickness of 0.455 mm and minimum depth of 22.2 mm. The minimum width of furring attachment flanges shall be 12.7 mm.
 - .4 Resilient furring channels are designed to reduce sounds transmission and shall have a minimum depth of 12.7 mm.
- .6 Steel Framing for Framed Assemblies
 - .1 Steel studs and track shall be in accordance with the AISI North American Standard for Cold-Formed Steel Framing (Product Data) and shall have minimum base steel thickness of 0.455 mm and a depth as indicated on drawings.
 - .2 Slip-Type Head Joints: Where indicated, provide one of the following:
 - .1 Deflection Track: steel sheet top track manufactured to prevent cracking of finishes applied to interior partition framing resulting from deflection of structure above; in thickness not less than indicated for studs and width to accommodate depth of studs.
 - .2 Single Long-Leg Track: track complying with the AISI North American Standard for Cold-Formed Steel Framing (Product Data) with 50.8 mm deep flanges in thickness not less than indicated for studs, installed with studs friction-fit into top track and with continuous bridging located within 305 mm of the top studs to provide lateral bracing.
 - .3 Double-Track System: track complying with AISI North American Standard for Cold-Formed Steel Framing (Product Data), inside track with 50.8 mm deep flanges in thickness not less than indicated for studs and fastened to studs, and outer track sized to friction fit inside track.
 - .3 Flat Strap and Backing Plate
 - .1 Sheet steel for blocking and bracing in length and width indicated.
 - .2 Minimum base steel thickness is 0.455 mm.

- .4 Channel bridging shall comply with the AISI North American Standard for Cold-Formed Steel Framing (Product Data) and shall have a minimum base steel thickness of 0.455 mm with minimum 12.7 mm wide flanges and depth of 19.1 mm.
- .5 Hat-shaped, rigid furring channels shall comply with the AISI North American Standard for Cold-Formed Steel Framing (Product Data) and shall have minimum base steel thickness of 0.455 mm, a minimum depth of 22.2 mm. The minimum width of furring attachment flanges shall be 12.7 mm.
- .6 Resilient furring channels are designed to reduce sound transmission and shall have a minimum depth 12.7 mm.
- .7 Furring channels shall comply with the AISI North American Standard for Cold-Formed Steel Framing (Product Data) and shall have a minimum base steel thickness of 0.455 mm and with minimum 12.7 mm wide flanges and a depth of 19.1 mm.
 - .1 Furring Brackets: adjustable, corrugated-edge of steel sheet with minimum base steel thickness of 0.79 mm.
 - .2 Tie wire shall comply with ASTM A641/A641M zinc-coated, soft-annealed, 1.21 mm minimum diameter, or of material and size having equivalent corrosion resistance and strength.
- .9 Z-shaped Furring: with slotted web or non-slotted web, face flange of 31.8 mm, wall attachment flange of 22.2 mm, and depth steel thickness of 0.455 mm, and depth required to fit insulation thickness indicated.
- .10 Fasteners for Metal Framing: of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates in accordance with ASTM C1002.
- .11 Isolation strip at exterior walls: provide one of the following:
 - .1 Asphalt-saturated organic felt: ASTM D226, Type 1 (no. 15 asphalt felt), perforated.
 - .2 Foam gasket: adhesive-backed, closed-cell vinyl foam strips that allow fastener penetration without foam displacement, 3.2 mm thick, in width to suit steel stud size.

PART 3 - EXECUTION

3.1 Examination

- .1 Examine areas and substrates, with Installer present, and including welded hollow-metal frames, cast-in anchors, and structural framing, for compliance with requirements and other conditions affecting performance.
 - .1 Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 Preparation

- .1 Suspended Assemblies: coordinate installation of suspension systems with installation of overhead structure to ensure that inserts and other provisions for anchorages to building structure have been installed to receive hangars at spacing required to support the work and that hangars will develop their full strength.
 - .1 Furnish concrete inserts and other devices indicated to other trades for installation in advance of time needed for coordination and construction.
- .2 Coordination with Sprayed Fire-Resistive Materials
 - .1 Before sprayed fire-resistive materials are applied, attach offset anchor plates or ceiling track to surfaces indicated to receive sprayed fire-resistive materials. Where offset anchor plates are required, provide continuous plates fastened to building structure not more than 600 mm o.c.
 - .2 After sprayed fire-resistive materials are applied, remove them only to extent necessary for installation of non-load bearing steel framing. Do not reduce thickness of fire-resistive

materials below that required for fire-resistance ratings indicated. Protect adjacent fire-resistive materials from damage.

3.3 Installation, General

- .1 Installation Standard: ASTM C754, except comply with framing sizes and spacing indicated.
 - .1 Gypsum Plaster Assemblies: also comply with requirements in ASTM C841 that apply to framing installation.
 - .2 Portland Cement Plaster Assemblies: also comply with requirements in ASTM C1063 that apply to framing installation.
 - .3 Gypsum Veneer Plaster Assemblies: also comply with requirements in ASTM C844 that apply to framing installation.
 - .4 Gypsum Board Assemblies: also comply with requirements in ASTM C840 that apply to framing installation.
- .2 Install supplementary framing, and blocking to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction.
- .3 Install bracing at terminations in assemblies.
- .4 Do not bridge building control and expansion joints with non-load bearing steel framing members. Frame both sides of joints independently.

3.4 Installing Suspension Systems

- .1 Install suspension system components in sizes and spacings indicated on drawings, but not less than those required by referenced installation standards for assembly types and other assembly components indicated.
- .2 Isolate suspension systems from building structure where they abut or are penetrated by building structure to prevent transfer of loading imposed by structural movement.
- .3 Suspended hangers from building structure as follows:
 - .1 Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structural or suspension system.
 - .1 Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced installation standards.
 - .2 Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with locations of hangers required to support standard suspension system members, install supplemental suspension members and hangers in the form of trapezes or equivalent devices.
 - .1 Size supplemental suspension members and hangers to support ceiling loads Within performance limits established by referenced installation standards.
 - .3 Wire Hangers: secure by looping and wire tying, either directly to structure or to inserts, eye screws, or other devices and fasteners that are secure and appropriate for substrate, and in a manner that will not cause hangers to deteriorate or otherwise fail.
 - .4 Do not attach hangers to steel roof deck unless otherwise approved.
 - .5 Do not attach hangers to permanent metal forms. Furnish cast-in-place hanger inserts that extend through forms.
 - .6 Do not attach hangers to rolled-in hanger tabs of composite steel floor deck.
 - .7 Do not connect or suspend steel framing from ducts, pipes, or conduit.
- .4 For fire-resistance-rated assemblies, wire tie furring channels to supports.
- .5 Installation Tolerances: install suspension systems that are level to within 3 mm in 3.6 m measured lengthwise on each member that will receive finishes and transversely between parallel members that will receive finishes.

3.5 Installing Framed Assemblies

- .1 Where studs are installed directly against exterior masonry walls or dissimilar metals at exterior walls, install isolation strip between studs and exterior wall.
- .2 Install studs so flanges within framing system point in same direction.
 - .1 Space studs as follows:
 - .1 Single-layer application: 406 mm o.c., unless otherwise indicated.
 - .2 Multilayer application: 406 mm o.c., unless otherwise indicated.
 - .3 Tile backing panels: 406 mm o.c., unless otherwise indicated.
 - .3 Install track floors and overhead supports. Extend framing full height to structural supports or substrates above suspended ceilings, except where partitions are indicated to terminate at suspended ceilings. Continue framing around ducts penetrating partitions of structure.
 - .1 Slip-Type Head Joints: where framing extends to overhead structural supports, install to produce joints at tops of framing systems that prevent axial loading of finished assemblies due to deflection of structure.
 - .2 Door Openings: screw vertical studs at jambs to jamb anchor clips to door frames; install track section (for cripple studs) at head and secure to jamb studs.
 - .1 Install two studs at each jamb, unless otherwise indicated.
 - .2 Install cripple studs at head adjacent to each jamb stud, with a minimum 12.7 mm clearance from jamb stud to allow for installation of control joint in finished assembly.
 - .3 Other Framed Openings: frame openings other than door openings the same as required for door openings, unless otherwise indicated. Install framing below sills of openings to match framing required above door heads.
 - .4 Fire-Resistance-Rated Partitions: install framing to comply with fire-resistance-rated assembly indicated and support closures and to make partitions continuous from floor to underside of solid structure.
 - .5 Sound-Rated Partitions: install framing to comply with sound-rated assembly indicated.
 - .6 Curved Partitions
 - .1 Bend track to uniform curve and locate straight lengths so they are tangent to arcs.
 - .2 Begin and end each arc with a stud, and space intermediate stud equally along arcs. On straight lengths of not less than 2 studs at ends of arcs, place studs 150 mm o.c.
 - .4 Direct Furring
 - .1 Screw to wood framing.
 - .2 Attach to concrete or masonry with stub nails, screws designed for masonry attachment, or power-driven fasteners spaced 610 mm o.c.
 - .5 Z-Furring Members
 - .1 Erect insulation as specified and hold in place with Z-furring members spaced 610 mm o.c.
 - .2 Except at exterior corners, securely attach narrow flanges of furring members to wall with concrete stub nails, screws designed for masonry attachment, or power-driven fasteners spaced 610 mm o.c.
 - .3 At exterior corners, attach wide flange of furring members to wall with short flange extending beyond corner; on adjacent wall surface, screw-attach short flange of furring channel to web of attached channel. At interior corners, space second member no more than 305 mm from corner and but insulation to fit,
 - .6 Installation Tolerance: install each framing member so fastening surfaces vary not more than 3 mm from the plane formed by faces adjacent framing.

END OF SECTION

PART 1 - GENERAL

1.1 References

- .1 American Society for Testing and Materials (ASTM)
 - .1 ASTM C1396 Standard Specification for Gypsum Board
 - .2 ASTM C 475-94, Specification for Joint Compound and Joint Tape for Finishing Gypsum Board.
 - .3 ASTM C 514-94, Specification for Nails for the Application of Gypsum Board.
 - .4 ASTM C 557-93a, Specification for Adhesives for Fastening Gypsum Wallboard to Wood Framing.
 - .5 ASTM C 840-95, Specification for Application and Finishing of Gypsum Board.
 - .6 ASTM C 954-93, Specification for Steel Drill Screws for the Application of Gypsum Board.
 - .7 ASTM C 1047-94, Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base.
 - .8 ASTM C1177-08, Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing
 - .9 ASTM C1178M -08, Standard Specification for Coated Glass Mat Water Resistant Gypsum Backing Panel
 - .10 ASTM C1658-06, Standard Specification for Glass Mat Gypsum Panels
 - .11 ASTM C1629M-06, Standard Classification for Abuse Resistant Non Decorated Interior Gypsum Panel Products and Fiber Reinforced Cement Panels
 - .12 ASTM D3273-00, Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber
- .2 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-51.34-M86, Vapour Barrier, Polyethylene Sheet for Use in Building Construction.
 - .2 CAN/CGSB-71.25-M88, Adhesive, for Bonding Drywall to Wood Framing and Metal Studs.
- .3 Underwriters Laboratories of Canada (ULC)
 - .1 CAN/ULC-S102-1988, Building Materials and Assemblies, Standard Method of Test for Surface Burning Characteristics of.

1.2 Site Environmental Requirements

- .1 Maintain temperature minimum 10C, maximum 21C for 48 hours prior to and during application of gypsum boards and joint treatment, and for at least 48 hours after completion of joint treatment.
- .2 Apply board and joint treatment to dry, frost free surfaces.

PART 2 - PRODUCTS

2.1 Materials

- .1 **Standard Gypsum Board: to ASTM C1396, Type X, 15.9mm (5/8" thick, 1200mm (4'-0") wide x maximum practical length.**
- .2 **Cement Board to ASTM C1325, 15.9mm (5/8") thick, 1220mm (4'0") wide x maximum practical length. Use throughout all washroom/shower locations scheduled to receive full height FRP panel finish.**

- .3 **Abuse Resistant Gypsum Board; Heavy duty glass mat facers with dense water resistant treated gypsum core to ASTM C1658 and ASTM C1629, Type X, 15.9mm (5/8") thick, 1220mm (4'0") wide x maximum practical length. Score of 10 (no mould growth) as per ASTM D3273). Provided to 1220mm (4'-0") above finished floor at all areas not scheduled to receive FRP Wainscotting.**
- .4 Steel drill screws: to ASTM C 1002.
- .5 Stud adhesive: to CAN/CGSB-71.25 ASTM C 557.
- .6 Laminating compound: as recommended by manufacturer, asbestos-free.
- .7 Shadow gap: Bailey D300 Metal trim, CGC Dur-a-bead or Nicolson Rollforming No 114, fillable edge trim, 0.55mm (0.022") base thickness commercial grade sheet steel with zinc wiped coating to ASTM A 525-93; perforated flanges; one piece length per location. To be used at the junction of all dissimilar materials and/or as detailed.
- .8 Corner bead: Bailey D100-90, 90-degree corner trim fillable edge trim, 0.55mm (0.022") base thickness commercial grade sheet steel with zinc wiped coating to ASTM A 525-93; perforated flanges; one piece length per location.
- .9 Control joints: No 093 Zinc Control Joints by CGC Inc or Nicholson Rollforming. To be installed where indicated on drawings.
- .10 Sealants: in accordance with Section 07900 - Joint Sealers.
- .11 Acoustic sealant: concealed purpose made, non-skinning, non hardening type to CAN/CGSB-19.21-M87, as manufactured by Tremco or Monsey-Bakor, USE Hickson
- .12 Sound attenuation insulation (acoustic batt insulation type 'C')
 - .1 Mineral or fiberglass sound attenuation batt or boards to ULC S702 and as required by fire rated tests.
 - .2 Thickness: full stud thickness or as otherwise stated on the Drawings and Schedule.
- .13 Joint compound: to ASTM C 475, asbestos-free. Latex resin base, possessing good adhesion, mixed with fresh, unadulterated water having no detrimental effects on compounds. Type recommended by manufacturer for application indicated.
- .14 Joint reinforcing tape; for gypsum board; 50mm (2") x 0.3mm (0.01") thick perforated paper with chamfered edges. **Use alkali resistant glass-fiber tape at cement board locations.**
- .15 1 hour rated walls to be filled with absorptive material processed from rock or slag with a mass of at least 2.8 kg/m² for 89mm thickness and completely filling the wall cavity.

PART 3 - EXECUTION

3.1 Erection

- 1 Do application and finishing of gypsum board in accordance with ASTM C 840 except where specified otherwise.
- .2 Do application of gypsum sheathing in accordance with ASTM C 1280.
- .3 Erect hangers and runner channels for suspended gypsum board ceilings in accordance with ASTM C 840 except where specified otherwise.
- .4 Support light fixtures by providing additional ceiling suspension hangers within 150 mm of each corner and at maximum 600 mm around perimeter of fixture.
- .5 Install work level to tolerance of 1:1200.
- .6 Frame with furring channels, perimeter of openings for access panels, light fixtures, diffusers, grilles.

- .7 Install 19 x 64 mm furring channels parallel to, and at exact locations of steel stud partition header track.
- .8 Furr for gypsum board faced vertical bulkheads within and at termination of ceilings.
- .9 Furr above suspended ceilings for gypsum board fire and sound stops and to form plenum areas as indicated.
- .10 Install wall furring for gypsum board wall finishes in accordance with ASTM C 840, except where specified otherwise.
- .11 Furr openings and around built-in equipment, cabinets, access panels, on four sides. Extend furring into reveals. Check clearances with equipment suppliers.
- .12 Furr duct shafts, beams, columns, pipes and exposed services where indicated

3.2 Application

- .1 Do not apply gypsum board until bucks, anchors, blocking, electrical and mechanical work are approved.
- .2 Apply 12 mm (1/2") diameter bead of acoustic sealant continuously around periphery of each face of partitioning to seal gypsum board/structure junction where partitions abut fixed building components. Seal full perimeter of cut-outs around electrical boxes, ducts, in partitions where perimeter sealed with acoustic sealant.

3.3 Installation

- .1 Erect accessories straight, plumb or level, rigid and at proper plane. Use full length pieces where practical. Make joints tight, accurately aligned and rigidly secured. Mitre and fit corners accurately, free from rough edges. Secure at 150mm oc using contact adhesive for full length.
- .2 Install casing beads around perimeter of suspended ceilings.
- .3 Install casing beads where gypsum board butts against surfaces having no trim concealing junction and where indicated. Seal joints with sealant.
- .4 Install insulating strips continuously at edges of gypsum board and casing beads abutting metal window and exterior door frames, to provide thermal break.
- .5 Install shadow mould at gypsum board/ceiling juncture as indicated. Minimize joints; use corner pieces and splicers.
- .6 Construct control joints of preformed units two back-to-back casing beads set in gypsum board facing and supported independently on both sides of joint.
- .7 Provide continuous polyethylene dust barrier behind and across control joints.
- .8 Locate control joints where indicated at changes in substrate construction at approximate 10m spacing on long corridor runs at approximate 15m spacing on ceilings.
- .9 Install control joints straight and true.
- .10 Construct expansion joints as detailed, at building expansion and construction joints. Provide continuous dust barrier.
- .11 Install expansion joint straight and true.
- .12 Splice corners and intersections together and secure to each member with 3 screws.
- .13 Install access doors to electrical and mechanical fixtures specified in respective Sections.
 - .1 Rigidly secure frames to furring or framing systems.
- .14 Finish face panel joints and internal angles with joint system consisting of joint compound, joint tape and taping compound installed according to manufacturer's directions and feathered out onto panel faces.

- .15 Finish corner beads, control joints and trim as required with two coats of joint compound and one coat of taping compound, feathered out onto panel faces.
- .16 Fill screw head depressions with joint and taping compounds to bring flush with adjacent surface of gypsum board so as to be invisible after surface finish is completed.
- .17 Sand lightly to remove burred edges and other imperfections. Avoid sanding adjacent surface of board.
- .18 Completed installation to be smooth, level or plumb, free from waves and other defects and ready for surface finish.
- .19 Mix joint compound slightly thinner than for joint taping.
- .20 Apply thin coat to entire surface using trowel or drywall broadknife to fill surface texture differences, variations or tool marks.
- .21 Allow skim coat to dry completely for walls receiving high gloss paint and where indicated.
- .22 Remove ridges by light sanding or wiping with damp cloth.
- .23 Fasten board to metal support members by metal gypsum board screws at, 9.5mm (0.374") minimum to , and 12.7mm (1/2") maximum from, center of joints. Space screw:
 - .1 At ceilings of fire rated board at 200mm (8") o.c. at edges and in field unless indicated otherwise.
 - .2 At walls of fire rated board at 200mm (8") o.c. at edges and 305mm (12") o.c. in field Locate screws opposite one another in adjacent panels unless indicated otherwise.
 - .3 At typical board walls at 400mm (16") o.c. at edges and field unless noted otherwise.
 - .4 At typical board ceilings at 305mm (12") o.c. at edges and field unless noted otherwise.
- .24 When installing fiberglass mat faced mould and moisture resistant gypsum board do so as per manufacturers recommendations. Tape joints with self adhesive fiberglass tape and embed the tape in setting type compound. Finish joint with two layers of all purpose joint compound. High build primer should be applied to surface before painting. As with regular paper faced gypsum board, in areas where gloss paint is to be applied or in areas of critical light a skim coat should be applied to the surface before priming and painting.

3.4 Schedules

- .1 Construct fire rated assemblies where indicated on drawings

END OF SECTION

PART 1 - GENERAL

1.1 References

- .1 American Society for Testing and Materials (ASTM):
 - .1 ASTM A 1008 Standard Specification for Steel, Sheet, Cold Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability.
 - .2 ASTM A 641 Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire.
 - .3 ASTM A 653 Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process.
 - .4 ASTM C 423 Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.
 - .5 ASTM C 635 Standard Specification for Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings.
 - .6 ASTM C 636 Recommended Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels.
 - .7 STM E 84 Standard Test Method for Surface Burning Characteristics of Building Materials.
 - .8 ASTM E 1414 Standard Test Method for Airborne Sound Attenuation Between Rooms Sharing a Common Ceiling Plenum.
 - .9 ASTM E 1111 Standard Test Method for Measuring the Interzone Attenuation of Ceilings Systems.
 - .10 ASTM E 1264 Classification for Acoustical Ceiling Products.
 - .11 ASTM E 1477 Standard Test Method for Luminous Reflectance Factor of Acoustical Materials by Use of Integrating-Sphere Reflectometers.
 - .12 ASTM D 3273 Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber.
 - .13 ASTM E 119 Standard Test Methods for Fire Tests of Building Construction and Material.
- .2 ASHRAE Standard 62.1-2004, "Ventilation for Acceptable Indoor Air Quality"

1.2 Equivalent Products

- .1 As per Section 01250 – Product Substitution Procedures.
- .2 Submittals which do not provide adequate data for the product evaluation will not be considered. The proposed substitution must meet all requirements of this section, including but not necessarily limited to, the following: Single source materials suppliers (if specified); Underwriters' Laboratories Classified Acoustical performance; Panel design, size, composition, color, and finish; Suspension system component profiles and sizes; Compliance with the referenced standards.

1.3 SUBMITTALS

- .1 Product Data: Submit manufacturer's technical data for each type of acoustical ceiling unit and suspension system required.
- .2 Samples: Minimum 6 inch x 6 inch samples of specified acoustical panel; 8 inch long samples of exposed wall molding and suspension system, including main runner and 4 foot cross tees.
- .3 Shop Drawings: Layout and details of acoustical ceilings. Show locations of items which are to be coordinated with, or supported by the ceilings.
- .4 Certifications: Manufacturer's certifications that products comply with specified requirements, including laboratory reports showing compliance with specified tests and standards. For acoustical

performance, each carton of material must carry an approved independent laboratory classification of NRC, CAC, and AC.

- .5 If the material supplied by the acoustical subcontractor does not have an Underwriter's Laboratory classification of acoustical performance on every carton, subcontractor shall be required to send material from every production run appearing on the job to an independent or NVLAP approved laboratory for testing, at the architect's or owner's discretion. All products not conforming to manufacturer's current published values must be removed, disposed of and replaced with complying product at the expense of the Contractor performing the work.

1.4 QUALITY ASSURANCE

- .1 Single-Source Responsibility: Provide acoustical panel units and grid components by a single manufacturer.
- .2 Fire Performance Characteristics: Identify acoustical ceiling components with appropriate markings of applicable testing and inspecting organization.
 - .1 Surface Burning Characteristics: As follows, tested per ASTM E 84 and complying with ASTM E 1264 for Class A products.
 - a. Flame Spread: 25 or less
 - b. Smoke Developed: 50 or less
 - .2 Fire Resistance Ratings: As indicated by reference to design designations in UL Fire Resistance Directory, for types of assemblies in which acoustical ceilings function as a fire protective membrane and tested per ASTM E 119.
 - a. Protect lighting fixtures and air ducts to comply with requirements indicated for rated assembly.
- .3 Handle acoustical ceiling units carefully to avoid chipping edges or damaged units in any way.

1.5 DELIVERY, STORAGE, AND HANDLING

- .1 Deliver acoustical ceiling units to project site in original, unopened packages and store them in a fully enclosed space where they will be protected against damage from moisture, direct sunlight, surface contamination, and other causes.
- .2 Before installing acoustical ceiling units, permit them to reach room temperature and a stabilized moisture content.
- .3 Handle acoustical ceiling units carefully to avoid chipping edges or damaged units in any way.

1.6 PROJECT CONDITIONS

- .1 All ceiling products and suspension systems must be installed and maintained in accordance with manufacturer written installation instructions for that product in effect at the time of installation and best industry practice. Prior to installation, the ceiling product must be kept clean and dry, in an environment that is between 32°F (0°C) and 120°F (49°C) and not subject to Abnormal Conditions. Abnormal conditions include exposure to chemical fumes, vibrations, moisture from conditions such as building leaks or condensation, excessive humidity, or excessive dirt or dust buildup.

1.7 WARRANTY

- .1 Acoustical Panel: Submit a written warranty executed by the manufacturer, agreeing to repair or replace acoustical panels that fail within the warranty period. Failures include, but are not limited to:
 - .1 Acoustical Panels: Sagging and warping as a result of defects in materials or factory workmanship.
 - .2 Grid System: Rusting and manufacturer's defects

- .3 Acoustical Panels designated as inherently resistive to the growth of micro-organisms installed with corresponding suspension systems: Visible sag and will resist the growth of mold/mildew and gram positive and gram negative odor and stain causing bacteria.
- .2 Warranty Period Humiguard:
 - .1 Acoustical panels: Ten (10) years from date of substantial completion.
 - .2 Grid: Ten (10) years from date of substantial completion.
 - .3 Acoustical panels and grid systems with HumiGuard Plus or HumiGuard Max performance supplied by one source manufacturer is thirty (30) years from date of substantial completion.
- .3 The Warranty shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and will be in addition to and run concurrent with other warranties made by the Contractor under the requirements of the Contract Documents.

1.8 MAINTENANCE

- .1 Extra Materials: Deliver extra materials to Owner. Furnish extra materials described below that match products installed. Packaged with protective covering for storage and identified with appropriate labels.
 - .1 Acoustical Ceiling Units: Furnish quality of full-size units equal to 5.0 percent of amount installed, for each ceiling type/pattern.
 - .2 Exposed Suspension System Components: Furnish quantity of each exposed suspension component equal to 2.0 percent of amount installed, for each ceiling type/pattern.

PART 2-PRODUCTS

2.1 MANUFACTURERS

- .1 Armstrong World Industries, Inc.
- .2 Ceiling Panels: Model numbers for acoustic ceiling tiles and grid as manufactured by Armstrong World Industries, are listed to establish a standard of quality for design, function, materials, performance, workmanship, and appearance. The following manufacturers may be submitted for evaluation by the architect by following the conditions of the Product Substitutions Section 01250. The architect shall be the sole judge as to the acceptability of all products submitted for substitution.
 - .1 CertainTeed.
 - .2 Canadian Gypsum Company (CGC).

2.2. ACOUSTICAL CEILING UNITS

- .1 Surface Texture: Medium
- .2 Composition: Wet formed mineral fibre
- .3 Color: White
- .4 Size: 24in X 24in X 5/8in
- .5 Edge Profile: Square
- .6 Noise Reduction Coefficient (NRC): 0.55.
- .7 CAC: .35
- .8 Fire Performance: ASTM E84 and CAN/ULC S102 surface burning characteristics. Flame Spread Index 25 or less. Smoke Developed Index 50 or less (UL labeled.)
- .9 Flame Spread: ASTM E 1264; Type XII, Form 2, Pattern E Fire Class A
- .10 Light Reflectance (LR): ASTM E 1477; White Panel: Light Reflectance: 0.85.

- .11 Antimicrobial Protection: Inherent - Resists the growth of mold/mildew and bacterial growth.
- .12 Acceptable Product: School Zone Fine Fissured 465 as manufactured by Armstrong World Industries, or equivalent.

2.3 SUSPENSION SYSTEMS

- .1 Components: All main beams and cross tees shall be commercial quality hot-dipped galvanized (galvanized steel, aluminum, or stainless steel) as per ASTM A 653. Main beams and cross tees are double-web steel construction with 15/16 IN type exposed flange design. Exposed surfaces chemically cleansed, capping pre-finished galvanized steel (aluminum or stainless steel) in baked polyester paint. Main beams and cross tees shall have rotary stitching (exception: extruded aluminum or stainless steel).
 - .1 Structural Classification: ASTM C 635 LD.
 - .2 Color: White Aluminum and match the actual color of the selected ceiling tile, unless noted otherwise.
 - .3 Acceptable Product: Prelude XL 15/16" Exposed Tee as manufactured by Armstrong World Industries, Inc.
- .2 Attachment Devices: Size for five times design load indicated in ASTM C 635, Table 1, Direct Hung unless otherwise indicated.
- .3 Wire for Hangers and Ties: ASTM A 641, Class 1 zinc coating, soft temper, pre-stretched, with a yield stress load of at least three times design load, but not less than 12 gauge.
- .4 Edge Moldings and Trim: Metal or extruded aluminum of types and profiles indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations, including light fixtures, that fit type of edge detail and suspension system indicated. Provide moldings with exposed flange of the same width as exposed runner.
- .5 Accessories
 - .1 Shadow molding with ½" (13mm) reveal, exposed flange same width as exposed runners, to be used at interface with walls/bulkheads.
 - .2 2" Floating Edge Trim Channel to be provided at all locations where ACT ceiling terminates away from walls/bulkheads. See also details.

PART 3 - EXECUTION

3.1 EXAMINATION

- .1 Do not proceed with installation until all wet work such as concrete, terrazzo, plastering and painting has been completed and thoroughly dried out, unless expressly permitted by manufacturer's printed recommendations. (Exception: HumiGuard Max Ceilings)

3.2 PREPARATION

- .1 Measure each ceiling area and establish layout of acoustical units to balance border widths at opposite edges of each ceiling. Avoid use of less than half width units at borders, and comply with reflected ceiling plans. Coordinate panel layout with mechanical and electrical fixtures.
- .2 Coordination: Furnish layouts for preset inserts, clips, and other ceiling anchors whose installation is specified in other sections.
 - .1 Furnish concrete inserts and similar devices to other trades for installation well in advance of time needed for coordination of other work.

3.3 INSTALLATION

- .1 Install suspension system and panels in accordance with the manufacturer's instructions, and in compliance with ASTM C 636 and with the authorities having jurisdiction.
- .2 Suspend main beam from overhead construction with hanger wires spaced 4'-0" on center along the length of the main runner. Install hanger wires plumb and straight.
- .3 Install wall moldings at intersection of suspended ceiling and vertical surfaces. Miter corners where wall moldings intersect or install corner caps.
- .4 For reveal edge panels: Cut and reveal or rabbet edges of ceiling panels at border areas and vertical surfaces.
- .5 Install acoustical panels in coordination with suspended system, with edges resting on flanges of main runner and cross tees. Cut and fit panels neatly against abutting surfaces. Support edges by wall moldings.

3.4 INTERFACE WITH OTHER WORK

- .1 Co-ordinate ceiling work to accommodate components of other sections, such as light fixtures, diffusers, speakers, sprinkler heads, to be built into acoustical ceiling components.

3.5 ADJUSTING AND CLEANING

- .1 Replace damaged and broken panels.
- .2 Clean exposed surfaces of acoustical ceilings, including trim, edge moldings, and suspension members. Comply with manufacturer's instructions for cleaning and touch up of minor finish damage.
 - .1 Ceiling Touch-Up Paint, (Item #5760, 8oz. bottles) (Item #5761, quart size cans), "global white" latex paint should be used to hide minor scratches and nicks in the surface and to cover field tegularized edges that are exposed to view.
- .3 Remove and replace work that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION

PART 1 - GENERAL

1.1 References

- .1 American Society for Testing and Materials (ASTM):
 - .1 ASTM F 2195 Standard Specification for Linoleum Tile Floor Covering.
 - .2 ASTM F 1869 Standard Test Method for Measuring Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride
 - .3 ASTM F 2170 Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes
 - .4 ASTM F 1861 Standard Specification for Resilient Wall Base.
 - .5 ASTM F 710 Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring.
 - .6 ASTM F 1482 Standard Practice for Installation and Preparation of Panel Type Underlayments to Receive Resilient Flooring.
 - .7 ASTM E 648 Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source.
 - .8 ASTM E 662 Standard Test Method for Specific Optical Density of Smoke Generated by Solid Materials.
 - .9 ASTM E 84 Standard Test Method for Surface Burning Characteristics of Building Materials.
 - .10 ASTM E 492 Standard Test Method for Laboratory Measurement of Impact Sound Transmission through Floor-Ceiling Assemblies Using the Tapping Machine.
 - .11 ASTM E 989 Standard Classification for Determination of Impact Insulation Class (IIC).
- .2 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.
- .3 International Standards and Training Alliance (Install):
 - .1 Install Resilient Certification.

1.2 Submittals

- .1 Product Data: Submit manufacturer's current printed Product literature, Specifications, installation instructions, and field reports in accordance with Section 01330 - Submittal Procedures.
- .2 Shop Drawings: Submit Shop Drawings to indicate materials, details, and accessories in accordance with Section 01330 - Submittal Procedures including but limited to the following:
 1. Submit a cut diagram indicating seam locations and roll direction. Use mitered seam layouts for corners when changing directions 180 degrees (e.g. when running material down corridors which bisect at a right angle), unless approved otherwise.
- .3 Samples: Submit duplicate 12" x 12" (300 mm x 300 mm) sample pieces of sheet material.

1.3 Closeout Submittals

- 1 Provide maintenance data and warranty for resilient flooring for incorporation into manual specified in Section 01780 - Closeout Submittals.

1.4 QUALITY ASSURANCE

- .1 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 installer certified by flooring manufacturer

- .2 Certificate: Submit certificate indicating installer qualification.
- .2 Regulatory Requirements:
 - .1 Fire Performance Characteristics: Provide resilient linoleum sheet flooring with the following fire performance characteristics as determined by testing Products in accordance with ASTM method indicated below by a certified testing laboratory or another testing and inspecting agency acceptable to authorities having jurisdiction:
 - Critical Radiant Flux: Class 1 Rating per NFPA 253 (ASTM E 648) (0.45 watts/cm² or greater).
 - Smoke Density: Less than 450 per NFPA 258 (ASTM E 662).
 - .2 Provide slip resistant sheet vinyl safety flooring in compliance with the following:
 - 1 Ontario Building Code (OBC), latest edition.
 - 2 City of Hamilton Barrier Free Design Guidelines, latest edition
 - 3 Workplace Safety Insurance Board (WSIB).
 - .3 Mock-Ups: Install at Project site a job mock-up using acceptable Products and manufacturer approved installation methods. Obtain Owner's and Consultant's acceptance of finish color, texture and pattern, and Workmanship standard. Comply with Division 1 Quality Control (Mock-Up Requirements) Section.
 - .1 Mock-Up Size: 3m x 3m, location as directed by Consultant.
 - .2 Incorporation: Mock-up may be incorporated into final construction upon Owner's approval.

1.5 DELIVERY, STORAGE, AND HANDLING

- .1 General: Comply with Division 1 Product Requirements Sections.
- .2 Ordering: Comply with manufacturer's ordering instructions and lead time requirements to avoid construction delays.
- .3 Delivery: Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.
- .4 Storage and Protection: Store materials protected from exposure to harmful weather conditions and at temperature and humidity conditions recommended by manufacturer.
 - .1 Material should be stored in areas that are fully enclosed and weathertight. The permanent HVAC should be fully operational, controlled and set at a minimum of 68° F (20° C) for at least 48 hours prior to the installation.

1.6 PROJECT CONDITIONS

- .1 Environmental Requirements/Conditions: In accordance with manufacturer's recommendations, areas to receive flooring should be clean, fully enclosed and weathertight. The permanent HVAC must be fully operational, controlled and set at a minimum of 68° F (20° C) for a minimum of seven days prior to, during, and seven days after the installation. The flooring material should be conditioned in the same manner for at least 48 hours prior to the installation. Areas to receive flooring shall be adequately lighted to allow for proper inspection of the substrate, installation and seaming of the flooring, and for final inspection.
- .1 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: 68° F (20° C) for a minimum of seven days prior to, during, and seven days after the installation.

1.7 SEQUENCING AND SCHEDULING

- .1 Finishing Operations: Install tile flooring after finishing operations, including painting and ceiling operations, have been completed.

- .2 Concrete Curing: Do not install tile flooring over concrete substrates until substrates have cured and are dry to bond with adhesive as determined by resilient flooring manufacturer's recommended bond, moisture test, and pH test.
 - .1 It is the Flooring Contractor's responsibility to verify suitability of substrate.

1.8 WARRANTY

- .1 Project Warranty: Refer to "Conditions of the Contract" for Project warranty provisions.
- .2 Manufacturer's Warranty: Submit, for Owner's acceptance, manufacturer's standard warranty document executed by authorized company official. Manufacturer's warranty is in addition to, and not a limitation of, other rights Owner may have under Contract Documents.
 - .1 Warranty Period: Five (5) year limited warranty commencing on Date of Substantial Completion.

1.9 MAINTENANCE

- .1 Extra Materials: Deliver to Owner extra materials from same Production run as Products installed. Package Products with protective covering and identify with descriptive labels. Comply with Division 1 Closeout Submittals (Maintenance Materials) Section.
 - .1 Quantity: Furnish quantity of flooring units equal to 5% of amount installed for each colour/pattern. Extra material to be Provided from same dye lot as installed material.
 - .2 Delivery, Storage and Protection: Comply with Owner's requirements for delivery, storage and protection of extra materials.

PART 2 - PRODUCTS

2.1 RESILIENT LINOLEUM TILE FLOORING (RES)

- .1 Product Performance Requirements
 - .1 Description: Homogeneous tile linoleum of primarily natural materials consisting of linseed oil, wood flour, and rosin binders, mixed and calendered onto a polyester backing to ensure optimum dimensional stability. Pattern and color shall extend throughout total thickness of material.
 - .2 Size: 50cm x 50cm; 50 cm x 25cm and 100cm x 25cm as indicated on drawings
 - .3 Gauge: 2.5mm (1/10")
 - .4 Backing: Polyester
 - .5 Pattern and Color: As selected by Consultant from manufacturer's full pattern/color range. Allow for 2 colours.
 - .6 Adhesive: As recommended by manufacturer
 - .7 Heat Welding Rod: colour-matched solid colour as recommended by manufacturer.
- 2 Resilient Tile Flooring must:
 - .1 not be manufactured or formulated with heavy metals including cadmium (Cd), chromium (Cr), lead (Pb), mercury (Hg), and nickel (Ni);
 - .2 not contain > 0.01 % by weight of arsenic (As);
 - .3 not contain > 1 % by weight of tin (Sn), and zinc (Zn);
 - .4 be manufactured with recycled content; and
 - .5 not contain or be manufactured with materials derived from species listed under CITES.
- .4 The manufacturing process must adhere to Lifecycle Assessment Standards as per CAN/CSA-ISO 14040.

2.2 ACCESSORIES

- .1 Resilient base: continuous, top set, complete with premoulded end stops and external corners:
 - .1 Type: rubber (100% PVC free, phthalate free and Red list chemical free).
 - .2 Style: cove.
 - .3 Thickness: 3.17 mm.
 - .4 Height: 101.6 mm.
 - .5 Lengths: cut lengths minimum 2400 mm.
 - .6 Colour: To be determined by Consultant from full colour range.
 - .7 Acceptable Products: Pinnacle by Roppe, Optimum Edge TS by Mannington or Baseworks by Johnsonite
- .2 One Piece rubber stair tread and riser with safety Strip.
 - .1 Nose Type: Square with taper & relief cut.
 - .2 Nose Length: 1 9/16" (39.69mm)
 - .3 Leading Edge Thickness: 1/4" (6.35mm)
 - .4 Back Edge Thickness: 5/64" (2mm)
 - .5 Tread Depth: 20 7/16" (519.12mm)
 - .6 Tread Length: 48" (1.22m)
 - .7 Safety Strip: One 2" (50.8mm) smooth carborundum insert spaced 3/4" (19mm) from nose.
 - .8 Provide coordinated landing tile.
 - .9 Acceptable Product: #96 Vantage Design Tread & Riser as manufactured by Roppe or equivalent.
- .3 Metal edge strips:
 1. For edging between resilient sheet flooring and all other floor materials always use a flush anodized aluminum metal edging. Exact model number to be determined by the Contractor based on site conditions and height differential and to be approved by Architect prior to installation.

PART 3 - EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

- .1 Compliance: Comply with manufacturer's Product data, including Product technical bulletins, Product catalog installation instructions, and Product carton instructions for installation.

3.2 EXAMINATION

- .1 Site Verification of Conditions: Verify substrate conditions (which have been previously installed under other sections) are acceptable for Product installation in accordance with manufacturer's instructions (i.e. moisture tests, bond test, pH test).
- .2 Material Inspection: In accordance with manufacturer's installation requirements, visually inspect materials prior to installation. Material with visual defects shall not be installed.

3.3 PREPARATION

- .1 Adjacent Surfaces Protection: Protect adjacent Work areas and finish surfaces from damage during Product installation.
- .2 Surface Preparation:
 - .1 General: Prepare floor substrate in accordance with manufacturer's instructions.
 - .2 Floor Substrate: Floors shall be sound, smooth, flat, permanently dry, clean, and free of all foreign materials including, but not limited to, dust, paint, grease, oils, solvents, curing and hardening compounds, sealers, asphalt and old adhesive residue.

- .3 Level all rough surfaces and fill cracks and marks with a patching compound compatible with Resilient Flooring.
- .4 Mechanically remove all surface contaminants such as paint, oil, grease, varnish, adhesive as well as various other products such as treatment compounds.
- .5 Concrete Moisture Testing: Conduct moisture tests on all concrete floors regardless of the age, grade level or the presence of existing flooring. Conduct calcium chloride tests in accordance with ASTM F 1869. Measure the internal relative humidity of the concrete slab in accordance with ASTM F 2170. One test of each type should be conducted for every 1,000 square feet of flooring (minimum of 3). The tests should be conducted around the perimeter of the room, at columns, and anywhere moisture may be evident. Concrete moisture vapor emissions must not exceed 5.0 lbs. per 1,000 square feet in 24 hours when using Forbo T 940 adhesive. Concrete internal relative humidity must not exceed 75% when using Forbo T 940 adhesive. A diagram of the area showing the location and results of each test should be submitted to the Consultant, General Contractor or End User. If the test results exceed these limitations, the installation must not proceed until the problem has been corrected.
- .6 Concrete pH Test: Perform pH tests on concrete floors regardless of the age or grade level. If the pH is greater than 10, it must be neutralized prior to beginning the installation.

3.4 INSTALLATION OF RESILIENT TILE FLOORING (RES)

- .1 Adhesive Flooring Installation: Begin laying tiles at the starting point, ensuring that the tile is laid exactly along the layout lines. Because the tiles must be installed into wet adhesive, do not spread the adhesive in an area larger than the tile can be installed while the adhesive is still wet. The successful installation of border tiles is best accomplished by following one of two strategies. (1) When laying out tile, determine the edge of a field tile a comfortable distance from each wall and then snap chalk lines around the perimeter of the room. When spreading adhesive, use these lines as a guide to stop spreading adhesive and install the field tile up to the adhesive spread lines. Once the field tiles have been installed, the border tiles can be "dry" fitted (before spreading the adhesive). After the border tiles have been cut, adhesive can be applied in the area of the border tiles and the tiles can be placed immediately into the wet adhesive. (2) Plan the sequence of spreading adhesive so that the border tiles can be cut and placed into the adhesive before the adhesive Working time has been exceeded. Immediately after installation, roll the tile with a 100 pound roller in both directions and repeat as necessary to ensure adequate transfer of adhesive to the backing.
 - .1 Adhesive Material Installation: Use trowel as recommended by flooring manufacturer for specific adhesive. Spread at a rate of approximately 150 ft²/gallon, as recommended by flooring manufacturer.
- .2 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.

- .1 Use adhesive applied to substrate in compliance with flooring manufacturer's recommendations, including those for trowel notching, adhesive mixing, and adhesive open and Working times.
- .7 Roll resilient flooring as required by resilient flooring manufacturer.
- .3 Finish Flooring Patterns: As selected by Consultant.

3.5 APPLICATION of RUBBER BASE

- .1 Lay out base to keep number of joints at minimum.
- .2 Clean substrate and prime with one coat of adhesive.
- .3 Apply adhesive to back of base.
- .4 Set base against wall and floor surfaces tightly by using 3 kg hand roller.
- .5 Install straight and level to variation of 1:1000.
- .6 Scribe and fit to door frames and other obstructions. Use premoulded end pieces at flush door frames.
- .7 Cope internal corners. Use premoulded corner units for right angle external corners. Use formed straight base material for external corners of other angles.
- .10 Heat weld base in accordance with manufacturer's printed instructions.

3.6 CLEANING

- .1 Cleaning: Remove temporary coverings and protection of adjacent Work areas. Repair or replace damaged installed Products. Clean installed Products in accordance with manufacturer's instructions prior to Owner's acceptance. Remove construction debris from Project site and legally dispose of debris.
 - .1 Remove visible adhesive and other surface blemishes using cleaning methods recommended by floor manufacturer.
 - .2 Sweep and vacuum floor after installation.
 - .3 Do not wash floor until after time period recommended by flooring manufacturer.
 - .4 Damp mop flooring to remove black marks and soil.

3.7 PROTECTION

- .1 Protection: Protect installed Product and finish surfaces from damage during construction. Remove and legally dispose of protective covering at time of Substantial Completion.

3.8 INITIAL MAINTENANCE PROCEDURES

- .1 General: Include in Contract Sum Amount cost for initial maintenance procedures, and execute procedures after flooring installation as recommended by flooring manufacturer.

END OF SECTION

PART 1 - GENERAL

1.01 SECTION INCLUDES

- .1 Seamless, resinous, waterproof, decorative, brightly coloured quartz broadcast aggregate, epoxy floor system with integral cove base.

1.02 SUMMARY

- .1 Definitions: Resinous epoxy flooring system includes a penetrating, two component primer, free flowing epoxy formulation including resin, hardener and reactive flow enhancers, brightly colored, quartz silica aggregate broadcast and a two-component, high performance, UV resistant, clear epoxy sealer.

1.03 SUBMITTALS

- .1 Product Data: Submit manufacturer's technical data, installation instructions, and general recommendations for each resinous flooring material required. Include certification indicating compliance of materials with project requirements.
- .2 Samples: Submit, for verification purposes, 4-inch square samples of each type of resinous flooring material required, applied to a rigid backing, in color and finish indicated.
 1. For initial selection of colors and finishes, submit manufacturer's color charts showing full range of colors and finishes available.

1.04 QUALITY ASSURANCE

- .1 Single Source Responsibility: Obtain primary resinous flooring materials including primers, resins, hardening agents, aggregates, finish or sealing coats from a single manufacturer with not less than ten years of successful experience in manufacturing and installing principal materials described in this section. Contractor shall have completed at least five projects of similar size and complexity.
- .2 Pre-Installation Conference
 1. General contractor shall arrange a for flooring manufacturer/installer representative to attend a regularly scheduled site meeting not less than thirty days prior to starting work to review site conditions and project installation with Owner and Consultant.
- .3 ISO 9001: All materials, including primers, resins, curing agents, finish coats, aggregates and sealants are manufactured and tested under an ISO 9001 registered quality system.

1.05 DELIVERY, STORAGE AND HANDLING

- .1 Material shall be delivered to job site and checked by flooring contractor for completeness and shipping damage prior to job start.
- .2 All materials used shall be factory blended and packaged in single, easy to manage batches to eliminate on site blending errors. Only the on-site weighing of catalyst will be allowed.
- .3 Material shall be stored in a dry, enclosed area protected from exposure to moisture. Temperature of storage area shall be maintained between 60 and 85°F/16 and 30°C.

1.06 PROJECT CONDITIONS

- .1 Concrete or masonry substrates shall be properly cured for a minimum of 30 days and shall be tested to ensure relative humidity or water vapour emission rates are in accordance with Manufacturer's recommendations. A vapor barrier or exterior applied waterproofing membrane must be present for concrete slabs below grade.
- .2 Utilities, including electric, water, heat (air temperature between 32 and 85°F/0 and 30°C) and

finished lighting to be supplied by General Contractor.

- .3 Job area to be free of other trades during, and for a period of 4 hours, after flooring system installation.
- .4 Protection of finished flooring system from damage by subsequent trades shall be the responsibility of the General Contractor.

1.07 WARRANTY

- .1 Manufacturer shall furnish a single, written warranty covering both material and workmanship for a period of one (1) full year from date of installation.

PART 2 -PRODUCTS

2.01 RESINOUS FLOORING SYSTEM

- .1 5 mm thick, 100% solids, decorative, quartz aggregate broadcast flooring system with integral cove base comprised of an epoxy primer, mortar base, undercoat, broadcast media and epoxy sealer.
- .2 Physical Properties: Provide flooring system in which minimum physical properties of the complete system, including primers, fillers, aggregates, and sealers, and when tested in accordance with standards or procedures referenced below, are as follows:

Compressive Strength (ASTM C-579)	10,000 psi
Tensile Strength (ASTM D-638)	2,000 psi
Flexural Strength (ASTM C-580)	4,000 psi
Hardness (ASTM D-2240, Shore D)	85-90
Impact Resistance (ASTM D-2794)	>160 in-lbs
Abrasion Resistance (ASTM D-4060, CS-17, 1 kg Load, 1,000 cycles)	0.06 gm max. weight loss
Bond Strength (ASTM D-7234) (100% concrete failure)	>400 psi
Heat Resistance Limitation	140oF/60oC (for continuous exposure) 200oF/93oC (for intermittent spills)
Slip Resistance Index (ASTM F-1679, when tested wet)	0.90
Water Absorption (ASTM C-413)	0.1%

- .3 Acceptable Manufacturers/Products:
 - .1 Stonshield HRI as distributed by Stonhard (including Stonhard Standard Primer, Stonshield HRI Base, Stonshield Undercoat, Stonshield Quartz Aggregate and Stonshield Sealer)
 - .2 Equivalent products per Specification 01250.
- .4 Colour/Pattern:
 - .1 To be selected by Consultant from full manufacturer colour range.

2.02 GROUT (SLOPE TO DRAIN)

- .1 A fast setting epoxy-based grout used to build up floor levels and slopes to drain as indicated on drawings/details.
- .2 Acceptable product: Stonset TG5 as manufactured by Stonhard, or equivalent products per Specification 01250.

2.03 WATERPROOF MEMBRANE

- .1 Acceptable product: Stonproof ME7 or equivalent products per Specification 01250.

2.04 ACCESSORIES

- .1 Joint Sealant: Type produced by manufacturer of resinous flooring system for type of service and joint condition indicated. Allowances should be included for Stonflex MP7 joint fill material, and CT5 concrete crack treatment.
- .2 Primer: As recommended by manufacturer.
- .3 Patching compound: As recommended by manufacturer.

PART 3 - EXECUTION

3.01 PREPARATION

- .1 Concrete Substrate: Concrete preparation shall be by mechanical means and may include use of diamond grinder, sander, shotblast method and / or other mechanical means for removal of bond inhibiting materials such as curing compounds, dust, form release agents or laitance. Comply with ASTM C 811 requirements, unless manufacturer's written instructions are more stringent.
- .2 Repair damaged and deteriorated concrete according to resinous flooring manufacturer's written recommendations.
- .3 Verify that concrete substrates are dry.
 - .1 Perform in situ probe test, ASTM F 2170. Proceed with application only after substrates do not exceed a maximum potential equilibrium relative humidity of 75 percent.
 - .2 Perform anhydrous calcium chloride test, ASTM F 1869. Proceed with application only after substrates have maximum moisture-vapor-emission rate of 5 lb of water/1000 sq. ft. of slab in 24 hours.
 - .3 Perform additional moisture tests recommended by manufacturer. Proceed with application only after substrates pass testing.
- .4 Verify that concrete substrates have neutral Ph and that resinous flooring will adhere to them. Perform tests recommended by manufacturer. Proceed with application only after substrates pass testing.

3.02 APPLICATION

- .1 General: Apply each component of resinous flooring system in compliance with manufacturer's directions to produce a uniform monolithic surface of thickness indicated, uninterrupted except at expansion joints or other types of joints (if any), indicated or required.
- .2 Primer: Mix and apply primer over properly prepared substrate throughout all areas required by resinous flooring system in strict adherence to manufacturer's installation procedures and coverage rates.
- .3 Mortar (Sloped to drain): Spread and compact mortar system with 3" x 12" steel finishing trowel producing slope as indicated on drawings.
- .4 Waterproof Membrane: apply waterproof membrane with a notched squeegee to a uniform dry film thickness of 500-625 microns (20-25 mil), and/or as per manufacturers written instructions.

- .5 Cove Base: Mix material according to manufacturer's recommended procedures. Apply cove base material immediately after mixing using preformed cove trowels to a height of 150mm (6") where indicated on the room finish schedule/details, before applying flooring. Cove base shall be finished smooth and free of all possible waves, undulations, and other surface defects. Minor imperfections shall be mechanically removed prior to application of topcoat.
- .6 Undercoat: Mix material according to manufacturer's recommended procedures. Apply undercoat material immediately after mixing using squeegees or premium nap rollers. Coloured, quartz aggregate shall be broadcast into the wet undercoat until refusal. Excess aggregate shall be removed following appropriate cure time. Strict adherence to manufacturer's coverage rates shall be maintained.
- .7 Topcoat: Apply topcoat(s) and sealer in number of coats indicated for flooring system and at spreading rates recommended in writing by manufacturer. Strict adherence to manufacturer's coverage rates shall be maintained.

3.03 TERMINATIONS

- .1 Chase edges to "lock" the flooring system into the concrete substrate along lines of termination.
- .2 Penetration Treatment: Lap and seal resinous system onto the perimeter of the penetrating item by bridging over compatible elastomer at the interface to compensate for possible movement.
- .3 Trenches: Continue flooring system into trenches to maintain monolithic protection. Treat cold joints to assure bridging of potential cracks.
- .4 Treat floor drains by chasing the flooring system to lock in place at point of termination.

3.04 JOINTS AND CRACKS

- .1 Treat control joints to bridge potential cracks and to maintain monolithic protection.
- .2 Treat cold joints and construction joints to bridge potential cracks and to maintain monolithic protection on horizontal and vertical surfaces as well as horizontal and vertical interfaces.
- .3 Discontinue floor coating system at vertical and horizontal contraction and expansion joints by installing backer rod and compatible sealant after coating installation is completed. Provide sealant type recommended by manufacturer for traffic conditions and chemical exposures to be encountered.

3.05 FIELD QUALITY CONTROL

- .1 The right is reserved to invoke the following material testing procedure(s) at any time, and any number of times during period of flooring application.
- .2 The Owner will engage service of an independent testing laboratory to sample materials being used on the job site. Samples of material will be taken, identified and sealed, and certified in presence of Contractor.
- .3 Testing laboratory will perform tests for any of characteristics specified, using applicable testing procedures referenced herein, or if none referenced, in manufacturer's product data.
- .4 The General Contractor shall engage service of an independent coating inspector to perform core tests to verify installation thickness meets the requirements of the specification. Installer shall repair to the Architect's satisfaction any damage in the flooring system.
- .5 If test results show materials being used do not comply with specified requirements, flooring contractor may be directed by Owner to stop work; remove non-complying materials; pay for testing; reapply flooring materials to properly prepared surfaces which had previously been coated with unacceptable materials.

3.06 CURING, PROTECTION AND CLEANING

- .1 Cure resinous flooring materials in compliance with manufacturer's directions, taking care to prevent contamination during stages of application and prior to completion of curing process.

Close area of application for a minimum of 18 hours after application.

- .2 Protect flooring system from damage and wear during construction operation. Where temporary covering is required for this purpose, comply with manufacturer's recommendations for protective materials and method of application. General Contractor shall be responsible for protection and cleaning of surfaces after final coats.
- .3 Cleaning: Remove temporary covering and clean resinous flooring system prior to final inspection. Use cleaning materials and procedures recommended by resinous flooring system manufacturer. General Contractor shall be responsible for cleaning of the surfaces prior to inspection.

END OF SECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

- .1 This section includes labor, materials and other services necessary to complete vinyl wall coverings.
- .2 Conform with requirements of all Sections of Division 1, General Requirements, as it applies to the work of this Section.

1.02 REFERENCES

- .1. General: Standards listed by reference, including revisions by issuing authority, form a part of this specification section to extent indicated. Standards listed are identified by issuing authority, authority abbreviation, designation number, title or other designation established by issuing authority. Standards subsequently referenced herein are referred to by issuing authority abbreviation and standard designation.
- .2 American Society for Testing & Materials (ASTM):
 1. AST ASTM E 84-05 Standard Test Method for Surface Burning Characteristics of Building Materials.
 2. ASTM D5420 Gardner Impact Exceeds 160 inch pounds

1.03 SYSTEM DESCRIPTION

- .1 Performance Requirements: Provide hygienic wall covering which has been manufactured and installed to maintain performance criteria stated by manufacturer without defects, damage or failure.

1.04 SUBMITTALS

- .1 Product Data: Submit manufacturer's current printed product literature, specifications, installation instructions, and field reports in accordance with Section 01330 - Submittal Procedures.
- .2 Shop Drawings: Submit shop drawings to indicate materials, details, and accessories in accordance with Section 01330 - Submittal Procedures including but limited to the following:
 1. Submit a layout diagram indicating the location of each panel and joining method.
- .3 Samples: Provide 3no 6"x6" samples of material in each colour/texture..
- .4 Quality Assurance Submittals: Submit the following:
 1. Test Reports: Certified test reports showing compliance with specified performance characteristics and physical properties.
 2. Manufacturer's Instructions: Current published manufacturer's installation and maintenance instructions.
- .5 Closeout Submittals: Submit the following:
 1. Operation and Maintenance Data: Operation and maintenance data for installed products in accordance with Division 1 Closeout Submittals (Maintenance Data and Operation Data) Section. Include methods for maintaining installed products and precautions against cleaning materials and methods detrimental to finishes and performance.
 2. Warranty: Warranty documents specified herein

1.05 QUALITY ASSURANCE

- .1 Installer Qualifications: Installer experienced in performing work of this section who has specialized in installation of work similar to that required for this project.
- .2 Mock-ups: Install at project site a job mock-up using acceptable products and manufacturer

approved installation methods. Obtain Owner's and Consultant's acceptance of finish color, texture and pattern, and workmanship standards.

- .1 Mock-Up Size: 4' x 8'
- .2 Incorporation: Mock-up may be incorporated into final construction upon Owner's approval.
- .3 Pre-installation Meeting: Conduct pre-installation meeting to verify project requirements, substrate conditions, manufacturer's installation instructions and manufacturer's warranty requirements.

1.06 DELIVERY, STORAGE & HANDLING

- .1 Ordering: Comply with manufacturer's ordering instructions and lead time requirements to avoid construction delays.
- .2 Deliver, store and handle panels in accordance with Section 01610 - Basic Material Requirements.
- .3 Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.
- .4 Store materials protected from exposure to harmful weather conditions, at temperature and humidity conditions recommended by manufacturer.
- .5 Store panels in temperature controlled environments. Leave protective blue film on panel until ready to use.

1.07 WASTE MANAGEMENT AND DISPOSAL

- .1 Deposit all packaging materials in appropriate container on site for recycling or reuse.
- .2 Avoid using landfill waste disposal procedures when recycling facilities are available.
- .3 Keep all discarded packaging away from children.

1.08 PROJECT CONDITIONS

- .1 Temperature Requirements: If storage temperature is below 65F (18C), hygienic wall panels must be moved to a warmer place and allowed to reach this temperature before installation. For further information, refer to manufacturers current Installation Guide.
- .2 Maintain air temperature and structural base temperature at installation area between 65F (18C) and 80F (26C) for 48 hours before, during and 24 hours after installation.

1.09 WARRANTY

- .1 Project Warranty: Refer to Conditions of the Contract for project warranty provisions.
- .2 Manufacturer's Warranty: Submit, for Owner's acceptance, manufacturer's standard warranty document executed by authorized company official. Manufacturer's warranty is in addition to, and not a limitation of, other rights Owner may have under Contract Documents.
- .3 Warranty Period for Hygienic Wall Panels shall be 10 years commencing on Date of Substantial Completion.

1.10 EXTRA MATERIALS

- A. Provide extra materials of product and adhesives in accordance with Section 01780 - Closeout Submittals.
- C. Provide 64sqft (6m2) of extra materials in one piece and from same production run as installed materials (for each colour/texture scheduled).
- D. Clearly identify each wall panel and each container of adhesive.
- E. Deliver to Owner, upon completion of the work of this section and store where directed.

PART 2 PRODUCTS

2.01 MATERIALS

- .1 100% pure vinyl, extruded, homogenous, semi-rigid PVCu sheet containing no plasticizers or fillers. Acceptable Manufacturers:
 - .1 Whiterock as manufactured by Altro
 - .2 Equivalent products as per Specification 01250
- .2 Panels
 - .1 Thickness: 0.10" (2.5 mm); Panel Width: 4' (1.22m) Panel Height: Either 8' or 10' (2.5m or 3m); Weight 4'x8' Panel: 24 lbs (10.4 kg) Weight 4'x10' Panel: 29 lbs (12.7 kg).
 - .1 Colour: to be selected by Consultant from Standard Colour range. Allow for 3 field colours and 3 accent colours.

2.02 ACCESSORIES

- .1 Vinyl welding rod: Acceptable material:
 - 1. Altro weld rod
- .2 Joint Strips/Accessories:
 - 1. 1-Part Stainless Steel Joint Strip – A855 Brushed Steel
 - 2. 1-Part Transition Strip –G832
 - 3. 1-Part Start and Edge Trim – G833
 - 4. Stainless Steel Capping – [A865 Brushed Steel] Length 8'
- .3 Recessed Shower Shelf: integrated, factory formed hygienic insert that can be welded directly to panels, offering a water-tight, robust recess for shower toiletries. Provide 1 per shower.
 - .1 Total Size: 406mm x 406mm
 - .2 Recessed Size: 254mm x 254mm
 - .3 Depth: 100mm
 - .4 Colour: to be selected by Consultant.
- .4 Acrylic Adhesive: For dry, climate controlled areas, use AltroFix W49, a one-part, water-based, acrylic adhesive as recommended by manufacturer.
- .5 Polyurethane Adhesive: The default adhesive for most installations, suitable for wet area, non-climate controlled areas, and non-absorbent surfaces, use AltroFix W39, a two-part resin-based polyurethane adhesive as recommended by manufacturer. Provide written confirmation adhesive is compatible with liquid applied waterproof membrane as per item 5 below.
- .6 Acrylic polymer based, liquid applied elastomeric waterproof membrane (to be applied to tile backer substrate at washroom/shower areas): Liquid Waterproofing Membrane by USG Durock or equivalent.
- .6 Caulking and Sanitary Sealant:
 - 1. Altro Sanitary Sealant Sealant, Colour: clear.

2.03 SOURCE QUALITY

- .1 Source Quality: Obtain wall products from a single manufacturer.

PART 3 EXECUTION

3.01 MANUFACTURER'S INSTRUCTIONS

- .1 Compliance: Comply with manufacturer's product data, including product technical bulletins, product catalog, installation instructions and product label instructions for installation.

3.02 EXAMINATION

- A. Site Verification of Conditions: Verify substrate conditions, which have been previously installed under other sections, are acceptable for product installation in accordance with manufacturer's instructions.

3.03 SUBSTRATE PREPARATION

- .1 Walls should be smooth and level. High points must be removed and low points filled with filler intended for the substrate and environmental conditions.
- .2 Wall tiles must be fixed firmly to the wall. As long as the tile edges do not protrude you do not have to skim grout joints.
- .3 Surfaces must be permanently dry and free from all substances that may contribute to adhesive bond failure.
- .4 Remove loose paint and conduct an adhesive bond test with paint.
- .5 Exterior walls must be adequately damp-proofed and insulated.
- .6 Dry wall substrates should be paint ready.
- .7 Apply liquid waterproof membrane where scheduled.

3.04 PREPARATION

- .1 All surfaces must be free from dust and cleaned prior to installation. The working environment must also be dust free. Failure to comply with these conditions will reduce the bond strength between the adhesive and substrate which may cause panels to de-bond.
- .2 Very absorbent / porous substrates (particularly plaster finishes and unprimed sheetrock) must have a proprietary sealer e.g. PVA primer or similar, applied to the surface a minimum of 12 hours prior to the installation.
- .3 All electrical switches, power points etc., should be in a first fix / installation state. All electrical equipment should only be moved or altered by a qualified electrician.
- .4 All plumbing should have pipe-work removed to a first fix or installation state and "tails" left protruding from the substrate. Panels can then be drilled and slid over the pipe tails. All holes should be drilled 1/8" (3mm) oversize to allow for expansion, then sealed with Mastic caulking. Plumbing should always be done by a qualified plumber.
- .5 Hot pipes and steam pipes should be insulated and a 1/8" to 1/4" (3-6mm) expansion gap should be created when installing panels around these pipes, then sealed with Mastic caulking.
- .6 All pipes, fixing bolts, etc. extending through the panels should have a minimum 1/8" (3mm) expansion gap and be sealed using Mastic caulking.
- .7 If fitting to door frames, these must be in place prior to installation of panels.
- .8 Prior to installation, it is advisable to complete any painting which comes in contact with panels, as sealant used at junctions is non-paintable.
- .9 Panels should be stored flat and be pre-conditioned a minimum of 24 hours in ambient temperatures similar to the prevailing operational conditions.
- .10 The panels must be stored on a level flat surface off the ground (risk of condensation on the panels if stored on damp surfaces). Storage on uneven surfaces could cause the panels to distort prior to installation.
- .11 First, check the room using a 6' (2 m) level to ensure all walls are flat, paying particular attention to the corners, window reveals, and door entrances. These need to be inspected to ensure they

are free of any debris or irregularities, which could prevent the panels laying flat to the substrate after the adhesive has been applied and the panel installed.

3.05 INSTALLATION

- .1 **Heat Weld System installation shall be provided throughout.** Install panels in accordance with the manufacturers current published Installation Guide. All joints should be joined by Heat Weld Application methods as detailed in manufacturers installation guide.

3.06 FIELD QUALITY REQUIREMENTS

- .1 **Manufacturer's Field Services:** Upon Owner's request, provide manufacturer's field service consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.

1. Site Visits: 1

3.07 CLEANING

- .1 Panels can be cleaned with a diluted soap/detergent solution, such as Altro 44 Cleaner.
- .2 When cleaning the panel surface, we recommend the temperature of water does not exceed 140° F (60° C).
- .3 Pressure cleaning with hot water may be used with the pressure nozzle a minimum of 2 feet (600mm) away from the surface.
- .4 To reduce the buildup of static, cleaning the panels with an anti-static solution is recommended.
- .5 Stubborn stains use AltroClean 44 cleaner or equivalent alkaline cleaner.
 - .1 Remove construction debris from project site and legally dispose of debris.

3.08 PROTECTION

- .1 Do not install near open heat sources (ovens, etc). Stainless steel panels should be used in such areas.

END OF SECTION

PART 1 - GENERAL

1.1 Related Sections.

- .1 Section 01330 - Submittal Procedures.
- .2 Section 01610 - Basic Product Requirements.
- .3 Section 01780 - Closeout Submittals.

1.2 References

- .1 Architectural Painting Specifications Manual, Master Painters Institute (MPI).
- .2 Systems and Specifications Manual, SSPC Painting Manual, Volume Two, Society for Protective Coatings (SSPC).
- .3 Test Method for Measuring Total Volatile Organic Compound Content of Consumer Products, Method 24 (for Surface Coatings) of the Environmental Protection Agency (EPA).
- .4 National Fire Code of Canada.

1.3 Quality Assurance

- .1 Contractor shall have a minimum of five years proven satisfactory experience. When requested, provide a list of last three comparable jobs including, job name and location, specifying authority, and project manager.
- .2 Qualified journeymen who have a "Tradesman Qualification Certificate of Proficiency" shall be engaged in painting work. Apprentices may be employed provided they work under the direct supervision of a qualified journeyman in accordance with trade regulations.
- .3 Conform to latest MPI requirements for interior painting work including preparation and priming.
- .4 Materials primers, paints, fillers, thinners, solvents, etc. shall be in accordance with MPI Painting Specification Manual "Approved Product" listing and shall be from a single manufacturer for each system used.
- .5 Other paint materials such as linseed oil, shellac, turpentine, etc. shall be the highest quality product of an approved manufacturer listed in MPI Painting Specification Manual and shall be compatible with other coating materials as required.
- .6 Retain purchase orders, invoices and other documents to prove conformance with noted MPI requirements when requested by Consultant.
- .7 Standard of Acceptance:
 - .1 Walls: No defects visible from a distance of 1000 mm at 90 degrees to surface.
 - .2 Ceilings: No defects visible from floor at 45degrees to surface when viewed using final lighting source.
 - .3 Final coat to exhibit uniformity of colour and uniformity of sheen across full surface area.

1.4 Environmental Performance Requirements

- .1 Provide paint products meeting MPI "Environmentally Friendly" ratings based on VOC (EPA Method 24) content levels.

1.5 Scheduling of Work

- 1 Submit work schedule for various stages of painting to Consultant for approval. Submit schedule minimum of 48 hours in advance of proposed operations.
- .2 Obtain written authorization from Consultant for any changes in work schedule.

- .3 Schedule painting operations to prevent disruption of occupants in and about the building.

1.7 Quality Control

- .1 When requested by Consultant prepare and paint designated surface, area, room or item in each colour scheme to requirements specified herein, with specified paint or coating showing selected colours, gloss/sheen, textures and workmanship to MPI Painting Specification Manual standards for review and approval. When approved, surface, area, room and/or items shall become acceptable standard of finish quality and workmanship for similar on-site work.

1.8 Delivery, Handling and Storage

- .1 Deliver, store and handle materials in accordance with Section 01610 - Basic Product Requirements.
- .2 Labels shall clearly indicate:
 - .1 Manufacturer's name and address.
 - .2 Type of paint or coating.
 - .3 Compliance with applicable standard.
 - .4 Colour number in accordance with established colour schedule.
- .3 Remove damaged, opened and rejected materials from site.
- .4 Provide and maintain dry, temperature controlled, secure storage.
- .5 Observe manufacturer's recommendations for storage and handling.
- .6 Store materials and supplies away from heat generating devices.
- .7 Store materials and equipment in a well ventilated area with temperature range 7C to 30C.
- .8 Store temperature sensitive products above minimum temperature as recommended by manufacturer.
- .9 Keep areas used for storage, cleaning and preparation, clean and orderly to approval of Consultant. After completion of operations, return areas to clean condition to approval of Consultant.
- .10 Remove paint materials from storage only in quantities required for same day use.
- .11 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling storage, and disposal of hazardous materials.
- .12 Fire Safety Requirements:
 - .1 Provide one 9 kg Type ABC dry chemical fire extinguisher adjacent to storage area.
 - .2 Store oily rags, waste products, empty containers and materials subject to spontaneous combustion in ULC approved, sealed containers and remove from site on a daily basis.
 - .3 Handle, store, use and dispose of flammable and combustible materials in accordance with the National Fire Code of Canada.

1.9 Site Requirements

- .1 Heating, Ventilation and Lighting:
 - .1 Ventilate enclosed spaces
 - .2 Perform no painting work unless adequate and continuous ventilation and sufficient heating facilities are in place to maintain ambient air and substrate temperatures above 10 C for 24 hours before, during and after paint application until paint has cured sufficiently.
 - .3 Where required, provide continuous ventilation for seven days after completion of application of paint.

- .4 Coordinate use of existing ventilation system with Contractor and ensure its operation during and after application of paint as required.
- .5 Provide temporary ventilating and heating equipment where permanent facilities are not available or supplemental ventilating and heating equipment if ventilation and heating from existing system is inadequate to meet minimum requirements.
- .6 Perform no painting work unless a minimum lighting level of 323 Lux is provided on surfaces to be painted. Adequate lighting facilities shall be provided by General Contractor.
- .2 Temperature, Humidity and Substrate Moisture Content Levels:
 - .1 Unless specifically pre-approved by the specifying body, Paint Inspection Agency and the applied product manufacturer, perform no painting work when:
 - .1 Ambient air and substrate temperatures are below 10 C.
 - .2 Substrate temperature is over 32 C unless paint is specifically formulated for application at high temperatures.
 - .3 Substrate and ambient air temperatures are expected to fall outside MPI or paint manufacturer's prescribed limits.
 - .4 The relative humidity is above 85% or when the dew point is less than 3 C variance between the air/surface temperature.
 - .5 Rain or snow are forecast to occur before paint has thoroughly cured or when it is foggy, misty, raining or snowing at site.
 - .2 Perform no painting work when the maximum moisture content of the substrate exceeds:
 - .1 12% for concrete and masonry (clay and concrete brick/block).
 - .2 15% for wood.
 - .3 12% for plaster and gypsum board.
 - .3 Conduct moisture tests using a properly calibrated electronic Moisture Meter, except test concrete floors for moisture using a simple "cover patch test".
 - .4 Test concrete, masonry and plaster surfaces for alkalinity as required.
- .3 Surface and Environmental Conditions:
 - .1 Apply paint finish only in areas where dust is no longer being generated by related construction operations or when wind or ventilation conditions are such that airborne particles will not affect quality of finished surface.
 - .2 Apply paint only to adequately prepared surfaces and to surfaces within moisture limits noted herein.
 - .3 Apply paint only when previous coat of paint is dry or adequately cured.
- .4 Additional Interior Application Requirements:
 - .1 Apply paint finishes only when temperature at location of installation can be satisfactorily maintained within manufacturer's recommendations.
 - .2 Apply paint in occupied facilities during silent hours only. Schedule operations to approval of Owner such that painted surfaces will have dried and cured sufficiently before occupants are affected

1.10 Extra Materials

- 1 Submit maintenance materials in accordance with Section 01780 - Closeout Submittals.
- .2 Submit – (one) four litre can of each type and colour of primer, stain, and finish coating. Identify colour and paint type in relation to established colour schedule and finish system.
- .3 Deliver to Contractor and store where directed.

PART 2 - PRODUCTS

2.1 Materials

- .1 Paint and fillers shall be manufacture's premium quality, of type and brand herein specified and listed under "Paint Product Recommendations" premium grade as covered in the association manual, latest edition, for specific uses and only as supplied by **Pratt & Lambert Co., Benjamin Moore & Co., Para Paints Canada Inc., ICI Paints (Canada) Inc, (Glidden), Sherwin Williams Canada Inc., Pittsburgh Paints**. Paint material such as linseed oil, shellac, turpentine and the like, and any of the materials not specifically mentioned herein but required for first class work with finish specified shall be highest quality product of approved manufacturer. Where specific products are indicated in painting schedule, use product manufacturer as specified.
- .2 Paint materials for paint systems shall be products of a single manufacturer.
- .3 Only qualified products with "Environmentally Friendly" rating are acceptable for use on this project.
- .4 Water-borne surface coatings must be manufactured and transported in a manner that steps of process, including disposal of waste products arising therefrom, will meet requirements of applicable governmental acts, by-laws and regulations including, for facilities located in Canada, Fisheries Act and Canadian Environmental Protection Act (CEPA).
- .5 Water-borne surface coatings must not be formulated or manufactured with aromatic solvents, formaldehyde, halogenated solvents, mercury, lead, cadmium, hexavelant chromium or their compounds.
- .6 Water-borne surface coatings and recycled water-borne surface coatings must have a flash point of 61.0 C or greater.
- .7 Both water-borne surface coatings and recycled water-borne surface coatings must be made by a process that does not release:
 - .1 Matter in undiluted production plant effluent generating a 'Biochemical Oxygen Demand' (BOD) in excess of 15 mg/L to a natural watercourse or a sewage treatment facility lacking secondary treatment.
 - .2 Total Suspended Solids (TSS) in undiluted production plant effluent in excess of 15 mg/L to a natural watercourse or a sewage treatment facility lacking secondary treatment.
- .8 Water-borne paints and stains, recycled water-borne surface coatings and water borne varnishes must meet a minimum "Environmentally Friendly" rating.
- .9 Recycled water-borne surface coatings must contain 50 % post-consumer material by volume.
- .10 Recycled water-borne surface coatings must not contain:
 - .1 Lead in excess of 600.0 ppm weight/weight total solids.
 - .2 Mercury in excess of 50.0 ppm weight/weight total product.
 - .3 Cadmium in excess of 1.0 ppm weight/weight total product.
 - .4 Hexavelant chromium in excess of 3.0 ppm weight/weight total product.
 - .5 Organochlorines or polychlorinated biphenyls (PCBS) in excess of 1.0 ppm weight/weight total product.
- .11 The following must be performed on each batch of consolidated post-consumer material before surface coating is reformulated and canned. These tests must be performed at a laboratory or facility which has been accredited by the Standards Council of Canada.
 - .1 Lead, cadmium and chromium are to be determined using ICP-AES (Inductively Coupled Plasma - Atomic Emission Spectroscopy) technique no. 6010 as defined in EPA SW-846.

- .2 Mercury is to be determined by Cold Vapour Atomic Absorption Spectroscopy using Technique no. 7471 as defined in EPA SW-846.
- .3 Organochlorines and PCBs are to be determined by Gas Chromatography using Technique no. 8081 as defined in EPA SW-846.

2.2 Colours

- .1 Consultant will provide Colour Schedule after Contract award.
- .2 Interior Colours will be based upon the selection of two (2) base colours and three (3) accent colours. No more than eight colours will be selected for the entire project and no more than three colours will be selected in each area. Include for 25% dark tones.
- .3 Exterior colors will be based on three (3) base colors and four (4) accent colors with a maximum of three (3) deep or bright color. No more than seven (6) colors will be selected for the entire project. Note that this does not include pre-finished items by others, e.g. flashings, aluminum or vinyl windows, aluminum doors, etc
- .4 Selection of colours will be from manufacturers full range of colours.
- .5 Where specific products are available in a restricted range of colours, selection will be based on the limited range.
- .6 Second coat in a three coat system to be tinted slightly lighter colour than top coat to show visible difference between coats.

2.3 Mixing and Tinting

- 1 Perform colour tinting operations prior to delivery of paint to site. On-site tinting of painting materials is allowed only with Consultant's written permission.
- .2 Paste, powder or catalyzed paint mixes shall be mixed in strict accordance with manufacturer's written instructions.
- .3 Where thinner is used, addition shall not exceed paint manufacturer's recommendations. Do not use kerosene or any such organic solvents to thin water-based paints.
- .4 Re-mix paint in containers prior to and during application to ensure break-up of lumps, complete dispersion of settled pigment, and colour and gloss uniformity.

2.4 Gloss/Sheen Ratings

- .1 Paint gloss shall be defined as the sheen rating of applied paint, in accordance with the following values:

Gloss Level	Description	Units @ 60 degrees	Units @ 85 degrees
G1	Matte of Flat finish	0 to 5	10 max
G2	Velvet Finish	0 to10	10 to 35
G3	Eggshell Finish	10 to 25	10 to 35
G4	Satin Finish	20 to 35	35 min
G5	Semi-Gloss Finish	35 to 70	
G6	Gloss Finish	70 to 85	
G7	High Gloss Finish	➤ 85	

- .2 Gloss level ratings of painted surfaces shall be as specified herein and as noted on Finish Schedule

2.5 Interior Painting Systems

- .1 Plaster and Drywall: Int 9.2A Latex (G3) finish over latex sealer
- .2 Plaster and Gypsum Board Ceilings: Int 9.2A Latex (G1) finish over latex sealer
- .3 Wood trim: Int 6.4A (G5) finish over alkyd sealer.
- .4 Concrete Unit Masonry: PT: Int 4.2A Latex (G3) finish.
- .5 Structural steel & metal fabrications: Int 5.1E (G5) finish.
- .6 Galvanized metal/zinc coated steel: Int 5.3L (G5) finish
- .7 Use fire retardant paint on fire rated plywood sheets behind electrical panels.

All Finishing System Codes are from the Ontario Painting Contractors Association.

PART 3 - EXECUTION

3.1 General

- .1 Perform preparation and operations for interior painting in accordance with MPI Painting Specifications Manual except where specified otherwise.
- .2 Apply paint materials in accordance with paint manufacturer's written application instructions.

3.2 Existing Conditions

- 1 Investigate existing substrates for problems related to proper and complete preparation of surfaces to be painted. Report to Consultant damages, defects, unsatisfactory or unfavourable conditions before proceeding with work.
- .2 Conduct moisture testing of surfaces to be painted using a properly calibrated electronic moisture meter, except test concrete floors for moisture using a simple "cover patch test" and report findings to Consultant. Do not proceed with work until conditions fall within acceptable range as recommended by manufacturer.
- .3 Maximum moisture content as follows:
 - .1 Stucco, Plaster and Gypsum Board: 12%.
 - .2 Concrete: 12%.
 - .3 Clay and Concrete Block/Brick: 12%.
 - .4 Wood: 15%.

3.3 Protection

- .1 Protect existing building surfaces and adjacent structures from paint spatters, markings and other damage by suitable non-staining covers or masking. If damaged, clean and restore such surfaces as directed by Consultant.
- .2 Protect items that are permanently attached such as Fire Labels on doors and frames.
- .3 Protect factory finished products and equipment.
- .4 Protect passing pedestrians, building occupants and general public in and about the building.
- .5 Removal of electrical cover plates, light fixtures, surface hardware on doors, bath accessories and other surface mounted equipment, fittings and fastenings shall be done prior to undertaking any painting operations by General Contractor. Items shall be securely stored and re-installed after painting is completed by General Contractor.
- .6 Move and cover furniture and portable equipment as necessary to carry out painting operations. Replace as painting operations progress.

- .7 As painting operations progress, place "WET PAINT" signs in occupied areas to approval of Consultant

3.4 Cleaning and Preparation

- .1 Clean and prepare surfaces in accordance with MPI Painting Specification Manual requirements. Refer to MPI Manual in regard to specific requirements and as follows:
 - .1 Remove dust, dirt, and other surface debris by vacuuming, wiping with dry, clean cloths or compressed air.
 - .2 Wash surfaces with a biodegradable detergent and bleach where applicable and clean warm water using a stiff bristle brush to remove dirt, oil and other surface contaminants.
 - .3 Rinse scrubbed surfaces with clean water until foreign matter is flushed from surface.
 - .4 Allow surfaces to drain completely and allow to dry thoroughly.
 - .5 Prepare surfaces for water-based painting, water-based cleaners should be used in place of organic solvents.
 - .6 Use trigger operated spray nozzles for water hoses.
 - .7 Many water-based paints cannot be removed with water once dried. However, minimize the use of kerosene or any such organic solvents to clean up water-based paints.
- .2 Prevent contamination of cleaned surfaces by salts, acids, alkalis, other corrosive chemicals, grease, oil and solvents before prime coat is applied and between applications of remaining coats. Apply primer, paint, or pretreatment as soon as possible after cleaning and before deterioration occurs.
- .3 Where possible, prime surfaces of new wood surfaces before installation. Use same primers as specified for exposed surfaces.
 - .1 Apply vinyl sealer to MPI #36 over knots, pitch, sap and resinous areas.
 - .2 Apply wood filler to nail holes and cracks.
 - .3 Tint filler to match stains for stained woodwork.
- .4 Sand and dust between coats as required to provide adequate adhesion for next coat and to remove defects visible from a distance up to 1000 mm.
- .5 Clean metal surfaces to be painted by removing rust, loose mill scale, welding slag, dirt, oil, grease and other foreign substances in accordance with MPI requirements. Remove traces of blast products from surfaces, pockets and corners to be painted by brushing with clean brushes, blowing with clean dry compressed air, or vacuum cleaning.
- .6 Touch up of shop primers with primer as specified in applicable section. Major touch-up including cleaning and painting of field connections, welds, rivets, nuts, washers, bolts, and damaged or defective paint and rusted areas, shall be by supplier of fabricated material.
- .7 Do not apply paint until prepared surfaces have been accepted by Consultant.

3.5 Application

- 1 Method of application to be as approved by Consultant. Apply paint by brush or roller. Conform to manufacturer's application instructions unless specified otherwise.
- .2 Brush and Roller Application:
 - .1 Apply paint in a uniform layer using brush and/or roller of types suitable for application.
 - .2 Work paint into cracks, crevices and corners.
 - .3 Paint surfaces and corners not accessible to brush using spray, daubers and/or sheepskins. Paint surfaces and corners not accessible to roller using brush, daubers or sheepskins.

- .4 Brush and/or roll out runs and sags, and over-lap marks. Rolled surfaces shall be free of roller tracking and heavy stipple unless approved by Consultant
- .5 Remove runs, sags and brush marks from finished work and repaint.
- .3 Use dipping, sheepskins or daubers only when no other method is practical in places of difficult access and only when specifically authorized by Consultant.
- .4 Apply coats of paint as a continuous film of uniform thickness. Repaint thin spots or bare areas before next coat of paint is applied.
- .5 Allow surfaces to dry and properly cure after cleaning and between subsequent coats for minimum time period as recommended by manufacturer.
- .6 Sand and dust between coats to remove visible defects.
- .7 Finish surfaces both above and below sight lines as specified for surrounding surfaces, including such surfaces as tops of interior cupboards and cabinets and projecting ledges and behind wall mounted items.

3.6 Mechanical/Electrical Equipment

- .1 Unless otherwise specified, paint finished area exposed conduits, piping, hangers, ductwork and other mechanical and electrical equipment with colour and finish to match adjacent surfaces, except as noted otherwise.
- .2 Boiler room, mechanical and electrical rooms: paint exposed conduits, piping, hangers, ductwork and other mechanical and electrical equipment.
- .3 Other unfinished areas: leave exposed conduits, piping, hangers, ductwork and other mechanical and electrical equipment in original finish and touch up scratches and marks.
- .4 Touch up scratches and marks on factory painted finishes and equipment with paint as supplied by manufacturer of equipment.
- .5 Do not paint over nameplates.
- .6 Keep sprinkler heads free of paint.
- .7 Paint inside of ductwork where visible behind grilles, registers and diffusers with primer and one coat of matt black paint.
- .8 Paint fire protection piping red, if required.
- .9 Paint disconnect switches for fire alarm system and exit light systems in red enamel.
- .10 Paint natural gas piping yellow.
- .11 Paint both sides and edges of backboards for telephone and electrical equipment before installation. Leave equipment in original finish except for touch-up as required, and paint conduits, mounting accessories and other unfinished items.
- .12 Do not paint interior transformers and substation equipment.

3.7 Field Quality Control

- .1 Advise Consultant when surfaces and applied coating is ready for inspection. Do not proceed with subsequent coats until previous coat has been approved.

3.8 Restoration

- .1 Clean and re-install all hardware items removed before undertaking painting operations.
- .2 Remove protective coverings and warning signs as soon as practical after operations cease.
- .3 Remove paint splashings on exposed surfaces that were not painted. Remove smears and spatter immediately as operations progress, using compatible solvent.

- .4 Protect freshly completed surfaces from paint droppings and dust to approval of Consultant. Avoid scuffing newly applied paint.
- .5 Restore areas used for storage, cleaning, mixing and handling of paint to clean condition as approved by Consultant.

END OF SECTION

PART 1 - GENERAL

1.01 SUMMARY

.1 Section Includes

Furnish, deliver and install all Toilet Partitions as indicated on the drawings and as required by actual conditions at the building. The Toilet Partitions shall include the furnishing of all necessary screws, special screws, bolts, special bolts, expansion shields and all other devices necessary for the proper installation and application of the Toilet Partitions.

1.02 REFERENCES

.1 Standard

All Toilet Partitions must be scheduled, supplied and installed in accordance with: Local Building Code, CGSB (Canadian Government Specifications Board), CSA (Canadian Standards Association), ANSI (American National Standards Institute), ADA (Americans with Disabilities Act). In all cases the above references shall be taken to mean the latest edition of that particular standard including all revisions.

1.03 SUBMITTALS

.1 Make all submittals in accordance with Section: 01330

.2 Submit detailed shop drawings. Drawings must clearly indicate all methods of attachment at floor/ceiling/walls.

.3 Submit product sheets and/or catalogue cuts, of all products listed in the shop drawings.

.4 Samples

1. Upon request, a returnable sample of the Toilet Partitions shall be submitted to the Consultant/Owner for approval not later than (10) days after requested. All samples must be properly identified including: name of supplier, and name of manufacturer.

.5 Operations and Maintenance Data

1. Provide closeout documents in accordance with Specification 01780.

2. Include at a minimum documentation relating to proper care of toilet partitions, such as required lubrications, adjustments, cleaning, etc

1.04 QUALITY ASSURANCE

.1 Supplier Qualifications

1. Toilet Partition shop drawings and Toilet Partitions shall be procured from a source of supply approved by the Consultant/Owner/Architect. Supplier is responsible for the complete Toilet Partition subcontract.

1.05 DELIVERY, STORAGE AND HANDLING

.1 Marking and Packaging

1. Toilet Partitions must be delivered to the job site in the manufacturers' original packages and marked to correspond with the approved shop drawings.

.2 Delivery

1. Toilet Partitions must be delivered in an amount of time deemed appropriate by the Consultant/Owner.

1.06 WARRANTY

- .1 Written Guarantee
 - 1. The Toilet Partition manufacturer shall guarantee all Toilet Partitions by written certification, for a period of (5) years from date of certified substantial performance of the project, against any defects in design, materials and workmanship. Any defects as described will be made good by the manufacturer at no additional cost to the owner.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- .1 Approved Manufacturers
 - 1. Hadrian Manufacturing Inc.
 - 2. ASI Global Partitions
 - 3. Bradley Corporation

2.02 MATERIALS

- .1 Doors: Shall be constructed of 19mm (3/4") thick solid phenolic core decorative plastic laminate with multiple resin-impregnated kraft and surface sheets fused at high temperature and pressure, edges being finished and polished. Colour to be selected by Consultant from manufacturers standard colour range.
 - .1 Sizes: 72" Height x Width as scheduled
- .2 Hardware:
 - .1 All door hardware shall be chrome plated zinc die castings, standard. Fasteners are 12 x 1-3/4" and 12 x 5/8" TR-27 6-lobe security screws. Doors shall be equipped with a gravity type hinge mounted on the lower pilaster hinge bracket. Door hinges shall be wrap-around style and adjustable to permit the door to rest at any position when not latched.
 - .2 All doors shall include thumbturn lever to activate latch without fingertip grip application. Latches shall have a turn slot designed to allow emergency access from exterior. The combined full length extruded aluminum door stop and keeper shall have a 1/4" wide continuous rubber bumper locked in place the length of the stop. To cover the sightline gap at door hinge side, full length extruded aluminum filler channel shall be provided. The "no sightline" continuous stop and hinge filler shall be #4 brushed stainless steel.
 - .3 Threaded upper hinge pin shall have a metal core and self-lubricating nylon sleeve to ensure smooth, quiet operation.
 - .4 Rubber door bumper must not contain coat hook function.
 - .5 Stainless Steel Hardware: All door wrap around hinge brackets are cast stainless steel, #4 brushed finish; all 12 x 1-3/4" and 12 x 5/8" TR-27 6-lobe security screws are stainless steel, #4 brushed finish; All inner, barrier free inner, outer, door pulls, stop and keepers, coat hooks and door castings are standard zinc die castings, #4 brushed finish.

PART 3 - EXECUTION

3.01 EXAMINATION

- .1 Site Preparation
 - 1. The contractor must examine all site conditions that would prevent the proper application and installation of Toilet Partitions. Any defect must be immediately identified and corrected, prior to the installation of the Toilet Partitions.

3.02 INSTALLATION

- .1 Mounting Locations

1. All Toilet Partitions must be mounted according Manufacturers standard locations and those specified on the drawings.

3.03 FIELD QUALITY CONTROL

.1 Inspection

1. After installation has been completed, provide for a site inspection of all Toilet Partitions to determine that all items have been supplied and installed as per the enclosed details. Also, check the operation and adjustment of all Toilet Partitions. Any discrepancies, or malfunctioning product, must be reported to the Architect immediately.

3.04 ADJUSTMENT AND CLEANING

.1 Final Preparation

1. At final completion, Toilet Partitions shall be left clean and free from disfigurement. Make all final adjustments. Where Toilet Partitions are found defective, repair or replace or otherwise correct as directed.

3.05 PROTECTION

.1 Site Protection

1. The Contractor must provide for the proper protection of all Toilet Partitions until the owner accepts the project as complete.

3.06 TOILET PARTITION SCHEDULE

.1 Schedule

1. Provide Toilet Partitions as specified in all above sections and as per the detailed Architectural Drawings.

END OF SECTION

PART 1 - GENERAL

1.1 SUMMARY

- .1 This Section includes manually operated, single panel operable partitions.

1.2 QUALITY ASSURANCE

- .1 **Installer Qualifications:** An experienced installer who is certified in writing by the operable partition manufacturer, as qualified to install the manufacturer's partition systems for work similar in material, design, and extent to that indicated for this Project.
- .2 **Acoustical Performance:** Test operable partitions in an independent acoustical laboratory in accordance with ASTM E90 test procedure to attain no less than the STC rating specified. Provide a complete and unedited written test report by the testing laboratory upon request.
- .3 **Preparation of the opening shall conform to the criteria set forth per ASTM E557 *Standard Practice for Architectural Application and Installation of Operable Partitions*.**

1.3 SUBMITTALS

- .1 **Product Data:** Material descriptions, construction details, finishes, installation details, and operating instructions for each type of operable partition, component, and accessory specified.
- .2 **Shop Drawings:** Show location and extent of operable partitions. Include plans, elevations, sections, details, attachments to other construction, and accessories. Indicate dimensions, weights, conditions at openings, and at storage areas, and required installation, storage, and operating clearances. Indicate location and installation requirements for hardware and track, including floor tolerances required and direction of travel. Indicate blocking to be provided by others.
- .3 **Setting Drawings:** Show imbedded items and cutouts required in other work, including support beam punching template.
- .4 **Samples:** Color samples demonstrating full range of finishes available by architect. Verification samples will be available in same thickness and material indicated for the work.

1.4 DELIVERY, STORAGE, AND HANDLING

- .1 Clearly mark packages and panels with numbering systems used on Shop Drawings. Do not use permanent markings on panels.
- .2 Protect panels during delivery, storage, and handling to comply with manufacturer's direction and as required to prevent damage.

1.5 WARRANTY

- .1 Provide written warranty by manufacturer of operable partitions agreeing to repair or replace any components with manufacturing defects.
- .2 **Partition Warranty period:** Three (3) years from date of shipment
- .3 **Suspension System Warranty:** Five (5) years from date of shipment

PART 2 – PRODUCTS

2.1 MANUFACTURERS/PRODUCTS

- 1. Acousti-Seal Encore 931 manually operated paired panel operable partition as fabricated by Modernfold Inc.
- .2 Equivalent products as per Specification 01250.

2.2 OPERATION

- .1 Single Panel: Series of individual flat panels, manually operated, top supported with operable floor seals.
- .2 Final Closure
 - .1 Horizontally expanding panel edge with removable crank.

2.3 PANEL CONSTRUCTION

- .1 Nominal 3-inch (76mm) thick panels in manufacturer's standard 48-inch (1220mm) widths. All panel horizontal and vertical framing members fabricated from minimum 18-gage or 16-gage formed steel with overlapped and welded corners for rigidity. Top channel is reinforced to support suspension system components. Frame is designed so that full vertical edges of panels are of formed steel and provide concealed protection of the edges of the panel skin.
- .2 Construction:
 - .1 1/2-inch (13mm) NAUF medium density fiberboard, single material or composite layers continuously bonded to panel frame.
 - .1 Acoustical rating: 41 STC
- .3 Hinges for Closure Panels shall be:
 1. Full leaf butt hinges, attached directly to panel frame with welded hinge anchor plates within panel to further support hinge mounting to frame. Lifetime warranty on hinges. Hinges mounted into panel edge or vertical astragal are not acceptable.
- .4 Panel Trim: No vertical trim required or allowed on edges of panels; minimal groove appearance at panel joints.
- .5 Panel Weights: 41 STC – 6.5 lbs./square foot

2.4 PANEL FINISHES

- .1 Panel face finish shall be Full height steel markerboard work surface.
- .2 Panel trim: Exposed panel trim of one consistent color from manufacturer's standard offering.

2.5 SOUND SEALS

- .1 Vertical Interlocking Sound Seals between panels: Roll-formed steel astragals, with reversible tongue and groove configuration in each panel edge for universal panel operation. Rigid plastic or aluminum astragals or astragals in only one panel edge are not acceptable.
- .2 Horizontal Top Seals: ModernFold Sureset automatic operable top seals, manually operated top seals not required or permitted.
- .3 Horizontal Bottom Seals:
 1. Bottom seal: Automatic operable seals providing nominal 2-inch (51 mm) operating clearance with an operating range of +1/2-inch (13mm) to -1-1/2 inch (38 mm) which automatically drop as panels are positioned, without the need for tools or cranks. Extended seal shall exert nominal 120 pounds (265kg) downward force to the floor throughout operating range.

2.6 SUSPENSION SYSTEM

1. Suspension Tracks: Minimum 11-gage, 0.12-inch (3 mm) roll-formed steel track, suitable for direct mounting to a steel header plate to be fastened mechanically to structural support. Aluminum track is not acceptable.
 - .2 Exposed track soffit: Steel, integral to track, and pre-painted off-white.
2. Carriers:

- .1 Right Angle Turn: Two carriers of low friction polymer, reinforced with steel, that permit panels to traverse L, T, and X intersections without mechanical switching, on all panels except hinged closure panels.
 - .2 Two all-steel trolleys with steel tired ball bearing wheels. Non-steel tires are not acceptable. Suspension system shall provide automatic indexing of panels into stack area using preprogrammed switches and trolleys without electrical, pneumatic, or mechanical activation.
3. Warranty period: 5 Years

2.7 OPTIONS

1. Pass Door: Matching pass door same thickness and appearance as the panels. AODA compliant pass door equipped with friction latch and flush pulls for panic operation. No threshold will be permitted.
2. Pocket Door: Provide pocket door to nearly close operable partition recess with same finish and appearance as the adjacent panels.

PART 3 – EXECUTION

3.1 INSTALLATION

- .1 General: Comply with ASTM E557, operable partition manufacturer's written installation instructions, Drawings and approved Shop Drawings.
- .2 Install operable partitions and accessories after other finishing operations, including painting have been completed.
- .3 Match operable partitions by installing panels from marked packages in numbered sequence indicated on Shop Drawings.
- .4 Broken, cracked, chipped, deformed or unmatched panels are not acceptable.

3.2 CLEANING AND PROTECTION

- .1 Clean partition surfaces upon completing installation of operable partitions to remove dust, dirt, adhesives, and other foreign materials according to manufacturer's written instructions.
- .2 Provide final protection and maintain conditions in a manner acceptable to the manufacturer and installer that insure operable partitions are without damage or deterioration at time of Substantial Completion.

3.3 ADJUSTING

- .1 Adjust operable partitions to operate smoothly, easily, and quietly, free from binding, warp, excessive deflection, distortion, nonalignment, misplacement, disruption, or malfunction, throughout entire operational range. Lubricate hardware and other moving parts.

3.4 EXAMINATION

- .1 Examine flooring, structural support, and opening, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of operable partitions. Proceed with installation only after unsatisfactory conditions have been corrected.

3.5 DEMONSTRATION

- .1 Demonstrate proper operation and maintenance procedures to Owner's representative.
- .2 Provide Operation and Maintenance Manual to Owner's representative.

END OF SECTION

PART 1 - GENERAL

1.1 References

- .1 CAN/CGSB-44.40-[92], Steel Clothing Locker.

1.2 Shop Drawings

- .1 Submit shop drawings in accordance with Section 01330 - Submittal Procedures.
- .2 Indicate type and class of locker, thicknesses of metal, fabricating and assembly methods, assembled banks of lockers, tops, rods, hooks, shelves, bases, trim, numbering, filler panels, end/back panels, doors, handles, locking method, ventilation method, finishes.

1.3 Samples

- .1 Submit samples in accordance with Section 01330 - Submittal Procedures.
- .2 Submit duplicate 50 x 50 mm samples of colour and finish on actual base metal.

PART 2 - PRODUCTS

2.1 Manufactured Units

- .1 Approved Manufacturers:
 - .1 ASI Storage Solutions
 - .2 Deluxe Series Lockers by Shannahan's
 - .3 Emperor Lockers by Hadrian Manufacturing,
- .2 Sizes:
 - .1 Locker type 1 (single tier): 15" wide x 24" deep x 72" high (single tier)
 - .2 Locker type 2 (single tier): 18" wide x 24" deep x 39" high (single tier)
- .3 Assembly: knock down construction.
 - .1 Sides and backs shall be no less than 22-gauge and should not contain extra unnecessary holes unless otherwise specifically used for the assembly of the lockers and accessories on the project.
 - .2 Edges shall be formed to provide a strong and rigid assembly when bolted or riveted together. Locker backs are flanged at right angles providing a triple thickness of metal at the back corner connections.
- .4 Doors: double pan design consisting of 20ga outer panel welded to 24ga inner panel with 1" cell honeycomb core, continuous 14ga piano hinge, door swing Right Hand Reverse. Provide magnet at latch to keep door in closed position.
- .5 Accessories: 20ga hat shelf, 3 single prong coat hooks, 4" tall pedestal base, flat top, 11ga hasp for trouble free use with standard padlock
- .6 Finish: high grade epoxy polyester powder finish, colour to be determined by consultant from manufacturer's standard colour range.

2.2 Schedule

- .1 Provide lockers as scheduled in the following quantities:
 - .1 Locker Type 1: fifty-seven (57)
 - .2 Locker Type 2: nineteen (19)

PART 3 - EXECUTION

3.1 Installation

- .1 Assemble and install lockers in accordance with manufacturer's written instructions.
- .2 Safely and securely anchor all lockers properly to walls and/or floors as required. Use fasteners appropriate to load and the substrate.
- .3 Provide continuous sealant between wall and locker – see specification 07900 for sealant.
- .4 Install finished end panels to exposed ends of locker banks.

END OF SECTION

PART 1. GENERAL

1.1 SUMMARY

- .1 This section includes toilet and bath accessories in accordance with the Contract Documents. The Work of this Section shall include but not be limited to the following:
 - 1. Surface, partition and recessed mounted toilet and bath accessories indicated on the Drawings and Schedules.
- .2 Related work:
 - .1 Wall backing required to secure accessories
 - .2 Glazing
 - .3 Tile
 - .4 Toilet compartments
 - .5 Unit masonry
 - .6 Gypsum wallboard systems
 - .7 Plumbing fixtures
 - .8 Countertops

1.2 SUBMITTALS

- .1 Comply with requirements of Section regarding submittals.
- .2 Provide required number copies of:
 - .1 Product data sheets.
 - .2 Installation instructions.
 - .3 Service and parts manual

1.3 WORK INCLUDED

- .1 Toilet Room Accessories

1.4 REFERENCES (INCLUDING BUT NOT LIMITED TO)

- .1 Ontario Building Code (latest edition)
- .2 City of Toronto Barrier Free Design Guidelines (latest edition)

1.5 QUALITY ASSURANCE

- .1 Model numbers for toilet room accessories manufactured by Frost Products Limited, are listed to establish a standard of quality for design, function, materials, workmanship, and appearance. The following manufacturers may be submitted for evaluation by the architect by following the conditions of the Product Substitutions Section 01250. The architect shall be the sole judge as to the acceptability of all products submitted for substitution.
 - .1 Bobrick Washroom Equipment, Inc.
 - .2 American Specialties, Inc.
 - .3 Bradley
- .2 Accessories with tumbler locks shall be keyed alike with the exception of coin boxes in vending equipment.

- .3 Regulatory Requirements
 - .1 Operation of accessories shall comply with guidelines set forth by the Ontario Building Code and the City of Toronto Barrier Free Design Guideline. Documentation and samples to be provided to architect upon request.
- 1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING
 - .1 Deliver items in manufacturer's original unopened protective packaging.
 - .2 Store materials in original protective packaging to prevent physical damage or wetting.
 - .3 Handle so as to prevent damage to accessories.
- 1.6 WARRANTY
 - .1 Furnish one year guarantee against defects in material and workmanship on all accessories.
 - .2 In addition to the above the following shall apply:
 - .1 Welded stainless steel framed mirrors shall have a fifteen year guarantee against silver spoilage.

PART 2. PRODUCTS

2.1 TOILET ROOM ACCESSORIES SCHEDULE

- .1 Provide the following toilet and bath accessories in the locations indicated on the drawings/schedules:

Type	Model/Series	Description
W1	Frost 941TG	18"x30" Mirror, tempered glass, 1 per washroom lavatory and/or as shown on drawings
W2	Dyson Airblade V HU02	Sprayed nickel finish, surface mounted hand dryer, ADA compliant, 120V
W3	Shower Headrail and Curtain	Headrail: Shall be 25mm (1") by 41mm (1.625") extruded anodized aluminum with anti-grip design. Wall thickness to be 1.5mm (.060") and shall be securely attached to wall and pilasters with manufacturer's fittings in such a way as to make a strong and rigid installation. Curtain: Shower Curtain shall be fabricated of .008" (0,203) thick vinyl treated with Macrobiotic KV-33 anti-bacterial, anti-fungal and anti mildew agent, and flame retardant agents. Provide chrome plated hooks with nylon sliders to suit curtain length
W4a	Frost 1001 24 SP	24" straight grab bar, SS peened finish, concealed mounting snap flange, 1 per accessible toilet
W4b	Frost 1003 30x30 SP	30"x30" 90-degree grab bar, SS peened finish, concealed mounting snap flange, 1 per accessible toilet
W5	Recessed Soap Dish	By Specification 09750
W6	Frost 972	Fold down shower seat, wall mounted, 1 per shower
W7	Bobrick B-983	Vandal Resistant Coat Hook (Quantity: 20)
W8	ASI 0692-818	Stainless Steel Shelf (Quantity: 4)
W9	Soap Dispenser	Owner Supplied, Contractor Installed

W10	Napkin Disposal	Owner Supplied, Contractor Installed
W11	Toilet Paper Dispenser	Owner Supplied, Contractor Installed

2.2 MATERIALS

- .1 All cabinets shall be constructed of 18-8, type-304 stainless steel.
- .2 All waste receptacles shall be constructed of 18-8, type-304 stainless steel or rigid molded leak-proof plastic.
- .3 Waste receptacles or cabinets manufactured of type-400 stainless steel are not acceptable.
- .4 All tumbler locks to be fastened to accessories with lock nuts. Fastening locks to units with spring clips is not acceptable

PART 3. EXECUTION

3.1 INSPECTION

- .1 Check wall open for dimensions, plumbness of blocking or frames that would affect installation of recessed accessories. For surface mounted accessories check condition of wall and confirm installation of backing within wall.
- .2 Verify spacing of plumbing fixtures and toilet compartments that affect installation of toilet room accessories.

3.2 INSTALLATION

- .1 Install accessories at locations and heights indicated, straight, plumb and level and in accordance with manufacturer's installation instructions.
- .2 Install items with non-corrosive anchoring devices.
- .3 Installation methods shall conform to manufacturer's recommendations for backing and proper support.
- .4 Conceal evidence of drilling, cutting, and fitting to room finish.
- .5 Fit flanges of accessories snugly to wall surfaces.

3.3 ADJUSTMENT AND CLEANING

- .1 Upon completion of the work, or when directed, remove all traces of protective coatings or paper.
- .2 Adjust accessories for proper operation. Test mechanisms, hinges, locks and latches and where necessary adjust and lubricate.
- .3 Clean and polish exposed surfaces prior to final installation.
- .4 Deliver accessories schedule, keys, and parts manual as part of project closeout documents. For owner's permanent records, provide two sets of the following items of manufacturer's literature:
 - .1 Technical data sheets of each item used for the project.
 - .2 Service and parts manuals.
 - .3 Name of local representative to be contacted in the event of need of field service or consultation.

END OF SECTION

1.0 GENERAL

1.1 SECTION INCLUDES

- .1 Manually operated, roll-up fabric interior window shades including mounting and operating hardware.

1.2 REFERENCES

- .1 All window coverings offered must meet the HAZARDOUS PRODUCTS ACT, Regulation SOR/2009-112, Sep 8, 2009 - Corded Window Covering Products Regulations
- .2 All window coverings offered must meet the CSA Z600-08 - Safety of Corded Window Covering Products standard including but not limited to meeting the product safety requirements of section 4 and the labeling and information requirements of section 5

1.3 SUBMITTALS

- .1 Submit under provisions of Section 01330 - Submittal Procedures:
- .2 Product Data: Manufacturer's data sheets on each product specified, including:
 - .1 Preparation instructions and recommendations.
 - .2 Installation and maintenance instructions.
 - .3 Styles, material descriptions, dimensions of individual components, profiles, features, finishes and operating instructions.
 - .4 Storage and handling requirements and recommendations.
 - .5 Mounting details and installation methods.
- .3 Window Treatment Schedule: For all roller shades. Use same room designations as indicated on the Drawings, field verified window dimensions, quantities, type of shade, controls, fabric, and color, and include opening sizes and key to typical mounting details.
- .4 Verification Samples: For each finish product specified, two complete sets of shade components, unassembled, demonstrating compliance with specified requirements. Shade fabric sample and aluminum finish sample as selected, representing actual product, color, and patterns. Mark face of material to indicate interior faces.
- .5 Maintenance Data: Methods for maintaining roller shades, precautions regarding cleaning materials and methods, instructions for operating hardware and controls.
- .6 Manufacturer's Certificates: Certify products meet or exceed specified requirements.

1.4 DELIVERY, STORAGE, AND HANDLING

- .1 Do not deliver window shades until building is enclosed and construction within spaces where shades will be installed is substantially complete.
- .2 Deliver products in manufacturer's original, unopened, undamaged containers with labels intact.
- .3 Label containers and shades according to Window Shade Schedule.
- .4 Store products in manufacturer's unopened packaging until ready for installation.

1.5 SEQUENCING

- .1 Ensure that locating templates and other information required for installation of products of this section are furnished to affected trades in time to prevent interruption of construction progress.
- .2 Ensure that products of this section are supplied to affected trades in time to prevent interruption of construction progress.

1.6 PROJECT CONDITIONS

- .1 Install roller shades after finish work and ambient temperature, humidity and ventilation conditions are maintained at levels recommended for project upon completion.

2.0 PRODUCTS

2.1 MANUFACTURERS

- .1 SOLARFECTIVE/LEGRAND.
- .2 HUNTER DOUGLAS CANADA.
- .3 Equivalent products as per 01250.

2.2 MANUALLY OPERATED WINDOW SHADES

- .1 Manually Operated Window Shades with Independent Control: Manually operated, vertical roll-up, fabric window shade with components necessary for complete installation.
 - .1 Operation: Bead chain and clutch operating mechanism allowing shade to stop when chain is released. Designed never to need adjustment or lubrication. Provide limit stops to prevent shade from being raised or lowered too far.
 - .1 Clutch mechanism: Fabricated from high carbon steel and molded fiberglass reinforced polyester or injected molded nylon.
 - .2 Bead chain loop: Stainless steel bead chain hanging at side of window.
 - .3 Idler Assembly: Provide roller idler assembly of molded nylon with adjustable length idler pin to facilitate easy installation, and removal of shade for service.
 - .2 Mounting:
 - .1 Mounting brackets.
 - .2 Endcaps and headbox.
 - .3 Roller Tube: Fabricated from extruded aluminum, galvanized steel, or enameled steel. Diameter, wall thickness, and material selected by manufacturer to accommodate shade type and size. Fabric connected to the roller tube with LSE (low surface energy) double sided adhesive specifically developed to attach coated textiles to metal. Adhesive attachment to eliminate horizontal impressions in fabric.
 - .4 Endcaps: Stamped steel with universal design suitable for mounting to ceiling, wall, and jamb. Provide size compatible with roller size.
 - .1 Endcap covers: To match fascia or headbox color.
 - .5 Brackets: Plated stamped steel. Provide size compatible with roller size.
 - .1 Mounted to wall.
 - .6 Coupling system: Provide system to operate shades from single crank by coupling shade rollers together. System to consist of endcaps, plus couplings to connect rollers.
 - .1 2 shades operated from single control when indicated on drawings.
 - .7 Fascia: L shaped aluminum extrusion to conceal shade roller and hardware.
 - .1 Attachment: Snaps onto endcaps without requiring exposed fasteners of any kind. Fascia can be mounted continuously across two or more shade bands.
 - .2 Finish: Clear anodized.

2.4 FABRIC

- .1 Light Filtering Fabrics
 - .1 Shade cloth shall be woven of .018 opaque, vinyl coated polyester yarn consisting of approximately 79% vinyl and 21% 500 denier polyester core yarn. The fabric shall be tensioned in the finishing range prior to heat setting to keep the warp ends straight and

minimize or eliminate weave distortion to keep the fabric flat. The fabric shall be dimensionally stable. Colour to be as selected from standard range.

- .2 Average 3% open.
 - .2 Performance – As a “shade cloth” the fabric shall hang flat without buckling or distortion. The edge, when trimmed, shall hang straight without raveling. An unguided roller shade Cloth shall roll true and straight, without shifting sideways more than +1/8” in either direction due to warp distortion, or weave design.
 - .3 Flame Retardance - Fabric shall be certified by an Independent Laboratory to pass the Small Scale Vertical Burn Requirements test CAN and ULC-S109-M87 and NFPA 701.
 - .4 The fabric supplied shall be GREENGUARD certified or approved equivalent.
- 2.5 Schedule
- .1 Provide rollershades at the following locations:
 - .1 Existing windows at east elevation on 2nd, 3rd and 4th floors
 - .2 New interior glazed screens S1 & S2

3.0 EXECUTION

3.1 EXAMINATION

- .1 Do not begin installation until substrates have been properly prepared.
- .2 If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

- .1 Coordinate requirements for blocking and structural supports to ensure adequate means for installation of window shades.

3.3 INSTALLATION

- .1 Install in accordance with manufacturer's instructions.
- .2 Install roller shades level, plumb, square, and true. Allow proper clearances for window operation hardware.
- .3 Install the following items to conceal roller and operating mechanism. Do not use exposed fasteners.
 - .1 Fascias.
 - .2 Closure panels.
 - .3 Endcaps.

3.4 TESTING AND DEMONSTRATION

- .1 Test window shades to verify that operating mechanism, fabric retainer, and other operating components are functional. Correct deficiencies.
- .2 During daylight hours, lower shades and turn off interior lights. Verify that there are no light leaks at perimeter or within shade assembly. Correct deficiencies.

3.5 PROTECTION

- .1 Protect installed products until completion of project.
- .2 Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION