CHILD CARE ADDITION AT
L'HARMONIE PUBLIC SCHOOL
158 BRIDGEPORT ROAD EAST
WATERLOO, ON

FOR

CONSIEL SCOLAIRE VIAMONDE

PROJECT MANUAL

WORKSHOP
6 SOUSA MENDES ST
TORONTO, ON

ISSUED FOR TENDER
OCTOBER 2024

TABLE OF CONTENTS

Survey of Asbestos Containing Materials prepared by Arcadis, December 2015 (49 pages)

Geotechnical Investigation – Proposed Building Addition, prepared by Pinchin, February 2023 (75 pages)

1 GENERAL

1.1 NORMAL BUSINESS HOURS

.1 The building is occupied and is to be considered "fully operational" from 9am Monday to 6pm Friday.

1.2 PROJECT DELIVERIES

.1 All deliveries are to be communicated to Site Staff for coordination purposes. It is preferred that deliveries are performed outside school drop-off/pick-up hours.

1.3 NOISY, PAINTING, GLUING, SUBSTANCES WITH VOC'S AND / OR STRONG ODOURS AND TARING (SEALANTS, ROOFING, ETC.)

.1 Painting, gluing, working with substances that contain volatile organic compounds (VOC's) and /or have strong odours and tarring work (sealants, roofing, etc.) are to be performed outside normal business hours.

.2 The Contractor shall minimize any reduction in comfort at the facility.

1.4 PARKING

.1 Owner will make some parking available to Contractor. Location and quantity of parking spaces will be confirmed with Owner.

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

1.5 SITE PROTECTION

.1 Dust barriers must be used at all times during dusty work. Poly sheet dust barriers are to be sealed tight to floor and ceiling and / or to the filter mediums on return air grills etc.

.2 Clean up after all work must be performed immediately and the area(s) are to be left in a clean and safe manner. Failure to clean properly may result in the Contractor being charged for cleaning services obtained by the Building Management and the Building Management may terminate the Contractor's access.

1.6 ADVANCE NOTIFICATION

.1 Seven (7) business days advance notification is required for any work affecting the building occupants such as the following:

.1 Mold remediation (removal) work / asbestos abatement (removal) work.

.2 Scanning and core drilling.

.3 Notification of start time for painting.

.4 Notification of exterior work.

.5 Notification of any building system shutdown (i.e. power, water, etc.).

.6 Notification of any loss of use area (i.e. washroom shutdown, lunchroom, etc.).

1.7 BREAKER PANELS

.1 Electrical panels must not be touched without first informing and obtaining written permission from Consultant and the Building Management.

.2 Whenever electrical power is shut off the Contractor must "Lock Out" and "Tag Out" any electrical panels or electrical breakers affected.

.3 Panel schedules to be updated each time a change to it is made.

1.8 DOORS

.1 For security purposes the building doors are to be close at all times.

.1 Exit doors must not be propped open for any reason.

.2 All fire doors must be kept closed at all times.

1.9 PROTOCOL FOR SCANNING, CORE DRILLING

.1 Prior to starting the scan work the contractor hired to carry out the work must provide a copy of their health and safety plan to CSV.

.2 The plan must include a copy any of required license(s), a description of the process to be used and any information needed to design safety limits of the work zone. In addition, the plan must include a process to protect the work zone from inadvertent entry, a list of potential hazards that may be encountered by the workers, training and / or instruction that the workers have received to address the hazards and a contingency plan in case of an emergency.

.3 X-Raying is not allowed without prior authorization.

1.10 CORE DRILLING

.1 If dry core drilling will be performed appropriate dust control measure must be identified and used. If wet core drilling will be performed, water control measures must be identified and must be used.

.2 Before commencing the core drilling operation, the Contractor must ensure that it is safe to start drilling. The area must be secured, dust controls are in place, the equipment is set up as intended by the manufacturer, and all safety devices are present and functioning. The location selected to perform the core drilling must be appropriate and will not impact on the structural integrity of the building. The intended path of the coring unit must be free of all embedded power or communication wires, conduits, rebar, pipes and / or structures that could be damaged or disabled.

.3 All sources of asbestos are not to be disturbed. If this is not possible, the appropriate precautions must be taken to prevent the asbestos from becoming airborne which may include the use of either, a type 1, type 2 or type 3 process to comply with the asbestos designated substance regulations O. Reg 838 as am. O. Reg 510/92.

.4 All coring debris must be cleaned up and disposed of and the site returned to its original state after the coring is completed.

.5 If the coring debris contains asbestos, it must be cleaned up following the requirements of the designated substance specifications included in the Contract Documents.

1.11 DESIGNATED SUBSTANCES

.1 Handling and removal of any designated substances shall follow all applicable legislative requirements. Refer to project specific Designated Substances Report.

1.12 MAINTANING LIFE SAFETY SYSTEMS IN OCCUPIED FACILITIES

.1 Maintain operational life safety systems and public access to exits in occupied areas during all stages of the Work.

.2 Determine nature and exact locations of existing fire and smoke sensors prior to the commencement of the Work. Avoid direct or indirect jarring while working in adjacent areas and exercise caution to avoid triggering these devices.

.3 Be responsible for costs incurred by Owner on account of false fire alarms activated as a result of the execution of the Work, without adequate precautions.

1.13 PROJECT CONDITIONS, GENERAL

.1 Most of the project will be performed during regular business hours in an operational business setting. Areas will be occupied during normal business hours. At end of each shift, broom clean and leave areas clean and in normal working condition.

.2 All items removed shall be replaced / returned / reinstalled during same shift.

.3 The Contractor shall not be responsible for moving furniture and equipment in areas of Work unless specifically specified in the Scope of Work. The Contractor shall be responsible for repairs or replacements of any damaged furniture.

.4 The Contractor shall cooperate / coordinate with moving contractors retained by CSV, and / or agencies.

1.14 CONTINUITY OF SERVICE

.1 Where equipment and systems are normally required to operate through the course of the Work, notify the CSV at least 2 weeks prior to the necessary interruption of mechanical or electrical service throughout course of Work

.2 Keep duration of interruptions to a minimum not to exceed 4 hours. Interruptions lasting longer than 4hrs will require approval from the Owner and should be scheduled outside of School operating hours.

END OF SECTION

1.1 CASH ALLOWANCES

.1 Refer to the CCDC 2 – 2020Paragraph GC 4.1 Cash Allowances and CCDC 2 – 2020 Supplementary Conditions Paragraph GC 4.1 Cash Allowances for the base details.

.2 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.

.3 Progress payments on accounts of Work authorized under cash allowances shall be included in the Consultant's monthly certificate for payment.

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

.5 Supply only allowances shall include:

- .1 Net cost of products.
- .2 Delivery to Site.
- .3 Applicable taxes and duties, excluding HST.

.6 Supply and install allowances shall include:

- .1 Net cost of products.
- .2 Delivery to Site.
- .3 Unloading, storing, handling or products on Site.
- .4 Installation, finishing and commissioning of products.
- .5 Applicable taxes and duties, excluding HST.
- .6 The amount of each cash allowance does not include Contractor's overhead and profit, and other related costs, which shall be included in the Contract Price and not in the cash allowance.

.7 Inspection and testing allowances shall include:

- .1 Net cost of inspection and testing services.
- .2 Applicable taxes and duties, excluding HST.

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

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

.10 Accord, through Consultant, may request Contractor to identify potential Suppliers or Subcontractors, as applicable, and to obtain at least three competitive prices for each cash allowance item.

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

.12 Accord, through Consultant, will determine by whom and for what amount each cash allowance item will be performed. Obtain Accord's prior written approval in the form of a Cash Allowance Disbursement Authorization (CADA) before entering into a subcontract, amending an existing subcontract, or performing own forces work included in a cash allowance. Upon issuance of the CADA, the Contractor's responsibilities for a cash allowance item shall be the same as for work of the Contract.

.13 The "Cash Allowances" expected and the amount of each allowance is listed in the Bid package.

END OF SECTION

1 GENERAL

1.1 ALTERNATIVES AND SUBSTITUTIONS

.1 Refer to the Rate Bid Form included in the Bid package - Alternate Prices.

.2 Requests for substitutions will not be accepted prior to the Notification of Award.

.3 Specified products, materials and systems are inherently open, unless specifically noted otherwise. Substitution will be considered by the Consultant provided that:

.1 The materials and / or products specified are not available.

.2 Substitute products to those specified, which are brought to the attention of, and considered by Project Team after the Contract Award as "equivalent" to those specified will result in a credit to the Contract Price.

.3 Substitute products to those specified which are brought to the attention of, and considered by Project Team after the Contract Award as "superior" to those specified will result in a change to the Contract Price.

.4 The proposed substitutions have been investigated and complete data are submitted in accordance with the Specifications. Proposed substitutions to show the material and product names and complete data and specifications and state what difference, if any, will be made to the Contract Price for each substitution, should it be accepted.

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

.6 Same warranty is given for the substitution as for the original product specified.

.7 All claims are waived for additional costs related to the substitution which may subsequently arise. Installation of the accepted substitution is coordinated into the Work and that full responsibility is assumed when substitutions affect other work. Make any necessary changes required to complete the Work. Revisions to the drawings for incorporation of the substitutions shall be made by the Consultant and all costs associated with the revisions shall be borne by the Contractor.

.8 Should the proposed substitution be accepted either in part or in whole, the Contractor will assume full responsibility when the substitution affects any other work or work of other Sections (Subcontractors). Drawing changes required as a

.9 result of the substitution will be executed by the Consultant at the Contractor's expense.

.10 Proposed substitutions must satisfy all design conditions and other specified requirements. Properties included but not limited to the following as applicable, will be considered:

.1 Physical dimension requirements must satisfy the space limitations,

.2 Static and dynamic weight limitations,

.3 Structural properties,

.4 Audible noise levels,

.5 Vibration generation,

.6 Interchangeability of parts and / or components,

.7 Accessibility for maintenance,

.8 Possible removal or replacement,

.9 Colours,

.10 Textures,

.11 Compatibility with other materials, products, assemblies and components.

.4 Substitutions to methods or process described in the Specifications or drawings, may be proposed for the consideration of the Consultant.

.5 Ensure that such substitutions are in accordance with the following requirements:

.1 Time spent by the Consultant in evaluating the substitution shall not be the basis for a claim by the Contractor for extensions;

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

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

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

.6 Substitutions will not be considered if:

.1 They are indicated or implied on shop drawings or product data without formal request;

.2 Acceptance will require substantial revision of the Specifications and Drawings.

.3 Contractor fails to order a specified Product or order a Product by a specified manufacturer in adequate time to meet Contractor's construction schedule

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

.8 Approved substituted products shall be subject to Consultant's sole discretion. Approved substituted products shall only be installed after receipt of the Consultant's written approval.

.9 The cost of changes in the Work of a Contractor necessitated by the use of proposed material and / or product substitution is to be borne by the Contractor proposing the substitution.

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

1.2 SUBMISSION REQUIREMENTS FOR PROPOSED SUBSTITUTIONS

.1 Include with each proposed Substitution the following information:

.1 Identification of the Substitution, including product name and manufacturer's name, address, telephone numbers, and web site.

.2 Reason(s) for proposing the Substitution.

.3 A statement verifying that the Substitution will not affect the Contract Price and Contract Time or, if applicable, the amount and extent of a proposed increase or decrease in Contract Price and Contract Time on account of the Substitution.

.4 A statement verifying that the Substitution will not affect the performance (or warrant) of other parts of the Work.

.5 Manufacturer's Product literature for the Substitution, including material descriptions, compliance with applicable codes and reference standards, performance and test data, compatibility with contiguous materials and systems, and environmental considerations.

.6 Product samples as applicable.

.7 A summarized comparison of the physical properties and performance characteristics of the specified Product and the Substitution, with any significant variations clearly highlighted.

.8 Availability of maintenance services and sources of replacement materials and parts for the Substitution, as applicable, including associated costs and time frames.

.9 If applicable, estimated life cycle cost savings resulting from the Substitution.

.10 Details of other projects and applications where the Substitution has been used.

.11 Identification of any consequential changes in the Work to accommodate the Substitution and any consequential effects on the performance of the Work as a whole. A later claim for an increase to the Contract Price or Contract Time for other changes in the Work attributable to the Substitution will not be considered.

1.3 METHODS OR PROCESSES SUBSTITUTIONS

.1 The Contractor may suggest, for the consideration of the Project Team, substitutions to methods or processes described in the Specifications and / or shown on the Drawings. Any application for such substitutions must indicate how such substitutions are advantageous to the Owner or to the better fulfillment of the Contract. There shall be no obligation on the parties concerned to accept any such suggestions. Requests for alternatives must be made in duplicate and be accompanied by catalogue cuts, specifications and methods of installation.

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

.3 The Contractor will be responsible for substitutions to methods or processes concerning such work, and the warranty covering all parts of the Work shall not be affected.

.4 The cost of all changes in the work of other Sections (Subcontractors) necessitated by the use of substituted methods or processes, is to be borne by the Section (Subcontractor) proposing the substitution.

.5 Said methods or processes must fit into the space allotted for the specified methods or processes.

1.4 CREDITS ARISING FROM SUBSTITUTIONS

.1 Any and all credits arising from the substitutions mentioned will be credited to the Contract and the Contract Price will be adjusted accordingly.

1.5 RELATED CHANGES

.1 The Contractor will advise Subcontractors and suppliers and make all necessary changes to the related Work occasioned by Owner's acceptance of alternatives.

END OF SECTION

1.1 SUMMARY

.1 This Section specifies Contractor's responsibilities for preparation and submission of schedules and other documentation related to tracking construction progress.

.2 The purpose of submitting progress schedules is to:

.1 Inform Owner and Consultant of actual progress versus planned progress, and

.2 Provide assurance that scheduling issues are being proactively identified and addressed in a timely manner, and that planned progress is being maintained as closely as possible.

1.2 CONSTRUCTION PROGRESS SCHEDULE

.1 Format and Content:

.1 Prepare schedule in the form of a Critical Path Method (CPM) Gantt chart using Microsoft Project or equivalent software as agreed.

.2 Provide a work breakdown structure identifying key activities, work packages, and major milestones, including long delivery Products, inspection and testing activities, preparation and review of mock-ups, Owner decisions for cash allowances, shutdown or closure activities, delivery of Owner supplied Products, Owner performed work, demonstration and training activities, and similar items, at a sufficient level of detail to effectively manage construction progress.

.3 Indicate milestone dates for Ready-for-Takeover and Substantial Performance of the Work.

.2 Submission:

.1 Submit initial schedule to *Owner* and *Consultant* within 15 *Working Days* after *Contract* award via email as .pdf file.

.2 Submit updated progress schedule monthly to Owner and Consultant, indicating actual and projected start and finish dates with report date line and progress, critical path, float, and baseline comparison to current progress.

1.3 SUBMITTALS SCHEDULE

.1 Format and Content:

.1 Prepare schedule identifying all required *Shop Drawing*, *Product* data, and sample submissions, including samples required for testing.

.2 Prepare schedule in electronic format.

.3 Provide a separate line for each required submittal, organized by

Specifications section names and numbers, and further broken down by individual *Products* and systems as required.

.4 For each required submittal, show planned earliest date for initial submittal, earliest date for return of reviewed submittal by *Consultant* and latest date for return of reviewed submittal without causing delay.

.5 Allow time in schedule for resubmission of submittals, should resubmission be necessary.

.2 Submission:

.1 Submit initial schedule to Consultant within 15 Working Days after Contract award via email.

.2 Submit updated submittals schedule monthly to Owner and Consultant.

1.4 SCHEDULE MANAGEMENT

.1 A schedule submitted as specified and accepted by Consultant shall become the baseline schedule and shall be used as the baseline for updates.

.2 At each regular progress meeting, review and discuss current construction progress and submittals schedules with Consultant and Owner, including activities that are behind schedule and planned measures to regain schedule slippage in key areas on or near the critical path.

.3 Activities considered behind schedule are those with start or completion dates later than the dates shown on the baseline schedule.

1.5 RECORDING ACTUAL SITE CONDITIONS ON AS-BUILT DRAWINGS

.1 Obtain from *Consultant* an electronic copy of the construction *Drawings* for the purpose of creating as-built drawings. Record information in electronic form, clearly identifying as-built deviations from the originally obtained construction *Drawings*.

.2 Clearly label each drawing as "AS-BUILT DRAWING". Record information concurrently with construction progress. Do not conceal *Work* until required information is recorded.

.3 Record actual construction including:

.1 Measured depths of elements of foundation in relation to finish first floor datum.

.2 Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.

.3 Measured locations of pipes, ducts, conduits, outlets, fixtures, access panels, and appurtenances, referenced to visible and accessible features of construction.

.4 Field changes of dimension and detail.

.5 Changes made by Change Orders and Supplemental Instructions

.6 References to Shop Drawings, where Shop Drawings show more detail.

.4 Do not use as-built drawings for construction purposes.

1.6 PROGRESS PHOTOGRAPHS

.1 Arrange for periodic digital photography to document and provide a photographic record of the progress of the *Work*.

.2 Identify each photograph by project name and date taken.

.3 Submission: Submit .jpg format files in standard resolution via project web site monthly.

.4 Do not use progress or any other *Project* photographs for promotional purposes without *Owner*'s written consent.

END OF SECTION

1.1 ADMINISTRATIVE

.1 Submit specified submittals to Consultant for review. Submit with reasonable promptness and in orderly sequence so as to not cause delay in the Work. Failure to submit in ample time is not considered sufficient reason for an extension of Contract Time or for Product substitutions or other deviations from the Drawings and Specifications.

.2 Where required by authorities having jurisdiction, provide submittals to such authorities for review and approval.

.3 Do not proceed with Work affected by a submittal until review is complete.

.4 Present Shop Drawings, Product data, and samples in SI metric units. Where items or information is not produced in SI Metric, converted values are acceptable.

.5 Review submittals, provide verified field measurements where applicable, and affix Contractor's review stamp prior to submission to Consultant. Contractor's review stamp represents that necessary requirements have been determined and verified, and that the submittal has been checked and coordinated with requirements of the Work and Contract Documents.

.6 Verify field measurements and that affected adjacent work is coordinated.

.7 Submittals not meeting specified requirements will be returned with comments.

.8 Reproduction of construction Drawings to serve as background for Shop Drawings is not permitted.

.9 Do not propose Substitutions or deviations from Contract Documents via Shop Drawing, Product data and sample submittals. Proposed alternates must follow the procedures outlined in Sectio 01 25 00.

1.2 SHOP DRAWINGS AND PRODUCT DATA

.1 Indicate Products, methods of construction, and attachment or anchorage, erection diagrams, connections, explanatory notes and other information necessary for completion of the Work.

.2 Where Products attach or connect to other Products, indicate that such items have been coordinated, regardless of Section under which adjacent items will be supplied and Installed. Indicate cross-references to Drawings, Specifications and other already reviewed Shop Drawings.

.3 Accompany submittals with a transmittal information including:

- .1 Date.
- .2 *Project* title and number.
- .3 *Contractor*'s name and address.
- .4 Identification of each submittal item and quantity.
- .5 Other pertinent data.

.4 *Shop Drawing* submittals shall include:

- .1 Date and revision dates.
- .2 *Project* title and number.
- .3 Name and address of:
  - .1 Subcontractor.
  - .2 Supplier.
  - .3 Manufacturer.
- .4 *Contractor*'s stamp, date, and signature of *Contractor*'s authorized representative

responsible for *Shop Drawing* review, indicating that each *Shop Drawing* has been reviewed for compliance with *Contract Documents* and, where applicable, that field measurements have been verified.

.5 Details of appropriate portions of the *Work* as applicable:

.1 Fabrication.

.2 Layout, showing dimensions, including identified field dimensions, and clearances.

.3 Setting or erection details.

.4 Capacities.

.5 Performance characteristics.

.6 Standards.

.7 Operating weight.

.8 Wiring diagrams.

.9 Single line and schematic diagrams.

.10 Relationships to other parts of the *Work*.

.6 *Product* data submittals shall include material safety data sheets (MSDS) for all controlled Products.

.7 Submit electronic copy of *Shop Drawings* where specified in the technical *Specifications*

.8 Submit electronic copy of Product data sheets or brochures where specified in the technical *Specifications*.

.9 Where a submittal includes information not applicable to the *Work,* clearly identify applicable information and strike out non-applicable information.

.10 Supplement standard information to include details applicable to *Project*.

.5 Allow 10 *Working Days* for *Consultant*'s review of each submittal and incorporate in submittals schedule specified in Section 01 32 00 – Construction Progress Documentation. Allow additional 5 *Working Days* where sub-*Consultant r*eview is required.

.6 If upon *Consultant*'s review no errors or omissions are discovered, or if only minor corrections are required as indicated, submittal will be returned and fabrication or installation of *Work* may proceed.

.7 If upon *Consultant*'s review significant errors or omissions are discovered, a so noted copy will be returned for correction and resubmission. Do not commence fabrication or installation.

.8 *Consultant*'s notations on submittals are intended to ensure compliance with *Contract Documents* and are not intended to constitute a change in the *Work* requiring change to the *Contract Price* or *Contract Time*. If *Contractor* considers any *Consultant*'s notation to be a change in the *Work*, promptly notify *Consultant* in writing before proceeding with the *Work*.

.9 Resubmit corrected submittals through same procedure indicated above, before any fabrication or installation of the *Work* proceeds. When resubmitting, notify *Consultant* in writing of any revisions other than those requested by *Consultant*.

1.3 SAMPLES

.1 Submit samples for *Consultant*'s review in triplicate where specified in the technical *Specifications*. Label samples as to origin, *Project* name, and intended use.

.2 Deliver samples prepaid to *Consultant*'s business address.

.3 Notify *Consultant* in writing of any deviations in samples from requirements of *Contract Documents*.

.4 Where a required colour, pattern or texture has not been specified, submit full range of available *Products* meeting other specified requirements.

.5 *Consultant* selection from samples is not intended to change the *Contract Price* or *Contract Time*. If a selection would affect the *Contract Price* or *Contract Time*, notify *Consultant* in writing prior to proceeding with the *Work*.

.6 Resubmit samples as required by *Consultant* to comply with *Contract Documents*.

.7 Reviewed and accepted samples will establish the standard against which installed *Work* will be reviewed.

END OF SECTION

1 GENERAL

1.1 TEMPORARY WORK

.1 Accept responsibility for all temporary structures and comply with applicable rules and regulations. Pay all taxes and all other charges.

.2 The expression "provide" shall be deemed to include the provision, installation and finishing, maintenance, servicing and removal of the work described. All Work damaged by temporary installations shall be repaired and made good at no expense to the Owner.

1.2 TEMPORARY UTILITIES - GENERAL

.1 Provide temporary utilities as specified and as otherwise necessary to perform the Work expeditiously.

.2 Remove temporary utilities after use.

1.3 TEMPORARY WATER SUPPLY

.1 Separate from water required for fire protection with adequate pressure at every floor, except hose extensions which shall be provided by Subcontractors requiring them.

.2 Water supply shall be potable, available from existing service. Be responsible for the careful and reasonable use of any Owner supplied water.

.3 If large quantity of water is required for the Work, a water meter shall be provided to monitor Contractor's water usage. Provide proof to Consultant of no drop in water pressure in water supply for affected tenant (s) (i.e. Contractors using hydrodemolition method to remove concrete in a project or similar instances).

1.4 TEMPORARY HEATING AND VENTILATION

.1 *Contractor* may connect to and use *Owner*'s existing supply of natural gas for temporary use during construction, subject to existing available volume and pressure. Usage at no cost to *Contractor*.

.2 Vent construction heaters in enclosed spaces to the outside or use flameless type of construction heaters.

.3 Provide temporary heat for the *Work* as required to:

.1 Facilitate progress of *Work*.

.2 Protect the *Work* against dampness and cold.

.3 Prevent moisture condensation on surfaces, freezing, or other damage to finishes or stored *Products*.

.4 Maintain specified minimum ambient temperatures and humidity levels for storage, installation and curing of *Products*.

.5 After building is enclosed, maintain interior temperature of minimum 10 degrees C.

.4 Provide temporary ventilation for the *Work* as required to:

.1 Prevent accumulations of fumes, exhaust, vapours, gases and other hazardous, noxious, or volatile substances in enclosed spaces, as required to maintain a safe work environment meeting applicable regulatory requirements.

.2 Ensure that hazardous, noxious, or volatile substances do not migrate to *Owner* occupied spaces.

.3 Ventilate temporary sanitary facilities.

.4 New permanent building heating and ventilation systems may be used during construction, at Contractor's option. If used during construction:

.1 *Owner* will pay utility costs resulting from the use of permanent systems.

.2 Operate systems in a non-wasteful and energy efficient manner. Be responsible for any system damage.

.3 Just prior to *Substantial Performance of the Work*, replace filters, and perform other required maintenance to ensure systems are in as near as new condition as possible. Refer also to Division 15 requirements.

.4 Ensure that systems manufacturers' warranties do not commence until the date of *Substantial Performance of the Work* or, if manufacturers' warranties do commence earlier when systems are put into use, arrange for necessary extension of manufacturers' warranties or provide equivalent coverage under *Contractor*'s warranty.

END OF SECTION

1.1 CONTRUCTION FACILITIES - GENERAL

.1 Provide temporary construction facilities as necessary for performance of the *Work* and in compliance with applicable regulatory requirements.

.2 Maintain temporary construction facilities in good condition for the duration of the *Work*.

.3 Remove temporary construction facilities from *Place of the Wor*k when no longer required.

1.2 CONSTRUCTION PARKING

.1 Limited parking will be permitted at *Place of the Work*, within the assigned limits of construction only, during normal working hours, provided it does not disrupt continuing operation of the facility. Outside of normal working hours, staff parking can be used.

1.3 VEHICULAR ACCESS

.1 Provide and maintain adequate access to Place of the Work.

.2 Existing roads at Place of the Work may be used for access to Place of the Work, provided Contractor assumes responsibility for any damage caused by construction traffic, and prevents or promptly cleans up any mud tracking or material spillage.

1.4 SITE OFFICES

.1 Space within the existing building will not be made available to the Contractor for use as a Site Office.

.2 Contractor shall provide a temperature controlled and ventilated office, with suitable lighting, of sufficient size to accommodate site meetings.

1.5 SANITARY FACILITIES

.1 Provide sanitary facilities for workers.

.2 Do not use permanent washroom facilities during construction.

.3 Keep sanitary facilities clean and fully stocked with the necessary supplies.

1.6 FIRE PROTECTION

.1 Provide and maintain temporary fire protection systems and equipment during construction. Contractor shall provide firewatch as required; costs for firewatch shall be included in base bid price.

END OF SECTION

1.1 BARRIERS AND ENCLOSURES - GENERAL

.1 Provide temporary barriers and enclosures necessary to protect the public and building occupants and to secure *Place of the Wor*k during performance of the *Work*.

.2 Comply with applicable regulatory requirements.

.3 Maintain temporary barriers and enclosures in good condition for the duration of the *Work*.

.4 Remove temporary barriers and enclosures from *Place of the Work* when no longer required.

1.2 FENCING

.1 Erect temporary security and safety site fencing, complete with sediment control fabric, minimum 1.8m high, using self-supporting wire fence sections enclosing applicable portions of site as necessary to maintain safety and security. Maintain site fencing in good repair until removed.

1.3 WEATHER ENCLOSURES

.1 Provide weather tight enclosures to unfinished door and window openings, tops of shafts and other openings in floors and roofs.

.2 Provide weather enclosures to protect floor areas where walls are not finished and to enclose work areas that require temporary heating.

.3 Design weather enclosures to withstand wind pressure and snow loading requirements.

1.4 DUST TIGHT PARTITIONS

.1 Provide dust tight wood stud and plywood and/or steel stud and gypsum board partitions to localize interior building areas from dust and noise generating activities.

.2 Erect, maintain, and relocate partitions as required to facilitate construction operations and *Owner*'s operational requirements.

1.5 FIRE ROUTES

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

1.6 PROTECTION OF BUILDING FINISHES

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

END OF SECTION

1.1 SURVEYOR QUALIFICATIONS

.1 Engage a registered land surveyor, licensed to practice in *Place of the Work*.

1.2 SUBMITTALS

.1 Submit name and address of registered land surveyor performing survey work.

.2 Submit to *Owner* and *Consultant* the survey of the *Work* prepared and issued by a registered land surveyor on completion of the building footings and foundations and on completion of the *Work*.

1.3 SURVEY REFERENCE POINTS

.1 Locate and confirm permanent reference points prior to starting site work. Preserve and protect permanent reference points on site during construction.

.2 Do not change or relocate reference points without prior written notice to *Consultant*.

.3 Report to *Consultant* when a reference point is lost or destroyed, or requires relocation because of necessary changes in grades or locations. Require registered land surveyor to replace reference points in accordance with original survey.

1.4 SURVEY REQUIREMENTS

.1 Establish sufficient permanent benchmarks on site, referenced to established benchmarks by survey control points.

.2 Confirm that existing survey reference points are in accordance with *Owner*'s survey and property limits.

.3 Establish initial lines and levels for building layout.

.4 Maintain a complete, accurate log of control and survey work as it progresses. Record locations with horizontal and vertical data in project record documents.

1.5 EXISTING UTILITIES AND STRUCTURES

.1 Before commencing excavation, drilling or other earthwork, establish or confirm location and extent of all existing underground utilities and structures in work area.

.2 Promptly notify *Consultant* if underground utilities, structures, or their locations differ from those indicated in *Contract Documents* or in available project information. *Consultant* will provide appropriate direction.

.3 Record locations of maintained, re-routed and abandoned utility lines.

1.6 VERIFICATION OF EXISTING CONDITIONS

.1 Where work specified in any Section is dependent on the work of another Section or Sections having been properly completed, verify that work is complete and in a condition suitable to receive the subsequent work. Commencement of work of a Section that is dependent on the work of another Section or Sections having been properly completed, means acceptance of the existing conditions.

.2 Verify that ambient conditions are suitable before commencing the work of any Section and will remain suitable for as long as required for proper setting, curing, or drying of *Products* used.

.3 Ensure that substrate surfaces are clean, dimensionally stable, cured and free of contaminants.

.4 Notify *Consultant* in writing of unacceptable conditions.

END OF SECTION

1.1 SUMMARY

.1 Except where otherwise specified in technical *Specifications* or otherwise indicated on *Drawings*, comply with requirements of this Section.

1.2 MANUFACTURER'S INSTRUCTIONS

.1 Install, erect, or apply *Products* in strict accordance with manufacturer's instructions.

.2 Notify *Consultant*, in writing, of conflicts between *Contract Documents* and manufacturer's instructions where, in *Contractor*'s opinion, conformance with *Contract Documents* instead of the manufacturer's instructions may be detrimental to the *Work* or may jeopardize the manufacturer's warranty.

.3 Do not rely on labels or enclosures provided with *Products*. Obtain written instructions directly from manufacturers.

.4 Provide manufacturer's representatives with access to the *Work* at all times. Render assistance and facilities for such access so that manufacturer's representatives may properly perform their responsibilities.

1.3 CONCEALMENT

.1 Conceal pipes, ducts, and wiring in floors, walls and ceilings in finished areas:

.1 after review by *Consultant* and authority having jurisdiction, and

.2 where locations differ from those shown on *Drawings*, after recording actual locations on as-built drawings.

.2 Provide incidental furring or other enclosures as required.

.3 Notify *Consultant* in writing of interferences before installation.

1.4 FASTENINGS - GENERAL

.1 Provide metal fastenings and accessories in same texture, colour and finish as adjacent materials.

.2 Prevent electrolytic action and corrosion between dissimilar metals and materials by using suitable non-metallic strips, washers, sleeves, or other permanent separators to avoid direct contact.

.3 Use non-corrosive fasteners and anchors for securing exterior work [and in spaces where high humidity levels are anticipated].

.4 Space anchors within individual load limit or shear capacity and ensure they provide positive permanent anchorage.

.5 Keep exposed fastenings to a minimum, space evenly and install neatly.

.6 Do not use fastenings or fastening methods that may cause spalling or cracking of material to which anchorage is made.

1.5 FASTENINGS - EQUIPMENT

.1 Use fastenings of standard commercial sizes and patterns with material and finish suitable for service.

.2 Bolts shall not project more than one diameter beyond nuts.

1.6 FIRE RATED ASSEMBLIES

.1 When penetrating fire rated walls, ceiling, or floor assemblies, completely seal voids with fire-stopping materials, smoke seals, or both, in full thickness of the construction element as required to maintain the integrity of the fire rated assembly.

1.7 LOCATION OF FIXTURES, OUTLETS AND DEVICES

.1 Consider location of fixtures, outlets, and devices indicated on *Drawings* as approximate.

.2 Locate fixtures, outlets, and devices to provide minimum interference, maximum usable space, and as required to meet safety, access, maintenance, acoustic, and regulatory, including barrier free, requirements.

.3 Promptly notify *Consultant* in writing of conflicting installation requirements for fixtures, outlets, and devices. If requested, indicate proposed locations and obtain approval for actual locations.

1.8 PROTECTION OF COMPLETED WORK AND WORK IN PROGRESS

.1 Adequately protect parts of the *Work* completed and in progress from any kind of damage.

.2 Promptly remove, replace, clean, or repair, as directed by *Consultant,* work damaged as a result of inadequate protection.

.3 Do not load or permit to be loaded any part of the *Work* with a weight or force that will endanger the safety or integrity of the *Work*.

1.9 REMEDIAL WORK

.1 Notify *Consultant* of, and perform remedial work required to, repair or replace defective or unacceptable work. Ensure that properly qualified workers perform remedial work. Coordinate adjacent affected work as required.

END OF SECTION

1.1 REQUEST FOR CUTTING, PATCHING AND REMEDIAL WORK

.1 Submit written request in advance of cutting, coring, or alteration which affects or is likely to affect:

.1 Structural integrity of any element of the Work.

.2 Integrity of weather-exposed or moisture-resistant elements.

.3 Efficiency, maintenance, or safety of any operational element.

.4 Visual qualities of sight-exposed elements.

.5 Work of *Owner* or other contractors.

.6 Warranty of *Products* affected.

.2 Include in request:

.1 Identification of *Project*.

.2 Location and description of affected work, including drawings or sketches as required.

.3 Statement on necessity for cutting or alteration.

.4 Description of proposed work, and *Products* to be used.

.5 Alternatives to cutting and patching.

.6 Effect on work of *Owner* or other contractors.

.7 Written permission of affected other contractors.

.8 Date and time work will be executed.

1.2 PRODUCTS

.1 Unless otherwise specified, when replacing existing or previously installed Products in the course of cutting and patching work, use replacement Products of the same character and quality as those being replaced.

.2 If an existing or previously installed Product must be replaced with a different Product, submit request for substitution in accordance with Section 01 25 00 - Substitution Procedures.

1.3 PREPARATION

.1 Inspect existing conditions in accordance with Section 01 71 00 - Examination and Preparation.

.2 Provide supports to ensure structural integrity of surroundings; provide devices and methods to protect other portions of the *Work* from damage.

.3 Provide protection from elements for areas that may be exposed by uncovering work.

1.4 EXISTING UTILITIES

.1 When breaking into or connecting to existing services' utilities, execute the Work at times directed by local governing authorities, with a minimum of disturbance to the Work, pedestrian and vehicular traffic, and ongoing Owner operations.

.2 Maintain excavations free of water.

.3 Keep duration of interruptions to a minimum.

.4 Carry out interruptions after regular working hours of occupants, preferably on weekends, unless Owner's prior written approval is obtained.

.5 Protect and maintain existing active services. Record location of services, including depth, on as-built drawings.

.6 Construct or erect barriers in accordance with Section 01 56 00 - Temporary Barriers and Enclosures as required to protect pedestrian and vehicular traffic.

1.5 CUTTING, PATCHING, AND REMEDIAL WORK

.1 Coordinate and perform the *Work* to ensure that cutting and patching work is kept to a minimum.

.2 Perform cutting, fitting, patching, and remedial work [including excavation and fill, to make the affected parts of the *Work* come together properly and complete the *Work*.

.3 Provide openings in non-structural elements of the *Work* for penetrations of mechanical and electrical work.

.4 Perform cutting by methods to avoid damage to other work

.5 Provide proper surfaces to receive patching, remedial work, and finishing.

.6 Perform cutting, patching, and remedial work using competent and qualified specialists familiar with the *Products* affected, in a manner that neither damages nor endangers the *Work*.

.7 Do not use pneumatic or impact tools without *Consultant*'s prior approval.

.8 Ensure that cutting, patching, and remedial work does not jeopardize manufacturers' warranties.

.9 Refinish surfaces to match adjacent finishes. For continuous surfaces refinish to nearest intersection. For an assembly, refinish entire unit.

.10 Fit work to pipes, sleeves, ducts, conduit, and other penetrations through surfaces with suitable allowance for deflection, expansion, contraction, acoustic isolation, and firestopping.

.11 Maintain fire ratings of fire rated assemblies where cutting, patching, or remedial work is performed. Completely seal voids or penetrations of assembly with firestopping material to full depth or with suitably rated devices.

END OF SECTION

1.1 READY-FOR-TAKEOVER

.1 The prerequisites to attaining Ready-for-Takeover of the Work are described in the General Conditions of the Contract.

1.2 INSPECTION AND REVIEW BEFORE READY-FOR-TAKEOVER

.1 Contractor's Inspection: Before applying for the Consultant's review to establish Ready-for-Takeover of the Work:

.1 Ensure that the specified prerequisites to Ready-for-Takeover of the Work are completed.

.2 Conduct an inspection of the Work to identify defective, deficient, or incomplete work.

.3 Prepare a comprehensive and detailed list of items to be completed or corrected.

.4 Provide an anticipated schedule and costs for items to be completed or corrected.

.2 Consultant's Review: Upon receipt of the Contractor's application for review, together with the Contractor's list of items to be completed or corrected, the Consultant will review the Work. The Consultant will advise the Contractor whether or not the Work is Ready-for-Takeover and will provide the Contractor with a list of items, if any, to be added to the Contractor's list of items to be completed or corrected. Provide the Consultant with a copy of the Contractor's revised list.

.3 Maintain the list of items to be completed or corrected and promptly correct or complete defective, deficient and incomplete work. The Contractor's inspection and Consultant's review procedures specified above shall be repeated until the Work is Ready-for-Takeover and no items remain on the Contractor's list of items to be completed or corrected.

.4 When the Consultant determines that the Work is Ready-for-Takeover, the Consultant will notify the Contractor and the Owner in writing to that effect.

1.3 PREREQUISITES TO FINAL PAYMENT

.1 After Ready-for-Takeover of the Work and before submitting an application for final payment in accordance with the General Conditions and Supplementary Conditions of Contract:

.1 Correct or complete all remaining defective, deficient, and incomplete work.

.2 Remove from the Place of the Work all remaining surplus Products, Construction Equipment, and Temporary Work.

.3 Perform final cleaning and waste removal necessitated by the Contractor's work performed after Ready-for-Takeover, as specified by General Condition 12.1.

1.4 PARTIAL USER OCCUPANCY

.1 If partial Owner occupancy of a part of the Work is required before the date of Ready-for-Takeover of the entire Work of the Contract, the provisions of this Section shall apply, to the extent applicable, to that part of the Work that the Owner intends to occupy.

1.5 SUBSTANTIAL PERFORMANCE OF THE WORK

.1 The prerequisites to, and the procedures for, attaining substantial performance of the Work, or similar such milestone as provided for in the lien legislation applicable to the Place of the Work, shall be:

.1 independent of those for attaining Ready-for-Takeover of the Work, and

.2 in accordance with the lien legislation applicable to the Place of the Work.

END OF SECTION

1.1 OPERATION AND MAINTENANCE MANUAL

.1 Prepare a comprehensive operation and maintenance manual, in the language of the Contract, using personnel qualified and experienced for this task.

.2 Submit an initial draft of the operation and maintenance manual for *Consultant*'s review. If required by *Consultant*'s review comments, revise manual contents and resubmit for *Consultant*'s review. If required, repeat this process until *Consultant* accepts the draft manual in writing.

.3 Submit final version to *Owner* in electronic format and 2 sets of hard copies (3 ring binder with letter sized pages, tabbed by division).

1.2 OPERATION AND MAINTENANCE MANUAL FORMAT

.1 Organize data in the form of an instructional manual.

.2 Binders: vinyl, hard covered, three D-rings, loose leaf, 216 x 279 mm, with spine and face pockets.

.3 When multiple binders are used, correlate data into related consistent groupings. Identify contents of each binder on spine.

.4 Cover: Identify each binder with typed or printed title "Operation and Maintenance Manual", name of Project or facility, and subject matter of contents.

.5 Arrange content [by systems,] [process flow,] under Section numbers and sequence of Table of Contents.

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

.7 Text: Manufacturer's printed data, or typewritten data.

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

.9 Provide electronic copy of manual in PDF format.

.10 Provide electronic copy of Shop Drawings in manual as CAD files in.dwg format on electronic media acceptable to Owner.

1.3 OPERATION AND MAINTENANCE MANUAL – GENERAL CONTENT

.1 Table of contents for each volume.

.2 Introductory information including:

.1 Date of manual submission.

.2 Complete contact information for *Consultant*, subconsultants, other consultants, and *Contractor*, with names of responsible parties.

.3 Schedule of *Products* and systems indexed to content of volume.

.3 For each *Product* or system, include complete contact information for *Subcontractors*, *Suppliers* and manufacturers, including local sources for

supplies and replacement parts.

.4 *Product* Data: mark each sheet to clearly identify specific products, options, and component parts, and data applicable to installation. Delete or strike out inapplicable information. Supplement with additional information as required.

.5 Reviewed *Shop Drawings*.

.6 Permits, certificates, letters of assurance and other relevant documents issued by or required by authorities having jurisdiction.

.7 Warranties.

.8 Operating and maintenance procedures, incorporating manufacturer's operating and maintenance instructions, in a logical sequence.

.9 Training materials as specified in Section 01 79 00 - Demonstration and Training.

1.4 OPERATION AND MAINTENANCE MANUAL - EQUIPMENT AND SYSTEMS CONTENT

.1 Each Item of Equipment and Each System: include description of unit or system and component parts. Give function, normal operation characteristics, and limiting conditions. Include performance curves, with engineering data and tests, and complete nomenclature and commercial number of replaceable parts.

.2 Panel Board Circuit Directories: provide electrical service characteristics, controls, and communications.

.3 Include installed colour coded wiring diagrams.

.4 Operating Procedures: include start-up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shut-down, and emergency instructions. Include summer, winter, and any special operating instructions.

.5 Maintenance Requirements: include routine procedures and guide for trouble-shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.

.6 Provide servicing and lubrication schedule, and list of lubricants required.

.7 Include manufacturer's printed operation and maintenance instructions.

.8 Include sequence of operation by controls manufacturer.

.9 Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.

.10 Provide installed control diagrams by controls manufacturer.

.11 Provide Contractor's coordination drawings, with installed colour coded piping diagrams.

.12 Provide charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.

.13 Provide list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.

.14 Include testing and balancing reports.

.15 Include additional content as specified in technical Specifications sections.

1.5 OPERATION AND MAINTENANCE MANUAL - PRODUCTS AND FINISHES CONTENT

.1 Include *Product* data, with catalogue number, options selected, size, composition, and colour and texture designations. Provide information for re-ordering custom manufactured *Products*.

.2 Instructions for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.

.3 Include an outline of requirements for routine and special inspections and for regular maintenance to ensure that on-going performance of the building envelope will meet the initial building envelope criteria.

.4 Include additional content as specified in technical *Specifications* sections.

1.6 OPERATION AND MAINTENANCE MANUAL - WARRANTIES CONTENT

.1 Separate each warranty with index tab sheets keyed to Table of Contents listing.

.2 List each warrantor with complete contact information.

.3 Verify that documents are in proper form and contain full information. Ensure that warranties are for the correct duration and are in *Owner*'s name.

1.7 CONTRACTOR'S AS-BUILT DRAWINGS

.1 Submit final as-built drawings in the form specified in Section 01 32 00 – Construction Progress Documentation to Consultant.

1.8 PROJECT RECORD DRAWINGS

.1 Transfer all information marked up on the as-built drawings during the progress of the *Work* to a master set of record drawing files provided by *Consultant*, in CAD format.

.2 Mark revised drawings as "RECORD DRAWINGS".

.3 Submit completed record drawings in electronic CAD and PDF form to *Owner*.

1.9 SPARE PARTS, MAINTENANCE MATERIALS, AND SPECIAL TOOLS

.1 Supply spare parts, maintenance materials, and special tools in quantities specified in technical *Specifications* sections.

.2 Ensure spare parts and maintenance materials are new, not damaged nor defective, and of same quality, manufacturer, and batch or production run as installed *Products*.

.3 Provide tags for special tools identifying their function and associated *Product*.

.4 Deliver to and store items at location directed by *Owner* at *Place of the Work*. Store in original packaging with manufacturer's labels intact and in a manner to prevent damage or deterioration.

.5 Catalogue all items and submit to *Consultant* an inventory listing organized by *Specifications* section. Include *Consultant* reviewed inventory listing in operation and maintenance manual.

END OF SECTION

1.1 SUMMARY

.1 Demonstrate and provide training to *Owner*'s personnel on operation and maintenance of equipment and systems prior to scheduled date of *Ready-for-Takeover of the Work*.

.2 *Owner* will provide list of personnel to receive training and will coordinate their attendance at agreed upon times.

.3 Coordinate and schedule demonstration and training provided by *Subcontractors* and *Suppliers*.

1.2 SUBMITTALS

.1 Submit proposed dates, times, durations, and locations for demonstration and training of each item of equipment and each system for which demonstration and training is required. Allow sufficient time for training and demonstration for each item of equipment or system, or time as may be specified in technical *Specifications*.

.2 *Consultant* and *Owner* will review submittal and advise *Contractor* of any necessary revisions.

.3 Submit report(s) within 5 *Working Days* after completion of demonstration and training:

.1 identifying time and date of each demonstration and training session,

.2 summarizing the demonstration and training performed, and

.3 including a list of attendees.

1.3 PREREQUISITES TO DEMONSTRATION AND TRAINING

.1 Testing, adjusting, and balancing has been performed in accordance with *Contract Documents*.

.2 Equipment and systems are fully operational.

.3 Copy of completed operation and maintenance manual is available for use in demonstration and training.

.4 Conditions for demonstration and training comply with requirements specified in technical *Specifications*.

1.4 DEMONSTRATION AND TRAINING

.1 Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, and maintenance of each item of equipment and system.

.2 Review operation and maintenance manual in detail to explain all aspects of operation and maintenance.

.3 Prepare and insert additional information in operation and maintenance manual if required.

END OF SECTION

1 General

1.1 SUMMARY

.1 Review drawings, site conditions, and other specification sections to ascertain the extent and nature of work of this section.

.2 The Work of this Section includes, but is not limited to the following:

.1 Demolish and removal of the following, where indicated on the Drawings:

.1 Soil and sod;

.2 Tress, stumps and roots;

.3 Cast-in-place concrete;

.4 Pre-cast concrete pavers

.5 Pressure treated step retaining walls;

.6 Pressure treated timber curbs;

.7 Wrought iron, wood and metal fencing;

.8 Light standards;

.9 Steel handrails.

.2 Dispose of demolished materials except where required to be salvaged or reused.

.3 Refer to demolition notes indicated on all disciplines Drawings.

.4 Payment for salvage, stockpiling, sealing, disposal, recycling, excavating and backfilling will be included in above removal items.

.5 Measure removal of waste, and materials designated for alternate disposal from site in tonnes.

.3 Drawings contain details that suggest directions for solving some of the major demolition and removal requirements for this project; Contractor is required to develop these details further by submitting a demolition plan prepared by a professional engineer employed by the Contractor.

1.2 REFERENCE STANDARDS

.1 American National Standards Institute (ANSI):

.1 ANSI A10.8-2011, Scaffolding Safety Requirements

.2 Canadian Standards Association (CSA):

.1 CSA S350- M1980 (R2003), Code of Practice for Safety in Demolition of Structures.

.3 National Fire Protection Association (NFPA):

.1 NFPA 241-09, Standard for Safeguarding Construction, Alteration, and Demolition Operations

.4 Provincial Legislation:

.1 Legislation specific to Authority Having Jurisdiction for work governed by this Section.

.5 Health Canada/Workplace Hazardous Materials Information System (WHMIS)

.1 Material Safety Data Sheets (MSDS).

.6 Transport Canada (TC)

.1 Transportation of Dangerous Goods Act, 1992 (TDGA), c. 34.

1.3 DEFINITIONS

.1 Demolish: Detach items from existing construction and legally dispose of them off site, unless indicated to be removed and salvaged or removed and reinstalled.

.2 Remove and Salvage: Detach items from existing construction and deliver them to Owner ready for reuse.

.3 Remove and Reinstall: Detach items from existing construction, prepare them for reuse, and reinstall them where indicated.

.4 Existing to Remain: Existing items of construction that are not removed and that are not otherwise indicated as being removed, removed and salvaged, or removed and reinstalled.

.5 Hazardous Materials: dangerous substances, dangerous goods, hazardous commodities and hazardous products, may include but not limited to: asbestos PCB's, CFC's, HCFC's poisons, corrosive agents, flammable substances, ammunition, explosives, radioactive substances, or other material that can endanger human health or well being or environment if handled improperly.

.6 Waste Audit (WA): detailed inventory of materials in building. Indicates quantities of reuse, recycling and landfill.

.1 Involves quantifying by volume/weight amounts of materials and wastes generated during construction, demolition, deconstruction, or renovation project.

.2 Indicates quantities of reuse, recycling and landfill.

.7 Waste Reduction Workplan (WRW): written report which addresses opportunities for reduction, reuse, or recycling of materials. WRW is based on information acquired from WA.

1.4 ADMINISTRATIVE REQUIREMENTS

.1 Site Meetings.

.1 Convene pre-demolition meeting one week prior to beginning work of this Section in accordance with Division 01, to:

.1 Verify project requirements.

.2 Review installation and substrate conditions.

.3 Co-ordination with other building subtrades.

.4 Review manufacturer's installation instructions and warranty requirements.

.2 Arrange for site visit with Consultant, to examine existing site conditions adjacent to demolition work, prior to start of Work.

.3 Hold project meetings weekly, unless otherwise agreed upon by the Consultant and the Contractor.

.4 Reporting Requirements: Contractor to complete.

.5 Provide verbal reporting on status of waste diversion activity at each meeting.

.6 Consultant will provide written notification of change of meeting schedule established upon contract award 24 hours prior to scheduled meeting.

1.5 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Division 01.

.2 Shop Drawings:

.1 Submit drawings stamped and signed by professional engineer registered or licensed in Province, Canada.

.2 Submit for approval drawings, diagrams or details showing sequence of demolition work and supporting structures and underpinning, where required by authorities having jurisdiction.

.3 Waste Reduction Workplan:

.1 Prior to beginning of Work on site submit detailed Waste Reduction Workplan in accordance with Division 01 and indicate:

.1 Descriptions of and anticipated quantities in percentages of materials to be salvaged reused, recycled and landfilled.

.2 Schedule of selective demolition.

.3 Number and location of dumpsters.

.4 Anticipated frequency of tippage.

.5 Name and address of haulers, waste facilities, and waste receiving organizations.

.4 Certificates:

.1 Submit copies of certified receipts from authorized disposal sites and reuse and recycling facilities for material removed from site on monthly basis.

.2 Written authorization from Consultant is required to deviate from haulers and receiving facilities listed in Waste Reduction Workplan.

1.6 DELIVERY, STORAGE AND HANDLING

.1 Store and manage hazardous materials in accordance with Division 01.

.2 Storage and Protection.

.1 Protect in accordance with Section 31 23 33 Excavation, Trenching and Backfilling.

.2 Protect existing items designated to remain and items designated for salvage. In event of damage to such items, immediately replace or make repairs to approval of Consultant and at no cost to the Owner.

.3 Remove and store materials to be salvaged, in manner to prevent damage.

.4 Store and protect in accordance with requirements for maximum preservation of material.

.5 Handle salvaged materials as new materials.

.3 Develop Waste Reduction Workplan related to Work of this Section and in accordance with Division 01.

1.7 SITE CONDITIONS

.1 Site Environmental Requirements.

.1 Ensure that selective demolition work does not adversely affect adjacent watercourses, groundwater and wildlife, or contribute to excess air and noise pollution.

.2 Do not dispose of waste of volatile materials including but not limited to, mineral spirits, oil, petroleum based lubricants, or toxic cleaning solutions into watercourses, storm or sanitary sewers.

.1 Ensure proper disposal procedures are maintained throughout the project.

.3 Do not pump water containing suspended materials into watercourses, storm or sanitary sewers or onto adjacent properties.

.4 Control disposal or runoff of water containing suspended materials or other harmful substances in accordance with local authorities, as directed by Consultant.

.5 Protect trees, plants and foliage on site and adjacent properties where indicated.

2 Products

2.1 EQUIPMENT

.1 Leave machinery running only while in use, except where extreme temperatures prohibit shutting machinery down.

3 Execution

3.1 PREPARATION

.1 Inspect site with Consultant and verify extent and location of items designated for removal, disposal, alternative disposal, recycling, salvage and items to remain.

.2 Locate and protect utilities. Preserve active utilities traversing site in operating condition.

.3 Notify and obtain approval of utility companies before starting demolition.

3.2 REMOVAL OF HAZARDOUS WASTES

.1 Remove contaminated or dangerous materials defined by authorities having jurisdiction, relating to environmental protection, from site and dispose of in safe manner to minimize danger at site or during disposal.

3.3 REMOVAL OPERATIONS

.1 Remove items as indicated.

.2 Do not disturb items designated to remain in place.

.3 Removal of pavements, curbs and gutters:

.1 Square up adjacent surfaces to remain in place by saw cutting or other method approved by Consultant.

.2 Protect adjacent joints and load transfer devices.

.3 Protect underlying and adjacent granular materials.

.4 Prevent contamination with base course aggregates, when removing asphalt pavement for subsequent incorporation into hot mix asphalt concrete paving,

.5 Excavate at least 300mm below pipe invert, when removing pipes under existing or future pavement area.

.6 Remove designated trees during site demolition.

.1 Obtain written approval of Consultant prior to removal of trees not designated.

.7 Stockpile topsoil for final grading and landscaping:

.1 Provide erosion control and seeding if not immediately used.

.8 Disposal of Material:

.1 Dispose of materials not designated for salvage or reuse on site at authorized facilities approved in Waste Reduction Workplan.

3.4 STOCKPILING

.1 Label stockpiles, indicating material type and quantity.

.2 Designate appropriate security resources/measures to prevent vandalism, damage and theft.

.3 Locate stockpiled materials convenient for use in new construction to eliminate double handling wherever possible.

.4 Stockpile materials designated for alternate disposal in location which facilitates removal from site and examination by potential end markets, and which does not impede disassembly, processing, or hauling procedures.

3.5 REMOVAL FROM SITE

.1 Remove stockpiled material as directed by Consultant, when it interferes with operations of project.

.2 Remove stockpiles of like materials by alternate disposal option once collection of materials is complete.

.3 Transport material designated for alternate disposal using approved facilities and haulers listed in Waste Reduction Workplan, and in accordance with applicable regulations.

.4 Dispose of materials not designated for alternate disposal in accordance with applicable regulations.

.1 Disposal Facilities: approved and listed in Waste Reduction Workplan.

3.6 RESTORATION

.1 Restore areas and existing works outside areas of demolition to conditions that existed prior to beginning of Work.

.2 Use soil treatments and procedures which are not harmful to health, are not injurious to plants, and do not endanger wildlife, adjacent water courses or ground water.

3.7 CLEANING

.1 Progress Cleaning: Clean in accordance with Division 01.

.1 Leave Work area clean at end of each day.

.2 Remove debris, trim surfaces and leave work site clean, upon completion of Work

.3 Use cleaning solutions and procedures which are not harmful to health, are not injurious to plants, and do not endanger wildlife, adjacent water courses or ground water.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Division 01.

.3 Waste Management: separate waste materials for reuse or recycling in accordance with Division 01.

.1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.8 PROTECTION

.1 Repair damage to adjacent materials or property caused by selective site demolition.

END OF SECTION

1 General

1.1 SUMMARY

.1 Review drawings, site conditions, and other specification sections to ascertain the extent and nature of work of this section.

.2 The Work of this Section includes, but is not limited to the following:

.1 Demolish and removal of the following where indicated on the Drawings:

.1 Concrete slabs;

.2 Masonry;

.3 Structural steel;

.4 Drywall/steel stud partitions/assemblies

.5 Doors, windows, frames and associated hardware;

.6 Roofing, insulation and roof ballast

.7 Exterior mechanical equipment and cap weather tight.

.2 Disconnect/cap existing service in areas of demolition.

.3 Trace, demolish and remove decommissioned mechanical and electrical services found during demolition. Remove decommissioned services to the area of demolition to the source, leaving no buried services in walls and floors, unless otherwise approved by written notice from the Owner.

.4 Dispose of demolished materials except where required to be salvaged or reused.

.5 Refer to demolition notes indicated on all disciplines Drawings.

.3 Drawings contain details that suggest directions for solving some of the major demolition and removal requirements for this project; Contractor is required to develop these details further by submitting a demolition plan prepared by a professional engineer employed by the Contractor.

1.2 REFERENCE STANDARDS

.1 American National Standards Institute (ANSI):

.1 ANSI A10.8-2011, Scaffolding Safety Requirements

.2 Canadian Standards Association (CSA):

.1 CSA S350- M1980 (R2003), Code of Practice for Safety in Demolition of Structures.

.3 National Fire Protection Association (NFPA):

.1 NFPA 241-09, Standard for Safeguarding Construction, Alteration, and Demolition Operations

.4 Provincial Legislation:

.1 Legislation specific to Authority Having Jurisdiction for work governed by this Section.

1.3 DEFINITIONS

.1 Demolish: Detach items from existing construction and legally dispose of them off site, unless indicated to be removed and salvaged or removed and reinstalled.

.2 Remove and Salvage: Detach items from existing construction and deliver them to Owner ready for reuse.

.3 Remove and Reinstall: Detach items from existing construction, prepare them for reuse, and reinstall them where indicated.

.4 Existing to Remain: Existing items of construction that are not removed and that are not otherwise indicated as being removed, removed and salvaged, or removed and reinstalled.

1.4 EXAMINATION

.1 Visit and examine the site and note all characteristics and irregularities affecting Work of this Section. Submit a pre-demolition inspection report. Ensure the Owner of premises being inspected is represented at inspection.

.2 Where appropriate prepare a photographic or video record of existing conditions, particularly of existing work scheduled to remain.

.3 Where applicable, examine adjacent tenancies not part of the scope of work. Determine extent of protection required to areas and related components not subject to demolition.

1.5 SUBMITTALS

.1 Provide required information in accordance with Division 01.

.2 Action Submittals: Provide the following submittals before starting any work of this Section:

.1 Prepare schedule in conjunction with overall project schedule, and outline proposed methods in writing. Obtain approval before commencing demolition work, and indicate the following:

.1 Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity

.2 Interruption of utility services

.3 Coordination for shutoff, capping, and continuation of utility services

1.6 QUALITY ASSURANCE

.1 Conform to requirements of all authorities having jurisdiction.

.2 Comply with applicable requirements of CSA S350-M "Code of Practice for Safety in Demolition of Structures".

.3 Work of this Contract shall be executed by an approved 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.

.4 Perform cutting and coring, where applicable, by a firm specializing in this type of work, able to produce evidence of successful completion of similar work over a period of at least five (5) years immediately prior to date of contract.

.5 Apply for, secure, arrange and pay for all permits, notices and inspections necessary for proper execution and completion of work in this Section.

.6 Professional Engineer Qualifications: Procure the services of a professional engineer who is experienced in providing relevant engineering services to perform the following:

.1 Review portions of the Work requiring structural performance, prepare plan of action, engineer temporary shoring and bracing, and Provide site administration and inspection for work of this Section.

1.7 PROTECTION

.1 Prevent movement or settlement of adjacent work. Provide and place bracing or shoring and be responsible for safety and support of such work. Be liable for any such movement or settlement, and any damage or injury caused.

.2 Cease operations and notify Consultant if safety of any adjacent work or structure appears to be endangered. Take all precautions to support the structure. Do not resume operations until reviewed with the Consultant.

.3 Prevailing weather conditions and weather forecasts shall be considered. Demolition work shall not proceed when weather conditions constitute a hazard to the workers and site.

.4 Prevent damage of surrounding vegetation by construction. Install tree protection barriers to trees that are scheduled to remain.

.5 Prevent debris from blocking surface drainage inlets and mechanical and electrical systems which remain in operation.

.6 Temporarily suspended work that is without continuous supervision shall be closed to prevent entrance of unauthorized persons.

1.8 REMAINING AND ADJACENT STRUCTURES

.1 Do not interfere with, encumber, endanger or create nuisance, from any cause due to demolition work, to public property or any adjacent attached and/or detached structures in possession of Owner or others, which are to remain, whether occupied or unoccupied during this work.

.2 Make good damage to such structures resulting from work under this Section at no cost to Owner. Make good adjacent building surfaces damaged by work of this Section.

1.9 PROTECTION OF SERVICES AND STRUCTURES

.1 Take necessary precautions to guard against movement, settlement or collapse of existing adjacent utility services, public property and/or structures, whether to remain or not. If these or other unforeseen conditions develop, take immediate emergency measures, report to Consultant, confirm in writing, and await instructions before proceeding with any further related demolition work.

.2 Prior to saw cutting or core drilling of existing concrete slabs, use ground penetrating radar (GPR) to detect utilities and structural reinforcing. Concrete X-Rays can be used when access to both sides of concrete slab is accessible for placement of required x-ray film.

1.10 EXISTING SERVICES

.1 Prior to start of demolition disconnect all electrical service lines in the areas to be demolished. Post warning signs on all electrical lines and equipment which must remain energized to serve other areas during period of demolition. Disconnect electrical service lines in demolition areas to the requirements of local authority having jurisdiction.

.2 In each case, notify the affected utility company in advance and obtain approval where required before commencing with the work on main services.

.3 Arrange with utility companies for locating of such services and for disconnection of existing services owned by utility companies and which will be disconnected by said utility companies, provided such services do not interfere with adjacent tenancy operators.

.4 Remove sewer and water lines where required within existing building as deemed necessary, and cap to prevent leakage, in accordance with authorities having jurisdiction.

.5 Existing services are to be maintained where required for normal tenant operation during regular hours of operation and/or as deemed necessary by Owner.

1.11 DECOMMISSIONED SERVICES

.1 Remove fully decommissioned electrical and mechanical service lines, plumbing, ducting, fixtures and all fasteners and supports for decommissioned items.

.1 Remove sewer and water lines where required within existing building as deemed necessary, and cap to prevent leakage, in accordance with authorities having jurisdiction.

.2 Patch and repair surfaces affected by this selective demolition to match existing adjacent surfaces, as approved by the Consultant.

1.12 EXISTING WARRANTIES

.1 Remove, replace, patch, and repair materials and surfaces cut or damaged during selective demolition, by methods and with materials so as not to void existing warranties.

2 Products

2.1 DEBRIS, SALVAGED MATERIAL AND EQUIPMENT DISPOSAL

.1 All materials and or equipment salvaged from demolition work becomes property of demolition Contractor unless designated otherwise.

.2 At no cost to Owner repair or replace material and/or equipment scheduled to remain which is damaged by demolition work. Do not sell any salvaged material or equipment directly from project site.

.3 Remove waste debris continually and entirely from project site during demolition work. Do not load vehicles transporting such debris beyond their safe capacity or in a manner which might cause spillage on public or private property. If spillage does occur, clean up immediately to prevent traffic hazards or nuisance.

2.2 PROTECTION

.1 Temporary Protection:

.1 Erect temporary hoarding protection, to enclose openings in exterior walls, and/or provide security to partially occupied interior spaces, as indicated in Division 01.

.2 Erect temporary dust screens to prevent dust and debris to enter areas of the building which are not scheduled for demolition. Remove temporary dust screens when no longer required.

2.3 REPAIR MATERIALS

.1 Use repair materials identical to existing materials:

.1 If identical materials are unavailable or cannot be used for exposed surfaces, use materials that visually match existing adjacent surfaces to the fullest extent possible.

.2 Use a material whose installed performance equals or surpasses that of existing material.

.3 Comply with material and installation requirements specified in individual Specification Sections.

.2 Floor Patching and Levelling Compounds: Cement based, trowelable, self-levelling compounds compatible with specified floor finishes; as indicated in Sections 03 35 00 Concrete Finishing, 09 30 00 Tile and 09 65 00 Resilient Flooring.

.3 Concrete Unit Masonry: Lightweight concrete masonry units, and mortar, cut and trimmed to fit existing opening to be filled. Provide standard hollow core units, square end units and bond beam units.

.1 Refer to drawings for schedule/extent of patching required.

.4 Gypsum Board Patching Compounds: Joint compound to ASTM C475, bedding and finishing types thinned to provide skim coat consistency to patch and prepare existing gypsum board walls ready for new finishes in accordance with Section 09 29 00.

.5 Fireproofing: Patch and repair all fireproofing damaged during demolition of adjacent surfaces with compatible fireproofing materials. Provide test reports from fireproofing manufacture warranting installation, adhesion and compatibility between existing and new fireproofing materials.

2.4 EXISTING MATERIALS

.1 Items to be retained for re-use in new construction include, but are not limited to the following:

.1 Confirm with Consultant any materials that appear to be in re-usable condition prior to disposal.

.2 Confirm with Consultant any materials scheduled for re-use that are not in re-usable condition prior to installation.

3 Execution

3.1 GENERAL

.1 Exercise caution in dismantling, disconnecting of work adjacent to existing work designated to remain.

.2 Carry out demolition in a manner to cause as little inconvenience to the adjacent properties as possible.

.3 Carry out demolition in an orderly and careful manner.

.4 Demolition by explosives is not permitted.

.5 Selling or burning of materials on site is not permitted.

.6 Sprinkle exterior debris with water to prevent dust. Do not cause flooding, contaminated run-off or icing. Do not allow waste material, rubbish, and windblown debris to reach and contaminate adjacent properties.

.7 Lower waste materials in a controlled manner; do not drop or throw materials from heights.

.8 At end of each day's work, leave in safe condition so that no part is in danger of toppling or falling.

3.2 PREPARATION

.1 Although possible (with additional precautions), openings through existing concrete columns and beams are generally not permitted; the structural engineer must be contacted for such proposed openings for specific additional requirements.

.2 For all openings to be located through existing structural components, the following requirements for coring or sawcutting openings through existing reinforced concrete floor slabs, roof slab and shear walls for mechanical and electrical services must be followed:

.1 Prior to installation of openings, a testing agency is to be engaged to accurately scan the areas of the proposed openings to locate existing reinforcing steel, electrical conduit and cast-in mechanical services (i.e. pipes). Electromagnetic scanning or ground-penetrating radar are acceptable methods of scanning for these purposes. Note that x-ray technology will not be permitted.

.2 During/after conducting the scanning procedures, the testing agency is to clearly and accurately mark the surfaces of the concrete elements identifying individual existing reinforcing bars and electrical/mechanical services.

3.3 SAFETY AND SECURITY

.1 Maintain security of the building at all times during demolition work.

.2 Provide and maintain fire prevention equipment and alarms accessible during demolition.

3.4 ACCESS ROUTES

.1 Restrict operations to designated access routes.

.2 Do not obstruct roads, parking lots, sidewalks, hydrants and the like.

3.5 SELECTIVE DEMOLITION

.1 Provide necessary shoring and supports to assure safety of structure prior to cutting and coring.

.2 Where practical, sawcut and remove material as required.

.3 Where sawcutting is not appropriate, use suitable hand tools.

.4 Demolish, cut-out and remove from site all other work noted on drawings or required to permit new construction.

.5 Do not allow water to accumulate or flow beyond work area. Provide receptacles and mop-up as work proceeds.

.6 Fill all openings in concrete block walls with concrete masonry units, coursing to match existing, prepare ready to receive new finishes to match existing.

.1 Provide bond beams in new openings cut into existing concrete masonry unit walls.

.2 Provide finished end masonry units to patch and repair for new jamb sections in existing concrete masonry unit walls.

.7 Fill all openings in gypsum board walls with gypsum board and steel framing to match existing, skim coat to make wall smooth and even.

.8 Demolish existing flooring and wall finishes, and adhesive remnants as follows:

.1 Floor and wall substrate shall be smooth, free from ridges and depressions, and adhesive remnants that could telegraph through new flooring and wall finishes.

.9 Demolish completely all ceiling panels and grid as indicated.

.10 Patch and repair all walls, floor and ceilings damaged during demolition with material matching adjacent walls, prepare ready for new finishes.

.1 Prepare existing surfaces schedule to receive new finish by grinding, filling, over-coating, stripping, washing, etching, shot blasting or other chemical or mechanical means, as required to ensure satisfactory installation of new finish.

3.6 PATCHING AND REPAIRING

.1 Floors and Walls:

.1 Where walls or partitions that are demolished extend from one finished area into another, patch and repair floor and wall surfaces in the new space.

.2 Provide a level and smooth surface having uniform finish colour, texture, and appearance.

.3 Remove existing floor and wall coverings and replace with new materials, if necessary, to achieve uniform colour and appearance.

.4 Patch with durable seams that are as invisible as possible.

.5 Provide materials and comply with installation requirements specified in other Sections of these Specifications.

.6 Patch any existing areas adjoining / adjacent to new construction in good workmanship, filling and finishing gaps between finishes to allow new work to blend seamlessly with existing work.

.7 Where patching occurs in a painted surface, apply primer and intermediate paint coats over patch and apply final paint coat over entire unbroken surface containing patch. Provide additional coats until patch blends with adjacent surfaces.

.8 Where feasible, test and inspect patched areas after completion to demonstrate integrity of installation.

.2 Exterior Walls:

.1 Where existing doors and/or windows are schedule to be removed during demolition, patch and repair exterior walls using similar wall construction techniques as adjacent wall construction. Provide exterior and interior substrate and finish materials, matching existing adjacent materials, to provide an even-plane surface of uniform appearance suitable for application of air barrier membrane AB-01 and/or finishes as scheduled.

.3 Parging:

.1 Patch and repair existing parging damaged or spalling, at areas identified in the Document, using single-component, sand/cement blend designed for coating or parging vertical surfaces. Build up in multiple layers in locations where depth of required repair cannot be filled in a single layer.

3.7 EQUIPMENT

.1 The Testing Agency shall provide and operate all necessary equipment for conducting accurate scans of existing reinforced concrete components for which openings are required.

.2 Equipment and methodology to be capable of scanning concrete elements to a maximum of 400 mm thickness.

3.8 EXCESSIVE DEMOLITION

.1 Where excessive demolition occurs, be responsible for cost of replacing such work.

.2 Consultant shall determine extent of such 'over-demolition' and method of rectification.

3.9 COMPLETION

.1 Leave project site as directed, reasonably clean and presentable, free from above grade debris, any salvaged material and/or equipment except those designated to remain.

.2 Maintain access to exits clean and free of obstruction during removal of debris.

END OF SECTION

1 General

1.1 SUMMARY

.1 Work of this Section includes the supply and installation of the following concrete floor treatments, as well as testing and measurement for floor flatness and levelness.

.1 Liquid-Applied Penetrating Sealer;

.2 Cementitious Levelling Treatments;

.3 Cementitious Topping, Patching and Flash Patching Materials.

1.2 DEFINITIONS

.1 Floor Classifications: Classification of concrete floor slabs based on their intended use, methods of finishing and finish materials applied to flooring as denoted by the F-rating below, and as follows:

.1 Single Course Floor: Floors placed in a single course with final finishing applied to properly levelled concrete.

.2 Finish or Finishes: Materials applied to finished concrete surface, i.e.: stained or coloured concrete, carpet, resilient flooring or ceramic tile.

.3 Finishing: Methods, tools and equipment employed to achieve levelness or surface flatness for shored slabs and slabs-on-grade, and durability indicated and as follows:

.1 F3-Finishing: Floors having a straightedge value of $\pm$1.6mm over 3048mm (1/6" over 10'); similar to CSA A23.1 Class C Slab Finishing.

1.3 REFERENCE STANDARDS

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

.1 ASTM C309-11, Standard Specification for Liquid Membrane-Forming Compound for Curing Concrete.

.2 ASTM C979/C979M-10, Standard Specification for Pigments for Integrally Colored Concrete.

.2 American Concrete Institute (ACI):

.1 ACI 117-2010, Specifications for Tolerances for Concrete Construction and Materials and Commentary

.2 ACI 302.1R-15, Guide for Floor and Slab Construction

.3 Canadian Standards Association (CSA):

.1 CSA A23.1-14/A23.2-14, Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete.

.4 International Concrete Repair Institute (ICRI):

.1 ICRI 310.2R-2013, Guideline for Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, Polymer Overlays and Concrete Repair

1.4 ADMINISTRATION REQUIREMENTS

.1 Coordination:

.1 Coordinate a meeting between the Contractor, Subcontractor responsible for concrete placement, and the Consultant to determine site quality control testing section borders and sample measurement line locations, method of measurement, and accuracy requirements of the measuring devices.

.2 Pre-Construction Meetings:

.1 Pre-Construction Conference: Arrange a site meeting, to coincide with regular bi-weekly site meetings, attended by the Contractor, the Subcontractor's representative and foreman for this project, the Consultant, materials supplier(s), and other relevant personal before commencement of work for this Section.

.2 Prepare an outline agenda for meeting in accordance with Division 01.

1.5 SUBMITTALS

.1 Provide submittals in accordance with Division 01.

.2 Action Submittals: Provide the following submittals before starting any work of this Section:

.1 Product Data: Submit manufacturer's product data for each materials specified including recommended application rates and methods of installation.

.3 Informational Submittals: Provide the following submittals during the course of the work:

.1 Site Quality Control Submittals: Submit results for straightedge measurements to demonstrate compliance with specified tolerances. Record the following information on a drawing indicating floor slab layout, column locations and slab penetrations:

.1 Indicate variance from specified straightedge measurements as a + or - value.

.2 Failed tests in excess of 50% of the straightedge will require the Subcontractor to flash patch floor to achieve specified tolerance; example of tolerance failure.

.3 Slabs-On-Grade: Measurement of 1.6mm (1/16") or greater than ±6mm (1/4") measurement will be considered as a failed test and will require flash patching.

.4 Suspended Slabs: Measurement of 3mm (1/8") or greater than ±6mm (¼") measurement (80% tolerance allowance) will be considered as a failed test and will require flash patching.

1.6 PROJECT CLOSEOUT SUBMISSIONS

.1 Operation and Maintenance Data:

.1 Submit detailed cleaning and maintenance instructions for concrete densifier products, and instruct Owner in proper care and maintenance of specified floor finishes, including a complete list of floor care products that will be required for ongoing maintenance, in accordance with Division 01.

1.7 QUALITY ASSURANCE

.1 Subcontractor executing work of this Section shall employ installers having a minimum of five (5) years continuous experience in successful installation of work of type and quality shown and specified. Submit proof of experience upon Consultant's request.

.2 Ensure proper use of proprietary materials in strict accordance with the material manufacturer's directions.

1.8 SITE CONDITIONS

.1 Environmental Requirements:

.1 Ensure that adequate temporary heating is provided as required for cold weather work.

.2 Provide adequate moisture, sun shades and wind barriers to prevent too rapid drying of concrete during hot weather.

.2 Protection:

.1 Ensure that finished concrete floor areas are protected from abrasion from foot or wheeled traffic, and from damage caused by spillage of oil or other harmful materials.

2 Products

2.1 MATERIALS

.1 Liquid-Applied Penetrating Sealer (SCON):

.1 Clear water based silane micro emulsion penetrating concrete sealer, formulated to prevent water and chloride intrusion into concrete surfaces.

.1 Basis of Design Materials:

.1 Planiseal WR 40 by Mapei Inc.

.2 Cipadm S-40 by CPD Construction Products

.3 Sikagard SN40 by Sika Canada Inc.

.4 Hydrozo Silane 40 VOC by BASF.

.5 or approved equivalent.

.2 Patching and Flash Patching Materials:

.1 Cementitious based, polymer modified, fine aggregate, single component, rapid curing, early strength floor patching compounds having high adhesion, for application in thicknesses to a minimum of 1/8" to 1".

.2 Basis of Design Materials:

.1 SikaQuick 1000 by Sika Canada Ltd.

.2 Planitop 18ES by MAPEI Canada Inc.

.3 Meadow-Crete H by W.R. Meadows of Canada

.4 or approved equivalent.

.3 Joint Sealant: Refer to Section 07 92 00.

3 Execution

3.1 EXAMINATION

.1 Before commencing work, ensure that surfaces are acceptable to receive and maintain concrete finishing, and that specified installation will be achieved.

3.2 FINISHING FLOORS AND SLABS

.1 Finish floors and slabs in accordance with CSA A23.1 and ACI 302.1R recommendations for screeding, re-straightening, and finishing operations for concrete surfaces; do not wet concrete surfaces.

3.3 INSTALLATION

.1 Installation - Liquid-Applied Penetrating Sealer:

.1 Vertical Surfaces:

.1 Apply using a brush, roller or low pressure spray, working from top to bottom by maintaining a 305mm (12") parallel curtain (run down).

.2 When applying the material on a vertical surface, avoid accumulation and run-off of the material. In the event of material accumulation or run-

off lines being formed, redistribute the material on the surface or remove by sponging.

.3 Apply flood coat in two (2) passes, "wet on wet" with the second pass at right angles to the first. Material coverage should not be greater than 2.5 m2/L total (100 ft2/US gal.), unless otherwise recommended by the Manufacturer.

.2 Horizontal Surfaces:

.1 Apply using a roller or low pressure spray, ensuring that product penetrates the substrate and does not "pond" or "puddle" on the surface.

.2 If ponding occurs, redistribute or remove the excess material on the surface before material starts to dry and form a film that will prevent penetration of excess material.

.3 Material coverage should not be greater than 4.4 m2/L (180 ft2/US gal.), unless otherwise recommended by the Manufacturer.

.4 Apply flood coat in two (2) passes, "wet on wet" with the second pass at right angles to the first.

.5 Complete and correct coverage of surfaces is crucial to the success of such sealers

.3 Control Joints:

.1 Install bond breaker of silica sand, polyethylene film strip or foam filler in bottom of joints.

.2 Cementitious Topping, Patching and Flash Patching Materials:

.1 Leak Prevention:

.1 Fill cracks and voids in subfloor where leakage of slurry could occur using suitable quick setting patch material or caulk, as recommended by underlayment manufacturer.

.2 Prime substrate according to manufacturer's recommendations.

.3 Installation shall not begin until building is enclosed and ventilated.

.4 Mix levelling treatments and cementitious topping, patching and flash patching materials in accordance with Manufacturer's written instructions.

.5 Pour levelling treatments and cementitious topping, patching and flash patching materials to recommended thickness and immediately spread and screen to desired surface finish and level.

.3 Control Joints – Interior Surfaces:

.1 Follow existing control joints in concrete levelling and topping finishes to prevent cracking. When concrete levelling and topping finishes are firm enough not to be torn or damaged by cutting, cut 5mm (3/16") wide control joints into surface of concrete with abrasive blade power saw.

.2 Once levelling and topping finishes are cured, fill control joints with joint sealant.

.1 Completely clean side joint surfaces of dirt, oil, grease, and similar contaminants, and mask floor surfaces at joints while installing joint sealant.

.2 Prime side joint surfaces with compatible primer if surfaces are not completely dry.

.4 Saw Cuts / Control Joints – Exterior Surfaces:

.1 Follow saw cut / control joint locations as indicated on the Landscape Drawing L-101.

.2 Joint width and depth as indicated on Landscape Drawing L-106.

.3 Fill saw cut / control joints with joint sealant.

.1 Completely clean side joint surfaces of dirt, debris, and similar contaminants, and mask floor surfaces at joints while installing joint sealant.

.2 Prime side joint surfaces with compatible primer if surfaces are not completely dry.

3.4 PATCHING AND REFINISHING

.1 Before completion of project, patch and refinish defective surfaces to match surrounding areas with no discernible variation in appearance.

END OF SECTION

1 General

1.1 SUMMARY

.1 This Section includes supply and installation of single wythe unit masonry assemblies, complete with mortar and grout, masonry joint reinforcement, ties, anchors, and miscellaneous masonry accessories.

.1 Standard Concrete Masonry Units

.2 Fire Resistant Concrete Masonry Units

.3 Glazed/Architectural Concrete Masonry Units

.4 Architectural Trim Units

.5 Architectural Clay Masonry Veneer

.6 Mortar, and Grout

.7 Reinforcing steel

.8 Masonry joint reinforcement

.9 Ties and anchors

.10 Miscellaneous masonry accessories

1.2 REFERENCE STANDARDS

.1 American Concrete Institute: (ACI):

.1 ACI 530.1-99/ASCE 6-99/TMS 602-99, Commentary on Specification for Masonry Structures

.2 Canadian Standards Association (CSA):

.1 CAN/CSA A82, Fired Masonry Brick Made From Clay or Shale.

.2 CSA A165 Series-04 (R2009), CSA Standards on Concrete Masonry Units

.3 CSA A179-04 (R2009), Mortar and Grout for Unit Masonry

.4 CSA A370-04 (R2009), Connectors for Masonry

.5 CAN/CSA A371-04 (R2009), Masonry Construction for Buildings

.6 CSA S304.1-04 (R2010), Design of Masonry Structures

.7 CSA W186-M1990 (R2012), Welding of Reinforcing Bars in Reinforced Concrete Construction

.3 American Society for Testing of Materials (ASTM):

.1 ASTM A123/A123M-09, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products

.2 ASTM A153/A153M-09, Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware

.3 ASTM A496/A496M-07, Standard Specification for Steel Wire, Deformed, for Concrete Reinforcement

.4 ASTM A563-07a, Standard Specification for Carbon and Alloy Steel Nuts

.5 ASTM A653/A653M-11, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process

.6 ASTM A1011/A1011M-12, Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength

.7 ASTM C67-11, Standard Test Methods for Sampling and Testing Brick and Structural Clay Tile.

.8 ASTM C207-06(2011), Standard Specification for Hydrated Lime for Masonry Purposes

.9 ASTM C270-12, Standard Specification for Mortar for Unit Masonry.

.10 ASTM C494-11, Standard Specification for Chemical Admixtures for Concrete.

.11 ASTM E488/E488M-10, Standard Test Methods for Strength of Anchors in Concrete Elements

.12 ASTM E514/E514M-11, Standard Test Method for Water Penetration and Leakage Through Masonry

.13 ASTM E2556/E2556M-10, Standard Specification for Vapour Permeable Flexible Sheet Water Resistive Barriers Intended for Mechanical Attachment.

.14 ASTM F593-02(2008)e1, Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs

.15 ASTM F594-09e1, Standard Specification for Stainless Steel Nuts

.4 Ontario Concrete Masonry Block Association (OCBA):

.1 OCBA Metric Technical Manual

.5 Underwriters Laboratories of Canada (ULC):

.1 ULC List of Equipment and Materials for Fire Rated Construction

1.3 ADMINISTRATIVE REQUIREMENTS

.1 Pre-Construction Conference: Arrange a site meeting, to coincide with regular bi-weekly site meetings, attended by the Contractor, the Subcontractor's representative and foreman for this project, the Consultant, materials supplier(s), and other relevant personal before commencement of work for this Section; agenda for meeting will include; but not be limited to, the following:

.1 Confirmation of specifications and details for the project;

.2 Required mortar, grout and concrete testing, batch control and grouting procedures;

.3 Confirmation of appearance of exposed block lintels;

.4 Confirmation of reinforcement at corners and wall intersections;

.5 Coordination of interior crack control measures;

.6 Confirmation of trowelled or tooled joints to concealed and exposed masonry faces.

.2 Coordination: Coordinate components of the work of this Section with work performed by other Sections including; but not limited to, the following:

.1 Steel Support Angles and Brackets:

.1 Coordinate requirements for structural steel support angles and brackets supplied and installed onto the building structure by Structural.

.2 Provide requirements for supply of loose steel lintels and shelf angles installed by this section to Section 05 50 00.

.2 Masonry Anchors:

.1 Coordinate supply of anchor sections connecting to structural frame installed by Structural.

.2 Include additional products for coordination furnished, but not installed, under this Section.

1.4 SUBMITTALS

.1 Provide submittals in accordance with Division 01.

.2 Samples: Submit samples of the following; Clay Veneer Masonry, Glazed/Architectural Concrete block, Concrete block, mortar, masonry reinforcement, ties and anchors for Consultant's approval before commencing work of this section.

.3 Shop Drawings: Submit shop drawings indicating the following:

.1 Indicate sizes, profiles, coursing, and locations of special shapes for concrete masonry units and clay masonry veneer units.

.2 Detail corner units, end dam units, and other special applications for fabricated flashings.

.4 Informational Submittals: Provide the following submittals when requested by the Consultant:

.1 Submit ULC Assembly Listings and Materials cut sheets for fire rated assemblies as follows:

.1 Not later than thirty (30) working days following Award of Contract, submit copies of ULC Assembly and Materials Listing for indicating ULC Number and how assembly meets the rating criteria for assemblies listed on drawings.

.2 Use the same system and material as would be required for a tested assembly for the project; ULC Listings are tested with the specific materials indicated; substitutions will not be permitted unless evidence of equivalency is confirmed.

.3 Submit manufacturer's product data for materials and prefabricated devices, providing descriptions are sufficient for identification at job site; include manufacturer's printed instructions for installation.

.5 Certificates: Submit statements of material properties indicating compliance with specified requirements for each type and size of the following:

.1 Masonry Units:

.1 Include material test reports substantiating compliance with requirements.

.2 Include ULC Listings for fire resistance rated materials and construction equivalent to assemblies with indicated on drawings indicating fire resistance ratings.

.2 Cementitious Materials:

.1 Include brand, type, and name of manufacturer for site mixed mortar materials.

.2 Include description of type and proportions of ingredients for pre-blended, dry mortar mixes.

.3 Include description of type and proportions of ingredients for grout mixes.

.3 Accessories:

.1 Reinforcing bars

.2 Joint reinforcement

.3 Anchors, ties, and metal accessories

.4 Site Quality Control Submissions: Submit detailed description of methods, materials, and proposed unit masonry cleaning techniques.

1.5 SITE CONDITIONS

.1 Protection of Masonry: Protect masonry and other work from marking and other damage and as follows:

.1 Cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work during construction until permanent flashings and membranes are completed.

.2 Cover partially completed masonry when construction is not in progress to prevent wetting of inside wythes of construction and contribution to efflorescence.

.3 Extend cover a minimum of 610mm (24") down both sides and hold cover securely in place.

.4 Secure cover a minimum of 610mm (24") down face next to un-constructed wythe and hold cover in place where one (1) wythe of multi-wythe masonry walls is completed in advance of other wythes.

.5 Provide adequate bracing for masonry during construction and until permanent lateral supports are in place.

.6 Do not apply uniform floor or roof loads for a minimum of twelve (12) hours and concentrated loads for a minimum of three (3) days after building masonry walls or columns.

1.6 DELIVERY, STORAGE, HANDLING AND PROTECTION

.1 Delivery and Acceptance Requirements: Deliver pre-blended, dry mortar mix in moisture resistant containers designed for lifting and emptying into dispensing silo; store dry mortar mix in delivery containers on elevated platforms, under cover, and in a dry location or in a metal dispensing silo with weatherproof cover.

.2 Storage and Handling Requirements: Store masonry units on elevated platforms in a dry location and as follows:

.1 Stack materials on floors of building so that structural design loads are not exceeded; coordinate with Consultant.

.2 Cover tops and sides of stacks with waterproof sheeting securely tied to pallets if units are not stored in an enclosed location; do not install masonry units that become wet until they are dry.

.3 Store cementitious materials on elevated platforms, under cover, and in a dry location; do not use cementitious materials that have become wet or damp.

.4 Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

2 Products

2.1 CONCRETE MASONRY UNITS (CMU-01)

.1 Standard concrete blocks: Autoclave or bubble cure process, high pressure steam cured, modular, conforming to CSA A165 Series-04 (R2009), with lineal shrinkage and moisture movement not to exceed 0.035% and shall be as follows;

.1 Classification: S/15/A/M, 75% solid for all locations where structural members bear on concrete block.

.2 H/15/A/M, for all other block work.

.3 Size: Modular to sizes indicated on Drawings and schedules.

.4 Special shapes:

.1 Provide square units for exposed corners.

.2 Provide purpose made shapes for lintels and bond beams.

.3 Provide additional special shapes required for project.

.4 Manufacture special shapes at same time and with the same batch as standard concrete block to be used.

.2 Fire Resistant Concrete Masonry Units: Manufactured in accordance with CSA A165 Series-04 (R2009) as modified below:

.1 Classification:

.1 1 Hour Fire Rating: H/15/A/O

.2 Concrete Composition – 2 Hour Fire Rating: Type $L_2$20S Concrete.

.3 Size: Modular to sizes indicated on Drawings.

.4 Where concrete block walls are required as fire separations or barriers, they shall conform to the local Building Code with respect to equivalent thickness and type of concrete. Consult with Consultant for locations and special conditions.

2.2 GLAZED CMU MASONRY (GLB)

.1 Glazed concrete blocks shall be medium weight units conforming to ASTM C90, Grade N and to achieve 20 MPa on net area compression strength. The glazed surface shall have a smooth satin-gloss finish, externally heat-polymerized cast-on facing conforming to ASTM C744-08. Glazed finish to be provided to all exposed faces.

.1 Size: Manufacturer's standard units with face dimensions of 15 ¾" long x 3 ¾" tall x 3 ¾" or 5 ¾" deep or as indicated in drawings/schedules.

.2 Special Shapes: Provide where shown or scheduled and where required to complete masonry work as indicated, including corners, intersections, end/end caps, control joints, bond beams and other special conditions, all of one manufacturer.

.2 Pattern: Stack Bond

.3 Colour: As selected later by Architect from manufacturers full colour range.

.4 Acceptable Products:

.1 Spectra-Glaze II Block as distributed by Thames Valley Brick & Tile or equivalent per Specification 01 25 00.

2.3 CLAY MASONRY VENEER BRICK (BRK-01)

.1 Pattern

.1 Running Bond

.2 Characteristics

.1 Size shall be Metric Norman, 57mm height x 290mm length x 90mm depth and complies with ASTM C-1405, Grade S, Type I & II, Class Exterior, Division Solid.

.3 Must meet ASTM C-84 (UL723) requirements and rated zero flame spread, zero smoke developed and zero fuel contribution. Also will not release any toxic or noxious fumes when burned at 2000°F (1093°C)

.4 Shapes: Provide where shown or scheduled and where required to complete masonry work as indicated, including corners, intersections, ends, control joints, and other special

conditions, all of one manufacturer. Glazed finish required on exposed surfaces, including returns into door/window openings.

.5 Acceptable Products:

.1 Brampton Brick, Contemporary Series, Manilla Smooth

.2 Canada Brick, Sundance Smooth

.3 Equivalents as per Specification 01 25 00

2.4 MORTAR MATERIALS (TYP)

.1 Mortar materials shall conform to CSA A179.

.2 Water: Potable (clean, exempt of ice, oils, acid, alkalis, organic matter, sediments or any other harmful matter).

.3 Aggregate: Meeting CSA A179, and as follows:

.1 Use same brands of materials and source of aggregate for entire project.

.2 Use washed aggregate consisting of natural sand or crushed stone for mortar that is exposed to view.

.3 Use aggregate graded with 100% passing the No. 16 (1.18-mm) sieve for joints less than 6 mm thick.

.4 Cement: Normal portland, in accordance with CSA A3000-08, Type GU.

.5 Grout: In accordance with CSA A179, Table 3.

.6 Hydrated Lime: ASTM C207, Type S.

2.5 MORTAR MATERIALS (AT GLAZED CMU)

.1 Non-loadbearing glazed masonry: Chemical/corrosion resistant, 3-component epoxy brick mortar with the following physical properties, to be used at glazed brick veneer.

Water absorption (ASTM C413)	0.1%
Working time (minutes) at 70°F (21°C)	35-45 minutes
Setting time (hours) at 70°F (21°C)	1.5-2.5 hours
Density (ASTM C138)	115 lbs./cu. ft. (1842 kg per meter^3)
Tensile (ASTM C307)	2,250 psi (15.5 MPa)
Compressive strength (ASTM C579)	12,000 psi (83 MPa)
Shrinkage (ASTM C531)	0.04%
Coefficient of thermal expansion (ASTM C531)	37 x 10^{-6} / °F (67 x 10^{-6} / °C)
Maximum service temperature	225°F (107°C)

2.6 MORTAR MIXES

.1 Mixing:

.1 Prepare and mix mortar materials under strict supervision and in small batches for immediate use only.

.2 Mix proprietary mortars in strict accordance with CSA A179. Do not use re-tempered mortars for coloured mortars.

.2 For Exterior Wythe of Cavity/Composite Walls (non load-bearing, above grade):

.1 Use Type 'N', 1:1:6 pre-mixed, pre-coloured, Portland cement/lime/sand mortar, 'Betomix Plus' by Daubois Inc., or Maxi-Mix silo. Use non-staining "white" cement where required to achieve colour as selected later by the Consultant.

.3 For Interior Reinforced or Non-Reinforced Block Walls:

.1 Use Type 'S', premixed 'Bloc Mix' by Daubios Inc., or approved equivalent by Maxi-Mix.

.4 Mortar pigment (for exterior wythe of cavity/composite walls):

.1 'Bay Ferrox' by Bayer Inc. or approved alternative by Elementis Pigments. Colour to later selection by Consultant.

2.7 MASONRY REINFORCEMENT, TIES AND ANCHORS

.1 Masonry Joint Reinforcement: In accordance with to CSA A371 and ASTM A496, with corrosion protection in accordance with CSA S304.1 and CSA A370, and as follows:

.1 Interior Walls: Hot dip galvanized, carbon steel.

.2 Exterior Walls: Stainless steel.

.3 Lengths: A minimum of 3048mm (10') with prefabricated corner and tee units.

.2 Connectors: In accordance with to CSA A370-04 (R2009) and CSA S304.1-04(R2010) with hot dip galvanized finish.

.3 Single Wythe Masonry Joint Reinforcement: Either ladder or truss type with single pair of side rods.

.4 Ties and anchors specified in this section shall be designed in accordance with CSA A370-04 (R2009) for non-conventional masonry connectors as follows:

.1 Deflection: Maximum 1.6mm (1/16") including free play, when acted upon by a lateral load of 0.45 kN, in all possible positions of adjustment.

.2 Positive restraint at position of maximum adjustment.

.3 Free play of multi-component ties maximum 0.8mm (1/32") when assembled in all possible configurations.

.4 Anchors shall allow vertical adjustment but resist tension and compression forces perpendicular to plane of wall.

.5 Wall Ties (masonry veneer/insulated cavity/masonry backup): Single screw, Type 304 stainless steel veneer tie for concrete/CMU construction featuring a dual-diameter barrel with factory-installed EPDM washers to seal both the face of the insulation and the air/vapor barrier, and thermal wings to decrease thermal transfer through cavity insulation. Provide 3/16" diameter, type 304 stainless steel 2X-Hook to wire tie. Length of tie/hook to suit thickness of cavity insulation and air space as detailed.

.1 Acceptable product: 2-Seal Thermal Concrete Wing Nut Anchor by Blok-Lok or equivalent.

.6 Lateral Partition Supports (Top of Wall Anchors):

.1 Angle Support: Fabricated from 3mm (1/8") core metal thickness angled steel plate having 75mm (3") long legs fastened to deck structure to allow vertical movement of masonry assembly; hot dip galvanized; coordinate with Section 07 84 00 for firestopping insulation and smoke seals.

.1 Basis of Design Materials: Blok-Lok BL-LSA1 & 2 (or approved equivalent).

.2 Plate Support: Fabricated from 3mm (1/8") core metal thickness stainless steel plate with 10mm (3/8") diameter metal 150mm (6") long welded to plate having closed end plastic tube fitted over rod that allows rod to move in and out of tube.

.3 Anchor Bolts: Where required provide Headed or L-shaped steel bolts in accordance with ASTM A307-10, Grade A; with ASTM A563-07a hex nuts and, where indicated, flat washers; hot-dip galvanized in accordance with ASTM A153, Class C.

.7 Galvanizing for Masonry Reinforcement, Ties and Anchors:

.1 Hot Dip Hardware and Bolts: In accordance with ASTM A153/A153M-09, Class B-2 regardless of location.

.2 Hot Dip Sheet Steel: In accordance with ASTM A653, Coating Designation Z600, regardless of location.

.3 Structural Shapes and Pipes: In accordance with ASTM A123, Grade 85, regardless of location.

.8 Rebar Positioners: 9 gauge diameter wire, hot dipped galvanized.

.1 Basis of Design Materials: Blok-Lok BL-RB Rebar Positioners (or approved equivalent).

.9 Fastening Into Solid Concrete or Solidly Grouted Installation: Two component, injectable adhesive specifically manufactured for use in installing dowels or threaded anchor rods and inserts into new or existing concrete or grout, and as follows:

.1 Epoxy Composition: Sealed packaging containing resin, hardener, cement and water; components.

.2 Curing Time: Rapid set, high strength and stiffness; maximum time 45 minutes at 20 deg C.

.3 Basis-of-Design Materials: Hilti Inc., HIT HY150 System (or approved equivalent).

.10 Fastening through Hollow Wall Installation: Two-component, injectable adhesive specifically manufactured for use in installing dowels or threaded anchor rods and inserts, with cylindrical mesh screen tube into new or existing masonry cavity wall, and as follows:

.1 Epoxy Composition: Sealed packaging containing resin, hardener, cement and water.

.2 Curing Time: Rapid set, high strength and stiffness; maximum time 60 minutes at 20 deg C.

.3 Basis-of-Design Materials: Hilti Inc., HIT HY20 System (or approved equivalent).

2.8 MISCELLANEOUS MASONRY ACCESSORIES

.1 Packing Insulation: As indicated in Section 07 20 00.

.2 Firestopping: As specified under Section 07 84 00.

.3 Sealants: As specified under Section 07 92 00, and as follows:

.1 Vertical Sealant: Colour to match masonry veneer

.2 Horizontal Sealant: Colour to match mortar

.4 Maintenance Cleaners: Manufacturer's recommended maintenance cleaners.

.5 Support Angle: Hot dip galvanized, in accordance with CSA A370 and ASTM A153.

.6 Fasteners: Galvanized fasteners meeting the requirements of ASTM A325, and as recommended by manufacturer.

.7 Compressible Joint Filler: Pre-moulded filler strips in accordance with ASTM D1056-07, Grade 2A1; compressible up to 35%; of width and thickness indicated; formulated from neoprene, urethane or PVC.

.8 Bond Breaker Strips: #15 asphalt saturated, organic roofing felt in accordance with CSA A123.3-05 (R2010).

.9 Weep hole vents: Flexible ultra-violet resistant polypropylene-copolymer plastic, 'Cell-Vent' by Blok-Lok, 'Mortar Maze Cell Vents' by Advanced Building Products Inc. or approved alternative. Provide at 600mm intervals at through-wall flashing/base course and as vents at high level below sill/horizontal interruptions to encourage air movement within cavity. Stagger high level vents in relation to base vents.

.10 Metal through wall flashings: Prefinished metal flashings in accordance with Section 07 62 00, continuous strips with a 19 mm folded drip edge.

.11 Membrane through wall flashing: Reinforced SBS rubberized asphalt compound laminated to cross-laminated polyethylene film, 40 mils thick; 'Airshield Thru Wall Flashing' by W.R. Meadows or approved alternative, complete with primer and adhesive recommended by flashing manufacturer. Refer also to Specification 07 27 39.

2.9 MASONRY COATINGS

.1 Proprietary Masonry Cleaner: Masonry manufacturer's recommended cleaner designed for removing mortar/grout stains, efflorescence, and other new construction stains from new masonry without discolouring or damaging masonry surfaces.

.1 Clear coating.

.2 Verify acceptability of cleaner for cleaning masonry with mortar joints and for kinds of masonry units specified.

3 Execution

3.1 EXAMINATION

.1 Examine conditions for compliance with requirements for installation tolerances and other conditions affecting performance of work.

.1 Prepare written report listing conditions detrimental to performance of work and submit to the Consultant.

.2 Verify that reinforcing dowels are properly placed.

.2 Examine rough-in and built-in construction for piping systems to verify actual locations of piping connections before installation of unit masonry.

.3 Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION - GENERAL

.1 Thickness: Build single wythe walls to actual widths of masonry units, using units of widths indicated on Drawings.

.2 Single wythe masonry construction shall conform with the Ontario Concrete Block Association (OCBA) requirements for water resistant single wythe masonry construction.

.3 Use full size units without cutting except as follows:

.1 Cut units with motor driven saws if cutting is required to provide a continuous pattern or to fit adjoining construction.

.2 Provide clean, sharp, un-chipped edges.

.3 Allow units to dry before laying unless wetting of units is specified.

.4 Install cut units with cut surfaces and cut edges concealed where possible; obtain Consultant's acceptance where cut edges must be exposed.

.4 Select and arrange units for exposed unit masonry to produce a uniform blend of colours and textures; mix units by drawing units diagonally down multiple rows from at least three

different pallets as masonry units are placed. "Exposed" means visible in complete work, unpainted and painted.

.1 Large variations in colour or texture between adjacent blocks of material will cause the Consultant to reject the installation, and the installer to rebuild the assembly at no additional cost to Contract.

.5 Wet masonry before laying when recommended by manufacturer; allow units to absorb water so they are damp but not wet at time of laying.

.6 Maintain dimensions, lines and levels.

.7 Keep exposed faces free from stains, chips and cracks.

.8 Keep tolerance in plane of 3mm in 2440mm (1/8" in 96"). Do not use chipped, cracked or deformed units in exposed work.

.9 Buttering corners of units, throwing mortar droppings into joints, will not be permitted. Do not shift or tap units after mortar has taken initial set, where adjustments must be made after mortar has started to set, remove mortar and replace with fresh supply.

3.3 LAYING MASONRY WALLS

.1 Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement type joints, returns, and offsets; avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.

.2 Bond Pattern for Exposed Masonry: Lay exposed masonry in bond as indicated on the Drawings; do not use units with less than 100mm (4") horizontal face dimensions at corners or jambs. Lay masonry in running bond where not otherwise indicated on the Drawings.

.3 Lay concealed masonry with all units in a wythe in running bond or bonded by lapping a minimum of 100mm (4"), and as follows:

.1 Bond and interlock each course of each wythe at corners.

.2 Do not use units with less than nominal 100mm (4") horizontal face dimensions at corners or jambs.

.4 Stopping and Resuming Work:

.1 Stop work by racking back units in each course from those in course below; do not tooth.

.2 Clean masonry surfaces that are to receive mortar, remove loose masonry units and mortar, and wet brick if required before laying fresh masonry when resuming work.

.5 Built-In Work:

.1 Build in items specified in this and other Sections as construction progresses.

.2 Fill in solidly with masonry around built-in items.

.3 Fill space between steel frames and masonry solidly with mortar.

.4 Place a layer of metal lath, wire mesh, or plastic mesh in the joint below and rod mortar or grout into core where built-in items are to be embedded in cores of hollow masonry units.

.5 Protect built-in items from damage arising from work of this Section.

.6 Grouting Hollow Concrete Masonry Units – Load Barring Application:

.1 Fill cores in hollow concrete masonry units with grout 610mm (24") under bearing plates, beams, lintels, posts, and similar items.

.2 Use concrete or fine grout where indicated, and also for vertical core filling, lintel beams, bond beams and other filled cores where reinforcing steel is indicated.

.3 Use fine grout where the space being grouted is 50mm (2") or less in its least dimensions; use concrete in all other applications that call for grout.

.4 Use square end concrete masonry units wherever a full or half concrete masonry unit will receive concrete fill.

.5 Use full mortar bedding of cross webs for cores that are filled.

.6 Fill cores in lifts of 1220mm (4') maximum; provide cleanout openings for lifts in excess of 4' where Consultant has accepted larger lifts.

.7 Consolidate core fill during placement by vibration or puddling.

.8 Stop concrete core fill 38mm (1-1/2") below top surface of lift whenever filling will be stopped for more than a 1 hour time duration.

.9 Fill all cores of roof parapets with concrete.

.10 Secure vertical reinforcement in position at top and bottom of core, and a maximum 4' spacing, refer to Drawings for location of vertical reinforcement.

.11 Fill voids solid with mortar so that ties and anchors are set in full mortar bed where masonry walls abut steel or concrete columns.

.7 Build non-load bearing interior partitions full height of storey to underside of solid floor or roof structure above, leaving a gap to allow for structural deflection, and as follows:

.1 Fasten lateral partition supports to structure above and build into top of partition; grout cells of concrete masonry units solidly around plastic tubes of anchors and push tubes down into grout to provide 13mm (½") clearance between end of anchor rod and end of tube; space anchors at 1220mm (4') O.C.

3.4 MORTAR BEDDING AND JOINTING

.1 Lay solid masonry units with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place; do not deeply furrow bed joints or slush head joints.

.2 Lay block work as follows:

.1 Provide special shapes and sizes as required such as halves, jambs, lintels, solids, corners, semi-solids, etc.

.2 Webs to align plumb over each other with thick ends of webs up. Leave no cells open in exposed work. Reinforce all block.

.3 Minimize cutting block. Cut exposed work with power driven abrasive cutting disc or diamond cutting wheel for flush mounted electrical outlets, grilles, pipes, conduit, etc., leaving 3mm (1/8") maximum clearance.

.4 Do not wet concrete masonry units before or during laying.

.5 Locate corners accurately. Use full bed of mortar for first course. Bed face shells and cross and end web fully in mortar. Stagger joints in every course. Align joints plumb over each other in every other course.

.6 Bond intersecting block walls in alternate courses. Where block abuts concrete, bond each block course with dovetail anchors, ties and dovetail slot. Do not break bond of corridor walls or other walls of exposed units where partitions intersect and if bonding would show through on intersect with prefabricated intersection masonry reinforcement in each course.

.7 Take special care in erecting block walls to which other sections will be applying finishes or attaching equipment to ensure tolerances required for work of other

sections can be met with reasonable construction procedures. (e.g. thin-set application of ceramic tile.)

.8 Provide bullnose block at all exposed block corners.

.9 Build block lintels, ensure that lintel jointing coincides with regular bond.

.3 Set trim units in full bed of mortar with full vertical joints, and as follows:

.1 Fill dowel, anchor, and similar holes.

.2 Clean soiled surfaces with fibre brush and soap powder and rinse thoroughly with clear water.

.3 Lay trim units so that joints are even and so that average distance between joint centrelines is equal to the nominal modular dimension of adjacent masonry. Lay trim units in running bond, unless otherwise indicated on the Drawings.

.4 Set trim units in accordance with manufacturers recommended installation practices and materials. Review manufacturer's written recommendations with the Consultant before proceeding.

.5 Use chipped or blemished units only where the defect will be concealed; reject all defective and broken units or units with chipped edges or corners.

.6 Install cut units with cut surfaces and, where possible, cut edges concealed. Where complex cutting is required, place mortar along the cut edge and trowel smooth to provide a consistent 50mm (2") wide gap.

.4 When mortar is "thumbprint" hard, tool all joints (exposed or concealed) concave except at blockwork designated to receive ceramic tile finish which blockwork shall be struck flush.

.1 Use sufficient force to press mortar tight against masonry units on both sides of joints.

.2 Remove excess material or burrs left after jointing. Use trowel or rub with burlap bag.

.5 Lay all joints 10mm (3/8") thick unless otherwise specified or otherwise indicated. Fill all joints solidly with mortar except where specifically designated to be left open.

.6 Stagger joints in every course. Align joints plumb over each other in every other course. Vertical and horizontal joints to be uniform in thickness.

3.5 PARTITIONS (OTHER THAN LOAD-BEARING)

.1 Carry following partitions up through ceiling to structure above, unless noted or specified otherwise; corridor partitions, partitions around staircases and shafts, partitions around washrooms, and any other partitions so indicated on drawings. Terminate all other partitions at first coursing joint above finished ceiling.

.2 Except around staircases and shafts, terminate through partitions within 19mm (3/4") of structure above, i.e. floor, roof decking depending under which partitions occur, and where such partitions occur directly under and parallel to structural framing carry these partitions up to within 19mm (3/4") of bottom of such structural framing.

.3 Around staircases and shafts, wedge and grout masonry solidly to structure above. Laterally support other partitions as required by building code. Where tops of partitions are exposed to view, lateral supports shall be concealed.

.4 Where walls and partitions are pierced by structural members, ducts or pipes, fill voids with mortar to within 19mm (3/4") of such members flush with wall fins.

.5 Fill spaces between partition and structure, ducts and pipes with compressed glass fibre or mineral wool insulation completely from one side of wall to other.

3.6 CONTROL JOINTS

.1 Provide vertical through wall control joints 7620mm (25') O.C. maximum (except as otherwise shown or specified) in continuous walls having no openings, intersections or columns. Control joints as shown on Drawings.

.2 Locate control joints at high stress concentrations and at points of weakness such as at abrupt changes in work height, wall thickness changes such as at chases and at pilasters and maximum of 3658mm (12') from corners.

.3 Construct joint as detailed and generally as follows:

.1 Place building paper against end of block on one side of control joint. Extend bond breaker full wall thickness.

.2 Fill voids between ends of block with mortar to form key and strike back exposed vertical joints 19mm (3/4") deep, install backer rod and caulk in accordance with Section 07 92 00.

.3 Reinforce joints every third course with two 6mm (1/4") diameter greased smooth rods. Locate rods 32mm (1-1/4") in from faces of block centres on joint running parallel to wall.

3.7 REINFORCEMENT AND REINFORCING TIES

.1 Reinforce all masonry walls with continuous masonry horizontal reinforcement in every second block course.

.2 Provide extra reinforcement or reinforcing ties at openings so that first and second courses above and below openings are reinforced. Extend extra reinforcement 610mm (2') beyond opening in each direction.

.3 Anchor new masonry to structural steel to concrete elements, to existing construction at maximum 406mm (16") O.C., vertically in accordance with local building code requirements.

3.8 BUILT-INS

.1 Built-in items provided by other Sections, anchor bolts, sleeves, inserts, loose steel lintels, shelf angles, access panels, and other such items.

.2 Built-in items to present neat, rigid, true and plumb installation. Leave wall openings required for ducts, grilles, pipes and other items.

.3 Fill voids between masonry and metal frames with masonry mortar.

3.9 REPOINTING OR TUCKPOINTING

.1 Repoint defective joints as follows:

.1 Cut back joints 13mm (1/2"), taking care not to damage units. Remove dust and loose materials by brushing or by water jet.

.2 If water jet is used, allow excess water to drain before repointing.

.3 Repoint with same mix as original. Pack mortar tightly in thin layers, and tool joints or strike flush as required.

3.10 CLEANING

.1 Keep work clean and free of mortar stains during laying. Allow mortar droppings which adhere to wall to dry out but not set.

.2 Rub with small piece of masonry followed by brushing to remove all traces.

.3 On completion of masonry, after mortar is thoroughly set and cured, and defective joints tucked and pointed, clean masonry thoroughly.

.4 Remove mortar with wood paddles and scrapers before wetting. Saturate masonry with clean water and flush off loose mortar and dirt. Clean block work using water, scrubbing brushes and wood paddles only.

.5 All masonry shall be free of efflorescence.

END OF SECTION

PART 1 – GENERAL

1.01 SECTION INCLUDES

.1 Architectural cast stone sills and parapet copings.

1.02 DEFINITIONS

.1 Cast Stone: Refined architectural concrete building unit manufactured to simulate natural cut stone, used in Division 4 masonry applications.

.2 Dry Cast: Manufactured from zero slump concrete.

.3 Vibrant Dry Tamp (VDT) Casting Method: Vibratory ramming of earth moist, zero-slump concrete against a rigid mold until it is densely compacted.

.4 Machine casting method: Manufactured from earth moist, zero-slump concrete compacted by machinery using vibration and pressure against a mold until it is densely consolidated.

1.03 REFERENCES

.1 ASTM A 185 - Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete.

.2 ASTM A 615/A 615M - Standard Specification for Deformed and Plain Billet-Steel Bars for Reinforced Concrete.

.3 ASTM C 33 - Standard Specification for Concrete Aggregates.

.4 ASTM C 150 - Standard Specification for Portland Cement.

.5 ASTM C 595 - Blended Cement

.6 ASTM C 1157 - Hydraulic Cement

.7 ASTM C 173 - Standard Test Method for Air Content of Freshly Mixed Concrete by the Volume Method.

.8 ASTM C 231 - Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.

.9 ASTM C 260 - Standard Specification for Air-Entrained Admixtures for Concrete.

.10 ASTM C 270 - Standard Specification for Mortar for Unit Masonry.

.11 ASTM C 494/C 494M - Standard Specification for Chemical Admixtures for Concrete.

.12 ASTM C 618 - Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Concrete.

.13 ASTM C 979 - Standard Specification for Coloring Pigments for Integrally Pigmented Concrete.

.14 ASTM C 989 - Standard Specification for Ground Granulated Blast-Furnace Slag for Use in Concrete.

.15 ASTM C 1194 - Standard Test Method for Compressive Strength of Architectural Cast Stone.

.16 ASTM C 1195 - Standard Test Method for Absorption of Architectural Cast Stone.

.17 ASTM C 1364 - Standard Specification for Architectural Cast Stone.

.18 ASTM D 2244 - Standard Test Method for Calculation of Color Differences from Instrumentally Measured Color Coordinates.

1.04 SUBMITTALS

.1 Submit under provisions of Section 01 30 00.

.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 instructions.

.4 Cast Stone Institute Plant Certification.

.3 Shop Drawings: Include profiles, cross-sections, reinforcement, exposed faces, arrangement of joints, anchoring methods, anchors, annotation of stone types and their location.

.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 Closeout Submittals:

.1 Provide Cast Stone Institute Member Limited Warranty

.2 Provide manufacturer's maintenance instructions that include recommendations for cleaning and maintenance.

1.05 QUALITY ASSURANCE

.1 Manufacturer Qualifications:

.1 Qualified manufacturer of cast stone units similar to those indicated for this Project, that has sufficient production capacity to manufacture required units, and has a minimum of 10 years documented experience.

.2 Testing Agency Qualifications: Qualified according to ASTM E 329 for testing indicated.

.3 Source Limitations for Cast Stone: Obtain cast stone units through single source from single manufacturer.

.4 Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color, from one manufacturer for each cementitious component and from one source or producer for each aggregate.

1.06 DELIVERY, STORAGE, AND HANDLING

.1 Deliver cast stone units secured to shipping pallets and protected from damage and discoloration.

.2 Store products off the ground and under cover in manufacturer's unopened packaging until ready for installation.

.3 Mark production units with the identification marks as shown on the shop drawings.

.4 Protect units from staining or damage during shipping and storage.

.5 Provide an itemized list of product to support the bill of lading.

.6 Protect cast stone units, including corners and edges, during storage, handling, and installation to prevent chipping, cracking, staining, or other damage.

1.07 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.

1.08 WARRANTY

.1 Provide a 10 year Limited Product Warranty for the Cast Stone supplied.

PART 2 - PRODUCTS

2.01 CAST STONE MATERIALS

.1 Unit Sizes and Shapes: Provide Architectural Cast Stone in the sizes and shapes indicated on the drawings, details and schedules. Architectural cast stone shall comply with the requirements of ASTM C 1364 and be provided with the following physical properties:

.1 Portland Cement: ASTM C 150, Type I or Type III, containing not more than 0.60 percent total alkali when tested according to ASTM C 114. Provide natural color or white cement as required to produce cast stone color indicated.

.2 Coarse Aggregates: Granite, quartz, or limestone complying with ASTM C 33; gradation and colors as needed to produce required cast stone textures and colors.

.3 Fine Aggregates: Natural sand or crushed stone complying with ASTM C 33, gradation and colors as needed to produce required cast stone textures and colors.

.4 Color Pigment: ASTM C 979, synthetic mineral-oxide pigments or colored water-reducing admixtures; color stable, free of carbon black, nonfading, and resistant to lime and other alkalis.

.5 Admixtures: Use only admixtures specified or approved in writing by the Consultant.

.1 ASTM C 260 for air-entraining admixtures.

.2 ASTM C 494/C 495M Types A - G for water reducing, retarding, accelerating and high range admixtures.

.3 Other admixtures: Integral water repellents and other chemicals, for which no ASTM Standard exists, shall be previously established as suitable for use in concrete by proven field performance or through laboratory testing.

.4 ASTM C 618 mineral admixtures of dark and variable colors shall not be used in surfaces intended to be exposed to view.

.5 ASTM C 989 granulated blast furnace slag may be used to improve physical properties. Tests are required to verify these features

.6 Reinforcing Bars: ASTM A 615/A 615M: Grade 40 or 60 steel galvanized or epoxy coated when cover is less than 1.5 inches

.7 Welded Wire Fabric: ASTM A 185 where applicable for wet cast units.

.8 Fiber reinforcement (optional): ASTM C 1116

.9 Anchors, dowels and other anchoring devices and shims shall be standard building stone anchors commercially available in a non-corrosive material such as zinc plated, galvanized steel or stainless steel Type 302 or 304

2.02 FABRICATION

.1 Cast Stone Shapes: Unless otherwise indicated on Drawings, provide:

.1 Suitable wash on exterior sills, copings, projecting courses, and units with exposed top surfaces.

.2 Drips on projecting units.

.2 Color and Finish:

.1 Surfaces intended to be exposed to view shall have a fine-grained texture similar to natural stone, with no air voids in excess of 1/32 inch and the density of such voids shall be less than 3 occurrences per any 1 square inch area and not obvious under direct daylight illumination at a 5 foot distance.

.2 Units shall exhibit a texture approximately equal to the approved sample when viewed under direct daylight illumination at a 10 foot distance.

.3 ASTM D 2244 permissible variation in color between units of comparable age subjected to similar weathering exposure.

.1 Total color difference - not greater than 6 units.

.2 Total hue difference - not greater than 2 units.

.4 Minor chipping resulting from shipment and delivery shall not be grounds for rejection. Minor chips shall not be obvious under direct daylight illumination from a 20-ft distance.

.5 The occurrence of crazing or efflorescence shall not constitute a cause for rejection.

.6 Remove cement film, if required, from exposed surfaces prior to packaging for shipment

.3 Reinforcing:

.1 Reinforce the units as required by the Drawings and as recommended by the manufacturer for safe handling and structural stress.

.2 Minimum reinforcing shall be 0.25 percent of the cross section area.

.3 Reinforcement shall be noncorrosive where faces exposed to weather are covered with less than 1.5 inches of concrete material. All reinforcement shall have minimum coverage of twice the diameter of the bars.

.4 Panels, soffits and similar stones greater than 24 inches (600 mm) in one direction shall be reinforced in that direction. Units less than 24 inches (600 mm) in both their length and width dimension shall be non-reinforced unless otherwise specified.

.5 Welded wire fabric reinforcing shall not be used in dry cast products.

.4 Curing:

.1 Cure in a warm curing chamber approximately 100 degrees F (37.8 degrees C) at 95 percent relative humidity for approximately 12 hours, or cure in a 95 percent moist environment at a minimum 70 degrees F (21.1 degrees C) for 16 hours after casting.

.2 Additional yard curing at 95 percent relative humidity shall be 350 degree days (i.e. 7 days @ 50 degrees F (10 degrees C) or 5 days @ 70 degrees F (21 degrees C)) prior to shipping.

.3 Form cured units shall be protected from moisture evaporation with curing blankets or curing compounds after casting.

.5 Production Tolerances:

.1 Cross section dimensions shall not deviate by more than +/- 1/8 inch from approved dimensions.

.2 Length of units shall not deviate by more than length/ 360 or +/- 1/8 inch, whichever is greater, not to exceed +/- 1/8 inch.

.3 Maximum length of any unit shall not exceed 15 times the average thickness of such unit unless otherwise agreed by the Architect.

.4 Warp, bow or twist of units shall not exceed length / 360 or +/- 1/8 inch, whichever is greater.

.5 Location of dowel holes, anchor slots, flashing grooves, false joints and similar features; on formed sides of unit, 1/8 inch, on unformed sides of unit, 3/8 inch maximum deviation.

2.03 MORTAR MATERIALS

.1 Provide mortar materials that comply with Section 04 20 00 "Unit Masonry.

PART 3 - EXECUTION

3.01 EXAMINATION

.1 Do not begin installation until substrates have been properly prepared.

.2 If substrate preparation is the responsibility of another installer, notify Consultant of unsatisfactory preparation before proceeding.

3.02 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.

3.03 INSTALLATION

.1 Install in accordance with manufacturer's instructions, ACI 530.1 and approved submittals.

.1 Check Cast Stone materials for fit and finish prior to installation. Unacceptable units shall not be set.

.2 Set units in full bed of mortar, unless otherwise indicated on the Drawings.

.3 Vertical Joints: Fill vertical joints with mortar.

.4 Head Joints: Leave head joints in copings and similar components open for sealant.

.5 Joints:

.1 Width: 3/8 inch wide; unless otherwise indicated on the Drawings or elsewhere in the specifications.

.2 Mortar joints should have a slight concave profile; unless otherwise indicated on the Drawings or elsewhere in the specifications.

.6 Remove excess mortar immediately; remove mortar fins and smears before tooling joints.

.7 Fill dowel holes and anchor slots completely with mortar or non-shrink grout.

.8 Cover freshly installed masonry products as required to assist with the curing process.

.2 Inspection:

.1 Inspect finished installation according to Cast Stone Institute Technical Bulletin #36.

.2 Do not field apply sealer water repellent until repair, cleaning, inspection is completed.

.3 Sealant Joints:

.1 As specified in Section 07 92 00 Joint Sealants

.2 Prime ends of units, insert properly sized backing rod, and install sealant.

.3 Provide sealant joints at following locations:

.1 Copings and cast stone units with exposed tops.

.2 Joints at relieving angles.

.3 Control and expansion joints.

.4 As indicated on the drawings.

3.03 TOLERANCES

.1 Comply with Cast Stone Institute Technical Manual and the following.

.1 Variation from Plumb: Do not exceed 1/8 inch in 5 feet or 1/4 inch in 20 feet or more.

.2 Variation from Level: Do not exceed 1/8 inch in 5 feet, 1/4 inch in 20 feet, or 3/8 inch maximum.

.3 Variation in Joint Width: Do not vary joint thickness more than 1/8 inch or 1/4 of nominal joint width, whichever is greater.

.4 Variation in Plane Between Adjacent Surfaces: Do not exceed 1/8 inch difference between planes of adjacent units or adjacent surfaces indicated to be flush with units.

3.04 REPAIR AND CLEANING

.1 Repair chips with touchup materials furnished by manufacturer.

.2 Clean exposed units after mortar is thoroughly set and cured.

.3 Areas with heavy soiling use a wood block or non-metallic scraper.

.4 Apply approved cleaner to units in accordance with manufacturer's instructions.

3.05 PROTECTION

.1 Protect installed products until completion of project.

.2 Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

1 General

1.1 SUMMARY

.1 Section Includes the following:

.1 Load-bearing steel framing systems and accessories for support of cladding at exterior walls.

.2 Load-bearing and/or laterally supported interior framing for bulkheads, support for head supported sliding doors and additional elements as detailed/scheduled.

.2 Unless otherwise specified conform to CSA-S16, Steel Structures for Building - Limit States Design and CAN/CSA-S136, Cold Formed Steel Structural Members.

1.2 REFERENCE STANDARDS

.1 Canadian Institute of Steel Construction (CISC):

.1 CISI - Specification for the Design of Cold-Formed Steel Structural Members, in accordance with CAN/CSA-S136.

.2 American Society for Testing and Materials (ASTM):

.1 ASTM A153/A123M-09, Zinc Coating (Hot-Dipped) on Iron and Steel Hardware.

.2 ASTM A568/A568M-11b, General Requirements for Steel Sheet, Carbon, and High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled.

.3 ASTM A653/A653M-11, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process

.4 ASTM C955-11c, Standard Specification for Load-Bearing (Transverse and Axial) Steel Studs, Runners (Track), and Bracing or Bridging for Screw Application of Gypsum Board and Metal Plaster Bases.

.5 ASTM C1513 - Standard Specification for Steel Tapping Screws for Cold Formed Steel Framing Connections.

.3 American National Standards Institute/American Welding Society:

.1 ANSI/AWS D1.3, Structural Welding Code - Sheet Steel.

.4 Canadian Standards Association:

.1 CSA-W47.1, Certification of Companies for Fusion Welding of Steel Structures.

.2 CSA-W59-03 (R2008), Welded Steel Construction (Metal Arc Welding).

.3 CSA-S16-09, Design of Steel Structures

.4 CAN/CSA-S136-07, North American Specification for the Design of Cold-Formed Steel Structural Members

.5 Canadian General Standards Board (CGSB):

.1 CAN/CGSB-1.181-99, Ready-Mixed Organic Zinc-Rich Coating

.2 CAN/CGSB-51.32-M77, Sheathing, Membrane, Breather Type

.6 Canadian Sheet Steel Building Institute:

.1 CSSBI 51M-1991, Lightweight Steel Framing Design Manual.

1.3 SYSTEM DESCRIPTION

.1 Design Requirements:

.1 Have work of this section designed by a professional engineer licensed to design structures and registered in the place of Work.

.2 Design cold formed metal framing system to resist pressure and suction of wind loads, snow loads, snow load build-up and temperature range, expected in the geographical area for this project, under the local Building Code, climatic information for 30 year probability without any detrimental effects on appearance and performance.

.3 Design shall be based on Limit States Design principles using factored loads and resistances.

.4 Deflection (inward or outward) shall not be greater than L/720 of the span between points of support.

.5 Resistance strength and resistance factors shall be determined in accordance with applicable building code requirements and CAN/CSA-S136.

.6 Construct work of this section to provide for expansion and contraction of components as will be caused by ambient temperature range without causing buckling, failure of joint seals, undue stress on fasteners or other effects detrimental to appearance or performance.

.7 Section properties shall be computed on the basis of the nominal core thickness.

.8 Design bridging to prevent member rotation and member translation perpendicular to the minor axis. Provide for secondary stress affects due to torsion between lines bridging. Sheathing shall not be used to help restrain member rotation and translation perpendicular to the minor axis for wind bearing studs.

.9 Design cold formed metal framing system to support loads and superimposed loads transferred from cladding and include for design of support and attachment components between other assemblies and stud system. Responsibility for design of exterior wall loads transferred from other envelope components is part of work of this section.

.10 Design of cold formed metal framing system shall account for deflection of primary structural elements as necessary.

1.4 SUBMITTALS

.1 Provide submittals in accordance with Division 01.

.2 Shop Drawings:

.1 Prepare and submit shop and erection drawings which conform to the requirements of the CAN/CSA-S16, and as specified herein.

.2 Cold formed metal framing system must have shop drawings prepared by qualified draftsmen, checked by and bearing the seal of a professional engineer registered to design structures and practice in the place of Work.

.3 Show the size, spacing and location of connections, attachments, reinforcing and anchorage. Include necessary plans, elevations and details. Indicate size and type of fastening. For weld connections use welding symbols in compliance with AWS and indicate clearly net weld lengths.

.4 Submit typical details of connections, and any special connections for approval before preparation of shop drawings.

.5 Review of shop drawings by the Consultant and Structural Engineer will not absolve the Contractor from his responsibility of providing materials and equipment to complete and finish work of this section in accordance with the architectural and structural drawings. Departures or differences from the referenced drawings shall be approved in writing by the Consultant.

1.5 QUALITY ASSURANCE

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

.2 Work to be executed by firm thoroughly conversant with laws, by-laws and regulations which govern, and capable of workmanship of best grade of modern shop and field practice known to recognized manufacturer's specializing in this work.

.3 Work shall be executed by workers especially trained and experienced in this type of work. Have a full time, senior, qualified representative at the site to direct the work.

.4 Install system to provide for movement of components without damage, failure of joint seals, undue stress on fasteners, or other detrimental effects when subject to seasonal or cyclic day/night temperature ranges.

.5 Install system to accommodate construction tolerances, deflection of building structural members, and clearances of intended openings.

1.6 INSPECTION AND TESTING

.1 An independent inspection and testing company appointed and paid for by the Cash Allowance may carry out inspection and testing of the structural steel stud systems in accordance with Division 01.

.2 Provide free access for inspectors to all places where work is being done.

.3 Inspectors are to ensure that materials conform to the requirements of this section.

.4 Any inspection and/or testing required because of an error by the Contractor, or due to departure from the Contract Documents shall be paid for by the Contractor.

.5 Inspection and testing of structural metal stud systems shall include, but shall not be limited to the following:

.1 Checking that mill test reports are properly correlated to materials.

.2 Sampling fabrication and erection procedures for general conformity to the requirements of the specification.

.3 Checking that the welding conforms to the requirements of CSA W47.1, CSA W59 (R2008) and/or ANSI/AWS D1.3, whichever is applicable.

.4 Checking fabricated members against specified member shapes.

.5 Visual inspection of all welded connections including sample checking of joint preparation and fit-up.

.6 Sample checking of screwed and bolted joints.

.7 Sample checking that tolerances are not exceeded during fit-up and/or erection.

.8 Additional inspection and testing of welded connections at required by CSA W59.

.9 General inspection of field cutting and alterations required by other trades.

.10 Submission of reports to the Consultant covering the work inspected with details of deficiencies discovered.

.6 The inspection and testing provided in this Section does not relieve the Contractor of his responsibility for the performance of the Contract. The Contractor shall implement his own supervisory and quality control procedures.

.7 Materials and/or workmanship not conforming to the requirements of the Contract Documents may be rejected at any time during the progress of the work, and shall be replaced and/or repaired without cost to the Owner.

1.7 DELIVERY, STORAGE, HANDLING AND PROTECTION

.1 Coordinate deliveries to comply with Construction Progress Schedule and arrange ahead for off-the-ground storage location. Do not load any area beyond the design limits.

.2 Adequately protect steel against rust and damage during manufacturing, delivery and storage.

.3 Store material on planks on a dry area and protect from damage. Make good immediately any damage done, clean scratches and the like, touch-up with specified primer.

2 Products

2.1 MANUFACTURERS

.1 Cold formed metal framing as indicated on drawings and as specified herein shall be by one of the following:

.1 Bailey Metal Products Limited, or;

.2 Canadian Steel Manufacturing, Division of British Steel Canada Inc., or;

.3 Lightsteel Inc., Boucherville, Quebec;

.4 Or equivalent per Specification 01 25 00.

2.2 MATERIALS

.1 Faming materials shall conform to the requirements of CAN/CSA-S136.

.2 Galvanized Sheet Steel:

.1 Conform to ASTM A653/A653M, minimum Grade D, 50 PSI (345 Mpa) yield for 1.5mm (.060") material.

.3 Structural Metal Studs:

.1 Galvanized sheet steel formed to channel shape, of minimum gauge, sizes, and section properties to meet design requirements, and conforms to ASTM C955.

.4 Metal Stud Runners/Top and Bottom Tracks:

.1 Galvanized sheet steel formed to channel shape, having same width as studs, with tight fit and solid web, of minimum gauge to meet design requirements, but no less than gauge of metal studs, and conforms to ASTM C955.

.5 Metal Plates, Bridging, Gussets and Clips:

.1 Formed from galvanized sheet steel, of gauges, shapes and sizes required to meet design requirements determined for conditions encountered, and of same finish as framing members.

.6 Fastenings:

.1 Self-drilling, Self-tapping Screws, Bolts, Nuts and Washers: Hot-dip galvanized to 1.25 ounce per square foot and conforms to ASTM A153/A153M-09, Class B3, '12-24 x 7/8 HWH #4STLG' by Hilti Canada, or approved equivalent.

.2 Anchorage Devices: Power driven, powder actuated, drilled expansion bolts, or screws with sleeves, as application dictates.

.3 Welding Materials: Conforms to CSA W59.

.4 Electrodes for welding shall have minimum 480 Mpa tensile strength series, (E480XXX,E480S-X).

.7 Touch-Up Primer:

.1 Ready mixed, zinc-rich primer, and conforms to CAN/CGSB-1.181, 'Sealtight Galvafroid Zinc-Rich Coating' by W.R. Meadows of Canada Limited, or 'Zinc Clad

No.7 Organic Zinc Rich Primer' by Sherwin Williams Company of Canada Ltd., or approved equivalent.

.8 Dampproof Course:

.1 No. 15 asphalt building paper conforming to CAN/CGSB-51.32-M77.

2.3 FABRICATION

.1 Fit and assemble work in shop where possible. Execute work according to details and reviewed shop drawings.

.2 Take measurements at the building for work which is to fit or be connected to steel, concrete framing or masonry, before commencing fabrication.

.3 Structural metal studs shall have one unreinforced service cut-out centred in the web of the studs and with the centreline of the cut-out a minimum of 455mm (1'-6") from the bottom of the studs. In addition to the above, provide cut-outs for internal bridging as required. All unreinforced cut-outs shall conform to dimension limitations of Table 1, in the CSSBI M50-1987 Manual.

.4 Provide pre-punched cut-outs in inner top track for anchor clearances so that deflection clearances are not reduced.

.5 Fabrication tolerances for cold formed steel framing members shall to Table 2 of the CSSBI M50-1987 Manual.

.6 Cutting of cold formed steel framing members shall be by "power saw" or "shear" methods. Cutting by "torch" method shall not be permitted.

.7 Steel thickness, exclusive of coating shall be marked on all cold formed steel framing members by embossing, or by stamping with indelible ink, or by colour coding method.

.8 Gauges and sizes of metal shall be adequate for various conditions.

2.4 CLADDING ACCOMODATION

.1 Provide an engineered designed framing support assembly to maintain dimensions to face of cladding materials indicated on drawings to include the framing supports configuration, size, spacing, and adjust as needed to accommodate support for each cladding type, in accordance with the engineering and/or contract documents including but not limited to:

.1 Metal Cladding specified by Section 07 46 19.

.2 Canopy/soffits as detailed.

.2 Tolerances

.1 Accommodate deflection of structural members as it applies to the Work.

.2 Maintain clearances at adjacent construction.

.3 Prevent load transfer to non-structural elements.

.4 Thermally isolate fasteners from metal using thermal isolation washers or other means.

.3 Effect on Wall Assemblies

.1 Framing system must not degrade complete wall assembly's thermal resistance by reasonable amount and conform to ASHRAE 90.1 prescriptive U-value of wall assembly for appropriate climate zone.

3 Execution

3.1 EXAMINATION

.1 Verify at site that the work to receive the work of this section is free of irregularities detrimental to the installation and performance of the work and that it is located correctly and at proper levels before delivery and installation.

.2 Verify that building framing components are ready to receive work.

.3 Beginning of installation means acceptance of existing conditions.

3.2 ERECTION OF STUDS

.1 Install components in strict accordance with manufacturer's written instructions.

.2 Methods of construction may be either piece by piece (stick-built), or by fabrication into panels (panelized) either on or off site. Handling and lifting of prefabricated panels shall not cause permanent distortion to any member or collateral material.

.3 Cold formed steel framing shall be erected true and plumb within the tolerances specified herein. Temporary bracing shall be employed wherever necessary to withstand all loads to which the structure may be subject during erection and subsequent construction. Temporary bracing shall be left in place as long as required for the safety and integrity of the structure. The Contractor shall ensure that during erection a margin of safety consistent with the requirements of the National Building Code and CAN/CSA-S136 exists in the uncompleted structure.

.4 Erection Tolerances:

.1 For the purposes of erection tolerances, "camber" is defined as the deviation from straightness of a member or any portion of a member with respect to its major axis and "sweep" is defined as the deviation from straightness of a member or any portion of a member with respect to its minor axis.

.2 For wind bearing studs, out of plumbness shall not exceed 1/500th of the member length. Out of straightness (camber and sweep) shall not exceed 1/1000th of the member length.

.3 For runners/tracks, camber shall not exceed 1/1000th of the member length.

.4 Studs shall seat into top and bottom runners/tracks. The gap between the end of the stud and the web of the runner/track shall not exceed 4mm (5/32") for wind bearing studs.

.5 Where cold formed metal framing is made in prefabricated panels, align adjacent prefabricated panels to provide surface continuity at the interface.

.6 Spacing of studs shall not be more than 3mm (1/8") from the design spacing. The cumulative error in spacing shall not exceed the requirements of the finishing materials.

.5 Align floor and ceiling runners/tracks, locate to wall or partition layout. Secure in place with screws or welding at maximum 610mm (24") O.C. Coordinate installation of sealant with floor and ceiling track.

.6 Place studs to meet design requirements as indicated on approved shop drawings, and not more than 50mm (2") from abutting walls, and at each side of openings. Connect studs to tracks using clips and ties, screws, or welding. Diameter of screws shall be equal to, or exceed the minimum diameter indicated on the reviewed shop drawings. Penetration of screws beyond joined materials shall be not less than three (3) exposed threads. Thread types and drilling capability of screws shall conform to the manufacturer's written recommendations to suit design requirements and conditions. Screws to be covered by sheathing materials shall have "low profile" type heads.

.7 Field cutting of cold formed steel framing members shall be by "power saw" or "shear" methods. Cutting by "torch" method shall not be permitted.

.8 Holes that are field cut into cold formed steel framing members shall conform to the dimensional requirements of Table 1, in the CSSBI M50-1987 Manual.

.9 Brace structural metal studs as required to meet design requirements and as indicated on reviewed shop drawings.

.10 Provide continuous dampproof course to underside of bottom runner/track.

.11 Construct corners using minimum of three studs. Double studs at door, window jambs, and wall openings.

.12 Erect studs one piece full length. Splicing of studs is not permitted.

.13 Erect load bearing studs, brace, and reinforce to develop full strength to meet design requirements.

.14 Refer to drawings for height of partition framing.

.15 Coordinate placement of insulation in multiple stud spaces made inaccessible after erection.

.16 Install intermediate studs above and below openings to match wall stud spacing.

.17 Provide deflection allowance in stud bottom runner/track, directly below horizontal building framing for non-load bearing framing.

.18 Attach cross studs or furring channels to studs for attachment of fixtures anchored to walls. Install framing between studs for attachment of mechanical and electrical items, and to prevent stud rotation.

.19 Touch-up field welds and damaged galvanized surfaces with two coats of zinc rich touch-up primer.

3.3 ERECTION OF CLADDING SUPPORT

.1 Install in accordance with manufacturer's instructions and approved submittals, and in proper relationship with adjacent construction.

.1 Attach cladding support system to structural backup anchor size/frequency as per engineered shop drawings.

.2 Attach cladding panels or tiles to cladding support system per cladding panels manufacturer's recommendations. Refer to Specifications 07 46 19.

.3 Frame as required for window, door and louvre openings. Install framing below sills and at jambs of openings to match framing at heads of openings.

3.4 PROTECTION

.1 Protect installed products until completion of project. repair or replace damaged products before Substantial Completion.

END OF SECTION

1 General

1.1 SUMMARY

.1 Supply and install all miscellaneous metal work indicated on drawings and not included in the work of other Sections in addition to items listed in this Section.

.2 Section includes the supply and installation of decorative steel railings and elements, as detailed on the Drawings for use in the following locations:

.1 Guardrail/handrails at ramp/stairs;

.2 Various fabrications as detailed

1.2 RELATED REQUIREMENTS

.1 Read carefully all other Sections and review drawings to determine extent of metal work supplied and installed, or installed by others.

.2 Be responsible for co-ordinating this section with all related sections.

1.3 REFERENCE STANDARDS

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

.1 ASTM A53/A53M-12, Standard Specification for Pipe, Steel, Black and Hot Dipped, Zinc Coated, Welded and Seamless

.2 ASTM A325-10, Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength

.3 ASTM A653/A653M-11, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process

.4 ASTM C939-10, Standard Test Method for Flow of Grout for Preplaced Aggregate Concrete (Flow Cone Method)

.5 ASTM A1011/A1011M-12b, Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with improved Formability, and Ultra-High Strength

.6 ASTM C1107/C1107M-11, Standard Specification for Packaged Dry, Hydraulic Cement Grout (Nonshrink)

.2 Canadian Standards Association (CSA):

.1 CSA G40.20-04/G40.21-04 (R2009), General Requirements for Rolled or Welded Structural Quality Steel / Structural Quality Steel

.2 CAN/CSA-G164-M92 (R2003), Hot Dip Galvanizing or Irregularly Shaped Articles

.3 CSA-S16-09, 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

.6 CSA W55.3-08, Certification of Companies for Resistance Welding of Steel and Aluminum

.7 CSA W59-03 (R2008), Welded Steel Construction (Metal Arc Welding)

.3 Canadian General Standards Board (CGSB):

.1 CAN/CGSB-1.181-99, Ready-Mixed Organic Zinc-Rich Coating

.2 CAN/CGSB-51.32-M77, Sheathing, Membrane, Breather Type

.3 CGSB 31-GP-105Ma, Zinc Phosphate Conversion Coatings for Paint Base

.4 The Society for Protective Coatings (SSPC):

.1 SSPC1 Solvent Cleaning - 2004

.2 SSPC2 Hand Tool Cleaning - 2004

.3 SSPC-3 Power Tool Cleaning - 2004

.4 SSPC-6 Commercial Blast Cleaning - 2007

1.4 QUALITY ASSURANCE

.1 All Codes and Standards referred to in this Specification shall be current editions including all latest revisions and addenda.

.2 Conform to requirements of CSA-S16, Design of Steel Structures and CAN/CSA-S136, Cold Formed Steel Structural Members.

.3 Architectural metals work shall be of the highest architectural quality, free of scratches, pitting, roughness, marring, discolouration, staining and other imperfections.

.4 Work of this Section to be executed by firm thoroughly conversant with laws, by-laws and regulations which govern, and capable of workmanship of best grade of modern shop and field practice known to recognized manufacturer's specializing in this work.

.5 Work of this Section shall be executed by workers especially trained and experienced in this type of work. Have a full time, senior, qualified representative at the site to direct the work of this Section.

.6 Where required by authorities having jurisdiction, have work of this Section designed by a professional engineer licensed to design structures and registered in the Province of the Work.

1.5 SUBMITTALS

.1 Provide submittals in accordance with Division 01, bearing stamp or seal and signature of the Professional Engineer responsible for the design of the work of this Section.

.2 Shop Drawings:

.1 Make thorough examination of drawings and details, determine the intent, extent, and materials, and be fully cognizant of requirements when preparing shop drawings.

.2 Submit shop drawings showing and describing in detail all work of this Section including large scale detail of members and materials, of connection and interfacing with work of other Sections, jointing details, and of anchorage devices, dimension, gauges, thicknesses, description of materials, metal finishing, as well as other pertinent data and information.

.3 Digital files of design drawings shall not be used in the preparation of shop drawings.

.3 Samples:

.1 Provide samples of duplex powder coat finish over hot dip galvanizing, on 100 x 100mm sheet steel (in triplicate).

1.6 STORAGE, DELIVERY, HANDLING AND PROTECTION

.1 Coordinate deliveries to comply with construction schedule and arrange ahead for strategic off the ground, under cover storage locations. Do not load any area beyond the design limits.

.2 Adequately protect and crate all components against damage, dirt, disfigurement and weather during delivery and storage. Damaged materials shall not be used and shall be replaced by approved material.

.3 Cover and protect the work of other Sections in the area of work from damage. Make good all damage to the satisfaction of the Consultant.

.4 Protect the installed work of this Section and on completion the work shall be examined and damage shall be remedied to the complete satisfaction of the Consultant.

2 Products

2.1 PERFORMANCE REQUIREMENTS

.1 Delegated Design: Engage a qualified professional engineer, to design railings, including attachment to building construction.

.2 Structural Performance: Railings, including attachment to building construction, shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:

.1 Handrails and Top Rails of Guards:

.1 Uniform load of 50 lbf/ft. (0.73 kN/m) applied in any direction.

.2 Concentrated load of 200 lbf (0.89 kN) applied in any direction.

.3 Uniform and concentrated loads need not be assumed to act concurrently.

.2 Infill of Guards:

.1 Concentrated load of 50 lbf (0.22 kN) applied horizontally on an area of 1 sq. ft. (0.093 sq. m).

.3 Infill load and other loads need not be assumed to act concurrently.

2.2 MATERIALS

.1 Structural Steel Sections and Steel Plate: New stock (not weathered or rusted); to conform to CAN/CSA-G40.21, Grade 300W (44W) and Grade 350W (50W) for wide flange shapes.

.2 Hollow Structural Sections (HSS): New stock; to conform to CAN/CSA-G40.21, Grade 350W (50W), Class C, stress relieved.

.3 Sheet Steel (Structural Quality): Conforms to ASTM A1011/A1011M.

.4 Sheet Steel (Commercial Quality): Conforms to ASTM A653/A653M, stretcher levelled or temper rolled.

.5 All Stainless Steel for interior use to be type 304, brushed satin finish, analysis 18-8.

.6 All Stainless Steel for exterior use to be type 316, brushed satin finish.

.7 Galvanized Sheet Steel (Commercial Quality): Galvanized coating G90 (Z275) in accordance with ASTM A653/A653M, minimized spangle, stretch levelled or temper rolled. Specially treat by phosphate conversion process conforming to CGSB 31-GP-105Ma ready to receive prime paint finish.

.8 Steel Pipe: Hot-dip galvanized, zinc coated, welded and seamless type steel pipe conforming to ASTM A53/A53M.

.9 Aluminum Plate and Sheet: ASTM B209M, Alloy 6061-T6.

.10 Aluminum Extrusions: ASTM B221M, Alloy 6063-T6.

.11 Non-Shrink Grout: Premixed, high strength, maximum bearing, impact resistant, non-shrink non-metallic aggregate grout having minimum 76 Mpa 28 day compressive strength and conforms to ASTM C939 and ASTM C1107/C1107M, 'Embeco Premixed Grout' by Master Builders Technologies Ltd., or 'Tartan Grout Iron' by Webster & Sons Ltd., or 'Sika Grout 212 HP' by Sika Canada Inc., or approved equivalent.

.12 Galvanizing: All uncoated steel specified to be galvanized shall be galvanized after fabrication by the hot dip process according to CAN/CSA-G164, with minimum coating of 2 oz./sq.ft. Galvanize after all welding is complete. Welding of galvanized material will not be permitted. Specially treat by phosphate conversion process conforming to CGSB 31-GP-105Ma ready to receive prime paint finish.

.13 Primer Paint: CISC/CPMA 2-75.

.14 Bolts, Nuts, Washers: Conforms to ASTM A325.

.15 Welding Materials: Conforms to CSA W59.

.16 Metal Filler: Polyester based type.

.17 Painting:

.1 Shop Applied Structural Steel Primer: Steel Spec Universal Primer (B50RV6227 Red), by Sherwin Williams Company of Canada Ltd., or approved equivalent. Apply a minimum of 2 mils dft./coat. Grey coloured primer is acceptable.

.2 Zinc Rich Paint For Touch-up of Galvanized Metals: Ready mixed, zinc-rich primer conforming to CAN/CGSB-1.181, Sealtight Galvafroid Zinc-Rich Coating by W.R. Meadows of Canada Limited or Zinc Clad No. 5 Organic Zinc Rich Primer by Sherwin Williams Company of Canada Ltd., or approved equivalent.

.3 Touch-up Primer (On Site): Procryl Universal Acrylic Primer by Sherwin Williams Company of Canada Ltd, or approved equivalent. Touch-up primer shall be no less than 3 mil dft.

.4 Refer to Section 09 90 00, and coordinate with the above.

.18 Isolation Coating: Acid and alkali resistant bituminous paint.

.19 Building Paper: Conforms to CAN/CGSB-51.32.

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

2.3 FABRICATION

.1 Fit and assemble work in shop where possible. Execute work according to details and reviewed shop drawings.

.2 Take measurements at the building for work which is to fit or be connected to steel or concrete before commencing fabrication.

.3 Where shop fabrication is not possible, make trial assembly in shop.

.4 Do all welding in accordance with requirements of CSA W59, CSA W55.3 and CSA W47.1 including all supplements. Weld stainless steel electric arc process. Grind welds smooth and flush with surface of parent metal, where exposed to view and where specifically indicated on drawings. Welds shall be continuous seam welds unless specified otherwise. Maintain sharp arises.

.5 Fit joints and intersecting members accurately in true planes, square, plumb, straight with tight joints and intersections.

.6 Provide adequate reinforcing, fastenings, anchors, accessories required for fabrication and erection of work of this Section. Such items occurring on or in an exterior wall or slab shall be hot-dip galvanized. Make thread dimensions such that nuts and bolts will fit without rethreading or chasing threads.

.7 Fabricate, drill and tap members to accommodate attachments, anchorage and work of other Sections where located and directed by them.

.8 Exposed steel surfaces shall be smooth and free from imperfections such as warping, buckling, weld marks, burrs, rust and scale.

.9 Gauges and sizes of metal shall be adequate for various conditions.

.10 Make exposed metal fastenings and accessories of same material, texture, colour and finish as base metal on which they occur unless otherwise shown or specified. Keep exposed fastenings to an absolute minimum evenly spaced and neatly laid out. Make fastenings of permanent type unless otherwise indicated.

2.4 HOT DIP GALVANIZING

.1 Hot dip galvanize, after fabrication, steel metal fabrication items. Straighten shapes and assemblies true to line and plane after galvanizing. Repair damaged galvanized surfaces with brush or spray-applied anti-corrosion coating containing 92-95% zinc, in accordance with manufacturer's printed directions.

.1 Members exposed to elements when in final location.

.2 Members embedded on exterior side of exterior walls.

.3 Members imbedded in concrete.

.4 Members specified in this Section or indicated on Drawings.

.2 Hot-dip galvanize members in accordance with CAN/CSA G164 and requirements of the following ASTM standards, with minimum coating weights or thicknesses as follows, unless otherwise indicated that high performance organic finish is required:

.1 Rolled, Pressed and Forged Steel Shapes, Plates, Bars and Strips: ASTM A123/A123M; average weight of zinc coating of actual surface

.1 4.8 mm (3/16") and less member thickness: 600 g/sq.m.

.2 6 mm (1/4") and heavier members: 640 g/sq.m.

.2 Iron and Steel Hardware: ASTM A153/A153M; minimum weight of zinc coating, in gram per square meter of surface, in accordance with Table 1 for the various classes of materials used in the Work.

.3 Components scheduled for powder coat finish after galvanizing shall be prepared according to ASTM D7803, including:

.1 Grind and fill as required to remove all bumps, runs and drips.

.2 Remove organic material with mild alkaline, acidic or solvent solution.

.3 Rinse and remove cleaning solution; thoroughly dry.

.4 Profile all surfaces using either sweep blasting, grinding or zinc phosphate solution.

.5 Bake at minimum 30C above temperature used to cure powder coat finish.

2.5 SHOP APPLIED COATINGS AND PROTECTION

.1 Preparation

.1 As per SSPC2 Hand Tool Clean and SSPC1 Solvent Clean, clean welds by wire brushing and wash down with clean water, to remove the chemical residues left by the electrodes, prior to painting.

.2 Prepare steel as per SSPC-3 Power Tool Cleaning for Interior or SSPC-6 Commercial Blast Cleaning for exterior members. Remove rust, mill scale, oil, dirt, and other foreign matter before commencing shop painting.

.2 Priming

.1 Apply shop coat of primer to all surfaces except areas requiring field welding. Apply by brush, working paint well into surfaces, interstices and cavities. Primer to be zinc rich for exterior applications.

.2 Primer is to be free of runs, sags, or other collections of primer due to dipping of members into primer.

.3 Prime field welded areas after erection and touch up shop coat where damaged and barred by erection and handling.

3 Execution

3.1 GENERAL

.1 Verify at site that the Work to receive the work of this Section is free of irregularities detrimental to the installation and performance of the work and that it is located correctly and at proper levels before delivery and installation.

.2 Erection: To meet specified requirements of CAN/CSA-S16.

.3 Bearing Plates and Anchors: Standard.

.4 Anchors: Anchors to structural concrete shall be approved inserts set into concrete or approved self-drilling expansion insets drilled and placed afterwards.

3.2 INSTALLATION

.1 Assemble and erect work plumb, true, square, straight, level and accurate to sizes detailed, to reviewed shop drawings, free from distortion and defects detrimental to appearance and performance.

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

.3 Supply adequate instructions, templates, and if necessary, supervise installation of the fastenings or accessories requiring to be built-in by other Sections of the Work.

3.3 SCHEDULES

.1 Where items are required to be built into masonry, concrete or other work, supply such items to respective Sections with all anchors and accessories for building in.

.2 Itemized List: Supply and install metal work listed below unless specifically designated to be supplied only. Each item shall be as shown on drawings and as detailed on reviewed shop drawings.

.3 Miscellaneous Steel Framing, Channels, Angles, Plates and Brackets: As required and indicated on drawings.

.4 Steel L-Angle support complete with mounting plates at either end for support at light shelf at windows W1 & W3.

.5 Guardrails and Handrails:

.1 Guardrail (G1) at interior ramp:

.1 Steel guardrail, complete with flat bar top/bottom rails with vertical bar pickets, flat bar vertical balusters, 43mm diameter handrail on 10mm diameter bar stand offs.

.2 Intermediate baluster to be welded to site installed mounting plate cast into concrete.

.3 Flat plate upstand below bottom rail to be clad in stainless steel.

.4 Finish: site painted as per Specification 09 90 00.

.2 Handrail (H1) at interior ramp:

.1 43mm diameter steel handrail on 10mm diameter stand offs complete with mounting plate at masonry wall attachment locations.

.2 Height of stand-offs varies as per drawings/details.

.3 Finish: site painted as per Specification 09 90 00.

.6 Loose Lintels:

.1 Provide and install loose lintels if not by structural steel.

.2 Finish: Hot-dip galvanized after fabrication.

.7 Masonry Lateral Supports:

.1 Install deflection space and lateral support for non-load-bearing masonry walls and partitions in accordance with specified requirements of CAN/ULC-S304-M, where not provided on Structural Drawings.

.2 At walls with concealed tops:

.1 3" x 2" x 1/4" angles 8" long on both sides of walls. Anchor to structure above wall.

.3 At walls with tops exposed to view:

.1 3" x 2" x 1/4" angles, continuous on both sides of wall. Anchor to structure above wall.

.4 Finish: Prime paint.

.8 Other Miscellaneous Metal Components:

.1 As required and indicated on drawings.

.2 Finish: Prime paint for interior components, ready for finishing by Section 09 90 00 and hot-dip galvanized after fabrication for exterior components.

END OF SECTION

1 General

1.1 SUMMARY

.1 Supply all labour, materials, equipment, services and perform all operations required to complete all rough carpentry work to the full intent of the drawings and as herein specified.

1.2 REFERENCE STANDARDS

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

.1 ASTM A307-04e1, Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength

.2 ASTM C954-00, Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs From 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness

.3 ASTM D6007-02 Standard Test Method for Determining Formaldehyde Concentration in Air from Wood Products Using a Small Scale Chamber

.4 ASTM D6330-98(2003) Standard Practice for Determination of Volatile Organic Compounds (Excluding Formaldehyde) Emissions from Wood-Based Panels Using Small Environmental Chambers Under Defined Test Conditions

.5 ASTM E1333-96(2002) Standard Test Method for Determining Formaldehyde Concentrations in Air and Emission Rates from Wood Products Using a Large Chamber

.2 Underwriters Laboratories of Canada (ULC):

.1 CAN/ULC S102-18, Standard Method of Test for Surface Burning Characteristics of building Materials and Assemblies

.3 American Wood Preservers Association (AWPA):

.1 AWPA Book of Standards, Latest edition

.4 Canadian General Standards Board (CGSB):

.1 CAN/CGSB 71.26-M88, Standard for Adhesives for Field-gluing Plywood to Lumber Framing for Floor Systems.

.5 Canadian Roofing Contractors Association (CRCA):

.1 Roofing Specifications

.6 Canadian Standards Association (CSA):

.1 CSA B111-1974 (R2003), Wire Nails, Spikes and Staples

.2 CSA G164-M92 (R2003), Hot Dip Galvanizing of Irregularly Shaped Articles

.3 CSA O80 Series-97 (R2002), Wood Preservation

.4 CSA O86-01, Engineering Design in Wood

.5 CSA O112 Series-M1977(R2001), Adhesives for Wood

.6 CSA O121-M1978 (R2003), Douglas Fir Plywood

.7 CSA-O141-M91(R1999), Softwood Lumber.

.8 CSA O151-M1978(R2003), Canadian Softwood Plywood.

.9 CSA O325.0-92(R2003), Construction Sheathing

.10 CSA O437 Series 93 (R2003) OSB and Waferboard

.11 CSA O452 Series 94 (R2001), Design Rated OSB

.7 National Lumber Grading Association (NLGA):

.1 NLGA SPS2-2000 Special Products Standards on Machine Stress-Rated Lumber.

.2 NLGA Canadian Lumber Grading Rules

1.3 DELIVERY, STORAGE, HANDLING AND PROTECTION

.1 Co-ordinate deliveries to comply with construction schedule and arrange ahead for off-the-ground, under cover storage location. Do not load any area beyond the design limits.

.2 Materials shall be carefully checked, unloaded, stored and handled to prevent damage. Protect materials with suitable non-staining waterproof coverings.

.3 Do not store seasoned materials under conditions that will cause their moisture content to increase.

.4 Protect edges and corners of sheet materials from damage during handling and storage.

.5 Store preservative-treated materials under cover, off the ground and protected from moisture.

2 Products

2.1 MATERIALS

.1 Framing Lumber:

.1 Lumber for structural components shall be of species and grade specified, well seasoned, processed and stamped at same mill with appropriate grade markings.

.2 Conform to requirements of Standard Grading Rules for Canadian Lumber of National Lumber Grades Authority the (NLGA) with latest supplements, approved by the Canadian Lumber Standards Administrative Board.

.2 Framing, Furring, Strapping, Blocking:

.1 Spruce, 122c, "Standard" light framing, except as otherwise specified.

.3 Plywood Sheathing:

.1 Shall be 19mm (3/4") thick and/or thickness as indicated on drawings, exterior grade at exterior locations; Douglas Fir plywood, veneer core.

.2 Select Sheathing; Tight Face, un-sanded, "B" faces and conforming to CSA 0121-08.

.4 Rough Hardware:

.1 Provide rough hardware such as nails, spikes, staples, H-clips, bolts, nuts, washers, screws, clips, strap iron and including hardware for temporary enclosures.

.2 Nails for plywood shall be annular or spiral type, all other nails shall be spiral type. All nails, spikes and staples shall conform to CSA B111.

.3 All rough hardware shall be galvanized unless otherwise noted. Galvanizing shall conform to CAN/CSA-G164.

.5 All Other Materials and Hardware:

.1 Shall be as noted on drawings.

2.2 PRESERVATIVE TREATED MATERIALS

.1 Preservative Treated Lumber: Lumber graded and stamped in accordance with applicable grading rules and standards of associations or agencies approved to grade lumber by Canadian Lumber Standards Accreditation Board in accordance with CSA O80 Series -08.

.1 Preservative Treatment: A waterborne, micronized copper azole (MCA) system developed to provide long-term protection for wood exposed in exterior applications from fungal decay and termite attack.

.1 For use on exterior lumber above ground, in ground contact and in freshwater contact.

.2 Basis of Design Materials: MicroPro Sienna® Treated Wood by Koppers Performance Chemicals Inc.

.2 Species: Pine or Spruce-Pine

.3 Grade: No.2 or better structural posts and lumber, pieces may be grade stamped or shipment certified by letter of compliance.

.4 Grading authority: NLGA, paragraph 131CC

.5 Material having twisted grain or structural defects affecting integrity of lumber will not be acceptable for this project.

.6 Use only material with radius edges, minimum 6 mm.

.7 Kiln dry lumber materials to 8% moisture content or less.

.2 Pressure Preservative Treated Plywood: Treated in accordance with CSA O80 Series -08 using micronized copper azole (MCA) preservative.

.1 Plywood or laminated materials shall be manufactured with exterior grade adhesives.

.2 After treatment, plywood shall be kiln dried to moisture content of 8% or less.

2.3 PRESSURE FIRE RETARDANT TREATED MATERIALS

.1 Treat by pressure impregnation with fire-retardant chemicals in accordance with CSA O80 Series -08 to provide classification for flame spread of not more than 25, smoke developed of not more than 75 in accordance with CAN/ULC S102.

.2 All fire retardant wood must comply with the requirements in AWPA Standard C20 for lumber and C27 for plywood.

.1 AWPA C20: Structural Lumber, Fire-Retardant Pressure Treatment, lumber materials shall only be of species listed. After treatment, lumber 50 mm or less in thickness shall be kiln dried to moisture content of 8% or less.

.2 AWPA C27: Plywood, Fire-Retardant Pressure Treatment, plywood or laminated materials shall be manufactured with exterior grade adhesives. After treatment, plywood shall be kiln dried to moisture content of 8% or less.

.3 All species to comply with CAN/ULC S102 for surface-burning characteristics and shall bear identification showing classification and type of fire retardant.

.3 Each piece or bundle of fire-retardant treated material or panel to bear ULC inspection label or stamp attesting to FRS rating indicating flame spread, smoke developed, and fuel contributed classification meeting AWPA standard C20 and C27 for Type A Use.

.4 Fire retardant chemicals used to treat lumber must comply with FR-1 of AWPA Standard P17 and shall be free of halogens, sulphates and ammonium phosphate.

.5 Acceptable materials: Plywood and lumber materials treated by licensed applicators with fire retardant materials from the following:

.1 Dricon FRTW by Hickson Corporation.

.2 Pyro-Guard by Hoover Treated Wood Products Inc.

.3 D-Blaze by Chemical Specialties Inc.

.4 Or approved equivalent.

3 Execution

3.1 INSTALLATION - GENERAL

.1 Consult with and co-operate with other Sections in advance and build-in or make provisions for installation of other work.

.2 Provide and fit in place all furring, strapping, battens, nailers, sleepers, grounds and blocking required to provide adequate properly placed fixing for all wood finishes, fitments and as required for the work of others trades.

.3 Blocking, strapping and other rough carpentry indicated shall not be regarded as complete or exact. Provide all rough carpentry work required, whether specifically shown or not.

.4 Grounds shall be of a thickness to provide for application of finishes. Room side surfaces of grounds shall be plumb and in true plane throughout.

.5 All nails shall be long enough so that at least half their length penetrate in to the second member. Splitting of wood members shall be minimized by staggering the nails in the direction of the grain and by keeping nails well in from edges.

.6 Blocking shall be through-bolted to structure.

.7 Anchor rough bucks to concrete or masonry with pairs of 3/16" (4.75mm) diameter x 2 ¼" (57mm) long Hilti Kwik Con+ anchors (minimum 1"/25mm embedment), at max 350mm O.C. Refer also to details.

3.2 WOOD BLOCKING, CANTS AND NAILERS

.1 Provide wood blocking, cants and nailers, where shown to be required as detailed. Bolt securely in place.

.2 Block under cants same thickness as installed roof insulation.

.3 Check mechanical, electrical, architectural drawings and provide all blocking, cants, nailers etc. required.

.4 Leave work ready for roofing work and prefinished sheet metal flashing installation.

3.3 PLYWOOD PANELS

.1 Provide plywood panels required for electrical/telephone mounting of equipment and in other locations as indicated on drawings.

3.4 PRESSURE PRESERVATIVE TREATED WOOD INSTALLATION

.1 Comply with AWPA M4.

.2 Re-treat surfaces exposed by cutting, trimming or boring with liberal brush application of preservative before installation. Allow first coating to fully soak into grain before applying second coating in accordance with manufacturer's instructions.

.3 Remove with fine sandpaper, chemical deposits on treated wood to receive applied finish.

.4 Use only hot-dipped galvanized, corrosion resistant nail or screw fasteners. Staples are not acceptable for installation of preservative treated materials.

.5 Use water-borne preservative treated wood for:

.1 Wood in contact with masonry or concrete;

.2 Wood within 457mm (18") of grade;

.3 Wood decking and fence boards;

.4 Wood in contact with flashings;

.5 Wood in contact with waterproofing membranes, confirm compatibility with membrane manufacturer prior to application.

.6 Use oil-borne preservative treated wood for:

.1 Wood in contact with the ground;

.2 Wood in contact with freshwater;

.3 Landscaping timbers;

.4 Retaining walls;

.5 Piers or docks;

.6 Pilings;

.7 Bases of utility poles;

.8 Bases of fence posts.

3.5 PRESSURE FIRE RETARDANT TREATED WOOD INSTALLATION

.1 Field Cuts:

.1 Do not rip, mill or conduct extensive surfacing of fire retardant treated lumber, label will be voided. Only end cuts, drilling holes and joining cuts are permitted.

.2 All cuts on plywood will be considered end cuts.

.3 Fire-retardant lumber and plywood can be given a light sanding for cosmetic cleaning after treatment.

.4 Pre-cut to the greatest extent possible before treating.

.2 Fire retardant treated plywood used in structural applications shall be graded or span-rated material.

.3 Use only hot-dipped galvanized, corrosion resistant nail or screw fasteners. Staples are not acceptable for installation of fire-resistant treated materials.

.4 Where humidity conditions are such that moisture may condense between hardware and treated wood, hardware shall be back-primed with a corrosive-inhibitive paint.

.5 Back-prime at contact points and fasteners to prevent electrolysis when fire retardant framing members are used in metal buildings.

END OF SECTION

1 General

1.1 SUMMARY

.1 Supply all labour, materials, equipment, services and perform all operations required to complete all finish carpentry, millwork and fitment installation including but not limited to the following:

.1 Interior millwork

.2 High pressure decorative laminate

.3 Millwork finishing hardware and accessories.

.4 Stainless Steel Countertops (See Division 12)

1.2 REFERENCE STANDARDS

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

.1 ASTM A307-04e1, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength

.2 ASTM D6007-02, Standard Test Method for Determining Formaldehyde Concentration in Air from Wood Products Using a Small Scale Chamber

.3 ASTM D6330-98(2003), Standard Practice for Determination of Volatile Organic Compounds (Excluding Formaldehyde) Emissions from Wood-Based Panels Using Small Environmental Chambers Under Defined Test Conditions

.4 ASTM E1333-96(2002), Standard Test Method for Determining Formaldehyde Concentrations in Air and Emission Rates from Wood Products Using a Large Chamber

.2 Underwriters Laboratories of Canada (ULC):

.1 CAN/ULC S102-18, Standard Method of Test for Surface Burning Characteristics of building Materials and Assemblies

.3 Canadian Standards Association (CSA):

.1 CSA B111-1974 (R2003), Wire Nails, Spikes and Staples

.2 CSA G164-M92 (R2003), Hot Dip Galvanizing of Irregularly Shaped Articles

.3 CAN/CSA O80 Series-97 (R2002), Wood Preservation

.4 CSA O86-01, Engineering Design in Wood

.5 CSA O112 Series-M1977(R2001), Adhesives for Wood

.6 CSA O121-M1978 (R2003), Douglas Fir Plywood

.7 CAN/CSA-O141-M91(R1999), Softwood Lumber.

.8 CSA O151-M1978(R2003), Canadian Softwood Plywood.

.9 CSA O325.0-92(R2003), Construction Sheathing

.10 CSA O437 Series 93 (R2003) OSB and Waferboard

.11 CSA O452 Series 94 (R2001), Design Rated OSB

.4 National Lumber Grading Association (NLGA):

.1 NLGA Canadian Lumber Grading Rules

1.3 QUALITY ASSURANCE

.1 Contractor executing work of this section shall have a minimum of five (5) years continuous experience in successful manufacture/fabrication and installation of work of

type and quality shown and specified. Submit proof of experience upon Consultant's request.

.2 Follow applicable requirements of The Architectural Woodwork Manufacturer's Association of Canada (AWMAC) Standard for Millwork latest edition, including supplements and modifications.

.3 Unless otherwise indicated on drawings, all millwork shall be Custom Grade, in accordance with AWMAC standards.

.4 Supplements and modifications to the above standards as indicated on the drawings or as specified herein shall govern work of this section.

1.4 SUBMITTALS

.1 Provide submittals in accordance with Division 01.

.2 Samples for Verification: Submit two (2) samples prior to fabrication of millwork as follows; accepted samples will form the standard of acceptance for the remainder of the work:

.1 High pressure decorative laminate for finishing of millwork.

.2 Solid surface countertops.

.3 Wood trim with applied opaque Finish: 12" long lumber for each finish system and colour.

.4 Exposed Fasteners, Hardware and Accessories: One unit for each type and finish.

.3 Shop Drawings:

.1 Submit detailed shop drawings of all shop fabricated finish carpentry components.

1.5 ADMINISTRATIVE REQUIREMENTS

.1 Coordination: Coordinate sizes and locations of framing, blocking, furring, and reinforcements provided by work that is specified in other Sections is complete before starting work of this Section.

.2 Pre-Construction Conference: Arrange a site meeting, to coincide with regular bi-weekly site meetings, attended by the Contractor, the Subcontractor's representative and foreman for this project, the Consultant, materials supplier(s), and other relevant personal before commencement of work for this Section. Topics for discussion include but are not limited to the following:

.1 Installation requirements;

.2 Special surface effects and finishing;

.3 Coordination of work with adjacent finishes;

.4 Protection of finishes;

.5 Acceptability of substrates and quality of materials being used for the project.

1.6 DELIVERY, STORAGE, HANDLING & PROTECTION

.1 Do not permit delivery of work of this section to site until area is sufficiently dry so that woodwork will not be damage by excessive changes in moisture content.

.2 Coordinate deliveries to comply with construction schedules and arrange ahead for under cover storage location.

.3 Materials shall be carefully checked, unloaded, stored and handled to prevent damage. Protect material with suitable non-staining waterproof coverings.

.4 Store material in original, undamaged containers or wrappings.

.5 Unsatisfactory materials shall be promptly removed from the site.

.6 Adequately protect the structure and work of other sections during delivery, storage, handling and execution of the work of this section.

.7 Provide tools, plant and other equipment required for the proper execution of the work of this section.

1.7 SITE CONDITIONS

.1 Site Measurements: Verify dimensions by site measurements before fabrication and indicate measurements on Shop Drawings where casework is indicated to fit walls and other construction; coordinate fabrication schedule with construction progress to avoid delaying the Work; locate concealed framing, blocking, and reinforcements that support woodwork by site measurements before being enclosed and indicate measurements on Shop Drawings.

.2 Established Dimensions: Establish dimensions and proceed with fabricating casework without confirmed site measurements where site measurements cannot be made without delaying the Work; coordinate with the construction to ensure that actual dimensions correspond to established dimensions; allow for trimming and fitting.

.3 Ambient Conditions: Maintain area or room in which casework is being installed at a uniform temperature and humidity for 24 hours prior to, during and after installation in accordance with AWS for relative humidity and moisture content; provide additional lighting to maintain a minimum of 430 lx on surfaces and areas where casework is being installed.

1.8 WARRANTY

.1 Warrant plastic laminate work of this Section against defects in materials and workmanship in accordance with General Conditions but for an extended period of two (2) years.

.2 Solid Surface Countertop Manufacturer Warranty: Provide manufacturer's standard 10 year warranty against defects in materials and workmanship; including material and labour to repair or replace defective materials.

.3 Agree to repair or replace faulty materials or work which appears during warranty period, without cost to the Owner.

.4 Defects shall include but not be limited to, opening of joints, cracking, shrinkage, warpage, delamination of plastic laminate.

2 Products

2.1 MATERIALS

.1 Framing Lumber:

.1 Lumber for structural components shall be of species and grade specified, well seasoned, and processed and stamped at same mill with appropriate grade markings. Conform to requirements of standard grading rule for Canadian lumber of Nation Lumber Grades Authority (NLGA) latest issue, approved by Canadian Lumber Standards Administrative Board, as follows:

.1 Rough Carpentry for built-in work: No. 2 select grade Ontario white pine.

.2 Blocking, Ground, Furring and Strapping, Bucks and Nailing Strips: C.L.A. No. 1 grade pine, kiln dried stock.

.3 Non-Exposed Softwood: Fabricator's option, meeting requirements of CAN/CSA O141-05(R2009), kiln dried for interior use to a moisture content of 4% to 8%, and 7% to 10% for exterior use; Surface 4 sides (S4S).

.2 Panel Materials:

.1 Plywood: Douglas Fir veneer core plywood, 19mm (3/4") thick or thickness as indicated on drawings, Select Sheathing-Tight Face, good two sides, sanded "B" faces and conforms to CSA 0121.

.2 Particleboard: ANSI A208.1, 700 kg/m³ density.

.3 Medium density fibreboard (MDF): ANSI A208.2, density minimum 750 kg/m³, moisture resistant.

.1 Basis of Design Materials: Premier Plus MR MDF by Flakeboard, or approved equivalent.

.4 Fire-Rated (FR) Medium density fibreboard (MDF): ANSI A208.2, meeting CAN/ULC S102, FSC certified; Modulus of Rupture (MOR): 4000 psi, with face screw hold of 250lbs.

.1 Basis of Design Materials: TRUPAN Fire-Rated (FR) MDF by Arauco, or approved equivalent.

.3 Glue: CSA 0112; Water-resistant urea-formaldehyde-free resin glue.

.4 Plastic Laminate Covered Components (PLAM):

.1 Plastic laminate face sheets: High pressure, paper based, melamine surfaced, laminated plastic sheets, conforming to CAN/CSA-A172, with thickness tolerances in accordance with Table 1 of CAN/CSA-A172 and plastic laminate grades as follows:

.1 General Purpose Grade (GP): Minimum 1.27mm (0.050") thick.

.2 Post-forming Grade (PF): Minimum 1.06mm (0.042") thick.

.2 Plastic laminate face sheet colour, gloss and texture: Carry pricing for two colours, as selected by the Consultant, from the manufacturers standard product line.

.3 Plastic laminate backing and liner sheets: High pressure, paper based, melamine surfaced, laminated plastic backing sheets, conforming to CAN/CSA-A172, backing grade (BK), minimum 0.5mm (0.020") thick.

.4 Cores: Unless otherwise indicated, 19mm (3/4") thick core.

.5 Laminating Adhesive: CSA-0112, water resistant type.

.6 Draw Bolt Fasteners: 'K&V 516' by Knape & Vogt Canada, or approved equivalent.

.7 Basis of Design: Wilsonart, Pionite, Nevamar or Formica.

.5 Wood Veneer (WV): plain sliced white birch with clearcoat finish.

.6 Stainless Steel Countertops – See Specification 12 35 00

.7 Rough Hardware:

.1 Provide required rough hardware to frame and fix all finished carpentry and include for expansion shields, nails, spikes, screws, bolts, anchors, clips, plates, washers, rods, wires, wall brackets, chrome finishing trim, and other ironmongery which may be required. All wood screws shall be drill thread screws except at chipboard where self-tapping screws shall be used. All rough hardware shall be galvanized unless otherwise noted.

.8 Millwork Finishing Hardware:

.1 As scheduled on drawings/details.

2.2 FABRICATION AND WORKMANSHIP

.1 Work shall be executed by skilled carpenters under the supervision of a competent carpentry foreman. All items shall be shop assembled, insofar as is practical. Unless indicated otherwise comply with AWMAC Custom Grade requirements.

.2 Make thorough examination of drawings and details, check anchorage, interfacing with work of other sections and other factors influencing the installation of the work, and be fully cognizant of requirements.

.3 Finished woodwork shall be free from bruises, blemishes, mineral marks, knots, shakes and other defects and shall be selected for uniformity of colour, grain and texture.

.4 Be responsible for methods of construction and for ensuring that materials are rigidly and securely attached and will not be loosened by the work of other sections.

.5 Fabricate the work in a manner which will permit expansion and contraction of the materials without visible open joints.

.6 Mitre exposed corners; no end grain shall be visible in completed installation.

.7 Provide solid wood edging at exposed plywood edges.

.8 Provide wood trim mouldings to profiles as indicated on drawings.

.9 Jointing of shop assembled work shall be by means of mortise and tenons, dowels, stub tenons, dovetails, dadoes, lock joints as applicable for the jointing condition.

.10 Accurately cut, mitre, fit and frame work together to produce tight hairline joints, rigidly secured together in a permanent manner using glue, blind screw fixing or nails. Use concealed glue blocks for additional strength where possible.

.11 Finished woodwork shall be in one piece wherever possible and all trim shall be in long lengths. Where jointing is necessary in the length, the joints between pieces shall be scarfed, glued and properly fastened. The material being jointed shall match reasonably well for grain and colour where natural finish is specified. Joints between lengths where paint finish is to be applied may be finger jointed in lieu of scarfing. Trim shall be accurately cut and mitred at all corners, glued and properly fastened.

.12 Machine dressed work shall be properly machine using sharp cutters, the finished work shall be free from drag, feathers, slivers or roughness of any kind. Remove machine marks by sanding.

.13 Finished woodwork shall be carefully hand sanded after installation to remove roughness and planer marks. Sanding shall be done with the grain of the wood and finished with fine grit paper to leave a smooth scratch-free surface suitable to receive the paint or natural finishes to be applied over as specified in Section 09 90 00.

.14 Nail heads in the finished surfaces shall be set with straight shank nail sets. Screw and bolt heads in finished surfaces shall be let into the work and capped with edge grain wood caps dressed and finished flush.

.15 Provide cutouts for fixtures, fittings, inserts, outlet boxes, services, other mechanical and electrical items and appliances. Round corners, and chamfer edges. Where items for cutouts butt to underside or back of finished surface, finish exposed edge to match face. Where item covers cutout, and at all concealed cut edges of core material, apply uniform coating of seal to cut edges.

.16 The finished work shall be of a high quality, with all corners having exact angles to ensure no swerve or twisting. All bends, crimps or angle parts shall be produced by professional equipment and tools for this purpose and if long runs or repeats are required, such shall be produced in the shop, or have proper equipment on site.

.17 Counters, Cabinets, Window Sills and Fitments:

.1 Provide and install counters, cabinets, and fitments as indicated on drawings.

.2 Shop fabricate and finish countertops and cabinet work in as large a size as practical. Verify field dimensions and conditions prior to fabrication.

.3 Make each unit rigid and self-supporting, suitable for individual removal. Assemble components with dovetail connections, mortise and tenon or blind dado joints, and adequately glued and secured with screws.

.4 Construct cabinets of solid lumber framing, with 19mm (3/4") MDF gables. Provide 19mm (3/4") MDF bottoms. Provide minimum 6mm (1/4") thick MDF full width backs having joints concealed behind framing. Backs which support shelves, equipment, or other loads, shall be 19mm (3/4") thick MDF. Route backs into end gables.

.5 Fabricate cabinet base in wood, separately in height indicated or, if not indicated, to match flooring base.

.6 Fabricate cabinet doors of flush panels from 19mm (3/4") thick MDF framed with hardwood edging.

.7 Make drawer fronts of 19mm (3/4") finished MDF, and wide enough to cover slide space. Provide 13mm (1/2") drawer backs, 16mm (5/8") sides, 6mm (1/4") dividers, and 6mm (1/4") bottoms, all of finished MDF. Fasten sides to fronts with dovetail joints, and grooved and glued joints for backs. Groove and glue bottoms into fronts and sides.

.8 Drawers shall be supported and guided with side extension drawer slides.

.9 Where a locking drawer is located below another drawer, provide 6mm (1/4") thick MDF diaphragm in framing immediately above locking drawer.

.10 Fabricate shelving of 19mm (3/4") finished MDF. Route cabinet gables to receive fixed shelving where indicated and to receive recessed metal shelf standards flush with adjacent surfaces for adjustable shelving.

.11 Fabricate countertops to details shown of 13mm solid surfacing mounted to 19mm exterior grade waterproof Douglas Fir plywood.

.1 Fit corners and edges of countertops with solid stock. Extend side and backsplashes to heights indicated. Provide side returns to match backsplashes at all abutting fixed vertical surfaces.

.18 Edging Treatment:

.1 Provide Self Edge Laminate: HPDL, colour matching cabinet work.

.2 Provide 3mm hardwood edging to match face veneer at WV casework.

.19 Plastic Laminate Covered Components:

.1 Meet requirements of CAN/CSA-A172, Appendix A.

.2 Bond plastic laminate to core with adhesive using pressure. Provide balanced construction with plastic laminate face sheet on exposed sides of core and backer/liner sheet. Finish drawers with liner sheet on both sides of core for balanced construction.

.3 Unless otherwise detailed, provide 19mm (3/4") thick core.

.4 Apply plastic laminate to core material in accordance with adhesive manufacturer's instructions. Provide same core and laminate profiles to provide continuous support and bond over entire surface.

.5 Use continuous lengths up to 2439mm (8'). Keep joints 610mm (2') from cutouts and in locations indicated on reviewed shop drawings.

.6 Locate joints, where required at 2439mm to 3048mm (8' to 10') O.C. At L-

shaped corners mitre plastic laminate, to the outside corner. Accurately fit members together to provide tight and flush butt joints, in true planes. Provide 6mm (1/4") blind spline and approved type draw bolts; one draw bolt for widths up to 150mm (6") at maximum 457mm (18") centres for widths exceeding 150mm (6"). Colour-match adjoining units.

.7 Form shaped profiles and bends using postforming grade laminate to laminate manufacturer's instructions.

.8 Where curved or bent surfaces are required for counters, backsplashes and other areas, use postforming laminate.

.9 Self-edge straight-line-edging with general purpose laminate and radius corners with postforming laminate, of same colour and finish as facing sheet, to cover exposed edges of core material. Apply with same adhesive as facing sheet. Chamfer edges uniformly at approximately 20 deg using machine router. Do not mitre laminate edges.

.10 Fabricate horizontal wearing surfaces including counters, shelves, both sides of removable shelves, cabinet doors and drawer fronts, of general purpose laminate except where postforming is required.

.11 Use general purpose laminate for exposed vertical surfaces except where otherwise specified or indicated.

.12 Apply plastic laminate backing sheet to reverse side of core of plastic laminate finished work including under counter tops and concealed portions of plastic laminate faced work. Provide backing sheet of specified minimum thickness, increased as required to compensate stresses caused by facing sheet.

.13 Apply laminated plastic liner sheet to interior of cabinetry unless indicated otherwise.

.14 Assemble work, true and square. Arrange adjacent parts of continuous laminate work to match in colour and pattern.

2.3 MOISTURE CONTENT

.1 Moisture content of interior woodwork shall be between 8% and 12%.

2.4 FINISHES

.1 Finishes shall match approved finished samples of wood treatment submitted by this section for each species of wood required. Wood items provided under this section shall be finished as part of the work of this section.

.2 Apply stain to items where scheduled, indicated or as directed Consultant, providing uniform required stain colour(s).

3 Execution

3.1 EXAMINATION

.1 Inspect available spaces and check surfaces over which the work of this section is dependent for any irregularities detrimental to the application and performance of the work. Notify Consultant in writing of all conditions which are at variance with those on the Contract Documents and/or detrimental to the proper and timely installation of the work of this section. The decision regarding correct measures shall be obtained from the Consultant prior to proceeding with the affected work.

.2 Check humidity in building with moisture reading instruments if doubt exists that building is sufficiently dry and ready to receive millwork. Do not proceed until unsatisfactory conditions are corrected.

.3 Commencement of work indicates acceptance of surfaces and conditions.

3.2 INSTALLATION - GENERAL

.1 Provide and fit in place all furring, strapping, battens, grounds and blocking required to provide adequate properly placed fixing for all finish carpentry work and as required for the work of other sections.

.2 Refer to drawings and coordinate with drywall, the painting and floor covering sections to establish sequence of installation or execution of each others' work. Pay particular attention to areas where materials are supplied by others and installed under this Contract.

.3 All nails where their use is permitted, shall be long enough so that at least half their length penetrates into the second member. Splitting of wood members shall be minimized by staggering the nails in the direction of the grain and by keeping nails well in from edges.

.4 Unless otherwise permitted by Consultant, fasten finish carpentry components in concealed manner.

.5 Plastic laminate work shall be free of cracks and chipped or broken edges. Replace damaged components.

.6 Fitments shall be installed level, plumb and true and complete in all respects.

.7 Fit small scribe moulds of same material as fitment to hide voids at junction of fitment to fitment and fitment to walls, partitions, ceilings, furrings.

3.3 PRIMING

.1 Immediately in instances where primed work is cut (as for fitting), a coat of primer shall be applied to the resulting raw surfaces.

3.4 INSTALLATION - FINISHING HARDWARE

.1 Take delivery of all finishing hardware and install. Check each item as received.

.2 Set, fit and adjust hardware according to manufacturer's directions at heights directed by Consultant. Hardware shall operate freely. Protect installed hardware from damage and paint spotting.

.3 Install all hardware for hollow metal doors including hinges.

.4 Pre-drill kickplates and doors before attachment of plates. Apply with water-resistant adhesive and countersunk stainless steel screws.

END OF SECTION

PART 1: GENERAL

1.1 Summary

.1 This Section includes requirements for supply and installation of a below grade damproofing membrane system, as required for complete and proper installation:

- .1 Fluid Applied Damproof Membrane
- .2 Fabric Reinforcement
- .3 Flashing Membrane
- .4 Flashing Membrane Adhesives
- .5 Mastics & Termination Sealants
- .6 Drainage Board
- .7 Protection Board
- .8 Auxiliary Materials

1.2 REFERENCES

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

- .1 ASTM D4479/D4479M, Standard Specification for Asphalt Roof Coatings – Asbestos Free
- .2 ASTM E96, Standard Test Methods for Water Vapor Transmission of Materials

.2 Canadian General Standards Board (CGSB):

- .1 CAN/CGSB 37.2, Emulsified Asphalt, Mineral-Colloid Type, Unfilled, for Dampproofing and Waterproofing, and for Roof Coatings
- .2 CAN/CGSB 37.16, Filled Cutback Asphalt for Dampproofing and Waterproofing
- .3 CGSB 37-GP-6M, Asphalt, Cutback, Unfilled for Dampproofing

1.3 Submittals

.1 Provide required information in accordance with Division 01.

.2 Action Submittals: Provide the following submittals before starting any work of this Section:

.3 Product Data: Submit manufacturer's data sheets covering the care and recommended maintenance procedures for incorporation into maintenance manuals.

.4 Certifications:

.5 Submit copies of manufacturers' current ISO 9001 certification. Fluid applied waterproofing membrane, adhesives and associated auxiliary materials shall be included.

.6 Submit references clearly indicating that the fluid applied waterproofing membrane manufacturer has successfully completed projects on an annual basis of similar scope and nature for a minimum of fifteen (15) years. Submit references for a minimum of ten (10) projects.

.7 Submit manufacturers' complete set of standard details for the fluid applied waterproofing membrane showing a continuous plane of water tightness below grade.

.8 Provide material checklist complete with application rates and minimum thickness of adhesives and primers.

1.4 Quality Assurance

.1 Damp proofing shall be carried out by applicators skilled in this Work in strict accordance with manufacturer's printed instruction. Submit proof of experience upon Consultant's request.

.2 Perform Work in accordance with the printed requirements of the membrane manufacturer and this specification.

.3 Maintain one copy of manufacturer instructions on site.

.4 At the beginning of the Work and at all times during the execution of the Work, allow access to Work site by the membrane manufacturers' representative.

.5 Components used in this section shall be sourced from one manufacturer, including sheet membrane, sealants, primers, mastics, and adhesives.

1.5 Delivery, Storage and Handling

.1 Deliver materials to the job site in undamaged and original packaging indicating the name of the manufacturer and Product.

.2 Store membrane at temperature of 5□C (40□F) and above to facilitate handling.

.3 Membrane contain petroleum solvents and are flammable. Do not use near open flame.

.4 Store role materials horizontally in original packaging.

.5 Store adhesives and primers at temperatures of 5°C and above to facilitate handling.

.6 Keep solvents away from open flame or excessive heat.

1.6 Site Conditions

.1 Environmental Requirements

.1 No installation Work shall be performed during rainy or inclement weather and on frost or wet covered surfaces.

.2 Protection

.1 Provide adequate protection of materials and Work of this section from damage by weather backfilling operations and other causes.

.2 Protect Work of other trades from damage resulting from Work of this section. Make good such damage at own expense to satisfaction of the Consultant.

1.8 WARRANTY

.1 Contractor Warranty: Warrant that the fluid applied dampproofing membrane and membrane flashings will stay in place and remain leak proof for two (2) years.

.2 Manufacturer's Warranty: Fluid applied dampproofing membrane manufacturer must warranty the membrane and membrane flashings for leak coverage as a result of faulty materials for a period of five (5) years from the date of substantial completion.

PART 2: PRODUCTS

2.1 Fluid Applied Bituminous Damproofing Membrane (RWP-01)

.1 Coating for Temperatures above 5°C (40°F): Liquid applied, dampproofing emulsion composed of vacuum-reduced asphalt dispersed in a mineral colloid emulsifier, in compliance with CAN/CGSB 37.2.

.1 Colour: Black

.2 Solids by Volume: 57%

.3 Application Temperature: 5 deg C (40 deg F) minimum.

.4 Maximum VOC: 0 g/L

.5 Water Vapour Permeance (ASTM E96): 8 ng/Pa.m^2.s., (0.14 perms)

.6 Basis of Design Product: 700-01 Dampproofing and Waterproofing Asphalt Emulsion by Henry Company; equivalents per Division 1.

.2 Coating for Temperatures below 5°C (40°F): Liquid applied medium consistency, solvent type waterproofing and dampproofing compound of selected asphalts and fibres permitting application in thick films; in compliance with CAN/CGSB 37.16-M89.

.1 Colour: Black

.2 Solids by Volume: 54%

.3 Application Temperature: Ambient (Thickens at low temperature).

.4 Water Vapour Permeance (ASTM E96): 2.9 ng/Pa.m^2.s., (0.05 perms)

.5 Basis of Design Product: 710-11 Dampproofing and Waterproofing Asphalt Coating by Henry Company; equivalent per Division 1.

2.2 Accessories

.1 Asphalt Primer (for use with 2.1.2)

.1 Light bodied asphalt based material for priming surfaces for cold-applied dampproofing coatings, in compliance with CGSB 37-GP-9M.

.1 Colour: Black

.2 Solids by Volume: 37%

.3 Basis of Design Product: 910-01 Penetrating Asphalt Primer by Henry or equivalent.

.2 Insulation Adhesive

.1 Insulation, Drainage Board and Protection Board Adhesive: Synthetic rubber base compound having the following characteristics:

.1 Colour: Cream.

.2 Compatible with sheet applied waterproofing membrane, substrate and insulation materials.

.3 Long term flexibility: Pass CGSB 71-GP-24M.

.4 Chemical resistance: Alkalis, mild acid and salt solutions.

.5 Application Temperature: between -12 deg C and 40 deg C.

.6 Basis of Design Products: 230-21 Insulation Adhesive by Henry Company; equivalent per Division 1.

.3 Protection Board:

.1 Extruded flexible twin wall board made of polypropylene copolymer and having the following physical properties:

.1 Thickness 2mm (80 mils)

.2 Tensile Strength Yield Point: 32 kg/cm²

.3 Tensile Strength Point of Failure: 242 kg/cm²

.4 Elongation: 167%

.5 Compression Strength (ASTM D695): 0.54 kg/cm²

.6 Impact Strength at 0 degrees C (32 degrees F): 8.9 kg/cm

.7 Basis of Design Product: 990-31 Polypropylene Protection Board by Henry Company; equivalent per Division 1.

.4 Drainage Boards:

.1 Composite two-part prefabricated geo-composite drain board consisting of a formed polystyrene core covered on one side with a woven or non-woven polypropylene filter fabric.

.1 Vertical Applications: Designed for vertical installations requiring a high compressive strength and moderate flow capacity:

.2 Basis of Design Product: Bakor DB 6200 by Henry Company; equivalent per Division 1.

.5 Auxiliary Materials:

.1 Insulation: Extruded Polystyrene rigid board as indicated in Section 07 20 00 Building Insulation.

PART 3: EXECUTION

3.1 EXAMINATION

.1 Verification of Conditions:

.1 Examine substrates to receive work and surrounding adjacent surfaces for conditions affecting installation.

.2 Strike masonry joints flush. Concrete surfaces shall be smooth and without large voids, honeycombing, spalled areas or sharp protrusions.

.3 Notify Consultant in writing of any discrepancies. Commencement of the work or any parts thereof shall mean acceptance of the prepared substrate.

.2 The installing contractor shall examine and determine that surfaces and conditions are ready to accept the Work of this section in accordance with published literature. Commencement of Work or any parts thereof shall mean installers acceptance of the substrate.

3.2 PREPARATION

.1 All surfaces must be sound, clean and free of oil, grease, dirt, excess mortar or other contaminants.

.2 Provide adequate protection of materials and work of this section from damage by weather, backfilling operations and other causes.

.3 Protect adjacent surfaces and Work of other trades from damage resulting from Work of this section. Make good such damage at no additional cost to the Owner.

.1 Provide sound handling and installation procedures to prevent and protect against overspray of materials specified in this Section.

3.3 INSTALLATION

.1 Fluid Applied Dampproofing Application (with 2.1.1):

.1 Preparation: Dry surfaces should be dampened with water prior to application.

.2 Dampproofing Application: Apply dampproofing coating at a rate of 1.5 l/m2 (3.6 gal/100ft2) and let dry.

.3 Waterproofing Application:

.1 Priming: Apply dampproof coating, diluted 20% by volume with clean water at the rate of 0.5 l/m2 and let dry. Priming is not required on insulated concrete forms (ICF) or preserved wood foundations (PWF).

.2 Apply fabric reinforcement into dampproof coating at not less than 1.0 l/m2 (2.4 gal/100ft2).

.3 Brush fabric reinforcement into place and eliminate wrinkles, air pockets or blisters and obtain full contact.

.4 Overlap fabric reinforcement at least 50mm (2") at all joints.

.5 At all corners, angles and junctions, reinforce with two (2) extra coats of dampproof coating and fabric reinforcement, at least 100mm (4") on each side of the junction.

.6 Apply a seal coat of dampproof coating over the entire area at not less than 1.0 l/m2 (2.4 gal/100ft2).

.4 Fluid Applied Dampproofing Membrane Application (with 2.2.2):

.1 Primer: Apply penetrating asphalt primer at a rate of approximately 2 to 8m^2 (895 to 330ft^2).and allow to cure.

.2 Dampproofing Application: Apply dampproofing coating at approximately 1.5 l/m^2 (3.6 gal/100ft^2). Allow to dry thoroughly before applying board products and/or backfilling.

.3 Waterproofing Application:

.1 Apply fabric reinforcement into dampproof coating at not less than 1.0 l/m^2 (2.4 gal/100ft^2).

.2 Brush fabric reinforcement into place and eliminate wrinkles, air pockets or blisters and obtain full contact.

.3 Overlap fabric reinforcement at least 50mm (2") at all joints.

.4 At all corners, angles and junctions, reinforce with two (2) extra coats of dampproof coating and fabric reinforcement, at least 100mm (4") on each side of the junction.

.5 Apply a seal coat of dampproof coating over the entire area at not less than 1.0 l/m^2 (2.4 gal/100ft^2).

.2 Protection Board Installation:

.1 Install protection board over the fluid applied dampproofing membrane to prevent damage from backfilling.

.2 Apply protection board adhesive in 13mm (1/2") wide strips spaced at 457mm (18") o/c to fluid applied dampproofing membrane.

.3 Immediately embed protection board and press into adhesive to ensure full contact.

.4 Backfill once protection board adhesive has fully cured.

.3 Drainage Board Installation:

.1 Attach drainage board to surface using adhesive. Permanent fixing is achieved once backfilling operation is complete.

.2 Vertical Application: Place drainboard with fabric side outwards.

.1 Start at the top or bottom of the wall. Drain board may be applied horizontally or vertically.

.2 When installed horizontally, position edge of core with flange at the top. When installed vertically, align edge with flange at the upstream edge.

.3 Bottom panel should be placed behind the discharge pipe.

.3 Overlaps: Pull back loose fabric to expose core. Position core of second panel over the overlap flange of first level.

.1 Overlap in direction of water flow and adhere the overlapped fabric with adhesive to prevent soils and/or concrete from entering core.

.4 Corners: Bend drainage board for inside corners. Cut drainage board to reach corner, providing 100mm (4") of extra fabric to wrap around corner. Overlap fabric at joint.

.4 Insulation Installation:

.1 Co-ordinate with Section 07 22 00 Building Insulation for insulating materials.

3.4 FIELD QUALITY CONTROL

.1 Final Observation and Verification:

.1 Final inspection of fluid applied dampproofing membrane shall be carried out by the Owner's representative, and the contractor.

.2 Contact Manufacturer for warranty issuance requirements.

.2 Fluid applied dampproofing membrane is not designed for permanent UV exposure. Apply protection board as soon as possible after installation of fluid applied dampproofing membrane. Refer to manufacturer published literature for product limitations.

3.5 CLEANING AND PROTECTION

.1 Progress Cleaning: Leave work area clean at the end of each work day, ensuring safe movement of passing pedestrians.

.2 Waste Management: Co-ordinate recycling of waste materials and packaging at appropriate facility, diverting waste from landfill. Certified installer shall be responsible for ensuring waste management efforts are practiced.

END OF SECTION

PART 1 - GENERAL

1.1 SUMMARY

.1 This Section includes requirements for supply and installation of the following:

.1 Rigid Foundation and Underslab Insulation Board

.2 Concrete Faced Rigid Insulation Board

.3 Mineral Wool Cavity Wall Insulation Board at Exterior Rainscreen assemblies

.4 Rigid Insulation Board at Roof Assemblies (see Roofing Specification 07 52 00)

.5 Dual Density Mineral Wool Insulation Board at Roof Assemblies

.5 Mineral Fibre Batt Acoustic Insulation (at interior framing cavity)

1.2 REFERENCE STANDARDS

.1 Underwriters Laboratories of Canada (ULC):

.1 CAN/ULC S701-11, Standard for Thermal Insulation, Polystyrene, Boards and Pipe Covering

.2 CAN/ULC S702-09-AM1, Standard for Thermal Insulation Mineral Fibre for Buildings

.3 CAN/ULC S114-05, Standard Method of Test for Determination of Non- Combustibility in Building Materials

.4 CAN/ULC S102-10, Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies

.2 American Society for Testing and Materials (ASTM):

.1 ASTM D1621-10, Standard Test Method for Compressive Properties of Rigid Cellular Plastics

.2 ASTM D2842-06, Standard Test Method for Water Absorption of Rigid Cellular Plastics

.3 Canadian General Standards Board (CGSB):

.1 CGSB 71-GP-24M, Adhesive, Flexible for Bonding Cellular Polystyrene Insulation

.2 CAN/CGSB-37.5, Cutback Asphalt Plastic Cement

.3 CAN/CGSB-51.10-92, Mineral Fibre Board Thermal Insulation

.4 Canadian Standards Association (CSA):

.1 CSA A123.3-05 (R2010), Asphalt Saturated Organic Roofing Felt

1.3 SUBMITTALS

.1 Provide submittals in accordance with Division 01.

.2 Affidavits:

.1 In lieu of samples and inspection procedures when required by CGSB and CAN/ULC Standards, submit affidavits, if requested, that materials supplied under these requirements meet CGSB and CAN/ULC Standards.

.3 Safety Data Sheets:

.1 Submit WHMIS safety data sheets for inclusion with project record documents. Keep one copy of WHMIS safety data sheets on site for reference by workers.

.4 Product Data Sheets.

1.4 SUSTAINABLE DESIGN REQUIREMENTS

.1 The Passive House sustainable design requirements shall apply to all relevant Sections and Work for this Project, whether specifically indicated or not. Compliance with The Passive

House certification requirements indicated in Section 01 35 63, will be used as one criterion to evaluate requests for substitutions or alternates.

.2 Field records including positive and negative pressure air change test results performed according to Section 01 83 16 Airtightness Testing Exterior Enclosure Requirements, construction progress documentation, inspections schedule and evidence of reviews. Refer to Section 01 32 33 Photographic Documentation.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Store insulation materials in dry areas, protected from wetting, sunlight and traffic. Store insulation board flat, on a flat surface, and to prevent edge damage and placing of materials on top of stored boards.

.2 Ensure that insulation board and adhesives are stored at a minimum temperature of 4 deg C for twelve (12) hours before installation, and that freezable adhesives are stored only at temperatures above 0 deg C at all times.

.3 Materials shall be delivered to the job in their original packages and containers bearing the manufacturer's labels intact and clearly visible.

.4 Store materials in dry, watertight areas and protect to prevent damage by other trades.

.5 Do not expose rigid insulation board to sunlight after installation. Protect it with black polyethylene or tarpaulin cover as recommended by manufacturer if permanent covering is not completed within twenty-four (24) hours.

PART 2 - PRODUCTS

2.1 BOARD INSULATION MATERIALS

.1 INS-01 Foundation and Underslab Insulation Board: Closed-cell, high compressive strength graphite expanded polystyrene (GPS) rigid board insulation.

.1 Meeting CAN/ULC S701 Type III.

.1 Basis of Design Materials: CHROME GPS 3000 Rigid Insulation by Beaver Plastics Ltd., or approved equivalent.

.2 Provide underslab insulation board with shiplapped edges.

.2 INS-02 Concrete Faced Perimeter Insulation Board.

.1 Perimeter Foundation Insulation: Extruded polystyrene board to ASTM C578 (CAN/ULC-S701) Type IV, rigid, closed cell, with integral high density skin, complete with integral 8mm (5/16") thick latex-modified concrete facing.

.2 Board Size: 610mm x 1220mm x 59mm (24" x 48" x 2-5/16").

.3 Edges: Tongue and groove sides, square edge ends.

.4 Thermal Resistance (ASTM C 518): Long term aged R-value of 5/1" (0.03 sm K/W / 1mm).

.5 Foam Compressive Strength: ASTM D1621, minimum: 35 psi (240 kPa).

.6 Compressive Strength Total: ASTM D1621, minimum 40 psi (275.6 kPa).

.7 Water Absorption (ASTM D2842): <0.1 (0.7% by volume maximum).

.8 Water Vapor Permeance (ASTM E96): 0.8 (50 ng/Pas m).

.9 Basis of Design Material: WallGUARD Concrete Faced Insulated Perimeter Wall Panels by T. Clear Corp.

.4 INS-03 Exterior Cavity Mineral Wool Wall Insulation at Rainscreen Assemblies: Fibrous mineral wool insulation, unfaced, in accordance with CAN/ULC S702, Type 1, thermal resistance not less than RSI 0.76/25 mm; rated non-combustible in accordance with CAN/ULC S114 and having a

flame spread rating of 5 or less in accordance with CAN/ULC S102; density 72 kg/m3; square edges, board size 406 mm x 1220 mm x thickness indicated on the Drawings:

.1 Density: To ASTM C303:

.1 Outer layer: 100 kg/m3

.2 Inner layer: 60 kg/m3

.2 Water vapour permeance: 1555 ng/Pa.s.m2.

.3 Moisture sorption: 1 % maximum to ASTM C1104/C1104M.

.4 Fungi resistance: Zero mould growth to ASTM C1338.

.5 Basis of Design Material: CavityRock by ROCKWOOL Inc., or approved equivalent

.5 INS-04a Rigid Polyiso Insulation at roof, refer to Spec 07 52 00.

.6 INS-04b Dual Density Mineral Wool Insulation at roof, refer to Spec 07 52 00.

2.2 BLANKET INSULATION MATERIALS

.1 INS-05 Mineral Fibre Batt Insulation:

.1 Unfaced, semi-rigid mineral slag batt insulation in accordance with CAN/ULC S702-09, Type 1; having a nominal RSI of 0.67/25 mm; rated non-combustible in accordance with CAN/ULC S114-05 and having a flame spread rating of 5 or less in accordance with CAN/ULC S102; density 32 kg/m3; square edges, thickness as required to meet design insulation values indicated on drawings or as required to fill insulated spaces where not indicated.

.2 Basis of Design Materials:

.1 ROCKWOOL Inc., COMFORTBATT

.2 Thermafiber, SAFB (2.5 pcf Density)

.3 Or approved equivalent.

2.3 INSULATION FASTENERS AND CLIPS

.1 Insulation Fasteners: Heat treated carbon steel pin with HPDE washer with 2-3/8" Holding Diameter

.1 Length of Fastener: shaft length to suit insulation thickness and substrate, as recommended by the Insultation Fastener Manufacturer.

.2 Basis of Design Material: Insulfast T4 I-F by Ramset, or approved equivalent.

.2 Concrete Faced Perimeter Insulation Fasteners: Manufacturer's standard concealed fasteners with groove mounting plate and fastening spline.

.3 Thermally Broken Insulation Clips: Stainless steel, adjustable clips, complete with a thermal break pad at the back (insulation/moisture barrier interface). Clips include cut-outs that represent 15% to 20% of the clip volume, reducing quantity of conductive material, further reducing the effects of thermal bridging in wall systems.

.1 Adjustable clips are a two-piece design; Stainless steel pieces, "L" shaped. The inner piece of the clip fts inside the outer piece, allowing the exact depth of the clip to be adjusted on-site by the installers.

.2 Basis of Design Materials: ACS-A Thermal Clip by Soprema, or approved equivalent.

.3 Size: Required to suit depth of Insulation, allowing fastening to structural support.

2.4 ACCESSORIES

.1 Felt Slip Sheet: No. 15 asphalt saturated, organic, unperforated felt conforming to CSA A123.3-05 (R2010).

.2 Slip Sheet Mastic: Cut back asphalt plastic cement conforming to CAN/CGSB-37.5.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Verification of Conditions: Verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for insulation installation in accordance with manufacturer's written recommendations.

.1 Visually inspect substrate in presence of Consultant.

.2 Ensure surfaces are free of snow, ice, frost, grease and other deleterious materials.

.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Consultant.

.2 Start of insulation installation indicates installer's acceptance of substrate installation conditions.

3.2 BLANKET INSULATION INSTALLATION

.1 Install insulation to maintain continuity of thermal protection to building elements and spaces.

.2 Cut insulation to fit around electrical boxes, pipes, ducts, openings, corners and all protruding obstructions occurring on the surface to be insulated and seal with adhesive.

.3 Keep insulation minimum of 75mm (3") away from heat emitting devices.

.4 Trim and cut insulation neatly to fit spaces. Butt joints tightly, offsetting vertical joints. In multiple layer application, offset both vertical and horizontal joints.

.5 Install batt insulation in locations and thicknesses shown. Seal joints to prevent transfer of moisture.

.6 Apply foamed-in-place insulation at exterior walls, around penetrations through walls and where indicated. Apply foamed-in-place insulation with suitable equipment in accordance with the manufacturer's written instructions. Fill all joints completely, leaving no voids or gaps and trim excess material.

3.3 BOARD INSULATION INSTALLATION

.1 Install insulation and accessories in accordance with manufacturer's written instructions applicable to products and application indicated and as follows:

.1 Use insulation that is undamaged, dry, and unsoiled.

.2 Maintain continuous thermal insulation, vapour barrier and air tightness for building spaces and elements, and as follows:

.1 Saw cut and trim insulation neatly to fit spaces; fill voids with foamed-in-place insulation compatible with installed insulation.

.2 Butt edges and ends tight

.3 Fit insulation tight against mechanical, electrical and other items protruding through the plane of insulation

.4 Use insulation free of broken or chipped edges

.5 Apply single layer of insulation to produce thickness indicated, unless multiple layers are otherwise specifically shown or required to make up total thickness

.6 Fit insulation firmly against substrate using insulation fasteners spaced in accordance with manufacturers recommended spacing and pattern.

.7 Drill a drill hole through the insulation material and push/hammer the insulation fastener in drilled hole.

.8 Progressively screw in, preventing damage to the insulation and/or plug. Screw with double thread allows for quick installation.

.2 Leave insulation joints unbonded over line of expansion and control joints; bond a continuous 150mm (6") wide strip of primary vapour membrane over expansion and control joints using compatible adhesive

.3 Protect insulation from damage until it is covered; replace any broken, sunburned, crushed or dented insulation immediately prior to covering; coordinate with back-filling operations

.4 Board Insulation: Install board insulation to vertical surfaces with adhesive applied in accordance with manufacturer's written instructions, and as follows:

.1 Exterior Application: Extend boards as indicated on Drawings to top of footing, installed on exterior face of perimeter foundation wall.

.2 Install insulation fasteners as indicated above.

.3 Protect below grade insulation on vertical surfaces from damage during backfilling by applying protection board; set in adhesive according to insulation manufacturer's written instructions.

.5 Foundation and Under Slab Insulation: Extend boards a minimum of 1220mm (4') in from perimeter foundation wall, unless otherwise indicated on Drawings, and as follows:

.1 Lay boards on level compacted fill.

.2 Insulate structural slabs at entrances with insulation placed horizontally underneath the concrete, and insulate surrounding slabs on grade in the same way for a distance of 1220mm (4') in every direction from the perimeter of the structural slab; omit perimeter insulation on adjacent foundations for the width of the structural slab.

.7 Cavity Wall Insulation: Fit courses of insulation between wall ties and other confining obstructions in cavity; butt edges tightly in vertical and horizontal directions and as follows:

.1 Install cavity insulation with a tight fit to substrate materials, provide adhesive and additional fasteners where uneven substrates cause air spaces behind insulation; apply adhesive to substrate in a continuous film not less than 3mm (1/8") thick when wet and bed the insulation into adhesive before adhesive loses its tack or skins-over.

.2 Apply insulation fasteners following manufacturer's written instructions.

.3 Install insulation clips to walls before sheet membrane air barriers are applied.

3.4 ADJUSTING & CLEANING

.1 At completion of installation remove off site all excess material and debris. Leave in clean, neat condition.

.2 Make good all defects to this installation or defects to other Work caused by this installation.

3.5 PROTECTION

.1 Protect installed board insulation from damage due to harmful weather exposures, physical abuse, and other causes.

.2 Provide temporary coverings or enclosures where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

END OF SECTION

1 General

1.1 SUMMARY

.1 This Section includes requirements for supply and installation of weather barriers and accessories, installed behind rainscreen.

1.2 REFERENCE STANDARDS

.1 American Society for Testing of Materials (ASTM):

.1 ASTM D882-2010, Standard Test Method for Tensile Properties of Thin Plastic Sheeting.

.2 ASTM E84-2010b, Standard Test Method for Surface Burning Characteristics of Building Materials.

.3 ASTM E96/96M-2010, Standard Test Methods for Water Vapor Transmission of Materials.

.4 ASTM E2178-2003, Standard Test Method for Air Permeance of Building Materials.

.2 Air Barrier Association of America (ABAA):

.1 ABAA 2011, Installer's Certification Program.

.2 ABAA 2012, Water-resistive Barrier Installation Guideline.

.3 American Association of Textile Chemists and Colorists (AATCC)

.1 AATCC 42 2007, Water Resistance: Impact Penetration Test.

1.3 ADMINISTRATIVE REQUIREMENTS

.1 Co-ordination: Co-ordinate work of this Section with work of other trades for proper time and sequence to avoid construction delays.

.2 Pre-Construction Conference: Arrange a site meeting, to coincide with regular bi-weekly site meetings.

.1 Notify attendees two (2) weeks prior to meeting and ensure meeting attendees include as minimum:

.1 Owner;

.2 Consultant;

.3 Water-resistive barrier installer;

.4 Manufacturer's Technical Representative.

.2 Ensure meeting agenda includes review of methods and procedures related to water-resistive barrier installation including co-ordination with related work.

.3 Record meeting proceedings including corrective measures and other actions required to ensure successful completion of work and distribute to each attendee within one (1) week of meeting.

1.4 SUBMITTALS

.1 Provide submittals in accordance with Division 01.

.2 Action Submittals:

.1 Product Data: Submit product data including manufacturer's literature for water-resistive barrier membrane and accessories, indicating compliance with specified requirements and material characteristics.

.1 Submit list on water-resistive barrier manufacturer's letterhead of materials, components and accessories to be incorporated into Work.

.2 MSDS report.

.3 Include product names, types and series numbers.

.4 Include contact information for manufacturer and their representative for this Project.

.2 Samples:

.1 Submit duplicate 305mm x 305mm (12" x 12") sample of membrane.

.2 Submit duplicate 305mm (12") long samples of seam tape and each type of flashing materials.

.3 Test Reports:

.1 Submit test reports showing compliance with specified performance characteristics and physical properties including air permeance, water vapour permeance and structural performance.

.2 Submit ICC-ESR documentation demonstrating compliance with ICC-AC 38 Acceptance Criteria for Water-Resistive Barriers.

.4 Field Reports: Submit manufacturer's field reports within three (3) days of each manufacturer representative's site visit and inspection.

.5 Installer Qualifications:

.1 Submit verification of manufacturer's approval of installer, or letter verifying installer's experience with work similar to work of this Section.

.3 Closeout Submittals

.1 Operation and Maintenance Data: Supply maintenance data for water-resistive barrier materials for incorporation into manual specified in Division 01.

.2 Record Documentation:

.1 List materials used in water-resistive barrier work.

.2 Warranty: Submit warranty documents specified.

1.5 QUALITY ASSURANCE

.1 Installer Quality Assurance: Manufacturer's approval of installer, or minimum two (2) years' experience with work similar to work of this Section.

.1 Ensure all accessories such as seam tape, flashing membranes, fasteners and sealants come from same source as water-resistive barrier membrane.

1.6 MOCK-UP

.1 Provide mock-ups in accordance with Division 01.

.2 Construct mock-ups for each form of construction and finish required to verify selections made under sample submittals and to demonstrate aesthetic effects and qualities of materials and execution before installing materials indicated in this Section.

.3 Build mock-ups using exposed and concealed materials indicated for the completed Work, and as follows:

.1 Locate mock-ups in the location and of the size indicated or, if not indicated, as directed by Consultant.

.2 Notify Consultant 7 days in advance of the dates and times when mock-ups will be constructed.

.3 Demonstrate the proposed range of aesthetic effects and workmanship.

.4 Include examples of window frame, door frame, interior corner, exterior corner and common protrusions or penetrations of membranes.

.5 Obtain Consultant's acceptance of mock-ups before proceeding with construction of work of this Section.

.6 Maintain mock-ups during construction in an undisturbed condition, as a standard for judging the completed Work.

.7 Accepted mock-ups may form a part of the completed Work.

1.7 ENVIRONMENTAL CONDITIONS

.1 Weather barrier shall to be applied to surfaces that are either wet, oily, frosted, dirty or contaminated in any way.

.2 Ambient Conditions: Apply air and vapour membrane to substrate surfaces that are within manufacturer's installation temperature threshold range accounting for wind cooling and apparent temperature when actual temperature is approaching manufacturer's minimum temperature threshold.

1.8 DELIVERY, STORAGE, HANDLING AND PROTECTION

.1 Delivery and Acceptance Requirements:

.1 Deliver material in accordance with Division 01.

.2 Deliver materials and components in manufacture's original packaging with identification labels intact and in sizes to suit project.

.2 Storage and Handling Requirements: Store materials off ground and protected from exposure to harmful weather conditions and at temperature conditions recommended by manufacturer.

.1 Ensure materials are protected from sunlight and UV radiation.

.3 Packaging Waste Management:

.1 Separate and recycle waste packaging materials.

.2 Remove waste packaging materials from site and dispose of packaging materials at appropriate recycling facilities.

.3 Collect and separate for disposal paper and plastic material in appropriate on-site storage containers for recycling in accordance with Waste Management Plan.

1.9 WARRANTY

.1 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 intended to limit other rights Owner may have under Contract Conditions.

.1 Ten (10) years limited material warranty.

.2 Installer's Warranty: Submit installers warranty stating that weather barrier and accessories are installed in accordance with manufacturer's recommendations and that membrane, transitions and through-wall flashing membranes, primers, mastics, adhesives and sealants are sourced from one manufacturer.

2 Products

2.1 MANUFACTURERS

.1 Basis-of-Design products are named in this Section; form the basis-of-design materials for the project; additional manufacturers offering similar products may be incorporated into the work of this Section provided they submit requests a minimum of five (5) days in advance of Bid Closing.

.2 Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

.1 Dörken Systems Inc.,

.2 Solitex

.3 Or approved equivalent.

2.2 MATERIALS

.1 Vapor permeable water-resistive barrier with highly tear-resistant thermo-bonded non-woven polyester substrate, and waterproof acrylic highly UV resistant coating.

.1 Include factory applied self-adhesive strip at longitudinal edges of barrier membrane.

.2 Design Criteria:

.1 Water Vapor Permeance: To ASTM E96 (Procedure A), 204 perms minimum.

.2 Water Impact Penetration Resistance: To AATCC 42, no water passing.

.3 Air Permeance: To ASTM E2178, 0.9 L/(s x m^2) @ 75 Pa.

.4 Tear Resistance: To ASTM D 1922, 1916 g minimum.

.5 Dry Tensile Strength: To ASTM D882, MD 47.4 lb/in^2, CD 28.7 lb/in^2 minimum.

.6 Elongation at Break: To ASTM D882, MD 40 %, CD 45 % minimum.

.7 Fire Rating Characteristics to ASTM E84:

.1 Rating: NFPA Class A, IBC Class A minimum.

.2 Flame Spread: 10 maximum.

.3 Smoke Developed: 145 maximum.

.3 Water-resistive Barrier for Walls: Vapor permeable water-resistive barrier with tear-resistant thermo-bonded, non-woven polyester substrate and waterproof acrylic polymeric coating stabilized against oxidation and UV degradation and factory applied adhesive edge strips.

.1 Service Life Expectancy: Twenty-five (25) years.

.2 Weight: 5.5 lb/100 ft^2, 270 g/m^2, 44 lb/roll nominal.

.3 Colour: Black.

.4 Basis of Design Materials:

.1 Dörken Systems Inc., DELTA®-FASSADE S

.2 Solitex Fronta WA Connect

.3 Equivalent products as per Specification 01 25 00.

.4 Accessories:

.1 Seam tape: In accordance with water-resistive barrier manufacturer's written recommendations.

.1 Basis of Design Materials: Dörken Systems Inc., DELTA®-FASSADE TAPE (or approved equivalent).

.2 Flashings: Self-adhering, water-resistive flashing membrane in accordance with water-resistive barrier manufacturer's written recommendations.

.1 Basis of Design Materials: Dörken Systems Inc., DELTA®-FASSADE FLASHING (or approved equivalent).

.3 Fasteners: Water and vapour resistant fasteners in accordance with water-resistive barrier manufacturer's written recommendations.

.1 41mm (1-5/8") corrosion-resistant screw with 50mm (2") minimum diameter plastic caps, unless otherwise recommended by the manufacturer.

.4 Sealants and Adhesives: Elastomeric sealant and adhesive in accordance with water-resistive barrier manufacturer's written recommendations, and Section 07 92 00.

.1 Ensure sealants are UV resistant and compatible with adjacent materials.

.2 Basis of Design Materials: Dörken Systems Inc., DELTA®-THAN (or approved equivalent).

.5 Primers: In accordance with flashing manufacturer's written recommendations.

.6 Flexible Membrane Through-wall Flashing: Self-adhering, butyl-rubber based flashing membrane.

.1 Basis of Design Materials: Dörken Systems Inc., DELTA®-TW FLASHING (or approved equivalent).

3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: Verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for water-resistive barrier installation in accordance with manufacturer's written recommendations.

.1 Visually inspect substrate in presence of Consultant.

.2 Inform Consultant of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Consultant.

3.2 PREPARATION

.1 Prepare surfaces in accordance with manufacturer's written requirements for type of substrate; free from voids, spalled areas, loose aggregates or sharp points; clean surfaces to remove contaminants that could affect bond such as grease or wax, dust, dirt and debris.

.2 Ensure step flashings and kick-out flashings are installed before beginning installation of water-resistive barrier membrane.

.3 Ensure protrusions that may penetrate water-resistive barrier membrane are removed before beginning installation.

3.3 INSTALLATION

.1 Install water-resistive barrier before installation of windows and doors in accordance with manufacturer's written recommendations.

.2 Do installation in accordance with ABAA written recommendations for installation of water-resistive barriers.

.3 Unroll water-resistive barrier with printed side out, wrapping entire building, including rough openings for windows, doors and other protrusions or penetrations.

.1 Install water-resistive barrier plumb and level to exterior face of sheathing, or directly to framing members in accordance with manufacturer written recommendations.

.2 Ensure water-resistive barrier is installed with textured side facing substrate.

.4 Start installation of water-resistive barrier at building corner, leaving 150mm to 305mm (6" to 12") of membrane extended beyond corner.

.5 Install horizontally starting at bottom of wall.

.1 Overlap water-resistive barrier membrane as follows:

.1 Exterior Corners: 305mm (12") minimum.

.2 Vertical and horizontal seems: 150mm (6") minimum.

.3 Other seams, joints or at protrusions and penetrations: 150mm (6") minimum.

.6 Attachment of Water-resistive Barrier Membrane to Substrate:

.1 Attach water-resistive barrier to steel studs through exterior sheathing with mechanical fasteners, and elastomeric adhesive in accordance with manufacturer's written recommendations.

.1 Secure using fasteners and custom caps spaced 157mm (18") maximum vertically on center along stud line and 610mm (24") maximum on center, horizontally.

.2 Ensure fasteners penetrate securely through metal studs 19mm (¾") minimum.

.3 Install fasteners 150mm (6") from sill and frame of window and door openings.

.4 Ensure fasteners are installed 229mm (9") minimum from window or door head.

3.4 SITE QUALITY CONTROL

.1 Field Inspection: Coordinate field inspection in accordance with Division 01.

.2 Manufacturer's Services:

.1 Coordinate manufacturer's services.

.1 Manufacturer review work involved in handling, installation, protection, and cleaning of water-resistive barrier and components, and submit written reports in acceptable format to verify compliance of Work with Contract conditions.

.2 Manufacturer's Field Services: Provide manufacturer's field services consisting of product use recommendations and periodic site visits for product installation review in accordance with manufacturer's instructions.

.1 Report any inconsistencies from manufacturer's recommendations immediately to Consultant.

.3 Schedule site visits to review work at stages listed:

.1 As required by consultant.

.2 Obtain reports within three (3) days of review and submit immediately to Consultant.

3.5 CLEANING AND PROTECTION

.1 Progress Cleaning: Perform cleanup as work progresses in accordance with Division 01.

.1 Leave work area clean end of each day.

.2 Final Cleaning: Upon completion, remove surplus materials, rubbish, tools, and equipment.

.3 Waste Management:

.1 Coordinate recycling of waste materials.

.2 Collect recyclable waste and dispose of or recycle field generated construction waste created during construction or final cleaning related to work of this Section.

.3 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

.4 Protect installed products and components from damage during construction.

.5 Repair damage to adjacent materials caused by water-resistive barrier installation.

END OF SECTION

1 General

1.1 SUMMARY

.1 This section includes requirements for supply and installation of under-slab vapour retarder required for the following:

.1 Below slab on grade Areas.

1.2 SUBMITTALS

.1 Provide submittals in accordance with Division 01.

.2 Action Submittals:

.1 Samples: Submit samples of materials to Consultant for review and acceptance as follows:

.1 305 mm x 305 mm (12" x 12") sample for review and acceptance.

.2 Data Sheets: Manufacturer's descriptive literature and recommended method of installation.

.3 Certificates: Manufacturer's certificates attesting that products meet specification requirements.

.3 Informational Submittals:

.1 Product Data: Submit manufacturer's product literature for each product listed including manufacturer's recommended installation procedures and any modifications required to suit installation conditions.

1.3 SUSTAINABLE DESIGN REQUIREMENTS

.1 The Passive House sustainable design requirements shall apply to all relevant Sections and Work for this Project, whether specifically indicated or not. Compliance with The Passive House certification requirements indicated in Section 01 35 63, will be used as one criterion to evaluate requests for substitutions or alternates.

.2 Field records including positive and negative pressure air change test results performed according to Section 01 83 16 Airtightness Testing Exterior Enclosure Requirements, construction progress documentation, inspections schedule and evidence of reviews. Refer to Section 01 32 33 Photographic Documentation.

1.4 QUALITY ASSURANCE

.1 Contractor executing work of this Section shall employ installers having a minimum of five (5) years continuous experience in successful installation of work of type and quality shown and specified. Submit proof of experience upon Consultant's request.

.2 The below-grade vapour retarder shall be inspected by the Consultant prior to concrete work.

1.5 STORAGE, DELIVERY, HANDLING AND PROTECTION

.1 Deliver materials on manufacturer's original skids, or in original unopened protective packing.

.2 Protect materials during transportation, storage and installation to avoid physical damage.

2 Products

2.1 MATERIALS

.1 Below Grade Vapour Retarder (VB-01)

.1 Membrane shall be a seven layer co-extruded barrier manufactured from polyethylene and ethylene vinyl alcohol (EVOH) resins, meeting the shall meet the following minimum performance requirements:

.1 Maximum Water Vapour Permeance (ASTM E154 Sections 7, 8, 11, 12, 13, by ASTM E96, Method B, or ASTM F1249)

.1 As received: 0.0098 perms.

.2 After Wetting and Drying: 0.0079 perms.

.3 Resistance to Plastic Flow and Temperature: 0.0079 perms.

.4 Effect Low Temperature and Flexibility: 0.0097 perms.

.5 Resistance to Deterioration from Organisms and Substances in Contacting Soil: 0.0113 perms.

.2 Puncture Resistance, ASTM D1709: 2,600 grams.

.3 Tensile Strength, ASTM E154, Section 9: 102 N (58 Lb. Force/Inch).

.4 Radon Diffusion Coefficient, k124/02/95: $<1.1 \times 10^{-13}$ m^2/s.

.5 Methane Permeance, ASTM D1434: 3.68×10^{-12} m/s (GTR).

.6 Aqueous Phase Film Permeance

.1 Benzene Permeance: 1.57×10^{-10} m/s.

.2 Toluene Permeance: 2.18×10^{-10} m/s.

.3 Ethylbenzene Permeance: 1.71×10^{-10} m/s.

.4 M & P Xylenes Permeance: 1.62×10^{-10} m/s.

.5 O Xylene Permeance: 1.53×10^{-10} m/s.

.2 Acceptable Material:

.1 Perminator EVOH by W.R. Meadows, or equivalent per 01 25 00.

2.2 ACCESSORIES

.1 Double Sided Seam Tape

.1 Double sided butyl tape for overlap sealing in gas barrier installations. Minimum width 50 mm (2").

.2 Acceptable Product: PERMINATOR EVOH BUTYL TAPE by W. R. MEADOWS or equivalent.

.2 Pipe Collars

.1 Construct pipe collars from gas barrier material and pressure sensitive tape per manufacturer's instructions.

3 Execution

3.1 INSPECTION

.1 Check graded subgrade for conformity with elevations and cross-sections before placing material.

.2 Check for unstable areas and areas requiring additional compaction.

.3 Level, tamp or roll granular material below slab.

.4 Notify Consultant of unsatisfactory surfaces and conditions.

.5 Do not begin installation of material until deficiencies have been corrected.

3.2 INSTALLATION

.1 Install the gas barrier membrane in accordance with manufacturer's instructions and ASTM E1643.

.2 Unroll gas barrier membrane with the longest dimension parallel with the direction of the pour.

.3 Lap gas barrier over the footing and seal to foundation walls with 50 mm (2") double sided butyl tape and roll press into place with rubber roller.

.4 Apply gas barrier seam tape to the terminated edge of the gas barrier membrane and onto the concrete foundation.

.5 Roll press into place.

.6 Joint Overlap

- .1 Apply double sided butyl tape 150 mm (6") from the termination of the gas barrier membrane and press into place.
- .2 Overlap the next layer of gas barrier membrane 300 mm (12") and roll press into place.
- .3 Apply gas barrier seam tape centered over the joint and roll press into place.

.7 Repair of Damaged Areas

- .1 Cut out damaged area of gas barrier membrane allowing for an overlap of 300 mm (12") in all directions.
- .2 Apply double sided butyl tape 150 mm (6") from the cut edges of the gas barrier membrane in all directions and press into place.
- .3 Place the new piece of gas barrier membrane overlapping the existing areas a minimum of 300 mm (12") and roll press into place.
- .4 Apply 100 mm (4") gas barrier seam tape centered over the joint in all directions and roll press into place.

3.3 PROTECTION

.1 Take extreme care during trenching operations, installation of materials and backfilling not to damage or displace materials or other utilities.

END OF SECTION

1 General

1.1 SUMMARY

.1 Supply labour, materials, plant, tools and equipment to complete the Work as shown on the Drawings and as specified herein, including, but not limited to the following:

.1 Compatible fluid applied/sheet applied vapour permeable air barrier (AB) membranes, complete with all associated primers and accessories necessary for complete system installation.

.2 Materials and installation methods to bridge and seal the following air leakage pathways and gaps:

.1 Connections of the walls to the roof air barrier.

.2 Connections of the walls to the foundations, seismic and expansion points, openings and penetrations of window frames, store front, and other envelope systems, door frames, piping, conduit, duct and similar penetrations, masonry ties, screws, bolts and similar penetrations.

.3 All other leakage pathways in the building envelope.

1.2 PERFORMANCE REQUIREMENTS

.1 Provide a vapour permeable air barrier constructed to perform as a continuous air and vapour barrier, and as liquid water drainage plane flashed to discharge any incidental condensation or water penetration.

.2 The air barrier shall be joined in an airtight and flexible manner to the air barrier material of adjacent systems, allowing for the relative movement of systems due to thermal and moisture variations and creep. Connection shall be made between:

.1 Foundations and walls.

.2 Walls and windows or doors.

.3 Different wall systems.

.4 Wall and roof.

.5 Wall and roof over unconditioned space.

.6 Walls, floor and roof across construction, control and expansion joints.

.7 Walls, floors and roof to utility, pipe and duct penetrations.

.8 All penetrations of the air barrier and paths of air infiltration/exfiltration shall be made airtight.

1.3 QUALITY ASSURANCE

.1 Work in this Section is to be carried out by a skilled applicator approved by manufacturer and in strict accordance with manufacturer's printed instructions. Upon request, provide written confirmation or certification from the vapour permeable air barrier manufacturer that the installer has been trained and is recognized by the manufacturer as suitable for the execution of the work.

.2 Perform Work in accordance with the manufacturer's written instructions of the air barrier membrane and this specification.

.3 Maintain one (1) copy of the manufacturer's written instructions on site.

.4 Compounds used in this section shall be sourced from one (1) manufacturer, including sheet membrane, air barrier sealants, primers, mastics and adhesives.

.5 Pre-Installation Conference:

.1 Convene a pre-installation conference two (2) weeks prior to commencing work of this section. Require attendance of parties directly affecting work of this section, including, but not limited to, the Owner's representative, Consultant, General Contractor, vapour permeable air barrier membrane contractor, vapour permeable air barrier membrane manufacturer's representative and substrate installer.

.2 Pre-Installation conference to be scheduled to coincide with regularly scheduled, on-site project progress meeting.

.3 Review preparation and installation procedures and co-ordinating and scheduling required with related work.

.4 Record discussions of conference and decisions and agreements (or disagreements) reached, and furnish copy of record to each party attending. Review foreseeable methods and procedures related to the vapour permeable air barrier membrane, including the following:

.1 Tour, inspect and discuss condition of substrate, penetrations and preparatory work performed by other trades.

.2 Review surface preparation, minimum curing period and installation procedures.

.3 Review special details and flashings.

.4 Review required submittals, both completed and yet to be completed.

.5 Review and finalize construction schedule related to work and verify availability of materials, installer's personnel, equipment and facilities needed to make progress and avoid delays.

.6 Review required inspections, testing, protection and repair procedures.

.7 Review weather and forecasted weather conditions, and procedures for coping with unfavourable conditions.

.8 Post the following warning in a prominent location at all building entrances and top of each stair in red – 1" letter height minimum. (available by request from www.foursevenfive.com)

AIRTIGHT BUILDING PROJECT

This is an airtight building; **DO NOT PENETRATE** the insulated envelope and airtight layer without prior permission of the Superintendent

.6 Arrange for a Manufacturer's Representative to:

.1 Visit the site and discuss any special requirements, procedures and unique conditions, prior to commencement of work.

.2 Inspect substrate surfaces and recommend solutions to accommodate requirements for surface preparation of the existing coating and any adverse conditions.

.3 Periodically visit and inspect the installation and report unsatisfactory conditions to the Contractor.

.4 Attend final inspection and to submit written certification that the products, systems and assemblies have been installed in accordance with the manufacturer's requirements.

.7 Inspection and Testing:

.1 Cooperate and coordinate with the Owner's inspection and testing agency. Do not cover any installed vapour permeable air barrier membrane until any required inspections, testing approvals have been completed.

.2 Contractor and membrane manufacturer's representative shall conduct at least three ASTM D4541 Adhesion test at random mock-up locations, demonstrating membrane achieves minimum pull strength of 16 PSI.

1.4 SUBMITTALS

.1 Provide submittals in accordance with Division 01.

.2 Documentation:

.1 Prior to commencing the Work, submit documentation from an approved independent testing laboratory certifying that the air leakage and vapour permeance rates of the air barrier membranes, including primary membrane and transition sheets, exceed the requirements of the NBC.

.2 Prior to commencing the Work submit copies of manufacturer's current ISO certification. Membrane, primers, sealants, adhesives and associated auxiliary materials shall be included.

.3 Prior to commencing the Work submit references clearly indicating that the membrane manufacturer/installer has successfully completed projects on an annual basis of similar scope and nature for a minimum of fifteen (15) years. Submit references for a minimum of ten (10) projects.

.4 Prior to commencing the Work submit manufacturer's complete set of standard details for the air barrier membrane system showing a continuous plane of air tightness throughout the building envelope.

.5 Prior to commencing work provide a material checklist, complete with application rates and minimum thickness of primary membranes.

.3 Shop Drawings:

.1 Show the locations and extent of the vapour permeable air barrier system including details of typical conditions, intersections with other envelope systems and materials, membrane counter-flashings and details showing how gaps in construction will be bridged and how miscellaneous penetrations such as conduits, pipes, etc. are sealed.

.4 Samples:

.1 Submit to Consultant for approval, samples of materials and components to be used in vapour permeable air barrier system, prior to fabrication of work together with name of manufacturer and technical literature. Submit 305mm x 305mm (12" x 12") samples of vapour permeable air barrier membrane.

.5 Safety Data Sheets:

.1 Submit WHMIS safety data sheets for inclusion with project record documents. Keep one copy of WHMIS safety data sheets on site for reference by workers.

1.5 MOCK-UP

.1 Provide mock-ups in accordance with Division 01.

.2 Construct mock-ups for each form of construction and finish required to verify selections made under sample submittals and to demonstrate aesthetic effects and qualities of materials and execution before installing materials indicated in this Section.

.3 Build mock-ups using exposed and concealed materials indicated for the completed Work, and as follows:

.1 Locate mock-ups in the location and of the size indicated or, if not indicated, as directed by Consultant.

.2 Notify Consultant 7 days in advance of the dates and times when mock-ups will be constructed.

.3 Demonstrate the proposed range of aesthetic effects and workmanship.

.4 Include examples of window frame, door frame, interior corner, exterior corner and common protrusions or penetrations of membranes.

.5 Obtain Consultant's acceptance of mock-ups before proceeding with construction of work of this Section.

.6 Maintain mock-ups during construction in an undisturbed condition, as a standard for judging the completed Work.

.7 Accepted mock-ups may form a part of the completed Work.

1.6 ENVIRONMENTAL CONDITIONS

.1 Vapour permeable air barrier membrane is not to be applied to surfaces that are either wet, oily, frosted, dirty or contaminated in any way.

.2 Maintain surface of substrates and ambient temperatures constantly between 38 deg C and 5 deg C during application and curing of primers and adhesives for flexible vapour permeable air barrier membrane flashings, except as permitted otherwise by Consultant in writing.

1.7 DELIVERY, STORAGE, HANDLING AND PROTECTION

.1 Coordinate deliveries with construction schedule and arrange for proper storage areas.

.2 Deliver materials to the job site in undamaged and original packaging indicating the name of the manufacturer and product.

.3 Store materials in a clean, dry and protected area, off the floor or ground, in their original containers, sealed and undamaged. Manufacturer's labels are to be easily visible and undamaged. Store rolled materials on end.

.4 Store liquid membrane materials, adhesives and primers at minimum 5 degree C, and store away from open flames, sparks and excessive heat as liquid membrane materials and primers are flammable because of solvent content.

.5 Care and precaution are to be exercised by the applicator so as not to damage the work of other trades. Applicator is responsible to take all necessary precautions to protect work of other trades during application.

.6 In addition to the above, store modified bituminous sheet type flexible vapour permeable air barrier membrane flashings as follows;

.1 Store rolls of membrane tape in accordance with manufacturers written instructions.

.2 Store materials away from direct heat or open flame.

.3 Store rolls away from direct sunlight until ready for use.

.4 For installation in cold weather, store rolls of membrane in heated storage trailer for minimum of 24-hours with the temperature kept at 21 degree C and remove for application with as little exposure as possible to low ambient temperatures.

.7 The vapour permeable air barrier membrane is not designed for permanent exposure, but can be left exposed for up to a maximum of thirty (30) days. As soon as possible after

the membrane has cured, protect vapour permeable air barrier membrane from damage by work of other Sections.

1.8 WARRANTY

.1 Warrant the work of this Section against defects in materials and workmanship in accordance with the General Conditions, but for a period of two (2) years and agree to repair and replace faulty materials or work which becomes evident during the warranty period, without cost to the Owner. Provide the Owner with a written warranty to this effect.

2 Products

2.1 MATERIALS

.1 Fluid-applied, Vapour Permeable Air Barrier (AVB-01): a high-quality, water-based acrylic dispersion air barrier. Apply with airless sprayer, paint brush or roller to air seal CMU, concrete, wood, joist bays, and weather resistant barriers. The liquid-applied acrylic membrane shall form a seamless, elastic air and vapor variable membrane once cured.

.1 Basis of Design Product: VISCONN by Pro Clima as distributed by FourSevenFive, or approved equivalent.

.1 Materials: Aqueous acrylic dispersion - Color: Blue (wet) and Navy Blue/ Black (dry) or White (wet and dry states).

.2 Coverage: 2.46 oz/sf (750 g/m² on smooth substrate) (wet) [dependent on the roughness of the substrate, the thickness and the application method]

.3 Surface Weight: 0.66 oz/sf (200 g/m²) (EN 1849-2) (dried) [dependent on the roughness of the substrate, the thickness and the application method]

.4 Application Thickness: 8-39 mils (0.2 – 1.0mm) (wet film) – dependent on substrate

.5 Airtight material: 0.000000 L/(Pa·m2·s) ASTM E2178

.6 WRB per IBC 1403.2/IRC R703 Passed modified ASTM E331 at 299Pa

.7 Vapor Permeance: Sd-value 0.13 – 10 m (EN 12572)
0.9 perms (dry cup ASTM E96)

.8 Weather/UV-exposure: Minimize the exposure to direct sunlight. Maximum exposure 3 months

.9 Water column: over 6'.7" (2m) under AATCC 127

.10 Temperature resistance: -40 °C/-40 °F to +80 °C/176 °F

.11 Application temperature: 41°F – 95°F (5°C-35°C)

.12 Drying: approx. 12 - 48 hours (at 20 °C, 65% rel. humidity) depending on subsurface and applied thickness

.2 Flexible Air Barrier Membrane Flashing Tape (AVB-02) Transition Tape:

.1 Vapour-open fabric (5 perms), PP backing fleece, single-sided adhesive with release strips for easy application, solid acrylic adhesive for connection to masonry/concrete substrates without need for primer.

.1 Basis of Design Product: Contega Solido by Clima as distributed by FourSevenFive, or approved equivalent.

.3 Reinforcing Sealant:

.1 Water-based acrylic dispersion air barrier, brush applied to fill gaps up to 3/4" to CMU, concrete, wood, joist bays. Fully compatible with AB-01 and can be covered with spray-on liquid film to form a seamless, elastic air and vapour retarding protective layer when fully installed.

.1 Basis of Design Product: VISCONN FIBRE by Clima as distributed by FourSevenFive, or approved equivalent.

.4 Substrate Cleaners:

.1 Compatible cleaner as recommended by manufacturer.

.5 Packing Insulation:

.1 Loose, glass fibre or mineral fibre insulation, 1.0 lbs./cu.ft. density, and conforming to CAN/CGSB-51.11.

3 Execution

3.1 EXAMINATION

.1 The installer shall examine conditions of substrates, areas and other conditions under which the vapour permeable air barrier system will be applied for compliance with requirements.

.2 Verify that surfaces and conditions are ready to accept the Work of this section. Surfaces shall be sound, dry, even and free of oil, grease, dirt, excess mortar or other contaminants. Concrete surfaces shall be cured and dry, smooth without large voids, spalled areas or sharp protrusions. Masonry joints shall be flush and completely filled with mortar, and all excess mortar sitting on masonry ties shall have been removed. Verify substrate is visibly dry and free of moisture.

.3 Notify the Consultant in writing of any discrepancies. Commencement of work or any parts thereof shall mean acceptance of the prepared substrate.

.4 Do not proceed with application of vapour permeable air barrier membrane when rain is expected within 16-hours.

3.2 GENERAL

.1 Ensure continuity of the air seal throughout the scope of this section.

.2 Components and membrane materials must be obtained as a single-source from the membrane manufacturer to ensure total system compatibility and integrity.

.3 Install all materials in accordance with the manufacturer's written directions, unless otherwise specified herein.

3.3 SURFACE PREPARATION

.1 Clean, prepare and treat substrates according to manufacturer's written instructions. Surfaces to be coated must be smooth, clean, dry, firm to the touch and free from oil, grease, dirt, excess mortar and other contaminants.

.1 Brushing and/or scraping of substrates may be required to adequately prepare surface.

.2 Remove all poorly bonded, existing surface coating prior to installing work of this Section.

.3 Thoroughly wash metal surfaces with mineral spirits or xylol and wipe dry with clean rags.

.2 Vapour permeable air barrier membrane is not to be applied over lightweight, cast-in-place concrete containing high moisture or certain curing compounds. Cast-in-place

concrete should be cured for a minimum of two (2) weeks prior to application of vapour permeable air barrier membrane.

.3 Concrete surfaces shall be free of large voids and spalled areas. Fill all spalled concrete areas, form-tie holes/voids and open mortar joints in concrete block with mortar to produce a smooth, even surface. Allow to cure properly before proceeding.

3.4 JOINT AND PROTRUSION TREATMENTS

.1 Prepare only enough vapour permeable air barrier membrane compound as required for joint and protrusion treatments and can be used within compound's usable pot life. Mix vapour permeable air barrier membrane with a double blade agitator attached to a 13mm (1/2") drill in strict accordance with the manufacturer's written instructions.

.2 Exterior sheathing board inside/outside corners: Embed minimum 305mm (12") wide, continuous strip of reinforcing fabric in vapour permeable air barrier membrane, centred over corner.

.3 Fill joints up to 6mm (1/4") wide in exterior grade sheathing board and joints in between panels of exterior grade plywood with trowel application of vapour permeable membrane or mastic as recommended by manufacturer ensuring that joints are completely filled.

.4 Where joints in exterior grade sheathing board are over 6mm (1/4") wide, ensure joints are completely filled with a vapour permeable membrane or mastic and apply continuous flexible air barrier membrane flashing or mesh as specified herein, lapped a minimum of 75mm (3") and fully adhered to both sides of substrate.

.5 Where joints/cracks up to 6mm (1/4") wide occur in concrete or masonry, fill joints/cracks with a thick trowel application of vapour permeable air barrier membrane or mastic, ensuring that joints are completely filled.

.6 Where joints/cracks in concrete or masonry are over 6mm (1/4") wide, apply a vapour permeable membrane or mastic as recommended by manufacturer ensuring that joints are completely filled.

.7 Ensure continuity of air barrier membrane by working air barrier membrane over all exterior sheathing board fasteners and around all masonry ties and anchors and other items.

3.5 APPLICATION - AIR BARRIER MEMBRANE FLASHINGS

.1 Apply primer to all substrate areas where flexible air barrier membrane flashings are to be applied. Apply primer using lambs wool roller at rate 100 sq.ft. to 300 sq.ft./gallon (2.044 to 6.131 sq.m./gallon) depending on porosity of substrates. Allow primer to "tack up" for approximately 30-minutes prior to application of flexible air barrier membrane flashings.

.2 Do not use solvent-based primer where it may be in contact with polystyrene insulation.

.3 Install flexible air barrier membrane flashings in strict accordance with the manufacturer's written instructions unless otherwise specified herein.

.4 Ensure a uniform, continuous air barrier effect. Where air barrier membranes are to be provided under other Sections, co-ordinate the work such that air barrier membrane continuity is achieved.

.5 Provide air tight seals at penetrations in flexible air barrier membrane flashings.

.6 Apply flexible air barrier membrane flashings to extend air barrier membrane at peripheries of the installation as required to facilitate joining and sealing of the air barrier provided in adjacent construction, lapping joints minimum of 75mm (3"), extending membrane onto adjacent concrete/metal substrates not less than 150mm (6"), centred over joints.

.7 Apply continuous flexible air barrier membrane flashings at expansion and deflection joints within framing members, lapping joints minimum of 75mm (3"), extending

membrane onto adjacent concrete/metal substrates which have no applied air barrier not less than 150mm (6"), centred over joints.

.8 Flexible Weather Barriers:

.1 Provide continuous 457mm (18") side flexible weather barrier membrane in exterior masonry cavity walls at expansion joints.

.2 Install flexible weather barrier membrane to substrate with adhesive, in strict accordance with manufacturer's instructions.

.3 Loop down flexible weather barrier into expansion/control joints approximately two (2) times the width. Lap joints minimum 150mm (6") and seal. Ensure that flexible weather barrier lap joints which are looped into expansion /control joints are sealed with adhesive. Seal tops and bottoms of membrane barrier at change in construction to present continuous, uninterrupted flexible weather barrier.

.4 Pack joint with loose batt insulation with face of insulation down two (2) times the width of expansion from face interior wythe.

3.6 APPLICATION - VAPOUR PERMEABLE AIR BARRIER MEMBRANE - LIQUID APPLIED

.1 Areas to receive vapour permeable air barrier membrane are as follows:

.1 On all new / existing substrates, behind all rainscreen cladding.

.2 Prepare only enough vapour permeable air barrier membrane compound as can be used within compound's usable pot life. Mix vapour permeable air barrier membrane with a double blade agitator attached to a 13mm (1/2") drill in strict accordance with the manufacturer's written instructions.

.3 Apply vapour permeable air barrier membrane to substrates in a continuous coating at a rate of 27 - 45 litres/9.29 sq.m. (6 to 10 gal./100 sq.ft.) by roller, spray or trowel methods, producing a minimum wet film thickness of 70 wet mils (1.5mm).

.4 Ensure that application of vapour permeable air barrier membrane overlaps all flexible air barrier membrane flashings, dampproof course/thru-wall flashings a minimum of 75mm (3").

.5 Where masonry anchors pass through the air barrier membrane, ensure continuity of air barrier by applying vapour permeable air barrier membrane all around/over masonry anchors.

3.7 PROTECTION AND CLEAN-UP

.1 Protect membrane to avoid damage from other trades, and construction materials during subsequent operations.

.2 If the vapour permeable air barrier cannot be covered within thirty (30) days after installation, apply temporary UV protection such as dark plastic sheet or tarpaulins. Contact material manufacturer for further recommendations.

.3 Clean spillage and soiling on adjacent construction that will be exposed in the finished work using cleaning agents and procedures recommended by the manufacturer of the affected construction.

.4 Remove any masking materials after installation.

.5 Applicator is responsible for the removal of surplus and waste material incurred during application.

.6 Equipment and tools can be cleaned using mineral spirits or xylol.

END OF SECTION

1 General

1.1 SUMMARY

.1 This Section includes requirements for prefinished metal siding, complete with a system of girts, flashings and trims, using sheet metals and exposed fasteners, on the following installation applications:

.1 Exterior Metal Wall Cladding;

.2 Exterior Metal Roof Cladding

.2 Provide specified system with labour, materials, and equipment required to fabricate and erect siding including cutting and penetrations, accessories, flashings, trims and closures necessary for a complete installation.

1.2 REFERENCE STANDARDS

.1 American Architectural Manufacturers Association (AAMA):

.1 AAMA 605.2, Voluntary Specification for High Performance Coatings on Architectural Panels and Extrusions.

.2 American Society for Testing and Materials (ASTM):

.1 ASTM A653/A653M-11, Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by the Hot-Dip Process, Physical (Structural) Quality.

.2 ASTM A755/A755M-11, Standard Specification for Steel Sheet, Metallic Coated by the Hot-Dip Process and Prepainted by the Coil-Coating Process for Exterior Exposed Building Products.

.3 Canadian Sheet Steel Building Institute (CSSBI):

.1 CSSBI 20M-08, Standard for Sheet Steel Cladding for Architectural, Industrial and Commercial Building Applications.

.2 CSSBI S8-08, Quality and Performance Specification for Prefinished Sheet Steel Used for Building Products.

.4 Canadian Standards Association (CSA):

.1 CSA CAN/CSA S16-09, Design of Steel Structures

.2 CSA S136-07, North American Specification for the Design of Cold Formed Steel Structural Members

.5 Canadian General Standards Board (CGSB):

.1 CGSB 1.108-M89, Bituminous Solvent Type Paint

.6 The Society for Protective Coatings (SSPC)

.1 SSPC Guide 14, Guide for the Repair of Imperfections in Galvanized, Organic, or Inorganic Zinc-Coated Steel Using Organic Zinc-Rich Coatings

1.3 SUBMITTALS

.1 Submit manufacturer's product specifications, standard details, certified product test results, and general recommendations, as applicable to materials and finishes for each component and for total panel assemblies.

.2 Shop Drawings:

.1 Submit fully dimensioned shop drawings to Consultant showing construction, assembly, elevations, sections and interfacing with work of other Sections.

.2 No work of this Section shall be fabricated until shop drawings and all other related submittals, documentation, certifications and samples as required by this Section, have been reviewed by the Consultant.

.3 Details shall indicate metal thicknesses, areas to be sealed and sealant materials, gaskets, type of joints, flashings, trim, finishes, fasteners and welds, all anchorage assemblies and components and erection details.

.4 Shop drawings shall bear the seal of an engineer registered to practice in the place of Work, employed by the preformed metal siding manufacturer, and shall include complete design calculations for the system and documentation in regard to the reactions of the metal siding due to thermal expansion and contraction, positive and negative wind pressure and assurance that the thermal movement and wind forces have sufficient attachments, supports, bracing and anchorage.

.3 Samples:

.1 Submit to the Consultant for approval, samples of materials and components to be used in the system, prior to fabrication of work together with name of manufacturer and technical literature.

.2 Submit 305mm x 305mm (12" x 12") samples of metal siding, and full size samples of thermal clips.

.4 Verification Samples:

.1 Submit two (2) full size panels of metal siding.

.5 Safety Data Sheets:

.1 Submit WHMIS safety data sheets for inclusion with project record documents. Keep one copy of WHMIS safety data sheets on Site for reference by workers.

1.4 QUALITY ASSURANCE

.1 Qualifications:

.1 Manufacturer and tradesmen executing the work of this Section shall have had a minimum five (5) years continuous experience in successful manufacture and installation of work of type and quality shown and specified. Submit proof of experience upon Consultant's request.

.2 Erection of preformed metal siding systems shall be by workers especially trained and experienced in this type of work. Have a qualified representative at the job site to direct the work of this Section at all times.

.3 Retain a professional engineer, registered in the province of the Work, to design fabrication and erection of the Work of this Section in accordance with applicable Building Code and Contract Document requirements including, but not limited to, the following:

.1 Seal and signature to shop drawings and design submittals requiring structural engineering.

.2 Field review of installed components.

.4 Conform to the requirements of the local Building Code, local by-laws and Authorities having jurisdiction.

1.5 PRE-INSTALLATION CONFERENCE

.1 Arrange a site meeting, to coincide with regular bi-weekly site meetings, attended by the Contractor, the Subcontractor's representative and foreman for this project, the Consultant, materials supplier(s), and other relevant personal before commencement of work for this Section; agenda for meeting will include; but not be limited to, the following:

.1 To discuss expectations for fit and finish of wall system, quality of workmanship for installation of air/vapour retarders and insulation and relationship of wall system to adjacent components.

.2 Manufacturer's representative shall also provide frequent inspection visits during the course of work of this Section to assure quality and competence of membrane installation and panel alignment

1.6 DESIGN REQUIREMENTS

.1 Maximum deflection not to exceed L/180 under system's own weight plus wind load (positive and negative) loads acting normal to the plane in accordance with the Building Code Climatic Data, wind load 1:50 years.

.2 Design wall system to maintain the following erection tolerances:

.1 Maximum variation from plane or location shown on shop drawings: 20 mm/10 m (3/4 inch/30 feet).

.2 Maximum offset from true alignment between two adjacent members abutting end to end in line: 1 mm (0.04 inches).

.3 Design sheet cladding to span continuously over at least four structural supports (three spans) and design fastening to structural supports to sustain factored loads in accordance with CAN/CSA S136-07.

.4 Calculate live load deflections in accordance with CSSBI 20M-08, as modified by the requirements of this Section.

.5 Provide for movement of components without causing buckling, failure of joint seals, undue stress on fasteners when subject to seasonal temperature range from -40 deg C to +50 deg C, and wind loads noted above.

.6 Final review and acceptance of work completed by this Section shall be carried out by the manufacturer's representative, the Consultant, Contractor and the Subcontractor.

1.7 BUILDING ENVELOPE PERFORMANCE CRITERIA

.1 Design systems identified in this Section to allow for the following:

.1 Air Infiltration: Design system for maximum air leakage of 0.03 L/m^2 of fixed wall area when tested in accordance with ASTM E283 at a minimum static air pressure differential of 300 Pa.

.2 Water Penetration Under Static Pressure: Design system for zero water penetration when tested in accordance with ASTM E331 at a minimum differential static pressure of 20% of positive design wind load, but not less than 475 Pa.

.3 Dynamic Water Penetration: No uncontrolled water penetration when tested in accordance with AAMA 501 at dynamic pressure differential of not less than 300 Pa (6.24 psf) for a 15 minute duration, with water application rate of 5 gal/ft2/hr.

1.8 MOCK-UP

.1 Construct mock-ups for each form of construction and finish required to verify selections made under sample submittals and to demonstrate aesthetic effects and qualities of materials and execution before installing materials indicated in this Section.

.2 Build mock-ups using exposed and concealed materials indicated for the completed Work, and as follows:

.1 Locate mock-ups in the location and of the size indicated or, if not indicated, as directed by Consultant.

.2 Notify Consultant 7 days in advance of the dates and times when mock-ups will be constructed.

.3 Demonstrate the proposed range of aesthetic effects and workmanship.

.4 Include examples of window frame, door frame, interior corner, exterior corner and common protrusions or penetrations of membranes.

.5 Obtain Consultant's acceptance of mock-ups before proceeding with construction of work of this Section.

.6 Maintain mock-ups during construction in an undisturbed condition, as a standard for judging the completed Work.

.7 Accepted mock-ups may form a part of the completed Work.

1.9 STORAGE, DELIVERY, HANDLING AND PROTECTION

.1 Co-ordinate deliveries to comply with construction schedule and arrange ahead for off-the-ground, under cover storage locations. Do not load any area beyond the design limits.

.2 Adequately protect and crate all components against damage, dirt, disfigurement and weather.

.3 Assembled units and/or their component parts shall be transported, handled and stored in a manner to preclude damage. Accessory materials required for erection at the Site shall be delivered to the Site in manufacturer's labelled containers. Remove all units or components which are cracked, bent, chipped, scratched or otherwise unsuitable for installation and replace with new.

.4 Provide safe and adequate equipment on the Site to execute the work of this Section, hoisting, scaffolding, staging, safety protection equipment, tools, plant and other equipment required for the completion of the work of this Section.

.5 Delivered damaged materials or materials which do not comply with this Section shall be rejected by Consultant, removed from the Site and replaced with acceptable materials at Contractor's expense.

.6 Adequately protect the structure and work of all other trades during delivery, storage, handling and erection of the work of this Section.

.7 Preformed metal siding components being hoisted to the working level shall be adequately banded and carefully slung employing steel wire rope.

.8 Bundles shall be tag lined during the ascent of the hoisting operation. Precaution shall be taken to avoid damage to metal siding components and to prevent marring of exposed surfaces.

.9 Preformed metal siding components, after being positioned, shall be adequately secured in place as quickly as possible and prior to leaving the job site at the end of the working day.

.10 Loose bundles of preformed metal siding components shall be adequately secured at the completion of each working day.

.11 Scaffolds, platforms, ladders, and the like, required by the erector for installation of metal siding components shall be properly secured to prevent accidental movement or collapse.

1.10 PROJECT CONDITIONS

.1 Make thorough examination of drawings and details. Determine the intent, extent, materials, and conditions of interfacing with work of other Sections and be fully cognizant of requirements.

.2 Inspect substrate surfaces on which the work of this Section is erected for any irregularities detrimental to the application and performance of the work of this Section. Confirm conditions satisfactory before proceeding.

.3 Co-ordinate and verify, by measurement at the job site, all dimensions affecting work of this Section. Notify Consultant, in writing, of all dimensions and/or conditions at variance with those on the reviewed shop drawings, Contract Documents and/or detrimental to the proper and timely installation of materials. Direction regarding correction measures shall be obtained from Consultant prior to fabrication of the item affected. Insure the compatibility of adjacent items in relationship to the work of this Section.

.4 Do not perform work of this Section during period of rain, fog, sleet or snow, or upon surfaces covered with dust, water, dew, ice, frost or snow.

.5 Report to Consultant in writing, defects of work prepared by other trades and unsatisfactory Site conditions. Commencement of application implies acceptance of surfaces and conditions.

1.11 COORDINATION

.1 Coordinate work of this section with the requirements of Section 07 62 00, for specific requirements for supply of prefinished sheet metal flashing materials to other sections of the work as follows:

.1 Supply prefinished sheet metal flashings required for the project, regardless of sheet metal thickness and colour.

.2 Provide prefinished sheet metal flashings to installing trades, tension levelled and guillotine sheared to length ready for brake forming, fabrication and installation by installing trades.

.3 Coordinate with installing trades during bid period and provide unit prices for materials based on specified thickness and colour of flashing materials required under their respective scopes of work; installing trades will be responsible for carrying cost for flashing materials in their scope of work in their Bid Price.

.4 Requirements of this portion of the scope of work do not apply to extruded aluminum or other pre-manufactured flashing materials normally supplied by installing trades (i.e.: extruded aluminum curtain wall flashing and sills, preformed roof penetrations, non-prefinished sheet metal products).

.5 Subcontractor responsible for supply of metal wall and soffit cladding will only be responsible for fabrication and installation of flashings relating to their scope of work.

1.12 WARRANTY

.1 Warrant the work of this Section against defects in materials and workmanship in accordance with General Conditions, but for a period of five (5) years. Agree to promptly make good defects which become evident during warranty period without cost to the Owner.

.2 Without restricting the generality of the Warranty, defects shall include deformation, buckling, leakage, weather tightness, failure of anchors and fastenings, failure of paint coating and sealants.

.1 Provide a manufacturer's written warranty: Furnish panel manufacturer's written warranty covering failure of factory-applied exterior finish within the warranty period. Warranty period for finish: 40 years after the date of Substantial Completion. The values below are based on normal environments and exclude any aggressive atmospheric conditions.

.3 Promptly make good defects and/or failures in the Work upon written notification by the Owner. Remedy shall include labour, materials, equipment and services required to make good defective work, and to replace components and finishes and the Owner's property damaged or disturbed in the course of remedying defects.

2 Products

2.1 MANUFACTURERS

.1 Basis of Design Products: Products named in this Section were used as the basis of design for the project; additional manufacturers offering similar products may be incorporated into the work of this Section.

.2 Acceptable Preformed Metal Siding Profile: Subject to compliance with requirements specified in this Section, profiles that may be incorporated into the Work include; but are not limited to, the following:

.1 Exterior Metal Wall Cladding (MTL-01):

.1 Concealed fastener metal wall cladding panels, 317mm wide (275mm exposure), complete with reveal joint at mid point x 38mm deep x maximum viable length; 20-gauge thickness.

.1 Basis of Design Profile: AD275R Vic West, (or equivalent per Specification 01 25 00).

.2 Orientation: Vertical profile.

.3 Colour: To be selected by Consultant from manufacturer's full colour range.

.2 Exterior Metal Roof Roofing (MTL-02):

.1 I-style Snap Cap metal roofing panel with hidden fasteners, 400mm wide x 22mm profile depth x maximum viable length; 22-gauge thickness.

.1 Basis of Design Profile: TRD100 by Vicwest, (or equivalent per Specification 01 25 00).

.2 Orientation: as per drawings/details.

.3 Colour: To be selected by Consultant from manufacturer's full colour range.

.2 Snap Cap

.1 Provide 25 mm high snap caps for full length of the roof panel and retained by panel clips, fabricated from Z275 galvanized (zinc coated) sheet steel conforming to ASTM A653M structural quality Grade 230 having a nominal core thickness 0.76mm (0.030"). Finish and colour to match roof sheet.

2.2 MATERIALS

.1 Steel:

.1 Sheet steel conforming to ASTM A653/A653M-11, structural quality, Grade 'A' with a minimized spangle zinc coating of Z275 conforming to ASTM A653/A653M-11 shall be used for girts, sub-grits, Z-bars, brackets, battens, retention clips, cleats, fascias, preformed metal siding panels, closures and flashings.

.2 Girts, sub-girts, Z bars, clips brackets shall be of the required base steel nominal thickness to meet design requirements. Thermal clips shall be slotted to minimize thru-metal conductivity.

.3 Horizontal Clip System: 38mm (1-1/2") wide, die cut aluminum extruded clip, adjustable to plumb structure, minimum 1.2mm (18 gauge) thick galvanized zinc-coated steel to ASTM A653. System to provide compliance to ASHRAE 90.1 and thermally broken façade requirements of the building code.

.1 Adaptable horizontal framing members.

.2 Clip Depth: Based on depth of the cavity insulation, as indicated on the Drawings.

.3 Vertical Clip Spacing: As recommended by clip manufacturer, and indicated on stamped Shop Drawings.

.4 Basis of Design Product: EA RVRS TClip and Girt, by Engineered Assemblies, ACS Thermal Clips by Soprema or equivalent per Specification 01 25 00.

.5 Fasteners:

.1 Colour matched stainless steel rivets, as per Engineered Assemblies recommendations. No dissimilar materials allowed, in selection of fasteners.

.2 All holes are pre-drilled at same diameter.

.3 Fixed holes include a stainless steel grommet on the rivet stem.

.4 Floating holes have rivet only.

.4 Weather Barrier: As indicated in Section 07 25 00.

.5 Metal cladding and roofing shall be of required base steel nominal thickness to meet design requirements. Metal flashings, fascias, copings, cap flashings, closures and the like shall be base steel nominal thickness of 24 gauge and thicker to suit application to prevent oil-canning.

.2 Finish:

.1 Preformed metal siding and related metal flashings shall be prefinished coil coated material in accordance with Technical Bulletin No. 7 "Prefinished and Post Painted Galvanized Sheet Steel for Exterior Building Products" of the Canadian Sheet Steel Building Institute (CSSBI), prefinished to CSSBI 10,000 Series or WeatherX finish requirements, (or approved alternate). Colours shall be as indicated on drawings and where not indicated, as selected later by Consultant from manufacturer's full available colours range, including manufacturer's extended colours range. Allow for two (2) different colours to be selected.

.2 Flatstock Material: Minimum 0.024" (24 gauge) thick or thicker to suit design requirements, coil coated sheet steel, prefinished to CSSBI 10,000 Series or WeatherX finish requirements, (or approved alternate). Colours shall be as indicated on drawings, and where not indicted, as selected later by Consultant from manufacturer's full available colours range, including manufacturer's extended colours range. Allow for two (2) different colours to be selected.

.3 Sealing Tape: Macro-polyisobutylene preformed sealant tape designed for use in metal cladding assemblies.

.4 Sealants and Gaskets:

.1 Sealants and gaskets shall be of types to allow for maximum movements anticipated, maintaining life cycle expectancy, adhesion and flexibility under temperature ranges of -25 degree C up to +80 degree C, without undue softening or deleterious effects.

.2 At sidelaps and end laps of panels, as required, factory applied butyl tape, or polyvinyl chloride "wedge fit" type extrusions.

.3 Perimeter Sealant: Multi-component, chemical curing epoxidized polyurethane type sealant conforming to ASTM C920-11, 'DYMERIC 240' by Tremco (Canada) Ltd., or 'Sonolastic NP2' by BASF Construction Chemicals, (or approved alternate). Colour as selected later by Consultant. Provide primers, bond breakers and cleaning agents as recommended by the sealant manufacturer.

.5 Screws, Bolts, Nuts, Washers, Rivets and Other Fastening Devices:

.1 Exposed fasteners used on exterior facing panels, flashing and all trim members shall be Series 400 stainless steel and nylon coloured coated head to match substrate colour, Atlas "Colormate", (or approved alternate).

.2 Mechanical fasteners used on underlayment; self tapping metal screws, type and length to suit application and securement plates to the approval of the Consultant.

.3 Concealed fasteners located within wall: No.12 teks, self-drilling, self-tapping galvanized screws.

.6 Bituminous Paint:

.1 Conforming to CAN/CGSB-1.108-M, Type 2.

.7 Field Touch-Up Paint:

.1 Zinc rich anti-corrosion primer, conforming to SSPC Guide 14, and approved by the coil coating manufacturer. Top coating of type and colour to match finish sheet and to comply with VOC regulations identified in South Coast Air Quality Management District (SCAQMD).

2.3 FABRICATION

.1 Co-ordinate and verify, by measurement at the job site, all dimensions affecting the Work. Submit written notifications documenting any and all field dimensions and/or conditions which are at variance with those on the reviewed shop drawings. The Contract documents and/or detrimental to the proper and timely installation of job site materials. The decision regarding corrective measures shall be obtained from the Consultant prior to the fabrication of the item affected. Ensure the suitability of adjacent items in relationship to the work of this Section.

.2 Report to Consultant in writing, defects in Work prepared by other trades and unsatisfactory Site conditions. Commencement of work shall imply acceptance of conditions.

.3 Workmanship shall be best trade shop and field practice known to recognized manufacturers specializing in work of this Section. Joints and intersecting members shall be accurately fitted to true planes, adequately and securely fastened and made completely weathertight. Component fastenings shall be concealed of adequate strength.

.4 Fabricate units to profile and sizes indicated complete with rabbets, interlocks, flashings, trim and filler sections, as required to interface with work of other trades.

.5 Fabricate all devices required for erection and adequate anchorage and attachment required to be built into or attached to the steel structural or steel deck and main building structure for the support of the Work.

.6 Anchorage brackets and devices shall be designed and fabricated to compensate for unevenness and dimensional difference in the structure and permit unrestricted expansion and contraction of framing members.

.7 Steel Welding: Conform with CSA W59-03 (R2008) and executed in accordance with CSA W47.1-09 or CSA W55.3-08.

.8 Fabricate preformed metal siding systems where indicated. The systems shall be formed to meet design requirements, and of prefinished steel sheet. The system shall be accurately cut and fitted, all fastenings shall be concealed. Method of attachment shall be to the Consultant's approval and clearly detailed on shop drawings. Panel faces shall be flat and true without waves, buckles or oil canning.

.9 Supply sufficient prefinished metal of same thickness and colours as the preformed metal siding to Section 07 62 00 for his use in installing roof flashings.

.10 Form starter strips of same material as flashings 1-1/2" wide and continuous.

.11 Exposed steel surfaces shall be smooth and free from imperfections such as warping, buckling, scratches, dents and abrasion.

.12 Thickness of metal shall be adequate for various conditions.

.13 Isolate where necessary to prevent electrolysis due to dissimilar metal to metal contact or metal to masonry or concrete. Use bituminous paint or other approved divorcing membrane.

3 Execution

3.1 INSTALLATION

.1 Erect preformed metal siding and accessories in strict accordance with reviewed shop and erection drawings and manufacturer's instructions to give a complete and weatherproof system.

.2 Install underlayment and protective membrane under preformed metal siding and elsewhere as required in strict accordance with manufacturer's written instructions forming a complete waterproof barrier, free of leaks.

.3 Install girts, 'Z' girts, thermally broken clips, sub-girts, cleats and retention clips and other attachment members necessary to complete the work of this Section.

.1 Co-operate with other trades to ensure proper installation and anchorage of work of this Section. Install steel bracing and framing and continuous clip angles and secure plumb and in line.

.2 Damaged, bent or dished sheets will be rejected.

.4 Place preformed metal siding against supporting substrate and adjust to final position before permanently securing. Bring each unit to bear evenly on framing.

.5 Align units to provide accurate fit with corresponding sections parallel and straight. Ensure complete nesting of interlocking and sealed side lap joint and fasten sheets to structural supports.

.6 Fasten exterior sheets of panels to horizontal sub-girts, using colour matching fasteners, where indicated.

.7 Install necessary closure and trim or neoprene closures at openings and penetrations, fastening at 12" O.C. Make cut-outs neatly by saw cutting.

.8 Where welding has been performed on work of this Section, or field cutting or scratches have been made, field coat such areas with touch-up paint after thoroughly cleaning affected surfaces.

.9 Seals:

.1 Fit flexible seals, tapes, formed gaskets and the like at locations required to provide air/vapour barriers and weathertight junctions. Ensure that end joints, between lengths of material have been properly sealed.

.2 Caulk junctions of preformed metal siding system components to themselves and work of other Sections with sealant in accordance with the requirements of Section 07 92 00, to maintain continuity of air/vapour and weather barriers.

.10 Rigidly connect all prefinished flashing pieces with specified colour matching fasteners at 12" O.C. along length. Use preformed corner pieces and erect with ample allowance for thermal movement.

.11 Furnish adequate quantity of prefinished flat stock flashing sheet to Section 07 62 00 for forming and installation. Trim members in this category are cap flashing, base flashing and those specifically shown on drawings as being prefinished and in close proximity to roofing. Flashing pieces entirely remote from roofing flashing and the like are furnished in place under work of this Section.

.12 Install work of this Section only during period of no rain, fog, sleet or snow, or upon surfaces covered with dust, water, dew, ice, frost or snow.

3.2 ROOF PANEL INSTALLATION

.1 Install exterior prefinished roof panels on panel support clips, using manufacturer's proper construction procedure. Ensure metal roofing sheet side-lap is positively retained by clips, and proper sheet coverage is maintained.

.2 Install the snap-cap at all side laps as shown on the approved shop drawings. Mitre snap-cap as required to resist water entry.

.3 Where indicated on approved shop drawings, secure the end-lap of metal roofing sheets in accordance with the manufacturers specifications and details to provide a weather-tight seal. Exposed fasteners to match colour of the roof sheet.

.4 Provide notched and formed closures, sealed against weather penetration, at changes in pitch, and at ridges and eaves, where required.

.5 Install all companion flashing {gutters}, {ventilators} as shown on the shop drawings. Use concealed fasteners when possible. Exposed fasteners to match colour of roof sheet.

3.3 CLEANING

.1 Remove debris and surplus materials from the Site upon completion of work of this Section.

.2 Clean dirt, soil and misplaced sealants from preformed metal siding systems with recommended cleaners and solvents.

END OF SECTION

1 General

1.1 SUMMARY

.1 The Work of this Section includes, but is not limited to the following:

.1 Tongue and groove siding and soffits

1.2 REFERENCE STANDARDS

.1 Western Red Cedar Lumber Association (WRCLA): Publications.

.1 Designer Handbook.

.2 How to Specify Western Red Cedar.

.3 How to Install Cedar Siding.

.4 How to Finish Western Red Cedar.

.5 Standard Dry Patterns.

.2 National Lumber Grades Authority (NLGA):

.1 Standard Grading Rules.

.3 West Coast Lumber Inspection Bureau (WCLIB):

.1 Standard Grading Rules.

.4 Western Wood Products Association (WWPA):

.1 Western Lumber Grading Rules.

1.3 SUBMITTALS

.1 Submit in accordance with Division 01.

.2 Western Red Cedar Lumber Association'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 Verification Samples: For each finish product specified, three samples, nominal size 5-1/2 inches (140 mm) square representing actual product with finished color and texture.

.4 Shop Drawings:

.1 Submit fully dimensioned shop drawings to Consultant showing construction, assembly, elevations, sections and interfacing with work of other Sections.

.2 No work of this Section shall be fabricated until shop drawings and all other related submittals, documentation, certifications and samples as required by this Section, have been reviewed by the Consultant.

.3 Details shall indicate material thicknesses, areas to be sealed and sealant materials, gaskets, type of joints, flashings, trim, finishes, fasteners, all anchorage assemblies and components and erection details.

.4 Shop drawings shall bear the seal of an engineer registered to practice in the place of Work, employed by the preformed wood siding installer.

1.4 QUALITY ASSURANCE

.1 Manufacturer Qualifications: Must fulfill all requirements for membership in the Western Red Cedar Lumber Association. Capable of providing all Western Red Cedar siding materials specified in this section.

.2 Source Limitations: Provide each type of product from a single manufacturing source to ensure uniformity.

1.5 DELIVERY, STORAGE, AND HANDLING

.1 Inspect the materials upon delivery to assure that specified products have been received.

.2 Store materials in safe area, away from construction traffic; store under cover and off ground, protected from moisture.

.3 Keep materials clearly separated and identified with grade marks legible. Keep damaged material identified as damaged and stored separately.

1.6 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.

1.7 SUPPLEMENTAL MATERIALS

.1 Fasteners, Supports, and Hangers: Provided by manufacturers other than member organizations of the WRCLA. Conform to requirements set forth by this section.

2 Products

2.1 TONGUE-AND-GROOVE SIDING

.1 Clear Cedar Tongue-and-Groove Siding:

.1 Western Red Cedar Graded to Meet any of the following:

.1 NLGA "Standard Grading Rules," paragraph 200.

.2 WCLIB "Grading Rules," paragraph 102.

.3 WWPA "Western Lumber Grading Rules," paragraph 20.10.

.2 Size: 19mm x 140mm or as detailed.

.3 Moisture Content: Kiln-dried.

.4 Grade: A Clear and Better.

.5 Pattern: V-grooved two sides (EV2S) WRCLA TG2.

.6 Pattern: Center matched WRCLA TG0.

.7 Texture: Smooth face.

.8 Finish: Factory stained.

2.2 FASTENERS

.1 Nails:

.1 Material: No. 316 stainless steel.

.2 Type: Spiral shank.

.3 Type: Textured head.

.4 Length: Sufficient to penetrate solid wood a minimum of 1-1/4 inch (32 mm).

2.3 PROTECTING FINISH

.1 Penetrating Stain: Follow guidelines of Western Red Cedar Lumber Association.

.1 Finish Type: Semi-transparent.

3 Execution

3.1 EXAMINATION

.1 Coordinate work with related trades. Allow installation of related work to avoid cutting and patching.

.2 Do not begin installation until substrates have been properly constructed and prepared.

.3 If substrate preparation is the responsibility of another installer, notify Architect in writing 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 Scribe and cope siding boards for accurate fit.

.4 Select siding boards of longest possible lengths. Discard boards that are warped, twisted, bowed, crooked or otherwise defective.

3.3 INSTALLATION

.1 Install in accordance with manufacturer's instructions, approved submittals, and in proper relationship with adjacent construction.

.1 Install products according to Western Red Cedar Lumber Association installation guidelines and with adherence to local building codes and regulations where the Project is located.

.2 Follow installation instructions specified in the Western Red Cedar Lumber Association's Installing Cedar Siding publication.

3.4 FIELD QUALITY CONTROL

.1 Field Inspection: Coordinate field inspection in accordance with appropriate sections in Division 01.

3.5 CLEANING AND PROTECTION

.1 As work proceeds, maintain premises free of unnecessary accumulation of tools, equipment, surplus materials, and debris related to this work.

.2 Clean cedar siding in accordance with the manufacturer's recommendations.

.3 Touch-up, repair or replace damaged products before Substantial Completion.

3.6 MAINTENANCE

.1 Explain proper maintenance procedures to owner or owner's representative at project closeout.

.2 Visually inspect siding, caulking, flashing annually for overall condition. Re-apply caulking and coating, as necessary. Adjust flashing as required.

.3 The use of pressure washers is not recommended.

END OF SECTION

1 General

1.1 SUMMARY

.1 This Section includes requirements for the supply and installation of cold applied SBS modified bituminous membrane roofing system (R-1).

.2 Section includes:

.1 Preparation of Metal Deck Surface

.2 Vapour Retarder

.3 Roof Insulation & Insulation Overlay Board

.4 Base Sheet Membrane

.5 Base Sheet Flashing

.6 Cap Sheet Membrane

.7 Cap Sheet Flashing

.8 Accessories

1.2 REFERENCE STANDARDS

.1 Canadian Roofing Contractors Association (CRCA):

.1 Roofing Specification Manual

.2 American Society for Testing and Materials (ASTM):

.1 ASTM C1002-04, Steel Drill Screws for the Application of Gypsum Board

.2 ASTM C1396/C1396M-06a, Standard Specification for Gypsum Board

.3 Canadian General Standards Board (CGSB):

.1 CGSB 37-GP-56M, Membrane, Modified, Bituminous, Prefabricated and Reinforced for Roofing

.2 CGSB 37-GP-64M, Mat Reinforcing, Fibrous Glass, for Membrane Waterproofing Systems and Built-up Roofing

.3 CAN/CGSB-37.5-M89, Cutback Asphalt Plastic Cement

.4 CAN/CGSB-37.28-M89, Reinforced, Mineral Colloid Type, Emulsified Asphalt for Roof Coatings and Waterproofing

.5 CGSB 37-GP-9Ma, Primer, Asphalt, Unfilled, for Asphalt Roofing, Dampproofing or Waterproofing

.4 Canadian Standards Association (CSA):

.1 CSA A123.4-04, Bitumen for Use in Construction of Built-up Roof Coverings and Dampproofing and Waterproofing Systems

.2 CSA B111-1974 (R2003), Wires, Nails, Spikes and Staples

.3 CSA O151-M1978 (R2003), Canadian Softwood Plywood

.5 Underwriters Laboratories Canada (ULC):

.1 CAN/ULC S107-03, Standard Methods of Fire Tests of Roof Coverings

.2 CAN/ULC S701-05, Thermal Insulation, Polystyrene, Boards and Pipe Covering

.3 CAN/ULC S702-97, Thermal Insulation, Mineral Fibre, Boards for Buildings and ULC S702.2-03, Mineral Fibre Thermal Installation for Buildings, Part 2: Application Guidelines

.4 CAN/ULC S704-03, Standard for Thermal Insulation, Polyurethane and Polyisocyanurate, Boards, Faced

.5 CAN/ULC S770-2000, Determination of Long-Term Thermal Resistance of Closed-Cell Thermal Insulating Foams

1.3 SUBMITTALS

.1 Provide required information in accordance with Division 01.

.2 Action Submittals: Provide the following submittals before starting any work of this Section:

.1 Product Data: Submit copies of membrane manufacturers current technical data sheets describing the physical properties and recommended installation procedures.

.2 Shop Drawings:

.1 Submit sloped insulation manufacturer's proposed roofing diagrams and layouts for review by the Consultant.

.2 Submit membrane manufacturer's standard details that will be used for this project, indicate changes that must be made to make the details project specific for review by the Consultant.

.3 Informational Submittals:

.1 Certificates: Provide roofing system materials that are compatible with building vapour retarders specified in Division 07; submit a written declaration to the Consultant that roofing materials and components are compatible with wall air and vapour retarder membranes when requested by Consultant.

1.4 MOCK-UPS

.1 Provide mock-ups in accordance with Section 01 43 39.

.2 Construct mock-ups for each form of construction and finish required to verify selections made under sample submittals and to demonstrate aesthetic effects and qualities of materials and execution before installing materials indicated in this Section.

.3 Build mock-ups using exposed and concealed materials indicated for the completed Work.

.4 Mock-up must demonstrate air barrier continuity between roof assembly and adjacent wall/parapet assembly.

1.5 QUALITY ASSURANCE

.1 Obtain roofing membrane materials through one source from a single manufacturer and install using workers who are trained and approved by the roofing membrane manufacturer; maintain a full time experienced journeyman roofer, and at least one apprentice per crew on the Work at all times.

.2 Roofing and sheet metal work will be performed in conformance with the roofing manufacturer's written recommendations using materials that meet the requirements of CAN/ULC S107 to obtain a Class A fire resistance rating; submit proof that roofing materials meet required performance when requested by the Consultant.

.3 Conform to Roofing Specifications as published by Canadian Roofing Contractors Association (CRCA) as a reference.

.4 Execute work of this section using an applicator approved by the membrane manufacturer, and capable of issuing a 10 year Performance Warranty.

.5 Pre-installation Conference:

.1 Convene a pre-installation conference at the site, one week prior to commencing work of this Section to review preparation and installation procedures and coordinating and scheduling required with related work.

.2 Require attendance of parties directly affecting work of this Section, including, but not limited to, the Owner's representative, Consultant, Contractor, Roofing Applicator and job foreman and Roofing Manufacturer's Representative.

.3 Contact Consultant two weeks prior to pre-installation conference to confirm schedule.

.4 Record discussions of conference and decisions and agreements (or disagreements) reached, and furnish copy of record to each party attending. Review foreseeable methods and procedures related to roofing work, including the following:

.1 Tour, inspect and discuss condition of substrate, roof drains, roof drain final locations, curbs, penetrations and other preparatory work performed by other trades.

.2 Review structural loading limitations of deck and inspect deck for loss of flatness and for required mechanical fastening.

.3 Review roofing system requirements (drawings, specifications and other contract documents).

.4 Review required submittals, both completed and yet to be completed.

.5 Review and finalize construction schedule related to roofing work and verify availability of materials, installer's personnel, equipment and facilities needed to make progress and avoid delays.

.6 Review required inspections, testing, certifying and material usage accounting procedures.

.7 Review weather and forecasted weather conditions, and procedures for coping with unfavourable conditions, including possibility of temporary roofing (if not a mandatory requirement).

1.6 DELIVERY, STORAGE AND HANDLING

.1 All materials will be delivered and stored in conformance with manufacturers written requirements; they must remain in their original packaging, displaying the manufacturer's name, product name, weight, and reference standards, as well as all other indications or references considered standard.

.2 Store materials in a dry and properly ventilated area, away from any welding flame or spark and sheltered from the elements or any harmful substance. Only materials destined for same-day use can be removed from this storage area. In cold weather, store materials in a heated area at a minimum temperature of +10 degree C and removed prior to application. If rolls cannot be stored in a heated environment, they may be pre-conditioned before installation, refer to manufacturers written recommendations on membrane application procedures.

.3 Store adhesives and emulsion-based waterproofing mastics at a minimum +5 degree C. Store adhesives and solvent-based mastics at sufficiently high temperatures to ensure ease of application.

.4 Materials delivered in rolls will be carefully stored upright; flashing will be stored to avoid creasing, buckling, scratches or any other possible damage.

.5 Avoid material overloads which may affect the structural integrity of specific roof areas.

.6 Place plywood runways over the Work to enable the movement of materials and other traffic during construction of roofing.

.7 Protect surrounding surfaces against damage from roofing work. Where hoisting is necessary, hang tarpaulins to protect walls during delivery of materials from ground to roof.

.8 Materials will be rejected and be replaced at no extra cost to the Owner where materials are damaged by the elements, improper handling or other causes; remove rejected materials promptly from the site.

.9 Protect exposed surfaces of finished walls with tarp to prevent damage during roofing work, repair any damage caused to adjacent materials and finishes caused by roofing installation.

1.7 SITE CONDITIONS

.1 Maintain roofing equipment in good working order.

.2 Apply roofing within the range of ambient and substrate temperatures recommended by roofing system manufacturer:

.1 Do not apply roofing to a damp or wet substrate.

.2 Do not apply roofing in snow, rain, fog, or mist.

1.8 WARRANTY

.1 Roofing Membrane Manufacturer: Provide manufacturer's warranty stating that they will repair or replace defective roofing (including labor) and base flashing materials that do not remain watertight, that splits, tears, or separates at the seams or from the substrate within the specified warranty period and as follows:

.1 Warranty Period: Ten (10) years Standard Warranty, starting from Substantial Performance for the Project.

2 Products

2.1 MANUFACTURERS

.1 Basis-of-Design products are named in this Section; additional manufacturers offering similar setting systems may be incorporated into the work provided they meet the performance requirements established by the named products.

.2 Additional manufacturers offering similar Products may be incorporated into the work provided they meet the performance requirements established by the named products and provided they submit requests for substitution a minimum of ten (10) days in advance of Bid Closing.

.3 Subject to compliance with requirements, manufacturers offering membrane products that may be incorporated into the Work include, but are not limited to, the following:

.1 Soprema Inc.

.2 Henry Company

.3 IKO

.4 Or approved equivalent.

2.2 PERFORMANCE REQUIREMENTS

.1 Design and construct roof so that completed installation will not leak.

.2 Structural Design Performance:

.1 Design Roof System to Resist:

.1 Maximum deflection not to exceed l/180 under system's own weight plus wind load (positive and negative) loads acting normal to the plane in accordance with the Building Code Climatic Data, wind load 1:50 years.

.1 Design roofing membrane to resist the following site specific dynamic wind uplift:

.1 Corner: -2.5kPa;

.2 Edge: -1.3kPa;

.3 Field: -1.0kPa.

.2 Design the systems so that there is no air or water infiltration under the positive and negative forces imposed by wind and gravity loads.

.2 Thermal movements: Allow for thermal movements from ambient and surface temperature changes by preventing buckling, overstressing of components, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime sky heat loss.

.1 Temperature change (range): 20 deg C; Ambient: 40 deg C, material surfaces.

2.3 MATERIALS

.1 Adhesives: Manufacturers recommended adhesives specifically formulated for installation of materials outlined below, meeting the wind resistance rating indicated in this Section.

.2 Vapour Barrier (VB-02):

.1 Self-adhesive membrane composed of SBS modified bitumen, with a surface screen made of high-density polyethylene laminated between two layers of polyethylene films.

.2 Resistance to water vapour transmission: 0.92 ng/Pa.s.m^2 (0.016 Perm).

.3 Basis of Design Product: SOPRAVAP'R by Soprema Inc. (or approved equivalent).

.3 Carpentry: Wood roof materials shall be as specified in Section 06 10 00. Do not use pressure treated materials where SBS membrane materials are to be adhered to wood fabrications.

.4 Insulation INS-04a – Flat (Lower Layer):

.1 Closed cell polyisocyanurate foam core between organic facers reinforced with glass fibres, suitable for use with adhesives.

.2 Thermal Resistance per 25mm (1"): R-5.7

.3 Compressive Strength – 138 kPa (20 psi).

.4 Linear Stability: < 5%

.5 Density: 32 kg/m3 (2.0 lb/ft3)

.6 Basis of Design Product: SOPRA-ISO by Soprema Inc. (or approved equivalent).

.5 Insulation INS-04b – Flat and Tapered Mineral wool (Upper Layer):

.1 Dual-density mineral wool insulation board with a rigid upper layer, impregnated with bitumen layer, compatible with mechanical fastening and adhesive applied membranes.

.2 Mineral wool boards made from balsat rock and steel slag, resulting in a non-combustible insulation.

.3 Thermal Resistance per 25mm (1"): R-3.8

.4 Compressive Strength – Top Layer at 25%: 37psi.

.5 Density – Top Layer: 220 kg/m3

.6 Density – Bottom Layer: 160 kg/m3

.7 Basis of Design Product: SOPRAROCK DD PLUS by Soprema Inc. (or approved equivalent).

.6 Base Sheet Membrane (Adhered):

.1 A high performance base sheet membrane composed of SBS modified bitumen and a composite reinforcement. Both sides are sanded

.2 Basis of Design Product: COLDPLY BASE 410 by Soprema Inc. (or approved equivalent).

.3 Adhesive: As recommended by membrane manufacturer.

.7 Base Sheet Membrane Flashing:

.1 Membrane composed of SBS modified bitumen and non-woven polyester mat reinforcement.

.2 Surface: Fine mineral aggregate for cold adhesive applications; Underside: High tack, self-adhesive layer, protected by polyefin release film.

.3 Basis of Design Product: SOPRALENE STICK by Soprema Inc. (or approved equivalent).

.8 Cap Sheet Field Membrane and Cap Flashing:

.1 Membrane composed of SBS modified bitumen and composite reinforcement.

.2 Thickness: 3.5mm

.3 Surface: Covered and protected by coloured granules; Underside: Fine mineral aggregate for cold adhesive applications.

.1 Colour of Granules: As selected by the Consultant from the manufacturer's standard product line.

.4 Basis of Design Product: COLPLY TRAFFIC CAP 460 by Soprema Inc. (or approved equivalent).

.9 Jointing Mastic / Caulking: SOPRAMASTIC by Soprema Inc. (or approved equivalent).

.10 Metal Flashings: As indicated in Section 07 62 00.

3 Execution

3.1 EXAMINATION

.1 Inspect completed roof deck and ensure that any defect of level or construction is corrected before proceeding with the work of this Section.

.2 Do not apply any roofing to surfaces which are dusty, rusty or covered in loose material, snow, water, ice or any other substance which might impair the bond of roofing materials.

.3 Verify that roof drains have been properly set and installed by the mechanical trade. Report any discrepancies to the Consultant so that they may be corrected.

.4 Ensure items projecting through roof are solidly set and reglets and nailing strips are in place.

.5 Inspect wood blockings, curbs and cants. Do not install roofing over such items if method of attachment is inadequate to withstand stresses imposed by thermal movement of roofing components.

.6 Start of roofing work will be interpreted as meaning roofing conditions are in accordance with manufacturer's requirements.

3.2 PREPARATION

.1 Protect finished work to avoid damage during roof installation and material transportation.

.2 Install protective boardwalks to enable passage of personnel and materials without causing damage to installed roofing materials.

.3 Mount mechanical application devices on pneumatic tired wheels; use devices designed and maintained to operate without damaging insulation, roofing membrane or structural components.

.4 Flame heated equipment is prohibited.

.5 Thoroughly clean all surfaces which are to receive the roofing and flashings by whatever means necessary to remove laitance, frost, snow, ice, water, debris, extraneous matter and other substances which could affect the proper performance of the work of this Section.

.6 Prime vertical surfaces with asphalt primer commencing at the top of the cant strip to the reglet or highest point as detailed. Allow sufficient time for the asphalt primer to cure and ensure that primer does not run into the building or stain wall faces.

3.3 INSTALLATION

.1 Prepare surfaces and complete roofing work specified in this Section in accordance with manufacturer's written instructions and guidelines.

.2 Install roofing elements on clean and dry surfaces; in a continuous operation when substrates are ready and as weather conditions permit.

.3 Seal seams in base sheets that are not covered by a cap sheet membrane in the same day; do not install cap sheet if any moisture is present at or within base sheet seams.

.4 Protect work of other sections during installation of work of this Section; repair or compensate other sections for damage caused by this Section.

.5 Vapour Retarder (VB-02):

.1 Install self-adhering vapour barrier membrane VB-02 by unrolling vapour barrier membrane onto deck sheathing board substrate, starting at bottom of slope without removing silicone release sheet, and as follows:

.1 Align roll parallel to sheathing board supporting membrane.

.2 Peel back one end of silicone release sheet and adhere membrane to substrate; peel remaining release sheet at a 45 deg angle to avoid wrinkles in membrane.

.3 Cut roll and start again where membrane is not properly aligned to deck sheathing board; re-align membrane and overlap end of misaligned piece by 150mm (6").

.4 Overlap adjacent membranes by 75mm (3"); overlap end laps by 150mm (6"); stagger end laps by 305mm (12"); place thin sheet of metal under end lap of membrane to provide structural support to lapped membranes.

.2 Overlap roof vapour barrier to wall air/vapour barrier using compatible continuity strip to provide continuity of building envelope.

.3 Install vapour barrier at insulation perimeters and around each element piercing insulation to provide sealed connections with base sheet at up-stands.

.6 Insulation:

.1 Adhere insulation INS-04a to vapour barrier using manufacturer's recommended adhesive applied at rate recommended by manufacturer; adhere insulation at locations where roof deck will be visible in final installation.

.2 Insulation may be mechanically fastened into top flutes of steel deck in accordance with manufacturer's written recommendations only where fasteners will not be visible from underside of deck in final installation.

.3 Install secondary insulation INS-04b as the first layer, followed by installation of manufacturer's required primary flat insulation ready for installation of cold adhesive applied membrane roofing.

.4 Stagger vertical joints between primary insulation boards and secondary insulation modules and between two rows of insulation board.

.5 Install only as much insulation as can be covered by roof membranes in the same day.

.6 Install tapered insulation panels INS-04b in conformance with manufacturers instructions and layout indicated on reviewed shop drawings.

.7 Cold Adhesive Applied Field Base Sheet Installation:

.1 Install membrane base sheet in full bed of adhesive applied at rate recommended by roofing membrane manufacturer using a notched 5mm (3/16") neoprene squeegee starting at drain and perpendicular to slope.

.2 Apply base sheet in parallel strips, butting board joints up and covering the joints with self-adhesive strip attached to adjacent board.

.3 Roll surface installed membrane using a 30 kg steel roller to smooth membrane and to provide continuous and uniform adhesion to insulation.

.4 Seal lap joints of base sheet at end each workday; perform work without interruption to avoid tears and formation of fish mouths, air pockets or wrinkles.

.5 Cut off corners at end laps being covered by next roll.

.6 Terminate base sheet at top of cant or at perimeter.

.8 Self-Adhere Base Sheet Flashing:

.1 Apply base sheet flashing when primer coat is dry and in accordance with manufacturer's written instructions.

.2 Position pre-cut membrane pieces; peel back 100mm to 150mm (4" to 6") of silicone release paper to hold the membrane in place at the top of the parapet, then gradually peel back remaining silicone release paper, pressing down on the membrane with aluminum applicator to provide good adhesion and to provide smooth transition between up-stand and field surface; smooth entire membrane surface with a roller for full adhesion.

.3 Cut off corners at end laps being covered by next roll.

.4 Seal overlaps at the end of each workday.

.9 Installation of Cap Sheet (Field):

.1 Starting at drain, unroll membrane on base sheet, taking care to align the edge of the first selvedge with the edge of the roof.

.2 Cut off corners at end laps at areas to be covered by the next roll.

.3 Each selvedge will overlap the previous one along lines provided for this purpose, and will overlap by 150mm (6") at ends. Space end laps a minimum of 305mm (12").

.4 Apply adhesive to base sheet membrane for first 125mm (5") of end laps using steel trowel with 5mm (3/16") notches.

.5 Use electric hot-air torch on all side laps and last 25mm (1") of end laps, rolling with membrane roller to adhere cap sheet membrane to base sheet, as recommended by the membrane manufacturer.

.6 During installation, be careful not to overheat the membrane or its reinforcements.

.7 Avoid the formation of wrinkles, swellings or fishmouths.

.8 Avoid walking over finished surfaces until adhesive has cured; use rigid protective walkways as needed.

.10 Cold Applied Cap Sheet Flashings:

.1 Install cap sheet flashings in 1000mm (3.25') wide strips.

.2 Each selvedge will overlap the previous one laterally along lines provided for this purpose, and will overlap by 150mm (6") the field surface.

.3 Space flashing membranes a minimum 100mm (4") with respect to the cap sheet membranes on the field surface, to avoid areas of excessive membrane thickness.

.4 Cut off corners at end laps on areas to be covered by the next roll.

.5 Use a chalk line to draw a straight line on the field surface, 150mm (6") from flashings and parapets.

.6 Starting from the chalk line on the field surface to the bottom edge of the flashing or parapet, as well as on the granulated vertical surfaces to be overlapped, apply adhesive for first 125mm (5") of end laps using steel trowel with 5mm (3/16") notches.

.7 Use electric hot-air torch on all side laps and last 25mm (1") of end laps, rolling with membrane roller to apply pressure and complete the installation.

.8 Avoid the formation of wrinkles, swellings or fishmouths.

.9 During installation, be careful not to overheat the membrane and its reinforcements.

3.4 FIELD QUALITY CONTROL

.1 An independent inspection and testing company appointed and paid for by the Owner may carry out inspection and testing.

.2 Arrange site meeting with roofing inspector three weeks prior to commencement of work on site to review work and procedures specified in this Section.

.3 Cooperate with the inspector and afford all facilities necessary to permit full inspection of the work and testing of materials prior to their use.

END OF SECTION

1 General

1.1 SUMMARY

.1 Furnish labour, materials and other services to complete the fabrication and installation of the following:

.1 Cap and base flashing; curb flashings,

.2 Roof edge flashing,

.3 Flashing at intersection of roof with vertical surfaces,

.4 Break metal flashings where shown,

.5 Prefinished flashings where indicated,

.6 Any other flashing as indicated on the drawings or as required, including all materials and fitments required for the operation of any unit furnished, in the manner, direction and performance shown on the shop drawings and specified herein.

1.2 REFERENCE STANDARDS

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

.1 ASTM A653/A653M-11, Standard Specification for Steel Sheet, Zinc Coated (Galvanized) or Zinc Iron Alloy Coated (Galvannealed) by the Hot Dip Process.

.2 Canadian General Standards Board (CGSB):

.1 CAN/CGSB-1.108-M89, Bituminous Solvent Type Paint

.2 CAN/CGSB-1.181-99, Ready Organic Zinc-Rich Coating

.3 CAN/CGSB-19.24-M90, Multicomponent, Chemical-Curing Sealing Compound

.3 Canadian Roofing Contractors Association

.1 CRCA Specifications Manual

1.3 SUBMITTALS

.1 Provide submittals specified and as required to assess conformance with the Contract Documents, in accordance with Division 01.

.2 Submit shop drawings indicating material, thickness and finish.

.3 Submit duplicate 4 sq.in. samples of each type of sheet metal material, colour and finish for review by Consultant prior to fabrication.

1.4 QUALITY ASSURANCE

.1 Fabricator and tradesmen executing the work of this Section shall have had a minimum five (5) years continuous experience in successful manufacture and installation of Work of type and quality shown and specified. Submit proof of experience upon Consultant's request.

.2 Erection of metal flashing systems shall be by workmen especially trained and experienced in this type of work. Have a senior, qualified representative at the job site to direct the work of this Section at all times.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Store materials flat at site under protection to prevent staining from the work of other trades or from collection of water on material and secured against wind damage.

.2 Carefully store preformed sheet metal work in such a manner as to prevent twisting, bending and rubbing.

.3 Protect sheet metal work from corrosive materials and dissimilar metals.

1.6 WARRANTY

.1 Warrant the work of this Section against defects in materials and workmanship in accordance with General Conditions, but for a period of two (2) years. Agree to promptly make good defects which become evident during warranty period without cost to the Owner.

.2 Without restricting the generality of the Warranty, defects shall include deformation, buckling, leakage, weather tightness, failure of anchors and fastenings, failure of paint coating and sealants.

.3 Promptly make good defects and/or failures in the work of this Section upon written notification by the Owner that such exist. Remedy shall include labour, materials, equipment and services required to make good defective work, and to replace components and finishes and Owner's property damaged or disturbed in the course of remedying defects.

2 Products

2.1 MATERIALS

.1 Sheet Metal Materials (MF-01): Prefinished galvanized sheet steel to ASTM A653/A653M-11 Grade A with G90 designation zinc coating to ASTM A653/A653M-11, factory precoated with Series 8000 paint finish, minimum 26 gauge.

.2 Hold-down, fastener clips - 20 ga. galv. steel sheet as above, unpainted.

.3 Nails, bolts screws and rivets: Material - galvanized steel, stainless steel or same metal as material to be fastened. Type - to approved samples.

.4 Bituminous Paint: Conforming to CAN/CGSB-1.108-M, Type 2.

.5 Field Touch-Up Paint: Zinc rich anti-corrosion primer, conforming to CAN/CGSB-1.181-92, 'Galvafroid, Grade SB' by W.R. Meadows of Canada Limited and top coating of type and colour to match finish sheet.

.6 Underlay for metal flashing: Asphalt laminated 3.6 to 4.5 kg kraft paper.

.7 Sealant: Multi-component, chemical curing epoxidized polyurethane type sealant conforming to CAN/CGSB-19.24-M90, 'DYmeric 240' by Tremco (Canada) Ltd., or approved equal. Colour as selected later by Consultant. Provide primers, bond breakers and cleaning agents as recommended by the sealant manufacturer.

.8 All other materials not specifically described but required for a complete and proper installation of the work of this Section shall be new first quality of their respective kinds and subject to the approval of the Consultant.

2.2 FABRICATION

.1 Fabricate metal flashings and other sheet metal work to applicable CRCA 'FL' series specifications and as detailed.

.2 Form flashings, counter flashings, scuppers and copings as required to suit each condition. Use prefinished sheet steel in all locations. Form pieces in 8'-0" maximum lengths. Make allowance for expansion at joints.

.3 Fabricate sheet metal components with lines, arrises and angles sharp and true and plane surfaces free from objectionable wave, warp or buckle.

.4 Mitre and seal corners with sealant. Form drip edging at 45 deg angle, secure with a continuous 20 ga. hold-down clip.

.5 Exposed edges of sheet metal shall be folded back to form a 1/2" wide hem on the side concealed from view. Prefabricate corner pieces for flashings and copings. The workmanship and methods employed for forming, anchoring, cleating and the provision for expansion and contraction of sheet metal work shall be to the approval of the Consultant.

.6 Form sections square, true and accurate to size, free from distortion and other defects detrimental to appearance or performance.

.7 Fabricate scuppers and overflow scuppers to applicable CRCA 'FL' Series details and as detailed.

.8 Apply two coats of bituminous paint to metal surfaces to be in contact with masonry, concrete, mortar or dissimilar metals.

2.3 FINISHING

.1 Provide 8000 series finished sheet for all work.

.2 Colour: As selected by the Consultant from the Manufacturers full colour range. Allow for three (3) colours in Base Bid.

3 Execution

3.1 EXAMINATION

.1 Inspect substrate surfaces on which the work of this Section is erected for any irregularities detrimental to the application and performance of the Work. Confirm conditions satisfactory before proceeding. Report to Consultant in writing, defects of work prepared by other trades and unsatisfactory site conditions. Commencement of work implies acceptance of surfaces and conditions.

3.2 INSTALLATION

.1 Metal flashing shall be in compliance with best sheet metal trade practice and shall in no way be contrary to sheet metal practice that will qualify for the Guarantee Certificate specified. Install with "S" lock expansion joints or standing seams incorporated on end of flashing length and all joints sealed with mastic.

.2 Provide continuous starter strips to present true, non-waving leading edge. Provide clips and anchor to backup in an approved manner to provide rigid, secure installation. Conceal fastenings in completed flashing. Lap, lock and seal all seams.

.3 Provide underlay under sheet metal. Secure in place and lap joints 100mm (4").

.4 Install sheet metal flashings, cap flashings and copings as indicated on drawings using flat lock seams. Make joints to permit thermal movement. Make surfaces free from buckling, warp, wave, dents, oil canning or other defects. Make corners square and surfaces straight and in true planes. Equally space joints in cap flashings to suit wall panel module. Space seams not farther apart than 2439mm (8').

.5 All sheet and strip flashing to be held in place by 14 gauge galvanized iron clips of a size and type to be determined by the construction requirements, except where specifically detailed on the drawings.

.6 Caulk flashing at cap flashing with sealant.

.7 Lock end joints and caulk with sealant.

.8 Use rubber-asphalt sealing compound for joints between sheet metal and bitumen.

.9 Supply rigid flashing, copings and sheet metal back-up to other trades where required to be built into other work at doors, windows, block openings, curbs and where shown on drawings.

.10 Take careful note of fans, vents, etc., on mechanical drawings to determine whether flashing and counter flashing is required or whether units are self-counter flashing.

.11 Caulking shall be installed as per written manufacturer's recommendations.

.12 Exposed fastenings will be permitted where indicated or where concealed fastening is not possible. Obtain Consultant's approval of exposed fastenings and methods of making same.

.13 If exposed screws or bolts are used, use cupped neoprene washers.

.14 Install scupper drains and overflow scupper drains as indicated on drawings, in strict accordance with CRCA manual.

3.3 CLEANING

.1 Remove, as the work progresses, all excess or foreign material which would set up or become difficult to remove from finished surfaces.

.2 Do all final cleaning upon completion of the Work of this Section. Leave building and Work in condition to meet the approval of the Consultant.

.3 Remove excess sealant by the moderate use of mineral spirits or other solvent acceptable by the sealant manufacturer.

END OF SECTION

1 General

1.1 SUMMARY

.1 Supply and install materials in accordance with published 'Through-Penetration Firestop Systems' in UL's Fire Resistance Directory or the publication of another approved independent laboratory.

1.2 REFERENCE STANDARDS

.1 Underwriters Laboratories of Canada (ULC):

.1 CAN/ULC S115-05, Standard Method of Fire Tests and Firestop Systems

.2 American Society for Testing and Materials (ASTM):

.1 ASTM E814-11a, Standard Test Method for Fire Tests of Penetration Firestop Systems

1.3 SUBMITTALS

.1 Provide submittals in accordance with Division 01.

.2 Shop Drawings:

.1 Provide details indicating all reinforcing, anchorages, fastening and proposed method of installation for the various conditions within the project.

.3 Samples:

.1 Submit samples of each type of firestop and smokeseal material and accessory.

1.4 QUALITY ASSURANCE

.1 Applicator shall be licensed by the manufacturer of fireproofing materials.

.2 Conform to flame and temperature ratings established by CAN/ULC-S115-05 and ASTM E814-11a.

.3 Submit manufacturer's certification that materials meet or exceed specified requirements.

.4 Maintain flame and temperature ratings equal to surrounding materials.

1.5 DELIVERY, STORAGE, HANDLING AND PROTECTION

.1 Deliver materials in original, unopened packages bearing name of manufacturer and product identification.

.2 Store materials off ground, under cover, and away from damp surfaces.

1.6 SITE CONDITIONS

.1 Do not apply materials when temperature of substrate material is below 4 deg C and surrounding air temperature is below 4 deg C, for 24 hours prior to application.

2 Products

2.1 MATERIALS

.1 Bears UL, ULC or Warnock Hersey label and confirmation of compliance with ASTM E814-11a or CAN/ULC-S115.

.2 Provide fire stopping and smoke sealing systems in accordance with CAN/ULC-S115-M and shall also conform to special requirements in part 3.5 of the Building Code.

.3 Fire-resistant rating of fire stopping material assemblies must meet or exceed the fire-resistance rating of the floor or wall section being penetrated.

.4 Fire stopping and smoke seals at openings around penetrations for pipes, ductwork and other mechanical items requiring sound and vibration control shall be elastomeric seal type. Do not use a cementitious, or rigid seal at such locations.

.5 Primers shall be to manufacturer's recommendation for specific material, substrate, and end use.

.6 Damming and backup materials, supports and anchoring devices shall be to manufacturer's recommendations, and in strict accordance with tested assembly being installed as acceptable to authorities having jurisdiction.

.7 Sealants for vertical joints, shall be non-sagging type.

3 Execution

3.1 PROTECTION

.1 Mask adjacent work of other Sections as necessary to avoid spillage onto adjoining surfaces. Remove stains on adjacent surfaces as required.

3.2 PREPARATION

.1 Examine sizes and conditions to establish correct thickness and installation of backup materials. Ensure surfaces are dry and frost free.

.2 Clean bonding surfaces of deleterious substances including dust, paint, rust, oil, grease and other foreign matter which may otherwise impair effective bonding.

.3 Do not apply firestops and smokeseals to surfaces previously painted or treated with sealer, curing compound, water repellent, or other coatings unless tests have been performed to ensure compatibility of materials. Remove coatings as required.

.4 Prepare surfaces in accordance with manufacturer's instructions.

.5 Priming and Sealing: Prime surfaces in accordance with manufacturer's instructions.

3.3 APPLICATION

.1 Mix materials in accordance with manufacturers' written instructions.

.2 Apply in strict accordance with ULC certification and manufacturer's recommendations to provide a temperature and flame rated seal equal as a minimum to the rating of the wall or floor surrounding.

.3 Seal all holes or voids made by penetrations to ensure an air and water resistant seal.

.4 Seal all joints to ensure an air and water resistant seal, capable to withstand compression due to thermal, wind or seismic joint movement.

.5 Consult with Mechanical Engineer and project manager prior to installation of UL firestop systems that might hamper the performance of fire dampers as it pertains to duct work.

.6 Apply to mechanical and electrical service through-penetrations, to formed, sleeved, or cored openings in smoke and fire rated masonry, or gypsum wallboard stud walls and structural floors and ceilings.

.1 Coordinate with plumbing, HVAC and electrical contractors to ensure proper firestopping application, providing smokeseal around penetrations through fire rated assemblies. Ensure that end joints between lengths of firestopping material have been properly sealed.

.7 Apply to head of smoke and fire rated gypsum wallboard stud wall abutting underside of structure (concrete or steel deck).

.8 Apply to control joints in rated stud walls.

.9 Apply to penetrations for passage of duct, cable, cable tray, conduit, piping, electrical busways and raceways through fire rated vertical barriers (walls and partitions), horizontal beams (floor/ceiling assemblies) and vertical service shaft walls and partitions.

.10 Apply to safing slots gaps between edge of floor slabs and curtain walls.

.11 Apply to openings between structurally separate sections of walls and floors.

.12 Apply to gaps between tops of walls and ceiling or roof assemblies.

.13 Apply to expansion joints in fire rated walls and floors.

.14 Apply to openings and penetrations in fire rated partitions or walls containing fire doors.

.15 Apply to openings around structural members which penetrate fire rated floors or walls.

.16 Apply firestop and smokeseal materials in accordance with manufacturer's directions, with sufficient pressure to properly fill and seal openings.

.17 Tool or trowel exposed surfaces.

.18 Remove excess compounds promptly as work of this Section progresses and upon completion of work of this Section.

3.4 CURING

.1 Cure materials in accordance with manufacturer's instructions.

.2 Do not cover up materials until proper curing has taken place.

3.5 IDENTIFICATION

.1 Identify through-penetration firestop systems with pressure-sensitive, self-adhesive, prepreinted vinyl labels. Attach labels permanently to surfaces of penetrated construction on both sides of each firestop system installation where labels will be visible to anyone seeking to remove penetrating items or firestop systems. Include the following information on labels:

.1 The words: "Warning: Through-Penetration Firestop System - Do Not Disturb"

.2 Contractor's name, address and telephone number.

.3 Designation of applicable testing and inspection agency.

.4 Date of installation.

.5 Manufacturer's name for firestop materials.

3.6 CLEAN UP AND REPAIRS

.1 Clean adjacent surfaces immediately and leave work neat and clean.

.2 Remove excess materials using recommended procedures, as work progresses.

.3 Remove dams after initial set of firestops and smokeseals as required.

.4 Correct staining and discolouring of adjacent surfaces as directed by Consultant.

.5 Remove all debris and excess materials entirely from the site and leave the work in a neat and tidy condition.

.6 Perform one simulated smoke test for each penetration type once per day. Simulate smoke at a rate of four seconds/100 cubic feet (2.8 cubic metres) and maintain the fog density until inspection is complete.

.7 After inspection is complete, repair all defective firestopping and smokeseals and test again. Continue this procedure until all firestopping and smokeseals passes test.

END OF SECTION

1 General

1.1 SUMMARY

.1 Read other Sections of the Specification for extent of sealant specified in those Sections. Do all other sealing indicated, specified or required.

.2 Provide all items, articles, materials, operations or methods listed, mentioned or scheduled on drawings and/or herein, including all labour, materials, equipment and incidentals necessary and required for the completion of the sealant.

1.2 REFERENCE STANDARDS

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

.1 ASTM C509-06(2011), Standard Specifications for Elastomeric Cellular Performed Gasket and Sealing Material

.2 ASTM C920-11, Standard Specification for Elastomeric Joint Sealants

.3 ASTM C-1382-11, Standard Test Method for Determining Tensile Adhesion Properties of Sealants when Used in Exterior Insulation and Finish Systems (EIFS) Joints

.4 ASTM D2240-05(2010), Standard Test Method for Rubber Property - Durometer Hardness

.2 Canadian General Standards Board (CGSB):

.1 CAN/CGSB-19.13-M87, Sealing Compound, One-Component, Elastomeric, Chemical Curing

1.3 SUBMITTALS

.1 Provide submittals in accordance with Division 01.

.2 Action Submittals: Provide the following submittals before starting any work of this Section:

.1 Manufacturer's Data: Submit manufacturer's literature describing each material to be used in the work of this Section. Literature shall contain a statement that the material complies with the specified standard.

.2 Samples: Submit for approval and colour selection sample of each type of compound, recommended primers and joint filler or fillers proposed to be used.

.3 Mock-Up:

.1 If requested by the Consultant, construct mock-ups where directed to show location, size, shape, colour and depth of joints complete with back-up material, primer and sealant. Mock-up may be part of finished work.

.2 Allow 24-hours for inspection of work before proceeding with work.

.4 Safety Data Sheets: Submit WHMIS safety data sheets for inclusion with project record documents. Keep one copy of WHMIS safety data sheets on Site for reference by workers.

1.4 QUALITY ASSURANCE

.1 Adhere to Manufacturer's recommendations for mixing or preparation of materials listed in this Section.

.2 Pot life or installation times shall not be exceeded.

.3 Integral materials which compose a joint detail shall be compatible.

.4 Component parts, where possible, shall have the same manufacturer.

.5 A representative of sealant material manufacturer shall visit the site during application to ensure that all Work is carried out according to the manufacturer's printed instructions.

1.5 SITE CONDITIONS

.1 Apply sealants only to completely dry surfaces, and at air, substrate and material temperatures above minimum established by manufacturer's written specifications.

1.6 DELIVERY, STORAGE HANDLING AND PROTECTION

.1 Deliver all materials to the jobsite in their original, unopened containers, with all labels intact.

.2 Receive and store materials as recommended by materials manufacturer.

.3 Maintain containers and labels in undamaged condition.

1.7 WARRANTY

.1 Provide a written warranty endorsed and issued in the name of the Owner stating that all sealant work of this Section is warranted against leakage, cracking, crumbling, melting, running, deterioration, shrinkage, loss of cohesion, loss of adhesion, staining of adjoining or adjacent work or surfaces, or failure to provide intended seal for a period of five (5) years from the Date of Substantial Performance of the Work, and that any defects will be made good including, related materials and installation at no additional cost to the Owner.

2 Products

2.1 MATERIALS

.1 Joint Cleaner:

.1 Non-corrosive solvents as recommended by sealant manufacturer for applicable substrate material(s).

.2 Primer:

.1 Non-staining type as recommended by sealant manufacturer, for use on substrate conditions outlined, and compatible with specified sealant being applied.

.3 Joint Back-Up – Backer Rod:

.1 Round, closed cell, reticulated foam, 50% compression, compatible with sealant and primer, non-adhering to sealant.

.4 Bond Breaker:

.1 Pressure sensitive plastic tape, not bondable to sealant as recommended by sealant manufacturer.

.5 Sealant Type "A" – Joints around Interior Door Frames, Windows and Under Exterior Thresholds:

.1 One-part, low or medium modulus, neutral curing 100% silicone joint sealant, conforming to ASTM C920-11, Type S, Grade NS, Class 35.

.1 DC CWS by Dow Corning.

.2 SWS by GE

.3 SikaSil WS-305CN by Sika

.4 Or approved equivalent.

OR

.2 One component, low modulus, moisture curing, polyurethane joint sealant, conforming to ASTM C920-11, Type S, Grade NS, Class 25.

.1 Dymonic FC by Tremco Ltd., division of RPM Company.

.2 Sikaflex 1A by Sika Canada Inc.

.3 Sonolastic NP1 by BASF.

.4 Pourthane NS by W.R MEADOWS

.5 Or approved equivalent.

.6 Sealant Type "B" – Exterior Wall Joints; Control Joints; Expansion Joints:

.1 One-part, ultra low modulus, non-staining neutral curing 100% silicone joint sealant, conforming to ASTM C920-11, Type S, Grade NS, Class 50.

.1 DC 790 by Dow Corning.

.2 Spectrem 1 by Tremco

.3 SCS2700 SilPruf LM by GE

.4 SikaSil WS-290 by Sika

.5 Or approved equivalent.

.7 Sealant Type "C" – Floor Control Joints:

.1 Multi-component, chemical curing, self-levelling, polyurethane joint sealant, conforming to ASTM C920-11, Type M, Grade P, Class 25.

.1 THC-900 by Tremco (Canada) Ltd., division of RPM Company.

.2 Sonolastic SL2 by Sonneborn Building Products, division of BASF Building Systems.

.3 Sikaflex 2c SL by Sika Canada Inc.

.4 Or approved equivalent.

.8 Sealant Type "E" – Mould and Mildew Resistant:

.1 Mould and mildew resistant, Shore A Hardness 15-25, conforming to ASTM C920-11, Type S, Grade NS, Class25, use NT, G, and A:

.1 SCS1700 by GE

.2 DC 786 by Dow Corning

.3 Tremsil 200 by Tremco

.4 Omni Plus by Sonneborn

.5 SikaSil –GP by Sika

.6 Or approved equivalent.

.9 Sealant Type "F" – Glazing Joints:

.1 Silicone Sealant: Butt glazing, one part, moisture curing, shore A hardness 15-25, conforming to CAN/CGSB-19.13-M, Classification C-1-40-B-N and C-1-25-B-N and ASTM C920-11, Type S, Grade NS, Class 25, use NT, G, A, O; Colour: clear (translucent):

.1 DC 795 by Dow Corning

.2 SCS2000 by GE.

.3 Multiseal by Chemtron.

.4 Spectrum 2 by Tremco

.5 SikaSil WS-295 by Sika

.6 Or approved equivalent.

.10 Sealant Type "H" – Saw Cut Sealant:

.1 Multi-component, self-levelling, conforming to ASTM D2240-05(2010):

.1 Tremco Control Joint Sealant

.2 BASF Masterfill 300

.3 Sika Loadflex

.4 Rezi-Weld Flex by W.R MEADOWS

.5 Or approved equivalent.

.11 Sealant Type "I" – HVAC Sealant:

.1 One-part, RTV, acetoxy-cure silicone sealant for heating, ventilation, air conditioning and refrigeration applications:

.1 Dow Corning HVAC Silicone Sealant

.2 Or approved equivalent.

.12 Sealant Type "J" – Electrical Sealant:

.1 One-part, white, non-flowing moisture cure adhesive for electrical applications:

.1 Dow Corning 738 Electrical Sealant

.2 Or approved equivalent.

.13 Sealant Type "K" - Interior Acoustical Sealant:

.1 Non-skinning, non-hardening, single component synthetic rubber sealant, conforming to CAN/CGSB-19.21-M:

.1 Tremco Acoustic Sealant

.2 Chemtron Metaseal

.3 Or approved equivalent.

.14 Preformed Compression Seal:

.1 Compartmental open cell neoprene extrusion type conforming to ASTM C509-06(2011), complete with liquid lubricant adhesive recommended by manufacturer.

3 Execution

3.1 INSPECTION

.1 Verify at site that joints and surfaces conditions provided will not adversely affect execution, performance or quality of completed work.

.2 Ensure masonry and concrete have cured 28 days minimum.

.3 Ascertain that sealers and coatings applied to substrates are compatible with sealant used and that full bond of the sealant and substrate is attained. Request samples of the sealed or coated substrate from their fabricators for testing of compatibility and adhesion, if necessary.

.4 Verify that specified recommended environmental conditions are present before commending work.

.5 Defective work resulting from application to unsatisfactory joint conditions will be considered the responsibility of those performing the work of this section.

.6 Do not start work of this Section until conditions are satisfactory.

3.2 PREPARATION

.1 Clean joint surfaces using joint cleaner as necessary, to remove dust, paint, loose mortar, and other foreign matter and dry joint surfaces.

.2 Remove dust, silt, scale and coatings from ferrous metals by wire brush, grinding or sandblasting.

.3 Remove oil, grease and other coatings from non-ferrous metals with approved cleaning solvent.

.4 Ensure surfaces are free of frost, rust, lacquers, laitance, release agents, moisture or other matter which might adversely affect adhesion of sealant.

.5 Examine joint sizes and correct as required to allow for anticipated movement and to achieve proper width/depth ratio per manufacturer's written recommendations for specified sealant.

.6 Support joint filler on horizontal traffic surfaces against vertical movement which might result from traffic loads or foot traffic.

.7 Prepare surfaces as recommended by sealant manufacturer.

.8 Fully remove existing sealant scheduled to be removed and replaced with new sealant, in areas indicated on the Drawings.

.1 Follow manufacturers procedures for removal of existing sealant and test areas for adhesion of new sealant. Provide the Consultant with field report identifying results of adhesion testing.

.9 Install joint backing material or apply bond breaker tape to achieve correct joint depth and prevent three-sided adhesion.

.10 To protect adjacent surfaces, mask adjacent surfaces with tape prior to priming and/or sealing.

.11 Prime sides of joints using two cloth method in accordance with manufacturer's directions immediately prior to sealing.

.12 Before any sealing is commended, a test of the material shall be made for indications of staining, poor adhesion or other undesirable effects.

.13 Seal joints in surfaces to be painted before painting. Where surfaces to be sealed are prime painted in shop before sealing, check to make sure prime paint is compatible with primer and sealant. If incompatible inform Consultant, consult the manufacturer, and change primer and sealant to approved compatible types.

.14 Check form release agent used on concrete for compatibility with primer and sealant. If incompatible inform Consultant and change primer and sealant to approved compatible types or clean concrete to Consultant's approval.

3.3 APPLICATION

.1 Apply sealant in accordance with manufacturer's directions, using a gun with proper nozzle size, ensuring to fill voids and joints completely, to leave a weathertight, airtight installation. Superficial pointing with skin bead is not acceptable.

.2 Neatly tool surface to a slight concave profile. Surface of sealant shall be smooth, free from ridges, wrinkles, sags, air pockets and embedded impurities.

.3 Clean adjacent surfaces immediately and leave Work neat and clean. Remove excess sealant and droppings, using recommended cleaners as Work progresses. Remove masking tape after tooling of joints.

3.4 CLEANING AND PROTECTION

.1 Remove all waste materials from site. Sealant shall be cleaned of all foreign material as recommended by the sealant manufacturer. Leave work in a condition satisfactory to the Consultant.

END OF SECTION

PART 1 - GENERAL

1.1 Work Included

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

.1 Steel frame products including frames, transom frames (glazed or paneled), sidelight and window assemblies, fire-rated and non-rated.

.2 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 01 33 00.

.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".

.3 Door Core Materials

.1 Honeycomb (Interior Doors). Structural small cell 25.4 mm (1") maximum kraft paper 'honeycomb'. Weight: 36.3 kg (80lb.) per ream minimum, density: 16.5 kg/m3 (1.03 pcf) minimum, sanded to required thickness.

.2 Polyisocyanurate (Exterior Doors). Rigid, modified polyisocyanurate, closed cell board. Density; 32 kg/m3 (2.0 pcf) minimum, thermal values; RSI 1.9 (R 11.0) minimum, in accordance with ASTM C591 (un-faced) or C 1289 (faced).

.4 Primers

.1 Rust inhibitive touch-up only.

.5 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 Fabrication - Frame Products

.1 Exterior frame product shall be 14 gauge. Exterior frames shall be welded type construction, thermally broken. Exterior transom frames, sidelight and window assemblies shall be welded type construction, thermally broken. Interior frame product shall be 16 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 (may be omitted on dry wall applications).

.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.

2.3 Welded Type Frames

.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.

2.4 Fabrication – Doors

.1 General

.1 Exterior doors shall be laminated core construction.

.2 Interior doors shall be welded stiffener construction.

.3 Longitudinal edges shall be continuously welded, filled and sanded with no visible edge seams.

.4 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.

.5 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.

.6 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.

.7 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.

.8 Minimum reinforcing and component gauges shall be in accordance with Table 1 of the CSDMA, "Recommended Specifications for Commercial Steel Door and Frame Products".

.9 Provide factory-applied touch-up primer at areas where zinc coating has been removed during fabrication.

.10 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.

.11 Prior to shipment, mark each door with an identification number as shown on the approved submittal drawings.

.2 Laminated Core Construction

.1 Both face sheets for exterior doors shall be formed from a sheet of 16 gauge (1.34 mm) steel with polyisocyanurate core, laminated under pressure to face sheets.

.2 Both face sheets for interior doors shall be formed from a sheet of 16 gauge (1.34 mm) steel with honeycomb core laminated under pressure to face sheets.

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 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.

.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 09 90 00.

END OF SECTION

1 General

1.1 SUMMARY

.1 Supply and install door hardware listed in the Hardware Schedule, establishes the quality standards, finishes, manufacturers and functions, and meets all current barrier free design standards required by authorities having jurisdiction.

1.2 ADMINISTRATIVE REQUIREMENTS

.1 Submission of Substitutions: Materials other than the named products for the Project may be acceptable to the Consultant, subject to Specification 01 25 00.

.2 Pre-installation Conference: Arrange a preconstruction meeting in accordance with Division 01 to discuss the following:

.1 Keying Conference: Conduct keying conference between the Owner, the Contractor and manufacturer to review and finalize requirements, at the Project site and incorporate decisions into final keying schedule after reviewing door hardware keying system.

.2 Electrified Hardware Conference: Conduct pre-installation conference at Project site and review methods and procedures related to electrified door hardware.

.3 Coordination: Obtain and distribute templates for doors, frames, and other work specified to be factory prepared for installing door hardware. Coordinate with shop drawings of other work to confirm that adequate provisions are made for locating and installing door hardware.

1.3 SUBMITTALS

.1 Provide required information in accordance with Division 01.

.2 Action Submittals: Provide the following submittals before starting any work of this Section:

.1 Product Data: Submit product data indicating installation details, material descriptions, dimensions of individual components and profiles, and finishes.

.2 Shop Drawings: Submit shop drawings indicating details of electrified door hardware including, but not limited to, the following:

.1 Wiring Diagrams: Detail wiring for power, signal, and control systems and differentiate between manufacturer installed and site installed wiring.

.3 Samples:

.1 Submit samples of complete line of hardware and finishes, if and when requested, to accompany any proposal for substitution. Fully label each sample as to manufacture, type, size and location for use proposed.

.4 Hardware Schedule: Submit door hardware schedule prepared by Architectural Hardware Consultant (AHC), detailing fabrication and assembly of door hardware, including make, model, material, function, size, finish, and other pertinent information.

.3 Do not order hardware from manufacturers until samples have been approved. Hardware and finishes supplied shall be identical with approved samples.

1.4 PROJECT CLOSEOUT SUBMISSION

.1 Operation and Maintenance Data: Provide operations and maintenance information in accordance with Division 01.

.2 Spare Parts and Tools: Submit unique parts and tools for maintaining hardware system in accordance with Division 01.

1.5 DELIVERY, HANDLING AND PROTECTION

.1 Pack hardware in suitable wrappings and containers to protect from injury during shipping and storage. Enclose accessories, fastening devices and other loose items with each item. Mark packages for easy identification as indicated on approved delivery schedule. Hand over hardware to designated installer.

1.6 WARRANTY

.1 Warrant door closers to remain free from defects in materials and workmanship in accordance with the General Conditions, but for a period of five (5) years, and locks and locksets for two (2) years. Agree to promptly make good defects which become apparent within warranty periods without cost to Owner.

2 Products

2.1 GENERAL

.1 Supply to the job site all items of finishing hardware as indicated in the Hardware Scheduled appended to this Section. All items to be supplied with complete and adequate fixing and anchoring devices necessary for satisfactory installation into or upon the various surfaces to which it is to be affixed.

.2 Cooperate with all trades using hardware supplied under this Section.

.3 Render a complete service to the metal fabrication contractor wherein full cooperation is assured them of the supply of hardware information, and templates as requested.

.4 Supply for installation by others where specified, as scheduled or indicated on the drawings.

.5 Provide six, (6) copies of the hardware specification for field construction and office use.

.6 All hardware shall be of the best quality and design, construction and finish, free from all defects.

.7 All blank strikes shall be ASA with no lip.

.8 Lock strikes shall be ASA with lip.

.9 All deadlock strikes shall be ASA with no lip.

.10 Where door pulls are scheduled on one side of door and a push plate on the other side, the contractor shall be responsible for fixing, so that the pull shall be secured through the door from the reverse side and the push plate installed to cover the thru bolts which will be countersunk flush with door.

.11 All door closers shall be non sized and where possible non handed. They shall be sized and adjusted by the installer to suit the site conditions.

.12 Panic sets are to be of style specified and completely plated.

.13 Before installing any hardware, carefully check all architectural drawings of Work requiring hardware, verify door swings, door and frame material and operating conditions. Ensure hardware will fit Work.

.14 Provide ULC approved hardware to ULC labelled doors.

.15 Check shop drawings and frame and door lists affecting hardware type and installation. Certify to correctness or advise Consultant in writing of required revisions.

.16 Templates:

.1 Check hardware schedule, drawings and specifications. Furnish promptly to applicable trades any patterns, templates, template information and manufacturer's literature required for proper preparation for and application of hardware, in ample time to facilitate progress of Work.

.2 Exposed screws for installing hardware shall have Phillips or Robertson heads.

.3 All door closers shall have back-checking features and shall be of proper size to operate door efficiently.

.4 Use no wall stops on drywall.

.5 Rim Panic Device strikes shall be mortise type application. Equip panic devices with hex bolts.

.17 Hinges

.1 Provide mortise type hinges, steel based for interior doors and stainless steel or brass for exterior doors or interior doors exposed to moisture.

.2 Provide hinges with stainless steel pins; non removable for exterior and public interior exposure, non rising for non security exposure.

.3 Provide full length continuous geared hinges, continuous pin and barrel hinges or full mortise type heavy weight butt hinges on all high frequency use or extreme weighted doors.

.4 Where doors are required to swing 180 degrees, provide ball bearing type swing clear hinges sufficient to clear trim.

.18 Locks, Cylinders, Latches and Bolts

.1 Locks are to be ANSI Grade 1 mortise type unless specified otherwise.

.2 Equip all locks with anti-friction latches with auxiliary latch guard. All fire rated doors must have a minimum latch throw as indicated on the fire door label.

.3 Where lever trim is required, provide levers containing concealed mounting and constructed of solid cast or forged material.

.4 Locks must be lever type.

.5 Provide locks in accordance with current barrier free accessibility requirements as set out by the OBC or by the jurisdiction having authority, when located in the barrier free path of travel.

.6 Strikes shall be ANSI standard size with curved lip strikes for latch bolts and no lip strikes for deadlocks. Provide complete with wrought iron boxes finished to match strike.

.7 Provide Cylinders and thumb turns with the correct cam or tailpiece to operate hardware correctly. Coordinate with Section 08 44 13 Glazed Aluminum Curtain Wall when applicable.

.8 Automatic flush bolts are to be equipped on all fire rated pairs of doors with regular use. Provide a coordinator in conjunction with automatic flush bolts.

.9 Provide a filler bar when using coordinators for a clean architectural appearance.

.19 Keying

.1 Supply the following:

.1 1 key cabinet with the required capacity plus 30%.

.2 3 keys per lock.

.3 10 copies of each master key and sub-master key.

.4 Construction keys as required.

.5 1 extractor key.

.6 List of keys.

.7 Code chart of keys and cylinders.

.2 Coding of keys used for this project will the first code of each master key. Codes not used in this project will be used later by the Owner.

.3 All permanent keys, including master keys, list of keys, the key code chart, the blank keys and all pinning shall be delivered directly from the manufacturer to the Owner, at the time of installation of the permanent cylinders, in clearly identified envelopes. Tag all keys.

.20 Exit Device

.1 All exit devices installed on labelled fire doors shall carry a ULC or Warnock Hersey Label.

.2 Coordinate exit devices with astragals, coordinators, carry open bars and thresholds for correct and safe operation.

.3 All exit devices shall have exposed metal to match architectural finishes used on other hardware.

.4 Exit devices are push pad style only.

.5 Provide non-fire rated exit devices with hex key dogging feature (Cylinder dogging may be required in lieu of hex key dogging).

.6 Provide Power supplies of same manufacturer when using electrified exit devices.

.7 Match style and finish of trims on exit devices for locksets used.

.21 Closers

.1 All closers shall be hydraulically controlled and full rack and pinion in operation.

.2 All closers shall be fully adjustable including the following features: back check, speed control, and latch speed control.

.3 Provide mounting plates where required on special frame applications.

.4 Install all necessary attaching brackets, mounting channels, and cover plates where necessary for correct application of door closers.

.5 Supply to the Owner any special keys and wrenches as usually packed with door closers.

.6 Closers complete with a cover unless specified otherwise by the Consultant. Provide cover of matching architectural finish to the other hardware used in the project.

.7 Coordinate closers with overhead stops & holders.

.22 Push Plates and Door Pulls

.1 Provide and install stainless steel plates in type #304 stainless steel and install secure with screw fastening.

.2 Length of kick plates shall be 1-1/2" less than door width for single doors and 1" less than door width for doors in pairs.

.3 All stainless steel plates are 0.050" thick, free of rough or sharp edges. Corners and edges to have slight radiuses. Install kick plates and armor plates on both sides of the door with 3M tape or counter sunk screws as specified.

.4 Where door pulls are scheduled on one side of door and push plates on other side, issue installations instructions to ensure that the pull is secured through door from reverse side and countersunk flush with door installation of push plate. Locate push plate to cover fasteners for door pulls.

.23 Door Stops and Holders

.1 Wall stops are only to be used on wall conditions such as block or masonry. If necessary to mount on drywall, provide proper backing to ensure no damage to the wall.

.2 Supply floor stops of sufficient height to suit floor conditions and the undercut of the door.

.3 Provide gray rubber exposed resilient parts.

.4 Surface mount overhead door stops may be used unless they conflict with the door closer. All overhead stops are to be set to 90 degree opening unless stated otherwise.

.5 All door stops shall be heavy duty and of high quality.

.24 Door Seals and Thresholds

.1 Perimeter seals must be provided that fully seal all gaps between the floor, door and frame. Perimeter seal must protect against weather, smoke and sound.

.2 Frame gasketing must be constructed of neoprene. The aluminum housing must have a rib to prevent against distortion during installation.

.3 Provide aluminum frames with felt inserts by door supplier.

.4 Install Thresholds in a manner that ensures the door bottom comes in full contact.

.5 All thresholds shall be aluminum and installed with lead shields and stainless steel screws.

.6 Cut ends of thresholds to follow exactly the door frame profile.

.7 Provide barrier-free thresholds to all units identified as barrier free (BF) on balcony doors.

3 Execution

3.1 INSTALLATION

.1 Subcontractor installing the hardware shall carefully follow manufacturers' instructions for installation of all finish hardware.

.2 For mounting heights of various hardware items refer to the following, unless otherwise indicated on the Drawings:

.1 Locksets: 1024mm (40-5/16") from centre of lever to finished floor.

.2 Deadlocks: 1220mm (48") from centre of cylinder to finished floor.

.3 Mortise Night Latches: 1024mm (40-5/16") from centre of cylinder to finished floor.

.4 Panic Bolts: 1024mm (40-5/16") from centre of crossbar to finished floor.

.5 Push Plates: 1143mm 45" from centre of plate to finished floor.

.6 Guard Bars: 1024mm (40-5/16") from centre of bar to finished floor.

.7 Door Pulls: 1067mm (42") from centre of pull to finished floor.

.8 Blank Strike: 1024mm (40-5/16") from centre of strike to finished floor.

.9 Blank Fronts: 1024mm (40-5/16") from centre of strike to finished floor.

3.2 PERFORMANCE

.1 Adjustment and Cleaning:

.1 Provide services of competent mechanic without additional cost to Owner. Mechanic shall inspect installation of all hardware furnished under this Section and supervise all adjustments (by trades responsible for fixing) necessary to leave hardware in perfect working order.

3.3 HARDWARE SCHEDULE

.1 Refer to attached Schedule of Finishing Hardware.

Hardware Group No. 01

For use on Door #(s):
D101A
Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	WELDED ON PIVOTS	BY DOOR/FRAME SUPPLIER		UNK
1	EA	POWER TRANSFER	EPTL	628	SEC
1	EA	ELEC FIRE EXIT HARDWARE	RX-QEL-35A-NL-OP-F-4'-L/TRIM-388-CON 24 VDC	626	VON
1	EA	RIM CYLINDER	20-021	626	SCH
1	EA	45 DEGREE OFFSET PULL	8145EZHD 305MM O	630-316	IVE
1	EA	OH STOP	90S	630	GLY
1	EA	SURF. AUTO OPERATOR	9542 MS	ANCLR	LCN
2	EA	ACTUATOR, TOUCH	8310-852T	630	LCN
1	EA	GASKETING	BY FRAME SUPPLIER		UNK
1	EA	DOOR SWEEP	39A X DOOR WIDTH	A	ZER
1	EA	THRESHOLD	626A X DR WIDTH NOTE:CONFIRM THRESHOLD DEPTH PER SITE CONDITIONS	A	ZER
1	EA	WIRE HARNESS	CON-___ TO SUIT		SCH
1	EA	WIRE HARNESS	CON-6W		SCH
1	EA	INTERCOM	BY DIV 26		UNK
1	EA	DOOR CONTACT	BY SECURITY	BLK	UNK
1	EA	POWER SUPPLY	PS904 900-4RL-FA KL900 120/240 VAC	LGR	SCE
1	EA	CARD READER	BY DIV 28		UNK

NOTE: ALL HARDWARE PROVIDED FROM MANUFACTURER WITH FIRE RATED ASSEMBLY

Hardware Group No. 02

For use on Door #(s):
D101B
Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	WELDED ON PIVOTS	BY DOOR/FRAME SUPPLIER		UNK
1	EA	POWER TRANSFER	EPTL	628	SEC
1	EA	ELEC FIRE EXIT HARDWARE	RX-QEL-35A-EO-F-CON 24 VDC	626	VON
1	EA	45 DEGREE OFFSET PULL	8145EZHD 305MM O	630-316	IVE
1	EA	SURFACE CLOSER	4040XP SCUSH ST-3068	689	LCN
1	EA	GASKETING	BY FRAME SUPPLIER		UNK
1	EA	DOOR SWEEP	39A X DOOR WIDTH	A	ZER
1	EA	THRESHOLD	626A X DR WIDTH NOTE:CONFIRM THRESHOLD DEPTH PER SITE CONDITIONS	A	ZER
1	EA	WIRE HARNESS	CON-___ TO SUIT		SCH
1	EA	WIRE HARNESS	CON-6W		SCH
1	EA	DOOR CONTACT	BY SECURITY	BLK	UNK

NOTE: ALL HARDWARE PROVIDED FROM MANUFACTURER WITH FIRE RATED ASSEMBLY

Hardware Group No. 03

For use on Door #(s):
D102
Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	WELDED ON PIVOTS	BY DOOR/FRAME SUPPLIER		UNK
1	EA	POWER TRANSFER	EPTL	628	SEC
1	EA	ELEC FIRE EXIT HARDWARE	RX-QEL-35A-NL-OP-F-4'-L/TRIM-388-CON 24 VDC	626	VON
1	EA	RIM CYLINDER	20-021	626	SCH
1	EA	45 DEGREE OFFSET PULL	8145EZHD 305MM O	630-316	IVE
1	EA	SURF. AUTO OPERATOR	9542 MS	ANCLR	LCN
2	EA	ACTUATOR, TOUCH	8310-852T	630	LCN
1	EA	WALL STOP	WS406/407CVX	630	IVE
1	EA	GASKETING	BY FRAME SUPPLIER		UNK
1	EA	WIRE HARNESS	CON-___ TO SUIT		SCH
1	EA	WIRE HARNESS	CON-6W		SCH
1	EA	INTERCOM	BY DIV 26		UNK
1	EA	DOOR CONTACT	BY SECURITY	BLK	UNK
1	EA	POWER SUPPLY	PS902 900-4RL-FA FA900 KL900 120/240 VAC	LGR	SCE
1	EA	CARD READER	BY DIV 28		UNK

NOTE: ALL HARDWARE PROVIDED FROM MANUFACTURER WITH FIRE RATED ASSEMBLY

Hardware Group No. 04

For use on Door #(s):
D103
Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	WELDED ON PIVOTS	BY DOOR/FRAME SUPPLIER		UNK
1	EA	POWER TRANSFER	EPT10 CON	689	VON
1	EA	ELEC FIRE EXIT HARDWARE	LX-RX-QEL-35A-NL-OP-F-L/TRIM-388-CON 24 VDC	626	VON
1	EA	RIM CYLINDER	20-021	626	SCH
1	EA	45 DEGREE OFFSET PULL	8145EZHD 305MM O	630-316	IVE
1	EA	OH STOP	100S	630	GLY
1	EA	SURFACE CLOSER	4021	689	LCN
1	EA	MOUNTING PLATE	4020-18	689	LCN
1	EA	GASKETING	BY FRAME SUPPLIER		UNK
1	EA	DOOR SWEEP	39A X DOOR WIDTH	A	ZER
1	EA	THRESHOLD	626A X DR WIDTH NOTE:CONFIRM THRESHOLD DEPTH PER SITE CONDITIONS	A	ZER
1	EA	WIRE HARNESS	CON-___ TO SUIT		SCH
1	EA	WIRE HARNESS	CON-6W		SCH
1	EA	DOOR CONTACT	BY SECURITY	BLK	UNK
1	EA	POWER SUPPLY	PS902 900-4RL 120/240 VAC	LGR	SCE
1	EA	CARD READER	BY DIV 28		UNK

NOTE: ALL HARDWARE PROVIDED FROM MANUFACTURER WITH FIRE RATED ASSEMBLY

Hardware Group No. 05

For use on Door #(s):
D110B
Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1	EA	CONT. HINGE	112XY EPT X DR HT	628	IVE
1	EA	POWER TRANSFER	EPT10 CON	689	VON
1	EA	ELEC PANIC HARDWARE	RX-QEL-35A-NL-OP-4'-388-CON 24 VDC	626	VON
1	EA	RIM CYLINDER	20-021	626	SCH
1	EA	45 DEGREE OFFSET PULL	8145EZHD 305MM O	630-316	IVE
1	EA	OH STOP	100S ADJ	630	GLY
1	EA	SURF. AUTO OPERATOR	9542 MS	ANCLR	LCN
2	EA	ACTUATOR, TOUCH	8310-852T	630	LCN
1	EA	GASKETING	BY FRAME SUPPLIER		UNK
1	EA	DOOR SWEEP	39A X DOOR WIDTH	A	ZER
1	EA	THRESHOLD	626A X DR WIDTH NOTE:CONFIRM THRESHOLD DEPTH PER SITE CONDITIONS	A	ZER
1	EA	WIRE HARNESS	CON-___ TO SUIT		SCH
1	EA	WIRE HARNESS	CON-6W		SCH
1	EA	INTERCOM	BY DIV 26		UNK
1	EA	DOOR CONTACT	BY SECURITY	BLK	UNK
1	EA	POWER SUPPLY	PS902 900-4RL-FA KL900 120/240 VAC	LGR	SCE
1	EA	CARD READER	BY DIV 28		UNK

NOTE: ALL HARDWARE PROVIDED FROM MANUFACTURER WITH FIRE RATED ASSEMBLY

Hardware Group No. 06

For use on Door #(s):
D110A
Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1	EA	CONT. HINGE	112XY	628	IVE
1	EA	DUMMY PUSH BAR	350-4'	626	VON
1	EA	45 DEGREE OFFSET PULL	8145EZHD 305MM O	630-316	IVE
1	EA	OH STOP	100S ADJ	630	GLY
1	EA	SURF. AUTO OPERATOR	9542 MS	ANCLR	LCN
2	EA	ACTUATOR, TOUCH	8310-852T	630	LCN

Hardware Group No. 07

For use on Door #(s):
D112
Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1	EA	CONTINUOUS HINGE	700CS EPT X DR HT	441	IVE
1	EA	POWER TRANSFER	EPT10 CON	689	VON
1	EA	ELEC PANIC HARDWARE	RX-QEL-35A-NL-OP-4'-388-CON 24 VDC	626	VON
1	EA	RIM CYLINDER	20-021	626	SCH
1	EA	45 DEGREE OFFSET PULL	8145EZHD 305MM O	630-316	IVE
1	EA	SURFACE CLOSER	4040XP EDA ST-1944 ST-3068	689	LCN
1	SET	GASKETING	429AA X 1/HEAD & 2/JAMBS.	AA	ZER
1	EA	DOOR SWEEP	39A X DOOR WIDTH	A	ZER
1	EA	THRESHOLD	626A X DR WIDTH NOTE:CONFIRM THRESHOLD DEPTH PER SITE CONDITIONS	A	ZER
1	EA	WIRE HARNESS	CON-___ TO SUIT		SCH
1	EA	WIRE HARNESS	CON-6W		SCH
1	EA	INTERCOM	BY DIV 26		UNK
1	EA	DOOR CONTACT	BY SECURITY	BLK	UNK
1	EA	POWER SUPPLY	PS902 900-4RL-FA KL900 120/240 VAC	LGR	SCE
1	EA	CARD READER	BY DIV 28		UNK

NOTE: ALL HARDWARE PROVIDED FROM MANUFACTURER WITH FIRE RATED ASSEMBLY

Hardware Group No. 08

For use on Door #(s):
D135A
Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1	EA	CONTINUOUS HINGE	700CS EPT X DR HT	441	IVE
1	EA	POWER TRANSFER	EPT10 CON	689	VON
1	EA	ELEC FIRE EXIT HARDWARE	RX-QEL-35A-NL-OP-F-4'-L/TRIM-388-CON 24 VDC	626	VON
1	EA	RIM CYLINDER	20-021	626	SCH
1	EA	45 DEGREE OFFSET PULL	8145EZHD 305MM O	630-316	IVE
1	EA	OH STOP	100S ADJ	630	GLY
1	EA	SURF. AUTO OPERATOR	9542 MS	ANCLR	LCN
2	EA	ACTUATOR, TOUCH	8310-852T	630	LCN
1	SET	GASKETING	429AA X 1/HEAD & 2/JAMBS.	AA	ZER
1	EA	DOOR BOTTOM(MORTISE)	355AA X DR WIDTH UNDERCUT HM DOOR BOTTOMFOR ENGAGEMENT OF DOOR BOTTOM TO FLOOR MATERIAL	AA	ZER
1	EA	WIRE HARNESS	CON-___ TO SUIT		SCH
1	EA	WIRE HARNESS	CON-6W		SCH
1	EA	INTERCOM	BY DIV 26		UNK
1	EA	DOOR CONTACT	BY SECURITY	BLK	UNK
1	EA	POWER SUPPLY	PS904 900-4RL-FA KL900 120/240 VAC	LGR	SCE
1	EA	CARD READER	BY DIV 28		UNK

NOTE: ALL HARDWARE PROVIDED FROM MANUFACTURER WITH FIRE RATED ASSEMBLY

Hardware Group No. 09

For use on Door #(s):
D135B
Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1	EA	CONTINUOUS HINGE	700CS EPT X DR HT	441	IVE
1	EA	POWER TRANSFER	EPT10 CON	689	VON
1	EA	ELEC FIRE EXIT HARDWARE	RX-QEL-35A-EO-F-CON 24 VDC	626	VON
1	EA	45 DEGREE OFFSET PULL	8145EZHD 305MM O	630-316	IVE
1	EA	OH STOP	100S	630	GLY
1	EA	SURFACE CLOSER	4040XP EDA	689	LCN
1	SET	GASKETING	429AA X 1/HEAD & 2/JAMBS.	AA	ZER
1	EA	DOOR BOTTOM(MORTISE)	355AA X DR WIDTH UNDERCUT HM DOOR BOTTOMFOR ENGAGEMENT OF DOOR BOTTOM TO FLOOR MATERIAL	AA	ZER
1	EA	WIRE HARNESS	CON-___ TO SUIT		SCH
1	EA	WIRE HARNESS	CON-6W		SCH
1	EA	DOOR CONTACT	BY SECURITY	BLK	UNK

NOTE: ALL HARDWARE PROVIDED FROM MANUFACTURER WITH FIRE RATED ASSEMBLY

Hardware Group No. 10

For use on Door #(s):
D137 D150
Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 127X114MM	652	IVE
1	EA	OFFICE LOCK W/ INSIDE INDICATOR	ND53P6D SPA IS-LOC	626	SCH
1	EA	FLOOR STOP	FS439	630	IVE

Hardware Group No. 11

For use on Door #(s):
D138
Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 127X114MM	652	IVE
1	EA	CLASSROOM LOCK	ND70P6D SPA	626	SCH
1	EA	OH STOP	100S	630	GLY

Hardware Group No. 12

For use on Door #(s):
D139 D141 D142 D147
Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 127X114MM	652	IVE
1	EA	CLASSROOM SECURITY W/ INSIDE INDICATOR	ND78P6D SPA IS-CRS	626	SCH
1	EA	FLOOR STOP	FS439	630	IVE
1	EA	FINGER GUARD	FINGER SAFE USA INC. MK1A	WHI	USA
1	EA	FINGER GUARD	FINGER SAFE USA INC. MK1B	WHI	USA

Hardware Group No. 13

For use on Door #(s):
D139B
Provide each PR door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
6	EA	HINGE	5BB1 114X114MM	652	IVE
2	EA	MANUAL FLUSH BOLT	FB458	626	IVE
1	EA	DUST PROOF STRIKE	DP2	626	IVE
1	EA	STOREROOM LOCK	ND80P6D SPA	626	SCH
2	EA	WALL STOP	WS406/407CVX	630	IVE

Hardware Group No. 14

For use on Door #(s):
D139C
Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 127X114MM	652	IVE
1	EA	DBL CYL STORE LOCK	ND66P6D SPA	626	SCH
1	EA	SURFACE CLOSER	1461 DEL CUSH STD	689	LCN
1	EA	KICK PLATE	8400 200MM X LDW B-CS	630	IVE
1	EA	FINGER GUARD	FINGER SAFE USA INC. MK1A	WHI	USA
1	EA	FINGER GUARD	FINGER SAFE USA INC. MK1B	WHI	USA

Hardware Group No. 15

For use on Door #(s):
D140 D143A D143B D148
Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 127X114MM	652	IVE
1	EA	DOOR PULL, 1" ROUND	8103HD 255MM L	630	IVE
1	EA	PUSH PLATE	8200 100X405MM	630	IVE
1	EA	OH STOP & HOLDER	100H	630	GLY
1	EA	FINGER GUARD	FINGER SAFE USA INC. MK1A	WHI	USA
1	EA	FINGER GUARD	FINGER SAFE USA INC. MK1B	WHI	USA

Hardware Group No. 16

For use on Door #(s):
D141B D142B
Provide each PR door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
6	EA	HINGE	5BB1 114X114MM	652	IVE
2	EA	MANUAL FLUSH BOLT	FB458	626	IVE
1	EA	DUST PROOF STRIKE	DP2	626	IVE
1	EA	STOREROOM LOCK	ND80P6D SPA	626	SCH
1	EA	OH STOP	90S	630	GLY
1	EA	WALL STOP	WS406/407CVX	630	IVE

Hardware Group No. 17

For use on Door #(s):
D144 D151
Provide each PR door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
6	EA	HINGE	5BB1 114X114MM NRP	652	IVE
2	EA	MANUAL FLUSH BOLT	FB458	626	IVE
1	EA	DUST PROOF STRIKE	DP2	626	IVE
1	EA	STOREROOM LOCK	ND80P6D SPA	626	SCH
2	EA	OH STOP	90S	630	GLY

Hardware Group No. 18

For use on Door #(s):
D145
Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 127X114MM	652	IVE
1	EA	STOREROOM LOCK	ND80P6D SPA	626	SCH
1	EA	SURFACE CLOSER	1461 REG	689	LCN
1	EA	KICK PLATE	8400 200MM X LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CVX	630	IVE

Hardware Group No. 19

For use on Door #(s):
D149
Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 127X114MM	652	IVE
1	EA	PASSAGE SET	ND10S SPA	626	SCH
1	EA	WALL STOP	WS406/407CVX	630	IVE
1	EA	GASKETING	188SBK PSA	BK	ZER
1	EA	DOOR BOTTOM(MORTISE)	355AA X DR WIDTH UNDERCUT HM DOOR BOTTOMFOR ENGAGEMENT OF DOOR BOTTOM TO FLOOR MATERIAL	AA	ZER
1	EA	FINGER GUARD	FINGER SAFE USA INC. MK1A	WHI	USA
1	EA	FINGER GUARD	FINGER SAFE USA INC. MK1B	WHI	USA

Hardware Group No. 20

For use on Door #(s):
D152
Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 127X114MM	652	IVE
1	EA	CLASSROOM LOCK	ND70P6D SPA	626	SCH
1	EA	FLOOR STOP	FS439	630	IVE

Hardware Group No. 21

For use on Door #(s):
D153
Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 127X114MM	652	IVE
1	EA	PUSH TO LOCK W/LED	CM-AF550RF W/ FRENCH SIGNAGE		CAM
1	EA	STOREROOM LOCK	ND80P6D SPA	626	SCH
1	EA	INTERFACE BOX	JB7		VON
1	EA	ELECTRIC STRIKE	6211 FS 12/16/24/28 VAC/VDC	630	VON
1	EA	LED ANNUNCIATOR	CM-AF500F w/french signage		CAM
1	EA	SURF. AUTO OPERATOR	9131 MS AS REQ (120 VAC)	ANCLR	LCN
2	EA	ACTUATOR, TOUCH	8310-852T	630	LCN
1	EA	KICK PLATE	8400 200MM X LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CVX	630	IVE
1	EA	WIRE HARNESS	CON-6W		SCH
1	EA	DOOR CONTACT	BY SECURITY	BLK	UNK
1	EA	ADVANCED LOGIC RELAY	CX-33		CAM
1	EA	EMERGENCY CALL KIT UNIV RESTRM	CX-WEC10K2F W/FRENCH SIGNAGE		CAM

Hardware Group No. MISC ITEMS

For use on Door #(s):
MISC ITEMS
Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1	EA	KEY CABINET	KEY CABINET 250 KEYS CAPACITY		LUN
3	EA	EXTRACTOR TOOL	35-057		SCH
100	EA	KEY BLANKS	35-101		SCH
5	EA	CUT CONST KEY	48-104		SCH
4	EA	MK KEY,DND	49-101		SCH

END OF SECTION

1 General

1.1 SUMMARY

.1 Furnish glazing materials and accessories to complete the fabrication and installation of:

.1 Tempered Glass and Interior Glazed Screens

.2 Exterior Insulated Glass Units

.3 Ceramic Fire-Rated Glass

1.2 REFERENCE STANDARDS

.1 Insulating Glass Manufacturers Alliance (IGMA) Manual.

.2 American Society for Testing and Materials (ASTM):

.1 ASTM C542-05(2011), Standard Specification for Lock-Strip Gaskets

.2 ASTM C920-11, Standard Specification for Elastomeric Joint Sealants

.3 ASTM C1172-09e1, Standard Specification for Laminated Architectural Flat Glass

.3 Canadian General Standards Board (CGSB):

.1 CAN/CGSB-12.1-M90, Tempered or Laminated Safety Glass

.2 CAN/CGSB-12.3-M91, Flat, Clear Float Glass

.3 CAN/CGSB-12.8-97, Insulating Glass Units

.4 CGSB-12.20-M89, Structural Design of Glass for Buildings

.4 National Fire Protection Association (NFPA):

.1 NFPA 80-2013, Standard For Fire Doors and Other Opening Protectives

1.3 SUBMITTALS

.1 Provide submittals in accordance with Division 01.

.2 Action Submittals: Provide the following submittals before starting any work of this Section:

.1 Product Data: Submit manufacturer's product data for each type of product specified. Data shall indicate compliance with specification and installation recommendations of manufacturer of products being used.

.2 Samples: Submit samples of materials if required by Consultant before commencing work of this section. Samples shall be clearly labeled with manufacturer's name and type.

.3 Shop Drawings: Submit shop drawings, to the Consultant for review prior to fabrication.

.1 Clearly indicate each type of glass and identify relationships with adjacent materials or system where glazing is being installed or supported.

.4 Samples for Verification: Submit samples for verification including sample sets showing the full range of variations expected where products involve normal colour variations.

.5 Maintenance Data: Upon completion of installation, supply instructions covering re-glazing, adjustments and other relevant maintenance data.

1.4 QUALITY ASSURANCE

.1 Conform to the requirements of the Flat Glass Marketing Association Glazing Manual, latest Edition.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Delivery and Acceptance Requirements: Deliver packaged materials in their original containers with manufacturer's labels and seals intact.

.2 Storage and Handling Requirements: Store vertically, blocked off the floor in a weatherproof enclosure in original containers with manufacturers labels and seals intact until read for installation, and as follows:

.1 Install glass as soon as possible after delivery to site.

.2 Handle glass carefully to its place of installation.

.3 Prevent damage to glass, adjacent materials and surfaces.

1.6 SITE CONDITIONS

.1 Ambient Conditions: Maintain temperature, humidity and solar exposure conditions of Glass Glazing materials during shipping, storage and site installation as required by manufacturer to maintain warranty and performance of installed products.

1.7 WARRANTY

.1 Provide manufacturer's warranty for the following types of glass listed, against defects in materials and workmanship for the period indicated, commencing from the date of Substantial Performance of Work:

.1 Seal Failure: Failure of hermetic seal under normal use that is attributed to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning insulating glass contrary to manufacturer's written instructions.

.2 Evidence of Failure: Obstruction of vision by dust, moisture, or film on interior surfaces of glass.

.3 Allowable Specific Exclusions: Breakage resulting from thermal stress will be accepted as a limitation to the warranty in accordance with CAN/CGSB 12.20.

.4 Warranty Period: Ten (10) Years.

2 Products

2.1 MATERIALS

.1 Float Glass: In accordance with CAN/CGSB-12.3, glazing quality and as follows:

.1 Clear Glass: No tint

.2 Tempered Glass (TGL):

.1 Conforming to CAN/CGSB-12.1, Type 2, Class 'B'. Tempering shall be performed using horizontal tong free method.

.1 Tinted (where indicated): CrystalGray by Guardian or equivalent per Specification 01 25 00.

.2 Provide acid etch finish at inboard light where indicated on drawings.

.3 Laminated Safety Glass: In accordance with CAN/CGSB-12.1 and ASTM C1172 as follows:

.1 Glass: Clear, tempered glass.

.2 Type: 1 - Laminated.

.3 Class: B - Float Glass.

.4 Category: II - Fully Tempered.

.4 Fire Rated, Ceramic Fire-Rated Glass (FGL-01): Material used in door and screen applications with fire rating requirements of 60 minutes with hose stream test.

.1 Fire Rated Glass: Two-ply of glass ceramic, laminated with Teflon or PVB interlayer and as follows:

.1 Thickness: 8mm

.2 Fire Rating: 60 minutes or as scheduled.

.3 Labelled: Permanent logo listing name of product, manufacturer, testing laboratory, fire rating period and safety requirements

.4 Basis-of-Design Materials:

.1 Technical Glass Products, FireLite Plus

.2 VetroTech, Keralite Select L

.3 SAFTI: Pyran Platinum L

.4 Or approved equivalent.

.5 Ceramic Frit-Silk Screened Coating (CF): to GANA/GTA 95-1-31, located on number 3 surface.

.1 Colour: To be selected by consultant from manufacturer standard colour range.

.2 Pattern: circle shaped markings in a grid pattern, spaced at 2" (50mm) horizontally and 2" (50mm) vertically, to comply with Toronto Green Standard (TGS**).** To be provided at all exterior glazing, unless otherwise noted.

.6 Gaskets:

.1 Neoprene/EPDM thermoplastic rubber type gaskets of sufficient thickness to be compressed 25% when installed, having 2,000 psi tensile strength, with 50 durometer shore A hardness plus/minus 5, maximum 30% resistance to permanent set, resistance to ozone without cracking, minimum elongation at break of 300% and conforming to ASTM C542.

.2 Colour - "Black".

.7 Warm Edge Spacer: Polymer SAN spacer with 35% glass fibre content and high-tech gas barrier foil. Equivalent thermal conductivity (in accordance with to ift guideline WA-17/1): $\lambda = 0.14$ W/mK.

.1 Acceptable product: Swisspacer Ultimate or equivalent per Specification 01 25 00.

.2 Colour: black.

.8 Sealant:

.1 One component, silicone base, solvent curing sealant conforming to ASTM C920. Colour as selected Later by Consultant.

.9 Glazing Compound:

.1 Non-hardening modified oil type glazing compound.

.10 Setting Blocks:

.1 Neoprene/EPDM rubber type, 4" long, with 40 to 50 durometer shore A hardness plus/minus 5; resistant to sunlight, weathering, oxidation and permanent deformation under load and wide enough to extend from fixed stop to opposite

face of glass of thickness suitable to glazing condition to provide adequate glazing "bite".

.11 Spacer Shims:

.1 Neoprene/EPDM rubber type, with 40 to 50 durometer shore A hardness plus/minus 5; resistant to sunlight, weathering, oxidation and permanent deformation under load and of adequate thickness to provide correct glass to face clearance at least 1/8".

.12 Glazing Tape:

.1 Macro-polyisobutylene preformed glazing tape, 'Polyshim' or 'Vision Strip' by Tremco Ltd., division of RPM Company, or approved equal.

2.2 INSULATING GLASS

.1 Insulating Glass Units: Provide sealed insulating glass units in accordance with CAN/CGSB-12.8 in configurations indicated, IGMA certified, and as specified herein.

.2 Manufacture sealed insulating glass units without edge channels or tape, that is, with bare glass edges.

.3 Use two stage seal method of manufacture, as follows:

.1 Primary Seal: Polyisobutylene sealing compound between glass and metal spacer/separator. Colour: Black.

.2 Secondary Seal: Structural silicone based, filling gap between the lites of glass at the edge up to the spacer/separator and primary seal. Colour: Black.

.4 Install stainless steel capillary breather tubes to equalize pressure differentials between insulating glass fabricating location and insulating glass installation location; crimp tube immediately prior to installation in accordance with glass fabricators written instructions.

.5 Insulating Glass Units (IGU):

.1 Insulated Glass Unit (IGU-01): At all exterior doors and windows unless noted otherwise, 25mm overall thickness

.1 Unit Composition:

.1 TGL outboard lite, tinted, minimum 4mm thick or to suit lite size.

.1 Low-E Coating (Surface #2) Basis of Design Materials: SunGuard Neutral 78/65 by Guardian Glass, or approved equivalent.

.2 Hermetically Sealed Air Space: 90% Argon, 10% air filled.

.3 Ceramic Frit (CF) finish to #3 surface where indicated.

.4 TGL inboard lite: clear, minimum 4mm thick or to suit lite size.

.2 Unit Characteristics:

.1 Unit Thickness: 25mm

.2 Visible Light Transmittance: 63%

.3 Max U-Value: 1.3 w/m2K (centre of glass)

.4 Solar Heat Gain Coefficient (SHGC): 0.51

.3 Basis of Design Manufacturer: Guardian Glass, or approved equivalent.

2.3 FABRICATION AND MANUFACTURE

.1 Label each light of glass with the registered name of the product and the weight and quality of the glass.

.2 Check dimensions on site before cutting materials.

.3 Minimum bite or lap of glass on stops and rabbets as recommended by glass manufacturer. Finish surfaces shall be free of tong marks.

.4 Cut glass true to dimensions, square, plumb and level. Verify all dimensions prior to fabrication.

.5 Distortion, pock marking or defects detrimental to appearance and/or performance, as determined by the Consultant, will be rejected.

2.4 GLAZING COMPOUND FOR FIRE RATED GLAZING MATERIALS

.1 Glazing Tape: Closed cell polyvinyl chloride foam, coiled on release paper over adhesive on two sides, maximum water absorption by volume of 2%, designed for compression of 25% to effect an air and vapour seal.

.2 Silicone Sealant: One-part neutral curing silicone, medium modulus sealant, Type S; Grade NS; Class 25 with additional movement capability of 50% in both extension and compression (total 100%); Use (Exposure) NT; Uses (Substrates) G, A, and O as applicable.

.3 Acceptable materials:

.1 Dow Corning Corp., Dow Corning 795

.2 General Electric Co., Silglaze-II 2800

.3 Tremco Inc., Spectrum 2

.4 Or approved equivalent.

.4 Setting Blocks: Hardwood, glass width by 4"x ¼" thick.

.5 Spacers: Neoprene or other resilient blocks of 40 to 50 Shore A durometer hardness, adhesive-backed on one face only, tested for compatibility with specified glazing compound.

.6 Cleaners, Primers, and Sealers: Type recommended by manufacturer of glass and gaskets.

2.5 FABRICATION: FIRE RATED GLASS

.1 Fabricate glass and other glazing products in sizes required to glaze openings indicated for project, with edge and face clearances, edge and surface conditions, and bite complying with recommendations of product manufacturer and referenced glazing standards as required to comply with system performance requirements.

3 Execution

3.1 EXAMINATION

.1 Examine areas of work affecting the work of this section. Report in writing all defects, errors and discrepancies immediately to the Consultant.

.2 Commencement of work implies acceptance of surfaces and conditions.

3.2 PREPARATION

.1 Openings shall be free from moisture, frost, rust, dirt and foreign matter.

.2 Clean surface to receive sealant with a clean cloth dampened with xylol or a 50-50 mixture of acetone and xylol. Wipe dry with a clean, dry cloth.

3.3 INSTALLATION

.1 Conform to the recommendation of the glazing manual, Flat Glass Marketing Association, latest edition and as specified herein.

.2 Unless otherwise indicated on drawings otherwise, provide tempered glass at all doors, transoms, sidelights and vision lites within 2'-6" of grade and/or finished floor.

.3 Glaze doors scheduled to be glazed.

.4 Set sheet glass with draw lines horizontal.

.5 Glaze interior openings using compound or glazing tapes or gaskets.

.6 Install removable stops. Insert spacer shims between glass and stops at 24" O.C. and not less than 1/4" below "sight lines". Fill remaining voids with sealant or glazing compound to "sight lines" and trim sealant/glazing compound to produce clean, sharp, straight lines without voids or depressions.

.7 Replace loose stops in their original positions, tighten all screws.

.8 Refer to drawings and door and frame schedule for locations of each type of glass.

3.4 INSTALLATION – FIRE RATED GLASS

.1 Comply with GANA standards and instructions of manufacturers of glass, glazing sealants, and glazing compounds.

.2 Protect glass from edge damage during handling and installation. Inspect glass during installation and discard pieces with edge damage that could affect glass performance.

.3 Place hardwood setting blocks located at quarter points of glass with edge block no more than 150mm (6") from corners.

.4 Glaze vertically into labelled fire rated metal frames or partition walls with same fire rating as glass and push against tape for full contact at perimeter of pane or unit.

.5 Place glazing tape on free perimeter of glazing in same manner described above.

.6 Do not remove protective edge tape.

.7 Install removable stop and secure without displacement of tape.

.8 Do not pressure glaze. Knife trim protruding tape.

.9 Provide minimum ¼" edge clearance.

.10 Install vision panels in fire rated doors to requirements of NFPA 80.

.11 Install so that appropriate fire rating labels and markings remain permanently visible.

3.5 CLEANING

.1 Repair all defects caused by the work of this section. Remove as work progresses, all excess or foreign materials or droppings which would set or become difficult to remove from surfaces at time of final cleaning.

.2 Immediately prior to acceptance of work of this section by Consultant, remove temporary protection, clean and polish exposed surfaces of all work of this section. Use proper cleaning materials and methods to prevent damage to surfaces, finishes, sealer or work of other trades. Make good such damage to Consultant's satisfaction.

.3 Do not use steel wool, wire brushes or steel scrapers on any finished surfaces.

.4 Replace or make good to Consultant's satisfaction, upon completion of work of this section, all defective, scratched or damaged work, at no extra cost to the Owner.

END OF SECTION

1 General

1.1 SUMMARY

.1 This Section includes requirements for supply and installation of glazing films for the following:

.1 Decorative glazing surface films

1.2 REFERENCE STANDARDS

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

.1 ASTM D1004-09, Standard Test Method for Initial Tear Resistance of Plastic Film and Sheeting

.2 ASTM D3330/D3330M-04 (2010), Standard Test Method for Peel Adhesion of Pressure-Sensitive Tape

1.3 ADMINISTRATIVE REQUIREMENTS

.1 Coordination: Coordinate the Work of this Section with the installation of glazing; sequence work so that installation of glazing films coincides with installation of glass materials without causing delay to the Work.

.2 Pre-Construction Conference: Arrange a site meeting, to coincide with regular bi-weekly site meetings, attended by the Contractor, the Subcontractor's representative and foreman for this project, the Consultant, materials supplier(s), and other relevant personal before commencement of work for this Section; agenda for meeting will include; but not be limited to, the following:

.1 Review methods and procedures related to installation, including manufacturer's written instructions

.2 Examine substrate conditions for compliance with manufacturers installation requirements

.3 Review temporary protection measures required during and after installation.

1.4 SUBMITTALS

.1 Provide required information in accordance with Division 01.

.2 Action Submittals: Provide the following submittals before starting any work of this Section:

.1 Verification Samples: Submit 300 mm x 300 mm sample of each type of film to the Consultant.

1.5 PROJECT CLOSEOUT SUBMISSIONS

.1 Operation and Maintenance Data: Submit manufacturer's written instructions for cleaning solutions, materials and procedures, include name of original installer and contact information in accordance with Division 01.

1.6 QUALITY ASSURANCE

.1 Qualifications: Provide proof of qualifications when requested by Consultant:

.1 Installer: Use installers having experience with projects of similar extent and complexity and that have experience laminating film to glass on site for a minimum of five (5) years.

1.7 DELIVERY, STORAGE AND HANDLING

.1 Delivery and Acceptance Requirements: Deliver and store packaged materials in their original containers with manufacturer's labels and seals intact; store as recommended by manufacturer in a weatherproof enclosure.

1.8 SITE CONDITIONS

.1 Ambient Conditions: Proceed with film installation when ambient and substrate temperature conditions are within limits permitted by manufacturer and when glass substrates are free from wetness arising from frost, condensation, or other causes detrimental to adhesion.

2 Products

2.1 MANUFACTURERS

.1 Basis-of-Design Products: Products named in this Section were used as the basis-of-design for the project; additional manufacturers offering similar products may be incorporated into the work of this Section

.2 Acceptable Materials Manufacturers: Subject to compliance with requirements specified in this Section and as established by the Basis-of-Design Materials, manufacturers offering products that may be incorporated into the Work include the following:

.1 Avery Dennison Graphics

.2 Llumar Window Film

.3 3M Window Film Solutions

.4 Or approved equivalent as per Section 01 25 00.

2.2 GLAZING FILMS

.1 Translucent Glazing Film (GF): Single layer, translucent decorative film with pressure sensitive ultraviolet resistant adhesive and scratch resistant coating; computer generated and cut.

.1 Film Thickness: 1.97 mil

.2 Film Type: Polyester

.3 Opacity: Translucent

.4 Shading Coefficient: 0.44

.5 Visible Light Reflectance: 43%

.6 Visible Light Transmittance: 21%

.7 Surface Finish: Matte

.8 Basis-of-Design Materials: 3M FASARA Glass Finishes; Design Pattern: Milky Milky. (or approved equivalent)

3 Execution

3.1 EXAMINATION

.1 Examine glass and surrounding adjacent surfaces for conditions affecting installation; proceed with installation after verification and correction of surface conditions acceptable to manufacturer.

3.2 PREPARATION

.1 Prepare glazing films using computer generated CNC cutting methods to eliminate any cutting of films directly on glass at project site.

.2 Clean glass surfaces of substances that could impair glazing film bond including mould, mildew, oil, grease, dirt and other foreign materials immediately before beginning installation of films.

.3 Protect window frames and surrounding conditions from damage during installation.

3.3 INSTALLATION

.1 Install in accordance with the manufacturer's written instructions and the contract documents, plumb, true, and level over clean glazing.

.2 Install film continuously, but not necessarily in one continuous length, with no gaps or overlaps and as follows:

.1 Install seams vertical and plumb where necessary; horizontal seams will not be allowed.

.2 Do not remove release liner from film until just before each piece of film is cut and ready for installation.

.3 Install film with mounting solution and custom cut to the glass with neat, square comers and edges to within 3 mm of window frame.

.4 Remove air bubbles, wrinkles, blisters, and other defects.

.3 Installation Tolerances: Consultant will view film installation from a distance of 3 metres against a bright uniform sky or background and will accept installation where it appears uniform in appearance with no visible streaks, banding, thin spots or pinholes; remove and replace with new film when directed by the Consultant for materials not meeting requirements.

END OF SECTION

PART 1 - GENERAL

1.1 SECTION INCLUDES

.1 Design, labour, Products, tool, equipment and services necessary for aluminum work in accordance with the Contract Documents.

.2 Aluminum work: Shall mean aluminum curtainwall entrances, windows, operable units, vestibules, doors, and framing mentioned in Part 2 of this Specification Section.

1.2 REFERENCES

.1 AAMA 611, Voluntary Standards for Anodized Architectural Aluminum.

.2 AAMA CW-10, Care and Handling of Architectural Aluminum from Shop to Site.

.3 ANSI H35.1M, Alloy and Temper Designation Systems for Aluminum (Metric).

.4 ASTM A167, Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet and Strip.

.5 ASTM B209M, Specification for Aluminum and Aluminum-Alloy Sheet and Plate.

.6 ASTM B221M, Specification for Aluminum-Alloy Extruded Bars, Rods, Wires, Profiles and Tubes.

.7 ASTM C920, Specification for Elastomeric Joint Sealants.

.8 ASTM E283, Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.

.9 ASTM E331, Standard Test Method for Water Penetration of Exterior Windows, Curtain Walls and Doors by Uniform Static Air Pressure Difference.

.10 ASTM F738M, Specification for Stainless Steel Metric Bolts, Screws, and Studs.

.11 CAN/CGSB 1.108-M, Bituminous Solvent Type Paint.

.12 CAN/CGSB 79.1-M, Insect Screens.

.13 CAN/ULC S702, Thermal Insulation, Mineral Fibre, for Buildings.

1.3 DESIGN REQUIREMENTS

.1 Design aluminum work in accordance with following Climatic Design Data for **Waterloo** contained in the Ontario Building Code.

.2 Design aluminum work to accommodate following without producing detrimental effect:

.1 Cyclic 40°C daily thermal swing of components.

.2 Cyclic, dynamic loading and release of loads such as wind loads.

.3 13 mm vertical deflection in supporting structure and movement of supporting structure due to live, dead load, and creep or deflections, seismic load, sway displacement and similar items.

.3 Minimum condensation resistance expressed as Temperature Index (I) shall not be less than 59 as determined in accordance with CAN/SCA-A440.2 and using the following design conditions:

.1 Interior temperature: 20°C.

.2 Exterior temperature: -18°C.

.3 Interior RH: 30%.

.4 Restrict air infiltration/exfiltration, through aluminum work in accordance with ASTM E283 at pressure differential as indicated:

.1 Curtainwall and entrance assemblies: 0.0003 m^3/s m^2 at differential of 300 Pa.

.2 Doors (per door): 2.78 m_3/h m per linear metre of crack at differential of 75 Pa.

.3 Window: to CAN/CSA A440

.1 Minimum performance grade: Class AW-PG40-FW (fixed) and Class AW-PG40-AP (awning/hopper).

.2 Air tightness: A3 (0.5L/s*m2 at 300 Pa) at operable windows; 0.2L/s*m2 at 300 Pa for fixed windows.

.3 Water tightness: [B7].

.4 Wind load resistance: [C5].

.5 Forced Entry: [F10]

.5 Design and detail controlled drainage path to actively discharge water, which enters into or forms within aluminum work, to exterior; prevent accumulation or storage of water within aluminum work. Prevent water from entering interior when tested in accordance with ASTM E331.

.6 Design and detail air barrier, vapour retarder, and rainscreen products and assemblies into continuous and integrated aluminum work envelope. Optimize aluminum work design to align envelope layers and to minimize thermal bridges.

.7 Prevent deflection and permanent or progressive glazing displacement. Restrict horizontal and vertical mullion deflection to less than L/175 (under uniformly distributed positive design wind load), and 10 mm maximum regardless of span.

.8 Design anchorage inserts for installation as part of other Sections of Work. Design anchorage assemblies to accommodate construction and installation tolerances.

.9 Provide all reinforcing within aluminum members as required by design and OBC to provide structurally sound assembly. In any case, mullion size shall not be increased due to provision of reinforcing.

.10 Design aluminum work and connections to substrate where the bottom of the aluminum work extends to a point below 1070 mm above finished floor level and separates a floor level from an adjacent interconnected space to withstand the required guard and handrail loads in accordance with the OBC and applicable local regulations. When requested by Consultant, provide a letter signed and sealed by a Professional Engineer certifying that the aluminum work conforms to the OBC requirements.

1.5 SUBMITTALS

.1 Shop drawings: Submit shop drawings in accordance with the Conditions of the Contract indicating:

.1 Plans, sections, details, type of extrusions, profiles, finishes, panels, operating components, doors, related flashings, closures, fillers, and end caps, and sealants.

.2 Products and glazing types.

.3 Anchorage inserts, system installation tolerances.

.4 Section and hardware reinforcement, anchorage, assembly fixings.

.5 Detailing, locations, and allowances for movement, expansion, contraction

.6 Path of cavity drainage and air pressure equalization.

.2 Samples: Submit two samples of following in accordance with the Conditions of the Contract.

.1 250 mm long samples of each type of extrusion and finish.

.2 250 x 200 mm samples of insulating glass unit.

.3 One complete corner detail of door frame, glazing, and finish for each door type.

.4 Each door and window hardware item for Consultant's approval.

.5 200 x 200 mm sample of insect screen for operable windows for Consultant's approval of fibreglass mesh.

.3 Reports:

.1 Submit substantiating engineering data, and independent test results of pretested, aluminum work to substantiate compliance with the design criteria including air leakage and water penetration conforming to ASTM E283 and ASTM E331.

.2 Submit documentation to substantiate ten years of experience in aluminum window and door manufacture and installation.

.4 Close-out submittals: Submit window data for incorporation into the Operations and Maintenance Manual as part of the Conditions of the Contract.

1.6 QUALITY ASSURANCE

.1 Retain a Professional Engineer, licensed in Province of Ontario, with experience in aluminum work of comparable complexity and scope to perform the following services as part of the Work of this Section:

.1 Design of aluminum work.

.2 Review, stamp, and sign shop drawings.

.3 Conduct on-Site inspections and prepare and submit inspection reports.

.2 Mock-up:

.1 Fabricate, deliver, and erect one, full scale mock-up of each type of aluminum work, in location acceptable to Consultant.

.2 Demonstrate full range of Products, finishes, textures, quality of fabrication, and workmanship.

.3 Mock-up may form part of final Work, if acceptable to Consultant. Remove and dispose of mock-ups which do not form part of Work.

1.7 DELIVERY, STORAGE, AND HANDLING

.1 Handle aluminum work in accordance with AAMA CW-10.

.2 Protect aluminum surfaces with strippable coating. Do not use adhesive papers or sprayed coatings which bond when exposed to sunlight or weather. Do not remove before final cleaning of building.

1.8 EXTENDED WARRANTY

.1 Submit a warranty for aluminum work in accordance with General Conditions, except that warranty period is extended to 5 years.

.1 Warrant against failure to meet the design criteria and requirements such as interior leakage, insulating glass unit failure, finish degradation, frame condensation.

.2 Coverage: Complete replacement including affected adjacent Work.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURER(S) AND SYSTEM(S)

.1 **Thermally Broken Aluminum Curtainwall System** (Basis-of-Design Product). To be used in exterior wall locations where scheduled: ThermaWall TW2200 thermally broken stick curtain wall system: 50.8mm x 127mm, as manufactured by Alumicor.

.2 Subject to compliance with requirements, provide a comparable product by the following

.1 1620 Series Thermally Broken Curtainwall system by Kawneer.

.2 or approved equivalent as per Section 01 25 00.

.2 **Fixed Aluminum Framed Windows** (Basis of Design Product): Rainblade 1970 series, fixed, 133mm depth (or as detailed) architectural window as manufactured by Alumicor.

.2 Subject to compliance with requirements, comparable products by the following are accepted:

.1 526 IsoPort Window as manufactured by Kawneer

.2 Series 1200-F Fixed Window as manufactured by Oldcastle.

.3 875 Series by Windspec.

.4 or approved equivalent as per Section 01 25 00.

.3 **Operable Aluminum Framed Windows** (Basis of Design Product): UniVent 1350 series, awning (project out) architectural window as manufactured by Alumicor.

.2 Subject to compliance with requirements, comparable products by the following are accepted:

.1 518 IsoPort TPO as manufactured by Kawneer

.2 Series 2000-2A Open Out Awning Vent as manufactured by Oldcastle.

.3 535 Series Operable vents by Windspec.

.4 or approved equivalent as per Section 01 25 00.

.4 **Non-Thermal Interior Aluminum Framing** (Basis-of-Design Product). To be used at interior vestibule/partition locations where scheduled: Flushglaze TL1800 non-thermally broken storefront system: 44.5mm x 114mm, as manufactured by Alumicor.

.2 Subject to compliance with requirements, comparable products by the following are accepted:

.1 Trifab VersaGlaze 450 by Kawneer.

.2 FG-2000 Series as manufactured by Oldcastle.

.3 630 Series by Windspec.

.4 or approved equivalent as per Section 01 25 00.

.5 **Thermally Broken Aluminum Exterior doors (medium rail)**

.1 'ThermaPorte 7700' T400A by Alumicor Limited.

.2 '250/425' Series Thermal Entrance Doors by Kawneer Inc.

.3 HTP Series by Windspec.

.4 or approved equivalent as per Section 01 25 00.

.6 **Non-Thermal Aluminum Interior doors (medium rail)**

.1 Canadiana 400A by Alumicor

.2 300 Series Standard Entrance by Kawneer.

.3 350 Standard Commercial Door by Windspec.

.4 or approved equivalent as per Section 01 25 00.

2.2 MATERIALS

.1 All materials under Work of this Section, including but not limited to, sealants are to have low VOC content limits.

.2 Aluminum extrusions and channels: ASTM B221 and ANSI H35.1 AA6063 alloy, T6 temper.

.1 Profile and dimensions: Refer to Contract Drawings.

.2 Thermal breaks in frame members: Vertically aligned with glazing.

.3 Aluminum sheet: ASTM B209 and ANSI H35.1 AA1100 aluminum alloy, H14 temper, minimum 1.29 mm for sheets less than 610 mm wide and minimum 2.05 mm for sheets of a greater dimension.

.4 Reinforcements and anchors: ASTM A167, Type 304 to AISI No. 2B finish. Size as shown.

.5 Glass and glazing materials: As specified in Section 08800.

.6 Spandrel panel insulated panel airseal backpan: ASTM A653/A653M; 0.9 mm thick, Z275 galvanized steel sheet.

.7 Thermal Break: Ensure complete separation of interior and exterior components by means of a structural thermal break. Do not permit screws to penetrate thermal break.

.1 24mm dual polyamide thermal barrier together with 6mm EPDM isolator.

.8 Pressure Plate (at Curtain Wall): fibreglass or glass-reinforced polyamide (aluminum not acceptable.

.9 Airseal and aluminum work sealant: ASTM C920, Type S, Grade NS, Class 100/50; One-part, low-modulus, moisture-curing, silicone. 'Dow Corning 790' by Dow Corning; 'Spectrem 1' by Tremco. Verify compatibility with insulating glass unit manufacturer's secondary sealant. Colour as selected by Consultant. Primer as recommended by manufacturer.

.10 Frame sealant: Type as recommended by the aluminum work manufacturer.

.11 Joint backing: Closed cell foam polyethylene rod, outsized minimum 30-50% larger than joint width and compatible with joint sealant. Product as recommended by sealant manufacturer.

.12 Airseal transition membrane as per Spec 07 26 50.

.13 Anchors, clips, and angles: Extruded aluminum or stainless steel.

.14 Shims and blocking for frame: Rigid plastic, wood is not permitted.

.15 Flashings, closures and trim: 1.0 mm minimum aluminum sheet, finish to match curtain wall/window framing finish.

.16 Screws, bolts and other fasteners: ASTM F738M; Stainless Steel Type 304.

.17 Isolation coating: CAN/CGSB-1.108-M; Bitumastic coating, acid and alkali resistant material.

.18 Spray Foam Insulation: CFC free, polyurethane foam in place, closed cell low expansion, one component, minimum density 15 kg/m3.

.1 'ENERFOAM' by Dow Chemical Canada.

.2 'IPF All Weather Pro' by Rivenco Industries.

.19 Window hardware: Manufacturer's standard heavy duty stainless steel hardware. Provide samples for the Consultant's approval.

.1 Provide each Top Hung/Projecting Out window unit with crank operated, scissor type roto-operator, complete with telescopic operator for all hardware located more than 1830mm (6'-0") above finished floor. Provide a total of 6 operators.

.2 Include restrictor to limit window opening to 225mm (9").

.19 Aluminum Insect screen (operable units): Extruded aluminum frames containing heavy duty, fine fibreglass mesh in accordance with CSA A440. Provide samples for the Consultant's approval.

.20 Weatherstripping: Durable, non-absorbing material resistant to deterioration by aging and weathering.

2.3 FABRICATION

.1 Fabricate sections true to detail, free from defects impairing appearance, strength and durability. Fabricate extrusions with sharp, well defined corners.

.2 Fabricate aluminum work systems in accordance with reviewed shop drawings and manufacturer's written instructions.

.3 Fabricate, fit, and secure framing joints and corners accurately, with flush surfaces, and hairline joints. Apply frame sealant at joints for weatherproof seams.

.4 Conceal anchors, reinforcement and attachments from view. Fabricate reinforcement in accordance with design requirements.

.5 Do not expose manufacturer's identification labels on aluminum assemblies.

.6 Fabricate continuous sill flashings with intermediate anchor clips, and joint reinforcing, form to profile shown. Fabricate filler and closure pieces as necessary for a complete and weather tight installation.

.7 Position operable windows on main frame to provide direction of opening specified, free and smooth operation, without binding or sticking against main frame members.

.8 Fabricate doors and frames complete with internal reinforcements, cut-outs, and recesses to accommodate finish hardware. Reinforce cut-outs to assure adequate strength.

.9 Fabricate aluminum work closures and trim from aluminum sheet. Form to profile shown. Make weathertight.

.10 Double weatherstrip windows and doors. Install weatherstripping in specially extruded ports and secure to prevent shrinkage or movement.

.11 Fabricate glazing recess with drainage to exterior.

2.4 FINISH

.1 Exterior extrusion finish: exposed aluminum surfaces To AA DAF-45-M12C22A44, Architectural Class I, anodized 18 µm (0.0007 inches) minimum thickness, coloured clear.

.2 Interior exposed aluminum surfaces: To AA DAF-45-M12C22A44, Architectural Class I, anodized 18 µm (0.0007 inches) minimum thickness, coloured clear.

3 EXECUTION

3.1 INSTALLATION

.1 Install aluminum work in accordance with reviewed shop drawings, manufacturer's written instructions, and CSA A440/A440.1.

.2 Install Work of this Section securely, in correct location, level, square, plumb, at proper elevations, free of warp or twist.

.3 Apply isolation coating at 0.8 mm dry film thickness to prevent corrosive or electrolytic action between dissimilar materials such as aluminum to concrete, masonry, galvanized steel and similar conditions.

.4 Install flashings, closures, and trim pieces.

.5 Fill voids between aluminum framing and adjacent construction with foam insulation.

.6 Install sills in maximum lengths possible. For sills over 1200 mm in length, maintain 3 mm to 6 mm space at each end.

.7 Refer to Contract Drawings for glazing type locations. Install glazing in accordance with Section 08 80 00.

.8 Automatic door operators to be supplied and installed by Section 08 70 00. Install doors and hardware to manufacturers' written instructions. Clean and adjust hardware for correct performance.

.9 Install aluminum door manufacturer's standard weatherstripping at door frame perimeter. Install weatherstripping throughout entire length and width of doors at jambs and heads.

.10 Install doors and hardware to manufacturers' written instructions. Clean and adjust hardware for correct performance.

.11 Adjust operable parts for correct function.

.12 Remove damaged or unacceptable Products and assemblies from Site and replace to Consultant's acceptance.

.13 Install glass presence markers, in two cross stripes extending from diagonal corners. Maintain markers until final clean-up.

3.2 ERECTION TOLERANCES

.1 Tolerances: Non-cumulative.

.1 Maximum variation from plumb: 1.5 mm/3 m non-cumulative or 12 mm/30 m, whichever is less.

.2 Maximum misalignment of two adjoining members abutting in plane: 0.8 mm.

.3 Vertical and horizontal positions: +/- 3 mm.

.4 Racking of face: 6 mm, nil in elevation.

.5 Operable components: Consistent with smooth operation and weatherproof performance.

.6 Maximum perimeter sealant joint between aluminum work and adjacent construction: 13 mm.

3.3 GLAZING PERIMETER AIRSEAL

.1 Install glazing perimeter airseal at entire perimeter of each insulating glass unit to achieve an airseal from insulating glass unit to curtain wall frame. Do not obstruct path of cavity drainage and air pressure equalization.

.2 Perform sealant work in accordance with manufacturer's written requirements.

3.4 AIRSEAL TRANSITION MEMBRANE

.1 Install primer and airseal transition membrane in accordance with manufacturer's instructions. Install airseal transition membrane into extrusion reglet as indicated on drawings. If there is no extrusion reglet, mechanically fasten airseal transition membrane to frame with batten bar fastened at 150 mm o.c.

.2 Overlap airseal transition membrane 75 mm minimum and lap in direction of waterflow.

.3 Coordinate airseal transition to adjacent parts of Work.

3.5 JOINT BACKING AND ALUMINUM WORK SEALANT

.1 Prepare substrate surface and mask as recommended by sealant manufacturer.

.2 Install joint backing and sealant at aluminum work and perimeter joints for weather tight installation in accordance with sealant manufacturer's instructions. Tool sealant. Remove excess sealant.

3.6 CLEANING

.1 Maintain aluminum work, inside and outside, in clean condition throughout construction period.

.2 Remove labels, protective material, and glass presence markers from prefinished surfaces.

.3 Remove CSA A440/A440.1 certification labeling when directed by Consultant, in writing.

.4 Wash aluminum work with solution of mild detergent in warm water, with particular attention to recesses and corners. Wipe surfaces clean and dry.

END OF SECTION

1 General

1.1 SUMMARY

.1 Section Includes the following:

.1 Non-load-bearing steel framing systems for interior partitions.

.2 Suspension systems for interior ceilings and soffits.

.3 Grid suspension systems for gypsum board ceilings.

1.2 REFERENCE STANDARDS

.1 Canadian Standards Association (CSA):

.1 CSA S136-07, North American Specification for the Design of Cold-Formed Steel Structural Members.

.2 Canadian General Standards Board (CGSB):

.1 CAN/CGSB-7.1-98, Lightweight Steel Wall Framing Components

.3 American Society for Testing and Materials International (ASTM):

.1 ASTM A641/A641M-09a, Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire.

.2 ASTM A653/A653M-11 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

.3 ASTM A792/A792M-10, Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.

.4 ASTM A875/A875M-10, Specification for Steel Sheet, Zinc-5% Aluminum Alloy-coated by the Hot Dip Process.

.5 ASTM A1003/A1003M-12, Specification for Steel Sheet, Carbon, Metallic and Non-Metallic Coated for Cold Formed Framing Members.

.6 ASTM C11-10a, Standard Terminology Relating to Gypsum and Related Building Materials.

.7 ASTM C473-12, Standard Test Methods for Physical Testing of Gypsum Panel Products.

.8 ASTM C645-11a, Standard Specification for Nonstructural Steel Framing Members.

.9 ASTM C665-12, Standard Specification for Mineral-Fibre Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.

.10 ASTM C754-11, Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products.

.11 ASTM C834-10, Standard Specification for Latex Sealants.

.12 ASTM C841-03(2008)e1, Standard Specification for Installation of Interior Lathing and Furring.

.13 ASTM C954-11, Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs From 0.033" to 0.112" in Thickness.

.14 ASTM C955-11c, Standard Specification for Load-Bearing (Transverse and Axial) Steel Studs, Runners (Tracks), and Bracing or Bridging for Screw Application of Gypsum Panel Products and Metal Plaster Bases

.15 ASTM C1002-07, Standard Specification for Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs.

.4 Canadian Sheet Steel Building Institute (CSSBI):

.1 CSSBI S6-2011, Guide Specification for Lightweight Steel Framing

1.3 SUBMITTALS

.1 Provide submittals in accordance with Division 01.

.2 Action Submittals: Provide the following submittals before starting any work of this Section:

.1 Product Data: Submit manufacturer's product data for each materials specified including recommended application rates and methods of installation.

.3 Informational Submittals: Provide the following submittals during the course of the work:

.1 Product Certificates: For each type of code-compliance certification for studs and tracks.

.2 Shop Drawings: Submit shop drawings showing the design, construction and relevant details of furring, enclosures and partitions which require a fire rating.

1.4 QUALITY ASSURANCE

.1 Code-Compliance Certification of Studs and Tracks: Provide documentation that framing members are certified according to the product-certification program of the Steel Stud Manufacturers Association (SSMA).

.2 Contractor executing work of this Section shall have a minimum of five (5) years continuous experience in successful installation of work of type and quality shown and specified. Submit proof of experience upon Consultant's request.

1.5 DELIVERY, STORAGE, HANDLING AND PROTECTION

.1 Coordinate deliveries to comply with construction schedule and arrange ahead for off the ground, enclosed, under cover storage location. Do not load any area beyond the design limits.

.2 Materials shall be carefully checked, unloaded, stored and handled to prevent damage. Protect materials with suitable non-staining waterproof coverings.

.3 Store material in original, undamaged containers or wrappings with manufacturer's seals and labels intact, in accordance with GA-238 and manufacturer's recommendations.

2 Products

2.1 PERFORMANCE REQUIREMENTS

.1 Fire-Test-Response Characteristics: For fire-resistance-rated assemblies that incorporate non-load-bearing steel framing, provide materials and construction identical to those tested in assembly indicated, according to ASTM E119 by an independent testing agency.

.2 STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated on Drawings, according to ASTM E90 and classified according to ASTM E413 by an independent testing agency.

2.2 FRAMING SYSTEMS

.1 Framing Members, General: Comply with ASTM C754 for conditions indicated.

.1 Steel Sheet Components: Comply with ASTM C645 requirements for steel unless otherwise indicated.

.2 Steel sheet components shall comply with ASTM C645 requirements for metal, unless otherwise indicated.

.3 Steel for non-loadbearing members shall have metallic coats that conform to ASTM A653M or ASTM A792M with minimum metallic coating weighs (mass) of Z120 and AZM150 respectively.

.4 Framing members shall comply with the CAN/CSA S136 - North American Specification for the Design of Cold Formed Steel Structural Members, for conditions indicated.

.5 Isolate where necessary to prevent electrolysis due to dissimilar metal-to-metal contact or metal-to-masonry and concrete contact. Use bituminous paint, butyl tape or other approved divorcing material.

.2 Studs and Tracks: ASTM C645.

.1 Steel Studs and Tracks:

.1 Minimum 0.0179" (25 gauge), screwable with crimped web and returned flange. Provide knockout openings in web at 150mm (6") O.C. to accommodate (if required) horizontal mechanical and electrical service lines, and bracing. Widths as indicated on drawings. Provide structural studs where indicated.

.2 Framing behind all fire resistant gypsum board shall be minimum 0.0329" (20 gauge).

.3 Where metal stud framing forms walls are to be thermally insulated as indicated on drawings, provide metal studs with integrated fastening system for glass fibre/mineral fibre insulation.

.4 Provide special shapes indicated on drawings as part of steel stud/drywall assemblies.

.3 Slip-Type Head Joints: Where indicated, provide one of the following:

.1 Clip System: Clips designed for use in head-of-wall deflection conditions that provide a positive attachment of studs to tracks while allowing 2" (51-mm) minimum vertical movement.

.2 Double-Track System: ASTM C645 top outer tracks, inside track with 2" (51 mm) deep flanges in thickness not less than indicated for studs and fastened to studs, and outer track sized to friction-fit over inner track.

.3 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 in width to accommodate depth of studs.

.4 Flat Strap and Backing Plate: Steel sheet for blocking and bracing in length and width indicated.

.1 Minimum Base-Steel Thickness: As indicated on Drawings.

.5 Cold-Rolled Channel Bridging: Steel, 0.0538" (1.367 mm) minimum base-steel thickness, with minimum ½" (13 mm) wide flanges.

.1 Depth: As indicated on Drawings.

.2 Clip Angle: Not less than 1-1/2" x 1-1/2" (38 mm x 38 mm), 0.068" (1.72 mm) thick, galvanized steel.

.6 Hat-Shaped, Rigid Furring Channels: ASTM C645.

.1 Depth: As indicated on Drawings.

.7 Resilient Furring Channels: ½" (13 mm) deep, steel sheet members designed to reduce sound transmission.

.1 Configuration: hat shaped.

.8 Cold-Rolled Furring Channels: 0.053" (1.34 mm) uncoated-steel thickness, with minimum ½" (13 mm) wide flanges.

.1 Depth: As indicated on Drawings

.2 Furring Brackets: Adjustable, corrugated-edge-type steel sheet with minimum uncoated-steel thickness of 0.0329" (0.8 mm).

.3 Tie Wire: ASTM A641/A641M, Class 1 zinc coating, soft temper, 0.062" (1.59 mm) diameter wire, or double strand of 0.048" (1.21 mm) diameter wire.

.9 Z-Shaped Furring: With slotted or nonslotted web, face flange of 1-1/4" (32 mm), wall attachment flange of 7/8" (22 mm), minimum uncoated-steel thickness of 0.0179" (0.455 mm), and depth required to fit insulation thickness indicated.

2.3 SUSPENSION SYSTEMS

.1 Tie Wire: ASTM A641/A641M, Class 1 zinc coating, soft temper, 0.062" (1.59 mm) diameter wire, or double strand of 0.048" (1.21 mm) diameter wire.

.2 Wire Hangers: ASTM A641/A641M, Class 1 zinc coating, soft temper, 0.16" (4.12 mm) in diameter.

.3 Flat Hangers: Steel sheet, in size indicated on Drawings.

.4 Carrying Channels (Main Runners): Cold-rolled, commercial-steel sheet with a base-steel thickness of 0.0538" (1.367 mm) and minimum ½" (13 mm) wide flanges.

.1 Depth: As indicated on Drawings.

.5 Furring Channels (Furring Members):

.1 Cold-Rolled Channels: 0.0538" (1.367 mm) uncoated-steel thickness, with minimum ½" (13 mm) wide flanges, ¾" (19 mm) deep.

.2 Steel Studs and Tracks: ASTM C645.

.1 Depth: As indicated on Drawings.

.3 Hat-Shaped, Rigid Furring Channels: ASTM C645, 7/8 inch (22 mm) deep.

.4 Resilient Furring Channels: 1/2"' (13 mm) deep members designed to reduce sound transmission.

.1 Configuration: Hat shaped.

.6 Grid Suspension System for Gypsum Board Ceilings: ASTM C645, direct-hung system composed of main beams and cross-furring members that interlock.

2.4 AUXILIARY MATERIALS

.1 General: Provide auxiliary materials that comply with referenced installation standards.

.1 Fasteners for Steel Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.

.2 Isolation Strip at Exterior Walls: Provide one of the following:

.1 Asphalt-Saturated Organic Felt: ASTM D226/D226M, Type I (No. 15 asphalt felt), nonperforated.

.2 Foam Gasket: Adhesive-backed, closed-cell vinyl foam strips that allow fastener penetration without foam displacement, 1/8" (3.2 mm) thick, in width to suit steel stud size.

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 of the Work.

.2 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 hangers at spacing required to support the Work and that hangers 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 tracks 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 24" (610 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 are required for fire-resistance ratings indicated. Protect adjacent fire-resistive materials from damage.

3.3 INSTALLATION, GENERAL

.1 Installation Standard: ASTM C754.

.1 Gypsum Plaster Assemblies: Also comply with requirements in ASTM C841 that apply to framing installation.

.2 Gypsum Board Assemblies: Also comply with requirements in ASTM C840 that apply to framing installation.

.2 Install framing and accessories plumb, square, and true to line, with connections securely fastened.

.3 Install supplementary framing, and blocking to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction.

.4 Install bracing at terminations in assemblies.

.5 Do not bridge building control and expansion joints with non-load-bearing steel framing members. Frame both sides of joints independently.

3.4 INSTALLING FRAMED ASSEMBLIES

.1 Install framing system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.

.2 Where studs are installed directly against exterior masonry walls or dissimilar metals at exterior walls, install isolation strip between studs and exterior wall.

.3 Install studs so flanges within framing system point in same direction.

.4 Install tracks at 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 that penetrate partitions above ceiling.

.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.

.2 Door Openings: Screw vertical studs at jambs to jamb anchor clips on door frames; install track section (for cripple studs) at head and secure to jamb studs.

.1 Extend jamb studs through suspended ceilings and attach to underside of overhead structure.

.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 studs equally along arcs. On straight lengths of no fewer than two studs at ends of arcs, place studs 6" (150 mm) o.c.

.5 Direct Furring:

.1 Screw to wood framing.

.2 Attach to concrete or masonry with stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches (610 mm) o.c.

.6 Z-Shaped Furring Members:

.1 Erect insulation, vertically and hold in place with Z-shaped furring members spaced 24" (610 mm).

.2 Except at exterior corners, securely attach narrow flanges of furring members to wall with concrete stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24" (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 12" (305 mm) from corner and cut insulation to fit.

.7 Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8" (3 mm) from the plane formed by faces of adjacent framing.

3.5 INSTALLING CEILING SUSPENSION SYSTEMS

.1 Install suspension system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.

.1 Hangers: 48" (1219 mm).

.2 Carrying Channels (Main Runners): 48" (1219 mm)

.3 Furring Channels (Furring Members): 24" (610 mm), unless otherwise indicated on the Drawings.

.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 Suspend 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 Splay hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.

.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 structures 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 Flat Hangers: Secure to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices and fasteners that are secure and appropriate for structure and hanger, and in a manner that will not cause hangers to deteriorate or otherwise fail.

.5 Do not attach hangers to steel roof deck.

.6 Do not attach hangers to permanent metal forms. Furnish cast-in-place hanger inserts that extend through forms.

.7 Do not attach hangers to rolled-in hanger tabs of composite steel floor deck.

.8 Do not connect or suspend steel framing from ducts, pipes, or conduit.

.4 Fire-Resistance-Rated Assemblies: Wire tie furring channels to supports.

.5 Grid Suspension Systems: Attach perimeter wall track or angle where grid suspension systems meet vertical surfaces. Mechanically join main beam and cross-furring members to each other and butt-cut to fit into wall track.

.6 Installation Tolerances: Install suspension systems that are level to within 1/8" in 12' (3 mm in 3.6 m) measured lengthwise on each member that will receive finishes and transversely between parallel members that will receive finishes.

END OF SECTION

1 General

1.1 SUMMARY

.1 This Section includes requirement for supply and installation of components required for a complete gypsum board assembly with proprietary components as follows:

.1 Gypsum Board Panels:

.1 Standard Gypsum Board

.2 Fire-Rated Gypsum Board 'Type X'

.3 Gypsum Ceiling Board

.4 Tile Backer Board

.5 Abuse Resistance Gypsum Board

.6 Exterior Sheathing Board

.7 Exterior Soffit Board

.2 Gypsum Wallboard Accessories:

.1 Screws, tape, joint compound and all other accessories required for gypsum board ceiling and wall partitions.

1.2 REFERENCE STANDARDS

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

.1 ASTM A641/A641M-09a, Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire.

.2 ASTM A653/A653M-11 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

.3 ASTM A792/A792M-10, Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.

.4 ASTM A875/A875M-10, Specification for Steel Sheet, Zinc-5% Aluminum Alloy-coated by the Hot Dip Process.

.5 ASTM A1003/A1003M-12, Specification for Steel Sheet, Carbon, Metallic and Non-Metallic Coated for Cold Formed Framing Members.

.6 ASTM C11-10a, Standard Terminology Relating to Gypsum and Related Building Materials.

.7 ASTM C473-12, Standard Test Methods for Physical Testing of Gypsum Panel Products.

.8 ASTM C475/C475M-12, Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board.

.9 ASTM C514-04(2009)e1, Standard Specifications for Nails for the Application of Gypsum Board.

.10 ASTM C645-11a, Standard Specification for Nonstructural Steel Framing Members.

.11 ASTM C665-12, Standard Specification for Mineral-Fibre Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.

.12 ASTM C754-11, Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products.

.13 ASTM C834-10, Standard Specification for Latex Sealants.

.14 ASTM C840-11, Standard Specification for Application and Finishing of Gypsum Board.

.15 ASTM C841-03(2008)e1, Standard Specification for Installation of Interior Lathing and Furring.

.16 ASTM C954-11, Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs From 0.033" to 0.112" in Thickness.

.17 ASTM C955-11c, Standard Specification for Load-Bearing (Transverse and Axial) Steel Studs, Runners (Tracks), and Bracing or Bridging for Screw Application of Gypsum Panel Products and Metal Plaster Bases

.18 ASTM C1002-07, Standard Specification for Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs.

.19 ASTM C1047-10a, Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base.

.20 ASTM C1177/C1177M-08, Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing.

.21 ASTM C1178/C1178M-11, Standard Specification for Coated Glass Mat Water-Resistant Gypsum Backing Panel.

.22 ASTM C1186-08, Standard Specification for Flat Fiber-Cement Sheets.

.23 ASTM C1278/C1278M-07a(2011), Standard Specification for Fiber-Reinforced Gypsum Panel.

.24 ASTM C1396/C1396M-11, Standard Specification for Gypsum Board.

.25 ASTM C1629/C1629M-06(2011), Standard Classification for Abuse-Resistant Nondecorated Interior Gypsum Panel Products and Fiber-Reinforced Cement Panels.

.26 ASTM C1658/C1658M-12, Standard Specification for Glass Mat Gypsum Panels.

.27 ASTM D3273-12, Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber.

.28 ASTM D3274-09, Standard Test Method for Evaluating Degree of Surface Disfigurement of Paint Films by Fungal or Algal Growth, or Soil and Dirt Accumulation.

.29 ASTM D3678-97(2008)e1, Standard Specification for Rigid Poly (Vinyl Chloride) (PVC) Interior-Profile Extrusions.

.2 Gypsum Association (GA):

.1 GA-214-10, Recommended Levels of Gypsum Board Finish.

.2 GA-216-10, Application and Finishing of Gypsum Board.

.3 GA-231-06, Assessing Water Damage to Gypsum Board.

.4 GA-238-03, Guidelines for the Prevention of Mold Growth on Gypsum Board.

.3 Underwriters Laboratories of Canada (ULC):

.1 CAN/ULC S101-07, Standard Methods of Fire Endurance Tests of Building Construction and Materials

.2 CAN/ULC S102-10, Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies

.3 ULC List of Equipment and Materials

.4 Underwriters' Laboratories (UL), Standards for Safety acceptable to the Standards Council of Canada (SCC)

1.3 QUALITY ASSURANCE

.1 Contractor executing work of this Section shall have a minimum of five (5) years continuous experience in successful installation of work of type and quality shown and specified.

.2 Submit proof of experience upon Consultant's request.

1.4 SUBMITTALS

.1 Provide submittals in accordance with the requirements of Division 01.

.2 Shop Drawings: Submit shop drawings showing the design, construction and relevant details of furring, enclosures and partitions which require a fire rating.

.3 Product Data: Submit manufacturer's current technical literature for each component.

.4 Samples: Supply for Consultant's review, if requested, samples of the following:

.1 Board: Submit sample of each panel product specified, 150mm (6") square.

.2 Trim: Submit sample of each type of trim specified, 305mm (12") long.

.5 Quality Assurance Submittals:

.1 Design Data, Test Reports: Provide manufacturer's test reports indicating product compliance with indicated requirements.

.2 Manufacturer's Instructions: Provide manufacturer's written installation instructions.

1.5 DELIVERY, STORAGE, HANDLING AND PROTECTION

.1 Coordinate deliveries to comply with construction schedule and arrange ahead for off the ground, enclosed, under cover storage location. Do not load any area beyond the design limits.

.2 Materials shall be carefully checked, unloaded, stored and handled to prevent damage. Protect materials with suitable non-staining waterproof coverings.

.3 Store material in original, undamaged containers or wrappings with manufacturer's seals and labels intact, in accordance with GA-238 and manufacturer's recommendations.

.4 Protect bagged products from excessive moisture or wetting. Store metal component sections in crates to prevent damage to material. Do not use bent or deformed material.

1.6 PROJECT CONDITIONS

.1 Establish and maintain environmental conditions for application and finishing gypsum wallboard to comply with ASTM C 840 and in accordance with manufacturer's written instructions.

.2 In cold weather (outdoor temperatures less than 13 deg. C, controlled heat in the range of 13 deg. C to 21 deg. C must be provided. Recommended temperature must be maintained twenty-four (24) hours before, during, and after entire gypsum board joint finishing and until the permanent heating system is in operation or the building is occupied.

.1 Minimum temperature of 10 deg. C shall be maintained during gypsum board application.

.3 Ventilate building spaces to remove excess moisture and humidity during the drying process. Avoid drafts during dry, hot weather to prevent materials from drying too rapidly.

2 Products

2.1 MATERIALS – WALLBOARD (GWB)

.1 Standard Gypsum Board:

.1 Conforming to ASTM C1396, ivory paper faced, tapered edges, 1220mm (48") wide sheets of maximum practical lengths to minimize end joints, 1/2" thick unless indicated otherwise on drawings.

.1 Sheetrock Brand Gypsum Panels by CGC Inc.

.2 ProRoc Regular by CertainTeed.

.3 ToughRock Gypsum Wallboard by Georgia-Pacific Canada.

.4 Or approved equivalent.

.2 Fire-Rated Gypsum Board 'Type X':

.1 Conforming to ASTM C1396, 1220mm (48") wide sheets of maximum practical lengths to minimize end joints, tapered edges, 16mm (5/8") thick, as indicated on drawing.

.1 Sheetrock Brand Gypsum Panels, Firecode Core by CGC Inc.

.2 ProRoc Type X by CertainTeed.

.3 ToughRock Fireguard Gypsum Board by Georgia-Pacific Canada.

.4 Or approved equivalent.

.3 Gypsum Ceiling Board:

.1 Sag Resistant Gypsum Board: Meeting requirements of ASTM C1396M, ceiling board manufactured to have more sag resistance than regular type gypsum board with long edges tapered, and as follows:

.1 Location: Ceiling surfaces.

.2 Acceptable Materials:

.1 Sheetrock Interior Ceiling Board by CGC Inc.

.2 Tough Rock CD Ceiling Board by Georgia Pacific Canada.

.3 ProRoc Interior Ceiling Board by CertainTeed.

.4 Or approved equivalent.

.4 Tile Backer Board:

.1 Glass Mat Water Resistant Gypsum Backer Board: Manufactured in accordance with ASTM C1178 and C1658 to produce greater resistance to water penetration and to provide improved surface bonding characteristics for ceramic tile than standard gypsum board:

.1 Location: Substrate for ceramic tile.

.2 Acceptable Materials:

.1 Fiberock Aqua Tough Tile Backerboard by CGC Inc.

.2 Diamondback Tile Backer by CertainTeed.

.3 GlasRoc Tile Backer by Georgia-Pacific Canada.

.4 Or approved equivalent.

.5 Abuse Resistant Gypsum Board:

.1 Manufactured to produce greater resistance to surface indentation and impact penetration resistance than standard gypsum panels:

.1 Gypsum panels with glass fibre reinforced core, tapered edges, minimum 5/8" thickness, Type X ULC fire rating, conforming to ASTM C1396M and tested to the following performance ratings.

.2 Acceptable Materials:

.1 Sheetrock Abuse Resistant Firecode by CGC Inc.

.2 Abuse Resistant Type X by CertainTeed.

.3 ToughRock Abuse Resistant Fireguard by Georgia Pacific Canada.

.4 Or approved equivalent.

.6 Exterior Sheathing Board:

.1 Glass mat faced, water-resistant treated core gypsum board, 1220mm (48") wide sheets of maximum practical lengths to minimize end joints, 13mm (1/2") thick, silicone treated gypsum core, front and back faces penetrated with inorganic glass fibre mats, square edge, conforming to ASTM C1177. Mould resistant panel score of 10 when tested in accordance with ASTM D3273 and evaluated to ASTM D3274.

.1 Securock Glass-Mat Sheathing by CGC Inc.

.2 Dens-Glass Gold by Georgia-Pacific Canada.

.3 GlasRoc Sheathing by CertainTeed.

.4 Or approved equivalent.

.7 Exterior Soffit Board:

.1 Mould and moisture resistant cement board, non-combustible, 1220mm (48") wide sheets of maximum practical lengths to minimize end joints, 13mm (1/2") thick, aggregated portland cement core wrapped in polymer-coated, glass-fiber mesh. panel score of 10 when tested in accordance with ASTM D3273:

.1 Acceptable Materials:

.1 Durock by CGC Inc.

.2 PermaBase Cement Board by CertainTeed

.3 ToughRock Fireguard Soffit Board by Georgia-Pacific Canada.

.4 Or approved equivalent.

2.2 ACCESSORIES

.1 Concrete Anchors:

.1 Self-drilling tie wire anchors, "Red-Head No. T-32" by Phillips Drill Company, Division of ITT Industries of Canada Ltd., (or approved alternate).

.2 Concrete Inserts:

.1 Hot-dip galvanized "turtle back" type concrete inserts to suit conditions as approved by Consultant, by Acrow-Richmond National Concrete Accessories, Division of Premetalco Inc., (or approved alternate).

.3 Mineral Fibre Acoustical Insulation: As indicated in Section 07 21 16.

.4 Gypsum Wallboard Accessories:

.1 In general, gypsum wallboard accessories shall conform to ASTM C1047.

.2 Corner Beads:

.1 Made from galvanized steel sheet conforming to ASTM A653, minimum 0.0179" (25 gauge). Minimum width of flanges 28mm for 13mm (1-1/8" for 1/2") thick wallboard and 32mm for 16mm (1-1/4" for 5/8") thick wallboard.

.3 Casing Beads:

.1 Made from galvanized steel sheet conforming to ASTM A653, minimum 30 gauge, U-shaped designed for finishing with joint compound.

.4 Control Joints:

.1 Made from galvanized sheet steel conforming to ASTM A653, minimum 0.0179" (25 gauge), or roll-formed zinc-alloy to resist corrosion, with expansion joint material perforated flanges.

.1 'Zinc Control Joint No. 093' by CGC Inc.

.2 (or approved alternate).

.5 Reveals:

.1 Galvanized sheet steel conforming to ASTM A653, minimum 0.0179" (25 gauge), in profiles as indicated on drawings.

.5 Wallboard Screws:

.1 Corrosion resistant, self-drilling, self-tapping gypsum wallboard screws conforming to ASTM C1002 (Type S) and ASTM C954 (Type S-12), 25mm (1") long No. 6 for single layer application, 41mm (1-5/8") long No. 7 for double layer application.

.2 At fire rated construction, type and size of wallboard screw shall be same as used in fire-rating test.

.6 Joint Compound for Interior Gypsum Board:

.1 Conforming to ASTM C475 and as recommended by gypsum wallboard, fire-rated gypsum wallboard and exterior wallboard manufacturers to suit conditions.

.7 Joint Compound for Tile Backing Panels:

.1 Gypsum based tile backing board: Use setting type taping and setting type, sandable topping compounds.

.8 Joint Compound for Exterior Sheathing Boards and Soffit Panels:

.1 Fibreglass mesh tape.

.9 Joint Compound for Abuse-Resistant Panels:

.1 ToughRock™ Sandable Joint Compound, by Georgia-Pacific.

.2 Durabond/Sheetrock Setting-Type Joint Compound, by CGC Canada Inc.

.3 Or approved equivalent.

.10 Resilient Sponge Tape:

.1 Closed cell neoprene sponge type tape with self-sticking adhesive on one side. 'Permastik 122X' by Jacobs and Thompson Ltd., or foamed vinyl type tape, 'Arnofoam' by Arno Adhesive Tape Incorporated, (or approved alternate).

.11 Adhesive:

.1 Conforming to CGSB 71-GP-25M, and as recommended by manufacturer and compatible with contacted surfaces.

3 Execution

3.1 EXAMINATION

.1 Examine gypsum wallboard panels for damage and existence of mould. Install only undamaged panels.

.2 Examine gypsum wallboard in accordance with GA-231 for water damage.

.3 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.

.4 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 hangers at spacing required to support the Work and that hangers will develop their full strength.

.2 Coordinate installation of gypsum board suspension systems with installation of acoustical ceiling tiles (ACT) suspension systems. Where gypsum board suspension systems abut ACT systems, ensure that ceiling tiles grid fit into gypsum grid without affecting overall design and appearance.

.3 Furnish concrete inserts and other devices indicated to other trades for installation in advance of time needed for coordination and construction.

3.3 INSTALLATION - GENERAL

.1 Conform to ASTM C840, except as otherwise specified herein. Co-operate with mechanical, electrical and other trades to accommodate fixtures, fittings and other items in wallboard areas.

.2 Review extent of temporary heat provided. Carry out the work of this Section only when temperature is maintained and controlled in the range of 13 deg. C to 21 deg. C for at least twenty-four (24) hours before installing gypsum board and shall be maintained until joint compound and adhesives are dried or cured.

.3 Bring gypsum board into contact, but do not force into place.

3.4 GYPSUM WALLBOARD - SINGLE LAYER APPLICATION

.1 Metal Studs:

.1 Apply gypsum wallboard with screws. Erect wallboard with long dimension at right angles to supports. For fire rated partitions, erect board vertically or horizontally according to the ULC listing. Locate end joints over supporting members.

.2 Locate vertical joints at least 305mm (12") from the jamb/head/sill lines of openings.

.3 For parallel application space screws at 200mm (8") O.C. at board edges at 305mm (12") O.C. on board fields.

.2 Fasteners:

.1 Perimeter screws shall be not less than 10mm (3/8") from edges and ends and shall be opposite the screws on adjacent boards.

.2 Screws shall be driven with a power screw gun and set with countersunk head slightly below the surface of the board.

.3 Joints:

.1 Finish all joints.

3.5 GYPSUM WALLBOARD - DOUBLE LAYER APPLICATION

.1 General:

.1 Lay out work to minimize end joints on the face layer and to offset parallel joints between face and base layers by at least 254mm (10"). Apply the face layer at right angles to the base layer.

.2 Base Layer:

.1 The base layer shall be same as face layer or wallboard backing board applied at right angles to framing members. Secure base layers with screws spaced 305mm (12") O.C. to each member. Perimeter screws shall be opposite the screws on adjacent boards.

.2 The surface of the erected base layer shall be straight, plumb or level, and without protrusions before the face layer is applied.

.3 Face Layer:

.1 Apply face layer at right angles to base layer with adhesive. Apply adhesive with a notched spreader to leave 10mm x 13mm (3/8" x 1/2") ribbons, 38mm (1-1/2") apart over entire back side of face layer. Erect wallboard immediately after spreading adhesive.

.2 Supplement adhesive with screw fasteners. Provide temporary support for wallboard until adhesive bond has fully developed.

.3 As an alternative to adhesive specified, joint compound mixed with water in accordance with manufacturer's directions may be used. Allow joint compound and water mixture to stand thirty (30) minutes before using.

.4 Joints:

.1 Finish joints in face layers only, unless otherwise required to achieve fire resistant ratings indicated, as hereinafter specified.

3.6 TILE BACKING PANELS

.1 Install standard gypsum board panels in areas not subject to wetting to produce a flat surface.

.2 Install water resistant gypsum board in locations requiring tile applications in washrooms, and as indicated on the Drawings.

.3 Shim surfaces to produce a uniform plane across panel surfaces where tile backing panels abut other types of panels in the same plane.

3.7 EXTERIOR SHEATHING BOARD

.1 Install exterior sheathing board to exterior walls in accordance with manufacturer's written instructions. Seal all cut edges, ends, utility holes and fastener heads, as recommended by manufacturer.

.2 Sufficient anchors must be provided on each structural stud prior to erection of stud. Sequentially lift anchors as exterior sheathing board is being installed such that each anchor rests on edge of the exterior sheathing board.

.3 Tape and fill all joints and fastener heads using materials recommended by exterior sheathing board manufacturer.

3.8 FIRE RESISTANT ASSEMBLIES

.1 Fire resistance rating of gypsum board assemblies and framing shall be as called for on drawings or schedules, and as required to conform with applicable codes and requirements of authorities having jurisdiction.

.2 Appropriate ULC designs as listed in current ULC list of equipment and materials, Volume II, Building Construction, shall be placed when applicable. Extend partitions full height through ceiling space unless otherwise noted on drawings.

.3 Vertical bulkheads in ceiling spaces over fire rated glazed partitions, doors and the like shall have same fire rating as the door or partition over which they occur. All such bulkheads shall be of drywall construction unless otherwise noted.

.4 Use fire rated gypsum board as specified.

.5 Where lighting fixtures, diffusers, and the like are recessed into fire rated ceilings or bulkheads, provide enclosure to maintain required fire rating. Form removable panel to give access to fixture outlet box.

.6 Where fire hose cabinets or other fixtures or equipment are recessed in fire rated walls or partitions, provide drywall enclosure or backing to maintain required fire rating, unless otherwise detailed.

3.9 CONTROL JOINTS

.1 Install control joints using metal control joint strip as specified where:

.1 A partition, furring or column fireproofing abuts a structural element, dissimilar wall or partition assembly, or other vertical penetration, or ceiling.

.2 A ceiling or soffit abuts a structural element, dissimilar wall or partition assembly or other vertical penetrations.

.3 Wings of "L", "U" and "T"-shaped ceiling/soffit areas are joined;

.4 Construction changes within the plane of the partition or ceiling or soffit.

.5 Partition, restrained ceiling or furring run exceeds 9144mm (30').

.6 Unrestrained ceiling dimensions exceed 15240mm (50') in either direction.

.7 Expansion or control joints occur in the base exterior wall.

.8 Wallboard is installed over masonry control joints.

.9 And elsewhere as indicated on the drawings.

.2 Install in accordance with manufacturer's instructions. Where application is on furring members and double furring members at control joints, place one furring member on each side of the control joint.

3.10 BULKHEADS

.1 Fur out bulkheads in areas indicated and as required to conceal mechanical, electrical or other services in rooms where drywall finishes are scheduled, and elsewhere if called for on drawings.

.2 Ensure hangers are installed as to prevent splaying.

3.11 PRESSED STEEL (HOLLOW METAL) FRAMES

.1 Install pressed steel (hollow metal) frames where they occur in gypsum wallboard partitions.

.2 Anchor frames securely to studs using a minimum of three (3) anchors per jamb for jambs up to 2134mm (7') high and minimum of four (4) anchors per jamb for jambs over 2134mm (7') high.

3.12 THERMAL BREAK

.1 Install self-sticking resilient sponge tape at edges of wallboard in contact with metal windows and exterior door frames to provide a thermal break.

.2 Adhere tape to casing bead and compress during installation.

3.13 FINISHING

.1 Before proceeding with installation of finishing materials ensure the following:

.1 Wallboard is fastened and held close to framing and furring.

.2 Fastening heads in wallboard are slightingly below surface in dimple formed by driving tool.

.2 Levels of Gypsum Wallboard Finish:

.1 Level 0: Temporary construction only.

.2 Level 1: Plenum areas and above ceilings. Where a fire-resistance rating is required finishing should be in accordance with reports of fire tests of assemblies that have met the requirements of the fire rating imposed.

.3 Level 2: Areas of water resistant gypsum backing board under tile, exposed areas where appearance is not critical.

.4 Level 3: Service corridors and areas to receive heavy or medium textured coatings or heavy-duty wall coverings.

.5 Level 4: Areas to receive light textured coatings or lightweight wall coverings.

.6 Level 5: Areas to receive gloss, semi-gloss or flat sheen paints and critical lighting conditions. Embed tape and apply separate first, fill, and finish coats of joint compound to tape, fasteners, and trim flanges, and apply skim coat over entire surface for corridors, long hallways, walls and ceilings longer than 7500 mm or walls higher than 3600 mm , and for all curved or angled wall surfaces.

.3 Finish gypsum wallboard in strict accordance with ASTM C840, GA-214 and GA-216 and as follows:

.1 Fill and tape joints and internal corners and fill screw depressions in board face and smooth out along corner beads and metal strip with joint compound.

.2 Mix joint compound (powder) in accordance with manufacturer's written instructions.

.3 Prefill "V" grooves of rounded edges with special setting type joint compound using a 127mm to 150mm (5" to 6") joint finishing knife. Finish flush with tapered surface ready for tape reinforcing application. Allow prefill material to dry thoroughly before application of embedding compound and tape.

.4 Apply joint compound in thin uniform layer. Embed reinforcing tape accurately centred on joint and securely pressed in, leaving sufficient compound under tape to provide proper bond. Immediately apply skim coat over tape application. Allow to dry thoroughly before application of next coat.

.5 Apply fill coat finishing the tapered depression flush with board surfaces. Allow to dry thoroughly before application of finish coat.

.6 Apply finish coat extending slightly beyond the filler coat and feathered out onto the board surface. Do not apply finish coat to gypsum board scheduled to be sprayed with acoustic surfacing finish.

.7 Sand between coats and following the finishing coat, where necessary, and leave surface smooth and ready for painting.

.8 Finish screw depressions with filler material and finish coat as specified above.

.9 Joint and depression finish shall in no case protrude beyond the plane of the board surface.

.10 Furnish corner beads and metal trim flush with board surface using filler and finishing coats feathered out approximately 50mm (2") and 100mm (4") respectively onto the board surface.

.11 Provide metal casing beads at exposed edges, at junctions of gypsum board with dissimilar material, at control joints and at junction with columns. Casing beads are required at perimeter of gypsum wallboard ceilings and soffits. Fasten with screws at 305mm (12") O.C. along entire length.

.12 Finish gypsum board to receive a Level 4 finish, unless indicated on the Drawings as a Level 5 finish.

3.14 REPAIRS

.1 After taping and finishing has completed, and before decoration, repair all damaged and defective work, including non-decorated surfaces.

.2 Patch holes or openings 13mm (1/2") or less in diameter, or equivalent size, with a setting type finishing compound or patching plaster.

.3 Repair holes or openings over 13mm (1/2"), or equivalent size, with 16mm (5/8") thick gypsum wallboard secured in such a manner as to provide solid substrate equivalent to undamaged surface.

.4 Tape and refinish scratched, abraded or damaged finished surfaces including cracks and joints in non-decorated surface to provide smoke tight construction, fire protection equivalent to the fire rated construction and STC equivalent to the sound rated construction.

3.15 PROTECTION

.1 Protect installed products from damage during remainder of construction period.

.2 Remove and replace panels that are damaged.

END OF SECTION

1 General

1.1 SUMMARY

.1 The work in this section includes supply and installation for the following:

.1 Porcelain Floor Tile

.2 Ant-Fracturing Waterproof Membrane

.3 Edge trims, Transition Strips and Accessories

.4 Raised steel tactile warning indicators

1.2 REFERENCE STANDARDS

.1 American National Standards Institute/Ceramic Tile Institute (ANSI/CTI):

.1 ANSI/CTI A108.1-2011, Specification for the Installation of Ceramic Tile: Collection of 20 ANSI/CTI A108, A118 and A136 Series of Standards on Tile Installation

.2 American Society for Testing and Materials (ASTM):

.1 ASTM C241/C241M-09, Standard Test Method for Abrasion Resistance of Stone Subjected to Foot Traffic

.2 ASTM C627-10, Standard Test Method for Evaluating Ceramic Floor Tile Installation Systems Using the Robinson-Type Floor Tester

.3 ASTM C920-11, Standard Specification for Elastomeric Joint Sealants

.4 ASTM C1028-07e1, Standard Test Method for Determining the Static Coefficient of Friction of Ceramic Tile and Other Like Surfaces by the Horizontal Dynamometer Pull-Meter Method

.3 Canadian General Standards Board (CGSB):

.1 CAN/CGSB-75.1-M88, Tile, Ceramic

.4 Terrazzo, Tile and Marble Association of Canada (TTMAC):

.1 2019-2021 Specification Guide 09 30 00, Tile Installation Manual

.2 Hard Surface Maintenance Guide

1.3 EXAMINATION

.1 Examine all areas and conditions affecting work of this Section and report any discrepancies or defects which would affect finished results.

1.4 SUBMITTALS

.1 Submit submittals in accordance with Division 01.

.2 Samples:

.1 Submit sample panel of each type and colour tile, 610mm x 610mm (24" x 24").

.2 Adhere to a rigid board with setting compound, grout and a dummy control joint showing sealant as specified. Identify samples by project number, date, name of sub-contractor and tile type.

.3 Tile and grout used in the building shall correspond to appearance of approved samples in all respects. Do not install tile until samples are approved.

.4 Upon Consultant's request submit samples of base, trim and fittings.

.3 Material Lists:

.1 Prior to ordering any materials submit list of products to be used. Products proposed must be recommended by their manufacturer for purpose intended. Upon Consultant's request submit evidence of manufacturer's endorsement.

.2 Take care to ensure compatibility of all materials. Consult the manufacturers in case of doubt.

.3 The supplementary materials shall come from the same production batch as installed materials.

.4 Safety Data Sheets:

.1 Submit WHMIS safety data sheets for inclusion with project record documents. Keep one copy of WHMIS safety data sheets on Site for reference by workers.

.5 Maintenance Instructions:

.1 Upon completion of the Work, furnish Consultant with copies of maintenance instructions, containing complete detailed and specific instructions for maintaining, preserving and keeping clean the surfaces of this Work and in particular, giving adequate warning of maintenance practices of materials detrimental to the work of this Section for inclusion in the Operation and Maintenance Manual.

.6 Maintenance Materials:

.1 Supply five percent (5%) extra of each colour of tile and of each tile type for future repairs by the Owner.

.2 Place maintenance materials where directed by the Owner and store in their original containers.

1.5 QUALITY ASSURANCE

.1 Subcontractor executing work of this Section shall employ installers having a minimum of five (5) years continuous experience in successful installation of work of type and quality shown and specified. Submit proof of experience upon Consultant's request.

.2 Work of this Section shall be executed by workers especially trained and experienced in this type of work. Have a full time, qualified representative at the Site to direct the work of this Section at all times.

.3 Ensure proper use of proprietary materials in strict accordance with the material manufacturer's directions. It shall be the responsibility of the material manufacturer or supplier to furnish these directions to the Contractor and to check periodically at the site to ensure that they are being carried out.

1.6 PRE-INSTALLATION CONFERENCE

.1 Pre-Construction Conference: Arrange a site meeting, to coincide with regular bi-weekly site meetings, attended by the Contractor, the Subcontractor's representative and foreman for this project, the Consultant, materials supplier(s), and other relevant personal before commencement of work for this Section; agenda for meeting will include; but not be limited to, the following:

.1 Substrate conditions, non-structural cracks, structural cracks and preparation requirements;

.2 Floor and wall surface irregularities and levelness tolerances, including all remedial requirements;

.3 Installation of anti-fracturing membranes and setting bed materials;

.4 Installation of tiles and grouting;

.5 Edge details and treatments;

.6 Installation of tile and grout sealers.

1.7 DELIVERY, STORAGE, HANDLING AND PROTECTION

.1 Co-ordinate deliveries to comply with construction schedule and arrange ahead for off the ground, under cover storage location. Do not load any area beyond the design limits.

.2 Materials shall be carefully checked, unloaded, stored and handled to prevent damage. Protect materials with suitable non-staining waterproof coverings.

.3 Store material in original, undamaged containers or wrappings with manufacturer's seals and labels intact.

.4 Restrict traffic by other trades during installation.

.5 Provide adequate protection of completed tiled surfaces to prevent damage by other trades until final completion of this project. Minimum protection shall consist of 4 mil polyethylene sheets lapped 100mm (4") and taped.

.6 Heavily travelled areas shall have additional 13mm (1/2") thick fibreboard sheet protection with taped joints over polyethylene sheet protection as specified above.

.7 Protect exposed edges of floor tile with same thickness as tile x 100mm (4") wide tapered strip of plywood adhered to floor until adjoining floor finish is to be installed.

1.8 SITE CONDITIONS

.1 Ambient Conditions: Apply tile after completion of work by other Sections is complete; to surfaces sufficiently dry, clean, firm, level, plumb and free from oil or wax or any other material deleterious to tile adhesion and as follows:

.1 Temperature: Maintain tile materials and substrate temperature between TTMAC recommended minimum and maximum temperature range; unless indicated otherwise by manufacturer, for forty-eight (48) hours before and during installation until materials are fully set and cured; provide additional heat during winter months or at any other time when there is a risk that surface temperatures may drop below minimum recommended temperatures.

.2 Ventilation: Maintain adequate ventilation where Work of this Section generates toxic gases or where there is a risk of raising relative humidity to levels that could damage building finishes and assemblies.

1.9 WARRANTY

.1 Warrant the work of this Section against defects in materials and workmanship in accordance with the General Conditions, but for a period of five (5) years, and agree to promptly make good defects which become evident during the warranty period without cost to the Owner.

.2 Defects shall include but not be limited to the following:

.1 Cracking and crazing;

.2 Discolouration and staining;

.3 Pitting, splitting, and;

.4 Deformation of tiles and grout.

2 Products

2.1 PERFORMANCE REQUIREMENTS

.1 Dynamic Coefficient of Friction (DCOF): Tile installed on walkway surfaces having following values as determined by testing identical products per ANSI A137.1:

.1 Level Interior Wet Spaces: A minimum wet DCOF AcuTest Value of 0.42 or higher.

.2 Level Interior Dry Spaces: A minimum wet DCOF AcuTest Value below 0.42

.2 Floor Level Tolerances: Provide materials to attain floor levelness tolerances required by this Section.

.1 Calculate quantity of materials based on the difference between the specified tolerance and the initial tolerance specified in Section 03 35 00.

.2 Measurements: As indicated in Section 03 35 00.

2.2 MATERIALS

.1 Porcelain Floor Tiles (POR):

.1 Size: 30cm x 60cm

.2 Finish: matte/unglazed

.3 Basis of Design Model and Manufacturer: Olympia Tile Unicolour Series; unglazed/thru body porcelain or equivalent per Specification 01 25 00.

.1 Colour to be selected from standard colour range, allow for 2 colours.

.2 Tactile Attention Indicators (TWI) for installation at top of all ramps/stairs as indicated in drawings:

.1 Individually installed tactile domes drilled and adhered in place on top of floor finish in a 50mm x 50mm grid across full stair/ramp width x minimum 765mm depth at ramps and minimum 915mm depth at stairs (or as indicated on drawings).

.2 Domes to be 23mm diameter and shall extend above adjacent floor finish 5mm with a domed head, complete with crosshatch pattern on face. Stem of domes to extend minimum 18mm below face of finished floor.

.1 Dome material: Stainless Steel.

.2 Adhesive: As recommended by manufacturer.

.3 Acceptable Manufacturer: ADV-D-1281 as manufactured by Advantage Tactile Systems or equivalent as per Specification 01 25 00.

.3 Control Joint Caulking:

.1 As supplied by the Grout Manufacturer.

.2 Colour: To match adjacent grout, as approved by the Consultant.

.4 Tile Straight Edge Trim:

.1 Extruded clear satin anodized aluminum edge trim, 3mm (1/8") wide at top edge; Height as required to suit tile installation; with integral perforated anchoring leg for setting the strip into the setting material.

.2 Basis of Design Materials: Schlüter Schiene AE by Schlüter.

2.3 MORTAR SETTING MATERIALS

.1 Manufacturers: Mortar and grout materials listed in this Section shall be of a uniform quality for each mortar, and grout component from a single manufacturer and each aggregate from one source or producer as follows:

.1 Flextile Ltd.

.2 MAPEI Inc.

.3 Custom Building Products Ltd.

.4 Laticrete International Inc.

.5 Or approved equivalent.

.2 Surface Preparation Materials: As indicated in Section 03 35 00.

.3 Interior Thin Set Epoxy Method Floor System: 100% solids epoxy mortar meeting requirements of ANSI A118.3.

.4 Refer also to TTMAC detail 311F.

2.4 GROUT MATERIALS

.1 Grout Colours: As selected by the Consultant from manufacturer's full product range.

.2 Epoxy Grout for Wall and Floor Joints ≤3mm (1/8") Interior Only: 100% solids epoxy grout meeting requirements of ANSI A118.3:

.3 Latex-Portland Cement Grout for Floors with Joints ≥3mm (1/8") Interior or Exterior: 100% solids epoxy grout meeting requirements of ANSI A118.3:

2.5 WATERPROOFING ANTI-FRACTURING MEMBRANES

.1 Waterproofing Anti-Fracturing Membranes: Load bearing, reinforced, liquid applied membrane; manufactured to accommodate flood testing and reduce the incidence of thermal shock cracking to tiling installations; meeting requirements of ANSI A108.1 and compatible with 100% solids epoxy mortar and grout materials. Waterproof Anti Fracture Membrane to be provided at all horizontal and vertical surfaces scheduled to receive tile finish:

.1 Acceptable Membrane Materials:

.1 Flex WP-980 Waterproof and Crack Isolation Membrane by Flextile Ltd.

.2 Mapelastic 315 Waterproofing and Reinforcing Fabric by MAPEI Inc.

.3 Level Quik Waterproof and Anti-Fracture Membrane by Custom Building Products.

.4 Hydroban Waterproofing by Laticrete International Inc.

.5 Or approved equivalent per Specification 01 25 00

.2 Reinforcing Fabric: strong, absorbent, flexible, alkali-resistant, polyester reinforcing fabric for use at coves, corners, cracks and around drains.

.1 Acceptable product: Reinforcing Fabric by Mapei

.2 Or approved equivalent per Specification 01 25 00

2.6 ACCESSORY MATERIALS

.1 Tile Cleaner: A neutral cleaner capable of removing soil and residue without harming tile and grout surfaces, specifically approved for materials and installations indicated by tile and grout manufacturers and as follows:

.1 Job Site Cleaner: Phosphoric acid/nitric acid based cleaning solution mixed in accordance with cleaner manufacturer's recommendations and as recommended by tile manufacturer.

.2 Maintenance Cleaner: Non-toxic, electrolytic, biodegradable, non-ammonia containing, pH controlled cleaning solution mixed in accordance with manufacturer's recommendations.

3 Execution

3.1 EXAMINATION

.1 Maintain minimum temperature of 13 deg C at tile installation area for twenty-four (24) hours prior to curing and for twenty-four (24) hours after installation. Do not apply work to frozen surfaces.

.2 Examine carefully surfaces to which tile is to be installed and report any defects to the Consultant.

.3 Waterproof Anti-Fracturing Membranes:

.1 Prepare all surfaces of non-structural and structural cracks in strict accordance with the anti-fracturing membrane manufacturer's written instructions.

.2 Prime and fill all surfaces of non-structural and structural cracks in strict accordance with the anti-fracturing membrane manufacturer's written instructions.

.4 Commencement of installation shall signify complete acceptance of surfaces and conditions.

3.2 PREPARATION

.1 Surface Preparation:

.1 Make backing surfaces level and true to a tolerance in plane of 3mm in 2439mm (±1/8" in 8') for walls and 3mm in 3048mm (±1/8" in 10') for floors using levelling bed mortar.

.2 Surfaces shall be structurally sound, well fastened, clean and free from dust, oil, grease, paint, tar, wax, curing agents, primers, sealers, form release agents or any deleterious substances that may act as bond barriers.

.3 Backing surfaces shall be dry and fully cured. Dampness must not exceed five percent (5%) by volume.

.2 Examine concrete substrate, repair as required to produce level, clean surface for new tile installation. Repair Work shall include levelling, filling, grinding or cutting, in accordance with Section 03 35 00.

.3 Work of other trades that are required before new tile installation (i.e. electrical conduit installed below ceramic tile) shall be installed, complete and approved before tile installation.

3.3 INSTALLATION – WATERPROOF ANTI-FRACTURING MEMBRANES

.1 Install waterproofing anti-fracturing membrane in accordance with waterproofing manufacturer's written instructions to produce a waterproof membrane of uniform thickness bonded securely to substrate.

.2 Do not install tile over waterproofing membrane until waterproofing has cured and been tested to determine that it is watertight.

.3 Prepare floor and wall substrates in accordance with manufacturers written instructions.

.1 All substrates should be structurally sound, stable, dry, clean and free of any substance or condition that may reduce or prevent proper adhesion.

.2 Do not use chemicals (acid etching or stripping) to prepare approved substrates.

.3 Concrete substrates should have a concrete surface profile of #2 per the International Concrete Repair Institute (ICRI). Mechanically clean and profile by diamond-cup grinding or other engineer-approved method when necessary.

.4 Application

.1 Fill all cracks, control joints and gaps in corners and coves that are greater than 1/32" (1 mm) with an appropriate filler material. Force material into crack and finish smooth with trowel. Let dry.

.2 Pre-treat cracks, corners, coves and floor wall intersections with 2 coats of waterproof membrane.

.3 Pre-treat drains by filling space between drain pipe and substrate with appropriate expansion joint materials and apply 2-coards of waterproof membrane

.5 Fabric Reinforcing Application

.1 Lay reinforcing fabric into wet waterproof membrane at all "pre-treat" sections as outlined in application section below (cracks, coves, corners and penetrations). Allow for 50mm fabric on horizontal surface and 100mm fabric on vertical surface. Use brush to press fabric into corners until liquid comes through fabric. Work out any wrinkles or bubbles.

.2 While fabric is wet, apply additional waterproof membrane over fabric until completely covered to create void-free surface. Let dry. Apply a second coat and let dry.

.3 Install reinforcing fabric through main/field areas by placing into wet first coat of waterproof membrane. Using a roller, apply pressure to the fabric, working out wrinkles or bubbles while forcing liquid waterproof membrane to come through the fabric. Overlap seams and ends of the fabric by 2" (50mm). While fabric is still wet, apply additional liquid waterproof membrane over the fabric until completely covered, creating a void-free surface. Let dry completely.

.4 Apply a second coat of liquid waterproof membrane to entire area. Let dry.

.5 Apply a bead of commercial-grade silicone or urethane sealant between the membrane and the drain flange, about 1/2" (12 mm) in from the drain opening.

.6 Bolt the drain collar into place while the sealant is still fresh.

.7 Install tile as per following section below.

3.4 INSTALLATION - GENERAL

.1 Unless otherwise specified, execute tile work according to the latest issue of Specification Guide 09 30 00, Tile Installation Manual - published by Terrazzo, Tile and Marble Association of Canada, as the minimum standard except as varied by this Specification.

.2 Thoroughly clean surfaces to which tile is to be applied.

.3 Back butter all floor tile.

.4 Neatly cut tile around fitments, fixtures, access panels, and the like. Splitting of tile is expressly prohibited except where no alternative is possible. Form intersections, corners and returns accurately.

.5 Finish surfaces flat and level or, sloped and graded as required.

.6 Joint Widths: Install tile with the following joint widths, unless indicated on drawings:

.1 Wall Tile: 1.6mm (1/16")

.2 Floor Tile: 6mm (1/4"), unless otherwise indicated on the Drawings.

.3 Quarry Tile: As per manufacturers recommendations.

.4 Make joints consistent width and alignment within tile area.

.5 Maintain 2/3 of grout joint depth free of setting material.

.7 Joints in base shall match floor patterns. Joints shall be watertight without voids, cracks or excess grout.

.8 Lay out tile so that fields or patterns are centred on wall areas or architectural features and so that no tile less than 1/2 size occurs.

.9 Arrange and set recessed accessories in tile work so that they are evenly spaced, centred with joints and set true with correct projection. Rigidly install accessories.

.10 Provide manufacturer's standard trim pieces at changes of direction and at terminations. Unless otherwise indicated provide the following corner and edge conditions:

.1 Internal horizontal corners: Coved.

.2 External vertical and horizontal corners: Bullnosed.

.3 Internal vertical corners and unexposed edges: Square.

.11 Install tiles in patterns and locations as indicated on drawings.

.12 Install wall tile full wall height unless shown otherwise.

.13 Coordinate work of this Section with work of other Sections for items requiring to be recessed into work of this Section.

.14 Sound tiles after setting and remove and replace tiles not fully bedded.

.15 Re-point joints after cleaning to eliminate imperfections. Avoid scratching tile surfaces.

.16 Finished tile work shall be clean and free of tiles which are pitted, chipped, cracked or scratched. All damaged tile shall be removed and replaced.

.17 Where indicated on Drawings or as required, install continuous single piece metal edge trims centred under doors in closed position and other locations where tile meets other floor finishes.

3.5 MORTAR APPLICATION METHOD

.1 Thin-Set Application Method:

.1 Install wall tile to gypsum wallboard and moisture resistant wallboard in dry areas using latex modified thin-set setting bed and latex modified wall grout in strict accordance with tile manufacturers written installation instructions as per the pre-installation conference.

.2 Apply floor tile and prepare floor slabs in strict accordance with tile manufacturers written installation instructions as per the pre-installation conference.

3.6 GROUTING

.1 Grout tiles in accordance with ANSI A108.6 and as specified herein.

.2 When grouting a fresh laid floor, make certain that traffic and grouting will not cause movement of floor in setting bed. Protect floor by using kneeling boards or gypsum board to defend floor against traffic while grouting.

.3 Mix grouts and install in strict accordance with the manufacturer's instructions.

.4 Excess grout shall be removed from the surface of tiles using the edge of a rubber float held at a 45 deg angle, moving it diagonally to the joints. Fill all gaps and air holes.

.5 Do not allow grout to harden on face of tile. Refer to manufacturer's instructions for thorough removal.

.6 Floors which required damp curing shall be cured for the required length of time using heavy kraft paper, not polyethylene sheets. Consult manufacturer for instructions.

3.7 CONTROL JOINTS AND SEALING

.1 Control joints of a flexible caulking material shall be placed every 4877mm to 6096mm (16' to 20') apart, directly over existing control joints and/or where indicated on drawings or as required in accordance with TTMAC Detail No. 301MJ-2019-2021, Details E, F and G, whichever is applicable.

.2 Control joints shall be placed around the floor perimeter at walls, around columns, and where tile abuts other hard materials or vertical surfaces. Saw cutting of tile after installation is prohibited. Tile shall be cut if required and installed along each side of control joints.

.3 Expansion joints must always be placed directly over all slab expansion joints in accordance with TTMAC Detail No. 301MJ-2019-2021, Details A and B, whichever is applicable.

.4 Locate expansion, control, contraction, and isolation joints, as indicated below, unless specifically indicated otherwise on the Drawings:

.1 Interior: 4877mm (16') maximum: 6mm (1/4") joint width.

.5 Joints around fixtures, pipes or other fittings shall be sealed with a sealant. Refer to Section 07 92 00 for type of sealants to be used.

.1 Colour of sealant shall match grout as selected later by Consultant.

3.8 CLEANING AND PROTECTION

.1 Clean tiled areas after grouting has cured, using compatible solutions and methods as recommended by the manufacturer.

.2 Remove grout residue from tile as soon as possible.

.3 Unglazed tile may be cleaned with acid solutions only when permitted by tile and grout manufacturer's written instructions, but no sooner than 10 days after installation.

.4 Protect metal surfaces, cast iron, and vitreous plumbing fixtures from effects of acid cleaning.

.5 Flush surface with clean water before and after cleaning.

.6 Leave finished installation clean and free of cracked, chipped, broken, unbonded, or other tile deficiencies.

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 01 25 00 – 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 quantity 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.

.3 Linear Acoustic Baffles: Furnish quantity of full-size units equal to 5.0 percent of amount installed, for each ceiling type/pattern.

PART 2-PRODUCTS

2.1 MANUFACTURERS

.1 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 01 25 00. 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 Acoustic Ceiling Tile ACT-1

.1 Surface Texture: Fine

.2 Composition: Mineral Fibre

.3 Color: White

.4 Size: 24in X 48in X 7/8in

.5 Edge Profile: Square

.6 Noise Reduction Coefficient (NRC): 0.75.

.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: 0.88.

.11 Antimicrobial Protection: Inherent - Resists the growth of mold/mildew and bacterial growth.

.12 Acceptable Product: Ultima High NRC 1943 as manufactured by Armstrong World Industries, or equivalent.

.2 Acoustic Ceiling Tile ACT-2

.1 Surface Texture: Smooth

.2 Composition: Mineral fibre

.3 Color: White

.4 Size: 24in X 24in X 3/4in lay in

.5 Edge Profile: Square

.6 Noise Reduction Coefficient (NRC): 0.70.

.7 CAC: 38

.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; Class A

.10 Light Reflectance (LR): ASTM E 1477; White Panel: Light Reflectance: 0.86.

.11 Antimicrobial Protection: Inherent - Resists the growth of mold/mildew and bacterial growth.

.12 Acceptable Product: Ultima Health Zone 1938 as manufactured by Armstrong World Industries, or equivalent.

2.3 SUSPENSION SYSTEMS FOR ACOUSTICAL CEILING UNITS

.1 Components: All main beams and cross tees shall be commercial quality aluminum 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 aluminum in baked polyester paint.

.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 time three 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.

.6 Floating Edge Trim: extruded aluminum floating edge channel to be provided at all locations where ACT ceiling does not terminate at wall/bulkhead.

.1 Acceptable product: Axiom Classic as manufactured by Armstrong.

.2 Colour: to be selected by Consultant from standard colour range (1 colour thoughout).

.3 Height: 3-7/8 and/or as detailed

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

1 General

1.1 SUMMARY

.1 This Section includes, but is not limited to, the following:

.1 Resilient tile materials:

.1 Rubber sheet flooring.

1.2 REFERENCE STANDARDS

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

.1 ASTM F1344-12, Standard Specification for Rubber Floor Tile

.2 ASTM F1516-13, Standard Practice for Sealing Seams of Resilient Flooring Products by the Heat Weld Method (when Recommended)

.3 ASTM F1869-11, Standard Test Method for Measuring Moisture Vapour Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride

.2 Canadian General Standards Board (CGSB):

.1 CAN/CGSB-51.34-M86, Vapour Barrier, Polyethylene Sheet for Use in Building Construction

1.3 ADMINISTRATIVE REQUIREMENTS

.1 Coordination: Close spaces to traffic during flooring installation and until time period after installation recommended in writing by manufacturer; install flooring and accessories after other finishing operations, including painting and ceiling construction have been completed.

.2 Pre-Construction Conference: Arrange a site meeting, to coincide with regular bi-weekly site meetings, attended by the Contractor, the Subcontractor's representative and foreman for this project, the Consultant, materials supplier(s), and other relevant personal before commencement of work for this Section.

1.4 SUBMITTALS

.1 Provide submittals in accordance with Division 01.

.2 Action Submittals:

.1 Product Data: Submit one copy of product data for each type of product specified.

.2 Shop Drawings: Submit shop drawings indicating:

.1 Location of seams and edges

.2 Location of columns, doorways, enclosing partitions, built-in furniture, cabinets, and cut-out locations

.3 Samples for Selection: Submit manufacturer's colour charts and samples for initial selection consisting of full range of colours and patterns available for each type of product indicated.

.4 Samples for Verification:

.1 Resilient Flooring: Submit samples of each different specified product for verification of colour and pattern in manufacturer's standard size, but not less than 150mm x 150mm (6" x 6") in size for tile.

.3 Informational Submittals: Provide the following submittals during the course of the work:

.1 Site Quality Control Test Results: Submit results or moisture emission testing of concrete subfloors prior to installation of flooring. Results shall include comparison of manufacturer's recommended moisture content to actual moisture vapour emission rate.

.4 Maintenance Data and Operating Instructions:

.1 Operation and Maintenance Data: Submit manufacturer's written instructions for maintenance and cleaning procedures, include list of manufacturers recommended cleaning and maintenance products, and name of original installer and contact information in accordance with Division 01.

.5 Safety Data Sheets:

.1 Submit WHMIS safety data sheets for incorporation into the Operation and Maintenance Manual. Keep one copy of WHMIS safety data sheets on site for reference by workers.

.6 Maintenance Materials:

.1 Provide five percent (5%) of each colour and type of resilient flooring specified, boxed and labelled.

.2 Store maintenance materials on the premises as directed by the Owner.

1.5 QUALITY ASSURANCE

.1 Contractor executing work of this Section shall have a minimum of five (5) years continuous experience in successful and installation of work of type and quality shown and specified. Submit proof of experience upon Consultant's request.

.2 Resilient Flooring Installer: Use an installer who is competent in heat welding and have a minimum of five (5) years documented experience in the installation of resilient flooring and seams in accordance with manufacturer's training or certification program.

1.6 DELIVERY, STORAGE, HANDLING AND PROTECTION

.1 Coordinate deliveries to comply with construction schedule and arrange ahead for off-the-ground, under cover storage location. Do not load any area beyond the design limits.

.2 Materials shall be carefully checked, unloaded, stored and handled to prevent damage. Protect materials with suitable non-staining waterproof coverings.

.3 Store material in original, undamaged containers or wrappings with manufacturer's seals and labels intact.

.4 Restrict traffic by other trades during installation.

1.7 ENVIRONMENTAL CONDITIONS

.1 Temperature of room, floor surface and materials shall not be less than 21 deg C for forty-eight (48) hours before, during and for forty-eight (48) hours after installation. Concrete floors shall be aged for a minimum of twenty-eight (28) days and shall be dry before application of the resilient flooring.

.2 Moisture content of floor shall not exceed a maximum of 3 lbs. of water per 1,000 sq. ft. of concrete slab area over a twenty-four (24) hour period as measured by one (1) of the following methods, as approved by Consultant:

.1 Rubber Manufacturer's Association (RMA) moisture test using anhydrous calcium chloride.

.2 Does not exceed 3% as measured by Calcium Carbide Hygrometer procedure.

.3 Does not exceed 5% as measured by normal Protimeter.

.3 Avoid exposure to high humidity, cold drafts and abrupt temperature changes.

1.8 WARRANTY

.1 Warrant the work of this Section against defects in materials and workmanship in accordance with the General Conditions but for an extended period of five (5) years and agree to repair or replace faulty materials or work which become evident during warranty period without cost to the Owner.

.2 Defects shall include, but not limited to, bond failure, and extensive colour fading.

2 Products

2.1 MANUFACTURERS

.1 Basis-of-Design Manufacturers: Manufacturers named in this Section were approved to provide work specified in this Section. Additional manufacturers offering similar products may be incorporated into the work of this Section provided they meet the performance requirements indicated and provided requests for substitution are provided a minimum of five (5) days in advance of Bid Closing.

.2 Health-Conscious Production: Rubber flooring to be free from red listed ingredients (LBC Red List v4.0) and is manufactured without bisphenol A (BPA), formaldehyde, halogens, heavy metals, isocyanates, phthalates and polyvinyl chloride (PVC). HPD (Health Product Declaration) and EPD (Environmental Product Declaration) available.

.3 Approved manufacturers:

.1 Mondo Flooring

.2 Nora Rubber Flooring

.3 Tarkett / Johnsonite

.4 Or approved equivalent.

2.2 RESILIENT SHEET FLOORING MATERIALS

.1 Resilient Rubber Sheet Flooring (RES-1): Conforming to ASTM F1859 and the following:

.1 Material: prefabricated resilient rubber flooring, calendered and vulcanized with a base of synthetic rubber, stabilizing agents and pigmentation

.2 Classification: Homogeneous rubber compound with a random scattered design.

.3 Colour: As selected by the Consultant from manufacturers standard product line; allow for 2 colours.

.4 Surface: smooth.

.5 Dimensions: 10m by 1.9m

.6 Thickness: Overall Thickness: Nominal 3mm

.7 Surface Burning (CAN/ULC-S102.2): FSC1 of 125 and SD of 370

.8 Slip Resistance (ASTM D2047): Static coefficient of friction, Neolite dry 0.8

.9 Hardness (ASTM D2240): Shore type "A", 97

.10 Basis of Design Material: Mondo Harmonie Rubber Sheet Flooring, or approved equivalent.

.2 Resilient Rubber Sheet Flooring (RES-2): Conforming to ASTM F1344 and the following:

.1 Material: prefabricated resilient rubber flooring, calendered and vulcanized with a base of synthetic rubber, stabilizing agents and pigmentation

.2 Classification: Homogeneous rubber compound with a random scattered design.

.3 Colour: As selected by the Consultant from manufacturers standard product line; allow for 2 colours.

.4 Surface: smooth.

.5 Dimensions: 10m by 1.9m

.6 Thickness: Overall Thickness: Nominal 3mm

.7 Surface Burning (CAN/ULC-S102.2): FSC1 of 125 and SD of 370

.8 Slip Resistance (ASTM D2047): Static coefficient of friction, Neolite dry 0.8

.9 Hardness (ASTM D2240): Shore type "A", 97

.10 Basis of Design Material: Mondo Lava Rubber Sheet Flooring, or approved equivalent.

2.3 RUBBER BASE

.1 Rubber thermoplastic wall base to ASTM F1861 consisting of a blend of a thermoplastic and rubber backing covered with a durable colored top layer

.2 Dimensions: 107.95mm high x 9.53mm thick x 2440mm lengths

.3 Colour: To be selected by Consultant from manufacturer's full colour range; allow for 3 colours.

.4 Surface burning: Class A per ASTM E84/NFPA 253, FSR 50/SDS 175 per CAN/ULC-S102.2

.5 Acceptable product:

.1 Contours, PV4060 #60 Candid by Roppe

.2 Equivalent per 01 25 00

2.4 RESILIENT ACCESSORIES

.1 Trowellable Levelling and Patching Compounds: As indicated in Section 03 35 00.

.2 Heat Welding Bead: Solid strand product recommended by flooring manufacturer for heat welding seams, and as follows:

.1 Colour and Pattern: Colour: As selected by Consultant from manufacturer's full range of colours to contrast with field colour of resilient flooring.

.3 Fillers and Primers:

.1 Types and brands approved, acceptable to flooring material and resilient base manufacturers for the applicable conditions. Use non-shrinking latex compound.

.4 Resilient Floor Tile Adhesive:

.1 Standard Tile: Waterproof, clear setting type and brands as recommended by the tile manufacturer.

.5 Sealer and Wax:

.1 Coordinated with Owners preferred long term maintenance program, sealer or wax as appropriate to flooring materials specified.

3 Execution

3.1 EXAMINATION

.1 Testing and Inspections: Test moisture emission rate of concrete subfloor prior to installing flooring, using the calcium chloride test method in accordance with ASTM F1869.

.2 Examine substrates, areas, and conditions affecting work are in accordance with manufacturer's requirements, and as follows:

.1 Verify that floor surfaces are smooth and flat to plus or minus 3mm over 3m (1/8" over 10'); notify Consultant in writing where floor tolerances are not within acceptable values.

.2 Verify that concrete slabs exhibit normal alkalinity of between 5 and 9 and that they are free of carbonization or dusting deleterious to flooring installation or adhesive bond.

.3 Verify that subfloors are free of cracks, ridges, depressions, scale, and foreign deposits that could interfere with flooring installation.

3.2 PREPARATION

.1 Comply with resilient flooring manufacturer's written installation instructions for preparing substrates indicated to receive flooring.

.2 Fill cracks, holes, and depressions in substrates using trowellable levelling and patching compounds in accordance with manufacturers written instructions, and as indicated in Section 03 35 00.

.3 Remove coatings from concrete substrates, including curing compounds and other substances that are incompatible with flooring adhesives, and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer; do not use solvents.

.4 Broom and vacuum clean substrates immediately before installing resilient flooring.

3.3 INSTALLATION: SHEET FLOORING

.1 Comply with resilient flooring manufacturer's written installation instructions.

.2 Unroll flooring and allow stabilizing before cutting and fitting in accordance with manufacturer's installation instructions.

.3 Apply primer in strict accordance with manufacturer's printed instructions. Permit primer to dry.

.4 Apply adhesive uniformly with an approved notchtooth spreader at the recommended rate. (Mechanical spreader not approved). Do not spread more adhesive than can be covered before initial set takes place. Use waterproof adhesive throughout. Follow manufacturer's instructions.

.5 Lay flooring with seams parallel to building lines to produce a minimum number of seams. Border widths minimum 1/3 width of full material.

.6 Run sheets in direction of traffic. Double cut sheet joints and continuously seal heat weld according to manufacturer's printed instructions.

.7 Accurately scribe flooring around walls, and other floor conditions.

.8 Each type of material used shall be from one manufacturer throughout the work and material in each area shall be of same production run.

.9 Install metal edge strips at unprotected or exposed edges where flooring terminates.

3.4 INSTALLATION: BASE

.1 Ensure substrate/background meets the requirements of ASTM F1861 and Manufacturer Installation Instructions and Technical Data.

.2 Fill cracks, holes, depressions and irregularities in the substrate/background to prevent transferring through to the surface of the resilient wall base.

.3 Lay out base to keep number of joints at minimum.

.1 Select the appropriate adhesive for the application and job site conditions.

.2 Install material according to roll sequence or with like run numbers.

.3 Ensure material is rolled appropriately into the adhesive using a hand roller.

.4 Install straight and level to variation of 1:1000.

.5 Scribe and fit to door frames and other obstructions.

.6 Conduct initial maintenance prior to final usage per the Manufacturer Care & Maintenance Documents. Do not conduct initial maintenance until adhesive has cured per the adhesive technical data.

3.5 CLEANING AND PROTECTION

.1 Cleaning, sealing and finishing of resilient flooring in accordance with the manufacturer's instructions and recommendations.

.2 Work shall be handed over to the Owner free of blemishes and in perfect condition.

END OF SECTION

1 General

1.1 SUMMARY

.1 Section includes surface preparation and the application of paint systems on the following interior and exterior substrates:

- .1 Concrete;
- .2 Concrete masonry units (CMU)
- .3 Steel and iron;
- .4 Galvanized metal;
- .5 Hollow metal doors and frames;
- .6 Gypsum board;
- .7 Exterior wood cladding
- .8 Cotton or canvas insulation covering.

1.2 REFERENCE STANDARDS

.1 Environmental Choice Paints and Surface Coatings, Low VOC Product Listings Program (ECP):

- .1 Paints and Surface Coatings, Low VOC Product Listings

.2 The Master Painters Institute (MPI):

- .1 New Surfaces: Architectural Painting Specification Manual.

.3 The Society for Protective Coatings (SSPC):

- .1 Coating Materials Guidelines
- .2 Surface Preparation Guidelines
- .3 Application, Inspection and Quality Control Guidelines

1.3 DEFINITIONS

.1 Gloss Levels: Standard coating terms defined by MPI Manual apply to products of this Section as follows:

- .1 MPI Gloss Level 1: Not more than five units at 60 degrees and 10 units at 85 degrees, according to ASTM D523.
- .2 MPI Gloss Level 2: Not more than 10 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D523.
- .3 MPI Gloss Level 3: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D523.
- .4 MPI Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D523.
- .5 MPI Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D523.
- .6 MPI Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D523.
- .7 MPI Gloss Level 7: More than 85 units at 60 degrees, according to ASTM D523.

.2 Gloss Values: Generally, provide paints and coatings having the following sheens when installed on the following substrates:

.1 Walls: Eggshell (G3) or Satin (G4) as selected by Consultant at a later date.

.2 Trim and Doors: Semi-gloss (G5).

.3 Ceilings: Flat (G1).

1.4 SUBMITTALS

.1 Provide required information in accordance with Division 01.

.2 Action Submittals: Provide the following submittals before starting any work of this Section:

.1 Product Data: Submit list of all painting materials used for the Work to the Consultant for review prior to ordering materials for each paint system indicated, including block fillers and primers.

.1 Material List: An inclusive list of required coating materials indicating each material and cross reference specific coating, finish system, and application; identify each material by manufacturer's catalogue number and general classification.

.2 Manufacturer's Information: Manufacturer's technical information, including label analysis and instructions for handling, storing, and applying each coating material.

.2 Samples: Provide stepped samples, defining each separate coat, including block fillers and primers using representative colours required for the project; label each sample for location and application, and as follows:

.1 Drawdown Samples: Provide three (3) drawdown sample charts (cards) for each type, texture and colour of finish specified for verification purposes before ordering paint materials.

.3 Informational Submittals: Provide the following submittals when requested by the Consultant:

.1 Certification: Submit certification reports for paint products indicating that they meet or exceed low VOC and coloured base requirements listed in this Section.

1.5 PROJECT CLOSEOUT SUBMISSIONS

.1 Operation and Maintenance Data: Submit copies of paint manufacturer's written maintenance information for inclusion in the operations manual in accordance with Division 01, including specific warning of any maintenance practice or materials that may damage or disfigure the finished Work.

.2 Maintenance Materials: Deliver maintenance materials to Owner in quantities indicated and in accordance with Division 01, that match products installed; packaged with protective covering for storage, and identified with labels describing contents and building location and as follows:

.1 Paints and Coatings: Minimum of 4-4L containers of field colours and 4-1 L containers of each accent colour, and all remnants.

1.6 QUALITY ASSURANCE

.1 Conform to the standards contained in the MPI Manual.

.2 Applicator Qualifications: A firm or individual experienced in applying paints and coatings similar in material, design, and extent to those indicated for this Project, whose work has resulted in applications with a record of successful in service performance, and as follows:

.1 Have a minimum of five (5) years proven satisfactory experience and shall show proof before commencement of work that he will maintain a qualified crew of painters throughout the duration of the work.

.2 When requested provide a list of the last three comparable jobs including, name and location, specifying authority, start and completion dates and cost amount of the painting work.

.3 Apprentices may be employed provided they work under the direct supervision of a qualified journeyman in accordance with trade regulations.

.3 Source Limitations: Obtain block fillers and primers for each coating system from the same manufacturer as the finish coats and as follows:

.1 Use only paint manufacturers and products as listed under the Approved Products section of the MPI Manual Architectural Painting Specification Manual.

1.7 MOCKUPS

.1 Mockups: Apply mockups of each paint system indicated and each colour and finish selected to verify preliminary selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

.1 Consultant will select one surface to represent surfaces and conditions for application of each paint system.

.1 Vertical and Horizontal Surfaces: Provide samples of at least 100 sq. ft. (9 sq. m).

.2 Other Items: Consultant will designate items or areas required.

.2 Final approval of colour selections will be based on mockups.

.1 If preliminary colour selections are not approved, apply additional mockups of additional colours selected by Consultant at no added cost to Owner.

.3 Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Consultant specifically approves such deviations in writing.

.4 Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.8 DELIVERY, STORAGE, AND HANDLING

.1 Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 7 deg C (45 deg F).

.1 Maintain containers in clean condition, free of foreign materials and residue.

.2 Remove rags and waste from storage areas daily.

1.9 FIELD CONDITIONS

.1 Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 10 and 35 deg C (50 and 95 deg F).

.2 Do not apply paints when relative humidity exceeds 85 percent; at temperatures less than 3 deg C (5 deg F) above the dew point; or to damp or wet surfaces.

1.10 WARRANTY

.1 Provide upon completion of the work, a Warranty Certificate, in the name of the Owner, stating that the work of this section was performed in accordance with these specifications and the MPI manual (latest edition), and is warranted against defects in material or installation, for a period of two (2) years from Date of Substantial Performance.

2 Products

2.1 MANUFACTURERS

.1 Subject to compliance with requirements, manufacturers that have attained the prerequisites for ecologically sustainable labelling mark on their products and may be incorporated into the Work include; but are not limited to, the following:

.1 Dulux Paints

.2 Sherwin-Williams LLC

.3 Benjamin Moore and Co. Limited

.4 ICI Paints (Canada) Inc.

2.2 PAINT, GENERAL

.1 MPI Standards: Products shall comply with MPI standards indicated and shall be listed in its "MPI Approved Products Lists".

.2 Material Compatibility:

.1 Materials for use within each paint system shall be compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.

.2 For each coat in a paint system, products shall be recommended in writing by topcoat manufacturers for use in paint system and on substrate indicated.

.3 VOC Content: For field applications, paints and coatings shall comply with VOC content limits of authorities having jurisdiction and the following VOC content limits:

.1 Flat Paints and Coatings: 50 g/L.

.2 Nonflat Paints and Coatings: 50 g/L.

.3 Dry-Fog Coatings: 150 g/L.

.4 Primers, Sealers, and Undercoaters: 100 g/L.

.5 Rust-Preventive Coatings: 100 g/L.

.6 Zinc-Rich Industrial Maintenance Primers: 100 g/L.

.7 Pretreatment Wash Primers: 420 g/L.

.8 Shellacs, Clear: 730 g/L.

.9 Shellacs, Pigmented: 550 g/L.

.4 Paint Colour and Manufacturer (PT): As selected by the Consultant from the manufacturer's standard product line. Carry five (5) colours and three (3) accent colours in Bid Price.

2.3 PREPARATORY COATS

.1 CMU Block Filler:

.1 Benjamin Moore; Coronado Super Kote 5000 Latex Block Filler (958-11).

.2 PPG; Speedhide Interior/Exterior Masonry Latex Block Filler (6-7).

.3 SW; PrepRite Block Filler Interior/Exterior Latex (B25W25).

3 Execution

3.1 EXAMINATION

.1 Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

.2 Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:

.1 Concrete: 12 percent.

.2 Fiber-Cement Board: 12 percent.

.3 Masonry (Clay and Concrete Masonry Units): 12 percent.

.4 Wood: 15 percent.

.5 Portland Cement Plaster: 12 percent.

.6 Gypsum Board: 12 percent.

.3 Gypsum Board Substrates: Verify that finishing compound is sanded smooth.

.4 Verify suitability of substrates, including surface conditions and compatibility, with existing finishes and primers.

.5 Proceed with coating application only after unsatisfactory conditions have been corrected.

.1 Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

.1 Comply with manufacturer's written instructions and recommendations in "MPI Painting Specification Manual" applicable to substrates and paint systems indicated.

.2 Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.

.1 After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.

.3 Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.

.1 Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.

.4 Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.

.1 Use abrasive blast-cleaning methods if recommended by paint manufacturer.

.5 CMU / Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces or mortar joints exceeds that permitted in manufacturer's written instructions.

.6 Steel Substrates: Remove rust, loose mill scale, and shop primer, if any. Clean using methods recommended in writing by paint manufacturer, but not less than the following:

.1 SSPC-SP 3.

.7 Shop-Primed Steel Substrates: Clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.

.8 Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.

.9 Gypsum Wallboard: Repair all surfaces in gypsum wallboard with wallboard joint finishing compound or spackling compound, filled out flush and sanded smooth. Clean all surfaces and taped joints of dust, dirt and other contaminants and be sure they are thoroughly dry before applying paint.

.10 Cotton or Canvas Insulation Covering Substrates: Remove dust, dirt, and other foreign material that might impair bond of paints to substrates.

.11 Mix and prepare paint materials according to manufacturer's written instructions.

.1 Maintain containers used in mixing and applying paint in a clean condition, free of foreign materials and residue.

.2 Stir material before application to produce a mixture of uniform density. Stir as required during application. Do not stir surface film into material. If necessary, remove surface film and strain material before using.

.3 Use only thinners approved by paint manufacturer and only within recommended limits.

3.3 APPLICATION

.1 Apply paints according to manufacturer's written instructions and to recommendations in "MPI Manual."

.1 Use applicators and techniques suited for paint and substrate indicated.

.2 Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed equipment or furniture with prime coat only.

.3 Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.

.4 Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.

.5 Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.

.2 Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Tint undercoats to match colour of topcoat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.

.3 Apply first coat to surfaces that have been cleaned, pretreated, or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.

.1 The number of coats and film thickness required are the same regardless of application method. Do not apply succeeding coats until previous coat has cured as recommended by manufacturer. If sanding is required to produce a smooth, even surface according to manufacturer's written instructions, sand between applications.

.1 Recoat primed and sealed surfaces where evidence of suction spots or unsealed areas in first coat appears, to ensure a finish coat with no burn-through or other defects due to insufficient sealing.

.2 Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.

.3 If undercoats, stains, or other conditions show through final coat of paint, apply additional coats until paint film is of uniform finish, color, and appearance. Give special attention to ensure that edges, corners, crevices, welds, and exposed fasteners receive a dry film thickness equivalent to that of flat surfaces.

.2 Allow sufficient time between successive coats to permit proper drying. Do not recoat surfaces until paint has dried to where it feels firm, and does not deform or feel sticky under moderate thumb pressure, and until application of another coat of paint does not cause undercoat to lift or lose adhesion.

.4 Apply paints and coatings by brush, roller, spray, or other applicators according to manufacturer's written instructions.

.1 Brushes: Use brushes best suited for type of material applied. Use brush of appropriate size for surface or item being painted.

.2 Rollers: Use rollers of carpet, velvet-back, or high-pile sheep's wool as recommended by manufacturer for material and texture required.

.3 Spray Equipment: Use airless spray equipment with orifice size as recommended by manufacturer for material and texture required.

.5 Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and colour breaks.

.6 Apply block fillers to CMU at a rate to ensure complete coverage with pores filled.

.7 Painting Fire Suppression, Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work:

.1 Paint the following work where exposed in equipment rooms and where exposed in occupied spaces:

.1 Equipment, including panelboards.

.2 Uninsulated metal piping.

.3 Uninsulated plastic piping.

.4 Pipe hangers and supports.

.5 Metal conduit.

.6 Plastic conduit.

.7 Tanks that do not have factory-applied final finishes.

.8 Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.

.8 Paint portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets that are visible from occupied spaces.

.1 Colour: Flat (gloss level 1), nonspecular, black.

3.4 FIELD QUALITY CONTROL

.1 Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test paint for dry film thickness.

.1 Contractor shall touch up and restore painted surfaces damaged by testing.

.2 If test results show that dry film thickness of applied paint does not comply with paint manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with paint manufacturer's written recommendations.

3.5 CLEANING AND PROTECTION

.1 At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

.2 After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

.3 Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Consultant, and leave in an undamaged condition.

.4 At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.6 EXTERIOR PAINTING SCHEDULE

.1 Galvanized Metal (doors, frames, railings, misc. steel, pipes, overhead decking, ducts, gutters, flashing, etcetera):

.1 Latex System - MPI EXT 5.3A.

.1 Semi-gloss (MPI Gloss Level 5).

.2 Wash Primer/2-Component Aliphatic Polyurethane Finish (High Contact Areas) - MPI EXT 5.3D:

.1 Semi-gloss (MPI Gloss Level 5).

.2 Wood Cladding/Soffits

.1 Stain System – MPI EXT 6.4D

.1 Semi-transparent stain (MPI Gloss Level 4).

3.7 INTERIOR PAINTING SCHEDULE

.1 Concrete Substrates:

.1 Latex System - MPI INT 3.1A:

.1 Primer: Alkali resistant, water based.

.2 Intermediate Coat: Latex, interior, matching topcoat.

.3 Topcoat: Latex, interior (gloss as selected by the Consultant).

.2 CMU Substrates:

.1 Latex System - MPI INT 4.2A:

.1 Primer: CMU block filler.

.2 Intermediate Coat: Latex, interior, matching topcoat.

.3 Topcoat: Latex, interior (gloss as selected by the Consultant).

.3 Structural Steel Substrates:

.1 Water-Based Dry Fall Finish - MPI INT 5.1C

.2 High-Performance Architectural Latex System - MPI INT 5.1R:

.1 Primer: Acrylic.

.2 Intermediate Coat: Latex, interior, high performance architectural; matching topcoat.

.3 Topcoat: Latex, interior, high performance architectural (gloss as selected by the Consultant).

.3 Coordinate with existing structural steel elements scheduled to receive applied fireproofing and/or intumescent fireproofing.

.4 Steel (Factory-Primed) Substrates:

.1 High-Performance Architectural Latex System:

.1 Primer: Acrylic (applied over factory primer).

.2 Intermediate Coat: Latex, interior, high performance architectural; matching topcoat.

.3 Topcoat: Latex, interior, high performance architectural (gloss as selected by the Consultant).

.5 Galvanized-Metal Substrates:

.1 High-Performance Architectural Latex System - MPI INT 5.3M:

.1 Prime Coat: Primer, galvanized, water based.

.2 Intermediate Coat: Latex, interior, high performance architectural, matching topcoat.

.3 Topcoat: Latex, interior, high performance architectural, semi-gloss (MPI Gloss Level 5).

.6 Hollow Metal Doors and Frames.

.1 High-Performance Architectural Latex System - MPI INT 5.3M:

.1 Prime Coat: Primer, galvanized, water based.

.2 Intermediate Coat: Latex, interior, high performance architectural, matching topcoat.

.3 Topcoat: Latex, interior, high performance architectural, semi-gloss (MPI Gloss Level 5).

.7 Gypsum Board Substrates:

.1 Latex System - MPI INT 9.2A:

.1 Primer: Sealer, latex, interior.

.2 Intermediate Coat: Latex, interior, matching topcoat.

.3 Topcoat: Latex, interior (gloss as selected by the Consultant).

.8 Cotton or Canvas Insulation-Covering Substrates: Including pipe and duct coverings.

.1 Latex System - MPI INT 10.1A:

.1 Prime Coat: Primer sealer, latex, interior.

.2 Topcoat: Latex, interior, flat (MPI Gloss Level 1).

END OF SECTION

1.0 GENERAL

1.1 SECTION INCLUDES

.1 Natural linoleum pinboard/bulletin board in aluminum frame.

1.2 SHOP DRAWINGS

.1 Submit shop drawings in accordance with Section 01 33 00 – Submittals.

.2 Indicate type dimensions, frame materials, bulletin boar materials, colour and mounting system.

1.3 SAMPLES

.1 Submit samples in accordance with Section 01 33 00 – Submittals.

.2 Submit duplicate 50 x 50 mm samples of colour and finish.

1.4 DELIVERY, STORAGE, AND HANDLING

.1 Deliver and store products in manufacturer's unopened packaging bearing the brand name and manufacturer's identification until ready for installation.

.2 Handle materials to avoid damage.

2.0 PRODUCTS

2.1 MATERIALS

.1 Natural Cork Bulletin boards (BB) to be ¼" (6mm) thick finest quality Krommenie Linoleum cork with burlap backing. Colour to be selected by consultant from full manufacturer range, allow for 2 colours.

.1 Basis of design product: Bulletin Board by Forbo or equivalent.

.2 Accessories

.1 Aluminum reveal edge trim

.2 Mounting adhesive to manufacturers recommendation

.3 Glass markerboard (WB) to be low iron, ultra-clear, safety writing glass with polished edges. Non-ghosting, smooth, bright white back finish intended for use with dry-erase markers; wet erase markets can be used but are not recommended.

.1 Thickness: ¼ inch (6mm)

.2 Edge Profile: Polished.

.3 Treatment: Fully tempered to comply with ANSI Z97.1 or 16 CFR 1201 criteria for safety glazing.

.4 Steel back for Magnetic Board: Required.

.5 Basis of design product: Glass Markerboard by ASI Visual Display Products or approved equivalent.

2.2 SCHEDULE

.1 Bulletin Board sizes:

.1 BB-01 – 2438mm W x 1219mm H

.2 BB-02 - 1829mm W x 1219mm H

.2 Bulletin Board Locations/Quantities

Location	Quantity
Corridor 136	1no BB-02 1no BB-01 refer to Corridor elevations for Bulletin board above cubbies
Cubbies 146	1no BB-02
Vestibule 144	1no BB-02

.3 Whiteboard sizes:

.1 WB-01 – 60"W x 72"H

.2 WB-02 – 48"W x 72"H

.3 WB-03 – 60"W x 48"H

.4 WB-04 – 72"W x 36"H

.5 WB-05 – 48"W x 36"H

.4 Whiteboard Locations/Quantities:

Location	Quantity
Toddler Room 139	1no WB-01 1no WB-02
Preschool Room 141	1no WB-01 4no WB-02

Preschool Room 142	2no WB-02 1no WB-03 1no WB-04 1no WB-05
Infant Room 147	1no WB-01 1no WB-05

3.0 EXECUTION

3.1 EXAMINATION

.1 Verify that substrates are properly prepared to receive visual display boards.

.2 Do not begin installation until substrates have been properly prepared.

.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 Install bulletin boards level and plumb, keeping perimeter trim aligned in accordance with manufacturer's recommendations.

3.4 ADJUSTING AND CLEANING

.1 Verify that all accessories are installed as required for each unit.

.2 Upon completion of installation, clean surfaces and trim in accordance with manufacturer's recommendations, leaving all materials ready for use.

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 ASTM International (ASTM):

.1 ASTM A167 - Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.

.2 American National Standards Institute (ANSI):

.2 ANSI A117.1 - Accessible and Usable Buildings and Facilities Standards.

.3 National Electrical Manufacturers Association (NEMA):

.3 NEMA LD3 - High Pressure Decorative Laminates.

1.03 SUBMITTALS

.1 Make all submittals in accordance with Section: 01 33 00

.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 01 78 00.
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/Products

1. Bobrick Washroom Equipment of Canada Ltd, Sierra Series
2. ASI Watrous/Global Toilet Partitions, Thru Colour Phenolic Partitions
3. Equivalent as per Spec 01 25 00.

2.02 MATERIALS

.1 Solid Color Reinforced Composite (SCRC) Toilet Partition Screens.

.1 Design Type: Wall Hung

.1 Screen height: 1200mm H x 800mm W complete with custom radius

.2 Floor Clearance: 200mm

.2 Mounting Brackets:

.1 18 gauge (1.2mm) stainless steel brackets to extend full height of panel and securely fasten privacy screen to backup wall.

.2 Stainless steel pilaster support bracket consisting of floor mounted circular flange, circular post and u-bracket to support leading edge of privacy screen. Acceptable product: Jacknob #1057838503

.3 Materials: Solid color reinforced composite (SCRC) material for stiles, panels, doors, and screens with antigraffiti coating, thermoset and integrally fused into homogenous piece; high density polyethylene (HDPE), not acceptable.

.1 Composition: Dyes, organic fibrous material, and polycarbonate/phenolic resins.

.2 Surface Treatment: Non-ghosting, graffiti resistant surface integrally bonded to core through a manufacturing steps requiring thermal and mechanical pressure.

.3 Edges: Same color as the surface.

.4 Color: As selected by Architect from manufacturer's standard colour range.

.5 Acceptable SCRC Products: Or manufacturer approved equal.

.1 Ultimate Corian System by Shower Shapes.

.2 WilsonArt Gibraltar Material.

.3 WilsonArt EarthStone Material.

.4 Performance Requirements:

.1 Graffiti Resistance (ASTM D 6578): Passed cleanability test; 5 staining agents.

.2 Scratch Resistance (ASTM D 2197): Maximum load value exceeds 10 kilograms.

.3 Impact Resistance (ASTM D 2794): Maximum impact force exceeds 30 inch-pounds.

.4 Smoke Developed Index (ASTM E 84): Less than 450.

.5 Flame Spread Index (ASTM E 84): Less than 75.

.6 National Fire Protection Association/International Building Code Interior Wall and Ceiling Finish: Class B.

.7 Uniform Building Code: Class II.

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

1.0 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 01 33 00 – Submittals.

.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 01 33 00 – Submittals.

.2 Submit duplicate 50 x 50 mm samples of colour and finish on actual base metal.

2.0 PRODUCTS

2.1 MANUFACTURED UNITS

.1 Approved Manufacturers:

.1 Emperor Lockers by Hadrian Manufacturing

.2 ASI Storage Solutions

.3 Deluxe Series Lockers by Shannahan's

.4 Or approved equivalent as per Section 01 25 00.

.2 Size:

.1 Locker type 1 (double tier): 15" wide x 18" deep x 72" high.

.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 Staff Room 150: 3no locker type 1 (double tier/6 total lockers).

3.0 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 07 90 00 for sealant.

.4 Install finished end panels to exposed ends of locker banks.

END OF SECTION

1 General

1.1 SECTION INCLUDES

.1 Aluminum flagpoles.

1.2 REFERENCES

.1 Aluminum Association (AA): Aluminum Finishes.

.2 American Society for Testing and Materials (ASTM):

.1 ASTM B 241 - Standard Specification for Aluminum and Aluminum-Alloy Seamless Pipe and Seamless Extruded Tube.

.2 ASTM B 597 - Standard Practice for Heat Treatment of Aluminum Alloys.

.3 National Association of Architectural Metal Manufacturers (NAAMM): NAAMM FP 1001 - Guide Specifications for Design of Metal Flagpoles.

1.3 SUBMITTALS

.1 Submit under provisions of Section 01300.

.2 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 instructions.

.3 Shop Drawings:

.1 Provide shop drawings indicating all materials, dimensions and methods of anchorage/operation.

.1 Shop drawings shall bear the seal of a Professional Engineer licensed to practice in Ontario.

.2 Include details of mounting to concrete foundation/pier.

1.4 DELIVERY, STORAGE, AND HANDLING

.1 Spiral wrap flagpoles with heavy paper and enclose in a hard fiber tube or other protective container.

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

.3 Keep flagpole and accessories covered and dry to prevent soiling or damage.

.4 Handle with protective gloves to prevent unwanted distortion.

1.5 PROJECT CONDITIONS

.1 Structural Performance: Provide flagpole assemblies, including anchorages and supports, capable of withstanding the effects of wind loads, determined according to Ontario Building Code.

2 Products

2.1 MANUFACTURERS

.1 Acceptable Manufacturers:

.1 Ewing Flagpole Co Inc.

.2 Concord American Flagpole

.3 American Flagpole & Flag Co

.4 Equivalents per Specification 01 25 00.

2.2 FLAGPOLES

.1 Aluminum Flagpole Construction

.1 Fabricate from seamless, extruded tubing complying with ASTM B 221, alloy 6063-T6, having a tensile strength not less than 30,000 psi with yield point of 25000 psi. Heat treated after fabrication to comply with ASTM B 597, temper T-6

.2 Flagpole Type

.1 Internal Halyard, cone-tapered, aluminum flagpole complete with Halyard access door. Provide one (1) complete internal halyard cam cleat rope assembly with a plastic coated, dual attachment point counterweight and beaded sling assembly. A manually operated cam cleat mechanism will be installed inside the flagpole behind a raised reinforced frame and door having a cylinder lock. Finish exposed metal surfaces to match flagpole.

.1 Exposed Height: 30ft

.2 Diameter: 6" base and 3" top

.3 Wall thickness: .188"

.4 Wind Speed: 50 MPH flagged, 94 MPH un-flagged

.5 Mounting: steel base plate complete with aluminum base cover

.3 Finish:

.1 Directional Sanded Satin Finish: Fine, directional, medium satin polish; buff complying with AA-M20; and seal aluminum surfaces with clear, hard-coat wax

.1 Satin Brushed Aluminum finish

.4 Foundation:
.1 Provide concrete foundations engineered a Structural engineer licensed to practice in Ontario. Provide shop drawings stamped/sealed by the Structural engineer.

3 EXECUTION

3.1 EXAMINATION

.1 Do not begin installation until final grades and elevations have been established.

.2 If others determine final base elevation, confirm with Architect before proceeding.

3.2 INSTALLATION

.1 Install flagpole where shown on drawings and in accordance with manufacturer's written instructions.

.2 Flagpole shall be plumbed with ¼" for every 10 feet of pole height.

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)

1.5 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	Bobrick B-290 1830 Or approved equivalent	18"x30" Mirror, 1 lavatory and/or as shown on drawings
W2	Bobrick B-293 1830 Or approved equivalent	18" x 30" Fixed Position Tilt Mirror, 1 per accessible lavatory
W3	Frost 109-60S Paper Towel Dispenser	Front loading, stainless steel finish, complete with tumbler lock. Quantities/locations as scheduled.
W4	Bobrick B-4112 Soap Dispenser, Frost 708A Soap Dispenser, Or approved equivalent	Liquid push-in valve, 1.2L/40 fl oz. capacity, keyed lock filler cap at top, plastic soap level indicator window, 20-gauge stainless steel with all mounting screws concealed. 1 per lavatory and/or as shown on drawings
W5	Bobrick B-4288 Toilet tissue dispenser Or approved equivalent	Vertical double-roll type, surface mounted, capacity of 2 standard core toilet tissue roles up to 133mm dia., keyed access with stainless steel finish
W6	Bobrick B-6806.99 Horizontal grab bar Or approved equivalent	1.214mm (0.048") thickness; 765mm (30") long x 32mm (1-1/4") Ø, straight, stainless steel, slip resistant grip, concealed mounting, cap secured with vandal resistant set screws.
W7	Bobrick B-6898.99 L-shaped grab bar Or approved equivalent	1-1/2″ (38mm) diameter stainless steel type-304 with satin-finish, concealed mounting, vandal resistant set screws.
W8	Dyson Airblade V HU02 Or approved equivalent	Sprayed nickel finish, surface mounted hand dryer, ADA compliant, 120V. Quanty: 1 per universal WC.
W9	Bobrick B-254 Sanitary Napkin Disposal Or approved equivalent	Stainless steel finish, surface mounted, pivoting self-closing lid with continuous hinge. Napkin disposal image embossed on lid.
W10	Frost 950-18 Or approved equivalent	Stainless Steel Shelf, 1 per Universal WC
W11	Bobrick B277 Or approved equivalent	Wall-mounted waste disposal (1 per WC typ., 2 per Preschool WC 143)
W12	Jonti-Craft Changing Table with Stairs – Item Code: 5131	Prefabricated change table, complete with retractable access stairs. Left or right stairs as per drawings.

2.2 MATERIALS

.1 All cabinets shall be steel construction with white epoxy powder finish.

.2 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

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 Custom Counters

.2 Bulkheads/Valance/Wall Panels

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 Standards

.1 Do welding work in accordance with CSA W59-M1989 unless specified otherwise.

.2 Weld structural components in steel, to conform to requirements of CSAW59-M1989, and by a fabricator fully certified by the Canadian Welding Bureau to conditions of CSA Standard W47.1 and W55.3 as applicable.

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.

1.6 Shop Drawings

.1 Submit shop drawings in accordance with Section 01 33 00.

.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 designs structures and registered in Place of the Work

1.7 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.

.4 All Stainless Steel to be type 304, brushed S Finish, analysis 18-8.

.2 Metals:

.1 Stainless Steel millwork to be as follows:

.1 14 GA. (1.8mm) S/S for sinks & countertops, column cladding, baseboards.

.2 18 GA. (1.2mm) S/S for body & liners

.3 16 GA. (1.5mm) S/S for shelving

.4 20 GA. S/S for wall panels

.3 Finishes:

.1 Brushed Stainless Steel "Blend S" type finish.

.2 Fastenings: stainless steel

2.2 Fabrication

.1 General:

.1 Fabricate Work of this Section with machinery and tools specifically designed for intended manufacturing processes and by skilled workers.

.2 Fit and assemble Work in shop. When this is not possible make a trial shop assembly.

.3 Incorporate anchors at 610 mm (24") o/c or as otherwise required for secure attachment for metal fabrications located in cast-in-place concrete.

.4 Incorporate means for fastenings of other Work secured to Work of this Section.

.2 Construction:

.1 Fabricate Work with materials, component sizes, metal gauges, reinforcing, anchors, and fasteners of adequate strength to withstand intended use, and within allowable design factors imposed by jurisdictional authorities. Fabricate items from steel unless otherwise noted.

.2 Ensure that Work will remain free of warping, buckling, opening of joints and seams, distortion, and permanent deformation to expansion and contraction forces and loads.

.3 Construct items that are part of floor construction, such as gratings and trench covers to support same live loads for which surrounding floors are designed unless indicated otherwise.

.4 Drill drainage holes at exterior steel fabrications to permit drainage of trapped moisture.

.3 Assembly:

.1 Accurately cut, machine and fit joints, corners, copes and miters so that junctions between components fit together tightly and in true planes.

.2 Fasten Work with concealed methods unless otherwise indicated on Drawings.

.3 Weld connections where possible, bolt where not possible, and cut off bolts flush with nuts. Countersink bolt heads, and provide method to prevent loosening of nuts. Ream holes drilled for fastenings.

.4 Grind welds smooth where exposed to view.

.5 Provide for differential movements within assemblies and at junctions of assemblies with surrounding Work.

.4 Finish work:

.1 Incorporate holes and connections for Work installed under other Sections of this Specification.

.2 Cleanly and smoothly finish exposed edges of materials including holes.

.3 Cap open ends of sections exposed to view, such as pipes, channels, angles, and other similar Work.

.4 Machine or grind floor plates, gratings, covers, or their bearings to provide level support.

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 Adjustment and Cleaning

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

3.4 Protection

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

.2 Protect prime and finish painted and galvanized surfaces from damage.

END OF SECTION

1 General

1.1 SUMMARY

.1 Furnish labour, materials and other services to complete the fabrication and installation of the following:

.1 Recessed entrance floor grids, including all materials and fitments required for the operation of any unit furnished, in the manner, direction and performance shown on the shop drawings and specified herein.

.2 Products Furnished but not Installed Under this Section:

.1 Supply floor grid frames to Section 03 35 00 for casting into concrete.

1.2 REFERENCE STANDARDS

.1 Canadian Standards Association (CSA):

.1 CSA W47.1-09, Certification of Companies for Fusion Welding of Steel

.2 CSA W55.3-08, Certification of Companies for Resistance Welding of Steel and Aluminum

.3 CSA W59-03 (R2008), Welded Steel Construction (Metal Arc Welding)

.2 Canadian General Standards Board (CGSB):

.1 CAN/CGSB-1.108-89, Bituminous Solvent Type Paint

.3 American Society for Testing and Materials (ASTM):

.1 ASTM A276-13, Standard Specification for Stainless Steel Bars and Shapes

.2 ASTM A666-10, Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip Plate, and Flat Bar

1.3 SUBMITTALS

.1 Provide submittals in accordance with Division 01.

.2 Submit product data for floor grid and frame to be supplied, including manufacturer's specifications and installation instructions, details of construction relative to materials, dimensions of individual components, profiles, anchors and accessories.

.3 Shop Drawings:

.1 Submit shop drawings showing and describing in detail, materials, finishes, dimensions, details of connections and fastenings, plans, sections, metal gauges, hardware and any other pertinent information.

.2 Make thorough examination of drawings and details, determine the intent, extent, materials, conditions of interfacing with other work and be fully cognizant of requirements.

.4 Submit 305mm x 305mm (12" x 12") samples of floor grids, 305mm (12") long samples of floor grid frames showing corner condition for review of Consultant.

1.4 QUALITY ASSURANCE

.1 The Contractor executing work of this Section shall have a minimum five (5) years continuous experience in successful manufacture and installation of work of type and quality shown and specified. Submit proof of experience upon Consultant's request.

.2 Slip resistance in accordance with ASTM D-2047-96, Coefficient of Friction, minimum 0.60 for accessible routes.

.3 Standard rolling load performance is 500 lb./wheel with larger loading requirements as specified (load applied to a solid 5" x 2" wide polyurethane wheel, 1000 passes without damage).

.4 Single Source Responsibility: Obtain floor grids and frames from one source of a single manufacturer.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Co-ordinate deliveries to comply with construction schedule and arrange ahead for off the ground, under cover storage location. Do not load any area beyond the design limits.

.2 Materials shall be carefully checked, unloaded, stored and handled to prevent damage. Protect materials with suitable non-staining waterproof coverings.

.3 Store materials in original, undamaged containers or wrappings with manufacturer's seals and labels intact.

.4 Unsatisfactory materials shall be removed from the site.

.5 Adequately protect the structure and work of other Sections during delivery, storage, handling and execution of the work of this Section.

.6 Provide tools, plant and other equipment required for the proper execution of the work of this Section.

1.6 PROJECT CONDITIONS

.1 Field measurements: Check actual openings for grids by accurate field measurements before fabrication.

.2 Record actual measurements on final shop drawings.

.3 Coordinate fabrication schedule with construction progress to avoid delay of work.

.4 Recessed Conditions: Coordination with Division 03 35 00 as required for proper installation, the concrete recess must be flat and smooth throughout.

.5 The final recess depth will match the specified product and must be field verified. For proper frame installation, the side walls of the concrete recess must also be straight and smooth.

.6 Inconsistencies with the recess and side walls must be remediated prior to product installation.

1.7 WARRANTY

.1 Warrant work of this Section against defects in materials and workmanship in accordance with the General Requirements for a period of five (5) years and agree to promptly make good defects which become evident during warranty period without cost to the Owner.

2 Products

2.1 MANUFACTURERS

.1 Basis-of-Design products are named in this Section; form the basis-of-design materials for the project; additional manufacturers offering similar products may be incorporated into the work of this Section provided they meet the performance requirements established by the named products and provided they submit requests a minimum of five (5) days in advance of Bid Closing.

.2 Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

.1 Pawling Corporation

.2 Construction Specialties Inc.

.3 Bolar Systems, Distributed by TenPlus Architectural Products Ltd.

.4 McGill Architectural Products

.5 K.N. Crowder

.6 Or approved equivalent.

2.2 MATERIALS

.1 Stainless steel - Type 304 stainless steel for surface wires and support bars.

.2 Screws, Bolts, Nuts, Washers, Rivets and other Fastening Devices: Stainless steel with not less than 12% chromium content to prevent galvanic action, and of sufficient strength for the purpose.

.3 Aluminum - Anodized 6063 –T5.

.4 Bituminous Paint: Conforms to CAN/CGSB-1.108, Type 2.

2.3 ASSEMBLY

.1 Entrance Stainless Steel Floor Grid:

.1 Type 304 stainless steel, 5/8" depth, 0.090" x 0.15" V-Wires electronically welded and spaced 0.145" apart

.1 Unit must withstand 1000 lb./ wheel loads (load applied to a solid 5" x 2" wide polyurethane wheel, 1000 passes without damage.

.2 Basis of Design Materials: Gridline G6 stainless steel grid system by Construction Specialties, or equivalent per Specification 01 25 00.

.2 Stainless Steel Angle Frame with Drain: Type 304 stainless steel with 1/8" (3.2mm) exposed surface, for casting into concrete. Drain pan to be .050" stainless steel with general purpose stainless steel strainer.

.3 Lock Down Mechanism: Hidden device to secure the entrance grid to the concrete surface, made from Type 304 stainless steel.

2.4 FABRICATION

.1 Verify site dimensions prior to fabrication. Fabricate work of this Section square, true, straight, level and free of distortion with joints closely fitted and properly secured. Provide adequate reinforcing and anchorage.

.2 Fabricate floor grids and frames in largest practical sized units to fit floor recesses.

.3 Where floor recess size exceeds manufacturer's recommended maximum floor grids size, abut adjacent floor grids sections symmetrically, space joints away from normal traffic lines.

.4 Fit and assemble work of this Section in shop.

.5 Joints and intersecting members shall be accurately fitted, made in true planes with adequate fastening. Wherever possible, fastenings shall be concealed.

.6 Isolate where necessary to prevent electrolysis between metal to metal or metal to masonry or concrete contact. Apply two (2) coats of bituminous paint to frame surfaces in contact with concrete.

.7 Drilling shall be reamed and exposed edges left clean and smooth.

.8 Include anchors and fastenings necessary to anchor work.

3 Execution

3.1 EXAMINATION

.1 Inspect surfaces over which the work of this Section is dependent for any irregularities detrimental to the application and performance of the work of this Section.

.2 Notify Consultant in writing of all conditions which are at variance with those in the contract documents and/or detrimental to the proper and timely installation of the work of this Section.

.3 The decision regarding corrective measures shall be obtained from the Consultant prior to proceeding with the affected work.

.4 Commencement of work implies acceptance of surfaces and conditions.

3.2 PREPARATION

.1 Co-ordinate the work of this Section with the work of other Sections to provide the necessary recesses, edge conditions for the accessories as required.

.2 Set frame above floor slab to suit the adjacent floor finish height, ensuring a level transition from floor finish to floor grids and back to floor finish.

.3 Upon completion of installation of entrance mat frames, provide temporary plywood filler protection in entrance mat recesses and cover frames with plywood protective flooring. Maintain protection until construction traffic has ended.

3.3 INSTALLATION

.1 Install floor grids when no further wheeled construction traffic will occur and all "wet" trades including painting and decorating have been completed.

.2 Vacuum clean floor recesses prior to installing floor grids.

.3 Install floor grids flush and level with frames with concealed type fasteners, providing required under door clearances, in strict accordance with the manufacturer's written instructions, with the floor grids aligned perpendicular to traffic flow.

END OF SECTION

PART 1 - GENERAL

1.1 SECTION INCLUDES

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

.2 Quick release blackout blinds for interior sidelights, screens and vision panels for quick deployment during lockdown procedures.

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 01 33 00 - 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.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

.1 SOLARFECTIVE/LEGRAND.

.2 HUNTER DOUGLAS CANADA.

.3 Equivalent products as per 01 25 00.

2.2 MANUALLY OPERATED SOLAR 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/back fascia: aluminum extrusion to conceal shade roller and hardware from both interior and exterior sides.

.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.

2.3 SOLAR SHADE 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 dernier 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.

2.4 QUICK RELEASE BLACKOUT SHADES (FOR USE DURING LOCKDOWN)

.1 A high quality, NFPA 701 compliant blackout fabric roll with weighted hem-bar, rolled and held with a velcro tab which allows the shade to drop into place when released**.**

.1 Basis of design product: Hideaway Helper Lockdown Shade by School Safety Solution or equivalent per specification 01 25 00.

2.5 SCHEDULE

.1 Provide solar rollershades at the following locations:

.1 New exterior windows type W1, W2, W3, W4 & W5

.2 New interior screen S2

.2 Provide lockdown blackout shades at the following locations:

.1 Sidelight at Door Type C (all locations)

PART 3 - 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

Part 1 General

1.1 MEASUREMENT PROCEDURES

.1 Asphalt paving will be measured as noted in the Form of Tender, including all excavation, base preparation, compaction and all incidental items required to complete the installation as shown on the drawings and details.

1.2 REFERENCE STANDARDS

.1 Ontario Provincial Standard Specifications:

.1 OPSS 1101 – Performance Graded Asphalt Cement

.2 OPSS 1150 – Material Specification for Hot Mix Asphalt

.3 OPSS 1003 – Aggregates – Hot Mix Asphalt

.4 OPSS.MUNI 310 - Construction Specification for Hot Mix Asphalt

.5 The Contractor shall have the current copies of all OPSS forms and details mentioned in this specification on the site for the duration of this work.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00 - Submittal Procedures.

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for asphalt mixes and aggregate and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Test and Evaluation Reports:

.1 Submit manufacturer's test data and certification that asphalt cement meets specification requirements.

.2 Submit asphalt concrete mix design and trial mix test results to Consultant for review at least 4 weeks prior to beginning Work.

.3 Submit printed record of mix temperatures at end of each week.

.1 Compaction and materials tests as per Section 01450 – Quality Control and Testing.

.2 Testing to be conducted for this section of work is as follows:

.1 Sub-grade to be minimum 98% Standard Proctor Maximum Dry Density

.2 Granular B compacted to 100% Standard Proctor Maximum Dry Density

.3 Granular A compacted to 100% Standard Proctor Maximum Dry Density

.4 HL8 Asphalt compacted to 96.5% MRD; to be tested for compaction, content, grain size and mix.

.5 HL3 Asphalt compacted to 96.5% MRD; to be tested for compaction, content, grain size and mix.

1.4 QUALITY CONTROL

.1 The asphalt contractor shall have a minimum of five (5) years of experience in asphalt paving work.

.2 Asphalt plants, spreading equipment and rollers and asphalt paving to meet the requirements of the current applicable OPSS sections.

.3 Haul trucks to be of adequate size, spread and condition to ensure orderly and continuous operation. Employ suitable hand tools.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.

.2 Coarse and fine aggregates shall be stored separately, in free draining stockpiles and in such a manner as to prevent contamination and segregation.

.3 When necessary to blend aggregates from one or more sources to produce required gradation, do not blend in stockpiles.

Part 2 Products

2.1 MATERIALS

.1 Asphalt Surface:

.1 Asphalt work materials and measurements to conform to applicable details.

.2 Prime coat: MTO Primer or SS-1 to OPSS 1103.

.3 Tack coat: SS-1 to OPSS 1103.

.4 Asphalt concrete: to OPSS 1150 as modified by items 5 and 6 below.

.5 Hot mix, hot laid HL3 – Reclaimed Asphalt Pavement (RAP) is **not** permitted

.6 Hot mix, hot laid HL8 – Reclaimed Asphalt Pavement (RAP) is **not** permitted

.7 Granular base as indicated on drawings.

2.2 EQUIPMENT

.1 Pavers: Mechanical grade controlled, self-powered pavers capable of spreading mix within specified tolerances, true to line, grade and crown indicated conforming to OPSS 310.06.01. Blade graders are not permitted for spreading asphalt.

.2 Rollers: Sufficient number of rollers of type and mass to obtain specified density of compact mix in accordance with OPSS 310.06.02.

Part 3 Execution

3.1 SAW-CUTTING

.1 The limits of existing asphalt to be removed shall be saw-cut prior to asphalt removal. If edge damage occurs during the repair work, the contractor shall saw-cut back beyond the damaged area prior to asphalt placement.

.2 Prior to the placement of the hot-mix asphalt, the exposed vertical sides of the surrounding pavement shall be tack coated using SS-1 emulsified asphalt.

3.2 SUBGRADE

.1 Set out work to lines and levels shown on Drawings. Gain approval from the Consultant of lines and levels prior to sub-base installation. Maintain such lines and levels for duration of work.

.2 Excavate and prepare all subgrade as noted on details. Remove and dispose of existing unsuitable subgrade materials off site.

.3 Verify grades of subgrade for conformity with elevations and sections before placing base material.

.4 Disturbed subgrade or clean fill shall be compacted to 100% of Standard Proctor Density in accordance with ASTM D698-70.

.5 Obtain subgrade approval from the Consultant prior to placing base material.

3.3 GRANULAR BASE

.1 Exercise caution at all times to prevent base material from becoming contaminated by clay or other deleterious materials.

.2 Place base material to compacted thickness as indicated on drawings.

.3 Place in layers not exceeding 150mm compacted thickness. Compact to density not less than 100% of Standard Proctor Density in accordance with ASTM D698-70.

.4 The granular base surface shall be rolled continuously, compacted and bladed as necessary.

.5 The granular base surface shall be within 10 mm of specified grade, but not uniformly high or low.

.6 Gain approval from the Consultant of the installed granular base. Installation of asphalt can only commence after granular base test results confirm that the specified compaction has been achieved.

3.4 TRANSPORTATION OF ASPHALT MIX

.1 Transport mix to job site in vehicles cleaned of foreign material.

.2 Paint or spray truck beds with light oil, limewater, soap or detergent solution, at least once a day or as required. Elevate truck bed and thoroughly drain. No excess solution will be permitted.

.3 Schedule delivery of material for placing during daylight hours.

.4 Deliver material to pave at a uniform rate and in an amount within the capacity of the paving and compacting equipment.

.5 Deliver loads continuously in covered vehicles and immediately spread and compact. Deliver and place mixes at a temperature recommended by OPSS documents.

.6 Air temperature during placing of mixture shall be minimum 7ºC (45ºF) and rising. Temperature of mixture when spread shall be not less than 120ºC (245ºF) nor more than 150ºC (300ºF). Do not increase temperature of mixture to offset long distance hauling.

3.5 ASPHALT PLACING

.1 Place asphalt to thickness, grades and lines indicated on drawings to provide continuously draining surface free of water ponding such that existing surface drainage is not disrupted.

.2 Asphalt shall not be placed during rainfall, or on a surface which is wet or covered by ice or snow, or if the temperature is below recommendations in OPSS documents.

.3 Compact asphaltic mixture as soon as it can bear roller without undue displacement or hair cracking and continue until all roller marks are eliminated. Keep speed of roller slow enough to avoid displacement of mixture. Keep roller wheels slightly moistened by water to prevent adhesion of mixture. Excess water is not permitted. Compact mixture with hot tampers in locations that are not easily accessible to machine roller.

.4 Use self propelled Class 'B' roller for initial and final rolling.

3.6 COMPACTING

.1 Roll asphalt continuously to a density not less than 92% of density obtained with Marshall specimens prepared from samples of mixture being used.

3.7 PAVEMENT CONSTRUCTION

.1 Application of prime coat: OPSS 302.

.2 Construction of asphalt concrete: OPSS 310.07.

3.8 FINISH TOLERANCES

.1 Upon completion of compaction each pavement course shall be:

.1 Smooth and true to crown and grade with variation not more than 3mm from thickness shown on drawings. Do not place any asphaltic course less than 25mm thick or more than 75mm thick.

.2 Finished asphalt surface to be within 10mm of design elevation, but not uniformly high or low, and with no irregularities greater than 10mm within every 4.5m.

.3 Compacted to a density of 96.5% MRD.

3.9 DEFECTIVE WORK

.1 Correct irregularities which develop before rolling is completed, by loosening surface mix and removing or adding material, as required. If irregularities or defects remain after final compaction, remove surface course promptly and lay new material to form a true and even surface and compact immediately to specified density.

.2 Repair areas showing checking or hairline cracking.

.3 Repair any areas exhibiting water ponding, preferably with seamless repair methodology.

3.10 JOINTS

.1 Cut back bituminous course to its full depth in straight or curved lines as required to expose a fresh, straight, vertical surface. Remove broken and loose material.

.2 Asphalt shall be placed in such a manner that the joint shall not be allowed to cool before adjacent asphalt course is applied.

.3 Overlap previously laid strip with spreader by 150mm, plus or minus 50mm.

.4 Carefully place and compact hot asphaltic material against joints. Correct any unsatisfactory joint before proceeding with work.

.5 Feathering of joints is not permitted.

3.11 CLEANING

.1 After completion of asphalt work and prior to final inspection, clean all areas contaminated by asphaltic or other materials resulting from the work.

END OF SECTION

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Synthetic turf surfacing, including artificial turf, [subbase preparation and placement of aggregate base course,] and turf infill.

B. Related Information:
   1. Division 32 Section "Aggregate Base Courses"
   2. Division 33 Section "Subdrainage" for piping and drainage course serving as subbase for synthetic turf surfacing.

1.2 REFERENCES

A. ASTM International (ASTM): www.astm.org:
   1. ASTM D1335 - Test Method for Tuft Bind of Pile Yarn Floor Coverings.
   2. ASTM D2859 - Standard Test Method for Ignition Characteristics of Finished Textile Floor Covering Materials.
   3. ASTM E648 - Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source.

1.3 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Conference: Conduct conference at Project site following award of contract. Review methods and procedures related to synthetic turf surfacing installation including, but not limited to, the following:
   1. Review survey of subbase conditions.
   2. Review delivery, storage, and handling procedures.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product specified.

B. Shop Drawings: Provide installation details including roll and seaming layout, methods of attachment and details at penetrations and terminations
   1. Show layout of marking plan if any, indicating details for specified activity areas.

C. Samples: For each type of synthetic turf surfacing indicated.
   1. Minimum 12-by-12-inch- square sample of synthetic turf surface with tufted perimeter line and carpet seam.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Installation Schedule: Showing planned commencement and completion dates for each portion of the Work; include critical dates indicated on Owner's project schedule.

C. Warranty: Sample warranty specified in this Section.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: A firm experienced in manufacturing synthetic turf surfacing materials similar to those specified for this project, with a record of successful service for a minimum of 5 years.

B. Installer Qualifications: An experienced Installer certified by the manufacturer, employing workers trained and approved by manufacturer.

C. Source Limitations: Obtain synthetic turf surfacing materials through one source from a single manufacturer.
1. Provide secondary materials including adhesives, paint, thread, and repair materials of type and from source recommended by manufacturer of synthetic turf surfacing materials.

1.7 PROJECT CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit synthetic turf surfacing installation to be performed according to manufacturers' written instructions and warranty requirements.

1.8 COORDINATION

A. Coordinate installation of synthetic turf surfacing's with installation of site paving, playground equipment, adjacent lawns, landscaping materials, site lighting, and related work.

1.9 WARRANTY

A. Manufacturer's Warranty: Submit manufacturer's standard published limited warranty form in which manufacturer agrees to repair or replace components of synthetic turf surfacing installation installed by manufacturer-certified Installer that fail in materials under normal use and maintenance, or provide other relief, within specified warranty period.
1. Failures include ultraviolet degradation, backing integrity, more than 50 percent loss of face fiber, and loss of tuft bind strength.
2. Warranty Period: Life of product.

B. Installer Project Warranty: Submit synthetic turf surfacing Installer's warranty, signed by Installer, covering the Work of this Section, including installation of all components of synthetic turf surfacing system, for the following warranty period:
1. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design Manufacturer: Subject to requirements of this Section, provide listed products of SYNLawn, Dalton GA 30721; (866) 796-5296; info@synlawn.com; www.synlawn.com.

1. Submit requests for substitution in accordance with Instructions to Bidders and Division 01 General Requirements.

B. Source Limitations: Obtain synthetic turf surfacing materials through one source from a single manufacturer.
   1. Provide secondary materials including adhesives, paint, thread, and repair materials of type and from source recommended by manufacturer of synthetic turf surfacing materials.

2.2 PERFORMANCE REQUIREMENTS

A. Certification: Provide synthetic turf surfacing system with safety performance testing certified by IPEMA.

B. Fire-Test-Response Characteristics: Provide products with the critical radiant flux classification indicated in Part 2, as determined by testing identical products per ASTM E648 by an independent testing and inspecting agency acceptable to authorities having jurisdiction.

C. Accessibility Requirements: Comply with applicable provisions in Accessibility of Ontarians with Disabilities Act, 2005 (AODA) and City of Toronto Accessiblity Design Guidelines for recreation surfaces.
   1. Provide synthetic turf system meeting requirements of ASTM F1951.

2.3 SYNTHETIC TURF SURFACING

A. Synthetic Turf Surfacing: Complete surfacing system, consisting of delustered UV-stabilized antimicrobial synthetic yarns bound to water-permeable bio-based primary and secondary backing. IPEMA-certified. Non-abrasive blades with low surface temperature. Anti-Static and Ultra Violet reflective pigment-enhanced.
   1. Basis of Design Product: **SYNLawn SYNAugustine 547**.
   2. Artificial Turf Fiber and Construction Characteristics:
      a. Yarn, Turf Zone: Polyethylene; soft omega shape.
         1) Color: Field green/Olive/Apple.
         2) Denier, ASTM D1577: 9900/9.
         3) Antimicrobial Protection: Sanitized®
         4) Antistatic Protection: StatBlock™
         5) IR Reflective: DualChill™
      b. Yarn, Thatch Zone: Polyethylene.
         1) Color: Field green/Beige.
         2) Denier: 5000/8.
      c. Finished Pile Height, ASTM D5823: 1-3/8 inch.
      d. Finished Pile Weight, ASTM D5848: 50 oz/sq. yd.
      e. Tuft Machine Gauge: 3/8 inch.
      f. Backing, Primary: Polypropylene, 2 layers with fiber-reinforcing core.
      g. Backing, Secondary: 22 oz. urethane.
         1) Enviroloc+™

a) Anti Fungi and Anti Algae blended into secondary backing.

         2)
      h. Total Weight: 78 oz./sq. yd.

i. Temperature-Reducing Infill: Silica sand and moisture-retaining coated sand ballast.

3. Performance Characteristics:
   a. Tuft Bind, ASTM D1335: Not less than 8 lb.
   b. Grab tear strength, ASTM D5034: Not less than 200 lbf.
   c. Elongation to break, ASTM D2256: Not less than 30 percent.
   d. Yarn breaking strength, ASTM D5793: Not less than 20 lb.
   e. Foot Traffic Rating: 5.
   f. Softness Rating: 5.
   g. Flammability, ASTM D2859: Pass.
   h. Fire Test Exposure, ASTM E108: Class A

B.

2.4 SUPPLEMENTARY TURF SURFACING MATERIALS

A. Turf Spikes: Manufacturer's approved fasteners.

B. Nailer Board: Manufacturer's approved nailer/edger board.

C. Curbing: Profile and extent as indicated on Drawings.

2.5 MATERIALS

A. Infill Material: Silica sand in manufacturer's recommended formula for application to synthetic turf surfacing.
   1. Product: SYNLawn, Envirofill.
      a. Color: Green.

B. Glue, Seaming Fabric, and Thread: As recommended by manufacturer for application.

C. Aggregate Base Course: 19mm Crusher Run Limestone

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine synthetic turf surfacing base and perimeter conditions, with Installer present, for compliance with requirements for installation tolerances, and other conditions affecting performance of the Work.
   1. Verify substrate meets profile required.
   2. Confirm base material, compaction of substrate, permeability, and drainage system installation meets requirements.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 SUBBASE PREPARATION

A. General: Prepare substrates to receive surfacing products according to synthetic turf surfacing manufacturer's written instructions. Verify that substrates are sound and without high spots, ridges, holes, and depressions. Remove organic debris. Grade soil subgrade level and compact.

B. Finish grade soil subgrade with slope between 0.5 percent and 1.0 percent toward path of site drainage.
   1. Compact subgrade in both directions with mechanical compacting equipment to achieve specified compaction at 90 percent standard Proctor.
   2. Prepare subgrade to tolerance of within 0.5 inch of design grade.
   3. Prepare subgrade within 0.25 inch in 10 feet in any direction from design grade over entire playing surface.

3.3 AGGREGATE COURSE INSTALLATION

A. Refer to Section 321123 "Aggregate Base Course for Synthetic Turf Surfacing" for requirements for

B. Place aggregate base course, compact by tamping with plate vibrator to 90 percent of ASTM D 1557 maximum laboratory density, and screed to depth indicated. Install 4-inch base course unless otherwise indicated.
   1. Slope base course between 0.5 percent and 1.0 percent, measured from the longitudinal center of the installation towards the edges. Grade base course to tolerance of within 0.5 inch of design grade, and with a maximum variation of 0.25 inch in 10 feet in any direction.

C. Install curbing and perimeter boards as indicated on approved submittals.

3.4 SYNTHETIC TURF INSTALLATION

A. General: Comply with synthetic turf surfacing manufacturer's written installation instructions. Install synthetic turf surfacing over area and in thickness indicated.

B. Fall Pad: Place fall pads tightly abutted over area to receive synthetic turf surfacing. Tape seams with pad seam tape to secure pads in position prior to installing synthetic turf.

C. Artificial Turf: Loose-lay artificial turf and allow fabric to relax for period recommended by manufacturer. Stretch turf sheet and attach at perimeter and in field of turf in accordance with approved submittals.

D. Seaming: Form seams flat and snug, with no gaps or fraying. Remove yarns that are trapped within seams. Form seams as recommended in synthetic turf manufacturer's written instructions using manufacturer's provided or recommended materials.

3.5 INSTALLATION, INFILL

A. Mix and install infill material components in accordance with manufacturer's requirements for approved system. Groom material and leave surface ready for use.

3.6 PROTECTION

A. Protect completed installation from damage. Prevent traffic over system prior to acceptance by Owner.

3.7 DEMONSTRATION

A. Instruct Owner's personnel in proper inspection and maintenance of synthetic turf surfacing. Review manufacturer's recommended maintenance procedures and warranty terms and conditions.

END OF SECTION

Part 1 General

1.1 SCOPE OF WORK

.1 Work described in this section includes materials, equipment, labor costs, including shipping of Omega II Architectural fences, gates and accessories.

1.2 REFERENCES

.1 ASTM STANDARDS: American Society for Testing and Materials

.1 A121 – 19 Standard Specification for Metallic-Coated Carbon Steel Barbed Wire

.2 A123 / A123M – 17 Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products

.3 A153 / A153M - 16a Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware

.4 A500 / A500M – 18 Standard Specification for Cold Formed Welded and Seamless Carbon Steel Structural Tubing in Round Shapes.

.5 A505 – 16 Standard Specification for Steel, Sheet and Strip, Alloy, Hot-Rolled and Cold-Rolled, General Requirements

.6 A513/A513M – 19 Standard Specification for Electric-Resistance-Welded Carbon and Alloy Steel Mechanical Tubing

.7 A641/A641M - 09a (2014) Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire.

.8 A653/A653M – 19 Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process

.9 A659/A659M – 18 Standard Specification for Commercial Steel (CS), Sheet and Strip, Carbon (0.16 Maximum to 0.25 Maximum Percent), Hot-Rolled

.10 A787/A787M - 15a Standard Specification for Electric-Resistance-Welded Metallic-Coated Carbon Steel Mechanical Tubing

.11 A853 - 24 (2017) Standard Specification for Steel Wire, Carbon, for General Use

.12 A1008 / A1008M - 18 Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High- Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable

.13 A1064 / A1064M - 18a Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete

.14 B6 - 18 Standard Specification for Zinc

.15 B22 – 14 Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes and Tubes.

.16 D2247 - 15 Standard Practice for Testing Water Resistance of Coatings in 100% Relative Humidity.

.17 D2794 - 93 (2014) Standard Test Method for Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact).

.18 D3359 – 17 Standard Test Methods for Measuring Adhesion by Tape.

.19 F626 - 14 (2019) Standard Specification for Fence Fittings

.20 F900 - 11 (2017) Standard Specification for industrial and commercial swing gates.

.21 F934 - 96 (2017) Standard Specification for Standard Colors for Polymer-Coated Chain Link Fence Materials.

.22 F1043 – 18 Standard Specification for Strength and Protective Coatings on Steel Industrial Chain Link Fence Framework.

.23 F1184 – 16 Standard Specification for industrial and commercial horizontal slide gates.

.24 F2919 / F2919M - 12 (2018) Standard Specification for Welded Wire Mesh Fence Fabric (Metallic-Coated or Polymer Coated) with Variable Mesh Patterns or Meshes Greater than 6 in2 [3871 mm2] in Panels

.25 F2957 - 13(2019)e1 Standard Specification for Ornamental Aluminum Fence Systems

.2 CSA STANDARDS: Canadian Standards Association

.1 A23.1:19/A23.2:19 Concrete Materials and Methods of Concrete Construction / Test Methods and Standard Practices for Concrete

.2 G164-18 Hot Galvanization of Irregularly Shaped Articles.

.3 CGSB STANDARDS: Canadian General Standards Board

.1 CAN/CGSB-138.1-2019 Fabric for Chain Link Fence

.2 CAN/CGSB-138.2-2019

.3 Steel Framework for Chain Link Fence

.4 CAN/CGSB-138.3-2019

.5 Installation of Chain Link Fence

.6 CAN/CGSB-138.4-2019Gates for Chain Link Fence

1.3 SUBMITTALS

.1 Product Data: Material descriptions, dimension of individual components and profiles, and finishes for the following:

.1 Fence, gate posts, brackets, rails and fittings.

.2 Gates and hardware.

.2 Shop Drawings: In accordance to Section 01 33 00 with 1 digital copy (PDF):

.1 Show locations of fence, each gate, posts, rails, and details of gate swing direction, or other operation, hardware, and accessories.

.2 Indicate materials, dimensions, sizes, weights, and finishes of components.

.3 Include plans, elevations, sections, gate swing direction and other required installation and operational clearances, and details of post anchorage, attachment and bracing.

.4 Installation recommendations and instructions by manufacturer describing all details for a typical fence and gates.

.3 Verification Samples: For each finish product specified, two (2) samples, minimum size 6 in (150 mm) long, representing actual standard/optional color or color chips for custom color.

.4 Qualification Data: For firms and persons specified in "Quality Assurance" article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

.5 Maintenance Data: Material Safety Data Sheet available upon request.

1.4 SUBSTITUTION OF PRODUCTS

.1 To enable all tenders to be judged equitably, they shall be based on the specified products in this document and shown on the drawings:

.1 The proposal for any substitute products must be attached to their tender separately, identifying the substitution product by its trade name along with any savings it may represent.

.2 Following the opening of the tender, only the substitutions proposed by the lowest bidder of the specified products will be considered.

.3 All substitutions approval requests shall be accompanied by manufacturing drawings and specifications, and they meet all specifications for design, size gauge of metal parts and fabrication.

.4 Each substitution sample must be presented to the owner/consultant within seven days following the opening of tenders. After this time, the bidder will be required to supply the original specified product.

.5 The owner/consultant reserves the right to grant or deny approval for proposed substitutions without prejudice to this right and the decision shall be final.

.6 Fencing products must be entirely interchangeable, if applicable, with already installed material.

.7 The above conditions apply to this section independently of any other clauses on the subject found in this document.

1.5 QUALITY ASSURANCE

.1 Installer Qualifications: An experienced installer who has completed installations of fences and gates similar in material, design, and extent to those indicated for this project and whose work has resulted in construction with a record of successful in-service performance.

.2 Source Limitations for Fences and Gates: Obtain each color, grade, finish, type, and variety of components for fences and gates from one source with resources to provide fences and gates of consistent quality in appearance and physical properties.

1.6 PROJECT CONDITIONS

.1 Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:

.1 Notify local utility making services before beginning work.

.2 Unless otherwise indicated in the general provisions of the contract, notify the Architect no less than two (2) days in advance of proposed utility interruptions.

.3 Do not proceed with utility interruptions without Architect's written permission.

.2 Field Measurements: Verify layout information for fences and gates shown on drawings in relation to property survey and existing structures. Verify dimensions by field measurements.

Part 2 Products

2.1 MANUFACTURER

OMEGA II FENCE SYSTEMS ™
A division of Metaltech - Omega Inc. 1735, St-Elzéar west
Laval (Quebec), Canada H7L 3N6
Tel: 800-836-6342 / 450-686-9600
Fax: 450-681-5318
Email: customerservice@omegatwo.com Web site: www.omegatwo.com

.1 Requests for substitutions will be considered in accordance with provisions of Section 01 60 00 - Product Requirement:

.1 All substitution approval requests shall be accompanied by manufacturing drawings and specifications, and they shall meet all specifications for design, size, gauge of metal parts, and fabrication.

2.2 COATINGS

.1 Zinc coating:

.1 Wire meshes are coated with 0.5 oz/ft2 (150 g/m2) zinc in conformity with ASTM A641 Class 1.

.2 Square fence posts, swing gate frame and posts:

.1 Thickness of 11GA (0.120 in or 3.0 mm) or less: Zinc coated (pre-galvanized process) with a minimum of 0.9 oz/ft2 (275 g/m2) as per ASTM A653 Grade 90.

.2 Polyester Coating:

.1 Polyester coating to be minimum 4 mils applied by an electrostatic process. Coating shall cover all surfaces of the wire and post sections. Coating shall be capable of withstanding the following tests:

.1 Mechanical adhesion test as per ASTM D3359 - Method B.

.2 Shock resistance tests as per ASTM D2794.

.3 Salt spray testing with a minimum of 1 000 hours without red rust appearance, as per ASTM B117.

.4 Humidity resistance in a weather meter chamber as per ASTM D2247.

.5 Exposure to ultraviolet light with exposure of 1 000 hours using apparatus Type E and 63°C as per ASTM D1499.

.3 Polyester Surface Coating Colors:

.1 Standard Coating: Black RAL 9004 (30% Gloss).

2.3 MATERIALS - MODEL "ELITE" FENCE AND ACCESSORIES

.1 Panel Height:

.1 5-foot-high nominal panels: 61-1/8 in (1 552 mm).

.2 Model "OMEGA ARCHITECTURAL" – Steel Mesh Fence Panels:

.3 92-11/16 in (2 35 mm) wide, welded by resistance using 6 gauge (0.192 in or 4.9 mm) pre-galvanized steel wire, welded at each crossing to form rectangles 1-15/16 in x 6 in (50.0 x 152.4 mm).

.1 Cold rolled annealed wire made of AISI Grade 1018 steel with tensile strength of at least 75 000 psi (515 Mpa) in accordance with ASTM A853.

.2 All ends of the vertical wires of the panel shall be cut flush prior to powder coat.

.3 Panel camber may not exceed 0.094 in (2.5 mm).

.4 Panels shall have the following number of folds based on the panel height:

.1 5-foot high nominal panels: 2 folds.

.4 Square Posts:

.1 Cold rolled 1008 grade steel to meet ASTM A500 and ASTM A787 and the following maximum horizontal loads, length as required for installation type:

.2 The length of the posts is minimum 36 in (914 mm) more than the actual height of the fence for installation in the ground depending on local land code requirements (frost line).

.3 Installation

.1 In ground, post length as required for local frost line requirements

.4 Post Size

.1 For 5-foot-high nominal panels

Post Size	Gauge	Maximum horizontal load
3 in x 3 in (76.2 mm x 76.2 mm)	11 (3.0 mm)	1 106 pounds (4 920 N)

.5 Post Brackets:

.6 Universal Collar Bracket Kit: Universal bracket for standard use on line or end posts. Includes the following: 14 gauge (1.9 mm) steel collar and wire retaining plate 1/4 in x 1 in (6.4 mm x 25.4 mm), nut, washer and carriage bolt 5/16 in x 1-1/4 in (7.9 mm x 31.8 mm), all galvanized steel.

.1 For 90º turn, use the same bracket

.2 For different angles, used the "Universal collar angle brackets".

.3 For 5-foot-high nominal panels: Provide 6 brackets per panel.

.5 Post caps:

.1 Aluminum alloy: For dimension posts 2 in x 2 in (50.8 mm x 50.8 mm), 3 in x 3 in (76.2 mm x 76.2 mm) and 4 in x 4 in (101.6 mm x 101.6 mm).

.2 Galvanized steel: For larger dimensions.

.6 Polyester powder coating: (See article 2.2.2).

.7 Single/double swing gates:

.1 Configuration:

.1 Single swing.

.2 Gate Frames:

.1 Two (2) 1-1/2 in x 1-1/2 in (38.1 mm x 38.1 mm) horizontal tubes and two (2) 2 in x 2 in (50.8 x 50.8 mm) vertical tubes, all 16 gauge (1.6 mm) tubes, welded at intersections to create a rigid frame, in accordance with ASTM F900.

.3 Gate Posts:

.1 Cold rolled from 1008 grade steel to meet ASTM A500 and ASTM A787. Posts are to include cap and SPF-W Kit for adjacent panel mounting. Length as required for installation type:

.1 Installation:

.1 In ground, post length as required for local frost line requirements

.2 Post Size:

.1 For fences with 3-foot-high nominal panels:

Opening Dimension	Post Size
3 ft to 11 ft	3 in x 3 in (76.2 mm x 76.2 mm) 11 gauge (3.0 mm)
> 11 ft to 16 ft	4 in x 4 in (101.6 mm x 101.6 mm) 11 gauge (3.0 mm)
> 16 ft to 19 ft	6 in x 6 in (152.4 mm x 152.4 mm) 3/16 in (4.8 mm)

.4 Gate Hardware:

.1 Standard Hardware: Hot-dip galvanized steel in conformity with ASTM F900, sized to assure proper gate operation. Non- moving parts shall be powder coated.

.1 Hinge: Structurally designed to support all gates without deformation during opening and closing.

.2 Latch: Clamp-on gravity system that is self-latching. Includes the following:

.1 Self-locking Device: With padlock eyes as an integral part of latch.

.5 Polyester powder coating: (See article 2.2.2).

Part 3 Execution

3.1 EXAMINATION

.1 Examine areas and conditions, with Installer present, for compliance with requirements for a verified survey of property lines and legal boundaries, site clearing, earthwork, pavement work, and other conditions affecting performance.

.2 Do not begin installation before final grading is completed, unless otherwise permitted by Architect.

.3 Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

.1 Stake locations of fence lines, gates, and terminal posts. Do not exceed intervals of 500 ft (152.5 m) or line of sight between stakes. Indicate locations of utilities, lawn sprinkler system, underground structures, benchmarks, and property monuments.

3.3 IN-GROUND CONCRETE INSTALLATION

.1 Install fencing on established boundary lines inside property line

.2 Post Excavation: Drill or hand-excavate holes for posts to diameters and spacing indicated, in firm, undisturbed or compacted soil.

.3 Post Setting: Set posts in concrete footing. Protect portion of posts above ground from concrete splatter. Place concrete around posts and consolidation. Using mechanical devices to set posts is not permitted. Verify that posts are set plumb, aligned, and at correct height and spacing, and hold in position during placement and finishing operations until concrete is sufficiently cured.

.1 Dimensions and Profile: As indicated on Drawings.

.2 Space line posts uniformly at center to center.

.3 Concealed Concrete Footings: Stop footings 2 in (50.8 mm) below grade to allow covering with surface material.

.4 Posts Set into Concrete in Sonotube: Refer to drawings.

3.4 FENCE INSTALLATION – MODEL "OMEGA ARCHITECTURAL"

.1 A. Install the fence along the specified layout according to the drawings. The fence panel shall be installed to maintain a clear minimum distance of 1-1/4 in (31.8 mm) and a maximum distance of 2 in (50.8 mm) from the ground surface. Holes for posts shall be at least 8 in (200 mm) in diameter and at least 42 in (1 070 mm) deep.

.2 Posts shall be adequately supported within the concrete forms to maintain the required positioning and prescribed level until concrete has set. All necessary anchors and posts shall be at a minimum depth of 48 in (1200 mm) into the ground.

.3 Square Post Installation: Once the concrete is set, the fence sections are fastened to the posts with the desired bracket type.

.1 Universal Collar Bracket Kit: Brackets slot allows for adjustments of ± 1-1/2 in (38.1 mm) on each side. Always install the brackets flush with horizontal wire of the panel (no gap).

Post Size	Post Spacing C/C
3 in x 3 in (76.2 mm x 76.2 mm)	104-5/8 in (2 657 mm)

.4 For the fence to follow slopes, it is required to step the fence sections. The Universal bracket on square posts can be slid along the post at the desired height and should always be install flush with horizontal wire (no gap). When faced with a steep slope, it will be necessary to order longer posts and panels cut in half as to keep the gap under the panel to a minimum.

.5 Upon cutting or trimming a post or a wire mesh section, apply a zinc rich primer to the exposed ends and finish with the matching touch-up paint supplied by the manufacturer.

3.5 CAST-IN-PLACE CONCRETE

.1 General: Comply with ACI 301 for cast-in-place concrete.

.2 Materials: Portland cement complying with ASTM C150, aggregates complying with ASTM C33, and potable water for ready-mixed concrete complying with ASTM C94. Measure, batch, and mix Project-site-mixed concrete according to ASTM C94.

.3 Concrete Mixture: Normal-weight concrete with not less than 3 000 psi (20.7 Mpa) compressive strength (28 days), 3 in (76.2 mm) slump, and contain "coarse aggregate" of a minimum diameter of 1/5 in (5.1 mm) to a maximum of 3/4 in (19.1 mm) maximum size aggregate. A 5% to 7% air entrained or according to recommendation of section 03 00 00.

.4 Materials: Dry-packaged concrete mix complying with ASTM C387 for normal-weight concrete mixed with potable water according to manufacturer's written instructions.

3.6 GATE INSTALLATION AND ADJUSTMENT

.1 Install gate posts in accordance with manufacturer's instructions.

.2 Concrete Set Gate Posts: Drill holes in firm, undisturbed or compacted soil. Holes shall have a diameter 4 times greater than outside dimension of post, and depths approximately 6 in (150 mm) deeper than frost level. Excavate deeper as required for adequate support in soft and loose soils, and for posts with heavy lateral loads. Set post bottom 36 in (914 mm) below surface when in firm, undisturbed soil. Place concrete around posts in a continuous pour, tamp for consolidation. Trowel finish around post and slope to direct water away from posts. Check each post for vertical and top alignment and maintain in position during placement and finishing operations.

.3 Install gates perfectly horizontal and levelled (at junction), plumb, and secure for full opening without interference.

.4 Attach hardware so to have the nuts inside the property thus making the assembly tamper-proof which will prevent unauthorized removal. Install ground-set items in concrete for anchorage.

.5 Adjust hardware for smooth operation and lubricate where necessary to operate smoothly, easily, and quietly, free from binding, warp, excessive deflection, distortion, nonalignment, misplacement, disruption, or malfunction, throughout entire operational range. Confirm that latches and locks engage accurately and securely without forcing or binding.

3.7 SITE CLEANING

.1 Clean and adjust soil disturbed during work. Get of all surplus and waste materials and replace damaged turf in accordance with directives of Engineer and Consultant.

3.8 MAINTENANCE

.1 Inspection

.1 A thorough visual inspection shall be done annually.

.2 This inspection must include overall verification of physical condition.

.2 Moveable parts shall be adjusted, if needed, every five (5) years, unless project requires additional inspections.

.3 In areas of extreme winter conditions, entire installation must be free of excessive ice and snow accumulation.

END OF SECTION

Part 1 General

1.1 MEASUREMENT PROCEDURES

.1 Payment for site furniture will be made as per plan quantities Components included in Contract price include:

.1 All labour, materials, equipment and incidental services necessary (including shipping, storage, delivering to supply and install site furnishings

1.2 QUALITY CONTROL

.1 Submit product data in accordance with Section 01 33 00 - Submittal Procedures.

.2 Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.

.3 Indicate dimensions, sizes, colour, assembly, anchorage and installation details for each product specified.

.4 Contractor to inspect all exterior site furnishings after delivery for signs of damage during transit

.5 Contractor to protect all parts of exterior site furnishings from damage during storage and installation.

.6 Consultant to confirm location and orientation of site furnishings prior to anchoring by contractor

1.3 WASTE MANAGEMENT AND DISPOSAL

.1 Remove from site and dispose of packaging materials at appropriate facilities.

Part 2 Products

2.1 Storage Shed

.1 Brooklin Concrete Products.

.1 Model: Model 40 precast concrete utility building with door.
.2 Material: Concrete
.3 Colour: N/A

.2 Supplier: Brooklin Concrete Products, P: 705-324-8265; E: brooklinsales@brooklin.com

.3 Contractor to provide shop drawing of storage shed assembly for review by Consultant.

2.2 Mud Kitchen

.1 Active Playground Equipment Toddler Mud Kitchen, or approved equal.

.1 Part No: NAT-000004
.2 Material: Wood, Plastic
.3 Colour/Finish: Natural wood finish

.2 Supplier: Active Playground Equipment, P: 800.463.2361, E: info@apeplayground.com

.3 Contractor to provide shop drawing of mud kitchen layout and assembly for review by Consultant.

.4 Active Playground Equipment Preschool Mud Kitchen, or approved equal.

.1 Part No: NAT-000010
.2 Material: Wood, Plastic
.3 Colour/Finish: Natural wood finish

.5 Supplier: Active Playground Equipment, P: 800.463.2361, E: info@apeplayground.com

.6 Contractor to provide shop drawing of mud kitchen layout and assembly for review by Consultant.

2.3 Paint Panel

.1 Active Playground Equipment Freestanding Paint Panel, or approved equal.

.1 Part No: NAT-000029
.2 Material: Wood
.3 Colour/Finish: Natural wood finish

.2 Supplier: Active Playground Equipment, P: 800.463.2361, E: info@apeplayground.com

.3 Contractor to provide shop drawing of paint panel connection to existing chain link fence for review by Consultant.

2.4 Log Table and Chairs

.1 Active Playground Equipment Log Table and Chairs, or approved equal.

.1 Part No: NAT-000048
.2 Material: Wood
.3 Colour/Finish: Natural wood finish

.2 Supplier: Active Playground Equipment, P: 800.463.2361, E: info@apeplayground.com

.3 Contractor to provide shop drawing of log table and chair layout and assembly for review by Consultant.

2.5 Arch Bridge

.1 Active Playground Equipment Arch Bridge, or approved equal.

.1 Part No: NAT-000065
.2 Material: Wood

.3 Colour/Finish: Natural wood finish

.2 Supplier: Active Playground Equipment, P: 800.463.2361, E: info@apeplayground.com

.3 Contractor to provide shop drawing of arch bridge layout and assembly for review by Consultant.

2.6 Fence

.1 Omega II Fence Systems Model: Omega II Architectural

.1 Panel Size: 1552mm H x 2355 W; 50x152.4mm mesh spacing; all pickets to be removed prior to powder coating

.2 Post Size: 76.2mm x 76.2mm 11 gauge

.3 Mounted: In-ground with concrete footing

.4 Material: (fence panels): 6 gauge 4.88mm, cold-formed AISI 1018 steel (posts): cold-formed AISI 1008 steel

.5 Finish: (posts): Hot-dip Galvanized, powder coated

.6 Gate: 5' tall, 4' width, single swing gate with 2" Frame

.7 Hinge: Standard, for use with 3" Gate Post, and 2" Gate Frame

.8 Latch: Lockable latch kit, for use with 3" Gate Post, and 2" Gate Frame

.2 Supplier: Park Street Solutions, Kevin Bettridge; kevin@parkst.ca; T: 519-589-5157

.3 Contractor to provide shop drawing of all panel, post, fence, and gate accessories and anchor/fastener assembly for review by Consultant.

.4 Contractor to supply approved anchor/fastener assembly.

Part 3 Execution

3.1 INSTALLATION

.1 Examine areas to receive furniture.

.2 Notify Consultant of conditions that would adversely affect installation or subsequent use.

.3 Do not begin installation until unacceptable conditions are corrected.

.4 Assemble and install furnishings in accordance with manufacturer's instructions.

.5 Repair minor damages to finish in accordance with manufacturer's instructions and as reviewed by Consultant and accepted by the Owner.

.6 Remove and replace damaged components that cannot be successfully repaired as determined by Consultant.

.7 Clean furniture promptly after installation in accordance with manufacturer's instructions.

.8 Do not use harsh cleaning materials or methods that could damage finish.

.9 Protect installed furniture for the duration of construction to ensure that, except for normal weathering, furniture will be without damage or deterioration at time of Substantial Completion.

END OF SECTION

Part 1 General

1.1 DESCRIPTION

.1 This section specifies the work requirements for supply, installation, and fine grading of topsoil.

1.2 MEASUREMENT PROCEDURES

.1 Preparation of sub-grade, supply, placing, spreading and finish grading of contractor supplied topsoil will be measured per plan quantities for surface area covered and depth specified. Testing for soil quality is included as part of the base price.

.2 Payment for supply, application and mixing of soil amendments required by test results will be measured in standard commercial units of volume/weight, as determined by the Consultant

1.3 QUALITY ASSURANCE

.1 Topsoil testing is a required component of the work.

.2 Perform one test for each source of on-site or imported topsoil.

.1 Testing of on-site topsoil shall be carried out by a soil testing laboratory accredited by the Ontario Ministry of Agriculture, Food and Rural Affairs. The nearest testing laboratory to the project site is:

.1 Agri-Food Laboratories
1-503 Imperial Road North
Guelph Ontario N1H 6T9
T:519.837.1600 F:519.837.1242

.2 Soil sampling, testing and analysis to be in accordance with Provincial standards.

.1 BASIC AGTEST TOPSOIL REPORT

.1 pH, Total Salts, % Organic Matter, Phosphorus, Potassium, Magnesium, Calcium, Sodium, Chloride, Sodium Absorption Ratio, CEC, Texture (%Sand, %Silt, %Clay)

.1 Including soil modification and fertility recommendations

.3 Contractor shall pay for cost of tests

.4 Submit soil testing report to consultant for review prior to amending topsoil.

Part 2 Products

2.1 TOPSOIL SOURCE

.1 Use on-site topsoil supplied by owner where possible.

.2 Where on-site topsoil is to be supplemented by external sources, test and amend as required.

2.2 TOPSOIL QUALITY

.1 Ensure that any topsoil used is free from:

.1 Debris and stones over 25mm diameter.

.2 Course vegetative material, 10 mm diameter and 100 mm length, occupying more than 2% of soil volume.

.3 Contain no toxic elements or growth inhibiting materials.

.2 Topsoil: mixture of particulates, micro organisms and organic matter which provides suitable medium for supporting intended plant growth.

.1 pH ranging from 5.5 to 7.5

.2 Organic Matter from 4 to 15%

.3 Phosphorus from 10-60 parts per million

.4 Potassium from 80-250 parts per million

.5 Calcium from 1000-4000 parts per million

.6 Magnesium from 100-300 parts per million

.7 Chloride less than 100 parts per million

.8 Sodium less than 200 parts per million

.9 Sand Fraction from 20 - 75%

.10 Silt Fraction from 5 - 30%

.11 Clay Fraction from 5 - 30%

.12 Consistency: friable when moist.

2.3 SOIL AMENDMENTS

.1 Fertilizer:

.1 Fertilizer:

.1 Conform to recommendations from soil testing agency with respect to improvement of tested topsoil and apply as specified for each condition.
.2 Industry accepted standard medium containing nitrogen, phosphorus, potassium and any other micro-nutrients suitable to the specific plant species or application or defined by the soil test.

.2 Peatmoss:

.1 Derived from partially decomposed species of Sphagnum Mosses.

.2 Elastic and homogeneous, brown in colour.

.3 Free of wood and deleterious material which could prohibit growth.

.4 Shredded particle minimum size: 5 mm.

.3 Sand: washed coarse silica sand, medium to course textured.

.4 Organic matter: such as compost, rotted manure, hay, straw, bark residue or sawdust, meeting the organic matter, stability and contaminant requirements.

.5 Limestone:

.1 Ground agricultural limestone.

.2 Gradation requirements: percentage passing by weight, 90% passing 1.0 mm sieve, 50% passing 0.125 mm sieve.

.6 Bonemeal: Finely ground with a minimum analysis of 3% nitrogen and 20% phosphoric acid.

Part 3 Execution

3.1 PREPARATION OF EXISTING GRADE IN LANDSCAPE AREAS

.1 Verify that rough grading has been completed and grades are correct. If discrepancies occur, notify Consultant and do not commence work until supplemental instruction is issued by Consultant.

.2 Grade soil, eliminating uneven areas and low spots, ensuring positive drainage.

.3 Remove debris, roots, branches, stones in excess of 25mm diameter and other deleterious materials. Remove soil contaminated with calcium chloride, toxic materials and petroleum products. Remove debris which protrudes more than 50mm above surface. Dispose of removed material off site.

.4 Cultivate entire area which is to receive topsoil to minimum depth of 300mm. Cross cultivate those areas where equipment used for hauling and spreading has compacted soil.

3.2 PLACING AND SPREADING OF TOPSOIL/PLANTING SOIL

.1 Place topsoil after Consultant has reviewed subgrade.

.2 Spread topsoil in uniform layers not exceeding 150 mm.

.3 For sodded areas keep topsoil 25mm below finished grade.

.4 Spread topsoil as indicated to following minimum depths after settlement.

.1 150mm for sodded areas.

.2 600mm depth for perennials and shrubs.

.3 900mm depth for trees.

.5 Manually spread topsoil/planting soil around existing trees, shrubs and obstacles.

3.3 FINISH GRADING

.1 Grade to eliminate rough spots and low areas to promote positive drainage. Prepare loose friable bed by means of cultivation and subsequent raking.

.2 Consolidate topsoil to required bulk density using equipment reviewed by Consultant. Leave surfaces smooth, uniform and firm against deep footprinting.

3.4 ACCEPTANCE

.1 Supply topsoil testing reports and documentation of amendments completed.

.2 Consultant will review topsoil in place for general conformance of material, depth of topsoil, and finish grading.

3.5 SURPLUS MATERIAL

.1 Dispose of materials except topsoil not required off site.

3.6 CLEANING

.1 Upon completion of installation, remove surplus materials, rubbish, tools and equipment barriers.

END OF SECTION

Part 1 General

1.1 DESCRIPTION

.1 This section specifies the work requirements for supply, installation, establishment supports, and establishment maintenance of turf grass sod.

1.2 MEASUREMENT PROCEDURES

.1 Payment for nursery sod will be made as per plan quantities

.2 Components included in bid price include: All labour, materials, equipment and incidental services necessary to supply, install, and maintain turf grass sod to the full extent of the contract documents.

.1 Bid price for sodding to include establishment period maintenance only.

1.3 SCHEDULING

.1 Schedule sod laying to coincide with preparation of soil surface.

.1 Coordinate sod laying with project work by others.

.2 Schedule sod installation when frost is not present in ground.

Part 2 Products

2.1 MATERIALS

.1 Number One Turf Grass Nursery Sod: sod that has been especially sown and cultivated in nursery fields as turf grass crop.

.1 Turf Grass Nursery Sod type:

.1 Number One Kentucky Bluegrass Sod - Fescue Sod: Nursery Sod grown solely from seed mixture of cultivars of Kentucky Bluegrass and Chewing Fescue or Creeping Red Fescue, containing not less than 50% Kentucky Bluegrass cultivars and 30% Chewing Fescue or Creeping Red Fescue cultivars.

.2 Turf Grass Nursery Sod quality:

.1 Not more than 2 broadleaf weeds or 10 other weeds per 40 square metres.

.2 Density of sod sufficient so that no soil is visible from height of 1500 mm when mown to height of 50 mm.

.3 Mowing height limit: 35 to 65 mm.

.4 Soil portion of sod: 6 to 15 mm in thickness.

.2 Water:

.1 Free of impurities that would inhibit plant growth.

.2 Supplied by Contractor.

.3 Fertilizer:

.1 To Canada "Fertilizers Act" and "Fertilizers Regulations".

.4 Topsoil:

.1 See section 32 91 21 Topsoil Placement and Grading for topsoil requirements

Part 3 Execution

3.1 PREPARATION

.1 Verify that grades are correct and depth of topsoil is satisfactory. Notify Consultant if discrepancies exist, do not proceed until supplemental instruction is issued by Consultant.

.2 Do not perform work under adverse field conditions such as frozen soil, excessively wet soil or soil covered with snow, ice, or standing water.

.3 Fine grade surface free of humps and hollows to smooth even grade, to contours and elevations indicated, to tolerance of plus or minus 30 mm, for Turf Grass Nursery Sod, surface to drain naturally.

.4 Remove and dispose of weeds; debris; stones 50 mm in diameter and larger; soil contaminated by oil, gasoline and other harmful materials; off site.

3.2 SOD PLACEMENT

.1 Lay sod within 24 hours of being lifted.

.2 Lay sod sections in rows, joints staggered. Butt sections closely without overlapping or leaving gaps between sections. Cut out irregular or thin sections with sharp implements.

.3 Provide close contact between sod and soil by light rolling. Use of heavy roller to correct irregularities in grade is not permitted.

.4 Water soil immediately after laying to a depth of 100mm.

3.3 MAINTENANCE DURING ESTABLISHMENT PERIOD

.1 Perform following operations from time of installation until acceptance or for 12 weeks after work is completed, whichever is later.

.1 Water sodded areas in sufficient quantities and at frequency required to maintain to obtain optimum soil moisture conditions to depth of 75 mm to 100 mm.

.2 Cut grass to 50 mm when or prior to it reaching height of 75 mm. Remove clippings which will smother sod and seeded areas.

.3 Maintain sodded areas 95% weed free.

3.4 ACCEPTANCE

.1 Turf Grass Nursery Sod areas will be accepted by Consultant provided that:

.1 Sodded areas are properly established.

.2 Sod is free of bare or dead spots and extent of weeds apparent in grass is acceptable.

.3 No surface soil is visible from height of 1500 mm when grass has been cut to height of 50 mm

.4 Sodded areas have been cut a minimum of two (2) times prior to acceptance.

.2 Areas sodded in the fall will be accepted the following spring one month after start of growing season provided acceptance conditions are fulfilled.

3.5 MAINTENANCE DURING WARRANTY PERIOD

.1 Maintenance to be provided by others under separate contract with Owner.

END OF SECTION

Part 1 General

1.1 DESCRIPTION

.1 This section describes the requirements for the supply and installation for plant material of different stock sizes and types, accessories, planting, mulching, maintenance, acceptance and warranty information.

1.2 REFERENCES

.1 Comply with following, which are invoked and form part of this specification section, as modified by this section:

.1 Canadian Landscape Standard, First Edition: Appendix G: Canadian Nursery Stock Standard (Ninth Edition), Canadian Society of Landscape Architects and Canadian Landscape Association

.2 International Code of Nomenclature for Cultivated Plants, International Society for Horticultural Science

.3 ANSI Standard – 133-1, American Standards for Tree Care Operations

.4 ANSI A-300, Best Management Practices - Tree Planting

.5 ANSI A-300, Best Management Practices - Part 1, 2008 (R2014) Pruning Standard

.6 ANSI A-300, Best Management Practices - Part 6, Transplanting Standard

1.3 MEASUREMENT PROCEDURES

.1 Payment for planting will be made at per plan quantities.

.1 Basis of contract price for items included in this section shall be full compensation for all labour, equipment, supply of materials, installation, and establishment maintenance, completed as described herein and as shown on the contract drawings. Warranty maintenance will be provided by the Owner.

1.4 SUBMITTALS

.1 Submit product data and samples for:

.1 Mulch.

.2 Growing Medium.

.3 Polypropylene type tree tie (Arbortie Green or approved equivalent).

.2 Submit monthly maintenance reports from time of planting to end of establishment period growing season (May to September) describing:

.1 Maintenance work carried out.

.2 Watering method, quantity of water used, water source.

.3 General development and condition of plant material.

.4 Preventative or corrective measures required which are outside Contractor's responsibility.

1.5 QUALITY ASSURANCE

.1 Planting work is to be carried out by experienced personnel under the direction of a skilled site superintendent.

.2 Notify Consultant within five (5) working days of pending plant shipment for inspection of plant material prior to shipping to site.

.3 All plants to be in conformance with Canadian Landscape Standard, First Edition: Appendix G: Canadian Nursery Stock Standard (Ninth Edition)

.4 There shall be no substitutions of plant materials without prior written approval from the Consultant.

.5 Contractor shall be responsible for ensuring plant materials delivered to the site are in conformance with the contract documents.

1.6 STORAGE AND PROTECTION

.1 Protect plant material from frost, excessive heat, wind and sun during delivery.

.2 Immediately store and protect plant material that will not be installed within 2 hours after arrival at site in storage location reviewed by Consultant.

.3 Protect plant material from mechanical damage, exposure, and extreme temperatures during transportation:

.1 Use enclosed vehicle where practical.

.2 Protect foliage and root balls using anti-desiccants and tarpaulins, where use of enclosed vehicle is impractical.

.3 Tie, wrap and pad branches and trunks securely to protect against abrasion, exposure and extreme temperature. Avoid binding of plant stock with rope or wire that would damage bark, break branches or destroy the natural shape of the plant. Plant material at no time shall be dropped or handled roughly,

.4 Loading and unloading: handle containerized plants by pots to reduce breakage of branches or leaves, handle balled & burlapped and wire basket plants with caution to maintain the firmness of the root balls and protection against damage to stems and branches. Lift wire baskets by attachments at minimum three points or by supporting below the rootball. Trunks

shall be supported in relation to the rootball to prevent tearing of roots or loosening of the rootball. Support shall be such that the cambium is not damaged.

.4 Protect stored plant material which will not be planted during the current day's operations from frost, wind and sun and as follows:

.1 For pots and containers, maintain moisture level in containers, heel in fibre pots.

.2 For balled and burlapped and wire basket root balls, heel in or cover rootballs with protective medium such as sawdust, mulch, peat moss or topsoil place to protect branches from damage. Store plants in a upright positions, with care taken to provide enough space between plants to allow light to reach all around to the bottom of the plant in order to avoid sunscald or burning when plants are planting in final location. Maintain moisture level in root zones.

.5 Where inadvertent damage to plants occurs, Contractor shall document damage and notify supplier and Consultant. Where Consultant accepts plant material despite the damage, prune broken branches back to the appropriate branch collar or bud, with care to avoid tearing of the stem bark, wounds shall be traces to remove shattered bark back to firm cambium without damaging the cambium or enlarging the wound in accordance with ANSI A-300 Best Management Practices - Part 1, 2008 (R2014) Pruning Standard.

.6 Waste Management and Disposal:

.1 Manage waste removal and disposal as per Section 01 74 00.

1.7 SCHEDULING

.1 Plant bare root plant material during dormancy between spring thaw and May 1st or between October 31st and winter freeze-up

.2 Plant potted, balled and burlap, and wire basket plant material between April 15th and June 15th or September 1st and November 30th

.3 Notify Consultant of schedule 7 days in advance of shipment of plant material.

.4 Schedule to include:

.1 Quantity and type of plant material.

.2 Shipping dates.

.3 Arrival dates on site.

.4 Planting Dates.

.5 Schedule delivery such that plant material spends a maximum of 36 hours stored on site prior to planting.

.6 Coordinate shipping of plants and excavation of planting pits to ensure minimum time lapse between digging and planting

.7 Where planting is postponed, plant material shall be stored and maintained with protection and irrigation procedures described in this section.

1.8 WARRANTY

.1 The Contractor hereby warrants that all plant material as itemized on plant list will remain free of defects, in accordance with GC 12.3 - WARRANTY and an additional 12 months, as required by the City of Waterloo, from the date of substantial performance or interim substantial performance dates as governed by GC 5.4 – Substantial Performance of the Work.

.1 Acceptable Survivability rates for planting stock are quantified in 3.8 ACCEPTANCE in this section.

.2 Replacements:

.1 During warranty period, remove from site any plant material that has died or failed to grow satisfactorily as a result of pests, diseases or failure to provide winter protection, as determined by Consultant.

.2 Extend warranty on replacement plant material for a period equal to the original warranty period.

.3 Continue such replacements and extend warranty until plant material is acceptable.

.4 Warranty of replacements shall not apply where replacement is necessary due to vandalism or inadequate maintenance carried out by others.

.3 End of warranty inspection will be conducted by Consultant.

.4 The Consultant reserves the right to extend Contractor's warranty responsibilities for an additional year if, at end of initial warranty period, leaf development and growth is not sufficient to ensure future survival, in the opinion of the Consultant.

Part 2 Products

2.1 PLANT MATERIAL

.1 Type of root preparation, sizing, grading and quality: comply with Canadian Landscape Standard, First Edition: Appendix G: Canadian Nursery Stock Standard (Ninth Edition) referring to size and development of plant material and root ball. Measure plants when branches in their natural position. Height and spread dimensions refer to main body of plant and not from branch tip to branch tip. Use trees and shrubs of No. 1 grade.

.1 Source of plant material: All plants shall have been grown in Canada or the north eastern United States and be hardy within the Canadian Plant Hardiness Zone 5a. Plant materials obtained from areas with milder climatic conditions are not acceptable.

.2 All plant material to:

.1 conform to the International Code of Nomenclature for Cultivated Plants and the latest addition of standardized plant names;

.2 be true to form and type and representative of their species or variety, densely foliated, structurally sound with well developed branch and root systems;

.3 have normal, well-developed branches and vigorous, fibrous root systems have been developed through proper cultivation practices. Plants shall be healthy, vigorous, free from defects, decay, girdling roots, sunscald, injuries, abrasions of the bark, plant diseases, insect pests' eggs, borers and all forms of infestation.

.4 be compact and properly proportioned, not week or thin, or injured by being planted too closely in nursery rows; plants shall have healthy tops to a size proportionate to the root requirements typical of the species or variety. Rootball sizes shall be of sufficient width and depth to encompass enough of the fibrous and absorptive root system to enable full recovery of the plan. Rootballs must be solid and remain intact.

.5 have proper development of wound wood surrounding past pruning.

.3 Deciduous trees shall have a dominant healthy single leader, sturdy straight trunks, well branched and balanced crowns (unless multi-stem form has been specified) and overall natural form characteristic of the species and variety.

.4 Trees larger than 200 mm in caliper: half root pruned during each of two successive growing seasons, the latter at least one growing season prior to arrival on site.

.5 Balled & burlapped and Wire Basket: must be dug with root ball in accordance with Canadian Landscape Standard, First Edition: Appendix G: Canadian Nursery Stock Standard (Ninth Edition).

.6 Collected stock: maximum 40 mm in caliper, with well developed crowns and characteristically branched; no more than 40% of overall height may be free of branches.

.7 Collected plant material: not acceptable.

2.2 WATER

.1 Free of organic or chemical contaminants detrimental to humans, animals, healthy plant growth and the environment.

.2 Supplied by Contractor.

2.3 STAKES

.1 38mm x 38mm x 2300mm wood stake pointed at one end.

2.4 TREE TIES

.1 Polypropylene type tree tie (Arbortie Green or approved equivalent) installed per manufacturers recommendations

2.5 GROWING MEDIUM

.1 Use existing topsoil on site where possible, amend as recommended by testing required in Section 32 91 21 Topsoil Placement and Grading.

.2 Where imported topsoil is used, perform testing required in Section 32 91 21 Topsoil Placement and Grading and amend as recommended in testing report.

2.6 TRUNK PROTECTION

.1 PVC Spiral Tree Guard: 60cm high perforated spiralled strip.

2.7 MULCH

.1 Shredded Pine Mulch (SPM) by GroBark or approved equivalent

.1 Non-dyed

.2 Composition: 75% or greater bark fiber and 25% or less wood fiber

.3 pH: 3.8-5.5

.4 Size gradation: 95% less than 2"

.5 Organic Matter 70-85% by weight

.6 Moisture Content 44-55%

.7 Free of noxious weeds and seeds or other live plant materials.

2.8 ANTI-DESICCANT

.1 Wax-like emulsion to provide film over plant surfaces reducing evaporation.

Part 3 Execution

3.1 PRE-PLANTING PREPARATION

.1 Ensure all vegetation control, grading works and other site preparation works are complete and has been reviewed by Consultant for general conformance prior to planting.

.2 Ensure plant material has been reviewed byo Consultant.

.3 Remove damaged roots and branches from plant material.

.4 Apply anti-desiccant to conifers and deciduous trees in leaf in accordance with manufacturer's instructions.

.5 Remove rejected and excess material from the Place of Work within 48 hours

3.2 EXCAVATION AND PREPARATION OF PLANTING BEDS

.1 Contractor shall verify the locations of all utilities and shall take adequate precautions against any damage. In the event of damage, Contractor shall notify utility company immediately and shall make or pay for required repairs to the satisfaction of the utility company at no additional cost to the Owner.

.2 Establishment of sub-grade for planting beds is specified in Section 31 22 13.

.3 Preparation of planting beds is specified in Section 32 91 21 - Topsoil and Fine Grading.

.4 For individual planting holes:

.1 Stake out location for Consultant review prior to excavating.

.2 Excavate planting pits in location, size and depths as indicated on Drawings

.3 Remove subsoil, rocks, roots, debris greater than 50mm in diameter and toxic material from excavated material that will be used as planting soil for trees and individual shrubs. Dispose of excess material.

.4 Excavation of subgrade below rootball shall only be as necessary to permit the bottom of the rootball to sit on undisturbed material or compacted fill such that the top of the rootball remains at the proper finished grade. Disturbed subgrade or fill below the rootball shall be compacted to 95% SPDD to prevent settlement of tree after planting.

.5 Where topsoil in planting pit is different in texture, structure or organic content from the surrounding soils or where planting pits are dug by mechanical means, pits shall have all sides scarified to a minimum depth of 100mm and the two soils mixed thoroughly. This is to ensure that there are no glazed surfaces or abrupt interfaces that could impede root development.

.6 Where poor drainage is suspected due to soil texture or standing water is observed, notify Consultant to obtain rectification methods to drain planting pit(s) prior to commencing with planting operations. Methods may include but are not limited to penetrating impervious soil layers, raising planting grade and/or adding drainage lines.

.1 Remove water which enters excavations prior to planting. Notify Consultant immediately if water source is ground water.

3.3 PLANTING

.1 Do not perform work under adverse field conditions such as frozen soil, excessively wet soil or soil covered with snow, ice, or standing water. Planting frozen rootballs is not acceptable.

.2 For plant material in burlapped root balls and wire basket root balls, cut away and remove all string, rope, wire, burlap and other restricting elements from top one-third of root ball. Do not pull burlap, rope or wire from bottom two-thirds of rootball.

.3 Treated burlap (i.e. burlap that is green), for plant material in plastic and fibre containers, remove and dispose of entire container, all wrappings, and tags, without disturbing rootball.

.4 Identify root collar (trunk flare) in burlapped and potted root balls, carefully remove overburden soil to uncover portion of collar. Trunk flare shall be 25mm to 50mm visible after tree is planted.

.5 Plant material shall be set plumb and oriented to give best appearance in relation to structures, roads and walkways. Orient plant material to give best appearance in relation to structures, roads and trails.

.6 For trees and shrubs:

.1 Backfill soil in 150mm lifts using native soil. Tamp each lift to eliminate air pockets. When two thirds of depth of planting pit has been backfilled, fill remaining space with water. After water has penetrated into soil, complete remaining one-third of backfilling to finish grade. Correct any settlement

.2 Form watering saucer as indicated on Drawings.

.7 For ground covers, backfill soil evenly to finish grade and tamp to eliminate air pockets.

.8 Water all plant material thoroughly.

.9 After soil settlement has occurred, fill with soil to finish grade.

.10 Dispose of burlap, wire and container material off site.

3.4 TRUNK PROTECTION

.1 Install trunk protection on deciduous trees as indicated per manufacturer's directions, carefully bend branches upward as needed without breaking.

.2 Install trunk protection prior to installation of tree supports when used.

.3 Remove trunk protection as per maintenance requirements.

3.5 TREE SUPPORTS

.1 Install tree supports as indicated.

.2 Use single stake tree support for deciduous trees less than 3 m.

.1 Place stake on prevailing wind side and 150 mm from trunk.

.2 Drive stake minimum 150 mm into undisturbed soil beneath roots. Ensure stake is secure, vertical and unsplit.

.3 Install Arbortie per manufacturer's instructions.

.3 After tree supports have been installed, remove broken branches with clean, sharp tools.

3.6 MULCHING

.1 Ensure mulch sample has been submitted and reviewed by Consultant prior to spreading.

.2 Ensure soil settlement has been corrected prior to mulching.

.3 Spread mulch in continuous beds and as indicated in Drawings.

3.7 MAINTENANCE RESPONSIBILITIES DURING ESTABLISHMENT PERIOD

.1 Perform following maintenance operations from time of planting to acceptance by Consultant:

.1 Water to maintain soil moisture conditions for optimum establishment, growth and health of plant material without causing erosion.

.1 Water newly planted plants at least once per week for the first four weeks, such that the water penetrates to a minimum depth of 300mm and the sufficiently thereafter to maintain optimum growing conditions.

.1 Water in early morning, late afternoon, early evening or when weather is cool to minimize water evaporation by sun and humidity.

.2 Water plants thoroughly in late fall prior to freeze-up to saturate soil around root system.

.2 Soil moisture to be monitored throughout the growing season:

.1 Watering schedule to be increased prior to plant materials reaching the permanent wilting point.
.2 Watering schedule to be reduced when a sufficient volume of rainfall has penetrated the soil fully as required

.3 Remove weeds in planting beds.

.1 Control outbreaks of perennial weeds and annual weeds by mechanical or chemical means utilizing acceptable integrated pest management practices to meet acceptance/success targets

.1 If chemical means are used, comply with Federal, Provincial and Municipal regulations as and when required to control unwanted vegetation.

.4 Replace or respread damaged, missing or disturbed mulch in planting beds.

.5 Report to Consultant any pests or diseases inflicting any plant material. The principles of Integrated Pest Management (IPM) should be applied to control insect pests, diseases, and invasive and noxious plants. IPM methods should be a combination of physical, cultural, biological and chemical methods chosen for the most effective, environmentally safe and economical control of plants.

.6 Apply pesticides in accordance with Federal, Provincial and Municipal regulations as and when required to control insects, fungus and disease. Obtain product approval from Owner and local authorities prior to application.

.7 Remove dead or broken branches from plant material.

.8 Keep trunk protection and guy wires in proper repair and adjustment.

.9 Remove and replace dead plants and plants not in healthy growing condition. Make replacements in same manner as specified for original plantings.

.10 Provide adequate protection against damage, including mechanical damage and damage caused by rodents.

3.8 ACCEPTANCE

.1 Plantings will be accepted by Consultant after planting operation is completed provided that plant material is planted per this Section and Drawings and future survival and true to form growth is expected as determined by the Consultant. All planting beds shall be free of weeds at time of acceptance. Plant material will not be granted acceptance separately from the balance of the Work.

.2 Plant material will not be accepted after October 15th of any year. These plants will be accepted in spring of the following year, one month after leaf out, provided all acceptance conditions are fulfilled.

3.9 MAINTENANCE RESPONSIBILITIES DURING WARRANTY PERIOD

.1 Perform following annual maintenance operations from time acceptance of practical completion to end of warranty period on trees and planting beds.

.2 End of Winter (March/April)

.1 Remove dead or broken branches prior to leaf budding.

.2 Keep trunk protection and guy wires in proper repair and adjustment.

.3 Remove dead plants and plants not in healthy growing condition. Make replacements in same manner as specified for original plantings in the spring.

.4 Clear away any litter from planting beds.

.3 Spring (May)

.1 Water to maintain soil moisture condition for optimum establishment, growth and health of plant material without causing erosion. Apply root growth fertilizer.

.2 Plant winter replacement planting in same manner as specified for original plantings.

.3 Remove weeds.

.4 Prune plant material in accordance with good horticultural practices.

.5 Keep trunk protection and guy wires in proper repair and adjustment.

.6 Replace or spread damaged, missing or disturbed mulch.

.4 Summer (June to August)

.1 Water to maintain soil moisture condition for optimum establishment, growth and health of plant material without causing erosion.

.2 Remove dead plants and plants not in healthy growing condition. Make replacements in same manner as specified for original plantings in the Fall.

.3 Remove weeds.

.4 Remove dead or broken branches prior to leaf budding.

.5 Keep trunk protection and guy wires in proper repair and adjustment.

.6 Apply pesticides in accordance with Federal, Provincial and Municipal regulations, as and when required to control insects, fungus and disease.

.5 End of Season (October/November)

.1 Water to maintain soil moisture condition for optimum establishment, growth and health of plant material without causing erosion.

.2 Replace or respread damaged, missing or disturbed mulch.

.3 Plant summer replacement planting in same manner as specified for original plantings.

.4 Remove weeds.

.5 Remove dead or broken branches prior to leaf budding.

.6 Keep trunk protection and guy wires in proper repair and adjustment.

.7 Remove trunk wrap, tree stakes and guy wire eyebolts at end of warranty period.

.6 Maintenance Reports

.1 The Contractor shall submit seasonal Maintenance Reports stating date of maintenance visits and work undertaken including replacements, pruning, watering, mulch top up, fertilizing, repair work, weeding, to Consultant.

3.10 END OF WARRANTY PERIOD FINAL ACCEPTANCE

.1 Final acceptance of plant material shall take place when:

.1 All plant material is healthy, vigorous and free of insects and disease.

.2 Plant material is good shape and any pruning that has occurred has not deformed the tree.

.3 All planting beds shall be free of weeds, litter, debris, mulch layer is replenished.

.4 Tree trunk wrap, tree stakes, and any protection/supports have been removed

.5 Survivability rates for plants are:

.1 100% at end of warranty.

.2 Remove dead plants and plants not in healthy growing condition. Make replacements in same manner as specified for original plantings in the spring.

.3 Failure to meet these criteria will require replanting at the Contractors expense.

END OF SECTION

ARCADIS Design & Consultancy for natural and built assets

Imagine the result

Conseil Scolaire Viamonde

UPDATED SURVEY OF ASBESTOS-CONTAINING MATERIALS

ÉCOLE ÉLÉMENTAIRE L'HARMONIE
Waterloo, Ontario

December 2015

Our Ref.:
702148-012

ARCADIS Design & Consultancy for natural and built assets

Candace Jagarnauth
Environmental Specialist

Rein Andre
Manager, Hazardous Materials Group

UPDATED SURVEY OF ASBESTOS-CONTAINING MATERIALS

ÉCOLE ÉLÉMENTAIRE L'HARMONIE

Prepared for:
Conseil scolaire Viamonde
Attention: Pascal Gosselin

Prepared by:
ARCADIS Canada Inc.
121 Granton Drive
Suite 12
Richmond Hill
Ontario L4B 3N4
Tel 905 882 5984
Fax 905 882 8962

Our Ref.:
702148-012

Date:
December 2015

Tables **ON PAGE**

Appendices **AT REAR OF REPORT**

1. Introduction

Arcadis Canada Inc. (Arcadis) was retained by Conseil scolaire Viamonde (CSV) to prepare an updated survey of the locations of asbestos-containing materials following asbestos abatement operations in 2015 at École Élémentaire L'Harmonie located at 158 Bridgeport Road East, Waterloo, Ontario. The original school (the south section) was constructed in 1957, with an addition to the north and a mezzanine above Rooms 107 and 123 constructed in 1970.

Asbestos has been widely used in buildings, both in friable applications (materials which can be easily crumbled such as pipe and tank insulation, sprayed-on fireproofing and acoustic and texture coat applications) and in non-friable materials such as floor tile, fire-rated ceiling tile, gaskets, cement board, cement pipe, drywall joint compound and so on. Plaster applications (walls, ceilings, bulkheads, etc.) may also contain asbestos. The use of asbestos in friable applications was curtailed in Ontario around the mid-1970s. Most buildings constructed prior to about the mid-1970s contain some form of friable asbestos-containing material. The use of asbestos in certain non-friable products continued beyond the 1970s. A sample list of suspect asbestos containing building materials is provided in Appendix C.

Control of exposure to asbestos is governed in Ontario by Regulation 278/05 – *Regulation respecting Asbestos on Construction Projects and in Buildings and Repair Operations*. Disposal of asbestos waste (friable and non-friable materials) is governed by Ontario Regulation 278/05 and by Ontario Regulation 347, Waste Management - General.

The major requirements of O.Reg. 278/05 with respect to asbestos surveys and assessments are as follows:

Survey Records:

- non-friable asbestos-containing materials (e.g., vinyl floor tiles, ceiling tiles, drywall joint compound, plaster, etc.) are to be included in asbestos survey records effective 1 November 2007;

- asbestos survey records are to be updated:

(a) at least once in every 12-month period;

(b) whenever the owner becomes aware of new information; and

- asbestos-containing materials are to be inspected at reasonable intervals in order to determine their condition.

Bulk Samples:

- the minimum number of bulk samples to be collected from an area of homogeneous material is set out in Table 1 of the regulation (Table 1 is reproduced below).

- if analysis establishes that a bulk material sample contains 0.5 per cent or more asbestos by dry weight:

(a) it is not necessary to analyze other bulk material samples taken from the same area of homogeneous material; and

(b) the entire area of homogeneous material from which the bulk materials sample was taken is deemed to be asbestos-containing material.

TABLE 1.1: Bulk Material Samples (FROM O.REG. 278/05)

ITEM	TYPE OF MATERIAL	SIZE OF AREA OF HOMOGENEOUS MATERIAL	MINIMUM NUMBER OF BULK MATERIAL SAMPLES TO BE COLLECTED
1.	Surfacing material, including without limitation material that is applied to surfaces by spraying, by trowelling or otherwise, such as acoustical plaster on ceilings and fireproofing materials on structural members	Less than 90 square metres	3
		90 or more square metres, but less than 450 square metres	5
		450 or more square metres	7
2.	Thermal insulation, except as described in Item 3	Any size	3
3.	Thermal insulation patch	Less than 2 linear metres or 0.5 square metres	1
4.	Other material	Any size	3

In practice, application of the Table 1 requirements means that the specified minimum number of negative (i.e., less than 0.5% asbestos) bulk sample analysis results will be required in order to classify a material as non asbestos.

Corrective Actions

If asbestos containing fireproofing or acoustical or thermal insulation has fallen and is being disturbed so that exposure to the material is likely to occur, O.Reg. 278/05 requires that the owner shall cause the fallen material to be cleaned up and, if it is readily apparent that material will continue to fall because of the deterioration, the owner shall repair, seal, remove or permanently enclose the material.

O.Reg. 278/05 classifies the asbestos work operations into three types (Type 1, 2 and 3) and specifies procedures to be followed in conducting asbestos abatement work.

2. Methodology

2.1 Survey

Site inspections were carried out by DCS staff on January 28, 2010 and Arcadis staff on March 19, 2015 to determine the locations of building construction materials suspected of containing asbestos. All readily accessible areas, including spaces above accessible suspended ceilings, were inspected throughout the facility.

Arcadis reviewed the report entitled*, "Project-Specific Designated Substances and Hazardous Materials Survey, École Élémentaire L'Harmonie*, *158 Bridgeport Road East, Waterloo, Ontario"* prepared by Arcadis, dated March, 2015.

Information and bulk sample analysis results obtained from these reports were utilized during the course of our investigation and in the preparation of this report. Additional representative and confirmatory bulk samples of materials were collected by Arcadis staff during the course of the site inspection and were forwarded to EMSL Canada Inc. for analysis of asbestos content. Determination of the locations of asbestos-containing materials were made based on results of bulk sample analysis, and on visual observations and physical characteristics of the applications at each inspection location.

2.2 Assessment

During the survey, the condition of all friable materials is assessed. Assessment involves the evaluation of a number of factors, including:

- asbestos content;
- physical damage;
- water damage;
- accessibility;
- adjacent activity, vibrations;
- air distribution system (air plenum); and
- friability.

Recommendations for appropriate corrective measures are based on findings of the assessment and consist primarily of either repair or removal (and replacement) of the asbestos containing materials. No recommended corrective actions were required at the time that this report was prepared.

3. Survey Results

On the basis of the survey work carried out, we report that friable asbestos-containing materials are present in the École Élémentaire L'Harmonie building in the following accessible applications:

- Thermal insulation on pipe fittings in Rooms 001, 106, 112A and 114; and
- Thermal insulation on pipe fittings located above the solid drywall ceiling above the T-Bar ceiling in the southeast corner in Room 101B.

Asbestos insulation on pipe fittings is a white-gray cementitious material.

Glass fibre insulation is readily visually distinguishable (typically yellow in colour) from asbestos containing insulation materials and was, therefore, not tested for asbestos content.

Cellulose pipe straight insulation with layers of black paper found on the rainwater piping in Rooms 112A, 113 and 114 does not contain asbestos.

Shiny black paper covering the glass fibre pipe straight insulation throughout the facility does not contain asbestos.

Visual inspections and laboratory analyses of representative bulk samples of materials confirm that non-friable asbestos-containing materials are present in the following accessible applications:

- (2' x 4') ceiling tiles in Room 122 and one 2' x 4' ceiling tile (where the heat detector is located) in Room 111;
- (9" x 9)" vinyl floor tiles in Rooms 106 and 107;
- (12" x 12") vinyl floor tiles in Rooms 109, 109C, 110 and 111;
- Mortar in concrete block walls in Rooms C104, 101 and throughout the building;
- drywall joint compound in Rooms 107, 108, 109, 109A, 109B, 113, 114A, 115, 201, 201A and 201B; and

- caulking (gray in colour) around the perimeter of the drywall panels located above the windows in Rooms 117, 118, 119, 122, 124 and 125.

Asbestos-containing mortar was confirmed to be present in Rooms C104, 101, 101A and 101B. Asbestos-containing mortar was assumed to be present in all other block wall applications throughout the school.

Caulking was tested on the interior window frames in Rooms 101 (formerly Room 120), 118 and 122 and on the red fire stop in Rooms 001 and C103 and was found to not contain asbestos. Caulking was tested on the drywall above the windows in Room 101 (formerly 120) and was found to contain asbestos, and was removed in 2015. All other caulking present throughout the building was not tested and should be assumed to contain asbestos or confirmatory testing on any such materials could be undertaken as the need arises (ie. at the time of renovations, modifications or demolition).

A room-by-room summary of the locations and conditions of asbestos-containing materials identified is presented in Table 3.2. The locations of accessible asbestos-containing materials are identified on the floor plans provided in Appendix A.

A summary of the results of laboratory analysis of bulk samples is presented in Table 3.1. The laboratory reports are provided in Appendix B.

TABLE 3.1

Summary of laboratory analysis of bulk samples
École élémentare l'harmonie

SAMPLE Nº	LOCATION	DESCRIPTION	ASBESTOS CONTENT
101-CT-1A	Rm. 101	12" x 12" Ceiling Tile – Pin Dot – Glued to Drywall	None Detected
123-CT-1B	Rm. 123	12" x 12" Ceiling Tile – Pin Dot – Glued to Drywall	None Detected
107-CT-1C	Rm. 107	12" x 12" Ceiling Tile – Pin Dot – Glued to Drywall	None Detected
101-CT-2A	Rm. 101	2' x 4' Ceiling Tile – Random Fissure Natural Back – Green Letters	None Detected
121-CT-2B	Rm. 121	2' x 4' Ceiling Tile – Random Fissure Natural Back – Green Letters	None Detected

SAMPLE Nº	LOCATION	DESCRIPTION	ASBESTOS CONTENT
121-CT-2C	Rm. 121	2' x 4' Ceiling Tile – Random Fissure Natural Back – Green Letters	None Detected
121-CT 3 (SINGLE)	Rm. 121	12" x 12" Ceiling Tile – Large Hole Small Hole - Cellulose	None Detected
122-CT-4A	Rm. 122	2' x 4' Ceiling Tile – Fissure on 4' – Red back	None Detected
122-CT-4B	Rm. 122	2' x 4' Ceiling Tile – Fissure on 4' – Red back	None Detected
111-CT-4C	Rm. 111	2' x 4' Ceiling Tile – Fissure on 4' – Red back	**2% Chrysotile**
124-CT-5A	Rm. 124	12" x 12" Ceiling Tile – Large Hole Small Hole – Stapled to wood frame	None Detected
124-CT-5B	Rm. 124	12" x 12" Ceiling Tile – Large Hole Small Hole – Stapled to wood frame	None Detected
124-CT-5C	Rm. 124	12" x 12" Ceiling Tile – Large Hole Small Hole – Stapled to wood frame	None Detected
111-CT-6A	Rm. 111	2' x 4' Ceiling Tile – Random Fissure – White streaks on the back	None Detected
111-CT-6B	Rm. 111	2' x 4' Ceiling Tile – Random Fissure – White streaks on the back	None Detected
111-CT-6C	Rm. 111	2' x 4' Ceiling Tile – Random Fissure – White streaks on the back	None Detected
105-FT-1A	Rm. 105	12' x 12' Floor Tile – Brown with Black Fleck	None Detected (TEM)
104-FT-1B	Rm. 104	12' x 12' Floor Tile – Brown with Black Fleck	None Detected
103-FT-1C	Rm. 103	12' x 12' Floor Tile – Brown with Black Fleck	None Detected
118-FT-2A	Rm. 118	12' X12' Floor Tile – Gray with Gray fleck	None Detected (TEM)
113-FT-2B	Rm. 113	12' X12' Floor Tile – Gray with Gray fleck	None Detected
115-FT-2C	Rm. 115	12' X12' Floor Tile – Gray with Gray fleck	None Detected
128-LINO-3A	Rm. 128	Sheet Flooring - Orange	None Detected (TEM)
128-LINO-3B	Rm. 128	Sheet Flooring - Orange	None Detected
128-LINO-3C	Rm. 128	Sheet Flooring - Orange	None Detected
107-FT-4A	Rm. 107	9'' x 9'' Floor Tile – Gray – Under Carpet	**0.6% Chrysotile**
109C-FT-5A	Rm. 109C	12'' x 12'' Floor Tile – Beige with Directional Brown Fleck	**1.3% Chrysotile**

SAMPLE Nº	LOCATION	DESCRIPTION	ASBESTOS CONTENT
109B-FT-6A	Rm. 109B	12'' x 12'' Floor Tile – Gray with Directional Gray Fleck	None Detected (TEM)
109B-FT-6B	Rm. 109B	12'' x 12'' Floor Tile – Gray with Directional Gray Fleck	None Detected
109B-FT-6C	Rm. 109B	12'' x 12'' Floor Tile – Gray with Directional Gray Fleck	None Detected
112-FT-7A	Rm. 112	12'' x 12'' Floor Tile – Light Beige with beige fleck	None Detected (TEM)
112-FT-7B	Rm. 112	12'' x 12'' Floor Tile – Light Beige with beige fleck	None Detected
112A-FT-7C	Rm. 112A	12'' x 12'' Floor Tile – Light Beige with beige fleck	None Detected
106-PL-1A	Rm. 106	Plaster on wall	None Detected
105-PL-1B	Rm. 105	Plaster on ceiling	None Detected
104A-PL-1C	Rm. 104A	Plaster on wall	None Detected
S001-PL-1D	Rm. S001	Plaster on wall	None Detected
120-PL-1E	Rm. 120 (101)	Plaster on wall under radiator	None Detected
118-PL-1F	Rm. 118	Plaster on wall under radiator	None Detected
117-PL-1G	Rm. 117	Plaster on wall under radiator	None Detected
123-PL-2A	Rm. 123	Plaster on lower 1/3 of wall	None Detected
C101-PL-2B	Rm. C101	Plaster on lower 1/3 of wall	None Detected
107-PL-2C	Rm. 107	Plaster on lower 1/3 of wall	None Detected
S01-PLT-3A	Rm. S01	Textured Plaster on Exterior Soffit	<0.25% Chrysotile(1)
S01-PLT-3B	Rm. S01	Textured Plaster on Exterior Soffit	<0.25% Chrysotile(1)
S01-PLT-3C	Rm. S01	Textured Plaster on Exterior Soffit	<0.25% Chrysotile(1)
106-DW-1A	Rm. 106	Drywall joint compound - bulkhead	None Detected
120-DW-1B	Rm. 120 (101)	Drywall joint compound - ceiling	None Detected
120-DW-1C	Rm. 120 (101)	Drywall joint compound – above window	None Detected
118-DW-1D	Rm. 118	Drywall joint compound - ceiling	None Detected
128A-DW-1E	Rm. 128A	Drywall joint compound - ceiling	None Detected

SAMPLE Nº	LOCATION	DESCRIPTION	ASBESTOS CONTENT
001-DW-1F	Rm. 001	Drywall joint compound - ceiling	<0.25% Chrysotile(1)
107A-DW-1G	Rm. 107A	Drywall joint compound – pipe chase	None Detected
109-DW-2A	Rm. 109	Drywall joint compound – wall - 1970	**0.6% Chrysotile**
101-TH-1A	Rm. 101	Glue pucks on drywall ceiling	None Detected (TEM)
104-TH-1B	Rm. 104	Glue pucks on drywall ceiling	None Detected
123-TH-1C	Rm. 123	Glue pucks on concrete ceiling	None Detected
104A-TH-2A	Rm. 104A	Shiny black paper on pipe straight insulation	None Detected (TEM)
001-TH-2B	Rm. 001	Shiny black paper on pipe straight insulation	None Detected
C104-TH-2C	Rm. C104	Shiny black paper on pipe straight insulation	None Detected
120-TH-3A	Rm. 120 (101)	Gray caulking on drywall above the windows	**4.6% Chrysotile (3)**
120-TH-4A	Rm. 120 (101)	Beige caulking on interior window frames	None Detected (TEM)
118-TH-4B	Rm. 118	Beige caulking on interior window frames	None Detected
122-TH-4C	Rm. 122	Beige caulking on interior window frames	None Detected
001-TH-5A	Rm. 001	Red Firestop caulking at ceiling perimeter	None Detected (TEM)
001-TH-5B	Rm. 001	Red Firestop caulking at ceiling perimeter	None Detected
C103-TH-5C	Rm. C103	Red Firestop caulking at ceiling perimeter above T-bar	None Detected
112A-TH-6A	Rm. 112A	Black paper on 'anti-sweat' pipe straight insulation	None Detected (TEM)
112A-TH-6B	Rm. 112A	Black paper on 'anti-sweat' pipe straight insulation	None Detected
113-TH-6C	Rm. 113	Black paper on 'anti-sweat' pipe straight insulation	None Detected
112A-TH-7 (SINGLE)	Rm. 112A	Asbestos Thermal Insulation on pipe fitting 1970	70% Chrysotile
S.01	Room 120 (101)	9" x 9" gray brown floor tile	**5% Chrysotile(3)**
S.06	Room 106	9" x 9" black floor tile	**2% Chrysotile**
S.07	Room 110	12" x 12" olive floor tile	**10% Chrysotile**
S.15	Room 112A	Insulated cement on the RWL	**60% Chrysotile**

SAMPLE Nº	LOCATION	DESCRIPTION	ASBESTOS CONTENT
S.16	Room 106	Insulated cement fitting	25% Chrysotile
1-A	Room 120 (101)	Mortar in concrete block walls	**2.1% Chrysotile**(2) (TEM)
2-A	Room 120 (101)	Paint on concrete block wall – cream coloured	None Detected (2)
2-B	Room 120 (101)	Paint on concrete block wall – cream coloured	None Detected (2)
2-C	Room 120 (101)	Paint on concrete block wall – cream coloured	None Detected (2)
3-A	Room 120 (101)	Mastic on 9"x9" asbestos vinyl floor tile – black coloured	**1.1% Chrysotile**(2)(3) (TEM)
4-A	Room 120 (101)	Vinyl baseboard – black coloured	None Detected(2) (TEM)
4-B	Room 104A	Vinyl baseboard – dark blue coloured	None Detected(2)
4-C	Room 103	Vinyl baseboard – grey coloured	None Detected(2)
5-A	Room 120 (101)	Mastic on vinyl baseboards – dark brown coloured	None Detected(2) (TEM)
5-B	Room 120 (101)	Mastic on vinyl baseboards – dark brown coloured	None Detected(2)
5-C	Room 120 (101)	Mastic on vinyl baseboards – dark brown coloured	None Detected(2)
6-A	Room 101	Mastic on 12"x12" non-asbestos vinyl floor tile – black coloured	**0.77% Chrysotile(2)(3)** (TEM)
7-A	Room 101	Mastic on vinyl baseboards – cream coloured	None Detected(2) (TEM)
7-B	Room 101	Mastic on vinyl baseboards – cream coloured	None Detected(2)
7-C	Room 103	Mastic on vinyl baseboards – cream coloured	None Detected(2)
8-A	Room 120 (101)	Drywall joint compound on drywall wall above windows	None Detected(2)
8-B	Room 104	Drywall joint compound on drywall enclosure adjacent to radiators	None Detected(2)
8-C	Room 102	Drywall joint compound on drywall above door	None Detected(2)

SAMPLE Nº	LOCATION	DESCRIPTION	ASBESTOS CONTENT
9-A	Room 120 (101)	Plaster on wall – top coat (white)	None Detected[2]
9-B	Room 120 (101)	Plaster on wall – top coat (white)	None Detected[2]
9-C	Room 104A	Plaster on wall – top coat (white)	None Detected[2]
10-A	Room 120 (101)	Plaster on wall – scratch coat (grey)	None Detected[2]
10-B	Room 120 (101)	Plaster on wall – scratch coat (grey)	None Detected[2]
10-C	Room 104A	Plaster on wall – scratch coat (grey)	None Detected[2]
11-A	Room 102	Textured plaster on wall – top coat (white)	0.36% Chrysotile[1][3]
11-B	Room 102	Textured plaster on wall – top coat (white)	**0.8% Chrysotile[2]**
11-C	Room 102	Textured plaster on wall – top coat (white)	None Detected[2][3]
12-A	Room 102	Textured plaster on wall – scratch coat (grey)	None Detected[2][3]
12-B	Room 102	Textured plaster on wall – scratch coat (grey)	None Detected[2][3]
12-C	Room 102	Textured plaster on wall – scratch coat (grey)	None Detected[2][3]
13-A	Room 102	Caulking inside ceiling cavity – red coloured	None Detected[2] (TEM)
13-B	Room 102	Caulking inside ceiling cavity – red coloured	None Detected[2]
13-C	Room 102	Caulking inside ceiling cavity – red coloured	None Detected[2]

Notes:

[1] "Asbestos-containing material" is defined as material that contains 0.5% or more asbestos by dry weight.
[2] Results obtained from report entitled, *"Project-Specific Designated Substances and Hazardous Materials Survey, École Élémentaire L'Harmonie*, *158 Bridgeport Road East, Waterloo, Ontario*" prepared by DCS (now Arcadis) and authored by Jean Daigle.
[3] Material removed from room in 2015.

Room numbers with brackets ( ) indicates current room designations.

Chrysotile = chrysotile asbestos
Amosite = amosite asbestos

All samples were analyzed using Polarized Light Microscopy (PLM) unless otherwise indicated.

TEM – Samples analyzed using Transmission Electron Microscopy (TEM)

< = Less than.

TABLE 3.2

Summary of asbestos–containing materials
École élémentaire l'harmonie

LEVEL	ROOM	MATERIAL	ASBESTOS CONTENT	LOCATION WITHIN SPACE	ESTIMATED QUANTITY	FRIABLE OR NON-FRIABLE	CONDITION	COMMENTS
B	001	Thermal Insulation on pipe fittings	25% chrysotile	Below ceiling	<5	Friable	G	
B	001A							NACMO
B	001B							Crawlspace was not entered. Area was surveyed visually NACMO
B	001C							Crawlspace was not entered. Area was surveyed visually NACMO
1	100							NACMO
1	101	Mortar in concrete block walls	2.1% Chrysotile	Walls	Unknown	Non-friable	G	
1	101A							NACMO
1	101B	Thermal Insulation on pipe fittings	25% chrysotile	Above solid drywall ceiling	Unknown	Friable	G	
1	101C							NACMO
1	101D							NACMO
1	102							NACMO
1	103							NACMO
1	104							NACMO
1	104A							NACMO
1	104B							NACMO
1	105							NACMO
1	106	9" x 9" vinyl floor tile	2% chrysotile	Floor	10 – 50 m^2	Non-friable	G	

LEVEL	ROOM	MATERIAL	ASBESTOS CONTENT	LOCATION WITHIN SPACE	ESTIMATED QUANTITY	FRIABLE OR NON-FRIABLE	CONDITION	COMMENTS
		Thermal insulation on pipe fittings	25% chrysotile	Below Ceiling	<5	Friable	G	
1	107	9" x 9" vinyl floor tile	0.6% chrysotile	Under carpet on floor	> 100 m^2	Non-friable	G	
		Drywall Joint Compound	0.6% chrysotile	Under stairs to mezzanine	10 – 50m^2	Non-friable	G	
1	107A							NACMO
1	108	Drywall Joint Compound	0.6% chrysotile	Pipechase in the north-west corner	<10m^2	Non-friable	G	
1	109	12" x 12" vinyl floor tile	1.3% chrysotile	Floor	<10 m^2	Non-friable	G	
		Drywall joint compound	0.6% chrysotile	On walls and ceiling above T-bar	50 – 100 m^2	Non-friable	G	
1	109A	Drywall joint compound	0.6% chrysotile	On walls and ceiling above T-bar	50 – 100 m^2	Non-friable	G	
1	109B	Drywall joint compound	0.6% chrysotile	On walls and ceiling above T-bar	50 – 100 m^2	Non-friable	G	
1	109C	12" x 12" vinyl floor tile	1.3% chrysotile	Floor	10 - 50 m^2	Non-friable	G	
1	110	12" x 12" vinyl floor tile	10% chrysotile	Floor	10 - 50 m^2	Non-friable	G	
1	111	2' x 4' ceiling tile	2% chrysotile	Ceiling at heat detector	One Tile	Non-friable	G	
		12" x 12" vinyl floor tile	10% chrysotile	Floor	10 - 50 m^2	Non-friable	G	
1	112							NACMO
1	112A	Thermal insulation on pipe fittings	60-70% chrysotile	Below ceiling	5-10	Friable	G	
1	113	Drywall joint compound	0.6% chrysotile	On bulkheads	10 - 50 m^2	Non-friable	G	
1	114	Thermal insulation on pipe fittings	60-70% chrysotile	Above and below ceiling	5-10	Friable	G	

LEVEL	ROOM	MATERIAL	ASBESTOS CONTENT	LOCATION WITHIN SPACE	ESTIMATED QUANTITY	FRIABLE OR NON-FRIABLE	CONDITION	COMMENTS
1	114A	Drywall joint compound	0.6% chrysotile	On bulkheads	10 - 50 m^2	Non-friable	G	
1	115	Drywall joint compound	0.6% chrysotile	On bulkheads	10 - 50 m^2	Non-friable	G	
1	116							NACMO
1	117	Caulking (gray in colour)	4.6 % chysotile	Around the perimeter of the drywall panels above the windows	<10m^2	Non-friable	G	
1	118	Caulking (gray in colour)	4.6 % chysotile	Around the perimeter of the drywall panels above the windows	<10m^2	Non-friable	G	
1	119	Caulking (gray in colour)	4.6 % chysotile	Around the perimeter of the drywall panels above the windows	<10m^2	Non-friable	G	
1	121							NACMO
1	122	2" x 4" ceiling tiles	2% amosite	Ceiling	50-100 m^2	Non-friable	G	
		Caulking (gray in colour)	4.6% chrysotile	Around the perimeter of the drywall panels above the windows	<10m^2	Non-friable	G	
1	123							NACMO
1	124	Caulking (gray in colour)	4.6% chrysotile	Around the perimeter of the drywall panels above the windows	<10m^2	Non-friable	G	
1	125	Caulking (gray in colour)	4.6% chrysotile	Around the perimeter of the drywall panels above the windows	<10m^2	Non-friable	G	
1	126							NACMO

LEVEL	ROOM	MATERIAL	ASBESTOS CONTENT	LOCATION WITHIN SPACE	ESTIMATED QUANTITY	FRIABLE OR NON-FRIABLE	CONDITION	COMMENTS
1	127							NACMO
1	128							NACMO
1	128A							NACMO
1	129							NACMO
1	130							NACMO
1	A1							NACMO
1	C101							NACMO
1	C102							NACMO
1	C103							NACMO
1	C104	Mortar in concrete block walls	2.1% Chrysotile	Walls	Unknown	Non-friable		
1	S01							NACMO
1	S02							NACMO
1	S03							NACMO
1	S04							NACMO
1	S05							NACMO
1	S06							NACMO
2	201	Drywall joint compound	0.6% chrysotile	West wall	10 - 50 m^2	Non-friable	G	
2	201A	Drywall joint compound	0.6% chrysotile	North and East walls and ceiling	>100 m^2	Non-friable	G	
2	201B	Drywall joint compound	0.6% chrysotile	South wall and ceiling	>100 m^2	Non-friable	G	
1/2	through out	Mortar in concrete block	2.1% chrysotile	Walls	Unknown	Non-friable	G	Asbestos-containing mortar is assumed to be present in concrete block walls throughout

NOTES:
Condition: G = Good.
F = Fair.
P = Poor.
NACMO: No Asbestos-Containing Materials Observed.

Chrysotile = chrysotile asbestos
Amosite = amosite asbestos
NOTE!: Asbestos may also be present in locations that are presently inaccessible (e.g., in pipe chases, behind walls, above suspended gypsum board or plaster ceilings, and below carpets).

4. Discussion

The owner of a building is required to provide information on the locations of asbestos containing material to:

i) any person who is an "occupier"(1) of the building. The occupier is then responsible for providing the information to their own employees;

ii) any prospective constructors, contractors and subcontractors prior to requesting tenders or arranging for the demolition, alteration or repair of all or part of a building. The information to be provided shall identify whether any material that is likely to be handled, dealt with, disturbed or removed is asbestos-containing material; describe the condition of the material; state whether the material is friable or non-friable; and contain drawings, plans and specifications, as appropriate, to show the locations of material;

iii) any employer with whom the owner arranges or contracts for work not described in ii) above that may involve asbestos-containing material or is to be carried out in close proximity to and may disturb the material;

iv) owner's staff, if they perform work that involves asbestos-containing material or work that is to be carried out in close proximity to and may disturb the material.

If material suspected of containing asbestos which is not identified in the asbestos survey records is discovered during the course of any work in a facility, then either the constructor or the owner is required to immediately notify (orally and in writing):

a) an inspector at the office of the Ministry of Labour nearest the workplace;
b) the owner;
c) the contractor; and
d) the joint health and safety committee or the health and safety representative.

(1) An "occupier" is defined as:
(a) a person who is in physical possession of premises, or
(b) a person who has responsibility for and control over the condition of premises or the activities carried on there, or control over persons allowed to enter the premises.

The owner is also responsible for providing tenderers with a list of designated substances (including asbestos) at the tendering stage of a project.

This report was prepared as part of the asbestos management program, not for the purposes of construction or renovation projects. Additional investigation and testing may be required prior to construction or renovation projects.

Bulk sampling of building materials was carried out in accordance with the minimum sampling requirements specified in Table 1 of O.Reg. 278/05. We recommend that additional samples of certain types of material which may have been mixed on site at the time of construction (plaster, drywall joint compound, ceiling texture coat, etc.) be tested for asbestos content prior to the disturbance of these materials at the time of renovations, alterations or demolition work.

Asbestos may also be present in materials which were not sampled during the course of the asbestos survey carried out by Arcadis, including, but not limited to, roofing materials, fire doors, mastics under vinyl flooring, acoustic ceiling tile adhesive, gaskets in piping, internal components of boilers, etc., and/or in locations that are presently inaccessible (e.g., in pipe chases, behind walls, above suspended gypsum board or plaster ceilings, inside crawlspaces, below carpets). Confirmatory testing of any such materials could be undertaken as the need arises (i.e., at the time of renovations, modifications or demolition) or the materials can be assumed to contain asbestos based on findings in adjacent areas.

5. Use and Limitations of this Report

This report, prepared for Conseil scolaire Viamonde, does not provide certification or warranty, expressed or implied, that the investigation conducted by Arcadis identified all asbestos-containing materials present in the subject facilities. The work undertaken by Arcadis was directed to provide information on the presence of asbestos-containing building materials based on visual inspection of readily accessible areas of the building and on the results of laboratory analysis of bulk samples of material gathered in the course of the visual inspection. The survey did not include for identification of asbestos in process materials, and equipment (including electrical equipment and wiring), nor in furniture (e.g., chairs, table tops, chalkboards, etc.).

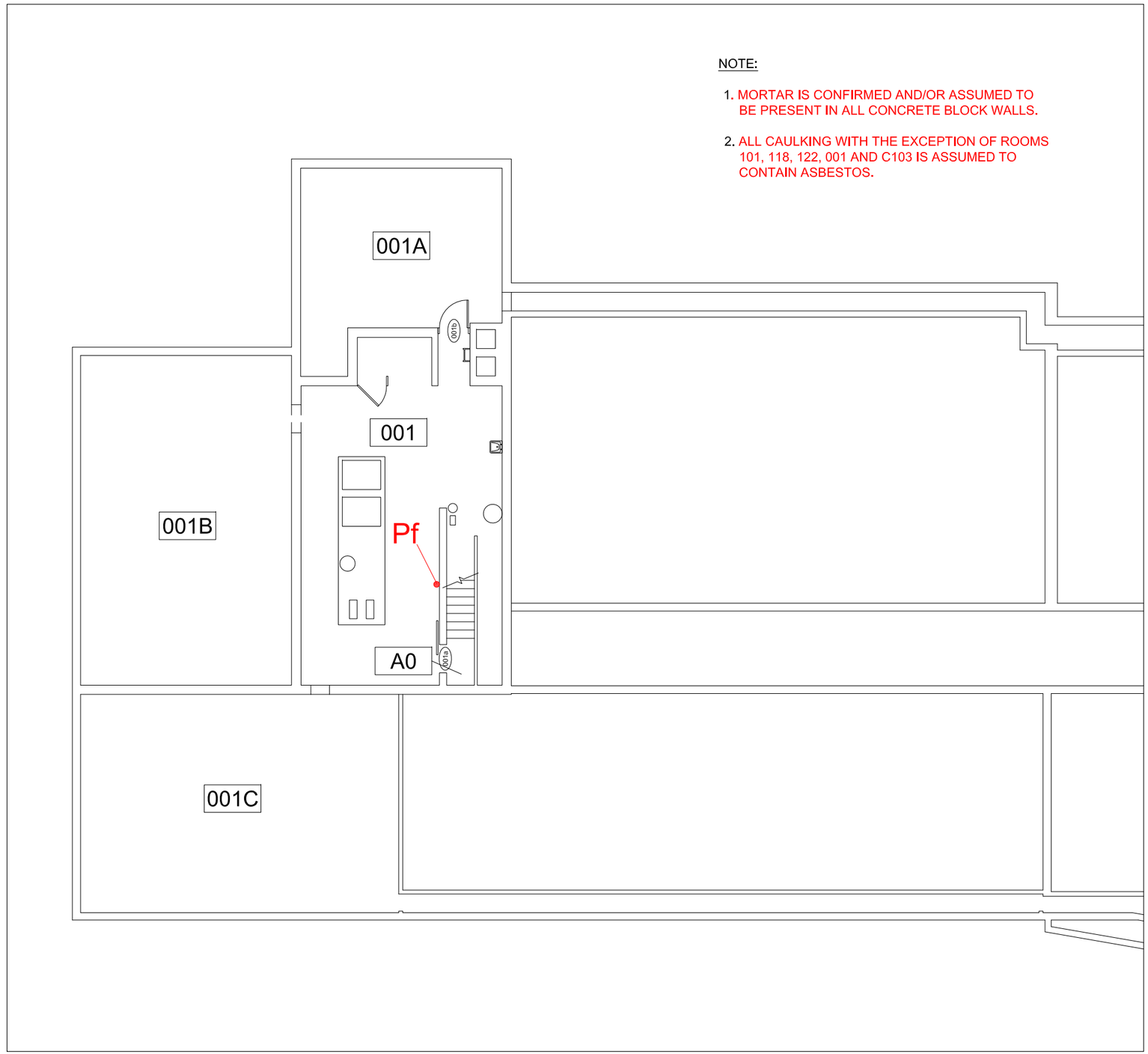
This report was prepared by Arcadis for Conseil Scolaire Viamonde. Any use which a third party makes of the report, or reliance on, or decisions to be based on it, is the responsibility of such third parties.

Appendix A

Floor Plans

NOTE:

1. MORTAR IS CONFIRMED AND/OR ASSUMED TO BE PRESENT IN ALL CONCRETE BLOCK WALLS.
2. ALL CAULKING WITH THE EXCEPTION OF ROOMS 101, 118, 122, 001 AND C103 IS ASSUMED TO CONTAIN ASBESTOS.



LEGEND:

001A FUNCTIONAL SPACE

Pf ASBESTOS ON PIPE FITTINGS

ARCADIS

CONSEIL SCOLAIRE VIAMONDE

UPDATED ASBESTOS SURVEY

LOCATIONS ASBESTOS-CONTAINING MATERIALS

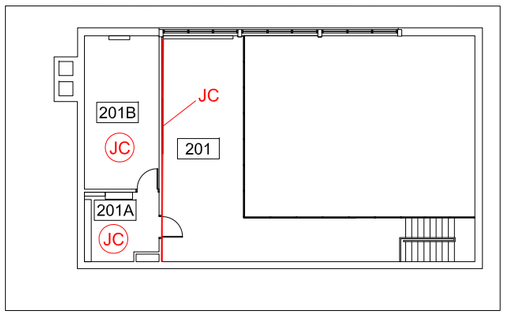
École élémentaire L'Harmonie

158 Bridgeport Road East, Waterloo, Ontario

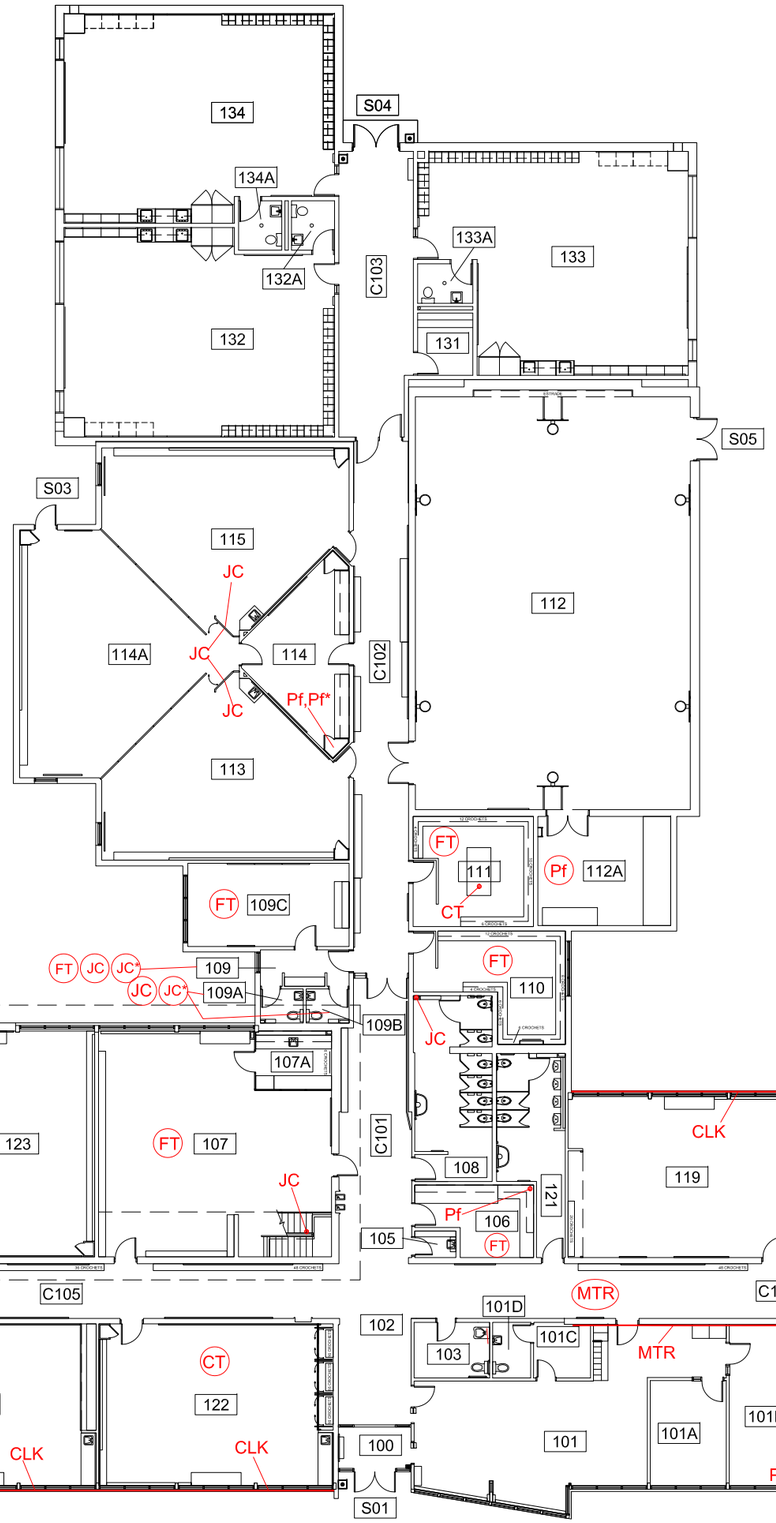
BASEMENT FLOOR PLAN

Drawn By: P.A.L.	Approved By: J.D.	Project No: 702148-012
Date: DEC. 2015	Scale: N.T.S	Drawing No: 702148-012-2

Dec 03, 2015 – 3:57pm – USER plandry
Z:\702000 Series\702148-012\702148-012 AOM HARMONIE FLOOR PLANS Updatedwg.dwg



MEZZANINE FLOOR



NOTE:

1. MORTAR IS CONFIRMED AND/OR ASSUMED TO BE PRESENT IN ALL CONCRETE BLOCK WALLS.
2. ALL CAULKING WITH THE EXCEPTION OF ROOMS 101, 118, 122, 001 AND C103 IS ASSUMED TO CONTAIN ASBESTOS.

LEGEND:

120	FUNCTIONAL SPACE
◯	THROUGHOUT FUNCTIONAL SPACE
*	ABOVE CEILING ASSEMBLY
FT	ASBESTOS VINYL FLOOR TILE
Pf	ASBESTOS ON PIPE FITTINGS
MTR	ASBESTOS MORTAR IN CONCRETE BLOCK
CLK	ASBESTOS CAULKING
CT	ASBESTOS CEILING TILE
CLK	ASBESTOS CAULKING
JC	ASBESTOS DRYWALL JOINT COMPOUND

ARCADIS

CONSEIL SCOLAIRE VIAMONDE

UPDATED ASBESTOS SURVEY

LOCATIONS OF ASBESTOS-CONTAINING MATERIALS

École élémentaire L'Harmonie

158 Bridgeport Road East, Waterloo, Ontario

MAIN AND MEZZANINE FLOOR PLAN

Drawn By: P.A.L.	Approved By: J.D.	Project No: 702148-012
Date: DEC. 2015	Scale: N.T.S	Drawing No: 702148-012-1

Appendix B

Laboratory Reports

EMSL Canada Inc.
2756 Slough Street Mississauga, ON L4T 1G3
Phone/Fax: 289-997-4602 / (289) 997-4607
http://www.EMSL.com / torontolab@emsl.com

EMSL Canada Order 551502993
Customer ID: 55DCSL97
Customer PO: 702148-012
Project ID:

Attn: Jean Daigle
ARCADIS SENES Canada Inc.
121 Granton Drive
Unit 11
Richmond Hill, ON L4B 3N4

Proj: HARMONIE/702148-012

Phone: (905) 882-5984
Fax: (905) 882-8962
Collected:
Received: 3/25/2015
Analyzed: 3/30/2015

Test Report: Asbestos Analysis of Bulk Materials for Ontario Regulation 278/05 via EPA600/R-93/116 Method

Client Sample ID: 1-A ***Lab Sample ID:*** **551502993-0001**
Sample Description: Room 120/Mortar in Concrete Block Walls

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM Grav. Reduction	3/28/2015	Gray	0.0%	100%	None Detected	
TEM Grav. Reduction	3/30/2015	Gray	0.0%	97.9%	**2.1% Chrysotile**	

Client Sample ID: 1-B ***Lab Sample ID:*** **551502993-0002**
Sample Description: Room 102/Mortar in Concrete Block Walls

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM	3/30/2015				Stop Positive (Not Analyzed)	

Client Sample ID: 1-C ***Lab Sample ID:*** **551502993-0003**
Sample Description: Room 102/Mortar in Concrete Block Walls

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM	3/30/2015				Stop Positive (Not Analyzed)	

Client Sample ID: 2-A ***Lab Sample ID:*** **551502993-0004**
Sample Description: Room 120/Paint on Concrete Black Wall Cream Colored

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM Grav. Reduction	3/28/2015	Various/Beige	0.0%	100%	None Detected	

Client Sample ID: 2-B ***Lab Sample ID:*** **551502993-0005**
Sample Description: Room 120/Paint on Concrete Black Wall Cream Colored

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM Grav. Reduction	3/28/2015	Green/Beige	0.0%	100%	None Detected	

Client Sample ID: 2-C ***Lab Sample ID:*** **551502993-0006**
Sample Description: Room 120/Paint on Concrete Black Wall Cream Colored

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM Grav. Reduction	3/28/2015	Green/Beige	0.0%	100%	None Detected	

Client Sample ID: 3-A ***Lab Sample ID:*** **551502993-0007**
Sample Description: Room 120/Mastic on 9" Asbestos Vinyl Floor Tile Black Coloured

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM Grav. Reduction	3/28/2015	Black	0.0%	98.9%	**1.1% Chrysotile**	
TEM Grav. Reduction	3/28/2015				Positive Stop (Not Analyzed)	

EMSL Canada Inc.
2756 Slough Street Mississauga, ON L4T 1G3
Phone/Fax: 289-997-4602 / (289) 997-4607
http://www.EMSL.com / torontolab@emsl.com

EMSL Canada Order 551502993
Customer ID: 55DCSL97
Customer PO: 702148-012
Project ID:

Test Report: Asbestos Analysis of Bulk Materials for Ontario Regulation 278/05 via EPA600/R-93/116 Method

Client Sample ID: 3-B **Lab Sample ID:** **551502993-0008**
Sample Description: Room 120/Mastic on 9" Asbestos Vinyl Floor Tile Black Coloured

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM	3/28/2015			Stop Positive (Not Analyzed)		

Client Sample ID: 3-C **Lab Sample ID:** **551502993-0009**
Sample Description: Room 120/Mastic on 9" Asbestos Vinyl Floor Tile Black Coloured

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM	3/27/2015			Stop Positive (Not Analyzed)		

Client Sample ID: 4-A **Lab Sample ID:** **551502993-0010**
Sample Description: Room 120/Vinyl Baseboard Black Coloured

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM Grav. Reduction	3/28/2015	Black	0.0%	100%	None Detected	
TEM Grav. Reduction	3/30/2015	Black	0.0%	100%	None Detected	

Client Sample ID: 4-B **Lab Sample ID:** **551502993-0011**
Sample Description: Room 104A/Vinyl Baseboard Dark Blue Coloured

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM	3/27/2015	Black	0%	100%	None Detected	

Client Sample ID: 4-C **Lab Sample ID:** **551502993-0012**
Sample Description: Room 103/Vinyl Baseboard Grey Coloured

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM	3/27/2015	White	0%	100%	None Detected	

Client Sample ID: 5-A **Lab Sample ID:** **551502993-0013**
Sample Description: Room 120/Mastic on Vinyl Baseboards Dark Brown Coloured

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM Grav. Reduction	3/28/2015	Brown/Yellow	0.0%	100%	None Detected	
TEM Grav. Reduction	3/30/2015	Brown/Yellow	0.0%	100%	None Detected	

Client Sample ID: 5-B **Lab Sample ID:** **551502993-0014**
Sample Description: Room 120/Mastic on Vinyl Baseboards Dark Brown Coloured

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM	3/27/2015	Brown	0%	100%	None Detected	

Client Sample ID: 5-C **Lab Sample ID:** **551502993-0015**
Sample Description: Room 120/Mastic on Vinyl Baseboards Dark Brown Coloured

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM	3/27/2015	Brown	0%	100%	None Detected	

EMSL Canada Inc.
2756 Slough Street Mississauga, ON L4T 1G3
Phone/Fax: 289-997-4602 / (289) 997-4607
http://www.EMSL.com / torontolab@emsl.com

EMSL Canada Order 551502993
Customer ID: 55DCSL97
Customer PO: 702148-012
Project ID:

Test Report: Asbestos Analysis of Bulk Materials for Ontario Regulation 278/05 via EPA600/R-93/116 Method

Client Sample ID: 6-A **Lab Sample ID:** **551502993-0016**

Sample Description: Room 101/Mastic on 12" Non Asbestos Vinyl Floor Tile Black Coloured

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM Grav. Reduction	3/28/2015	Black	0.0%	99.5%	**0.48% Chrysotile**	
TEM Grav. Reduction	3/30/2015	Black	0.0%	99.2%	**0.77% Chrysotile**	

Client Sample ID: 6-B **Lab Sample ID:** **551502993-0017**

Sample Description: Room 101/Mastic on 12" Non Asbestos Vinyl Floor Tile Black Coloured

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM	3/28/2015				Stop Positive (Not Analyzed)	

Client Sample ID: 6-C **Lab Sample ID:** **551502993-0018**

Sample Description: Room 103/Mastic on 12" Non Asbestos Vinyl Floor Tile Black Coloured

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM	3/27/2015				Stop Positive (Not Analyzed)	

Client Sample ID: 7-A **Lab Sample ID:** **551502993-0019**

Sample Description: Room 101/Mastic on Vinyl Baseboards Cream Coloured

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM Grav. Reduction	3/28/2015	White/Beige	0.0%	100%	None Detected	
TEM Grav. Reduction	3/30/2015	White/Beige	0.0%	100%	None Detected	

Client Sample ID: 7-B **Lab Sample ID:** **551502993-0020**

Sample Description: Room 101/Mastic on Vinyl Baseboards Cream Coloured

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM	3/27/2015	Yellow	0%	100%	None Detected	

Client Sample ID: 7-C **Lab Sample ID:** **551502993-0021**

Sample Description: Room 103/Mastic on Vinyl Baseboards Cream Coloured

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM	3/27/2015	Yellow	0%	100%	None Detected	

Client Sample ID: 8-A **Lab Sample ID:** **551502993-0022**

Sample Description: Room 120/Drywall Joint Compound on Drywall Wall Above Windows

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM Grav. Reduction	3/28/2015	White	0.0%	100%	None Detected	

Client Sample ID: 8-B **Lab Sample ID:** **551502993-0023**

Sample Description: Room 104/Drywall Joint Compound on Drywall Enclosure Adjacent to Radiators

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM Grav. Reduction	3/28/2015	White	0.0%	100%	None Detected	

EMSL Canada Inc.
2756 Slough Street Mississauga, ON L4T 1G3
Phone/Fax: 289-997-4602 / (289) 997-4607
http://www.EMSL.com / torontolab@emsl.com

EMSL Canada Order 551502993
Customer ID: 55DCSL97
Customer PO: 702148-012
Project ID:

Test Report: Asbestos Analysis of Bulk Materials for Ontario Regulation 278/05 via EPA600/R-93/116 Method

Client Sample ID: 8-C **Lab Sample ID:** **551502993-0024**
Sample Description: Room 102/Drywall Joint Compound on Drywall Above Door

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM Grav. Reduction	3/28/2015	White	0.0%	100%	None Detected	

Client Sample ID: 9-A **Lab Sample ID:** **551502993-0025**
Sample Description: Room 120/Plaster on Wall Top Coat White

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM Grav. Reduction	3/28/2015	White	0.0%	100%	None Detected	

Client Sample ID: 9-B **Lab Sample ID:** **551502993-0026**
Sample Description: Room 120/Plaster on Wall Top Coat White

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM Grav. Reduction	3/28/2015	White	0.0%	100%	None Detected	

Client Sample ID: 9-C **Lab Sample ID:** **551502993-0027**
Sample Description: Room 104A/Plaster on Wall Top Coat White

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM Grav. Reduction	3/28/2015	White/Beige	0.0%	100%	None Detected	

Client Sample ID: 10-A **Lab Sample ID:** **551502993-0028**
Sample Description: Room 120/Plaster on Wall Scratch Coat Grey

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM Grav. Reduction	3/28/2015	Gray	0.0%	100%	None Detected	

Client Sample ID: 10-B **Lab Sample ID:** **551502993-0029**
Sample Description: Room 120/Plaster on Wall Scratch Coat Grey

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM Grav. Reduction	3/28/2015	Gray	0.0%	100%	None Detected	

Client Sample ID: 10-C **Lab Sample ID:** **551502993-0030**
Sample Description: Room 104A/Plaster on Wall Scratch Coat Grey

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM Grav. Reduction	3/28/2015	Gray	0.0%	100%	None Detected	

Client Sample ID: 11-A **Lab Sample ID:** **551502993-0031**
Sample Description: Room 102/Textured Plaster on Wall Top Coat White

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM Grav. Reduction	3/28/2015	White	0.0%	99.6%	**0.36% Chrysotile**	

EMSL Canada Inc.
2756 Slough Street Mississauga, ON L4T 1G3
Phone/Fax: 289-997-4602 / (289) 997-4607
http://www.EMSL.com / torontolab@emsl.com

EMSL Canada Order 551502993
Customer ID: 55DCSL97
Customer PO: 702148-012
Project ID:

Test Report: Asbestos Analysis of Bulk Materials for Ontario Regulation 278/05 via EPA600/R-93/116 Method

Client Sample ID: 11-B **Lab Sample ID:** **551502993-0032**
Sample Description: Room 102/Textured Plaster on Wall Top Coat White

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
400 PLM PtCt Grav. Red.	3/28/2015	White	0.0%	99.2%	**0.8% Chrysotile**	

Client Sample ID: 11-C **Lab Sample ID:** **551502993-0033**
Sample Description: Room 102/Textured Plaster on Wall Top Coat White

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM Grav. Reduction	3/28/2015			Positive Stop (Not Analyzed)		

Client Sample ID: 12-A **Lab Sample ID:** **551502993-0034**
Sample Description: Room 102/Textured Plaster on Wall Scratch Coat Grey

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM Grav. Reduction	3/28/2015	Gray	0.0%	100%	None Detected	

Client Sample ID: 12-B **Lab Sample ID:** **551502993-0035**
Sample Description: Room 102/Textured Plaster on Wall Scratch Coat Grey

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM Grav. Reduction	3/28/2015	Gray	0.0%	100%	None Detected	

Client Sample ID: 12-C **Lab Sample ID:** **551502993-0036**
Sample Description: Room 102/Textured Plaster on Wall Scratch Coat Grey

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM Grav. Reduction	3/28/2015	Gray	0.0%	100%	None Detected	

Client Sample ID: 13-A **Lab Sample ID:** **551502993-0037**
Sample Description: Room 102/Caulking Inside Ceiling Cavity Red Coloured

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM Grav. Reduction	3/28/2015	Brown	0.0%	100%	None Detected	
TEM Grav. Reduction	3/30/2015	Brown	0.0%	100%	None Detected	

Client Sample ID: 13-B **Lab Sample ID:** **551502993-0038**
Sample Description: Room 102/Caulking Inside Ceiling Cavity Red Coloured

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM	3/27/2015	Brown	0%	100%	None Detected	

Client Sample ID: 13-C **Lab Sample ID:** **551502993-0039**
Sample Description: Room 102/Caulking Inside Ceiling Cavity Red Coloured

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM	3/27/2015	Brown	0%	100%	None Detected	

EMSL Canada Inc.
2756 Slough Street Mississauga, ON L4T 1G3
Phone/Fax: 289-997-4602 / (289) 997-4607
http://www.EMSL.com / torontolab@emsl.com

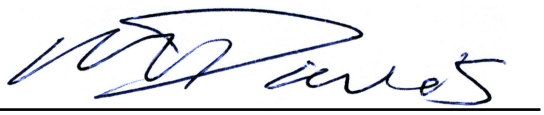
EMSL Canada Order 551502993
Customer ID: 55DCSL97
Customer PO: 702148-012
Project ID:

Test Report: Asbestos Analysis of Bulk Materials for Ontario Regulation 278/05 via EPA600/R-93/116 Method

Analyst(s):

Arabee Sathiaseelan	TEM Grav. Reduction (6)
John Biesiadecki	PLM (8)
Natalie D'Amico	PLM Grav. Reduction (5)
Nicole Yeo	400 PLM PtCt Grav. Red (1) PLM Grav. Reduction (18)

Reviewed and approved by:



Matthew Davis
or Other Approved Signatory

None Detected = <0.5%. EMSL maintains liability limited to cost of analysis. This report relates only to the samples reported above and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities or analytical method limitations. Interpretation and use of test results are the responsibility of the client. Samples received in good condition unless otherwise noted. This report must not be used to claim product endorsement by NVLAP of any agency of the U.S. Government.

Samples analyzed by EMSL Canada Inc. Mississauga, ON NVLAP Lab Code 200877-0

Initial report from: 03/30/201510:10:17

EMSL Analytical, Inc.
490 Rowley Road, Depew, NY 14043
Phone: (716) 651-0030 Fax: (716) 651-0394 Email: buffalolab@emsl.com

Attn: **Jean Daigle**
Decommissioning Cons Srvs, Ltd
121 Granton Drive
Unit 11
Richmond Hill, Ontario, CN L4B3N4

Fax: (905) 882-8962 Phone: (905) 882-5984
Project: **70740 / Harmonie**

Customer ID: DCSL97
Customer PO: 70740
Received: 02/03/10 10:10 AM
EMSL Order: 141000413

EMSL Proj:
Analysis Date: 2/8/2010

Test Report: Polarized Light Microscopy (PLM) - Point Count Performed by EPA 600/R-93/116 Method with Gravimetric Reduction and 400 Point Count

SAMPLE ID	DESCRIPTION	APPEARANCE	(%) Matrix Organic	(%) Matrix Acid	ASBESTOS % TYPES	NON-ASBESTOS % Fibrous	NON-ASBESTOS % NON-FIBROUS
105-FT-1A *141000413-0017*	rm 105, 12x12 floor tile, brown with brown fleck	Tan	18.8	46.7	None Detected		34.4 Non-fibrous (other)
104-FT-1B *141000413-0018*	rm 104, 12x12 floor tile, brown with brown fleck	Tan	18.0	55.1	None Detected		26.9 Non-fibrous (other)
103-FT-1C *141000413-0019*	rm 103, 12x12 floor tile, brown with brown fleck	Tan	20.2	76.0	None Detected		3.8 Non-fibrous (other)
118-FT-2A *141000413-0020*	rm 118, 12x12 floor tile, gray with gray fleck	Gray	17.6	74.1	None Detected		8.3 Non-fibrous (other)
113-FT-2B *141000413-0021*	rm 113, 12x12 floor tile, gray with gray fleck	Gray	19.1	32.2	None Detected		48.7 Non-fibrous (other)
115-FT-2C *141000413-0022*	rm 115, 12x12 floor tile, gray with gray fleck	Gray	16.8	40.7	None Detected		42.5 Non-fibrous (other)
128-LINO-3A *141000413-0023*	rm 128, sheet flooring, orange	Tan	68.2	20.1	None Detected		11.6 Non-fibrous (other)
128-LINO-3B *141000413-0024*	rm 128, sheet flooring, orange	Tan	68.8	27.9	None Detected		3.3 Non-fibrous (other)

Analyst(s)
Tom Hanes (54)

Rhonda McGee

Rhonda McGee, Laboratory Manager
or other approved signatory

EMSL Analytical, Inc.
490 Rowley Road, Depew, NY 14043
Phone: (716) 651-0030 Fax: (716) 651-0394 Email: buffalolab@emsl.com

Attn: **Jean Daigle**
Decommissioning Cons Srvs, Ltd
121 Granton Drive
Unit 11
Richmond Hill, Ontario, CN L4B3N4

Fax: (905) 882-8962 Phone: (905) 882-5984
Project: **70740 / Harmonie**

Customer ID: DCSL97
Customer PO: 70740
Received: 02/03/10 10:10 AM
EMSL Order: 141000413

EMSL Proj:
Analysis Date: 2/8/2010

Test Report: Polarized Light Microscopy (PLM) - Point Count Performed by EPA 600/R-93/116 Method with Gravimetric Reduction and 400 Point Count

SAMPLE ID	DESCRIPTION	APPEARANCE	(%) Matrix Organic	(%) Matrix Acid	ASBESTOS %	ASBESTOS % TYPES	NON-ASBESTOS % Fibrous	NON-ASBESTOS % NON-FIBROUS
128-LINO-3C *141000413-0025*	rm 128, sheet flooring, orange	Tan	69.7	28.0		None Detected		2.3 Non-fibrous (other)
107-FT-4A *141000413-0026*	rm 107, 9x9 floor tile, gray, under carpet	Gray	28.0	57.0	0.6	Chrysotile		14.3 Non-fibrous (other)
107-FT-4B *141000413-0027*	rm 107, 9x9 floor tile, gray, under carpet	Gray			Positive Stop (Not Analyzed)			
Positive Stop (Not Analyzed)								
107-FT-4C *141000413-0028*	rm 107, 9x9 floor tile, gray, under carpet	Gray			Positive Stop (Not Analyzed)			
Positive Stop (Not Analyzed)								
109C-FT-5A *141000413-0029*	rm 109C, 12x12 floor tile, beige with directional	Beige	36.7	15.9	1.3	Chrysotile		46.1 Non-fibrous (other)
109C-FT-5B *141000413-0030*	rm 109C, 12x12 floor tile, beige with directional	Beige			Positive Stop (Not Analyzed)			
Positive Stop (Not Analyzed)								
109C-FT-5C *141000413-0031*	rm 109C, 12x12 floor tile, beige with directional	Beige			Positive Stop (Not Analyzed)			
Positive Stop (Not Analyzed)								

Analyst(s)
Tom Hanes (54)

Rhonda McGee

Rhonda McGee, Laboratory Manager
or other approved signatory

EMSL Analytical, Inc.
490 Rowley Road, Depew, NY 14043
Phone: (716) 651-0030 Fax: (716) 651-0394 Email: buffalolab@emsl.com

Attn: **Jean Daigle**
Decommissioning Cons Srvs, Ltd
121 Granton Drive
Unit 11
Richmond Hill, Ontario, CN L4B3N4

Fax: (905) 882-8962 Phone: (905) 882-5984
Project: **70740 / Harmonie**

Customer ID: DCSL97
Customer PO: 70740
Received: 02/03/10 10:10 AM
EMSL Order: 141000413

EMSL Proj:
Analysis Date: 2/8/2010

Test Report: Polarized Light Microscopy (PLM) - Point Count Performed by EPA 600/R-93/116 Method with Gravimetric Reduction and 400 Point Count

SAMPLE ID	DESCRIPTION	APPEARANCE	(%) Matrix Organic	(%) Matrix Acid	ASBESTOS %TYPES	NON-ASBESTOS % Fibrous	NON-ASBESTOS % NON-FIBROUS
109B-FT-6A *141000413-0032*	rm 109B, 12x12 floor tile, gray with directional	White	25.8	49.1	None Detected		25.1 Non-fibrous (other)
109B-FT-6B *141000413-0033*	rm 109B, 12x12 floor tile, gray with directional	White	26.8	44.3	None Detected		29.0 Non-fibrous (other)
109B-FT-6C *141000413-0034*	rm 109B, 12x12 floor tile, gray with directional	White	26.1	35.3	None Detected		38.6 Non-fibrous (other)
112-FT-7A *141000413-0035*	rm 112, 12x12 floor tile, light beige with beige	Tan	24.2	73.8	None Detected		2.0 Non-fibrous (other)
112-FT-7B *141000413-0036*	rm 112, 12x12 floor tile, light beige with beige	Tan	20.4	77.8	None Detected		1.9 Non-fibrous (other)
112A-FT-7C *141000413-0037*	rm 112A, 12x12 floor tile, light beige with beige	Tan	19.8	57.0	None Detected		23.2 Non-fibrous (other)
106-PL-1A *141000413-0038*	rm 106, plaster on wall	White/Gray	10.9	46.8	None Detected		42.4 Non-fibrous (other)
105-PL-1B *141000413-0039*	rm 105, plaster on ceiling	White/Gray	8.0	42.1	None Detected		49.9 Non-fibrous (other)

Analyst(s)
Tom Hanes (54)

Rhonda McGee

Rhonda McGee, Laboratory Manager
or other approved signatory

Disclaimers: Some samples may contain asbestos fibers present in dimensions below PLM resolution limits. EMSL Analytical Inc. suggests that samples reported as <0.25% or none detected undergo additional analysis via TEM. The above test report relates only to the items tested. This report may not be reproduced, except in full, without written approval by EMSL Analytical Inc. This report must not be used to claim product endorsement by NVLAP or any agency of the United States Government. EMSL Analytical bears no responsibility for sample collection activities, analytical method limitations, or the accuracy of results when requested to separate layer samples. EMSL Analytical Inc. liability is limited to the cost of sample analysis. Samples received in good condition unless otherwise noted.
Samples analyzed by EMSL Analytical, Inc. 490 Rowley Road, DepewNY

EMSL Analytical, Inc.
490 Rowley Road, Depew, NY 14043
Phone: (716) 651-0030 Fax: (716) 651-0394 Email: buffalolab@emsl.com

Attn: **Jean Daigle**
Decommissioning Cons Srvs, Ltd
121 Granton Drive
Unit 11
Richmond Hill, Ontario, CN L4B3N4

Fax: (905) 882-8962 Phone: (905) 882-5984
Project: **70740 / Harmonie**

Customer ID: DCSL97
Customer PO: 70740
Received: 02/03/10 10:10 AM
EMSL Order: 141000413

EMSL Proj:
Analysis Date: 2/8/2010

Test Report: Polarized Light Microscopy (PLM) - Point Count Performed by EPA 600/R-93/116 Method with Gravimetric Reduction and 400 Point Count

SAMPLE ID	DESCRIPTION	APPEARANCE	(%) Matrix Organic	(%) Matrix Acid	ASBESTOS % TYPES	NON- ASBESTOS % Fibrous	NON- ASBESTOS % NON-FIBROUS
104A-PL-1C *141000413-0040*	rm 104A, plaster on wall	White/Gray/Tan	8.5	42.6	**None Detected**		48.9 Non-fibrous (other)
S001-PL-1D *141000413-0041*	rm S001, plaster on wall	White/Yellow/Gray	9.6	41.3	**None Detected**		49.0 Non-fibrous (other)
120-PL-1E *141000413-0042*	rm 120, plaster on wall under radiator	White/Gray	24.2	21.8	**None Detected**		54.0 Non-fibrous (other)
118-PL-1F *141000413-0043*	rm 118, plaster on wall under radiator	White/Gray	21.0	19.0	**None Detected**		60.0 Non-fibrous (other)
117-PL-1G *141000413-0044*	rm 117, plaster on wall under radiator	White/Gray	12.8	34.4	**None Detected**		52.8 Non-fibrous (other)
123-PL-2A *141000413-0045*	rm 123, plaster on lower 1/3 of wall	White/Gray	10.7	27.4	**None Detected**		62.0 Non-fibrous (other)
C101-PL-2B *141000413-0046*	rm C101, plaster on lower 1/3 of wall	White/Gray/Tan	13.1	29.3	**None Detected**		57.6 Non-fibrous (other)
107-PL-2C *141000413-0047*	rm 107, plaster on lower 1/3 of wall	White/Gray	16.3	37.1	**None Detected**		46.5 Non-fibrous (other)

Analyst(s)
Tom Hanes (54)

Rhonda McGee

Rhonda McGee, Laboratory Manager
or other approved signatory

EMSL Analytical, Inc.
490 Rowley Road, Depew, NY 14043
Phone: (716) 651-0030 Fax: (716) 651-0384 Email: buffalolab@emsl.com

Attn: **Jean Daigle**
Decommissioning Cons Srvs, Ltd
121 Granton Drive
Unit 11
Richmond Hill, Ontario, CN L4B3N4

Fax: (905) 882-8962 Phone: (905) 882-5984
Project: **70740 / Harmonie**

Customer ID: DCSL97
Customer PO: 70740
Received: 02/03/10 10:10 AM
EMSL Order: 141000413

EMSL Proj:
Analysis Date: 2/8/2010

Test Report: Polarized Light Microscopy (PLM) - Point Count Performed by EPA 600/R-93/116 Method with Gravimetric Reduction and 400 Point Count

SAMPLE ID	DESCRIPTION	APPEARANCE	(%) Matrix Organic	(%) Matrix Acid	ASBESTOS % TYPES		NON-ASBESTOS % Fibrous	NON-ASBESTOS % NON-FIBROUS
S01-PLT-3A *141000413-0048*	rm S01, textured plaster on exterior soffit	White	7.3	31.0	<0.25	Chrysotile		61.8 Non-fibrous (other)
S01-PLT-3B *141000413-0049*	rm S01, textured plaster on exterior soffit	White	6.3	46.1	<0.25	Chrysotile		47.6 Non-fibrous (other)
S01-PLT-3C *141000413-0050*	rm S01, textured plaster on exterior soffit	White	8.7	39.4	<0.25	Chrysotile		51.9 Non-fibrous (other)
106-DW-1A *141000413-0051*	rm 106, drywall joint compound, bulkhead	White	18.0	61.5		**None Detected**		20.5 Non-fibrous (other)
120-DW-1B *141000413-0052*	rm 120, drywall joint compound, ceiling	White	4.6	70.0		**None Detected**		25.4 Non-fibrous (other)
120-DW-1C *141000413-0053*	rm 120, drywall joint compound, above window	White/Tan	28.2	42.4		**None Detected**		29.4 Non-fibrous (other)
118-DW-1D *141000413-0054*	rm 118, drywall joint compound, ceiling	White	1.8	93.4		**None Detected**		4.8 Non-fibrous (other)
128A-DW-1E *141000413-0055*	rm 128A, drywall joint compound, wall	White	28.7	55.0		**None Detected**		16.3 Non-fibrous (other)

Analyst(s)
Tom Hanes (54)

Rhonda McGee

Rhonda McGee, Laboratory Manager
or other approved signatory

EMSL Analytical, Inc.
490 Rowley Road, Depew, NY 14043
Phone: (716) 651-0030 Fax: (716) 651-0394 Email: buffalolab@emsl.com

Attn: **Jean Daigle**
Decommissioning Cons Srvs, Ltd
121 Granton Drive
Unit 11
Richmond Hill, Ontario, CN L4B3N4

Fax: (905) 882-8962 Phone: (905) 882-5984
Project: **70740 / Harmonie**

Customer ID: DCSL97
Customer PO: 70740
Received: 02/03/10 10:10 AM
EMSL Order: 141000413

EMSL Proj:
Analysis Date: 2/8/2010

Test Report: Polarized Light Microscopy (PLM) - Point Count Performed by EPA 600/R-93/116 Method with Gravimetric Reduction and 400 Point Count

SAMPLE ID	DESCRIPTION	APPEARANCE	(%) Matrix Organic	Acid	ASBESTOS %	TYPES	NON-ASBESTOS % Fibrous	NON-ASBESTOS % NON-FIBROUS
001-DW-1F *141000413-0056*	rm 001, drywall joint compound, ceiling	White/Tan	12.4	41.1	<0.25	Chrysotile		46.5 Non-fibrous (other)
107A-DW-1G *141000413-0057*	rm 107A, drywall joint compound, pipe chase	White	16.6	43.9		None Detected		39.6 Non-fibrous (other)
109-DW-2A *141000413-0058*	rm 109, drywall joint compound, wall, 1970	White/Cream	13.3	31.1	0.6	Chrysotile		55.1 Non-fibrous (other)
109-DW-2B *141000413-0059*	rm 109, drywall joint compound, ceiling, 1970	White/Cream			Positive Stop (Not Analyzed)			
Positive Stop (Not Analyzed)								
113-DW-2C *141000413-0060*	rm 113, drywall joint compound, bulkhead, 1970	White/Orange			Positive Stop (Not Analyzed)			
Positive Stop (Not Analyzed)								
114A-DW-2D *141000413-0061*	rm 114A, drywall joint compound, bulkhead, 1970	White/Orange			Positive Stop (Not Analyzed)			
Positive Stop (Not Analyzed)								
115-DW-2E *141000413-0062*	rm 115, drywall joint compound, bulkhead, 1970	White/Cream			Positive Stop (Not Analyzed)			
Positive Stop (Not Analyzed)								

Analyst(s)
Tom Hanes (54)

Rhonda McGee

Rhonda McGee, Laboratory Manager
or other approved signatory

EMSL Analytical, Inc.
490 Rowley Road, Depew, NY 14043
Phone: (716) 651-0030 Fax: (716) 651-0394 Email: buffalolab@emsl.com

Attn: **Jean Daigle**
Decommissioning Cons Srvs, Ltd
121 Granton Drive
Unit 11
Richmond Hill, Ontario, CN L4B3N4

Fax: (905) 882-8952 Phone: (905) 882-5984
Project: **70740 / Harmonie**

Customer ID: DCSL97
Customer PO: 70740
Received: 02/03/10 10:10 AM
EMSL Order: 141000413

EMSL Proj:
Analysis Date: 2/8/2010

Test Report: Polarized Light Microscopy (PLM) - Point Count Performed by EPA 600/R-93/116 Method with Gravimetric Reduction and 400 Point Count

SAMPLE ID	DESCRIPTION	APPEARANCE	(%) Matrix Organic	Acid	ASBESTOS %	TYPES	NON-ASBESTOS % Fibrous	NON-ASBESTOS % NON-FIBROUS
101-TH-1A *141000413-0063*	rm 101, glue pucks on drywall ceiling	Brown	53.2	8.3		None Detected		38.5 Non-fibrous (other)
104-TH-1B *141000413-0064*	rm 104, glue pucks on drywall ceiling	Brown	50.7	10.1		None Detected		39.2 Non-fibrous (other)
123-TH-1C *141000413-0065*	rm 123, glue pucks on concrete ceiling	Brown	47.9	13.1		None Detected		39.1 Non-fibrous (other)
104A-TH-2A *141000413-0066*	rm 104A, shiny black paper on pipe straight ins.	Black	97.7	2.0		None Detected		<1 Non-fibrous (other)
001-TH-2B *141000413-0067*	rm 001, shiny black paper on pipe straight ins.	Black	88.1	9.0		None Detected		2.9 Non-fibrous (other)
C104-TH-2C *141000413-0068*	rm C104, shiny black paper on pipe straight ins.	Black	97.7	1.4		None Detected		<1 Non-fibrous (other)
120-TH-3A *141000413-0069*	rm 120, gray caulking on drywall above the windows	Gray	63.7	17.2	4.6	Chrysotile		14.5 Non-fibrous (other)
117-TH-3B *141000413-0070*	rm 117, gray caulking on drywall above the windows	Gray				Positive Stop (Not Analyzed)		

Positive Stop (Not Analyzed)

Analyst(s)
Tom Hanes (54)

Rhonda McGee

Rhonda McGee, Laboratory Manager
or other approved signatory

EMSL Analytical, Inc.
490 Rowley Road, Depew, NY 14043
Phone: (716) 651-0030 Fax: (716) 651-0394 Email: buffalolab@emsl.com

Attn: **Jean Daigle**
Decommissioning Cons Srvs, Ltd
121 Granton Drive
Unit 11
Richmond Hill, Ontario, CN L4B3N4

Fax: (905) 882-8962 Phone: (905) 882-5984
Project: **70740 / Harmonie**

Customer ID: DCSL97
Customer PO: 70740
Received: 02/03/10 10:10 AM
EMSL Order: 141000413

EMSL Proj:
Analysis Date: 2/8/2010

Test Report: Polarized Light Microscopy (PLM) - Point Count Performed by EPA 600/R-93/116 Method with Gravimetric Reduction and 400 Point Count

SAMPLE ID	DESCRIPTION	APPEARANCE	(%) Matrix Organic	(%) Matrix Acid	ASBESTOS % TYPES	NON-ASBESTOS % Fibrous	NON-ASBESTOS % NON-FIBROUS
122-TH-3C *141000413-0071*	rm 122, gray caulking on drywall above the windows	Gray			**Positive Stop (Not Analyzed)**		
Positive Stop (Not Analyzed)							
120-TH-4A *141000413-0072*	rm 120, beige caulking on interior window frames	Yellow/White	74.8	14.3	**None Detected**		10.9 Non-fibrous (other)
118-TH-4B *141000413-0073*	rm 118, beige caulking on interior window frames	Yellow/White	75.0	10.4	**None Detected**		14.7 Non-fibrous (other)
122-TH-4C *141000413-0074*	rm 122, beige caulking on interior window frames	Yellow/White	65.3	20.3	**None Detected**		14.3 Non-fibrous (other)
001-TH-5A *141000413-0075*	rm 001, red firestop caulking at ceiling perimeter	Red	25.4	58.1	**None Detected**		16.5 Non-fibrous (other)
001-TH-5B *141000413-0076*	rm 001, red firestop caulking at ceiling perimeter	Red	28.8	55.9	**None Detected**		15.3 Non-fibrous (other)
C103-TH-5C *141000413-0077*	rm C103, red firestop caulking ceiling perimeter	Red	23.4	62.4	**None Detected**		14.2 Non-fibrous (other)

Analyst(s)
Tom Hanes (54)

Rhonda McGee

Rhonda McGee, Laboratory Manager
or other approved signatory

EMSL Analytical, Inc.
490 Rowley Road, Depew, NY 14043
Phone: (716) 651-0030 Fax: (716) 651-0394 Email: buffalolab@emsl.com

Attn: **Jean Daigle**
Decommissioning Cons Srvs, Ltd
121 Granton Drive
Unit 11
Richmond Hill, Ontario, CN L4B3N4

Fax: (905) 882-8962 Phone: (905) 882-5984
Project: **70740 / Harmonie**

Customer ID: DCSL97
Customer PO: 70740
Received: 02/03/10 10:10 AM
EMSL Order: 141000413

EMSL Proj:
Analysis Date: 2/8/2010

Test Report: Polarized Light Microscopy (PLM) - Point Count Performed by EPA 600/R-93/116 Method with Gravimetric Reduction and 400 Point Count

SAMPLE ID	DESCRIPTION	APPEARANCE	(%) Matrix Organic	(%) Matrix Acid	ASBESTOS % TYPES	NON-ASBESTOS % Fibrous	NON-ASBESTOS % NON-FIBROUS
112A-TH-6A *141000413-0078*	rm 112A, black paper on anti-sweat pipe straight	Black	94.9	4.7	None Detected		<1 Non-fibrous (other)
112A-TH-6B *141000413-0079*	rm 112A, black paper on anti-sweat pipe straight	Black	93.5	5.2	None Detected		1.3 Non-fibrous (other)
113-TH-6C *141000413-0080*	rm 113, black paper on anti-sweat pipe straight	Black	95.3	3.0	None Detected		1.8 Non-fibrous (other)

Analytical Sensitivity <0.5% Asbestos.

Analyst(s)
Tom Hanes (54)

Rhonda McGee, Laboratory Manager
or other approved signatory

Disclaimers: Some samples may contain asbestos fibers present in dimensions below PLM resolution limits. EMSL Analytical Inc. suggests that samples reported as <0.25% or none detected undergo additional analysis via TEM. The above test report relates only to the items tested. This report may not be reproduced, except in full, without written approval by EMSL Analytical Inc. This report must not be used to claim product endorsement by NVLAP or any agency of the United States Government. EMSL Analytical bears no responsibility for sample collection activities, analytical method limitations, or the accuracy of results when requested to separate layer samples. EMSL Analytical Inc. liability is limited to the cost of sample analysis. Samples received in good condition unless otherwise noted.
Samples analyzed by EMSL Analytical, Inc. 490 Rowley Road, DepewNY

THIS IS THE LAST PAGE OF THE REPORT.

EMSL Analytical, Inc.
490 Rowley Road, Depew, NY 14043
Phone: (716) 651-0030 Fax: (716) 651-0394 Email: buffalolab@emsl.com

Attn: **Jean Daigle**
Decommissioning Cons Srvs, Ltd
121 Granton Drive
Unit 11
Richmond Hill, Ontario, CN L4B3N4

Fax: (905) 882-8962 Phone: (905) 882-5984
Project: **70740 / Harmonie**

Customer ID: DCSL97
Customer PO: 70740
Received: 02/03/10 10:10 AM
EMSL Order: 141000413

EMSL Proj:
Analysis Date: 2/9/2010

Test Report: Asbestos Analysis of Non-Friable Organically Bound Materials by TEM via EPA/600/R-93/116 Section 2.5.5.1

SAMPLE ID	DESCRIPTION	APPEARANCE	% MATRIX MATERIAL	% NON-ASBESTOS FIBERS	ASBESTOS TYPES
105-FT-1A *141000413-0017*	rm 105, 12x12 floor tile, brown with brown fleck	Tan	100.0	None	No Asbestos Detected
118-FT-2A *141000413-0020*	rm 118, 12x12 floor tile, gray with gray fleck	Gray	100.0	None	No Asbestos Detected
128-LINO-3A *141000413-0023*	rm 128, sheet flooring, orange	Tan	100.0	None	No Asbestos Detected
107-FT-4A *141000413-0025*	rm 107, 9x9 floor tile, gray, under carpet	Gray			
Not Analyzed					
109C-FT-5A *141000413-0029*	rm 109C, 12x12 floor tile, beige with directional	Beige			
Not Analyzed					
109B-FT-6A *141000413-0032*	rm 109B, 12x12 floor tile, gray with directional	White	100.0	None	No Asbestos Detected
112-FT-7A *141000413-0035*	rm 112, 12x12 floor tile, light beige with beige	Tan	100.0	None	No Asbestos Detected

Analyst(s)
Shannon Arlauckas (10)

Rhonda McGee

Rhonda McGee, Laboratory Manager
or other approved signatory

EMSL Analytical, Inc.
490 Rowley Road, Depew, NY 14043
Phone: (716) 651-0030 Fax: (716) 651-0394 Email: buffalolab@emsl.com

Attn: **Jean Daigle**
Decommissioning Cons Srvs, Ltd
121 Granton Drive
Unit 11
Richmond Hill, Ontario, CN L4B3N4

Fax: (905) 882-8962 Phone: (905) 882-5984
Project: **70740 / Harmonie**

Customer ID: DCSL97
Customer PO: 70740
Received: 02/03/10 10:10 AM
EMSL Order: 141000413

EMSL Proj:
Analysis Date: 2/9/2010

Test Report: Asbestos Analysis of Non-Friable Organically Bound Materials by TEM via EPA/600/R-93/116 Section 2.5.5.1

SAMPLE ID	DESCRIPTION	APPEARANCE	% MATRIX MATERIAL	% NON-ASBESTOS FIBERS	ASBESTOS TYPES
101-TH-1A *141000413-0063*	rm 101, glue pucks on drywall ceiling	Brown	100.0	None	No Asbestos Detected
104A-TH-2A *141000413-0066*	rm 104A, shiny black paper on pipe straight ins.	Black	100.0	None	No Asbestos Detected
120-TH-3A *141000413-0069*	rm 120, gray caulking on drywall above the windows	Gray			
Not Analyzed					
120-TH-4A *141000413-0072*	rm 120, beige caulking on interior window frames	Yellow/White	100.0	None	No Asbestos Detected
001-TH-5A *141000413-0075*	rm 001, red firestop caulking at ceiling perimeter	Red	100.0	None	No Asbestos Detected
112A-TH-6A *141000413-0078*	rm 112A, black paper on anti-sweat pipe straight	Black	100.0	None	No Asbestos Detected

Analytical Sensitivity <0.5% Asbestos.

Analyst(s)
Shannon Arlauckas (10)

Rhonda McGee

Rhonda McGee, Laboratory Manager
or other approved signatory

THIS IS THE LAST PAGE OF THE REPORT.

EMSL Analytical, Inc.
490 Rowley Road, Depew, NY 14043
Phone: (716) 651-0030 Fax: (716) 651-0394 Email: buffalolab@emsl.com

Attn: **Jean Daigle**
Decommissioning Cons Srvs, Ltd
121 Granton Drive
Unit 11
Richmond Hill, Ontario, CN L4B3N4

Fax: (905) 882-8962 Phone: (905) 882-5984
Project: **70740 / Harmonie**

Customer ID: DCSL97
Customer PO: 70740
Received: 02/03/10 10:10 AM
EMSL Order: 141000413

EMSL Proj:
Analysis Date: 2/9/2010

Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

			Non-Asbestos			Asbestos
Sample	Description	Appearance	%	Fibrous	% Non-Fibrous	% Type
101-CT-1A *141000413-0001*	rm 101, 12"x12" ceiling tile, pin dot, glued to	Gray Fibrous Homogeneous	25% 50%	Cellulose Min. Wool	25% Non-fibrous (other)	None Detected
123-CT-1B *141000413-0002*	rm 123, 12"x12" ceiling tile, pin dot, glued to	Gray Fibrous Homogeneous	25% 50%	Cellulose Min. Wool	25% Non-fibrous (other)	None Detected
107-CT-1C *141000413-0003*	rm 107, 12"x12" ceiling tile, pin dot, glued to	Gray Fibrous Homogeneous	25% 50%	Cellulose Min. Wool	25% Non-fibrous (other)	None Detected
101-CT-2A *141000413-0004*	rm 101, 2'x4' ceiling tile, random fissure natural	Gray Fibrous Homogeneous	40% 40%	Cellulose Min. Wool	20% Non-fibrous (other)	None Detected
121-CT-2B *141000413-0005*	rm 121, 2'x4' ceiling tile, random fissure natural	Gray Fibrous Homogeneous	40% 40%	Cellulose Min. Wool	20% Non-fibrous (other)	None Detected
121-CT-2C *141000413-0006*	rm 121, 2'x4' ceiling tile, random fissure natural					Not Analyzed
		No sample in bag				
121-CT-3 *141000413-0007*	rm 121, 12"x12" ceiling tile, large hole small	Brown Fibrous Homogeneous	95%	Cellulose	5% Non-fibrous (other)	None Detected

Analyst(s)

Tom Hanes (16)

Rhonda McGee

Rhonda McGee, Laboratory Manager
or other approved signatory

Due to magnification limitations inherent in PLM, asbestos fibers in dimensions below the resolution capability of PLM may not be detected. Samples reported as <1% or none detected may require additional testing by TEM to confirm asbestos quantities. The above test report relates only to the items tested and may not be reproduced in any form without the express written approval of EMSL Analytical, Inc. EMSL's liability is limited to the cost of analysis. EMSL bears no responsibility for sample collection activities or analytical method limitations. Interpretation and use of test results are the responsibility of the client. Samples received in good condition unless otherwise noted.

Samples analyzed by EMSL Analytical, Inc. 490 Rowley Road, Depew NY NVLAP Lab Code 200056-0, NYS ELAP 11606

EMSL Analytical, Inc.
490 Rowley Road, Depew, NY 14043
Phone: (716) 651-0030 Fax: (716) 651-0394 Email: buffalolab@emsl.com

Attn: **Jean Daigle**
Decommissioning Cons Srvs, Ltd
121 Granton Drive
Unit 11
Richmond Hill, Ontario, CN L4B3N4

Fax: (905) 882-8962 Phone: (905) 882-5984
Project: 70740 / Harmonia

Customer ID: DCSL97
Customer PO: 70740
Received: 02/03/10 10:10 AM
EMSL Order: 141000413

EMSL Proj:
Analysis Date: 2/9/2010

Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

			Non-Asbestos			Asbestos
Sample	Description	Appearance	%	Fibrous	% Non-Fibrous	% Type
122-CT-4A *141000413-0008*	rm 122, 2'x4' ceiling tile, fissure on 4', red	Gray Fibrous Homogeneous	20% 40% 10%	Cellulose Min. Wool Wollastonite	30% Non-fibrous (other)	None Detected
122-CT-4B *141000413-0009*	rm 122, 2'x4' ceiling tile, fissure on 4', red	Gray Fibrous Homogeneous	20% 40% 10%	Cellulose Min. Wool Wollastonite	30% Non-fibrous (other)	None Detected
111-CT-4C *141000413-0010*	rm 111, 2'x4' ceiling tile, fissure on 4', red	Gray Fibrous Homogeneous	30% 30%	Cellulose Min. Wool	38% Non-fibrous (other)	2% Amosite
124-CT-5A *141000413-0011*	rm 124, 12"x12" ceiling tile, large hole small	Gray Fibrous Homogeneous	35% 45%	Cellulose Min. Wool	20% Non-fibrous (other)	None Detected
124-CT-5B *141000413-0012*	rm 124, 12"x12" ceiling tile, large hole small	Gray Fibrous Homogeneous	35% 45%	Cellulose Min. Wool	20% Non-fibrous (other)	None Detected
124-CT-5C *141000413-0013*	rm 124, 12"x12" ceiling tile, large hole small	Gray Fibrous Homogeneous	35% 45%	Cellulose Min. Wool	20% Non-fibrous (other)	None Detected

Analyst(s)
Tom Hanes (16)

Rhonda McGee

Rhonda McGee, Laboratory Manager
or other approved signatory

Due to magnification limitations inherent in PLM, asbestos fibers in dimensions below the resolution capability of PLM may not be detected. Samples reported as <1% or none detected may require additional testing by TEM to confirm asbestos quantities. The above test report relates only to the items tested and may not be reproduced in any form without the express written approval of EMSL Analytical, Inc. EMSL's liability is limited to the cost of analysis. EMSL bears no responsibility for sample collection activities or analytical method limitations. Interpretation and use of test results are the responsibility of the client.Samples received in good condition unless otherwise noted.
Samples analyzed by EMSL Analytical, Inc. 490 Rowley Road, DepewNY NVLAP Lab Code 200056-0, NYS ELAP 11606

EMSL Analytical, Inc.
490 Rowley Road, Depew, NY 14043
Phone: (716) 651-0030 Fax: (716) 651-0394 Email: buffalolab@emsl.com

Attn: **Jean Daigle**
Decommissioning Cons Srvs, Ltd
121 Granton Drive
Unit 11
Richmond Hill, Ontario, CN L4B3N4

Fax: (905) 882-8962 Phone: (905) 882-5984
Project: **70740 / Harmonie**

Customer ID: DCSL97
Customer PO: 70740
Received: 02/03/10 10:10 AM
EMSL Order: 141000413

EMSL Proj:
Analysis Date: 2/9/2010

Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

			Non-Asbestos			Asbestos
Sample	**Description**	**Appearance**	**%**	**Fibrous**	**% Non-Fibrous**	**% Type**
111-CT-6A *141000413-0014*	rm 111, 2'x4' ceiling tile, random fissure, white	Gray Fibrous Homogeneous	40% 40%	Cellulose Min. Wool	20% Non-fibrous (other)	None Detected
111-CT-6B *141000413-0015*	rm 111, 2'x4' ceiling tile, random fissure, white	Gray Fibrous Homogeneous	40% 40%	Cellulose Min. Wool	20% Non-fibrous (other)	None Detected
111-CT-6C *141000413-0016*	rm 111, 2'x4' ceiling tile, random fissure, white	Gray Fibrous Homogeneous	40% 40%	Cellulose Min. Wool	20% Non-fibrous (other)	None Detected
112A-TH-7 *141000413-0081*	rm 112A, asbestos thermal insulation on pipe	Gray Fibrous Homogeneous			30% Non-fibrous (other)	70% Chrysotile

Analytical Sensitivity <0.5% Asbestos.

Analyst(s)

Tom Hanes (16)

Rhonda McGee

Rhonda McGee, Laboratory Manager
or other approved signatory

THIS IS THE LAST PAGE OF THE REPORT.

Appendix C

Sample List of Suspect Asbestos-Containing Building Materials from *A Guide to the Regulation* Respecting Asbestos on Construction Projects and in Buildings and Repair Operations

APPENDIX C

SAMPLE LIST OF SUSPECT ASBESTOS-CONTAINING BUILDING MATERIALS

There are an estimated 3,000 products that contain asbestos. In Ontario, asbestos was widely used in sprayed-on material and in pipe and boiler insulation until 1973(1). The use of many other asbestos-containing materials continued until the mid-1980s. Asbestos is still used in the manufacture of a limited number of products, including some floor tiles, cement products, friction materials and textiles. The following list was adapted from the United States Environmental Protection Agency's (EPA) *Sample List of Suspect Asbestos Containing Materials*(2). It is not an all inclusive list but is intended as a general guide to show which types of building materials may contain asbestos.

Possible Asbestos-Containing Materials in Buildings

- X Acoustical Plaster
- X Adhesives
- X Asphalt Floor Tile
- X Base Flashing
- X Blown-in (Loose Fill) Insulation
- X Boiler Insulation
- X Breaching Insulation
- X Caulking/Putties
- X Ceiling Tiles and Lay-in Panels
- X Cement Pipes
- X Cement Siding
- X Cement Wallboard
- X Construction Mastics (floor tile, carpet, ceiling tile, etc.)
- X Cooling Towers
- X Decorative Plaster
- X Ductwork Flexible Fabric Connections
- X Electrical Cloth
- X Electrical Wiring Insulation
- X Elevator Brake Shoes
- X Elevator Equipment Panels
- X Fire Doors
- X Fireproofing Materials
- X Flooring Backing
- X Heating and Electrical Ducts
- X High Temperature Gaskets
- X HVAC Duct Insulation
- X Joint Compounds
- X Pipe Insulation (corrugated air-cell, block, etc.)
- X Roofing Felt
- X Roofing Shingles
- X Spackling Compounds
- X Sprayed-on Insulation
- X Taping Compounds (thermal)
- X Textured Paper Products
- X Vinyl Floor Tile
- X Vinyl Sheet Flooring
- X Vinyl Wall Coverings
- X Wallboard

(1) J.S. Dupre, J.F. Mustard & R.J. Uffin, *Report of the Royal Commission on Matters of Health and Safety Arising from the Use of Asbestos in Ontario*, Ontario Ministry of the Attorney General, Toronto, Ontario, 1984, page 12.

(2) U.S. Environmental Protection Agency, http://www.epa.gov/Region06/6pd/asbestos/asbmatl.htm.

FINAL

Geotechnical Investigation – Proposed Building Addition

158 Bridgeport Road East, Waterloo, Ontario.

Prepared for:

Workshop Architecture Inc. c/o
Conseil Scolaire Viamonde
116 Cornelius Parkway
Toronto, Ontario M6L 2K5

February 14, 2023

Pinchin File: 315520

Issued to:	**Workshop Architecture Inc. c/o**
Issued on:	**Conseil Scolaire Viamonde**
Pinchin File:	**February 14, 2023**
Issuing Office:	**315520**
	Waterloo, ON

Author:
Karanveer Singh
Senior Project Technologist
226.808.7014
ksingh@pinchin.com

Reviewer:
Vanessa Marshall, M.Eng., P.Eng.
National Practice Leader, Geotechnical Services
519.904.4660
vmarshall@pinchin.com

Reviewer:
Jeff Dietz, P.Eng.
Senior Technical Manager, Geotechnical Services
519.589.3768
jdietz@pinchin.com

TABLE OF CONTENTS

FIGURES

APPENDICES

1.0 INTRODUCTION AND SCOPE

Pinchin Ltd. (Pinchin) was retained by Workshop Architecture Inc. c/o Conseil Scolaire Viamonde (Client) to conduct a Geotechnical Investigation and provide subsequent geotechnical design recommendations for the proposed building addition to be located at 158 Bridgeport Road East, Waterloo, Ontario. The Site location is shown on Figure 1.

Based on information provided by the Client, it is Pinchin's understanding that the development will consist of a 670 m^2 single-storey slab-on-grade (i.e. no basement level) building addition to the south side of the existing building located at 158 Bridgeport Road East, Waterloo, Ontario.

Pinchin's geotechnical comments and recommendations are based on the results of the Geotechnical Investigation and our understanding of the project scope.

The purpose of the Geotechnical Investigation was to delineate the subsurface conditions and soil engineering characteristics by advancing a total of four (4) sampled boreholes (Boreholes BH1 to BH4) at the Site but due to access restraints BH3 was deleted from the program. Thus, the final geotechnical investigation program comprised of three (3) sampled boreholes (Boreholes BH1, BH2 and BH4).

Based on a desk top review and the results of the Geotechnical Investigation, the following geotechnical data and engineering design recommendations are provided herein:

- A detailed description of the soil and groundwater conditions;
- Site preparation recommendations;
- Open cut excavations;
- Anticipated groundwater management;
- Foundation design recommendations including soil bearing resistances at Ultimate Limit States (ULS) and Serviceability Limit States (SLS) design;
- Potential total and differential settlements;
- Foundation frost protection and engineered fill specifications and installation;
- Seismic Site classification for seismic Site response;
- Concrete floor slab-on-grade support recommendations;
- Asphaltic concrete pavement structure design for parking areas and access roadways; and,
- Potential construction concerns.

Abbreviations, terminology and principle symbols commonly used throughout the report, borehole logs and appendices are enclosed in Appendix I.

2.0 SITE DESCTIPTION AND GEOLOGICAL SETTING

The Site is located on the north side of Bridgeport Road East and west side of Ellis Crescent North in Waterloo, Ontario. The Site is currently developed with a single-storey school building on its south half. There is a parking lot on the east side and play areas on the west and north sides of the existing building.

Data obtained from the Ontario Geological Survey Maps, as published by the Ministry of Northern Development and Mines, indicates that the Site is located on deposits of poorly to well sorted ice contact sand(Map 2559, Issued 1993). The underlying bedrock at this Site is dolostone or shale of the Salina formation (Ministry of Northern Development and Mines Map 2544, dated 1991).

3.0 GEOTECHNICAL FIELD INVESTIGATION AND METHODOLOGY

Pinchin completed field investigations at the Site on November 25, 2022, by advancing a total of three (3) sampled boreholes (Boreholes BH1, BH2 and BH4) throughout the Site. The boreholes were advanced to depths of approximately 5.2 metres below existing ground surface. The spatial locations of the boreholes advanced at the Site are shown on Figure 2.

The boreholes were advanced with the use of a Geoprobe 7822 DT direct push drill rig which was equipped with standard soil sampling equipment. Soil samples were collected at 0.75 and 1.5 m intervals using a 51 mm outside diameter (OD) split spoon barrel in conjunction with Standard Penetration Tests (SPT) “N” values (ASTM D1586). The SPT “N” values were used to assess the compactness condition of the non-cohesive soil. Approximate shear strengths of the cohesive deposits were measured using a handheld pocket penetrometer and the results are presented on the appended borehole logs.

Groundwater observations and measurements were obtained from the open boreholes during and upon completion of drilling. The groundwater observations and measurements recorded are included on the appended borehole logs.

The field investigation was monitored by experienced Pinchin personnel. Pinchin logged the drilling operations and identified the soil samples as they were retrieved. The recovered soil samples were sealed into plastic bags and carefully transported to an independent and accredited materials testing laboratory for detailed analysis and testing. All soil samples were classified according to visual and index properties by the project engineer.

The field logging of the soil and groundwater conditions was performed to collect geotechnical engineering design information. The borehole logs include textural descriptions of the subsoil in accordance with a modified Unified Soil Classification System (USCS) and indicate the soil boundaries inferred from non-continuous sampling and observations made during the borehole advancement. These boundaries reflect approximate transition zones for the purpose of geotechnical design and should not be interpreted as exact planes of geological change. The modified USCS classification is explained in further

detail in Appendix I. Details of the soil and groundwater conditions encountered within the boreholes are included on the Borehole Logs within Appendix II.

A select soil sample collected from the boreholes was submitted to Pinchin's material testing laboratory to determine the grain size distribution of the soil. A copy of the laboratory analytical reports is included in Appendix III. In addition, the collected samples were compared against previous geotechnical information from the area, for consistency and calibration of results.

4.0 LIMITED ENVIRONMENTAL SOIL SAMPLING PROGRAM AND METHODOLOGY

This Limited Soil Sampling Program was completed in general accordance with the Canadian Standards Association document entitled "*Phase II Environmental Site Assessment, CSA Standard Z769-00 (R2018)*", dated 2000 and reaffirmed in 2018.

It is noted that this soil sampling plan does not meet the requirements of Ontario Regulation 406/19, On-Site and Excess Soil Management and additional studies including sampling, analysis and reporting will be required for excess soil generated at the Site in order to meet the requirements of Ontario Regulation 406/19.

4.1 Scope of Work

The scope of work for the Limited Soil Sampling Program included the following activities:

- Submit a total of two most-apparent "worst case" soil samples, based on the field screening methodologies, from the geotechnical boreholes for chemical analyses of benzene, toluene, ethylbenzene and xylenes (collectively referred to as BTEX), petroleum hydrocarbons (PHCs) in the F1 to F4 fraction ranges (F1-F4), and metals and inorganics.
- Compare the soil and groundwater laboratory analytical results with the applicable standards stipulated in the *MECP Standards*; and
- Incorporate the laboratory analytical results into the geotechnical report.

4.2 Analytical Laboratory

Selected soil samples were delivered to ALS Environmental in Waterloo for analysis. ALS Environmental is an independent laboratory accredited by the Standards Council of Canada and the Canadian Association for Laboratory Accreditation. Formal chain of custody records of the sample submissions were maintained between Pinchin and the staff at ALS Environmental.

4.3 Site Condition Standards and Analytical Results

The Site is located within the City of Waterloo. It is Pinchin's understanding that potable water for the Site and surrounding area is supplied by the City of Waterloo drinking water system, which has the Grand River as well as the groundwater wells as the water source, therefore potable conditions apply.

Ontario Regulation 153/04 (as amended) states that a Site is classified as an "environmentally sensitive area" if the pH of the surface soil (less than 1.5 mbgs) is less than 5 or greater than 9, the pH of the subsurface soil (greater than 1.5 mbgs) is less than 5 or greater than 11, or if the Site is an area of natural significance or is adjacent to or contains land within 30 metres of an area of natural significance.

Based on Pinchin's understanding of the Site, the Site is not located in or adjacent to, nor does it contain land within 30 m of, an area of natural significance.

Based on the above, the appropriate Site Condition Standards (SCS) for the potential reuse of soil at the Site are:

- *"Table 2: Full Depth Generic Site Condition Standards in a Potable Ground Water Condition",* provided in the Excess Soil Rules for residential/parkland/institutional property use *(Table 2 SCS)*.

Pinchin also compared the excess soil quality data to the following Excess Soil Quality Standards (ESQS) provided in the Excess Soil Rules in order to provide information for evaluating potential reuse sites:

- *"Table 1: Full Depth Background Site Condition Standards"* for agricultural and other property use *(Table 1 SCS) and,*
- *"Table 2.1: Full Depth Excess Soil Quality Standards in a Potable Ground Water"* for residential/parkland/institutional property use *(Table 2.1 ESQS)*.

As noted in the analytical results provided in Appendix IV no breaches were found on any parameters of the soil samples.

The soil sample analytical results are provided in Appendix IV, and were compared to the *Table 1 SCS,* and *Table 2.1 ESQS*. As shown in the analytical results, all parameters tested in the two samples meet the *Table 1 SCS* and *Table 2.1 ESQS*. As noted above, additionally sampling and reporting may be required under Ontario Regulation 406/19.

5.0 SUBSURFACE CONDITIONS

5.1 Borehole Soil Stratigraphy

In general, the soil stratigraphy at the Site consists of topsoil underlain by deposits of sand and gravel to glaciolacustrine deposits of silt and clay material. The appended borehole logs provide detailed soil

descriptions and stratigraphies, results of SPT and pocket penetrometer testing, and moisture content profiles.

Surficial topsoil was encountered at all borehole locations and was found to be approximately 200 mm thick. Sand and gravel material was encountered below the topsoil in BH2 and BH4 and extended to depths of approximately 0.7 mbgs. The sand and gravel material generally comprised of brown silty sand and gravel. The sand and gravel material had a compact relative density based on SPT 'N' values of 10 to 12 blows per 300 mm penetration of a split spoon sampler. At the time of sampling, the sand and gravel material was generally described as moist.

Sandy silt was encountered underlying the topsoil in BH1 and extended to a depth of approximately 0.75 mbgs. This material comprised of brown sandy silt to silty sand with trace gravel. The sandy silt material had a loose relative density based on a SPT 'N' value of 7 blows per 300 mm penetration of a split spoon sampler. At the time of sampling, the sandy silt material was generally moist.

Clayey silt till material was encountered underlying the sand and gravel material in boreholes BH4 and BH2 and below the sandy silt material in borehole BH1. This material extended to depths of approximately 2.3 to 3.1 mbgs in borehole BH1 and BH2 and extended beyond the termination depth of 5.2 mbgs in borehole BH4. This deposit generally comprised of clayey silt with trace sand and gravel. The cohesive clayey silt had a stiff to hard consistency based on approximate shear strengths measured with a handheld pocket penetrometer of greater than 225 kPa and on SPT 'N' values of 5 to 27 blows per 300 mm penetration of a split spoon sampler.

The results of a particle size distribution analysis completed on a sample of the clayey silt till are provided in Appendix III and are also presented in the following table:

Borehole and Sample No.	Sample Depth (mbgs)	% Gravel	% Sand	% Silt	% Clay
BH2 SS3	1.5 - 2.1	1	11	54	34

The clayey silt material was underlain by silty clay in boreholes BH1 and BH2 and extended to depths of approximately 4.6 to 4.9 mbgs. The silty clay material generally comprised of greyish brown silty clay with trace sand and silt seems. The silty clay had a very stiff consistency based on approximate shear strengths measured with a handheld pocket penetrometer of 200 kPa to greater than 225 kPa and on SPT 'N' values of 11 to 18 blows per 300 mm penetration of a split spoon sampler.

Silty sand was encountered underlying the silty clay material in boreholes BH1 and BH2 and extended beyond the termination depths of 5.2 mbgs in both boreholes. This deposit generally comprised grey silty sand. The silty sand material had a compact relative density based on SPT 'N' values of 15 to 26 blows per 300 mm penetration of a split spoon sampler. At the time of sampling, the silty sand material was generally wet.

5.2 Groundwater Conditions

Groundwater observations and measurements were obtained in the open boreholes at the completion of drilling and are summarized on the appended borehole logs. The water levels at the time of drilling exploration typically ranged from 3.0 to 4.5 mbgs. These groundwater depths correspond to Elevations 326.4 to 324.8 masl.

Seasonal variations in the water table should be expected, with higher levels occurring during wet weather conditions in the spring and fall and lower levels occurring during dry weather conditions. It is also noted that there is potential for groundwater to be locally perched in the sandy silt or sand and gravel deposits overlying the less permeable clayey silt till.

6.0 GEOTECHNICAL DESIGN RECOMMENDATIONS

6.1 General Information

The recommendations presented in the following sections of this report are based on the information available regarding the proposed construction, the results obtained from the geotechnical investigation, and Pinchin's experience with similar projects. Since the investigation only represents a portion of the subsurface conditions, it is possible that conditions may be encountered during construction that are substantially different than those encountered during the investigation. If these situations are encountered, adjustments to the design may be necessary. A qualified geotechnical engineer should be on-Site during the foundation preparation to ensure the subsurface conditions are the same/similar to what was observed during the investigation.

It is Pinchin's understanding that the development will consist of a 670 m^2 single storey slab-on-grade (i.e. no basement level) building addition to the south of the existing school building located at 158 Bridgeport Road East, Waterloo, Ontario..

6.2 Site Preparation

The existing topsoil is not considered suitable to remain below the proposed building, driveways and parking areas and will need to be removed. In calculating the approximate quantity of topsoil to be stripped, we recommend that the topsoil thicknesses provided on the individual borehole logs be increased by 50 mm to account for variations and some stripping of the mineral soil below.

Pinchin recommends that any engineered fill required at the Site be compacted in accordance with the criteria stated in the following table:

Type of Engineered Fill	Maximum Loose Lift Thickness (mm)	Compaction Requirements	Moisture Content (Percent of Optimum)
Structural fill to support foundations and floor slabs	200	100% SPMDD	Plus 2 to minus 4
Subgrade fill beneath parking lots and access roadways	300	98% SPMDD	Plus 2 to minus 4

Prior to placing any fill material at the Site, the subgrade should be inspected by a qualified geotechnical engineer, and loosened/soft pockets should be sub excavated and replaced with engineered fill.

It is recommended that any fill required to raise grades below the proposed building addition comprise imported Ontario Provincial Standards and Specifications (OPSS) 1010 Granular 'B' or Select Subgrade Material (SSM). If the work is carried out during very dry weather, water may have to be added to the material to improve compaction.

A qualified geotechnical engineering technician should be on site to observe fill placement operations and perform field density tests at random locations throughout each lift, to indicate the specified compaction is being achieved.

6.3 Open Cut Excavations

It is anticipated that the foundations will be constructed at conventional frost depths, approximately 1.2 metres below finished floor elevation.

Based on the subsurface information obtained from within the boreholes, it is anticipated that the excavated material will predominately consist of native clayey silt material. Groundwater seepage could potentially be experienced from perched groundwater at the site. It is anticipated that conventional trenching and sump pumping techniques will suffice to control the inflow. It will be necessary to flatten the excavation side slopes where groundwater seepage is occurring in order to ensure stability.

Where workers must enter trench excavations deeper than 1.2 m, the trench excavations should be suitably sloped and/or braced in accordance with the Occupational Health and Safety Act (OHSA), Ontario Regulation 213/91, Construction Projects, July 1, 2011, Part III - Excavations, Section 226. Alternatively, the excavation walls may be supported by either closed shoring, bracing, or trench boxes complying with sections 235 to 239 and 241 under O. Reg. 231/91, s. 234(1). The use of trench boxes can most likely be used for temporary support of vertical side walls. The appropriate trench should be designed/confirmed for use in this soil deposit.

Based on the OHSA, the clayey silt soils would be classified as Type 2 soil and temporary excavations in these soils may be cut vertical in the bottom 1.2 m and must be sloped back at an inclination of 1 horizontal to 1 vertical (H to V) above this. Excavations extending below the groundwater table would be classified as a Type 4 soil and temporary excavations will have to be sloped back at 3 horizontal to 1 vertical from the base of the excavation. Excavations through more than one soil type must be completed in conformance with the requirements for the soil type with the highest number.

In addition to compliance with the OHSA, the excavation procedures must also be in compliance to any potential other regulatory authorities, such as federal and municipal safety standards.

Alternatively, the excavation walls may be supported by either closed shoring, or bracing, complying with sections 235 to 239 and 241 under O. Reg. 231/91, s. 234(1). Pinchin would be pleased to provide further recommendations on shoring design once the building plans have been completed.

6.4 Foundation Design

6.4.1 Shallow Foundations Bearing on Native Soils

It is anticipated that footings for the proposed building addition will extend to native clayey silt. Conventional shallow strip footings established on the inorganic stiff/very stiff clayey silt, may be designed using a bearing resistance for 25 mm of settlement at Serviceability Limit States of 150 kPa, and a factored geotechnical bearing resistance of 225 kPa at Ultimate Limit States (ULS).

As the actual service loads were not known at the time of this report, these should be reviewed by the project structural engineer to determine if SLS or ULS governs the footing design.

It is noted that there is a potential for weaker subgrade soil to be encountered between the investigation locations. Pinchin presumes that any areas of weaker subgrade soil will consist of small pockets of soft/loose natural soil which can be compacted to match the density of the remainder of the Site. As such, the material must be compacted to a minimum of 100% Standard Proctor Maximum Dry Density (SPMDD) prior to installing the concrete formwork. Any soft/loose areas which are not able to achieve the recommended 100% SPMDD are to be removed and replaced with a low strength concrete.

Pinchin notes that a qualified geotechnical engineering consultant should be on-Site during the proof roll and foundation preparation activities to verify the recommended level of compaction is achieved and to verify the design assumptions and recommendations. This is especially critical with respect to the recommended soil bearing pressures. If variations occur in the soil conditions between the borehole locations, site verification and site review by Pinchin is recommended to provide appropriate recommendations at that time.

The natural subgrade soil is sensitive to change in moisture content and can become loose/soft if subjected to additional water or precipitation. As well, it could be easily disturbed if travelled on during

construction. Once it becomes disturbed it is no longer considered adequate to support the recommended design bearing pressures. It is recommended that a working slab of lean concrete (mud slab) be placed in the footing areas immediately after excavation and inspection to protect the founding soils during placement of formwork and reinforcing steel.

In addition, to ensure and protect the integrity of the subgrade soil during construction operations, the following is recommended:

- Prior to commencing excavations, it is critical that all existing surface water, potential surface water and perched groundwater are controlled and diverted away from the work Site to prevent infiltration and subgrade softening. At no time should excavations be left open for a period of time that will expose them to inclement weather conditions and cause subgrade softening;
- The subgrade should be sloped to a sump outside the excavation to promote surface drainage and the collected water pumped out of the excavation. Any potential precipitation or seepage entering the excavations should be pumped away immediately (not allowed to pond);
- The footing areas should be cleaned of all deleterious materials such as topsoil, organics, fill, disturbed, caved materials or loosened bedrock pieces;
- Any potential large cobbles or boulders (i.e. greater than 200 mm in diameter) within the subgrade material are to be removed and replaced with a similar soil type not containing particles greater than 200 mm in diameter. It is critical that particles greater than 200 mm in diameter are not in contact with the foundation to prevent point loading and overstressing; and
- If the excavated subgrade soil remains open to weather conditions and groundwater seepage, sidewall stability and suitability of the subgrade soil will need to be verified prior to construction.

If construction proceeds during freezing weather conditions, adequate temporary frost protection for the footing bases and concrete must be provided and maintained above freezing at all times.

6.4.2 Soil Corrosivity and Sulphate Attack on Concrete

One soil sample was submitted to ALS Laboratories Ltd. in Waterloo to assess the corrosivity of the soil and potential for sulphate attack on concrete. The assessment was completed using the 10-point soil evaluation procedure, provided in the Appendix to the American Water Works Association A21.5 Standard, as recommended by the Ductile Iron Pipe Research Association (DIPRA). The soil sample was evaluated for the following parameters: soil resistivity, pH, redox potential, sulfides, and moisture. Each parameter is assessed and assigned a point value, and the points are totalled. If the total is equal or

greater than 10, the soil is considered corrosive to ductile iron pipe. In this case, protective measure must be undertaken. The following table summarizes the 10-point soil evaluation for the tested samples:

Parameter	BH4, SS2 0.7 – 1.4 mbgs	
	Results	Points
Resistivity (ohm-cm)	1850	5
pH	7.5	0
Redox Potential (mV)	350	0
Sulfide	<0.20	0
Moisture	Poor drainage, continuously wet	2
Total Points		**7**

In summary, the tested samples indicate a low potential for soil corrosivity, and no additional protective measures are required.

Parameter	BH4, SS2 0.7 – 1.4 mbgs
	Results
Sulphate (µg/g)	**21**
Chloride (µg/g)	232

The results indicate that a low degree of potential sulphate attack is expected for concrete in contact with the soil. Type GU Portland Cement can be considered for use in buried concrete structures at the Site. The results should be reviewed by the structural engineer to ensure conformance to the concrete exposures.

6.4.3 Site Classification for Seismic Site Response & Soil Behaviour

The following information has been provided to assist the building designer from a geotechnical perspective only. These geotechnical seismic design parameters should be reviewed in detail by the structural engineer and be incorporated into the design as required.

The seismic site classification has been based on the 2012 OBC. The parameters for determination of Site Classification for Seismic Site Response are set out in Table 4.1.8.4.A of the OBC. The site classification is based on the average shear wave velocity in the top 30 m of the site stratigraphy. If the average shear wave velocity is not known, the site class can be estimated from energy corrected Standard Penetration Resistance (N60) and/or the average undrained shear strength of the soil in the top 30 m.

The boreholes advanced at this Site extended to approximately 5.2 mbgs and encountered clayey silt with SPT “N’ values of 5 to 27 blows per 300 mm. As such, based on Table 4.1.8.4.A of the OBC, this Site has been classified as Class D. A Site Class D has an average shear wave velocity (Vs) of between 180 and 360 m/s. Estimated Settlement

All individual spread footings should be founded on uniform subgrade soils, reviewed and approved by a licensed geotechnical engineer.

Foundations installed in accordance with the recommendations outlined in the preceding sections are not expected to exceed total settlements of 25 mm and differential settlements of 19 mm.

All foundations are to be designed and constructed to the minimum widths as detailed in the 2012 OBC.

6.4.4 Building Drainage

To assist in maintaining the building dry from surface water seepage, it is recommended that exterior grades around the buildings be sloped away at a 2% gradient or more, for a distance of at least 2.0 m. Roof drains should discharge a minimum of 1.5 m away from the structure to a drainage swale or appropriate storm drainage system.

Exterior perimeter foundations drains are not required, where the finished floor elevation is established a minimum of 150 mm above the exterior final grades or that the exterior gradient is properly sloped to divert surface water away from the building.

6.4.5 Shallow Foundations Frost Protection & Foundation Backfill

In the City of Waterloo, Ontario area, exterior perimeter foundations for heated buildings require a minimum of 1.2 m of soil cover above the underside of the footing to provide soil cover for frost protection.

Where the foundations for heated buildings do not have the minimum 1.2 m of soil cover frost protection, they should be protected from frost with a combination of soil cover and rigid polystyrene insulation, such as Dow Styrofoam or equivalent product. If required, Pinchin can provide appropriate foundation frost protection recommendations as part of the design review.

To minimize potential frost movements from soil frost adhesion, the perimeter foundation backfill should consist of a free draining granular material, such as a Granular ‘B’ Type I (OPSS 1010) or an approved sand fill, extending a minimum lateral distance of 600 mm beyond the foundation. Backfill must be brought up evenly on both sides of any wall not designed to resist lateral earth pressure. All granular backfill material is to be placed in maximum 300 mm thick lifts compacted to a minimum of 100% SPMDD below the interior of the building and exterior hard landscaping areas; and, 95% SPMDD below exterior soft landscaping areas. It is recommended that inspection and testing be carried out during construction to confirm backfill quality, thickness and to ensure compaction requirements are achieved.

6.5 Floor Slabs

Prior to the installation of the engineered fill material, all pre-existing fill/topsoil materials should be removed to the underlying organic free in-situ soil. The natural subgrade soil is to be proof roll compacted with a minimum 10 tonne non-vibratory steel drum roller to observe for weak/soft spots. It is noted that some locations will not be accessible by the steel drum roller; as such, these locations can be proof roll compacted with a minimum 450 kg vibratory plate compactor.

The in-situ inorganic silt material encountered within the boreholes is considered adequate for the support of the concrete floor slabs provided it is proof roll compacted as outlined above. Any soft area(s) encountered during proof rolling should be excavated and replaced with a similar soil type.

Once the subgrade soil is exposed it is to be inspected and approved by a qualified geotechnical engineering consultant to ensure that the material conforms to the soil type and consistency observed during the subsurface investigation work.

Based on the in-situ soil conditions, it is recommended to establish the concrete floor slab on a minimum 300 mm thick layer of Granular “A” (OPSS 1010) compacted to 100% SPMDD. Alternatively, consideration may also be given to using a 200 mm thick layer of uniformly compacted 19 mm clear stone placed over the approved subgrade. Any required up fill should consist of a Granular “B” Type I or Type II (OPSS 1010).

The following table provides the unfactored modulus of subgrade reaction values:

Material Type	Modulus of Subgrade Reaction (kN/m^3)
Granular A (OPSS 1010)	85,000
Granular “B” Type I (OPSS 1010)	75,000
Granular “B” Type II (OPSS 1010)	85,000
Glacial Till	45,000
Engineered Fill	20,000

The values in the table above are for loaded areas of 0.3 m by 0.3 m.

6.6 Asphaltic Concrete Pavement Structure Design for Parking Lot and Driveways

6.6.1 Discussion

It is Pinchin’s understanding that new parking areas will be constructed around the proposed building addition. The in-situ glacial till is considered a sufficient bearing material for an asphaltic concrete pavement structure provided all organics and deleterious materials are removed prior to installing the engineered fill material.

At this time Pinchin is unaware of the proposed final grades for the parking lot area. As such, provided the pavement structure overlies the in-situ glacial till, the following pavement structure is recommended.

6.6.2 Pavement Structure

The following table presents the minimum specifications for a flexible asphaltic concrete pavement structure:

Pavement Layer	Compaction Requirements	Parking Areas
Surface Course Asphaltic Concrete HL-4 (OPSS 1150)	92% MRD as per OPSS 310	35 mm
Binder Course Asphaltic Concrete HL-8 (OPSS 1150)	92 % MRD as per OPSS 310	55 mm
Base Course: Granular “A” (OPSS 1010)	100% Standard Proctor Maximum Dry Density (ASTM-D698)	150 mm
Subbase Course: Granular “B” Type I (OPSS 1010)	100% Standard Proctor Maximum Dry Density (ASTM D698)	350 mm

Notes:

I. Prior to placing the pavement structure, the subgrade soil is to be proof rolled with a smooth drum roller without vibration to observe weak spots and the deflection of the soil.

II. The recommended pavement structure may have to be adjusted according to the City of Waterloo standards. Also, if construction takes place during times of substantial precipitation and the subgrade soil becomes wet and disturbed, the granular thickness may have to be increased to compensate for the weaker subgrade soil. In addition, the granular fill material thickness may have to be temporarily increased to allow heavy construction equipment access the Site, in order to avoid the subgrade from “pumping” up into the granular material.

Performance grade PG 58-28 asphaltic concrete should be specified for Marshall mixes.

6.6.3 Pavement Structure Subgrade Preparation and Granular up Fill

The proper placement of base and subbase fill materials becomes very important in addressing the proper load distribution to provide a durable pavement structure.

The pavement subgrade materials should be thoroughly proof-rolled prior to placement of the Granular ‘B’ subbase course. If any unstable areas are noted, then the Granular ‘B’ thickness may need to be increased to support pavement construction traffic. This should be left as a field decision by a qualified geotechnical engineer at the time of construction, but it is recommended that additional Granular ‘B’ be carried as a provisional item under the construction contract.

Where fill material is required to increase the grade to the underside of the pavement structure it should consist of Granular ‘B’ Type I (OPSS 1010). The up fill material is to be placed in maximum 300 mm thick lifts compacted to 98% SPMDD within 4% of the optimum moisture content.

Samples of both the Granular 'A' and Granular 'B' Type I aggregates should be tested for conformance to OPSS 1010 prior to utilization on Site and during construction. All stockpiled material should be protected from deleterious materials, additional moisture and be kept from freezing.

Post compaction settlement of fine grained soil can be expected, even when placed to compaction specifications. As such, fill material should be installed as far in advance as possible before finishing the parking lot and access roadways for best grade integrity.

Where the subgrade material types differ below the underside of the pavement structure, the transition between the materials should be sloped as per frost heave taper OPSD 205.60.

6.6.4 Drainage

Control of surface water is a critical factor in achieving good pavement structure life. The pavement thickness designs are based on a drained pavement subgrade via sub-drains or ditches.

The silt soils have poor natural drainage and therefore it is recommended that pavement subdrains be installed in the lower areas and be connected to the catch basins. Subdrains should comprise 150 mm diameter perforated pipe in filter sock, bedded in concrete sand. The upper limit of the concrete sand bedding should be at the lower limit of the subbase, with the subgrade below the subbase sloped towards the subdrains.

The surface of the roadways should be free of depressions and be sloped at a minimum grade of 1% in order to drain to appropriate drainage areas. Subgrade soil should slope a minimum of 3% toward stormwater collection points. Positive slopes are very important for the proper performance of the drainage system. The granular base and subbase materials should extend horizontally to any potential ditches or swales.

In addition, routine maintenance of the drainage systems will assist with the longevity of the pavement structure. Ditches, culverts, sewers and catch basins should be regularly cleared of debris and vegetation.

7.0 SITE SUPERVISION & QUALITY CONTROL

It is recommended that all geotechnical aspects of the project be reviewed and confirmed under the appropriate geotechnical supervision, to routinely check such items. This includes but is not limited to inspection and confirmation of the undisturbed natural subgrade material prior to subgrade preparation, pouring any foundations or footings, backfilling, or engineered fill installation to ensure that the actual conditions are not markedly different than what was observed at the borehole locations and geotechnical components are constructed as per Pinchin's recommendations. Compaction quality control of engineered fill material (full-time monitoring) is recommended as standard practice, as well as regular

sampling and testing of aggregates and concrete, to ensure that physical characteristics of materials for compliance during installation and satisfies all specifications presented within this report.

8.0 TERMS AND LIMITATIONS

This Geotechnical Investigation was performed for the exclusive use of Workshop Architecture Inc. c/o Conseil Scolaire Viamonde (Client) in order to evaluate the subsurface conditions at 158 Bridgeport Road East, Waterloo, Ontario. Within the limitations of scope, schedule and budget, our services have been executed in accordance with generally accepted practises in the field of geotechnical engineering for the Site. Classification and identification of soil, and geologic units have been based upon commonly accepted methods employed in professional geotechnical practice. No warranty or other conditions, expressed or implied, should be understood. Conclusions derived are specific to the immediate area of study and cannot be extrapolated extensively away from sample locations.

Performance of this Geotechnical Investigation to the standards established by Pinchin is intended to reduce, but not eliminate, uncertainty regarding the subgrade soil at the Site, and recognizes reasonable limits on time and cost.

Regardless how exhaustive a Geotechnical Investigation is performed, the investigation cannot identify all of the subsurface conditions. Therefore, no warranty is expressed or implied that the entire Site is representative of the subsurface information obtained at the specific locations of our investigation. If during construction, subsurface conditions differ from then what was encountered within our test location and the additional subsurface information provided to us, Pinchin should be contacted to review our recommendations. This report does not alleviate the contractor, owner, or any other parties of their respective responsibilities.

This report has been prepared for the exclusive use of the Client and their authorized agents. Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of the third parties. If additional parties require reliance on this report, written authorization from Pinchin will be required. Pinchin disclaims responsibility of consequential financial effects on transactions or property values, or requirements for follow-up actions and costs. No other warranties are implied or expressed. Furthermore, this report should not be construed as legal advice.

The liability of Pinchin or our officers, directors, shareholders or staff will be limited to the lesser of the fees paid or actual damages incurred by the Client. Pinchin will not be responsible for any consequential or indirect damages. Pinchin will only be liable for damages resulting from the negligence of Pinchin. Pinchin will not be liable for any losses or damage if the Client has failed, within a period of two years following the date upon which the claim is discovered (Claim Period), to commence legal proceedings against Pinchin to recover such losses or damage unless the laws of the jurisdiction which governs the Claim Period which is applicable to such claim provides that the applicable Claim Period is greater than

two years and cannot be abridged by the contract between the Client and Pinchin, in which case the Claim Period shall be deemed to be extended by the shortest additional period which results in this provision being legally enforceable.

Pinchin makes no other representations whatsoever, including those concerning the legal significance of its findings, or as to other legal matters touched on in this report, including, but not limited to, ownership of any property, or the application of any law to the facts set forth herein. With respect to regulatory compliance issues, regulatory statutes are subject to interpretation and these interpretations may change over time. Please refer to Appendix IV, Report Limitations and Guidelines for Use, which pertains to this report.

Specific limitations related to the legal and financial and limitations to the scope of the current work are outlined in our proposal, the attached Methodology and the Authorization to Proceed, Limitation of Liability and Terms of Engagement which accompanied the proposal.

Information provided by Pinchin is intended for Client use only. Pinchin will not provide results or information to any party unless disclosure by Pinchin is required by law. Any use by a third party of reports or documents authored by Pinchin or any reliance by a third party on or decisions made by a third party based on the findings described in said documents, is the sole responsibility of such third parties. Pinchin accepts no responsibility for damages suffered by any third party as a result of decisions made or actions conducted. No other warranties are implied or expressed.

\\pinchin.com\wat\Job\315000s\0315520.000 Workshop,158BridgeportRdGEO\Deliverables\315520 FINAL Geotechnical Investigation Report Waterloo, ON Workshop Feb 14 2023.docx

Template: Master Geotechnical Investigation Report – Ontario, GEO, September 2, 2021

FIGURES

PINCHIN

PROJECT NAME:	GEOTECHNICAL INVESTIGATION				
CLIENT NAME:	CONSEIL SCOLAIRE VIAMONDE				
PROJECT LOCATION:	158 BRIDGEPORT ROAD EAST, WATERLOO, ONTARIO				
FIGURE NAME:	KEY MAP				FIGURE NUMBER: 1
PROJECT NUMBER: 315520	SCALE: 1:15,000	DRAWN BY: AMG	REVIEWED BY: KT	DATE: NOV. 2022	

N

LEGEND

- SITE BOUNDARY
- SITE BUILDING
- RES RESIDENTIAL
- BOREHOLE
- [XX.X] GROUND SURFACE ELEVATION (MASL)
- MASL METERS ABOVE SEA LEVEL

LEGEND IS COLOUR DEPENDENT. NON-COLOUR COPIES MAY ALTER INTERPRETATION.

PINCHIN

PROJECT NAME:
GEOTECHNICAL INVESTIGATION

CLIENT NAME:
CONSEIL SCOLAIRE VIAMONDE

PROJECT LOCATION:
158 BRIDGEPORT ROAD EAST, WATERLOO, ONTARIO

FIGURE NAME:
BOREHOLE LOCATION PLAN

PROJECT NUMBER:	SCALE:
315520	AS SHOWN
DRAWN BY: AMG	REVIEWED BY: KT
DATE: NOV. 2022	FIGURE NUMBER: 2

APPENDIX I

Abbreviations, Terminology and Principle Symbols used in Report and Borehole Logs

ABBREVIATIONS, TERMINOLOGY & PRINCIPAL SYMBOLS USED

Sampling Method

AS	Auger Sample	**w**	Washed Sample
SS	Split Spoon Sample	**HQ**	Rock Core (63.5 mm diam.)
ST	Thin Walled Shelby Tube	**NQ**	Rock Core (47.5 mm diam.)
BS	Block Sample	**BQ**	Rock Core (36.5 mm diam.)

In-Situ Soil Testing

Standard Penetration Test (SPT), "N" value is the number of blows required to drive a 51 mm outside diameter spilt barrel sampler into the soil a distance of 300 mm with a 63.5 kg weight free falling a distance of 760 mm after an initial penetration of 150 mm has been achieved. The SPT, "N" value is a qualitative term used to interpret the compactness condition of cohesionless soils and is used only as a very approximation to estimate the consistency and undrained shear strength of cohesive soils.

Dynamic Cone Penetration Test (DCPT) is the number of blows required to drive a cone with a 60 degree apex attached to "A" size drill rods continuously into the soil for each 300 mm penetration with a 63.5 kg weight free falling a distance of 760 mm.

Cone Penetration Test (CPT) is an electronic cone point with a 10 cm2 base area with a 60 degree apex pushed through the soil at a penetration rate of 2 cm/s.

Field Vane Test (FVT) consists of a vane blade, a set of rods and torque measuring apparatus used to determine the undrained shear strength of cohesive soils.

Soil Descriptions

The soil descriptions and classifications are based on an expanded Unified Soil Classification System (USCS). The USCS classifies soils on the basis of engineering properties. The system divides soils into three major categories; coarse grained, fine grained and highly organic soils. The soil is then subdivided based on either gradation or plasticity characteristics. The classification excludes particles larger than 75 mm. To aid in quantifying material amounts by weight within the respective grain size fractions the following terms have been included to expand the USCS:

Soil Classification		Terminology	Proportion
Clay	< 0.002 mm		
Silt	0.002 to 0.06 mm	“trace”, trace sand, etc.	1 to 10%
Sand	0.075 to 4.75 mm	“some”, some sand, etc.	10 to 20%
Gravel	4.75 to 75 mm	Adjective, sandy, gravelly, etc.	20 to 35%
Cobbles	75 to 200 mm	And, and gravel, and silt, etc.	>35%
Boulders	>200 mm	Noun, Sand, Gravel, Silt, etc.	>35% and main fraction

Notes:

- Soil properties, such as strength, gradation, plasticity, structure, etcetera, dictate the soils engineering behaviour over grain size fractions; and
- With the exception of soil samples tested for grain size distribution or plasticity, all soil samples have been classified based on visual and tactile observations. The accuracy of visual and tactile observation is not sufficient to differentiate between changes in soil classification or precise grain size and is therefore an approximate description.

The following table outlines the qualitative terms used to describe the compactness condition of cohesionless soil:

Cohesionless Soil	
Compactness Condition	**SPT N-Index (blows per 300 mm)**
Very Loose	0 to 4
Loose	4 to 10
Compact	10 to 30
Dense	30 to 50
Very Dense	> 50

The following table outlines the qualitative terms used to describe the consistency of cohesive soils related to undrained shear strength and SPT, N-Index:

Cohesive Soil		
Consistency	**Undrained Shear Strength (kPa)**	**SPT N-Index (blows per 300 mm)**
Very Soft	<12	<2
Soft	12 to 25	2 to 4
Firm	25 to 50	4 to 8
Stiff	50 to 100	8 to 15
Very Stiff	100 to 200	15 to 30
Hard	>200	>30

Note: Utilizing the SPT, N-Index value to correlate the consistency and undrained shear strength of cohesive soils is only very approximate and needs to be used with caution.

Soil & Rock Physical Properties

General

W Natural water content or moisture content within soil sample

γ Unit weight

γ' Effective unit weight

γ_d Dry unit weight

γ_{sat} Saturated unit weight

ρ Density

ρ_s Density of solid particles

ρ_w Density of Water

ρ_d Dry density

ρ_{sat} Saturated density e Void ratio

n Porosity

S_r Degree of saturation

E_{50} Strain at 50% maximum stress (cohesive soil)

Consistency

W_L	Liquid limit
W_P	Plastic Limit
I_P	Plasticity Index
W_S	Shrinkage Limit
I_L	Liquidity Index
I_C	Consistency Index
e_{max}	Void ratio in loosest state
e_{min}	Void ratio in densest state
I_D	Density Index (formerly relative density)

Shear Strength

C_u, S_u	Undrained shear strength parameter (total stress)
C'_d	Drained shear strength parameter (effective stress)
r	Remolded shear strength
τ_p	Peak residual shear strength
τ_r	Residual shear strength
ø’	Angle of interface friction, coefficient of friction = tan ø’

Consolidation (One Dimensional)

C_C	Compression index (normally consolidated range)
C_r	Recompression index (over consolidated range)
C_S	Swelling index
m_V	Coefficient of volume change
c_V	Coefficient of consolidation
T_V	Time factor (vertical direction)
U	Degree of consolidation
σ'_O	Overburden pressure
σ'_p	Preconsolidation pressure (most probable)
OCR	Overconsolidation ratio

Permeability

The following table outlines the terms used to describe the degree of permeability of soil and common soil types associated with the permeability rates**:**

Permeability (k cm/s)	Degree of Permeability	Common Associated Soil Type
$> 10^{-1}$	Very High	Clean gravel
10^{-1} to 10^{-3}	High	Clean sand, Clean sand and gravel
10^{-3} to 10^{-5}	Medium	Fine sand to silty sand
10^{-5} to 10^{-7}	Low	Silt and clayey silt (low plasticity)
$>10^{-7}$	Practically Impermeable	Silty clay (medium to high plasticity)

Rock Coring

Rock Quality Designation (RQD) is an indirect measure of the number of fractures within a rock mass, Deere et al. (1967). It is the sum of sound pieces of rock core equal to or greater than 100 mm recovered from the core run, divided by the total length of the core run, expressed as a percentage. If the core section is broken due to mechanical or handling, the pieces are fitted together and if 100 mm or greater included in the total sum**.**

RQD is calculated as follows:

$$\text{RQD (\%)} = \frac{\Sigma \text{ Length of core pieces} > 100 \text{ mm} \times 100}{\text{Total length of core run}}$$

The following is the Classification of Rock with Respect to RQD Value:

RQD Classification	RQD Value (%)
Very poor quality	**<25**
Poor quality	25 to 50
Fair quality	50 to 75
Good quality	75 to 90
Excellent quality	90 to 100

APPENDIX II

Pinchin’s Borehole Logs

Log of Borehole: BH1

Project #: 315520 **Logged By:** JD

Project: Proposed Building Addition

Client: Conseil Scolaire Viamonde

Location: 158 Bridgeport Rd E., Waterloo, Ontario

Drill Date: November 25, 2022 **Project Manager:** KT

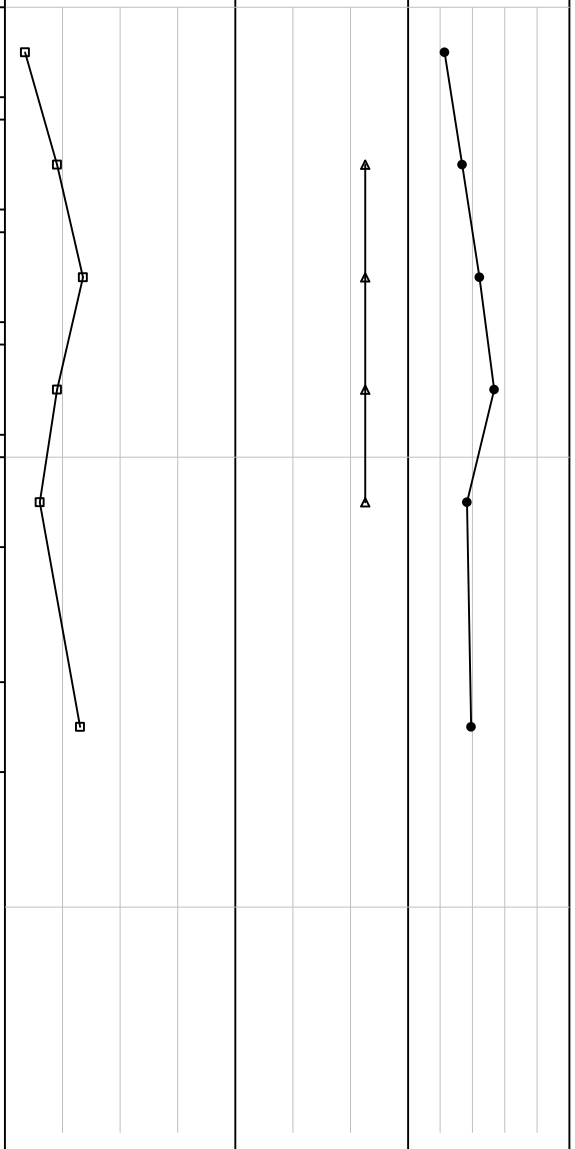
SUBSURFACE PROFILE

Depth (m)	Description	Elevation (m)
0	Ground Surface	329.37
	Topsoil Topsoil - 200 mm thick	329.16
	Sandy Silt Brown silty sand to sandy silt, trace gravel, loose, moist	328.61
1	**Clayey Silt Till** Brown clayey silt, trace sand and gravel, very stiff to hard, DTPL; trace sand seams	
2		327.08
	Silty Clay Greyish brown silty clay, very stiff, DTPL to APL; trace silt seams, moist	326.32
3	Grey silty clay, trace sand, very stiff, DTPL to APL	325.81
	Some sand	
4		324.80
	Silty Sand Grey silty sand, compact, wet; sand seam, wet	324.19
5	End of Borehole	
6	Borehole terminated at 5.2 mbgs. At drilling completion water was measured at 3.0 mbgs	
7		

Monitoring Well Details: No Monitoring Well Installed

SAMPLE

Sample Type	Sampler #	Recovery (%)	SPT N-Value
SS	1	30	7
SS	2	90	18
SS	3	70	27
SS	4	70	18
SS	5	100	12
SS	6	100	26



Contractor: Strata Drilling Inc.

Grade Elevation: 329.37 masl

Drilling Method: Hollow Stem Augers/Split Spoon Sampler

Top of Casing Elevation: NA

Well Casing Size: NA

Sheet: 1 of 1

Log of Borehole: BH2

Project #: 315520 **Logged By:** JD

Project: Proposed Building Addition

Client: Conseil Scolaire Viamonde

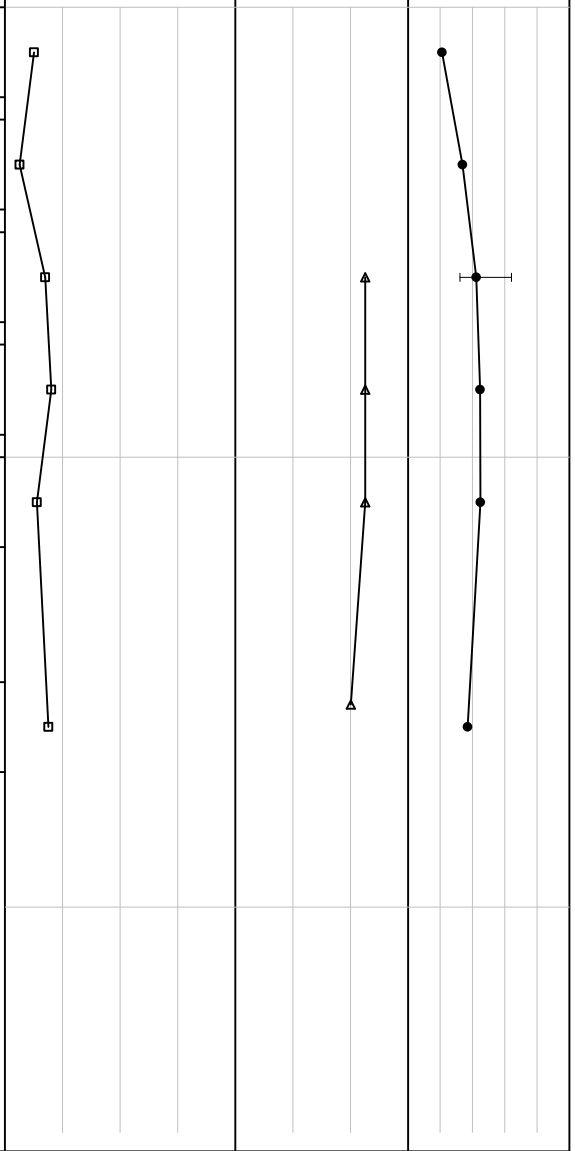
Location: 158 Bridgeport Rd E., Waterloo, Ontario

Drill Date: November 25, 2022 **Project Manager:** KT

Depth (m)	Description	Elevation (m)
	Ground Surface	329.08
0	**Topsoil** Topsoil - 200 mm thick	328.87
	Sand and Gravel Brown sand and gravel, trace rootlets, compact, moist	328.32
1	**Clayey Silt Till** Brown clayey silt, some sand, trace gravel, stiff, DTPL	327.56
	Very stiff	
2		
3		326.03
	Silty Clay Greyish brown silty clay, very stiff, APL; trace sand seams	
4		324.51
	Grey silty clay, trace sand, very stiff, APL	324.20
5	**Silty Sand** Grey silty sand, compact, wet	323.90
	End of Borehole	
6	Borehole terminated at 5.2 mbgs. At drilling completion water was measured at 3.7 mbgs	
7		

Monitoring Well Details: No Monitoring Well Installed

Sample Type	Sampler #	Recovery (%)	SPT N-Value
SS	1	30	10
SS	2	40	5
SS	3	80	14
SS	4	75	16
SS	5	100	11
SS	6	80	15



Contractor: Strata Drilling Inc.

Grade Elevation: 329.08 masl

Drilling Method: Hollow Stem Augers/Split Spoon Sampler

Top of Casing Elevation: NA

Well Casing Size: NA

Sheet: 1 of 1

Log of Borehole: BH4

Project #: 315520 **Logged By:** JD

Project: Proposed Building Addition

Client: Conseil Scolaire Viamonde

Location: 158 Bridgeport Rd E., Waterloo, Ontario

Drill Date: November 25, 2022 **Project Manager:** KT

Depth (m)	Description	Elevation (m)	Sample Type	Sampler #	Recovery (%)	SPT N-Value
0	Ground Surface	329.29				
	Topsoil Topsoil - 200 mm thick	329.08	SS	1	60	12
	Sand and Gravel Brown silty sand and gravel, compact, moist	328.53				
1	**Clayey Silt Till** Brown clayey silt, trace sand and gravel, stiff to very stiff, DTPL		SS	2	60	10
	trace sand seams	327.77	SS	3	90	17
2			SS	4	90	23
3	Greysih brown clayey silt, very stiff, DTPL; trace sand seams	326.24	SS	5	100	16
4						
	APL	324.72	SS	6	100	18
5	End of Borehole	324.11				
6	Borehole terminated at 5.2 mbgs. At drilling completion water was measured at 4.5 mbgs					
7						

Monitoring Well Details: No Monitoring Well Installed

Standard Penetration N-Value: 20, 40, 60

Shear Strength: kPa, 100, 200

Water Content: %, 10, 20, 30, 40

Contractor: Strata Drilling Inc.

Grade Elevation: 329.29 masl

Drilling Method: Hollow Stem Augers/Split Spoon Sampler

Top of Casing Elevation: NA

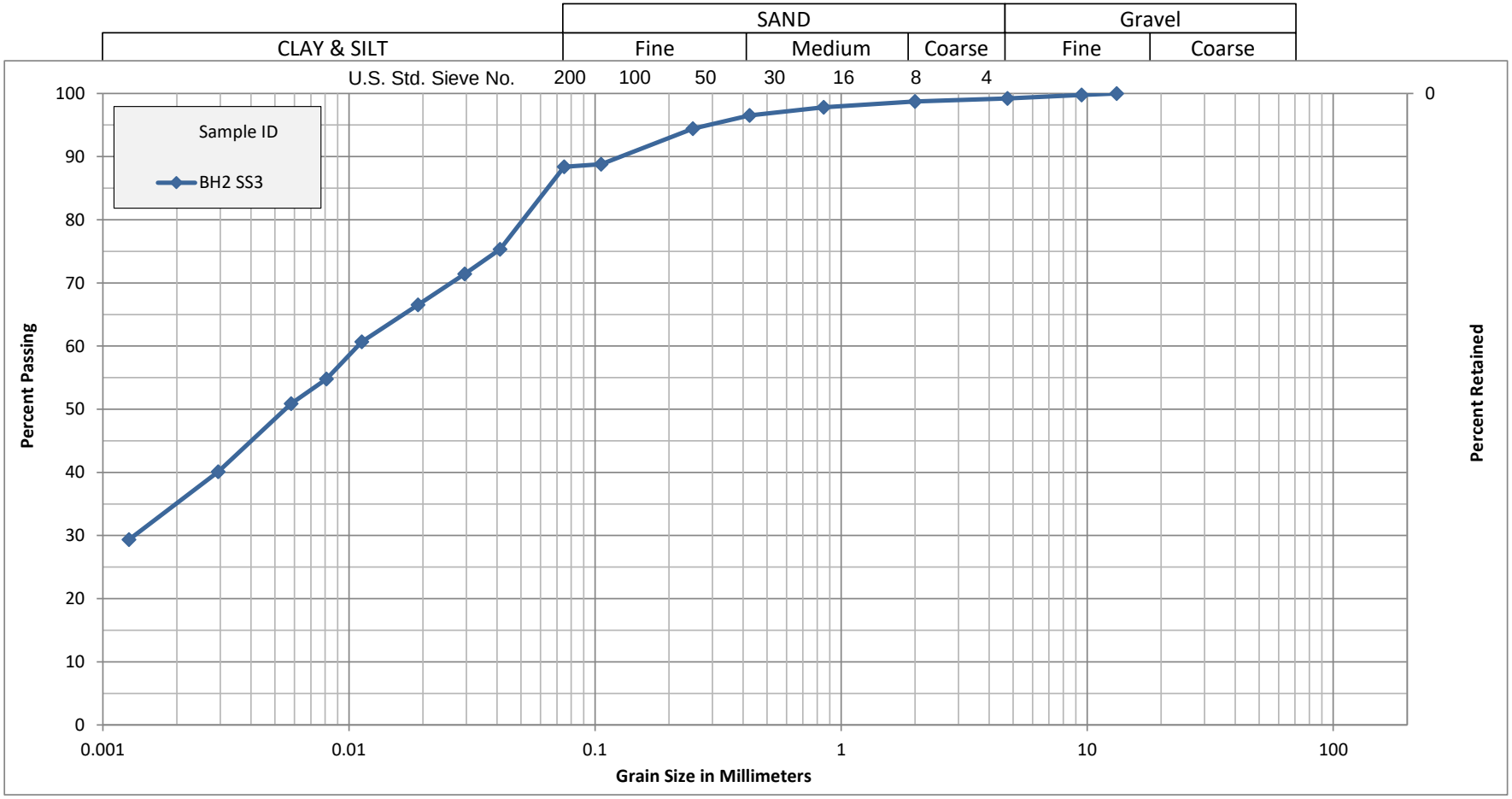
Well Casing Size: NA

Sheet: 1 of 1

APPENDIX III

Laboratory Testing Reports for Soil Samples

Unified Soil Classification System



Sample ID	Depth (ft)	% Gravel	% Sand	% Silt	% Clay
BH2 SS3	5.0-7.0	1.0	10.6	54.4	34.0

PINCHIN

Pinchin Waterloo - 225 Labrador Drive,
Unit 1, Waterloo, Ontario N2K 4M8

PARTICLE SIZE DISTRIBUTION ANALYSIS

Proposed Building Addition - 158 Bridgeport Rd, Waterloo, ON
Conseil scolaire Viamonde

Figure No. 1

315520.000

Reviewed By:

More information available upon request

Atterberg Limits

LS 703&704 / AASHTO T89

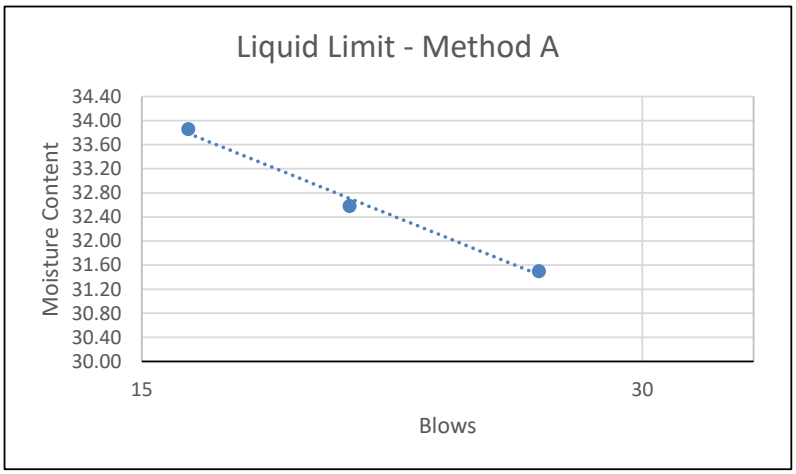
Project Name: Proposed Building Addition
Project No. 315520.000
Client: Conseil scolaire Viamonde
Location: 158 Bridgeport Rd, Waterloo, ON
Material: Soil
Sample: BH2 SS3 5.0-7.0

Test Date: November 29, 2022
Tested By: B Frank
Sample Date: November 25, 2022
Sampled By: J Desai
Reviewed By: V Marshall

Liquid Limit - Method A						
Pot Number	1	2	3			
Number of blows	26	20	16			
Wet mass + pot	36.49	33.93	34.33			
Dry mass + pot	31.51	29.45	29.58			
Tare	15.70	15.70	15.55			
Water content %	31.50	32.58	33.86			

Plastic Limit			
Pot Number	1	2	
Wet mass + pot	23.76	26.14	
Dry mass + pot	22.65	24.71	
Tare	15.65	15.61	
Water content %	15.9	15.7	

PI = LL - PL	
Liquid Limit %	**32**
Plastic Limit %	**16**
Plastic Index	**16**
Non Plastic	



APPENDIX IV

Analytical Laboratory Testing Reports for Soil Samples

ALS Canada Ltd.

right solutions.
right partner.

CERTIFICATE OF ANALYSIS (GUIDELINE EVALUATION)

Work Order	: **WT2223205**	Page	: 1 of 7
Client	: **Pinchin Ltd.**	Laboratory	: Waterloo - Environmental
Contact	: Karen Thrams	Account Manager	: Amanda Overholster
Address	: 225 Labrador Drive Unit #1 Waterloo ON Canada N2K 4M8	Address	: 60 Northland Road, Unit 1 Waterloo, Ontario Canada N2V 2B8
Telephone	: ----	Telephone	: 1 416 817 2944
Project	: 315520	Date Samples Received	: 25-Nov-2022 15:30
PO	: ----	Date Analysis Commenced	: 26-Nov-2022
C-O-C number	: ----	Issue Date	: 02-Dec-2022 12:54
Sampler	: J.D.		
Site	: ----		
Quote number	: 2022 SOA		
No. of samples received	: 3		
No. of samples analysed	: 3		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Guideline Comparison

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Amanda Ganouri-Lumsden	Department Manager - Microbiology and Prep	Centralized Prep, Waterloo, Ontario
Danielle Gravel	Supervisor - Semi-Volatile Instrumentation	Organics, Waterloo, Ontario
Greg Pokocky	Supervisor - Inorganic	Inorganics, Waterloo, Ontario
Greg Pokocky	Supervisor - Inorganic	Metals, Waterloo, Ontario
Sarah Birch	VOC Section Supervisor	Organics, Waterloo, Ontario

No Breaches Found

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.
Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Application of guidelines is provided "as is" without warranty of any kind, either expressed or implied, including, but not limited to fitness for a particular purpose, or non-infringement. ALS assumes no responsibility for errors or omissions in the information. Guidelines are not adjusted for the hardness, pH or temperature of the sample (the most conservative values are used). Measurement uncertainty is not applied to test results prior to comparison with specified criteria values.

Key : LOR: Limit of Reporting (detection limit).

Unit	*Description*
-	no units
%	percent
µS/cm	microsiemens per centimetre
mg/kg	milligrams per kilogram
mg/L	milligrams per litre
mS/cm	millisiemens per centimetre
mV	millivolts
ohm cm	ohm centimetres (resistivity)
pH units	pH units

>: greater than.
<: less than.
Red shading is applied where the result is greater than the Guideline Upper Limit or the result is lower than the Guideline Lower Limit.
For drinking water samples, Red shading is applied where the result for E.coli, fecal or total coliforms is greater than or equal to the Guideline Upper Limit.

Analytical Results Evaluation

Matrix: **Soil/Solid**

Analyte	CAS Number	Unit	Client sample ID	BH4 / SS-1 / 0'-2'	BH2 / SS-2 / 2.5'-4.5'	BH4 / SS-2 / 2.5'-4.5'	----	----	----	----
			Sampling date/time	25-Nov-2022 10:15	25-Nov-2022 12:00	25-Nov-2022 10:20	----	----	----	----
			Sub-Matrix	Soil/Solid	Soil/Solid	Soil/Solid	----	----	----	----
				WT2223205-001	WT2223205-002	WT2223205-003	--------	--------	--------	--------
Physical Tests										
conductivity (1:2 leachate)	----	µS/cm		----	----	541	----	----	----	----
conductivity (1:2 leachate)	----	mS/cm		0.268	0.130	----	----	----	----	----
moisture	----	%		11.4	14.0	13.2	----	----	----	----
oxidation-reduction potential [ORP]	----	mV		----	----	350	----	----	----	----
pH (1:2 soil:CaCl2-aq)	----	pH units		7.27	7.47	7.50	----	----	----	----
resistivity	----	ohm cm		----	----	1850	----	----	----	----
Cyanides										
cyanide, weak acid dissociable	----	mg/kg		<0.050	<0.050	----	----	----	----	----
Inorganics										
sulfides, acid volatile	----	mg/kg		----	----	<0.20	----	----	----	----
Fixed-Ratio Extractables										
calcium, soluble ion content	7440-70-2	mg/L		29.4	17.9	----	----	----	----	----
magnesium, soluble ion content	7439-95-4	mg/L		3.90	2.90	----	----	----	----	----
sodium, soluble ion content	17341-25-2	mg/L		21.5	2.55	----	----	----	----	----
sodium adsorption ratio [SAR]	----	-		0.99	0.15	----	----	----	----	----
Metals										
antimony	7440-36-0	mg/kg		0.10	0.13	----	----	----	----	----
arsenic	7440-38-2	mg/kg		2.88	4.58	----	----	----	----	----
barium	7440-39-3	mg/kg		58.2	103	----	----	----	----	----
beryllium	7440-41-7	mg/kg		0.30	0.78	----	----	----	----	----
boron	7440-42-8	mg/kg		5.4	12.7	----	----	----	----	----
boron, hot water soluble	7440-42-8	mg/kg		0.14	<0.10	----	----	----	----	----
cadmium	7440-43-9	mg/kg		0.190	0.137	----	----	----	----	----
chromium	7440-47-3	mg/kg		15.7	25.4	----	----	----	----	----
cobalt	7440-48-4	mg/kg		3.88	10.3	----	----	----	----	----
copper	7440-50-8	mg/kg		10.0	20.8	----	----	----	----	----
lead	7439-92-1	mg/kg		12.8	12.6	----	----	----	----	----

Analytical Results Evaluation

Matrix: **Soil/Solid**

Analyte	CAS Number	Unit	Client sample ID	BH4 / SS-1 / 0'-2'	BH2 / SS-2 / 2.5'-4.5'	BH4 / SS-2 / 2.5'-4.5'	----	----	----	----
			Sampling date/time	25-Nov-2022 10:15	25-Nov-2022 12:00	25-Nov-2022 10:20	----	----	----	----
			Sub-Matrix	Soil/Solid	Soil/Solid	Soil/Solid	----	----	----	----
				WT2223205-001	WT2223205-002	WT2223205-003	--------	--------	--------	--------
Metals										
mercury	7439-97-6	mg/kg		0.0236	0.0139	----	----	----	----	----
molybdenum	7439-98-7	mg/kg		1.45	0.51	----	----	----	----	----
nickel	7440-02-0	mg/kg		9.01	22.6	----	----	----	----	----
selenium	7782-49-2	mg/kg		<0.20	<0.20	----	----	----	----	----
silver	7440-22-4	mg/kg		<0.10	<0.10	----	----	----	----	----
thallium	7440-28-0	mg/kg		0.067	0.167	----	----	----	----	----
uranium	7440-61-1	mg/kg		0.474	0.585	----	----	----	----	----
vanadium	7440-62-2	mg/kg		27.6	37.1	----	----	----	----	----
zinc	7440-66-6	mg/kg		57.5	69.0	----	----	----	----	----
Speciated Metals										
chromium, hexavalent [Cr VI]	18540-29-9	mg/kg		<0.10	<0.10	----	----	----	----	----
Leachable Anions & Nutrients										
chloride, soluble ion content	16887-00-6	mg/kg		----	----	232	----	----	----	----
sulfate, soluble ion content	14808-79-8	mg/kg		----	----	21	----	----	----	----
Volatile Organic Compounds										
benzene	71-43-2	mg/kg		<0.0050	<0.0050	----	----	----	----	----
ethylbenzene	100-41-4	mg/kg		<0.015	<0.015	----	----	----	----	----
toluene	108-88-3	mg/kg		<0.050	<0.050	----	----	----	----	----
xylene, m+p-	179601-23-1	mg/kg		<0.030	<0.030	----	----	----	----	----
xylene, o-	95-47-6	mg/kg		<0.030	<0.030	----	----	----	----	----
xylenes, total	1330-20-7	mg/kg		<0.050	<0.050	----	----	----	----	----
BTEX, total	----	mg/kg		<0.10	<0.10	----	----	----	----	----
Hydrocarbons										
F1 (C6-C10)	----	mg/kg		<5.0	<5.0	----	----	----	----	----
F2 (C10-C16)	----	mg/kg		<10	<10	----	----	----	----	----
F3 (C16-C34)	----	mg/kg		128	<50	----	----	----	----	----
F4 (C34-C50)	----	mg/kg		<50	<50	----	----	----	----	----
F1-BTEX	----	mg/kg		<5.0	<5.0	----	----	----	----	----

Analytical Results Evaluation

Matrix: **Soil/Solid**

Analyte	CAS Number	Unit	Client sample ID	BH4 / SS-1 / 0'-2'	BH2 / SS-2 / 2.5'-4.5'	BH4 / SS-2 / 2.5'-4.5'	----	----	----	----
			Sampling date/time	25-Nov-2022 10:15	25-Nov-2022 12:00	25-Nov-2022 10:20	----	----	----	----
			Sub-Matrix	Soil/Solid	Soil/Solid	Soil/Solid	----	----	----	----
				WT2223205-001	WT2223205-002	WT2223205-003	--------	--------	--------	--------
Hydrocarbons										
hydrocarbons, total (C6-C50)	----	mg/kg		128	<80	----	----	----	----	----
chromatogram to baseline at nC50	n/a	-		YES	YES	----	----	----	----	----
Hydrocarbons Surrogates										
bromobenzotrifluoride, 2- (F2-F4 surr)	392-83-6	%		86.0	87.2	----	----	----	----	----
dichlorotoluene, 3,4-	97-75-0	%		106	97.9	----	----	----	----	----
Volatile Organic Compounds Surrogates										
bromofluorobenzene, 4-	460-00-4	%		115	114	----	----	----	----	----
difluorobenzene, 1,4-	540-36-3	%		114	111	----	----	----	----	----

Please refer to the General Comments section for an explanation of any qualifiers detected.

Summary of Guideline Limits

Analyte	CAS Number	Unit	ON406/20 T1-RPIICC	ON406/20 T2.1-S-RPI					
Physical Tests									
conductivity (1:2 leachate)	----	µS/cm	**0.57 mS/cm**	**0.7 mS/cm**					
conductivity (1:2 leachate)	----	mS/cm	**0.57 mS/cm**	**0.7 mS/cm**					
moisture	----	%							
oxidation-reduction potential [ORP]	----	mV							
pH (1:2 soil:CaCl2-aq)	----	pH units							
resistivity	----	ohm cm							
Cyanides									
cyanide, weak acid dissociable	----	mg/kg	**0.051 mg/kg**	**0.051 mg/kg**					
Inorganics									
sulfides, acid volatile	----	mg/kg							
Fixed-Ratio Extractables									
calcium, soluble ion content	7440-70-2	mg/L							
magnesium, soluble ion content	7439-95-4	mg/L							
sodium adsorption ratio [SAR]	----	-	**2.4 -**	**5 -**					
sodium, soluble ion content	17341-25-2	mg/L							
Metals									
antimony	7440-36-0	mg/kg	**1.3 mg/kg**	**7.5 mg/kg**					
arsenic	7440-38-2	mg/kg	**18 mg/kg**	**18 mg/kg**					
barium	7440-39-3	mg/kg	**220 mg/kg**	**390 mg/kg**					
beryllium	7440-41-7	mg/kg	**2.5 mg/kg**	**4 mg/kg**					
boron, hot water soluble	7440-42-8	mg/kg		**1.5 mg/kg**					
boron	7440-42-8	mg/kg	**36 mg/kg**	**120 mg/kg**					
cadmium	7440-43-9	mg/kg	**1.2 mg/kg**	**1.2 mg/kg**					
chromium	7440-47-3	mg/kg	**70 mg/kg**	**160 mg/kg**					
cobalt	7440-48-4	mg/kg	**21 mg/kg**	**22 mg/kg**					
copper	7440-50-8	mg/kg	**92 mg/kg**	**140 mg/kg**					
lead	7439-92-1	mg/kg	**120 mg/kg**	**120 mg/kg**					
mercury	7439-97-6	mg/kg	**0.27 mg/kg**	**0.27 mg/kg**					
molybdenum	7439-98-7	mg/kg	**2 mg/kg**	**6.9 mg/kg**					
nickel	7440-02-0	mg/kg	**82 mg/kg**	**100 mg/kg**					
selenium	7782-49-2	mg/kg	**1.5 mg/kg**	**2.4 mg/kg**					
silver	7440-22-4	mg/kg	**0.5 mg/kg**	**20 mg/kg**					
thallium	7440-28-0	mg/kg	**1 mg/kg**	**1 mg/kg**					
uranium	7440-61-1	mg/kg	**2.5 mg/kg**	**23 mg/kg**					
vanadium	7440-62-2	mg/kg	**86 mg/kg**	**86 mg/kg**					
zinc	7440-66-6	mg/kg	**290 mg/kg**	**340 mg/kg**					
Speciated Metals									

Analyte	CAS Number	Unit	ON406/20 T1-RPIICC	ON406/20 T2.1-S-RPI					
Speciated Metals - Continued									
chromium, hexavalent [Cr VI]	18540-29-9	mg/kg	**0.66 mg/kg**	**8 mg/kg**					
Leachable Anions & Nutrients									
chloride, soluble ion content	16887-00-6	mg/kg							
sulfate, soluble ion content	14808-79-8	mg/kg							
Volatile Organic Compounds									
benzene	71-43-2	mg/kg	**0.02 mg/kg**	**0.02 mg/kg**					
BTEX, total	----	mg/kg							
ethylbenzene	100-41-4	mg/kg	**0.05 mg/kg**	**0.05 mg/kg**					
toluene	108-88-3	mg/kg	**0.2 mg/kg**	**0.2 mg/kg**					
xylene, m+p-	179601-23-1	mg/kg							
xylene, o-	95-47-6	mg/kg							
xylenes, total	1330-20-7	mg/kg	**0.05 mg/kg**	**0.091 mg/kg**					
Hydrocarbons									
chromatogram to baseline at nC50	n/a	-							
F1 (C6-C10)	----	mg/kg	**25 mg/kg**	**25 mg/kg**					
F1-BTEX	----	mg/kg	**25 mg/kg**	**25 mg/kg**					
F2 (C10-C16)	----	mg/kg	**10 mg/kg**	**10 mg/kg**					
F3 (C16-C34)	----	mg/kg	**240 mg/kg**	**240 mg/kg**					
F4 (C34-C50)	----	mg/kg	**120 mg/kg**	**2800 mg/kg**					
hydrocarbons, total (C6-C50)	----	mg/kg							

Please refer to the General Comments section for an explanation of any qualifiers detected.

Key:

ON406/20	Ontario Regulation 406/19 - Excess Soils - 17-December-20
T1-RPIICC	406 T1 - Soil - Res/Park/Inst/Ind/Com/Commu Property Use
T2.1-S-RPI	406 T2.1 - Volume Independent Soil - Res/Park/Inst Property Use

ALS Canada Ltd.

right solutions.
right partner.

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **WT2223205**	Page	: 1 of 12
Client	: **Pinchin Ltd.**	Laboratory	: Waterloo - Environmental
Contact	: Karen Thrams	Account Manager	: Amanda Overholster
Address	: 225 Labrador Drive Unit #1 Waterloo ON Canada N2K 4M8	Address	: 60 Northland Road, Unit 1 Waterloo, Ontario Canada N2V 2B8
Telephone	: ----	Telephone	: 1 416 817 2944
Project	: 315520	Date Samples Received	: 25-Nov-2022 15:30
PO	: ----	Issue Date	: 02-Dec-2022 12:54
C-O-C number	: ----		
Sampler	: J.D.		
Site	: ----		
Quote number	: 2022 SOA		
No. of samples received	: 3		
No. of samples analysed	: 3		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number: Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Soil/Solid**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Cyanides : WAD Cyanide (0.01M NaOH Extraction)										
Glass soil jar/Teflon lined cap										
BH2 / SS-2 / 2.5'-4.5'	E336A	25-Nov-2022	26-Nov-2022	14 days	1 days	✓	29-Nov-2022	14 days	3 days	✓
Cyanides : WAD Cyanide (0.01M NaOH Extraction)										
Glass soil jar/Teflon lined cap										
BH4 / SS-1 / 0'-2'	E336A	25-Nov-2022	26-Nov-2022	14 days	1 days	✓	29-Nov-2022	14 days	3 days	✓
Fixed-Ratio Extractables : Sodium Adsorption Ratio (SAR) - 1:2 Soil:Water (Dry)										
Glass soil jar/Teflon lined cap										
BH2 / SS-2 / 2.5'-4.5'	E484	25-Nov-2022	01-Dec-2022	180 days	6 days	✓	01-Dec-2022	180 days	0 days	✓
Fixed-Ratio Extractables : Sodium Adsorption Ratio (SAR) - 1:2 Soil:Water (Dry)										
Glass soil jar/Teflon lined cap										
BH4 / SS-1 / 0'-2'	E484	25-Nov-2022	01-Dec-2022	180 days	6 days	✓	01-Dec-2022	180 days	0 days	✓
Hydrocarbons : CCME PHC - F1 by Headspace GC-FID										
Glass soil methanol vial [ON MECP]										
BH2 / SS-2 / 2.5'-4.5'	E581.F1	25-Nov-2022	26-Nov-2022	14 days	1 days	✓	27-Nov-2022	40 days	1 days	✓
Hydrocarbons : CCME PHC - F1 by Headspace GC-FID										
Glass soil methanol vial [ON MECP]										
BH4 / SS-1 / 0'-2'	E581.F1	25-Nov-2022	26-Nov-2022	14 days	1 days	✓	27-Nov-2022	40 days	1 days	✓
Hydrocarbons : CCME PHCs - F2-F4 by GC-FID (Low Level)										
Glass soil jar/Teflon lined cap										
BH2 / SS-2 / 2.5'-4.5'	E601.SG-L	25-Nov-2022	26-Nov-2022	14 days	1 days	✓	01-Dec-2022	40 days	5 days	✓

Matrix: **Soil/Solid**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Hydrocarbons : CCME PHCs - F2-F4 by GC-FID (Low Level)										
Glass soil jar/Teflon lined cap										
BH4 / SS-1 / 0'-2'	E601.SG-L	25-Nov-2022	26-Nov-2022	14 days	1 days	✓	01-Dec-2022	40 days	5 days	✓
Inorganics : Acid Volatile Sulfide in Soil by Colourimetry (0.2 mg/kg)										
Glass soil jar/Teflon lined cap										
BH4 / SS-2 / 2.5'-4.5'	E396-L	25-Nov-2022	28-Nov-2022	14 days	3 days	✓	28-Nov-2022	7 days	0 days	✓
Leachable Anions & Nutrients : Water Extractable Chloride by IC										
Glass soil jar/Teflon lined cap										
BH4 / SS-2 / 2.5'-4.5'	E236.Cl	25-Nov-2022	01-Dec-2022	30 days	6 days	✓	01-Dec-2022	28 days	0 days	✓
Leachable Anions & Nutrients : Water Extractable Sulfate by IC										
Glass soil jar/Teflon lined cap										
BH4 / SS-2 / 2.5'-4.5'	E236.SO4	25-Nov-2022	01-Dec-2022	30 days	6 days	✓	01-Dec-2022	28 days	0 days	✓
Metals : Boron-Hot Water Extractable by ICPOES										
Glass soil jar/Teflon lined cap										
BH2 / SS-2 / 2.5'-4.5'	E487	25-Nov-2022	01-Dec-2022	180 days	6 days	✓	01-Dec-2022	180 days	0 days	✓
Metals : Boron-Hot Water Extractable by ICPOES										
Glass soil jar/Teflon lined cap										
BH4 / SS-1 / 0'-2'	E487	25-Nov-2022	01-Dec-2022	180 days	6 days	✓	01-Dec-2022	180 days	0 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
Glass soil jar/Teflon lined cap										
BH2 / SS-2 / 2.5'-4.5'	E510	25-Nov-2022	01-Dec-2022	----	----		01-Dec-2022	28 days	6 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
Glass soil jar/Teflon lined cap										
BH4 / SS-1 / 0'-2'	E510	25-Nov-2022	01-Dec-2022	----	----		01-Dec-2022	28 days	6 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
Glass soil jar/Teflon lined cap										
BH2 / SS-2 / 2.5'-4.5'	E440	25-Nov-2022	01-Dec-2022	----	----		01-Dec-2022	180 days	6 days	✓

Matrix: **Soil/Solid**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Metals in Soil/Solid by CRC ICPMS										
Glass soil jar/Teflon lined cap										
BH4 / SS-1 / 0'-2'	E440	25-Nov-2022	01-Dec-2022	----	----		01-Dec-2022	180 days	6 days	✓
Physical Tests : Conductivity in Soil (1:2 Soil:Water Extraction) (Low Level)										
Glass soil jar/Teflon lined cap										
BH2 / SS-2 / 2.5'-4.5'	E100-L	25-Nov-2022	01-Dec-2022	----	----		01-Dec-2022	30 days	6 days	✓
Physical Tests : Conductivity in Soil (1:2 Soil:Water Extraction) (Low Level)										
Glass soil jar/Teflon lined cap										
BH4 / SS-1 / 0'-2'	E100-L	25-Nov-2022	01-Dec-2022	----	----		01-Dec-2022	30 days	6 days	✓
Physical Tests : Conductivity in Soil (1:2 Soil:Water Extraction) (Low Level)										
Glass soil jar/Teflon lined cap										
BH4 / SS-2 / 2.5'-4.5'	E100-L	25-Nov-2022	01-Dec-2022	----	----		01-Dec-2022	30 days	6 days	✓
Physical Tests : Moisture Content by Gravimetry										
Glass soil jar/Teflon lined cap										
BH2 / SS-2 / 2.5'-4.5'	E144	25-Nov-2022	----	----	----		26-Nov-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
Glass soil jar/Teflon lined cap										
BH4 / SS-1 / 0'-2'	E144	25-Nov-2022	----	----	----		26-Nov-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
Glass soil jar/Teflon lined cap										
BH4 / SS-2 / 2.5'-4.5'	E144	25-Nov-2022	----	----	----		26-Nov-2022	----	----	
Physical Tests : ORP by Electrode										
Glass soil jar/Teflon lined cap										
BH4 / SS-2 / 2.5'-4.5'	E125	25-Nov-2022	01-Dec-2022	----	----		01-Dec-2022	180 days	7 days	✓
Physical Tests : pH by Meter (1:2 Soil:0.01M CaCl2 Extraction) - As Received										
Glass soil jar/Teflon lined cap										
BH2 / SS-2 / 2.5'-4.5'	E108A	25-Nov-2022	26-Nov-2022	----	----		29-Nov-2022	30 days	4 days	✓

Matrix: **Soil/Solid**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : pH by Meter (1:2 Soil:0.01M CaCl2 Extraction) - As Received										
Glass soil jar/Teflon lined cap										
BH4 / SS-1 / 0'-2'	E108A	25-Nov-2022	26-Nov-2022	----	----		29-Nov-2022	30 days	4 days	✓
Physical Tests : pH by Meter (1:2 Soil:0.01M CaCl2 Extraction) - As Received										
Glass soil jar/Teflon lined cap										
BH4 / SS-2 / 2.5'-4.5'	E108A	25-Nov-2022	26-Nov-2022	----	----		29-Nov-2022	30 days	4 days	✓
Speciated Metals : Hexavalent Chromium (Cr VI) by IC										
Glass soil jar/Teflon lined cap										
BH2 / SS-2 / 2.5'-4.5'	E532	25-Nov-2022	26-Nov-2022	30 days	1 days	✓	29-Nov-2022	7 days	3 days	✓
Speciated Metals : Hexavalent Chromium (Cr VI) by IC										
Glass soil jar/Teflon lined cap										
BH4 / SS-1 / 0'-2'	E532	25-Nov-2022	26-Nov-2022	30 days	1 days	✓	29-Nov-2022	7 days	3 days	✓
Volatile Organic Compounds : BTEX by Headspace GC-MS										
Glass soil methanol vial [ON MECP]										
BH2 / SS-2 / 2.5'-4.5'	E611A	25-Nov-2022	26-Nov-2022	14 days	1 days	✓	27-Nov-2022	40 days	1 days	✓
Volatile Organic Compounds : BTEX by Headspace GC-MS										
Glass soil methanol vial [ON MECP]										
BH4 / SS-1 / 0'-2'	E611A	25-Nov-2022	26-Nov-2022	14 days	1 days	✓	27-Nov-2022	40 days	1 days	✓

Legend & Qualifier Definitions

Rec. HT: ALS recommended hold time (see units).

Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Soil/Solid**

Evaluation: × = *QC frequency outside specification*; ✓ = *QC frequency within specification.*

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
Acid Volatile Sulfide in Soil by Colourimetry (0.2 mg/kg)	E396-L	759974	1	15	6.6	4.7	✓
Boron-Hot Water Extractable by ICPOES	E487	758602	1	18	5.5	5.0	✓
BTEX by Headspace GC-MS	E611A	758673	1	20	5.0	5.0	✓
CCME PHC - F1 by Headspace GC-FID	E581.F1	758672	1	20	5.0	5.0	✓
CCME PHCs - F2-F4 by GC-FID (Low Level)	E601.SG-L	758595	1	16	6.2	5.0	✓
Conductivity in Soil (1:2 Soil:Water Extraction) (Low Level)	E100-L	758601	1	18	5.5	5.0	✓
Hexavalent Chromium (Cr VI) by IC	E532	758592	1	17	5.8	5.0	✓
Mercury in Soil/Solid by CVAAS	E510	758597	1	17	5.8	5.0	✓
Metals in Soil/Solid by CRC ICPMS	E440	758598	1	18	5.5	5.0	✓
Moisture Content by Gravimetry	E144	758607	1	19	5.2	5.0	✓
ORP by Electrode	E125	763428	1	4	25.0	5.0	✓
pH by Meter (1:2 Soil:0.01M CaCl2 Extraction) - As Received	E108A	758599	1	18	5.5	5.0	✓
Sodium Adsorption Ratio (SAR) - 1:2 Soil:Water (Dry)	E484	758600	1	17	5.8	5.0	✓
WAD Cyanide (0.01M NaOH Extraction)	E336A	758593	1	17	5.8	5.0	✓
Water Extractable Chloride by IC	E236.Cl	764058	1	17	5.8	5.0	✓
Water Extractable Sulfate by IC	E236.SO4	764057	1	17	5.8	5.0	✓
Laboratory Control Samples (LCS)							
Acid Volatile Sulfide in Soil by Colourimetry (0.2 mg/kg)	E396-L	759974	1	15	6.6	4.7	✓
Boron-Hot Water Extractable by ICPOES	E487	758602	2	18	11.1	10.0	✓
BTEX by Headspace GC-MS	E611A	758673	1	20	5.0	5.0	✓
CCME PHC - F1 by Headspace GC-FID	E581.F1	758672	1	20	5.0	5.0	✓
CCME PHCs - F2-F4 by GC-FID (Low Level)	E601.SG-L	758595	1	16	6.2	5.0	✓
Conductivity in Soil (1:2 Soil:Water Extraction) (Low Level)	E100-L	758601	2	18	11.1	10.0	✓
Hexavalent Chromium (Cr VI) by IC	E532	758592	2	17	11.7	10.0	✓
Mercury in Soil/Solid by CVAAS	E510	758597	2	17	11.7	10.0	✓
Metals in Soil/Solid by CRC ICPMS	E440	758598	2	18	11.1	10.0	✓
Moisture Content by Gravimetry	E144	758607	1	19	5.2	5.0	✓
ORP by Electrode	E125	763428	1	4	25.0	5.0	✓
pH by Meter (1:2 Soil:0.01M CaCl2 Extraction) - As Received	E108A	758599	1	18	5.5	5.0	✓
Sodium Adsorption Ratio (SAR) - 1:2 Soil:Water (Dry)	E484	758600	2	17	11.7	10.0	✓
WAD Cyanide (0.01M NaOH Extraction)	E336A	758593	1	17	5.8	5.0	✓
Water Extractable Chloride by IC	E236.Cl	764058	2	17	11.7	10.0	✓
Water Extractable Sulfate by IC	E236.SO4	764057	2	17	11.7	10.0	✓
Method Blanks (MB)							
Acid Volatile Sulfide in Soil by Colourimetry (0.2 mg/kg)	E396-L	759974	1	15	6.6	4.7	✓

Matrix: **Soil/Solid**

Evaluation: × = *QC frequency outside specification*; ✓ = *QC frequency within specification.*

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Method Blanks (MB) - Continued							
Boron-Hot Water Extractable by ICPOES	E487	758602	1	18	5.5	5.0	✓
BTEX by Headspace GC-MS	E611A	758673	1	20	5.0	5.0	✓
CCME PHC - F1 by Headspace GC-FID	E581.F1	758672	1	20	5.0	5.0	✓
CCME PHCs - F2-F4 by GC-FID (Low Level)	E601.SG-L	758595	1	16	6.2	5.0	✓
Conductivity in Soil (1:2 Soil:Water Extraction) (Low Level)	E100-L	758601	1	18	5.5	5.0	✓
Hexavalent Chromium (Cr VI) by IC	E532	758592	1	17	5.8	5.0	✓
Mercury in Soil/Solid by CVAAS	E510	758597	1	17	5.8	5.0	✓
Metals in Soil/Solid by CRC ICPMS	E440	758598	1	18	5.5	5.0	✓
Moisture Content by Gravimetry	E144	758607	1	19	5.2	5.0	✓
Sodium Adsorption Ratio (SAR) - 1:2 Soil:Water (Dry)	E484	758600	1	17	5.8	5.0	✓
WAD Cyanide (0.01M NaOH Extraction)	E336A	758593	1	17	5.8	5.0	✓
Water Extractable Chloride by IC	E236.Cl	764058	1	17	5.8	5.0	✓
Water Extractable Sulfate by IC	E236.SO4	764057	1	17	5.8	5.0	✓
Matrix Spikes (MS)							
BTEX by Headspace GC-MS	E611A	758673	1	20	5.0	5.0	✓
CCME PHC - F1 by Headspace GC-FID	E581.F1	758672	1	20	5.0	5.0	✓
CCME PHCs - F2-F4 by GC-FID (Low Level)	E601.SG-L	758595	1	16	6.2	5.0	✓
WAD Cyanide (0.01M NaOH Extraction)	E336A	758593	1	17	5.8	5.0	✓

Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Conductivity in Soil (1:2 Soil:Water Extraction) (Low Level)	E100-L Waterloo - Environmental	Soil/Solid	CSSS Ch. 15 (mod)/APHA 2510 (mod)	Conductivity, also known as Electrical Conductivity (EC) or Specific Conductance, is measured by immersion of a conductivity cell with platinum electrodes into a soil sample that has been added in a defined ratio of soil to deionized water, then shaken well and allowed to settle. Conductance is measured in the fluid that is observed in the upper layer.
pH by Meter (1:2 Soil:0.01M CaCl2 Extraction) - As Received	E108A Waterloo - Environmental	Soil/Solid	MOEE E3137A	pH is determined by potentiometric measurement with a pH electrode, and is conducted at ambient laboratory temperature (normally 20 ± 5°C) and is carried out in accordance with procedures described in the Analytical Protocol (prescriptive method). A minimum 10g portion of the sample, as received, is extracted with 20mL of 0.01M calcium chloride solution by shaking for at least 30 minutes. The aqueous layer is separated from the soil by centrifuging, settling, or decanting and then analyzed using a pH meter and electrode.
ORP by Electrode	E125 Waterloo - Environmental	Soil/Solid	APHA 2580 (mod)	Oxidation Redution Potential (ORP) is reported as the oxidation-reduction potential of the platinum metal-reference electrode employed in the analysis, measured in mV.
Moisture Content by Gravimetry	E144 Waterloo - Environmental	Soil/Solid	CCME PHC in Soil - Tier 1	Moisture is measured gravimetrically by drying the sample at 105°C. Moisture content is calculated as the weight loss (due to water) divided by the wet weight of the sample, expressed as a percentage.
Water Extractable Chloride by IC	E236.Cl Waterloo - Environmental	Soil/Solid	EPA 300.1	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection using a soil sample that has been added in a defined ratio of soil to deionized water, then shaken well and allowed to settle. Anions are measured in the fluid that is observed in the upper layer.
Water Extractable Sulfate by IC	E236.SO4 Waterloo - Environmental	Soil/Solid	EPA 300.1	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection using a soil sample that has been added in a defined ratio of soil to deionized water, then shaken well and allowed to settle. Anions are measured in the fluid that is observed in the upper layer.
WAD Cyanide (0.01M NaOH Extraction)	E336A Waterloo - Environmental	Soil/Solid	APHA 4500-CN I (mod)	Weak Acid Dissociable (WAD) cyanide is determined after extraction by Continuous Flow Analyzer (CFA) with in-line distillation followed by colourmetric analysis.
Acid Volatile Sulfide in Soil by Colourimetry (0.2 mg/kg)	E396-L Waterloo - Environmental	Soil/Solid	APHA 4500S2J	This analysis is carried out in accordance with the method described in APHA 4500 S2-J. After extraction the Acid Volatile Sulphide is determined colourimetrically.

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Metals in Soil/Solid by CRC ICPMS	E440 Waterloo - Environmental	Soil/Solid	EPA 6020B (mod)	This method is intended to liberate metals that may be environmentally available. Samples are dried, then sieved through a 2 mm sieve, and digested with HNO3 and HCl. Dependent on sample matrix, some metals may be only partially recovered, including Al, Ba, Be, Cr, Sr, Ti, Tl, V, W, and Zr. Silicate minerals are not solubilized. Volatile forms of sulfur (including sulfide) may not be captured, as they may be lost during sampling, storage, or digestion. This method does not adequately recover elemental sulfur, and is unsuitable for assessment of elemental sulfur standards or guidelines. Analysis is by Collision/Reaction Cell ICPMS.
Sodium Adsorption Ratio (SAR) - 1:2 Soil:Water (Dry)	E484 Waterloo - Environmental	Soil/Solid	SW846 6010C	A dried, disaggregated solid sample is extracted with deionized water, the aqueous extract is separated from the solid, acidified and then analyzed using a ICP/OES. The concentrations of Na, Ca and Mg are reported as per CALA requirements for calculated parameters. These individual parameters are not for comparison to any guideline.
Boron-Hot Water Extractable by ICPOES	E487 Waterloo - Environmental	Soil/Solid	HW EXTR, EPA 6010B	A dried solid sample is extracted with calcium chloride, the sample undergoes a heating process. After cooling the sample is filtered and analyzed by ICP/OES. Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).
Mercury in Soil/Solid by CVAAS	E510 Waterloo - Environmental	Soil/Solid	EPA 200.2/1631 Appendix (mod)	Samples are dried, then sieved through a 2 mm sieve, and digested with HNO3 and HCl, followed by CVAAS analysis.
Hexavalent Chromium (Cr VI) by IC	E532 Waterloo - Environmental	Soil/Solid	APHA 3500-CR C	Instrumental analysis is performed by ion chromatography with UV detection.
CCME PHC - F1 by Headspace GC-FID	E581.F1 Waterloo - Environmental	Soil/Solid	CCME PHC in Soil - Tier 1	CCME Fraction 1 (F1) is analyzed by static headspace GC-FID. Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler, causing VOCs to partition between the aqueous phase and the headspace in accordance with Henry's law.
CCME PHCs - F2-F4 by GC-FID (Low Level)	E601.SG-L Waterloo - Environmental	Soil/Solid	CCME PHC in Soil - Tier 1	Sample extracts are subjected to in-situ silica gel treatment prior to analysis by GC-FID for CCME hydrocarbon fractions (F2-F4).
BTEX by Headspace GC-MS	E611A Waterloo - Environmental	Soil/Solid	EPA 8260D (mod)	Volatile Organic Compounds (VOCs) are analyzed by static headspace GC-MS. Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler, causing VOCs to partition between the aqueous phase and the headspace in accordance with Henry's law.
Resistivity Calculation for Soil Using E100-L	EC100R Waterloo - Environmental	Soil/Solid	APHA 2510 B	Soil Resistivity (calculated) is determined as the inverse of the conductivity of a 2:1 water:soil leachate (dry weight). This method is intended as a rapid approximation for Soil Resistivity. Where high accuracy results are required, direct measurement of Soil Resistivity by the Wenner Four-Electrode Method (ASTM G57) is recommended.

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
F1-BTEX	EC580 Waterloo - Environmental	Soil/Solid	CCME PHC in Soil - Tier 1	F1-BTEX is calculated as follows: F1-BTEX = F1 (C6-C10) minus benzene, toluene, ethylbenzene and xylenes (BTEX).
Sum F1 to F4 (C6-C50)	EC581 Waterloo - Environmental	Soil/Solid	CCME PHC in Soil - Tier 1	Hydrocarbons, total (C6-C50) is the sum of CCME Fractions F1(C6-C10), F2(C10-C16), F3(C16-C34), and F4(C34-C50). F4G-sg is not used within this calculation due to overlap with other fractions.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Leach 1:2 Soil:Water for pH/EC	EP108 Waterloo - Environmental	Soil/Solid	BC WLAP METHOD: PH, ELECTROMETRIC, SOIL	The procedure involves mixing the dried (at <60°C) and sieved (No. 10 / 2mm) sample with deionized/distilled water at a 1:2 ratio of sediment to water.
Leach 1:2 Soil : 0.01CaCl2 - As Received for pH	EP108A Waterloo - Environmental	Soil/Solid	MOEE E3137A	A minimum 10g portion of the sample, as received, is extracted with 20mL of 0.01M calcium chloride solution by shaking for at least 30 minutes. The aqueous layer is separated from the soil by centrifuging, settling or decanting and then analyzed using a pH meter and electrode.
Preparation of ORP by Electrode	EP125 Waterloo - Environmental	Soil/Solid	APHA 2580 (mod)	Field-moist sample is extracted in a 1:2 ratio with DI water and then analyzed by ORP meter.
Anions Leach 1:10 Soil:Water (Dry)	EP236 Waterloo - Environmental	Soil/Solid	EPA 300.1	5 grams of dried soil is mixed with 50 grams of distilled water for a minimum of 30 minutes. The extract is filtered and analyzed by ion chromatography.
Cyanide Extraction for CFA (0.01M NaOH)	EP333A Waterloo - Environmental	Soil/Solid	ON MECP E3015 (mod)	Extraction for various cyanide analysis is by rotary extraction of the soil with 0.01M Sodium Hydroxide.
Distillation for Acid Volatile Sulfide in Soil	EP396-L Waterloo - Environmental	Soil/Solid	APHA 4500S2J	Acid Volatile Sulfide is determined by colourimetric measurement on a sediment sample that has been treated with hydrochloric acid within a purge and trap system, where the evolved hydrogen sulfide gas is carried into a basic solution by argon gas for analysis.
Digestion for Metals and Mercury	EP440 Waterloo - Environmental	Soil/Solid	EPA 200.2 (mod)	Samples are dried, then sieved through a 2 mm sieve, and digested with HNO3 and HCl. This method is intended to liberate metals that may be environmentally available.
Boron-Hot Water Extractable	EP487 Waterloo - Environmental	Soil/Solid	HW EXTR, EPA 6010B	A dried solid sample is extracted with weak calcium chloride, the sample undergoes a heating process. After cooling the sample is filtered and analyzed by ICP/OES. Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011)

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Preparation of Hexavalent Chromium (Cr VI) for IC	EP532 Waterloo - Environmental	Soil/Solid	EPA 3060A	Field moist samples are digested with a sodium hydroxide/sodium carbonate solution as described in EPA 3060A.
VOCs Methanol Extraction for Headspace Analysis	EP581 Waterloo - Environmental	Soil/Solid	EPA 5035A (mod)	VOCs in samples are extracted with methanol. Extracts are then prepared in headspace vials and are heated and agitated on the headspace autosampler, causing VOCs to partition between the aqueous phase and the headspace in accordance with Henry's law.
PHCs and PAHs Hexane-Acetone Tumbler Extraction	EP601 Waterloo - Environmental	Soil/Solid	CCME PHC in Soil - Tier 1 (mod)	Samples are subsampled and Petroleum Hydrocarbons (PHC) and PAHs are extracted with 1:1 hexane:acetone using a rotary extractor.

QUALITY CONTROL REPORT

Work Order	: **WT2223205**	Page	: 1 of 11
Client	: Pinchin Ltd.	Laboratory	: Waterloo - Environmental
Contact	: Karen Thrams	Account Manager	: Amanda Overholster
Address	: 225 Labrador Drive Unit #1 Waterloo ON Canada N2K 4M8	Address	: 60 Northland Road, Unit 1 Waterloo, Ontario Canada N2V 2B8
Telephone	:	Telephone	: 1 416 817 2944
Project	: 315520	Date Samples Received	: 25-Nov-2022 15:30
PO	: ----	Date Analysis Commenced	: 26-Nov-2022
C-O-C number	: ----	Issue Date	: 02-Dec-2022 12:54
Sampler	: J.D. ----		
Site	: ----		
Quote number	: 2022 SOA		
No. of samples received	: 3		
No. of samples analysed	: 3		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Reference Material (RM) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Amanda Ganouri-Lumsden	Department Manager - Microbiology and Prep	Waterloo Centralized Prep, Waterloo, Ontario
Danielle Gravel	Supervisor - Semi-Volatile Instrumentation	Waterloo Organics, Waterloo, Ontario
Greg Pokocky	Supervisor - Inorganic	Waterloo Inorganics, Waterloo, Ontario
Greg Pokocky	Supervisor - Inorganic	Waterloo Metals, Waterloo, Ontario
Sarah Birch	VOC Section Supervisor	Waterloo Organics, Waterloo, Ontario

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Soil/Solid**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Physical Tests (QC Lot: 758599)											
WT2223135-001	Anonymous	pH (1:2 soil:CaCl2-aq)	----	E108A	0.10	pH units	7.45	7.38	0.944%	5%	----
Physical Tests (QC Lot: 758601)											
WT2223135-001	Anonymous	conductivity (1:2 leachate)	----	E100-L	5.00	µS/cm	0.147 mS/cm	150	1.55%	20%	----
Physical Tests (QC Lot: 758607)											
WT2223135-001	Anonymous	moisture	----	E144	0.25	%	14.5	14.3	1.25%	20%	----
Physical Tests (QC Lot: 763428)											
WT2223205-003	BH4 / SS-2 / 2.5'-4.5'	oxidation-reduction potential [ORP]	----	E125	0.10	mV	350	320	8.96%	25%	----
Cyanides (QC Lot: 758593)											
WT2223135-001	Anonymous	cyanide, weak acid dissociable	----	E336A	0.050	mg/kg	<0.050	<0.050	0	Diff <2x LOR	----
Inorganics (QC Lot: 759974)											
WT2223222-004	Anonymous	sulfides, acid volatile	----	E396-L	0.20	mg/kg	<0.20	<0.20	0	Diff <2x LOR	----
Metals (QC Lot: 758597)											
WT2223135-001	Anonymous	mercury	7439-97-6	E510	0.0050	mg/kg	0.0298	0.0301	0.970%	40%	----
Metals (QC Lot: 758598)											
WT2223135-001	Anonymous	antimony	7440-36-0	E440	0.10	mg/kg	<0.10	<0.10	0	Diff <2x LOR	----
		arsenic	7440-38-2	E440	0.10	mg/kg	2.98	2.87	3.76%	30%	----
		barium	7440-39-3	E440	0.50	mg/kg	75.6	70.4	7.15%	40%	----
		beryllium	7440-41-7	E440	0.10	mg/kg	0.55	0.52	0.03	Diff <2x LOR	----
		boron	7440-42-8	E440	5.0	mg/kg	6.5	5.9	0.6	Diff <2x LOR	----
		cadmium	7440-43-9	E440	0.020	mg/kg	0.106	0.108	0.002	Diff <2x LOR	----
		chromium	7440-47-3	E440	0.50	mg/kg	20.0	19.2	4.07%	30%	----
		cobalt	7440-48-4	E440	0.10	mg/kg	6.47	6.29	2.90%	30%	----
		copper	7440-50-8	E440	0.50	mg/kg	11.8	11.2	4.92%	30%	----
		lead	7439-92-1	E440	0.50	mg/kg	6.96	6.75	3.09%	40%	----
		molybdenum	7439-98-7	E440	0.10	mg/kg	0.27	0.21	0.06	Diff <2x LOR	----
		nickel	7440-02-0	E440	0.50	mg/kg	14.2	13.7	3.65%	30%	----
		selenium	7782-49-2	E440	0.20	mg/kg	<0.20	<0.20	0	Diff <2x LOR	----
		silver	7440-22-4	E440	0.10	mg/kg	<0.10	<0.10	0	Diff <2x LOR	----
		thallium	7440-28-0	E440	0.050	mg/kg	0.136	0.131	0.005	Diff <2x LOR	----
		uranium	7440-61-1	E440	0.050	mg/kg	0.542	0.524	3.37%	30%	----

Sub-Matrix: **Soil/Solid**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Metals (QC Lot: 758598) - continued											
WT2223135-001	Anonymous	vanadium	7440-62-2	E440	0.20	mg/kg	34.3	33.2	3.36%	30%	----
		zinc	7440-66-6	E440	2.0	mg/kg	34.2	33.6	1.95%	30%	----
Metals (QC Lot: 758600)											
WT2223135-001	Anonymous	calcium, soluble ion content	7440-70-2	E484	0.50	mg/L	28.4	29.5	3.80%	30%	----
		magnesium, soluble ion content	7439-95-4	E484	0.50	mg/L	<0.50	<0.50	0	Diff <2x LOR	----
		sodium, soluble ion content	17341-25-2	E484	0.50	mg/L	2.07	2.04	0.03	Diff <2x LOR	----
Metals (QC Lot: 758602)											
WT2223135-001	Anonymous	boron, hot water soluble	7440-42-8	E487	0.10	mg/kg	<0.10	<0.10	0.00002	Diff <2x LOR	----
Speciated Metals (QC Lot: 758592)											
WT2223135-001	Anonymous	chromium, hexavalent [Cr VI]	18540-29-9	E532	0.10	mg/kg	<0.10	<0.10	0	Diff <2x LOR	----
Leachable Anions & Nutrients (QC Lot: 764057)											
EO2210338-001	Anonymous	sulfate, soluble ion content	14808-79-8	E236.SO4	20	mg/kg	36	37	0.6	Diff <2x LOR	----
Leachable Anions & Nutrients (QC Lot: 764058)											
EO2210338-001	Anonymous	chloride, soluble ion content	16887-00-6	E236.Cl	5.0	mg/kg	18.9	17.2	1.7	Diff <2x LOR	----
Volatile Organic Compounds (QC Lot: 758673)											
WT2223126-001	Anonymous	benzene	71-43-2	E611A	0.0050	mg/kg	<0.0050	<0.0050	0	Diff <2x LOR	----
		ethylbenzene	100-41-4	E611A	0.015	mg/kg	<0.015	<0.015	0	Diff <2x LOR	----
		toluene	108-88-3	E611A	0.050	mg/kg	<0.050	<0.050	0	Diff <2x LOR	----
		xylene, m+p-	179601-23-1	E611A	0.030	mg/kg	<0.030	<0.030	0	Diff <2x LOR	----
		xylene, o-	95-47-6	E611A	0.030	mg/kg	<0.030	<0.030	0	Diff <2x LOR	----
Hydrocarbons (QC Lot: 758595)											
WT2223135-001	Anonymous	F2 (C10-C16)	----	E601.SG-L	10	mg/kg	<10	10	0.3	Diff <2x LOR	----
		F3 (C16-C34)	----	E601.SG-L	50	mg/kg	<50	<50	0	Diff <2x LOR	----
		F4 (C34-C50)	----	E601.SG-L	50	mg/kg	<50	<50	0	Diff <2x LOR	----
Hydrocarbons (QC Lot: 758672)											
WT2223126-001	Anonymous	F1 (C6-C10)	----	E581.F1	5.0	mg/kg	<5.0	<5.0	0	Diff <2x LOR	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Soil/Solid**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 758601)						
conductivity (1:2 leachate)	----	E100-L	5	µS/cm	<5.00	----
Physical Tests (QCLot: 758607)						
moisture	----	E144	0.25	%	<0.25	----
Cyanides (QCLot: 758593)						
cyanide, weak acid dissociable	----	E336A	0.05	mg/kg	<0.050	----
Inorganics (QCLot: 759974)						
sulfides, acid volatile	----	E396-L	0.2	mg/kg	<0.20	----
Metals (QCLot: 758597)						
mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	----
Metals (QCLot: 758598)						
antimony	7440-36-0	E440	0.1	mg/kg	<0.10	----
arsenic	7440-38-2	E440	0.1	mg/kg	<0.10	----
barium	7440-39-3	E440	0.5	mg/kg	<0.50	----
beryllium	7440-41-7	E440	0.1	mg/kg	<0.10	----
boron	7440-42-8	E440	5	mg/kg	<5.0	----
cadmium	7440-43-9	E440	0.02	mg/kg	<0.020	----
chromium	7440-47-3	E440	0.5	mg/kg	<0.50	----
cobalt	7440-48-4	E440	0.1	mg/kg	<0.10	----
copper	7440-50-8	E440	0.5	mg/kg	<0.50	----
lead	7439-92-1	E440	0.5	mg/kg	<0.50	----
molybdenum	7439-98-7	E440	0.1	mg/kg	<0.10	----
nickel	7440-02-0	E440	0.5	mg/kg	<0.50	----
selenium	7782-49-2	E440	0.2	mg/kg	<0.20	----
silver	7440-22-4	E440	0.1	mg/kg	<0.10	----
thallium	7440-28-0	E440	0.05	mg/kg	<0.050	----
uranium	7440-61-1	E440	0.05	mg/kg	<0.050	----
vanadium	7440-62-2	E440	0.2	mg/kg	<0.20	----
zinc	7440-66-6	E440	2	mg/kg	<2.0	----
Metals (QCLot: 758600)						
calcium, soluble ion content	7440-70-2	E484	0.5	mg/L	<0.50	----
magnesium, soluble ion content	7439-95-4	E484	0.5	mg/L	<0.50	----
sodium, soluble ion content	17341-25-2	E484	0.5	mg/L	<0.50	----

Sub-Matrix: **Soil/Solid**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Metals (QCLot: 758602)						
boron, hot water soluble	7440-42-8	E487	0.1	mg/kg	<0.10	----
Speciated Metals (QCLot: 758592)						
chromium, hexavalent [Cr VI]	18540-29-9	E532	0.1	mg/kg	<0.10	----
Leachable Anions & Nutrients (QCLot: 764057)						
sulfate, soluble ion content	14808-79-8	E236.SO4	20	mg/kg	<20	----
Leachable Anions & Nutrients (QCLot: 764058)						
chloride, soluble ion content	16887-00-6	E236.Cl	5	mg/kg	<5.0	----
Volatile Organic Compounds (QCLot: 758673)						
benzene	71-43-2	E611A	0.005	mg/kg	<0.0050	----
ethylbenzene	100-41-4	E611A	0.015	mg/kg	<0.015	----
toluene	108-88-3	E611A	0.05	mg/kg	<0.050	----
xylene, m+p-	179601-23-1	E611A	0.03	mg/kg	<0.030	----
xylene, o-	95-47-6	E611A	0.03	mg/kg	<0.030	----
Hydrocarbons (QCLot: 758595)						
F2 (C10-C16)	----	E601.SG-L	10	mg/kg	<10	----
F3 (C16-C34)	----	E601.SG-L	50	mg/kg	<50	----
F4 (C34-C50)	----	E601.SG-L	50	mg/kg	<50	----
Hydrocarbons (QCLot: 758672)						
F1 (C6-C10)	----	E581.F1	5	mg/kg	<5.0	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Soil/Solid**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 758599)									
pH (1:2 soil:CaCl2-aq)	----	E108A	----	pH units	7 pH units	99.3	98.0	102	----
Physical Tests (QCLot: 758601)									
conductivity (1:2 leachate)	----	E100-L	5	µS/cm	1409 µS/cm	97.9	90.0	110	----
Physical Tests (QCLot: 758607)									
moisture	----	E144	0.25	%	50 %	99.1	90.0	110	----
Cyanides (QCLot: 758593)									
cyanide, weak acid dissociable	----	E336A	0.05	mg/kg	2.5 mg/kg	98.1	80.0	125	----
Inorganics (QCLot: 759974)									
sulfides, acid volatile	----	E396-L	0.2	mg/kg	2.496 mg/kg	87.3	70.0	130	----
Metals (QCLot: 758597)									
mercury	7439-97-6	E510	0.005	mg/kg	0.1 mg/kg	102	80.0	120	----
Metals (QCLot: 758598)									
antimony	7440-36-0	E440	0.1	mg/kg	100 mg/kg	99.2	80.0	120	----
arsenic	7440-38-2	E440	0.1	mg/kg	100 mg/kg	102	80.0	120	----
barium	7440-39-3	E440	0.5	mg/kg	25 mg/kg	95.4	80.0	120	----
beryllium	7440-41-7	E440	0.1	mg/kg	10 mg/kg	88.6	80.0	120	----
boron	7440-42-8	E440	5	mg/kg	100 mg/kg	87.4	80.0	120	----
cadmium	7440-43-9	E440	0.02	mg/kg	10 mg/kg	98.0	80.0	120	----
chromium	7440-47-3	E440	0.5	mg/kg	25 mg/kg	94.2	80.0	120	----
cobalt	7440-48-4	E440	0.1	mg/kg	25 mg/kg	95.2	80.0	120	----
copper	7440-50-8	E440	0.5	mg/kg	25 mg/kg	92.7	80.0	120	----
lead	7439-92-1	E440	0.5	mg/kg	50 mg/kg	101	80.0	120	----
molybdenum	7439-98-7	E440	0.1	mg/kg	25 mg/kg	98.3	80.0	120	----
nickel	7440-02-0	E440	0.5	mg/kg	50 mg/kg	96.2	80.0	120	----
selenium	7782-49-2	E440	0.2	mg/kg	100 mg/kg	93.8	80.0	120	----
silver	7440-22-4	E440	0.1	mg/kg	10 mg/kg	85.1	80.0	120	----
thallium	7440-28-0	E440	0.05	mg/kg	100 mg/kg	102	80.0	120	----
uranium	7440-61-1	E440	0.05	mg/kg	0.5 mg/kg	101	80.0	120	----
vanadium	7440-62-2	E440	0.2	mg/kg	50 mg/kg	98.8	80.0	120	----
zinc	7440-66-6	E440	2	mg/kg	50 mg/kg	96.0	80.0	120	----

Sub-Matrix: **Soil/Solid**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Metals (QCLot: 758600)									
calcium, soluble ion content	7440-70-2	E484	0.5	mg/L	300 mg/L	106	80.0	120	----
magnesium, soluble ion content	7439-95-4	E484	0.5	mg/L	50 mg/L	99.4	80.0	120	----
sodium, soluble ion content	17341-25-2	E484	0.5	mg/L	50 mg/L	101	80.0	120	----
Metals (QCLot: 758602)									
boron, hot water soluble	7440-42-8	E487	0.1	mg/kg	1.33333 mg/kg	100	70.0	130	----
Speciated Metals (QCLot: 758592)									
chromium, hexavalent [Cr VI]	18540-29-9	E532	0.1	mg/kg	0.8 mg/kg	93.8	80.0	120	----
Leachable Anions & Nutrients (QCLot: 764057)									
sulfate, soluble ion content	14808-79-8	E236.SO4	20	mg/kg	5000 mg/kg	104	70.0	130	----
Leachable Anions & Nutrients (QCLot: 764058)									
chloride, soluble ion content	16887-00-6	E236.Cl	5	mg/kg	5000 mg/kg	102	80.0	120	----
Volatile Organic Compounds (QCLot: 758673)									
benzene	71-43-2	E611A	0.005	mg/kg	3.475 mg/kg	91.1	70.0	130	----
ethylbenzene	100-41-4	E611A	0.015	mg/kg	3.475 mg/kg	100	70.0	130	----
toluene	108-88-3	E611A	0.05	mg/kg	3.475 mg/kg	94.4	70.0	130	----
xylene, m+p-	179601-23-1	E611A	0.03	mg/kg	6.95 mg/kg	103	70.0	130	----
xylene, o-	95-47-6	E611A	0.03	mg/kg	3.475 mg/kg	99.1	70.0	130	----
Hydrocarbons (QCLot: 758595)									
F2 (C10-C16)	----	E601.SG-L	10	mg/kg	1040.925 mg/kg	104	70.0	130	----
F3 (C16-C34)	----	E601.SG-L	50	mg/kg	1783.035 mg/kg	105	70.0	130	----
F4 (C34-C50)	----	E601.SG-L	50	mg/kg	802.11 mg/kg	109	70.0	130	----
Hydrocarbons (QCLot: 758672)									
F1 (C6-C10)	----	E581.F1	5	mg/kg	69.1875 mg/kg	104	80.0	120	----

Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Soil/Solid**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Cyanides (QCLot: 758593)										
WT2223135-001	Anonymous	cyanide, weak acid dissociable	----	E336A	1.24 mg/kg	2.5 mg/kg	99.3	70.0	130	----
Volatile Organic Compounds (QCLot: 758673)										
WT2223126-001	Anonymous	benzene	71-43-2	E611A	2.09 mg/kg	3.125 mg/kg	96.1	60.0	140	----
		ethylbenzene	100-41-4	E611A	2.46 mg/kg	3.125 mg/kg	113	60.0	140	----
		toluene	108-88-3	E611A	2.28 mg/kg	3.125 mg/kg	105	60.0	140	----
		xylene, m+p-	179601-23-1	E611A	4.88 mg/kg	6.25 mg/kg	112	60.0	140	----
		xylene, o-	95-47-6	E611A	2.39 mg/kg	3.125 mg/kg	110	60.0	140	----
Hydrocarbons (QCLot: 758595)										
WT2223135-001	Anonymous	F2 (C10-C16)	----	E601.SG-L	705 mg/kg	1040.925 mg/kg	79.8	60.0	140	----
		F3 (C16-C34)	----	E601.SG-L	1200 mg/kg	1783.035 mg/kg	79.5	60.0	140	----
		F4 (C34-C50)	----	E601.SG-L	647 mg/kg	802.11 mg/kg	95.1	60.0	140	----
Hydrocarbons (QCLot: 758672)										
WT2223126-001	Anonymous	F1 (C6-C10)	----	E581.F1	31.3 mg/kg	62.5 mg/kg	72.0	60.0	140	----

Reference Material (RM) Report

A Reference Material (RM) is a homogenous material with known and well-established analyte concentrations. RMs are processed in an identical manner to test samples, and are used to monitor and control the accuracy and precision of a test method for a typical sample matrix. RM results are expressed as percent recovery of the target analyte concentration. RM targets may be certified target concentrations provided by the RM supplier, or may be ALS long-term mean values (for empirical test methods).

Sub-Matrix:

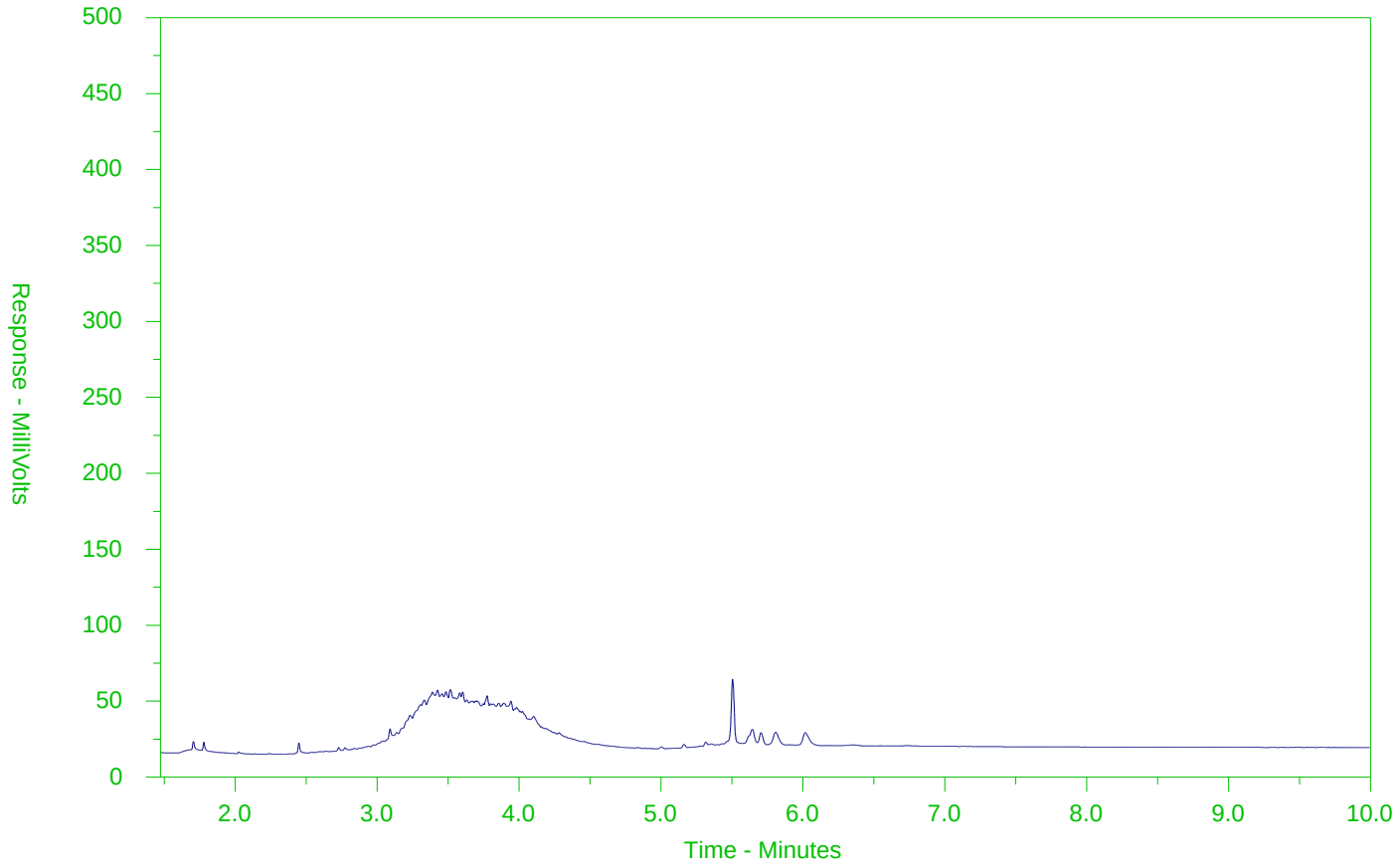
					Reference Material (RM) Report				
					RM Target	Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Concentration	RM	Low	High	Qualifier
Physical Tests (QCLot: 758601)									
	RM	conductivity (1:2 leachate)	----	E100-L	1031.5 µS/cm	98.1	70.0	130	----
Physical Tests (QCLot: 763428)									
	RM	oxidation-reduction potential [ORP]	----	E125	475 mV	98.7	80.0	120	----
Metals (QCLot: 758597)									
	RM	mercury	7439-97-6	E510	0.0585 mg/kg	100	70.0	130	----
Metals (QCLot: 758598)									
	RM	antimony	7440-36-0	E440	3.99 mg/kg	107	70.0	130	----
	RM	arsenic	7440-38-2	E440	3.73 mg/kg	116	70.0	130	----
	RM	barium	7440-39-3	E440	105 mg/kg	123	70.0	130	----
	RM	beryllium	7440-41-7	E440	0.349 mg/kg	114	70.0	130	----
	RM	boron	7440-42-8	E440	8.5 mg/kg	120	40.0	160	----
	RM	cadmium	7440-43-9	E440	0.91 mg/kg	113	70.0	130	----
	RM	chromium	7440-47-3	E440	101 mg/kg	116	70.0	130	----
	RM	cobalt	7440-48-4	E440	6.9 mg/kg	110	70.0	130	----
	RM	copper	7440-50-8	E440	123 mg/kg	111	70.0	130	----
	RM	lead	7439-92-1	E440	267 mg/kg	119	70.0	130	----
	RM	molybdenum	7439-98-7	E440	1.03 mg/kg	118	70.0	130	----
	RM	nickel	7440-02-0	E440	26.7 mg/kg	112	70.0	130	----
	RM	silver	7440-22-4	E440	4.06 mg/kg	94.3	70.0	130	----
	RM	thallium	7440-28-0	E440	0.0786 mg/kg	115	40.0	160	----
	RM	uranium	7440-61-1	E440	0.52 mg/kg	115	70.0	130	----
	RM	vanadium	7440-62-2	E440	32.7 mg/kg	114	70.0	130	----
	RM	zinc	7440-66-6	E440	297 mg/kg	111	70.0	130	----
Metals (QCLot: 758600)									
	RM	calcium, soluble ion content	7440-70-2	E484	86.59 mg/L	93.0	70.0	130	----
	RM	magnesium, soluble ion content	7439-95-4	E484	25.74 mg/L	92.8	70.0	130	----
	RM	sodium, soluble ion content	17341-25-2	E484	30.05 mg/L	93.2	70.0	130	----
Metals (QCLot: 758602)									

Sub-Matrix:

					Reference Material (RM) Report				
					RM Target	Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Concentration	RM	Low	High	Qualifier
Metals (QCLot: 758602) - continued									
	RM	boron, hot water soluble	7440-42-8	E487	1.4938 mg/kg	101	60.0	140	----
Speciated Metals (QCLot: 758592)									
	RM	chromium, hexavalent [Cr VI]	18540-29-9	E532	172 mg/kg	95.0	70.0	130	----
Leachable Anions & Nutrients (QCLot: 764057)									
	RM	sulfate, soluble ion content	14808-79-8	E236.SO4	217 mg/kg	118	60.0	140	----
Leachable Anions & Nutrients (QCLot: 764058)									
	RM	chloride, soluble ion content	16887-00-6	E236.Cl	673 mg/kg	101	70.0	130	----

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: WT2223205-001-E601.SG-L
Client Sample ID: BH4 / SS-1 / 0'-2'



←F2→	←F3→	←F4→	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
Gasoline →		← Motor Oils/Lube Oils/Grease →	
← Diesel/Jet Fuels →			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

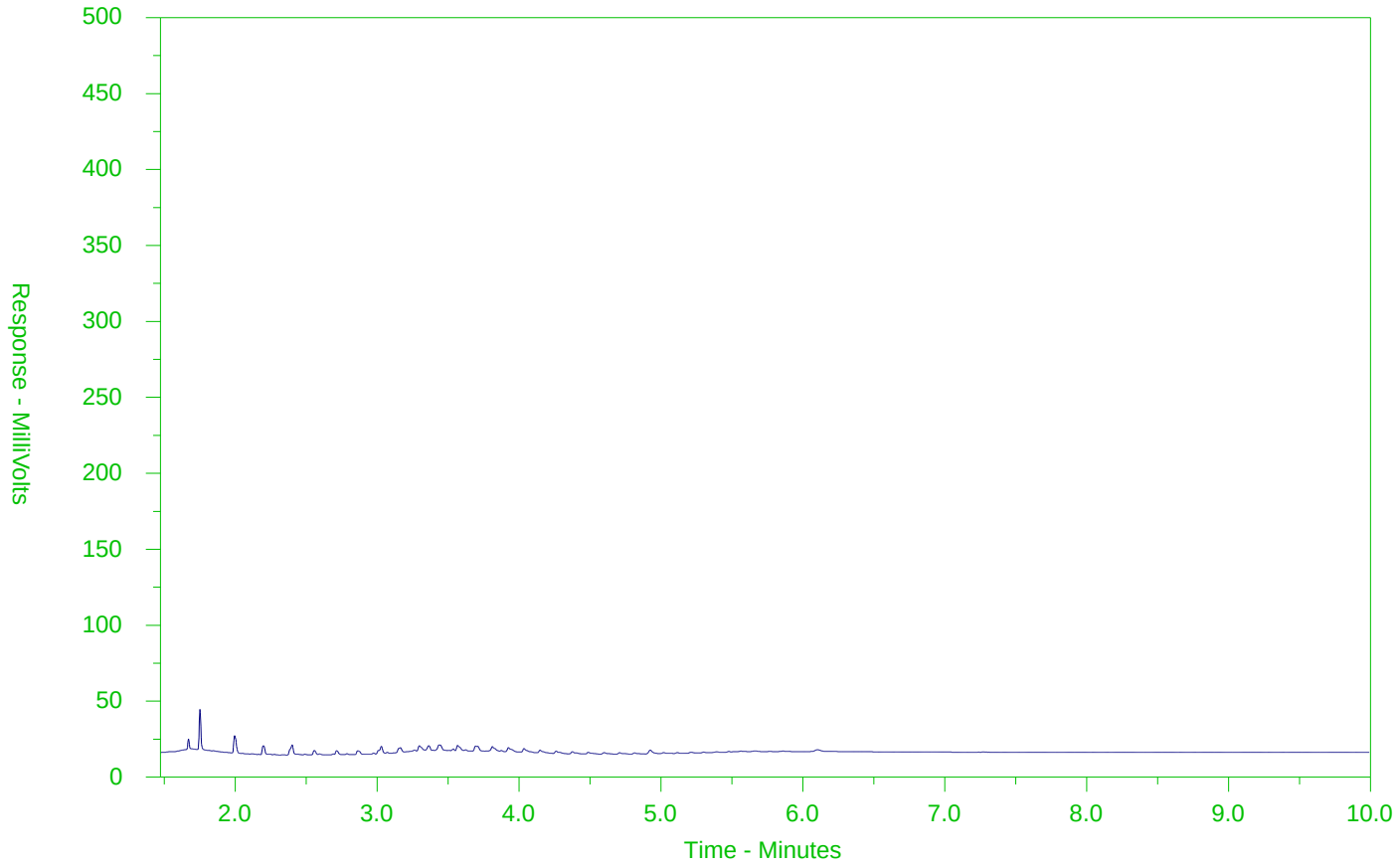
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: WT2223205-002-E601.SG-L
Client Sample ID: BH2 / SS-2 / 2.5'-4.5'



←F2→	←F3→	←F4→	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
Gasoline →		← Motor Oils/Lube Oils/Grease →	
← Diesel/Jet Fuels →			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

Chain of Custody (COC) / Analytical Request Form

COC Number: 20 - 1002443

Canada Toll Free: 1 800 668 9878

Pa

www.alsglobal.com

Environmental Division
Waterloo
Work Order Reference
WT2223205

Telephone : + 1 519 886 6910

Report To	Contact and company name below will appear on the final report	Reports / Recipients	Turnaround Time (TAT) Requested
Company:	Pinchin Ltd.	Select Report Format: ☑ PDF ☑ EXCEL ☐ EDD (DIGITAL)	☑ Routine [R] if received by 3pm M-F - no surcharges apply
Contact:	Kathryn Thrams	Merge QC/QCI Reports with COA ☑ YES ☐ NO ☐ N/A	☐ 4 day [P4] if received by 3pm M-F - 20% rush surcharge min
Phone:	5194046483	☐ Compare Results to Criteria on Report - provide details below if box checked	☐ 3 day [P3] if received by 3pm M-F - 25% rush surcharge mi
	Company address below will appear on the final report	Select Distribution: ☐ EMAIL ☐ MAIL ☐ FAX	☐ 2 day [P2] if received by 3pm M-F - 50% rush surcharge mi
Street:	225 - Labrador Dr, Unit 1	Email 1 or Fax kthrams@pinchin.com	☐ 1 day [E] if received by 3pm M-F - 100% rush surcharge mi
City/Province:	Waterloo / ON	Email 2	☐ Same day [E2] if received by 10am M-S - 200% rush surcharge may apply to rush requests on weekends, statutory holidays and
Postal Code:	N2K 4M6	Email 3	Date and Time Required for all E&P TATs:
Invoice To	Same as Report To ☑ YES ☐ NO	Invoice Recipients	For all tests with rush TATs requested, pl
	Copy of Invoice with Report ☐ YES ☐ NO	Select Invoice Distribution: ☐ EMAIL ☐ MAIL ☐ FAX	
Company:	Pinchin Ltd.	Email 1 or Fax ap@pinchin.com	
Contact:	Accounts Payables	Email 2 kthrams@pinchin.com	

Project Information		Oil and Gas Required Fields (client use)	
ALS Account # / Quote #:	PINC100 / 2022 SOA	AFE/Cost Center:	PO#
Job #:	315520	Major/Minor Code:	Routing Code:
PO / AFE:		Requisitioner:	
LSD:		Location:	
ALS Lab Work Order # (ALS use only):	YG	ALS Contact: Amanda Overholster	Sampler: J. Desai

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (ALS use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	Excessive Soil 1	Excessive Soil 1	Excessive Soil 1	COOLABILITY PACKAGE	SAMPLES ON HOLD	EXTENDED STORAGE REQUIRED	SUSPECTED HAZARD (see notes)
	BH4 / SS-1 / 0'-2'	NOV-25-2022	10:15AM	Soil	4	R	R					
	BH2 / SS-2 / 2.5-4.5'	NOV-25-2022	12:00 PM	Soil	4		R					
	BH4 / SS-2 / 2.5'-4.5'	NOV-25-2022	10:20AM	Soil	1			R				

Drinking Water (DW) Samples[1] (client use)	Notes / Specify Limits for result evaluation by selecting from drop-down below (Excel COC only)
Are samples taken from a Regulated DW System? ☐ YES ☐ NO	REG 406/19 T1, T2.1 ESAS RPI
Are samples for human consumption/ use? ☐ YES ☐ NO	

SAMPLE RECEIPT DETAILS (ALS use only)

Cooling Method: ☐ NONE ☐ ICE ☐ ICE PACKS ☐ FROZEN ☐ COOLING INITIATED

Submission Comments identified on Sample Receipt Notification: ☐ YES ☐ NO

Cooler Custody Seals Intact: ☐ YES ☐ N/A Sample Custody Seals Intact: ☐ YES ☐ N/A

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			
				17.9			

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (ALS use only)			FINAL SHIPMENT RECEPTION (ALS use only)		
Released by: J. Desai	Date: 25-NOV-22	Time: 2:20	Received by:	Date:	Time:	Received by:	Date: 11/25/22	Time: 1530

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

AUG 2020 FRONT

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a Regulated Drinking Water (DW) System, please submit using an Authorized DW COC form.

VS-155; SOL 812

APPENDIX V
Report Limitations and Guidelines for Use

REPORT LIMITATIONS & GUIDELINES FOR USE

This information has been provided to help manage risks with respect to the use of this report.

GEOTECHNICAL SERVICES ARE PERFORMED FOR SPECIFIC PURPOSES, PERSONS AND PROJECTS

This report was prepared for the exclusive use of the Client and their authorized agents, subject to the conditions and limitations contained within the duly authorized work plan. Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of the third parties. If additional parties require reliance on this report, written authorization from Pinchin will be required. Pinchin disclaims responsibility of consequential financial effects on transactions or property values, or requirements for follow-up actions and costs. No other warranties are implied or expressed. Furthermore, this report should not be construed as legal advice.

SUBSURFACE CONDITIONS CAN CHANGE

This geotechnical report is based on the existing conditions at the time the study was performed, and Pinchin's opinion of soil conditions are strictly based on soil samples collected at specific test hole locations. The findings and conclusions of Pinchin's reports may be affected by the passage of time, by manmade events such as construction on or adjacent to the Site, or by natural events such as floods, earthquakes, slope instability or groundwater fluctuations.

LIMITATIONS TO PROFESSIONAL OPINIONS

Interpretations of subsurface conditions are based on field observations from test holes that were spaced to capture a 'representative' snap shot of subsurface conditions. Site exploration identifies subsurface conditions only at points of sampling. Pinchin reviews field and laboratory data and then applies professional judgment to formulate an opinion of subsurface conditions throughout the Site. Actual subsurface conditions may differ, between sampling locations, from those indicated in this report.

LIMITATIONS OF RECOMMENDATIONS

Subsurface soil conditions should be verified by a qualified geotechnical engineer during construction. Pinchin should be notified if any discrepancies to this report or unusual conditions are found during construction.

Sufficient monitoring, testing and consultation should be provided by Pinchin during construction and/or excavation activities, to confirm that the conditions encountered are consistent with those indicated by the test hole investigation, and to provide recommendations for design changes should the conditions revealed during the work differ from those anticipated. In addition, monitoring, testing and consultation by Pinchin should be completed to evaluate whether or not earthwork activities are completed in

accordance with our recommendations. Retaining Pinchin for construction observation for this project is the most effective method of managing the risks associated with unanticipated conditions. However, please be advised that any construction/excavation observations by Pinchin is over and above the mandate of this geotechnical evaluation and therefore, additional fees would apply.

MISINTERPRETATION OF GEOTECHNICAL ENGINEERING REPORT

Misinterpretation of this report by other design team members can result in costly problems. You could lower that risk by having Pinchin confer with appropriate members of the design team after submitting the report. Also retain Pinchin to review pertinent elements of the design team's plans and specifications. Contractors can also misinterpret a geotechnical engineering or geologic report. Reduce that risk by having Pinchin participate in pre-bid and preconstruction conferences, and by providing construction observation. Please be advised that retaining Pinchin to participation in any 'other' activities associated with this project is over and above the mandate of this geotechnical investigation and therefore, additional fees would apply.

CONTRACTORS RESPONSIBILITY FOR SITE SAFETY

This geotechnical report is not intended to direct the contractor's procedures, methods, schedule or management of the work Site. The contractor is solely responsible for job Site safety and for managing construction operations to minimize risks to on-Site personnel and to adjacent properties. It is ultimately the contractor's responsibility that the Ontario Occupational Health and Safety Act is adhered to, and Site conditions satisfy all 'other' acts, regulations and/or legislation that may be mandated by federal, provincial and/or municipal authorities.

SUBSURFACE SOIL AND/OR GROUNDWATER CONTAMINATION

This report is geotechnical in nature and was not performed in accordance with any environmental guidelines. As such, any environmental comments are very preliminary in nature and based solely on field observations. Accordingly, the scope of services do not include any interpretations, recommendations, findings, or conclusions regarding the, assessment, prevention or abatement of contaminants, and no conclusions or inferences should be drawn regarding contamination, as they may relate to this project. The term "contamination" includes, but is not limited to, molds, fungi, spores, bacteria, viruses, PCBs, petroleum hydrocarbons, inorganics, pesticides/insecticides, volatile organic compounds, polycyclic aromatic hydrocarbons and/or any of their by-products.

Pinchin will not be responsible for any consequential or indirect damages. Pinchin will only be held liable for damages resulting from the negligence of Pinchin. Pinchin will not be liable for any losses or damage if the Client has failed, within a period of two years following the date upon which the claim is discovered within the meaning of the Limitations Act, 2002 (Ontario), to commence legal proceedings against Pinchin to recover such losses or damage.