ARCHITECTURAL SPECIFICATION

DIVISION 28 ELECTRONIC SAFETY AND SECURITY (UNDER SEPARATE COVER)

DIVISION 32 EXTERIOR IMPROVEMENTS

DIVISION 33 UTILITIES

PPENDICES

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PART 1 - GENERAL

1.1 WORK INCLUDED

Work of this Contract comprises the construction of Urban Arts Eco-Rejuvenation and Innovative Garden Project.

1.1.1 Perform Work under one Contract; the Contract will be in the form of the Agreement between Owner and Contractor, Canadian Standard Construction Document, CCDC 2, 2008, Stipulated Price Contract as amended by the Supplementary Conditions.

1.1.2 Contract includes the new renovation work on 5 Bartonville Ave E, Toronto.

1.2 RELATIONS OF TRADES

1.2.1 The Contract Specifications included in the drawing have been generally divided into trade sections for the purpose of ready reference.

1.2.2 The Contractor is responsible for coordinating all trades. He is solely responsible for determining the lines of demarcation between Contractor and/or trades. Neither the Consultant nor the Owner assumes any responsibility for any such determination or for any dispute arising concerning it. No extras will be considered due to any such dispute concerning either labour or materials.

1.2.3 Specifications and drawings form an integral part of the Contract Documents. Any subject or item omitted from one, but which is mentioned or reasonably implied in the other, shall be considered as properly and sufficiently specified and will be part of the Work.

1.3 ADDITIONAL DRAWINGS

1.3.1 Consultant may furnish additional drawings to assist proper execution of the Work. These drawings will be issued for clarification only. Such drawings, however, shall have the same meaning and intent as if they were included with plans referred to in the Contract Documents.

1.4 EXISTING SITE CONDITIONS

1.4.1 There are no unusual or remarkable existing site conditions beyond those shown or indicated on the drawings and/or specifications.

1.4.2 The Contractor shall assume the work site based on the existing conditions as shown on the drawings and visible on the job site at the time of the closing of the tender. All excavation, stockpiling, removal, importing and/or grading of soils is to be included in the work of this Contract. Refer to site plan drawings and soils investigation records.

1.4.3 Inspection of the site during the tender period is **MANDATORY** for all Contractors and the site visit to be held on (Refer to City Tender Document)

1.4.4 Minor adjustments (not to exceed 150 mm) to the level of sodded areas, berms, etc., will be permitted, to the approval of the Landscape Architect, to suit the quantity of fill and top soil on site.

1.5 BYLAWS, PERMITS AND APPROVALS

1.5.1 Nothing indicated on the Drawings or Specifications is intended to be in conflict with any law, by-law or regulation of Municipal, Provincial, or similar Authority Having Jurisdiction.

1.5.2 Work of this Contract must conform with such laws, by-laws and/or regulations. Any required variation to, or deviation from, the drawings and specifications, shall be performed in accordance with the Stipulated Price Contract , Canadian Standard Construction Document, CCDC 2,as attached, CHANGES IN THE WORK.

1.5.3 Furnish inspection certificates and/or permits as may be applicable as evidence that the installed Work conforms with laws, by-laws and regulations of Authorities Having Jurisdiction.

1.5.4 Each subtrade shall obtain and pay for all permits and licenses required by Municipal, Provincial, or other Authorities Having Jurisdiction, particular to their trade.

1.5.5 It is the final responsibility of the General Contractor to obtain all the required approvals and permits and include in his Total Stipulated Price, the cost of such approvals, permits and fees. The only exception is the Building Permit, which will be applied for by the Consultant and paid for by the Owner.

1.5.6 Any revisions or deviations required by any Authorities Having Jurisdiction must be reviewed by the Consultants before implementation.

1.6 ORGANIZATION

1.6.1 Organize the Work of each section as required for satisfactory and expeditious completion of the Work. Take field dimensions required for the Work. Fabricate and install work to suit field dimensions and conditions.

1.6.2 If applicable, take into account existing work to ensure best arrangements of components in available space. Contact the Consultant prior to commencing Work in critical locations and interface with other Contractors' Work.

1.6.3 Provide all forms, templates, anchors, sleeves, inserts and accessories required to be installed in the Work. Set in place, or instruct the applicable subtrade as to their location. Pay costs of extra work, if required, as a result of a failure to comply with these requirements at the proper time.

1.6.4 Before starting his work and from time to time as the work progresses, each Subcontractor shall examine the work and materials installed by the other Subcontractors insofar as it effects his own work, and the General Contractor shall promptly notify the Consultant IN WRITING, if any condition exists that will prevent any Subcontractor from giving a satisfactory result in his own work.

1.6.5 Should any Subcontractor start his own work without such notification, it shall be construed as an acceptance by him of all preceding work and as a waiver of all claims or questions as to its suitability for receiving his work.

1.7 CANADIAN PRODUCTS AND LOCAL LABOUR

1.7.1 To the extent that the same are available and consistent with the proper economy and expeditious completion of the Contract, Canadian equipment, materials, products and other such applicable items are preferred by the Owner to be used in the Work, wherever possible and practical.

1.8 WARRANTY

1.8.1 Warrant the work of the Entire Building against defects in materials and workmanship for a period

of one (1) years for the first year of construction from the date of Substantial Completion. Repairs are to be completed to no additional cost to the Owner/Tenant

PART 2 - PRODUCTS

2.1 MATERIALS AND WORKMANSHIP

2.1.1 All materials shall be new and the best of their respective kinds. Pre-packaged materials shall be delivered and stored in unopened containers.

2.1.2 All work performed under this Contract shall be done by mechanics skilled in their respective trades. They shall make use of such templates, jigs or special tools as may be required for the operation involved.

2.1.3 The acceptance of any materials or workmanship shall not be a bar to their subsequent rejection, if found defective.

2.1.4 Adequate, dry storage facilities shall be provided and all stored materials shall be protected from damage and theft.

2.1.5 All Contractors will do Work in accordance with the best industry practice of the type of work specified, unless the Contract Documents stipulate more precise requirements, in which case, the more precise requirements shall govern.

2.1.6 Do Work in a neat, plumb & square manner. Ensure that various work components are properly installed, forming tight joints and appropriately aligned junctions, edges and surfaces, free of warps, twists, waves, or other such irregularities.

2.1.7 Wherever indicated on the drawings or specifications, or in the manufacturers' / suppliers' written instructions, arrange to have manufacturers' / installer's representatives inspect the Work which incorporates their materials, products or items.

2.1.8 Do not permit materials to come in contact with other materials such conditions may result in corrosion, staining, discolouration or deterioration of the completed Work. Provide compatible, durable separators where such contact is unavoidable.

2.1.9 The design of the Work is based on the full interaction of its component parts. No provisions have been made for conditions occurring during construction. Ensure that no part of the Work is subjected to a load which will endanger its safety or which might cause permanent deformation.

2.1.10 Conceal pipes, ducts, conduit, wiring and other such items requiring concealment preferably in, wall or ceiling construction of all finished areas. If in doubt as to method of concealment, or intent of the Contract Documents in this regard, request clarification from the Consultant before proceeding with the Work.

2.1.11 Lay out mechanical and electrical work well in advance of concrete placement and furring installation to allow for proper concealment. Test and inspect Work before applying pipe covering and before it is concealed.

2.1.12 Provide and maintain control lines and levels required for the Work. Lay out the Work in accordance with these lines and levels and dimensions indicated on the drawings.

2.1.13 Verify lines, levels and dimensions and report any errors or inconsistencies on the drawings to the Consultants.

2.1.14 Final responsibility of satisfactory completion of all the Work, however, lies with the General Contractor.

3 PART 3 - EXECUTION

3.1 QUALITY CONTROL

3.1.1 The Consultants and authorized Owner staff shall have access to all areas of the Work, including any off site construction facilities.

3.1.2 The General Contractor shall give timely notice requesting inspection if Work is designated for special tests, inspections, or approvals by the Consultants, or any other authorized Owner staff, or testing and inspection company.

3.1.3 If the General Contract covers, or permits to be covered Work that has been designated as outlined above, he shall uncover such work, have the inspections and tests satisfactorily completed and make good such work at no additional cost to the Owner.

3.1.4 The Consultants or the Owner may order any part of the Work to be examined, if such Work is suspected not to be according to the Contract Documents. If, upon examination, such work is found not to be in accordance with the Contract Documents, then the General Contractor shall correct such Work and pay for cost of examinations and correction. If such Work is found to be in full accordance with the Contract Documents, the Owner shall pay for the cost of examination and making good.

3.1.5 If defects are revealed during inspection and/or testing, the appointed agency may request additional inspection and/or testing to ascertain the full degree of defects. The General Contractor shall correct the defects and irregularities as reported by the inspection and/or testing agency, at no additional cost to the Owner and the General Contractor shall pay all associated costs for retesting and reinspection.

3.1.6 The General Contractor shall provide any tools, materials or equipment that may be required by the inspection and/or testing agencies in retesting the Work. (E.g. Video camera rental to reinspect incorrectly installed sewer lines.)

3.1.7 The employment of inspection and/or testing agencies does not, in any way, affect the General Contractor's responsibility to perform the Work in strict accordance with the Contract Documents.

3.1.8 The General Contractor shall remove all defective work, whether the result of poor workmanship by him or his subtrades, use of defective or damaged products, whether or not incorporated into the Work and any Work that has been rejected by the Consultants or the Owner's representative as failing to conform to the Contract Documents. Replacement and execution of the affected Work shall be done in full accordance with the Contract Documents, making good other trades' work damaged by such removals or replacements at no additional charge to the Owner.

3.1.9 If, in the opinion of the Consultant and/or the Owner, it is not expeditious to correct the defective Work, or Work not performed in accordance with the Contract Documents, the Owner, may, at its sole discretion, deduct from the Contract Price, the difference in value between the work performed and that required by the Contract Documents, the amounts of which shall be determined by the Owner.

.1 The notable exception to the above item is a faulty installation of base and asphalt paving. If, the inspection agency, after performing random test holes to determine

compaction and thickness of sub base, base and asphalt, determines that either one or both, are not according to what was specified in the Contract Documents, the Owner will not accept credits for such inconsistencies but rather, demand that any such installation be removed and redone in its entirety, at the pleasure and convenience of the Owner, but within the first year of the warranty period.

3.2 OVERTIME

3.2.1 The General Contractor must include in his Total Stipulated Tender Price, all costs for after hours and overtime work and weekend work which may be necessary to complete the Work, in accordance with the Completion Dates specified in the Form of Tender.

3.2.2 The Owner shall not entertain requests for any payments in connection with overtime work that may be required by the General Contractor, or any of his subtrades, in order to comply with the above referenced dates.

3.3 SCAFFOLDING

3.3.1 All necessary scaffolding shall be provided and constructed according to all by-laws and safety regulations. It shall be removed promptly and completely when no longer required.

3.4 WINTER CONSTRUCTION - WINTER ENCLOSURE & TEMPORARY HEATING

3.4.1 Provide weather-tight closures to unfinished door and window openings, tops of shafts and other openings in floors and roofs. Close off floor areas where walls are not finished; seal off other openings; enclose building interior work area for temporary heat.

3.4.2 Provide temporary weather-tight heated enclosures over and around portions of the work to facilitate construction of concrete and masonry elements during winter weather conditions.

3.4.3 If the work is undertake during winter conditions, the Contractor is to employ comprehensive measures to ensure that structural and/or cosmetic damage due to freezing/thawing or frost does not affect the work. Open trenches, footings, foundations, and underground services in particular are to be kept frost-free at all times until full earth ground cover is restored.

3.4.4 Frozen fill or earth is not to be used for backfilling purposes. Under conditions where on-site materials are frozen, backfill with Type 3 fill “Crushed Run Limestone”.

3.4.5 Winter Enclosure, Winter Heating, Defrosting, Frost Removal requirements shall be the responsibility of the Contractor. The Owner will not consider additional payments for such work except related conditions which are documented to exceed “Ten Year Storm” or “Ten Year” cold and frost depth conditions as verified by Environment Canada data.

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

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

3.4.8 Maintain temperatures of minimum 10 degrees Celsius in area where construction is in progress unless otherwise indicated in the contract documents. Protect exposure and adjacent services from freezing. Repair at no cost to the Owner any such services, buildings or other utilities disrupted by freezing.

3.4.9 Ventilated heated areas and keep structures free from exhaust combustion gases.

3.4.10 The permanent heating system of the building or portions thereof may be used when available only upon written permission by consultant.

3.5 PROTECTION OF OTHER WORK

3.5.1 Each trade shall avoid damage to other trades and shall take all measures necessary and provide all masking and materials necessary, to provide adequate protection.

3.5.2 Each Subcontractor shall be held responsible for all damage to work installed by others that is caused by this work or by anyone employed by him.

3.5.3 Patching and repairing of damaged work shall be done by the Contractor who installed the work, as directed by the Consultant, but the cost of same, shall be paid for by the Contractor who is responsible for the damage.

3.6 FASTENINGS

3.6.1 All fastenings must be permanent, of same metal, or compatible with any metals with which they are in contact, of adequate size and spacing, to ensure permanent anchorage against load or shear.

3.6.2 Exposed fastenings must be evenly spaced, neatly laid out and must not mar surfaces of prefinished materials.

3.6.3 No ram setting or similar techniques will be permitted, without prior written approval of the Consultant.

3.7 SUPPLY AND INSTALL

3.7.1 Unless specifically noted, “supply only”, any reference to supply intends the **supply and installation** of material or item so noted.

3.8 RENOVATION TO AN EXISTING OCCUPIED BUILDING

3.8.1 All access to the operating Joseph Shepard building will be made after hours or on weekends.

3.8.2 Connection of any services must be made after hours and in such a way that it leaves no disturbance to materials or systems, nor any exposed construction conditions within the operating building area.

3.8.3 The General Contractor shall maintain construction fencing at all times.

3.8.4 Catering trucks are not permitted on the site whatsoever.

3.8.5 Contractor shall minimize nuisances to the building operation such as noise, dust, odours. Shall be done after hours (after 4:00 p.m., or during the weekends).

3.9 OCCUPATION BEFORE COMPLETION

3.9.1 If the General Contractor, for any reason, does not have the Project completed by even the specified completion date and the Owner, of necessity, is forced to occupy any part of the building before the whole of the Work is completed, the Contractor will not be entitled to any

indemnity for interference with their operation **and** a renegotiated Per Diem Liquidated Damages will continue to be calculated, even though the Owner has occupied the building.

3.10 GENERAL REQUIREMENTS

3.10.1 All Contractors shall examine carefully all drawings and specifications to inform themselves fully of all conditions and limitations pertaining to the work of the contract.

3.10.2 All Contractors shall co-operate and co-ordinate their work for the proper completion of the work, including co-ordination of delivery dates and commencement of subtrades work.

3.10.3 The responsibility for all work, including temporary structures, shoring and erection shall at all times rest with the General Contractor and his Subcontractors. The Consultant will review construction methods and shop drawings for general arrangements only. The method of obtaining the results contemplated by the Contract Documents shall be determined by the General Contractor.

3.10.4 The undertaking of period site review by the Consultant or Owner's Representative shall not be construed as supervision of actual construction, nor make them responsible for providing a safe place for work, visit, use, access, travel, or occupancy of the Consultant's or Owner's Representative.

3.10.5 The General Contractor shall be fully responsible for coordinating and expediting the work of all Subcontractors and shall employ the necessary and qualified personnel to provide the required quality of labour and materials and to prevent delays in the progress of the project. Each trade shall be afforded all reasonable opportunities for the installation of its work and for the storage and handling of its materials.

3.11 COORDINATION

3.11.1 The General Contractor shall coordinate all work and preparation on which subsequent work depends to facilitate mutual progress, and to prevent any conflict.

3.11.2 The General Contractor shall ensure that each trade makes known, for the information of the General Contractor and other trades, the environmental and surface conditions required for the execution of its work; and that each trade makes known the sequence of others' work required for installation of its work.

3.11.3 The General Contractor shall ensure that each trade, before commencing work, knows the requirements for subsequent work and that each trade is assisted in the execution of its preparatory work by trades whose work depends upon it.

3.11.4 The General Contractor shall ensure that shop and layout drawings, templates, and all information necessary for the location and installation of materials, openings, inserts, anchors, accessories, fastenings, connections and access panels are provided by each trade whose work requires cooperative location and installation by other trades and that such information is communicated to the applicable installer.

3.11.5 The General Contractor shall ensure that delivery of materials supplied by one trade to be installed by another, is well before the installation begins.

3.11.6 The General Contractor shall inform all trades that giving installation information in error, or too late to incorporate in the work, shall be responsible for any extra work caused thereby.

3.12 ACCESS TO THE PROJECT

3.12.1 The General Contractor for this Work shall, at all times allow Owner, or any other Owner commissioned contractor or their employees, access into the building or around the premises, undisturbed, whether union or non-union, as may be required in the execution of other portions of the building work and installation of equipment, etc.

3.12.2 The General Contractor shall cooperate fully with any and all Owner commissioned Contractors.

3.13 SUBTRADE AWARDS

3.13.1 The Contractor shall, on notice of award of the contract, obtain the Consultants approval of a complete list of all persons or firms to which he proposes to sublet any part of the work, the trades or divisions of work which are to be sublet to each, and the amount of each trade. The General Contractor shall provide to the Consultant a financial breakdown showing all divisions of the work amounting to the full sum of the contract. Mechanical and Electrical trades shall be further broken down as specified in Divisions 20 and 26.

3.14 SAFETY DATA SHEETS

3.14.1 The General Contractor shall ensure that the following material and safety data sheets are submitted prior to commencing installation and application of at least the following:

lead-free solder	sealants and caulking
resilient flooring	painting and finishing
fertilizers	glues and adhesives
pesticides	herbicides

any other product which may give off air borne particles after installation.

3.14.2 The General Contractor and all of his Subcontractors must note that specifically, Asbestos and Asbestos containing materials, solder for piping containing lead, and Painting & Coatings containing lead and/or mercury must be excluded from any part of the Work.

3.14.3 The General Contractor must submit Certificates of Compliance, prior to the application for Substantial performance, for each of the following items:

.1 An affidavit relative to the use of Lead-free solder for all domestic water lines, regardless of location.
.2 Products for which Material Safety Data Sheets have been submitted and accepted.
.3 Other Work/Products identified in the Contract Documents as requiring a Certificate of Compliance.
.4 Each Certificate of Compliance must indicate names and addresses of the project, the Owner, the date of Issue, produce description including name, number, manufacturer, with a statement verifying that the Work/Product installed meets specified requirements and, if applicable, complies with the submitted and accepted Material Safety Data Sheets.

3.14.4 Each Certificate of Compliance must be issued on the trade's letterhead, properly executed, under whose work the respective Work/Product has been provided.

3.14.5 Each Certificate of Compliance must be endorsed by the General Contractor with his authorized stamp/signature.

3.15 REGULATING DOCUMENTS

3.15.1 The General Contractor and all of his Subcontractors, Suppliers/Installers etc., must conform to the latest editions of the Ontario Building Code (Ontario Reg. 413/90), the Canadian Electrical Code (CEC), CSA B44 and CSA W59, The Occupational Health and Safety Act, Ontario, 1990 (Bill 208), the National Fire Code, the local Municipal Fire Code, and all other applicable Codes and Building By-Laws. All must also conform to the requirements of the Authorities Having Jurisdiction, such as Public Utilities. Where required under the Occupational Health and Safety Act, engage a Professional Engineer to design formwork and falsework for concrete.

3.15.2 Contract forms, codes, standards and manuals referred to in these specifications are the latest published editions at the date of close of tenders. The General Contractor and all of his Subcontractors, Suppliers/Installers must meet or exceed the requirements of specified standards.

3.15.3 Provide, on site, copies of documents referred to in the Specification for joint use of Contractor and Consultant.

3.16 GENERAL CONTRACTOR'S RESPONSIBILITIES

The list of General Contractor's responsibilities identified below is by no means comprehensive, nor is it in any priority or critical order. It is here, merely to identify the most often forgotten or ignored responsibilities of the General Contractor and is reproduced only as a reminder. The Consultants and the Owner advise the General Contractor that it is they who are responsible for all aspects and facets of the Project, from start to completion, from compliance with Occupational Health and Safety regulations to compliance with all codes and statutes.

3.16.1 The General Contractor will be responsible to take all necessary steps to protect personnel (workers, visitors, general public, etc.) and property from any harm during the course of the contract.

3.16.2 All equipment shall be in safe operating condition and appropriate to the task.

3.16.3 Only competent personnel will be permitted on site. During the site introduction, only the Consultant will determine who is competent. The General Contractor will cause to remove from the site any persons not observing or complying with safety requirements.

3.16.4 The General Contractor shall comply with, and shall ensure that all of his Subcontractors, Suppliers, Installers etc., comply with all Federal, Provincial and Municipal Safety Codes and Regulations and the Occupational Health and Safety Act.

3.16.5 The General Contractor shall supply competent personnel to implement his safety program and ensure that all Subcontractors comply with the Owner's standards, and those of the Occupational Health and Safety Act.

3.16.6 The Owner will provide periodic monitoring to ensure that safety requirements are met, and that safety records are properly kept and maintained. Continued disregard for safety standards can cause the Contract to be cancelled and the General Contractor removed from the site.

3.16.7 The Owner may hire Commissioners to perform inspections of building systems at the closing stages of the work of this contract. If so contracted and identified in the Instructions to Bidders, the General Contractor shall cooperate with and coordinate the work of the Owner's Commissioners on site.

3.16.8 The General Contractor will report to the Owner and Jurisdictional Authorities any accident or incident involving personnel and/or property of the Contractor, Owner, or Public, arising from the General Contractor's or any of his Subcontractors' execution of the work.

3.16.9 The General Contractor will include all provisions of this contract in any agreement with Subcontractors, and hold them equally responsible for safe work performance.

3.16.10 If the General Contractor is responsible for a delay in the progress of the work due to an infraction of legislation or Owner's Health and Safety requirements, the Contractor will, without additional cost to the Owner, work such overtime, and aquire and use for the execution of the work such additional labour and equipment as to be necessary in the sole opinion of the Owner's Representative and Consultant, to avoid delay in the final completion of the work or any operations thereof.

3.17 MANUFACTURERS' INSTRUCTIONS

3.17.1 Unless otherwise specified, the General Contractor and all his Subcontractors shall comply with manufacturer's latest printed instructions for materials and installation methods.

3.17.2 The General Contractor shall notify the Consultant in writing of any conflict between the Specifications and Manufacturer's Instructions and have same clarified.

3.18 FIRE SAFETY

3.18.1 The General Contractor and all of his Subcontractors must comply with requirements of standard for Building Construction Operations DFC No. 301-1975, issued by Dominion Fire Commissioner.

3.18.2 The appropriate clauses of the Ontario Building Code relating to fire protection shall be strictly followed.

3.18.3 The General Contractor shall provide and maintain free access to temporary or permanent fire hydrants acceptable to local fire department.

3.19 CONSTRUCTION SAFETY

The General Contractor and all his trades must observe and enforce construction safety measures required by Canadian Construction Safety Code, Workplace Safety & Insurance Board, (formerly known as Workers' Compensation Board), and Municipal statutes. In particular, the Ontario Construction Safety Act, the regulations of the Ontario Department of Labour and Ontario Hydro Safety Requirements shall be strictly enforced. In event of conflict between any provisions of above authorities the most stringent provisions will apply.

The General Contractor is reminded, once again, that it is they who are responsible for Occupational Health and Safety on this Project. The items listed below are only guidelines of the Owner's expectations in this regard and not to be construed to be comprehensive or total in nature.

3.19.1 The Owner will take every reasonable precaution to prevent injury or illness to students, employees and the public, participating in activities, or performing their duties. This shall be accomplished by providing and maintaining a safe, health working environment by providing the education necessary to perform these activities or duties safely.

3.19.2 The Owner is vitally interested in the health and safety of all Contractors and their workers performing work for the Owner. Cooperation and support of the General Contractor in the protection of workers from injury or occupational disease is a major, continuing object of the Owner. To achieve these goals, the Owner, in concert with the Contractors, will endeavour to make every effort to ensure that the Contractors provide a work site which is a safe and healthy work environment. The Owner insists that all Contractors and their workers are dedicated to the continuing objective of reducing risk and injury.

3.19.3 The General Contractor covenants and agrees to comply with all statutory and other obligations, including, without limitation, the provisions of the Occupational Health and Safety Act (Ontario) and all Regulations thereto, and all amending and successor legislation, including without limitation, Bill 208 (the "Act") in connection with all work performed by either the Contractor, Subcontractors, or any Other Contractor on, or in connection with, the Project.

3.19.4 Without limiting the foregoing, for the purposes of this Contract, the General Contractor agrees that they shall be the "constructor" of the Project within the meaning of the Act, and as such, shall assume all the obligations and responsibilities, and observe all construction safety requirements and procedures, and duties of inspection imposed by the Act on the "constructor", as therein defined, for all work and services performed by the General Contractor, Subcontractors and Other Contractors on or in connection with the Project.

3.19.5 The General Contractor further covenants and agrees that the Owner and its existing and former officers, trustees, employees and agents, and their respective heirs, executors, administrators, successors and assigns (hereinafter collectively referred to as the "Owner") shall be released from any obligations or liabilities otherwise imposed on the Owner, or on any of them, pursuant to the Act in connection with the Project, and that the General Contractor shall assume all liability and responsibility in connection with same.

3.19.6 The General Contractor agrees to save harmless and indemnify the Owner from any losses, damages, costs and expenses of any kind, or nature whatsoever, including all legal expenses, and all defense costs and related expert or consulting fees, incurred by the Owner, or any of them, arising in connection with the failure, default, or inability of the General Contractor of the Owner, or any of them, to comply with any of the aforementioned statutory, or other legal requirements, or arising in connection with any breach by the General Contractor of any of its covenants, agreements and obligations under this Contract.

3.19.7 The General Contractor shall inform and instruct Other Contractors that they, while performing work on this project, are under the authority of the Contractor. Other Contractors are to discuss and co-ordinate with, and follow instructions from, the General Contractor on all matters of site access, vehicles, deliveries, storage, temporary facilities, coordination with the work of other subcontractors, work methods, scheduling, labour conditions, construction safety, environmental protection, security and all other matters which relate to the safe and proper execution of construction work.

3.19.8 The General Contractor shall ensure that all supervisory personnel on job site are fully aware of the procedures and requirements outlined above and comply with all requirements specified.

3.19.9 All Contractors are responsible to ensure that all machinery and/or equipment are/is safe and that the workers perform their tasks in compliance with established safe work practices or procedures. Workers must receive adequate training in their specific work tasks to protect their health and safety.

3.19.10 The General Contractor shall be responsible for all persons and companies performing work, including Other Contractors, on this project, at all times, up to and including, the date of

Substantial Performance of the Work. Authority for coordination and instructions relating to all matters which relate to the safe and proper execution of construction work shall rest with the General Contractor. The Contract Price must include the General Contractor's fees for the coordination and supervision of the work of all Other Contractors.

3.19.11 In addition to the responsibility of all contractors as outlined above, Subcontractors will be held accountable for the health and safety of workers under their supervision.

3.19.12 Every worker must protect his/her own health and safety by working in compliance with the law and with safe work practices and procedures established by the authorities having jurisdiction.

3.19.13 All sections of the Occupational Health and Safety Act for Industrial Establishments, latest edition, and the Occupational Health and Safety Act for Construction projects, latest edition, shall be enforced, by the General Contractor, in their entirety, throughout the duration of the construction project.

3.19.14 The General Contractor shall provide the Consultant with the telephone number where the General Contractor or his representative can be reached at any time, day or night, for the duration of the contract.

3.19.15 Where an accident, explosion, or fire causes a person injury at the work place, and the worker is disabled from performing the usual task, the General Contractor shall prepare a written notice and shall forward same to the Ministry of Labour within four days of the occurrence with a copy to the Owner's Representative, who shall copy and inform the Owner's Supervisor of Health and Safety and/or the Owner's Joint Health and Safety Committee, containing such information and particulars as may be described.

3.19.16 Where a person is killed or critically injured from any cause at the work place, the General Contractor shall immediately call the Ministry of Labour. A written notice from the General Contractor shall be given to the Ministry of Labour within forty-eight hours after the occurrence, containing such information and particulars as may be prescribed, with copies to the Architect and the Owner's Representative.

3.19.17 The General Contractor is advised that the accident scene is under the jurisdiction of the Ministry of Labour and no wreckage, articles, etc., shall be interfered with, disturbed, destroyed, altered or carried away at the scene, or connected with the occurrence, until the Ministry of Labour has given permission.

3.20 INDEPENDENT TESTS AND INSPECTIONS

3.20.1 The Contractor shall appoint inspection firms as directed by the Consultant and make payments from the cash allowances specified in Division noted, except for the following, which shall be included in the contract:

.1 Inspection and testing required by laws, ordinances, rules, regulations or orders of public authorities.
.2 Inspection and testing performed exclusively for Contractor's convenience.
.3 Testing, adjustment and balancing of mechanical and electrical equipment and systems.
.4 Mill tests and certificates of compliance.
.5 Re-testing as already described in Quality Control of this Section.

3.20.2 The Consultant will authorize payment of inspection services from specified cash allowances.

3.20.3 The General Contractor shall furnish labour and facilities to:

.1 Provide access to work to be inspected and tested.
.2 Facilitate inspections and tests.
.3 Make good work disturbed by inspection and test.
.4 Pour concrete test cylinders and store as directed by Inspection Firm.

3.20.4 The General Contractor shall notify Inspection Firms sufficiently in advance of operations to allow for assignment of laboratory personnel and scheduling of test.

3.20.5 Where materials are specified to be tested, the General Contractor shall deliver representative samples in required quantity to testing laboratory.

3.21 PERIODIC CLEANING

3.21.1 As part of the Tender, the General Contractor shall provide all necessary garbage bins through the duration of the project. The General Contractor shall ensure that the following is accomplished:

.1 Keep all areas of the Work clean and orderly, free from accumulation of dirt, debris, garbage, oily rags, excess material, or such other trash items. Remove such items for all areas of the Work on a daily basis.
.2 Vacuum and/or broom interior building areas when ready to receive painting and other finishes. Continue cleaning on an “as needed” basis until the building is ready for inspection and takeover.
.3 Schedule cleaning operations so that resulting dust and other contaminants do not affect wet, newly painted surfaces.
.4 First, conduct inspections of all exposed interior and exterior surfaces.
.5 Remove grease, dust, dirt, stains, labels, fingerprints, and other foreign materials from all exposed interior and exterior finishes, including glass and other polished surfaces.
.6 Remove all protective film from switch plates and hardware, particular kick plates.
.7 Clean lighting reflectors, lenses and other lighting surfaces.
.8 Broom clean paved surfaces and rake clean other disturbed surfaces in the area of the Work, to remove site debris caused by the Work of this Contract. Inspect for damages and make good.
.9 Remove debris and surplus materials from the roof areas and accessible concealed spaces.
.10 Replace heating, ventilation and/or air conditioning filters whether or not, the units were operated during construction operations.
.11 Refer to “clean-up” sections of the specifications for additional specific periodic and final clean up requirements.

3.21.2 The General Contractor must note the Owner insists that tiled (VCT) and sheet good floors (vinyl or linoleum) be broom swept only. Wet mopping and waxing/polishing will be done by the Owner’s Caretaking Staff.

3.21.3 Do not provide sealants and waxes on terrazzo, ceramic and other hard surfaced floors without reviewing products and methods of application with the Owner’s Caretaking Staff. Failure to comply with this requirement will result in the contractor stripping these floors in their entirety.

3.22 DUST CONTROL

3.22.1 Provide dust tight screens or barriers to localize dust generating activities for the protection of tenants, employees, equipment, adjacent and finished areas of Work, and the public. Maintain

and relocate protection until Work is complete. Respond immediately to complaints of dust received from the public, authorities having jurisdiction, Owner and Consultant.

3.22.2 Obtain Consultant's approval of installed dustproof screens and protection methods before proceeding with construction/alteration work.

3.22.3 Painted gypsum wallboard and metal stud dustproof screens, shall extend to underside of structure, and shall be erected to protect adjoining areas and rooms. Apply bead of sealant or other acceptable seal continuously around periphery of each face of partitioning to seal gypsum board/structure junction where dustproof screens abut fixed building components. Seal perimeter of cut outs, around fixtures and fittings and other penetrations. Tape or seal between adjacent boards. Separate construction areas from occupied areas.

3.22.4 Provide protection for existing equipment sensitive to dust and noise. Co-ordinate location of dust barriers and dust tight doors with Consultant.

3.22.5 Install temporary packing at bottom of doors to areas where demolition/construction shall be performed to prevent dust seepage into existing spaces. Do not permit dust and dirt to escape beyond area being constructed/altered.

3.22.6 Provide daily vacuuming of construction dust from existing areas as work progresses; this shall be considered a minimum requirement, increase vacuuming as necessary. The Owner may have vacuuming work done by others and cost deducted from Contractor's progress payments if this requirement is not fulfilled.

3.22.7 Provide locked doors in barriers to permit access by Consultant, Owner and Owner's security personnel to construction areas and to areas under Contractor's custody. Supply padlocks and construction cores.

3.22.8 Remove dustproof screens at completion of work in areas and make good damaged or blemished areas. Patch and make good to access, altered and damaged areas caused by work and screens. Maintain integrity of fire or sound separation.

3.22.9 Prevent nuisance to adjacent areas near the work from dust by taking additional appropriate anti-dust measures at such times as found necessary, and at other times complaints of dust are received from the Owner's representative and others.

3.23 TEMPORARY PROTECTION

3.23.1 The General Contractor must provide temporary barricades, screens and 6 ft. high construction fence as shown and directed by the Consultant and/or authorized Owner Representative, for the safety of persons, or for dividing the Work from portion or portions of the building or site that may be required for use by the building, or others.

3.23.2 Properly protect the Work from any damage by the elements. In cold weather cover all exterior openings in the work areas likely to cause water damage.

3.23.3 During off hours and/or stages of suspended operations for whatever reasons, the General Contractor must assume all responsibility for protection against the elements, theft and/or vandalism. This applies not only to the work in progress, but also to any materials, products, tools, equipment, or other such items left at the work site.

3.23.4 Properly protect floors and roofs from any damage. Take special precautions when moving heavy loads or equipment over floors and roofs.

3.23.5 The General Contractor must keep floors free of oils, grease or other such materials likely to discolour them and/or affect bonding of applied surfaces.

3.23.6 The General Contractor must ensure that no part of the Work is loaded greater than it was designed for, when completed. Make any temporary support as strong as the permanent support. Place no load on concrete structure until it has sufficient strength to safely bear such load.

3.23.7 Protect glass and other finishes against heat, slab and weld splatters, using appropriate protective shields and covers.

3.23.8 The General Contractor must provide and maintain, in good working order, appropriately labelled ULC fire extinguishers, to the approval of Authorities Having Jurisdiction.

3.23.9 The General Contractor must provide a minimum of two safety helmets on site at all times for the use of the Consultant and any other Owner authorized visitors to the site. It is the General Contractor's responsibility to make certain that any such visitors wear the protective headgear and any other safety gear which may be necessary at that particular time of construction.

3.24 COMPLETION

3.24.1 Upon completion of the Work, all protection erected shall be removed, all damage to the Work and adjoining Work due to the lack or failure of such protection shall be made good and all debris, surplus materials tools equipment shall be removed from the work areas and the site, and the Project shall be left clean and tidy to the full and complete satisfaction of the Consultant and the Owner Staff. The General Contractor shall give written notice to the Consultant, requesting final inspection of the completed Project.

3.24.2 Refer to the pertinent sections of the Specifications for requirements with respect to submission of Record Documents, Maintenance Materials, Special Tools and Spare Parts.

3.25 GUARANTEES

3.25.1 The following is a summary of the guarantees (in number of years) required by the contract:

Entire Building, General Contract	1
Miscellaneous Metals	2
Finish Carpentry and Millwork	2
High Density Laminate Panel	10
Hollow Metal Door and Frames	2
Aluminum Door and Screen	5
Wood Doors	5
Aluminum Entrance Sliding Doors	5
Finishing Hardware	3
Glass and Glazing	2
Security Glazing	2
Porcelain and Ceramic Tile	2
Acoustic Ceilings	2
Granite Tile	5
Resilient Flooring and Accessories	5
Carpet Tile	2

Acoustical Wall Treatment	5
Acoustical Wall and Ceiling Panels	5
Painting	2
Metal Toilet Partitions	3
Folding Panel Partitions	2
Washroom Accessories	2
Metal Lockers	3
Manufactured Specialties	1
Tie-Back and Life Line Anchors	3
Roller Window Shades	5
Quartz Countertops	10
Solid Surface Countertops	10
Structural	As specified under respective Sections
Mechanical	As specified under respective Sections
Electrical	As specified under respective Sections

3.25.2 The guarantee period shall start on the date of issue of the Certificate of Substantial Performance of the Contract by the Consultant.

3.26 CASH ALLOWANCES

3.26.1 Include in the Contract Price, a stipulated sum Cash Allowance in the amount of **$20,000.00 Dollars.**

3.26.2 Cash Allowances, unless otherwise specified, cover the net cost to the General Contractor of services, products, construction, machinery and equipment, freight, handling, unloading, storage installation and other authorized expenses incurred in performing the Work.

3.26.3 The Contract Price, and the Cash Allowance, includes the General Contractor's profit in connection with such cash allowance.

3.26.4 The Contract Price will be adjusted by written order by the Consultant to provide for an excess or deficit to each Cash Allowance. Any unused portions of these allowances shall be returned to the Owner on the conclusion of the Contract.

3.26.5 Expend Cash Allowances as directed by the Consultant in writing. Allowances will be adjusted to actual cost with no adjustment to Contractor's charges. Cash expenditure must identify the H.S.T. separately.

3.26.6 The following is a summary of the cash allowances to be included in the contract.

- Testing and Inspection _____

Total: **$20,000.00**

3.26.7 A schedule shall be prepared jointly by the Consultant and General Contractor to show when items called for under Cash Allowances so that the progress of the work is not delayed.

3.27 SCHEDULE OF ALLOWANCES

3.27.1 Material Allowances shall include the following:

.1 Net cost of Material

.2 Applicable taxes and duties
.3 Deliveries to site

3.27.2 For Material Allowance, the contract shall include:

.1 Handling at site, including unloading, uncarting, storage and hoisting
.2 Protections from elements, from damage
.3 Labour, installation and finishing
.4 Other expenses required to do cash allowance work (i.e. contract co-ordination)
.5 Overhead and profit

3.27.3 Material and Installation Allowances shall include the following:

.1 Net cost of material
.2 Applicable taxes and duties
.3 Deliver to site
.4 Handling at site, including unloading, uncarting, storage and hoisting
.5 Labour, installation and finishing

3.28 DEMOLITION, RECONSTRUCTION, ALTERATIONS AND MAKING GOOD

3.28.1 Where the new additions and alterations interface with existing and where existing Work is altered execute all necessary cutting and fitting required to make satisfactory connections with existing Work under this Contract. Leave the entire Work in a finished workmanlike condition acceptable to Consultant.

3.28.2 Make good all exterior finish system masonry, waterproofing, and other materials and finishes which are damaged or disturbed during execution of Work. Warranties specified for materials and workmanship shall apply.

3.28.3 Disconnect and relocate, where necessary, existing services and reconnect as required to complete the Work. This work shall include, without being limited, to plumbing, drainage, electrical and gas required for accommodation of new work. Abandon all services not required in conformance with ordinances and laws.

3.28.4 Co-ordinate work of the various trades, taking into account existing installations to assure best arrangements of pipes, conduit, ducts mechanical, electrical and other equipment, in the available space.

3.28.5 If required, in critical locations prepare interference or installation drawings, or both, showing the work of various trades as well as existing installations. Submit to Consultant for written permission before commencement of work.

3.28.6 Drilling and cutting of existing work shall be carefully done, leaving a clean hole no larger than required. All patching shall be done to Consultant’s approval.

3.28.7 Make good all areas disturbed to adjoining buildings due to the Work of this Contract.

3.28.8 Effectively seal off work area from the rest of the building to permit the continuation of Owner’s operations during new construction.

3.28.9 Provide dust and weather tight temporary enclosures complete with hinged doors, fastenings and locksets to provide egress from existing building to new additions.

3.28.10 Dust-tight enclosures shall be of adequate construction, sufficient to obviate dispersion of dust and dirt into existing building.

3.29 NO SMOKING POLICY

3.29.1 Cooperate, respect and comply with Smoke-Free Workplace policy requirements established by Provincial Government throughout this facilities. Smoking is not permitted within the site boundary.

3.29.2 Smoke-Free workplace policy applies to all areas including cafeterias and washrooms.

3.29.3 Smoke-Free workplace policy applies to everyone who works on the site and to all visitors.

3.29.4 Ensure that Contractor's employees, sub-contractors and suppliers, performing work on Site on Contractor's behalf, are instructed to comply with Smoke-Free Workplace policy requirements.

END OF SECTION

PART 1 – GENERAL

1.1 SETTING OUT THE WORK

1.1.1 The Contractor shall be responsible for the construction layout.

1.1.2 Verify all elevations, lines, levels, and dimensions and report any errors, discrepancies or conflicts to the Consultant.

1.1.3 Establish and maintain benchmarks, location stakes and batter boards as required.

1.1.4 Verify and record proposed location and finished elevations relative to existing grades.

1.1.5 Determine actual location and elevation of existing underground utilities where connections are required.

1.1.6 Call in relevant utility companies where required to locate utilities.

1.1.7 Undertake test digging where required.

1.1.8 Verify and coordinate finished elevations and dimensions of the work of one Section with respect to a related Section of the Work.

1.1.9 Prepare interference drawings of system and equipment components to ensure that all elements can be accommodated within the spaces provided.

1.1.10 Ensure that all clearances required by authorities having jurisdiction are maintained in the installed work.

1.2 SURVEYOR'S CERTIFICATE

1.2.1 Provide an Ontario Land Surveyor's Certificate with a Surveyor's Plan to verify the location of the building in relation to the existing property lines.

1.2.2 Submit to the Consultant four (4) copies of the Surveyor's Certificate and the Surveyor's Plan within seven days of completion of the exterior foundations.

1.2.3 On completion of the work submit to the Consultant the same Survey to show the outline of paved areas, final finished grades throughout the site and the location of buried services. Note any deviations from the approved working drawings.

END OF SECTION

PART 1 - GENERAL

1.1 PERMITS, LICENSES AND FEES

1.1.1 The Owner shall obtain and pay for, in a timely manner in order to avoid delays to the construction, the Building Permit and Occupancy Permit.

1.2 BUILDING CODE BY-LAWS AND REGULATIONS

1.2.1 Carry out all work in accordance with the regulations of the Ontario Building Code, latest issue, including all amendments and revisions.

1.2.2 Comply with all requirements, regulations and ordinances of all jurisdictional authorities.

1.2.3 Comply with and pay for requirements of local authorities regarding any necessary work outside the property lines such as curbs and sidewalks.

1.2.4 Inform the Consultant of any known variance of the Contract Documents from the requirements of the Building Code and authorities having jurisdiction and assume responsibility for work known to be contrary to such requirements and performed without notifying the Consultant.

1.3 FIRE PROTECTION

1.3.1 Materials and components required to construct fire rated assemblies and materials requiring fire hazard classification shall be listed and labelled.

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

1.3.3 Construct fire rated assemblies as continuous, uninterrupted elements except for permitted openings. Extend fire rated walls and partitions from top of floor assembly to underside of the fire rated assembly above.

1.4 HAZARDOUS MATERIALS

1.4.1 Comply with requirements of the Occupational Health and Safety Act, as amended to include WHMIS (Workplace Hazardous Materials Information System).

1.4.2 Ensure that a current Material Safety Data Sheets (MSDS) arrives before or with the first delivery of every controlled product.

1.4.3 Check the date to ensure that the MSDS is up-to-date (MSDS are valid for three years from date of production).

1.4.4 Ensure that worksite copies of the MSDS are available to workers wishing to consult them and to the health and safety representative and/or joint health and safety committee.

1.4.5 Ensure that workers are instructed in the purpose and content of MSDS.

END OF SECTION

PART 1 - GENERAL

1.1 CONTRACT REFERENCE

1.1.1 The General Conditions and all Sections of Division 1 shall be part and govern all Sections of these Specifications.

1.1.2 All Subcontractors and suppliers shall carefully read and study the General Conditions and Division 1 before commencing their respective work. Delay and/or extra expense will not be accepted by reason of non-compliance with this requirement.

1.2 SCOPE AND DIVISION OF WORK

1.2.1 Mention in the Specifications or indication on the Drawings of materials, products, operations, or methods, requires that the Contractor provide each item mentioned or indicated of the quality or subject to the qualifications noted; perform according to conditions stated for each operation prescribed; and provide all labour, materials, products, equipment and services to complete the Work.

1.2.2 The Specifications have generally been divided into trade division and the trade divisions into Sections for the purpose of ready reference, but a Section may consist of the work of more than one subcontractor or supplier. The responsibility for determining which subcontractor or supplier shall provide labour, material, products, equipment and services to complete the Work rests solely with the Contractor.

1.3 WORK PROVIDED BY OWNER OR PERFORMED UNDER SEPARATE CONTRACTS

1.3.1 The term "NIC" shall be construed to mean that work of this Project which is not being performed or provided by the Contract; the term shall mean "Not in This Contract" or "Not a Part of the Work to be Performed or Provided by the Contractor".

1.3.2 "NIC" work is indicated on the Drawings and specified herein as an aid to the Contractor in scheduling the amount of time and materials necessary for the completion of the Contract.

1.4 DISCREPANCIES/OMISSIONS

1.4.1 Notify the Consultant of any discrepancies in, or omissions from the Drawings, Specifications or other Contract Documents or any doubt as to the meaning or intent of any part thereof. The Consultant will send written instructions, clarifications or explanations. Neither the Owner nor the Consultant will be responsible for oral instructions.

1.5 EXAMINATION

1.5.1 Refer to Appendix ‘A’ at the back of this Specification book for copy of the Geotechnical Investigation Report. Neither the Consultant nor the Owner guarantee the accuracy of the Geotechnical report, and the Contractor shall satisfy himself with regard to all matters relating to the sub soil before commencing work.

1.5.2 The Geotechnical Investigation report was prepared by Sola Engineering dated December 8, 2021

1.5.3 Make a careful examination of the site of the project, and investigate and be satisfied as to all matters relating to the nature of the work to be undertaken, as to the means of access and egress thereto and there from, as to the obstacles to be met with, as to the rights and interests which

may be interfered with during the construction of the Work, as to the extent of the work to be performed and any and all matters which are referred to in the Drawings, Specifications and other Contract Documents, or which are necessary for the full and proper understanding of the Work and the conditions under which it will be performed.

1.5.4 No allowance will be made subsequently in this connection on behalf of the Contractor for any error or negligence on its part.

1.5.5 Before commencing the work of any Section, carefully examine the work of other Sections upon which it may depend. Report any defects which might affect the new work in writing to the Consultant. Commencement of new work shall imply acceptance of all work by other Sections upon which the new work depends.

1.6 BASE BUILDING STRUCTURE

1.6.1 Base Building is masonry and steel frame structure, unless noted otherwise. The Contractor shall familiarize himself with site conditions affecting construction. Any elements in conflict with the Drawings shall be verified with the Consultant immediately.

1.7 DEFECTS

1.7.1 Defective material or workmanship whenever found at any time prior to the final acceptance of the work will be rejected regardless of previous inspection. Inspection by the Consultant will not relieve the Contractor from responsibility, but it is a precaution against oversight or error.

1.7.2 Remove and replace defective materials at no extra cost to the Owner. Be responsible for all unnecessary delays and expenses caused by the rejection.

1.8 DIMENSIONS

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

1.8.2 Where dimensions are not available before fabrication commences the dimensions required shall be agreed upon between the Sections concerned.

1.8.3 Wall thicknesses shown on the Drawings are nominal only, and actual sizes shall be in all cases ascertained at the building.

1.8.4 Verify dimensions of shop fabricated portions of the Work on the site before shop drawings and fabrications are commenced. The Owner will not accept claims for extra cost on the part of the Contractor by reason of non-compliance with this requirement.

1.8.5 In areas where equipment will be installed, check dimensional data on equipment to ensure that the area and equipment dimensions are compatible with the necessary access and clearance provided. All equipment supplied shall be dimensionally suitable for space provided.

1.8.6 The mechanical and electrical drawings are intended to show approximate locations of mechanical and electrical apparatus, mechanical fixtures, mechanical equipment, piping and duct runs, electrical fixtures, electrical outlets, electrical equipment, electrical units, and conduit in diagrammatic form and are not dimensioned, their locations shall be considered approximate. Check the Architectural drawings and consult with the Consultant to settle the actual locations of these items as may be required to suit aesthetic and job conditions. Such relocation shall be done without charge to the Owner.

1.8.7 Leave areas clear when space is reserved for future equipment, including access to such future equipment.

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

1.8.9 Furr in all exposed pipes located not more than 12" from the wall (exception storage rooms, janitor, service, mechanical and electrical, telephone and garage) and/or ceiling surfaces and finish similar to the respective wall and/or ceiling surfaces.

1.8.10 Conceal pipes, service lines and ducts, in chases, behind furring, or above ceiling except where such items are noted as being exposed, and except to where no ceiling is provided.

1.8.11 Install equipment, materials and products to present a neat appearance. Run piping, ducts, and conduit parallel to or perpendicular to building planes.

1.8.12 Install all ceiling mounted components including but not limited to air terminals, sprinkler heads, and lighting fixtures in strict accordance with ceiling plans.

1.9 CO-OPERATION AND CO ORDINATION

1.9.1 All Sections shall co-operate with each other, to ensure that the work will be carried out expeditiously and will be satisfactory in all respects at completion.

1.9.2 All Sections shall examine the Drawings and Specifications covering the work of all other Sections which may affect the performance of his own work. Examine the work of other Sections at the building, and report to the Consultant any defects or deficiencies which may adversely affect the work. In the absence of such a report the Contractor shall be held to have waived all claims for damage to or defects in such work.

1.9.3 All trades and Sections shall co-operate with other Sections whose work attaches to or is affected by their own work, and ensure that minor adjustments are made to make adjustable work fit fixed work.

1.9.4 Trades and Sections requiring foundations, supports or openings to be left for the installation of their work shall furnish the necessary information to the sections concerned in ample time so that proper provision can be made for such items. Failure to comply with this requirement will not relieve the Section at fault of the cost of cutting, drilling, etc., at a later period, and the subsequent patching of other work required.

1.9.5 Supply all items to be built-in (including anchors, ties, dovetail slots, nailing strips, blocks, bolts, sleeves, etc.) foundations and openings, when required by the trades concerned, together with templates, measurements and shop drawings. The responsible Section shall pay for any necessary cutting, fixing, and make good to the work of other Sections for failure to comply with this requirement.

1.9.6 Where the Work of this Contract involves changes, revisions or connections to the Base Building, mechanical, electrical, sprinkler or structural, and the changes, revisions, or connections hereto would adversely affect the Owner's guarantees or warranties, the Owner will specify the method in which such item of work shall be done so as not to void the guarantee or warranty, or he may insist on doing such items of work, the cost chargeable to this Contract. The Contractor shall strictly follow such method or be responsible for any loss or damage suffered by the Owner.

1.10 SERVICES PRIORITY

1.10.1 In the event of interference occurring between equipment shown in a concealed area, the following order of priority shall be observed:

.1 Structural Elements
.2 Plumbing Drains
.3 Sprinkler Piping
.4 Duct Work
.5 Heating Piping
.6 Plumbing Piping
.7 Electrical Conduit

1.11 WORKMANSHIP

1.11.1 The work of all Sections shall be fabricated and installed in accordance with the best practice by craftsmen skilled in the work of the respective Section. Unless otherwise specified, the manufacturer's latest printed instructions shall be rigidly complied with in the methods and materials to be used in the installation of the work.

1.11.2 Notify the Consultant in writing if these Specifications and/or Drawings conflict in any way with manufacturer's instructions. The Consultant will then rule which specifications shall be followed. If applicable, a copy of those instructions shall be made available at job site.

1.12 PROTECTION

1.12.1 Adequately protect the work at all stages of the operations and maintain the protection until work is completed. Remove and replace any work and materials damaged that cannot be repaired or restored to the Consultant's approval.

1.12.2 The Owner assumes no responsibility for the safeguarding of tools or equipment from theft.

1.12.3 Be responsible for the protection of existing curbs, roads, sidewalks, lawns, trees, landscaping, utility lines, existing uncompleted work of other contracts, services and similar items located on job site and adjoining properties. Replace and make good any of the damaged existing work without extra cost to the Owner and to the approval of the Consultant.

1.12.4 Provide proper guard devices, and lights for the prevention of accidents. Provide and maintain temporary sidewalks, fences, barricades, etc., as necessary to ensure the safety of the public and other persons on or adjacent to the project site, and maintain sufficient and noticeable warning lights at night to prevent accidents and injuries to persons or property.

1.12.5 Protected at all times all public areas that are affected by construction under this Contract. Repair immediately any damages.

1.13 OVERLOADING

1.13.1 Do not overload any part of the structure during the construction with a load greater than it is calculated to bear safely when complete. Be solely responsible and liable for any damage resulting from violation of this requirement. Provide temporary support as strong as the permanent support. Do not load concrete floors until they have obtained their design strength.

1.13.2 Do not cut, bore or sleeve load bearing members without approval of the Consultant.

1.14 CONSTRUCTION SAFETY

1.14.1 Observe and enforce all construction safety measures, as contained in the requirements of Provincial Government and local Municipal Statutes and Authorities.

1.14.2 Comply with the Occupational Health and Safety Act and Bill 208 an Act to amend the Occupational Health and Safety Act and the Workers' Compensation Act.

1.14.3 Comply with WHMIS Regulation, Ont. Reg. 644/88.

1.14.4 In the event of conflict between any of the provisions of Municipal By-laws, the Provincial Acts and the Canadian Construction Safety Code, the most stringent provision shall apply.

1.14.5 Manufacturers and suppliers providing materials that fall under WHMIS Regulation Ont. Reg.644/88, shall submit material safety data as required by the above legislation.

1.14.6 Ensure that "controlled products" brought on site are labelled as required.

1.14.7 Maintain and make available to workers and Consultant, MSDSs for "controlled products" brought on site.

1.14.8 Ensure that workers are familiar with WHMIS and are trained in the use of "controlled products".

1.14.9 Resolve any WHMIS-related conflicts between trade sections.

1.14.10 Provide and maintain adequate First Aid facilities during the construction period.

1.15 SETTING OUT

1.15.1 Verify on the site, all lines, levels and dimensions shown on the Drawings and report any discrepancies in levels or dimensions to the Consultant before commencing work. Work done prior to the receipt of the Consultant's directions shall be at the risk of the Contractor.

1.15.2 Lay out the location of all walls on the floor as a guide to the various Sections.

1.16 FASTENINGS

1.16.1 Supply fastenings, anchors and accessories as required for the fabrication and erection of the Work.

1.16.2 Use exposed metal fastenings and accessories of the same texture, colour and finish as the base metal on which they occur.

1.16.3 Provide metal fastenings of the same material as the metal component they are anchoring or of a metal which will not set up an electrolytic action, which would cause damage to the fastening of metal component under moist conditions.

1.16.4 In general, exterior anchors for windows, waterproofing, roofing, sheet metal, and anchors occurring on or in an exterior wall or slab shall be non-corrosive or hot dip galvanized steel. Prime paint will not be accepted as suitable protection against corrosion.

1.16.5 Use fastenings of a type and size to provide positive permanent anchorage of the unit to be anchored in position. Install fastenings in a manner and at spacing required to provide load bearing capacity.

1.16.6 Keep exposed fastenings to a minimum, evenly spaced and neatly laid out, unless otherwise specified.

1.16.7 Provide adequate instructions and/or templates and, if necessary supervise, installation where fastenings or accessories are required to be built into work of other Sections.

1.16.8 Wood plugs will not be permitted.

1.16.9 Fastenings which cause spalling or cracking of material to which anchorage is being made will not be permitted.

1.16.10 Do not use powder-activated fastenings on any portion of the Work unless written approval for a specific use is obtained from the Consultant. Only tools of low velocity, double guidance type are acceptable.

1.16.11 Powder actuated tools, low velocity type, meeting CSA Z-166 latest edition may be used for drywall partitions.

1.16.12 No drilling of holes into window members, T-bars, or induction unit covers is permitted.

1.17 WELDING

1.17.1 No open flame for welding, cutting or other purposes are permitted without prior approval of the Owner. If pressurized gas cylinders are used, the Contractor shall ensure that such use is in accordance with requisite safety provisions and requirements. All welding shall be accompanied with fire extinguisher.

1.18 OWNER'S RIGHT TO RELOCATE DOORS AND/OR PARTITIONS

1.18.1 The Owner reserves the right to relocate doors and frames and/or partitions at a later date, but prior to installation, without cost, assuming that there will be no increase in the number of doors and/or frames, or greater lengths or heights of partition, or no increase in number of corners.

1.18.2 Should there be an increase or decrease in doors, frames or lengths of partition after such relocation adjustments in costs shall be made.

1.19 OWNER'S RIGHT TO RELOCATE MECHANICAL/ELECTRICAL ITEMS

1.19.1 The Owner reserves the right to relocate electrical outlets at a later date, but prior to installation, without cost, assuming that the relocation per outlet does not exceed 10'-0" from the original location. No credits shall be anticipated where relocation per outlet of up to 10'-0" reduces materials, products, and labour.

1.19.2 Should relocations per outlet exceed 10'-0" from the original location, the contract price will be adjusted accordingly.

1.19.3 Make necessary changes, due to lack of co-ordination, and as required when approved, at no additional cost, to accommodate structural and building conditions. The location of pipes and other and other equipment shall be altered without charge to the owner, if approved, provided the change is made before installation.

1.20 CODES AND STANDARDS

1.20.1 All contract forms, codes, specifications, standards, manuals, and installation, application and

maintenance instructions, referred to in the Contract Documents shall be of the latest published editions at the date of submission of the Bid unless otherwise stated in the Contract Documents or acceptable to the authorities having jurisdiction.

1.20.2 The purpose of specifying standard reference specifications is to establish minimum acceptable standards of materials and workmanship. Materials and workmanship shall meet or exceed requirements of the reference standards specified.

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

1.20.4 Where no standard is referred to, materials or workmanship shall meet requirements of the applicable standards of the Canadian Standards Association, Canadian General Specifications Board or the Ontario Building Code.

1.20.5 Where a material or product is required to conform to a standard such as CSA, ASTM, ULC, ULI, CGSB, OBC, etc., supply to the Consultant, on request, satisfactory evidence that the material or product complies with the standard specification or test requirements.

1.21 EMERGENCY CONTACT

1.21.1 The Contractor shall post at the site at least two names and telephone numbers for emergency contact.

1.22 TESTING AND TIE-INS

1.22.1 Obtain the Owner's permission prior to installing of any tie-ins to mechanical, fire protection, life safety, or electrical systems, or tests of such tie-ins.

1.22.2 The Contractor shall be held fully responsible for any damages which result from tie-ins to such systems or any tests thereof.

1.23 FIRE RATINGS

1.23.1 Where specifications require a material, component or assembly to be fire rated, the fire rating shall be as determined or listed by one of the following testing authorities if approved by Authorities having jurisdiction:

.1 Underwriters' Laboratories of Canada
.2 Underwriters' Laboratories Inc. (U.S.A.)
.3 Factory Mutual Laboratories
.4 The National Building Code of Canada
.5 The National Board of Fire Underwriters
.6 Warnock Hersey International

1.23.2 Where reference is made to only one testing authority, an equivalent fire rating as determined or listed by another of the aforementioned authorities is acceptable if approved by authorities having jurisdiction.

1.24 DOCUMENTS

1.24.1 Maintain one copy of each of the following on the job site;
- .1 Contract Drawings
- .2 Specifications
- .3 Addenda
- .4 Reviewed shop drawings
- .5 Change Orders
- .6 Test reports
- .7 Approved work schedule
- .8 Manufacturer's installation and application instructions.

1.25 BY LAWS AND REGULATIONS

1.25.1 Comply with codes and references as indicated in General Notes on Drawings and in these Specifications.

1.25.2 Nothing contained in the Contract Documents shall be so construed as to be in conflict with any law, by law or regulation of the municipal, provincial or other authorities having jurisdiction. Perform work in conformity with all such laws, by laws and regulations.

1.26 FAIR WAGES

1.26.1 Rates of wages, hours and conditions of work of persons employed on the work shall be in accordance with provincial codes and as generally accepted and recognized in the locality.

1.27 LOCAL SUPPLIERS AND TRADES

1.27.1 Where appropriate the General Contractor is encouraged to use local suppliers and trades where possible.

1.28 TRADEMARKS AND LABELS

1.28.1 Trademarks and labels, including applied labels shall not be visible in the finished work. Remove such trademarks or labels by grinding if necessary, or paint where the particular material has been painted.

1.28.2 The exception of this requirement shall be those essential to obtain identification of mechanical and electrical equipment and those required to be visible by authorities having jurisdiction.

1.29 CLEAN UP

1.29.1 Maintain the Work in a tidy condition and free from the accumulation of waste products and debris, other than that caused by the Owner, other Contractors or their employees.

1.29.2 Clean and make good, to the Consultant's approval, surfaces soiled or otherwise damaged. Pay cost of replacing fixtures or materials that cannot be satisfactorily cleaned.

1.29.3 Remove all debris, equipment and excess material resulting from the site.

1.29.4 All rubbish must be segregated for, and kept in recycling containers and removed from the site on a regular basis.

1.29.5 Do not burn rubbish on the site.

1.29.6 Do not bury rubbish or waste material on the site.
1.29.7 Do not dispose of waste or volatile materials such as mineral spirits, oil or paint thinner into waterways, storm or sanitary sewers.

1.30 ACCESS

1.30.1 Maintain, without interruption, unrestricted access to the building by the students and the Owner's staff so the Owner's business operations are not interfered with and no annoyances to customers and students occur.

1.30.2 Maintain, without interruption, unrestricted circulation by the public on City Sidewalks and access by the public to bus stops, and waiting areas.

1.30.3 Arrange for delivery of materials, products and equipment to arrive when needed, and at times to prevent interference with vehicular traffic on the streets, at Owner's Service area, and with pedestrian traffic on sidewalks.

1.31 ACCESS PANELS

1.31.1 Provide access panels in walls and/or ceilings, as required by codes and as directed by the Owner's representative to permit necessary access to equipment and/or services.

1.32 SECURITY

1.32.1 Comply with Owner's security requirements.

1.32.2 Watch the site at all times including weekends and holidays. No compensation will be paid by the Owner for materials of work stolen, lost damaged, or destroyed.

1.33 PUBLIC UTILITIES

1.33.1 Before commencement of the Work, ensure that the area occupied by the public utilities; including but not limited to Electricity, Gas, Water, and Telephone, meet the correct requirements of the respective utility company.

1.33.2 Notify the Consultant immediately in writing if the requirements of the utility companies are not met.

1.34 EXISTING PUBLIC SERVICE LINES

1.34.1 Where existing public service lines are indicated to be removed and/or relocated, do such work in compliance with all authorities having jurisdiction.

1.34.2 Make good to the requirements of authorities having jurisdiction all soiled or damaged public roads, walkways, sidewalks, curbs, public utilities, hydro and telephone lines, and supports.

1.35 NOISE CONTROL

1.35.1 Comply with the requirements of Authorities having jurisdiction and noise control by laws to ensure noise generated by the work is not excessive and not disturbing to the Public and the Owner's and users of adjacent buildings.

1.36 TESTING AND MIX DESIGNS

1.36.1 Arrange for tests as required to establish design parameters, to verify the characteristics or quality of products and materials, and any other tests which the Consultant may reasonably require. Such tests will be paid by the Owner unless specifically stated in the Contract Documents to be at the Contractor's expense. The Consultant will appoint the independent testing agencies or facilities which may be required to effectively carry-out such tests.

1.36.2 Co-operate with independent testing agencies while latter are performing above tests.

1.37 SCHEDULING

1.37.1 Schedule segments of construction and demolition according to staging indicated on Drawings.

1.37.2 Construction, demolition, and renovation shall be carried out with a minimum of disturbance to the Owner's use of the premises.

1.38 IMPERIAL/INTERNATIONAL SYSTEM OF UNITS

1.38.1 Where measurements are indicated in both Imperial and International System of Units (SI), the Imperial System of Units will apply.

1.39 EXPANSION AND CONTRACTION

1.39.1 Make provisions for expansion and contraction due to temperature changes, within components, products and assemblies and between adjacent components, products, or assemblies. Provisions for expansion and contraction shall ensure no damages occur to and within components, products, and assemblies.

1.40 AIR AND FLUID MOVEMENTS

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

1.41 BUILDING VOLTAGES

1.41.1 All motors with 1/2 hp or above shall be 208 volt 3 phase unless otherwise specified in Divisions 15 and 16.

1.41.2 All motors under 1/2 hp shall be 120 volt single phase unless otherwise specified in Divisions 15 and 16.

1.41.3 Verify available voltages to be utilized for equipment and co-ordinate with Division 15 and 16.

1.42 SPIRITUOUS LIQUORS

1.42.1 The Contractor shall neither permit nor allow the introduction or use of spirituous liquors upon or about the Works embraced in this Contract, or upon any of the grounds occupied by him.

END OF SECTION

PART 1 - GENERAL

1.1 PRE-CONSTRUCTION MEETING

1.1.1 Immediately prior to construction, upon notification attend at location of Owner's choice, a pre construction meeting, along with authoritative representatives of key subcontractors, project superintendent, inspection and testing company representatives, and the consultants.

1.1.2 Purpose of meeting is as follows:

.1 Review project communications procedures.

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

.3 Identify all critical points on Construction Schedule for positive action.

.4 Review Consultant's inspection requirements.

.5 Review any points which require clarification.

1.2 SITE MEETINGS

1.2.1 Hold regular site meetings every two weeks. Ensure that persons, whose presence is required, Are present and that relative information is available to allow meetings to be conducted efficiently. The Consultant will attend these meetings. The Owner may also choose to attend these meetings, at his discretion.

1.2.2 Schedule additional meetings, if required.

1.2.3 Prepare an agenda for each meeting and distribute a copy to all required participants prior to the meeting.

1.3 SUPERVISION

1.3.1 Employ an experienced and qualified superintendent for the project who shall devote his time exclusively to the work of this Contract and who shall be in complete charge of the work from commencement to completion. A working foreman will not be acceptable. The superintendent shall not be changed after commencement of work without the Consultant's approval. The Superintendent shall possess a C.C.S. and/or Gold Seal Certificate designation and be acceptable to the Owner.

1.3.2 Supervise, direct, manage and control the work of all forces carrying out the work, including subcontractors and suppliers. Carry out daily inspections to ensure compliance with the working drawings and detailed specifications and the maintenance of quality standards. Ensure that the inspection staff includes personnel competent in supervising the mechanical and electrical trades.

1.4 PROGRESS RECORD

1.4.1 The Contractor shall maintain on site, permanent written record of progress of work. Record shall be open to inspection by Owner at all times and copy shall be furnished to Consultants upon the Consultant's request.

1.4.2 This record shall show weather conditions, dates of commencement, progress and completion of

various trades and items of work. Particulars pertaining to erection and removal of forms, pouring of concrete, installation of roofing and other critical or major components as well as number of employees of various trades and type and quantity of equipment employed daily, shall be noted.

1.4.3 Display a copy of the construction schedule in the site office from start of construction to completion. Superimpose actual progress of work on schedule at least once each week.

1.5 AS-BUILT DRAWINGS

1.5.1 Maintain an accurate set of As-Built Drawings showing progress of the work and all changes, revisions and additions to the work and deviations from the Contract Documents in red ink.

1.5.2 Include accurate location, depth, position, size and type of concealed and underground services, both inside and outside shall be as part of these As-Built Drawings.

1.5.3 As-Built Drawings shall be available for review at each site meeting by the Consultant.

1.6 DOCUMENTS ON SITE

1.6.1 The Contractor’s field office shall at all times contain a complete set of Contract Documents (Schematic Drawings and Performance Specifications) with all addenda, site instructions, change orders, reviewed shop drawings and samples, colour schedule, paint materials schedules, hardware list, progress reports and meeting minutes.

1.6.2 The Contractor’s field office shall at all times contain a complete set of all construction documents, as issued for building permit and bearing the stamp of the appropriate municipal authority.

END OF SECTION

PART 1 - GENERAL

1.1 WORK INCLUDED

1.1.1 No work requiring a sample or shop drawing submission shall be commenced until the submission has received the Consultant's final review. All such work shall be in accordance with reviewed samples and shop drawings.

1.1.2 Provide submittals as requested by the Contract Documents, as specified herein, and in accordance with the conditions of the Contract.

1.1.3 In addition to submittals specifically requested by the Contract Documents, provide other submittals as may be reasonably requested by the Consultant, or as are required to coordinate the Work and to provide the Owner with choices available, within the scope of Contract Documents.

1.1.4 Contractor’s review of submittals:

.1 Review submittals for conformity to Contract Documents before submitting to Consultant. Submittals shall bear stamp of Contractor and signature of a responsible official in Contractor’s organization indicating in writing that such submittals have been checked and coordinated by Contractor. Contractor’s review shall be performed by qualified personnel who have detailed understanding of those elements being reviewed and of the conditions at the Place of the Work proposed for installation.

.2 Check and sign each submittal and make notations considered necessary before submitting to Consultant for review. Where submittal is substantially and obviously in conflict with requirements of Contract Documents, reject submittal without submitting to Consultant and request resubmission. Note limited number of reviews of each submittal covered under Consultant’s services as specified below.

.3 Contractor shall assume sole responsibility for any conflicts occurring in the Work that result from lack of comparison and coordination of submittals required for the Work.

.4 Submittals that have not been reviewed, checked, and coordinated by Contractor prior to submission to Consultant, will be rejected.

.5 Notify Consultant in writing of changes made on submittals from Contract Documents. Consultant’s review of submittals shall not relieve Contractor of responsibility for changes made from Contract Documents not covered by written notification to Consultant.

1.1.5 Consultant’s review of submittals:

.1 Review of submittals by Consultant is for the sole purpose of ascertaining conformance with the general design concepts and the general intent of the Contract Documents. This review shall not mean that Consultant approves the detail design inherent in the submittals, responsibility for which shall remain with the Contractor. Such review shall not relieve the Contractor of responsibility for errors or omissions in the submittals, or responsibility for meeting requirements of Contract Documents.

.2 Contractor shall be responsible for dimensions to be confirmed and correlated at the Place of the Work for information that pertains solely to fabrication processes or to techniques of construction and installation, and for coordination of the Work.

.3 As part of their scope of work, Consultant shall review shop drawings no more than twice. Should three or more reviews be required due to reasons of Contractor omissions causing resubmission requests, then Contractor shall reimburse the Consultant for time expended in these extra reviews. Time shall be invoiced to the Owner (to be deducted from monies due to the Contractor and paid to Consultant by Owner) at rates recommended by Consultant’s professional association and disbursements shall be

invoiced at Consultant's cost. The Contractor shall cover directly costs and administration associated with courier services and the like for these extra shop drawing reviews.

4. Consultant's review and markings on submittals do not authorize changes in the Work or the Contract Time.

.5 Submittals received but not required by the Contract Documents or requested by the Consultant will not be reviewed by the Consultant and will be marked 'NOT REVIEWED' by the Consultant and returned to the Contractor.

1.1.6 Make submittals with reasonable promptness and in an orderly sequence so as to cause no delay in the Work. Be responsible for delays, make up time lost and pay added costs, at no additional cost to the Owner, incurred because of not making submittals in due time to permit proper review by Consultant.

1.1.7 Do not proceed with work affected by a submittal, including ordering of Products, until relevant submittal has been reviewed by Consultant.

1.1.8 Contractor's responsibility for errors and omissions in submittals is not relieved by Consultant's review of submittals.

1.1.9 Contractor's responsibility for deviations in submittal from requirements of Contract Documents is not relieved by Consultant's review of submittal, unless Consultant gives written acceptance of specific deviations.

1.1.10 Engineered submittals:

.1 Submittals for items required to be sealed by professional engineer (or as otherwise indicated as engineered), shall be prepared under the direct control and supervision of a qualified professional engineer registered in the Place of the Work, and having minimum professional liability insurance required in accordance with the General Conditions, as amended.

.2 Design includes life safety, sizing of supports, anchors, framing, connections, spans, and as additionally required to meet or exceed requirements of applicable codes, standards, regulations, and authorities having jurisdiction.

.3 Engineered submittals shall include design calculations, complete with references to codes and standards used in such calculations, supporting the proposed design represented by the submittal. Prepare calculations in a clear and comprehensive manner so that they can be easily reviewed. Incomplete or haphazard calculations will be rejected.

.4 The professional engineer responsible for the preparation of engineered submittals shall undertake periodic field review, including review of associated mock-ups, at locations wherever the work as described by the engineered submittal is in progress, during fabrication and installation of such work, and shall submit a field review report after each visit. Field review reports shall be submitted to the Consultant, to authorities having jurisdiction as required, and in accordance with the building code.

.5 Field reviews shall be at intervals as necessary and appropriate to the progress of the work described by the submittal to allow the engineer to be familiar with the progress and quality of such work and to determine if the work is proceeding in general conformity with the Contract Documents, including reviewed shop drawings and design calculations.

.6 Upon completion of the parts of the Work covered by the engineered submittal, the professional engineer responsible for the preparation of the engineered submittal and for undertaking the periodic field reviews described above, shall prepare and submit to the Consultant and authorities having jurisdiction, as required, a letter of general conformity for those parts of the Work, certifying that they have been Provided in accordance with

the requirements both of the Contract Documents and of the authorities having jurisdiction over the Place of the Work.

.7 Costs for such field reviews and field review reports and letters of general conformity are included in the Contract Price.

1.1.11 Keep copies of reviewed submittals at the Place of the Work in a neat, orderly condition. Only submittals that have been reviewed by the Consultant's and are marked with Consultant's review stamp, as applicable, are permitted at the Place of the Work.

1.1.12 The Work shall conform to reviewed submittals subject to the requirements of this section. Remove and replace materials or assemblies not matching reviewed submittals at no increase in the Contract Time and at no additional cost to the Owner.

PART 2 - PRODUCTS

2.1 MATERIAL LIST

2.1.1 Within 15 days of award of Contract, submit a complete list of manufactured materials to Consultant.

2.1.2 List is required to enable Consultant to verify that materials meet Specifications prior to submission of shop drawings or installation, and to select colours and/or patterns.

2.1.3 Should materials not meeting requirements be included, the Consultant will require re-submission.

2.1.4 Only the listed materials shall be used, unless otherwise approved by the Consultant.

PART 3 - EXECUTION

3.1 PROJECT MEETING

3.1.1 Prior to commencement of the work, the Contractor together with the Owner shall mutually agree to a sequence for holding regular "on-site meetings".

3.1.2 Organize all necessary site meetings. Ensure that persons, whose presence are required, are in attendance and that relevant information is available, to allow meetings to be conducted efficiently.

3.1.3 Record minutes of each meeting and distribute copies to all participants, and all others requiring information of recorded minutes, within one week of date meeting.

3.2 SHOP DRAWINGS

3.2.1 The term shop drawings means drawings, diagrams, illustrations, schedules, performance charts, brochures, and other data which are to be provided by the Contractor to illustrate details of a portion of the work.

3.2.2 Contractor shall arrange for the preparation of clearly identified shop drawings called for by the Contract Documents or as the Consultant may reasonably request.

3.2.3 Submitted shop drawings must indicate the name of the project and specific information as to location within the project including reference to the drawing or specification section to which it

relates.

3.2.4 The shop drawings shall show, but not necessarily be limited to the following:

.1 Clear and obvious notes of any proposed changes from Drawings and Specifications.
.2 Fabrication and erection dimensions.
.3 Provisions for allowable construction tolerances and deflections provided for live loading.
.4 Details to indicate construction arrangements of the parts and their connections, and interconnections with other work.
.5 Location and type of anchors, and exposed fastenings.
.6 Materials and finishes.
.7 Descriptive names of equipment.
.8 Mechanical and electrical characteristics when applicable.
.9 Information to verify that superimposed loads will not affect function, appearance, and safety of the work detailed as well as of interconnected work.
.10 Assumed design loadings, and dimensions and material specifications for load bearing members.
.11 Dimensions and dimensioned locations of proposed chases, sleeves, cuts and holes in structural members.

3.2.5 Prior to submission to the Consultant the Contractor shall review all shop drawings. By this review the Contractor represents that he has determined and verified all field measurements, field construction criteria, materials, catalogue numbers, and similar data, or will do so, and that he has checked and coordinated each shop drawing with the requirements of the work and of the Contract Documents. The Contractor's review of each shop drawing shall be indicated by stamp, date, and signature of a responsible person.

3.2.6 Contractor shall submit drawings to the Consultant for his review with reasonable promptness and in orderly sequence so as to cause no delay in the work or the work of other Contractors. If either the Contractor or the Consultant so requests they shall jointly prepare a schedule fixing the dates for the submission and return of shop drawings. Shop drawings shall be submitted in the form of one reproducible transparency and one white print. Where the subject of the shop drawings involves the structural, mechanical, or electrical Engineers, in addition to the one reproducible transparency, submit two white prints. At time of submission the Contractor shall notify the Consultant in writing of any deviation in the shop drawings from the requirements of the Contract Drawings.

3.2.7 Contractor shall make any changes in the shop drawings which the Consultant may require consistent with the Contract Documents and resubmit unless otherwise directed by the Consultant. When resubmitting, Contractor shall notify the Consultant in writing of any revision other than those requested by the Consultant.

3.2.8 Shop drawings shall define the division of responsibility between the trades and items shown on shop drawings. Shop drawings shall show materials, methods of construction, and attachment or anchorage, erection, connections and other details necessary to complete the work. Shop drawings shall show cross references to Drawings and specifications.

3.2.9 Review by the Consultant is for the sole purpose of ascertaining conformance with the general design concept. Review shall not mean that the Consultant approves the detail design inherent in the shop drawings, responsibility for which shall remain with the Contractor submitting same and such review does not relieve Contractor of his responsibility for errors or omissions in the shop drawings, or his responsibility for meeting all requirements of the Contract Documents. Contractor is responsible for dimensions to be confirmed and correlated at the job site, for information that pertains solely to fabrication processes or technique of construction and installation, and for

coordination of the work of all its subtrades and work of other Contractors.

3.2.10 Any adjustments made on the shop drawings by the Consultant are not intended to change the Contract Sum. If the Contractor deems that such adjustments affect the value of the work, he shall so state in writing before proceeding with the fabrication and installation of the work.

3.2.11 Submit two copies of each final reviewed shop drawing to the Consultant.

3.2.12 After final review, the Consultant will return reviewed copies to the Contractor, who shall reproduce, at his expense the number of prints required.

3.2.13 Submit 6 copies of standard preprinted shop drawings. Assemble submittals of more than 2 pages in individual booklet form, after final review. Consultant will return at least 3 copies of shop drawings to the Contractor.

3.2.14 After final review, the Consultant will return one copy to the Contractor.

3.2.15 Shop drawings which require the approval of a legally constituted authority having jurisdiction shall be submitted by the Contractor to such authority for approval. Such shop drawings shall receive final approval of authority having jurisdiction before being submitted to the Consultant.

3.2.16 No work requiring a sample or shop drawing submission shall be commenced until the submission has received the Consultant's final review. All such work shall be in accordance with reviewed samples and shop drawings.

3.3 SAMPLES

3.3.1 For the purpose of this Article samples means: Samples, models and templates.

3.3.2 Samples shall be submitted to the Consultant in a number as specified in the respective Section in sufficient time to permit review process before the item is needed to be installed or as directed otherwise.

3.3.3 If either the Contractor or the Consultant so requests, they shall jointly prepare a schedule fixing the dates for submission and return of samples, including time allowances for re-submissions.

3.3.4 Samples shall be submitted by the Contractor only.

3.3.5 Samples which are "rejected" shall be removed by the Contractor.

3.3.6 Samples will receive consideration only when hand delivered or mailed accompanied with a covering letter signed by the Contractor. Letter shall be sent via First Class mail and shall contain a list of samples being submitted, name of project, Contractor, Subcontractor, manufacturer, brand, also the project number, specification article and paragraph numbers to which the samples refer, and such additional information as may be required by the specification for the particular item being furnished. A copy of the letter shall be enclosed with the samples and any sample received without identification letter will be considered "unclaimed goods" and will be held for a limited time only.

3.3.7 Each sample shall be labelled to indicate name of project, Contractor, Subcontractor, manufacturer, brand, job number, as required.

3.3.8 Where samples are rejected by the Consultant, new samples shall be submitted as soon as possible after notification of the rejection and shall be marked "Second submissions" or

subsequent submissions in addition to the other information required on the label.

3.3.9 Review by the Consultant is for the sole purpose of ascertaining conformance with general design concept. This review shall not mean that the Consultant approves the detail design inherent in the samples, responsibility for which shall remain with the Contractor submitting same and such review shall not relieve the Contractor of his responsibility for errors or omissions or of his responsibility for meeting all requirements of the Contract Documents.

3.3.10 Cost of all samples shall be paid by the Contractor including all carrying charges, which shall be prepaid.

3.3.11 Where colour, pattern, or texture is a criterion, submit the full range of samples.

3.3.12 Field samples and mock-ups may form part of the Work if so agreed to by the Consultant.

3.3.13 Construct each sample or mock-up complete, including the work of all trades.

3.3.14 Reviewed samples or mock-ups will become standards of workmanship and material against which installed work shall be checked.

3.4 ACCESS PANELS AND ACCESS DOORS

3.4.1 Before commencing the installation of mechanical and electrical work, the Contractor with his mechanical and electrical Subcontractors shall prepare on a set of Drawings provided for that purpose, a complete lay out of all access panels and access doors which will be required. These lay outs shall be submitted for review as specified for shop drawings, and shall show exact sizes and locations of access panels and doors. Revisions may be required to the lay out before final review.

3.4.2 Items requiring access panels shall be located behind removable materials wherever possible. Location of access panels may be relocated by the Consultant to more unobtrusive locations.

3.4.3 Access panels and doors shall be finished to match adjacent wall and/or ceiling finish unless otherwise specified or indicated.

3.5 PROGRESS SCHEDULE

3.5.1 Contractor shall prepare and deliver to the Consultant for submitting to the Owner, within fourteen (14) days after the award of the contract, a progress schedule, indicating the dates for:

.1 Submission of shop drawings for the various Sections of the Work; shop drawings schedule for mechanical and electrical work shall contain a list identifying the contents of each shop drawing by subject matter, item, manufacturer's name and supplier's name.
.2 Commencement and completion of each major division of work, including the work to be done by the Subcontractors.
.3 Final completion date.

3.5.2 Furnish monthly progress reviews as related to the work schedule. Reviews shall include comments on both, the parts of the Work and general progress of the project. Correlate reviews to progress payment applications.

3.5.3 Update and re-issue the progress schedule as required to conform to monthly progress reviews.

3.5.4 Maintain progress schedule, as the work progresses.

3.5.5 Progress review shall show weather conditions, dates of commencement, progress and completion of various trades and items of work. Particulars pertaining to erection and removal of forms, pouring of concrete and type and quantity of equipment employed daily, shall be noted.

3.5.6 Completely update schedule and cash flow chart whenever changes occur to scheduling, in a manner and at times satisfactory to the Owner.

3.5.7 Provide competent and experienced staff familiar with scheduling work of this type to prepare, maintain, revise, direct and check implementation of schedule.

3.6 IMPERIAL

3.6.1 Contractor's submittals containing measurements of any kind shall be in the Imperial system of measurement.

3.7 PROGRESS PHOTOGRAPHS

3.7.1 Before starting work, photograph interiors, to record existing conditions. File two prints of each with the Consultant for examination and safekeeping.

.1 The number of photographs, close or otherwise must be sufficient to ensure that existing conditions are adequately recorded to minimize the possibility of unjustified claims against the Contractor and Owner.

.2 Where parts of existing buildings are concealed pending demolition work of this Contract, photograph immediately on exposure.

3.7.2 Upon commencement of the Work, and thereafter at monthly intervals until Completion of the Contract, the Contractor shall supply the Consultant with three copies of photographs with sufficient views, 4 locations, of the progress on all parts of the Work.

3.7.3 Contractor shall include for the total number of photographs stated herein, but the Consultant shall have the right to request that fewer photographs be taken at certain intervals, so that more photographs may be taken at other times, providing the total number of photographs taken remains the same.

3.7.4 Photographs shall be taken from exterior locations as determined by the Consultant.

3.7.5 Monthly Digital photograph by email is acceptable.

3.8 AS-BUILT DRAWINGS

3.8.1 Upon completion of Work, provide three sets of as-built drawings, prints of photograph and where possible, provide as-built drawings on CADD diskettes.

3.9 MOCK-UPS

3.9.1 Where required by the Contract Documents or as may reasonably be requested by the Consultant during the course of the Work, Provide field or shop erected example of work complete with specified materials and workmanship.

3.9.2 Erect mock-ups at locations as specified and as acceptable to Consultant. Do not proceed with work for which mock-ups are required prior to Consultant’s review of mock-ups.

3.9.3 Modify or remove and replace mock-ups as many times as required to secure acceptance of the

Consultant. Such removal and replacement shall be done at no increase in either the Contract Price or the Contract Time.

3.9.4 Protect and maintain mock-ups until directed to be removed. Commence work demonstrated in mock-up only after review and acceptance of workmanship. If possible, mock-up may become part of finished work, at sole discretion, and with prior written acceptance, of Consultant.

3.9.5 Reviewed and accepted mock-ups will become standards of workmanship and material against which installed work will be compared.

3.9.6 Remove and replace materials or assemblies not matching reviewed mock-ups.

3.9.7 Resubmit mock-ups until written acceptance is obtained from Consultant.

3.10 EXTRA MATERIALS

3.10.1 Supply extra materials at completion of Project as specified in Trade Sections of this Specification.

3.10.2 Deliver extra materials to location designated by the Owners representative.

3.11 WASTE MANAGEMENT

3.11.1 Contractor shall prepare and submit waste audit and reduction plan in compliance with the requirements of Ontario Regulations 102/94, Waste Audits and Waste Reduction Workplans and 103/94, Industrial, Commercial and Institutional Source Separation Programs under the Environmental Protection Act of Ontario. For definitions refer to Ontario Regulation 105/94, Definitions.

END OF SECTION

PART 1 - GENERAL

1.1 WORK INCLUDED

1.1.1 Comply with all Sections of Division 1, General Requirements and all documents referred to therein.

1.1.2 Provide all labour, materials, products, equipment and services required to complete the work of alterations and make good to existing building according to the Specifications and/or Drawings.

1.1.3 Execute each part of the Work related to existing building by tradesmen specializing in such work.

1.1.4 Schedule Work to avoid interference with progress of new construction Work.

1.2 PERMITS AND REGULATIONS

1.2.1 Arrange and pay for all permits, notices and inspections necessary for the proper execution and completion of the alteration work.

1.2.2 Follow Ontario Office of the Fire Marshall "Guidelines for Maintaining Fire Safety During Construction in Existing Buildings".

1.3 EXISTING BUILDING

1.3.1 Visit the site and become fully knowledgeable of existing building drawings and specifications and of conditions affecting the Work.

1.3.2 Ensure the operations of the existing building, the existing tenants' premises and access to the existing building areas, are not restricted or disrupted.

.1 Maintain existing exits and ensure that proper and safe means of egress from all parts of existing building to open spaces are provided at all times to the approval of authorities having jurisdiction. Locate and install exit lights, and illuminate temporary means of egress.

1.3.3 Before any work is commenced in any portion of the existing building, the Owner will remove all furnishing and movable furniture that do not require disconnecting from services, storing same in some other portion of the building or off the premises. All other items not removed from any section of the building being renovated, shall be removed from the premises by the Contractor.

1.3.4 Obtain Owner's approval to commence alterations in existing building. Execute Work as quietly as possible in and around existing building at all times Owner and their tenants are occupying it. Schedule noisy operations with Owner, to achieve least disturbance to the Owner, tenants and the public.

1.3.5 The removal of hazardous and asbestos-containing materials will be under separate contract and shall have been completed before any other work of this Contract is commenced.

PART 2 - PRODUCTS

2.1 SALVAGE MATERIALS

2.1.1 Salvage materials, products, and equipment indicated. Carefully remove items to be salvaged, protect during alteration and reinstall in locations indicated.

2.1.2 Refer to sprinkler, mechanical and electrical Drawings and specifications for sprinkler, mechanical and electrical work to be reused.

2.1.3 Salvage the items as indicated on the Drawings for reuse and return to the Owner in an adequately preserved and usable condition on date of Substantial Performance or other mutually agreed date.

2.1.4 All materials and products from the alteration not required for reuse shall become the property of the Contractor. Remove all material and debris from the site as quickly as possible and dispose of legally. Burning of debris on the site will not be permitted.

2.2 SERVICES IN EXISTING BUILDING

2.2.1 Ensure that existing services are not damaged during demolition and construction. Arrange with mechanical and electrical Subcontractors to immediately cut off and cap concealed services uncovered during work.

2.2.2 Do not interrupt mechanical or electrical services of the existing building except for temporary close-downs to make connections to new work, and as approved by prior arrangements. Give Owner two (2) working days' notice of intention to interrupt mechanical or electrical services in existing building in any area.

2.2.3 In no case shall service interruptions affect the total existing building.

2.2.4 Should existing services be accidentally uncovered and disrupted, make complete restoration immediately, and ensure adequate protection to avoid further disruption until alternative means of providing permanent continuation of the services are made.

2.2.5 Make payment for work specified in the foregoing at no additional cost to the Owner if, in the opinion of the Consultant, such work could have been reasonably foreseen by examination at time of bidding and which has been caused by lack of proper care and protection.

2.2.6 Unless otherwise specified, restore services on which work is performed to original condition.

PART 3 - EXECUTION

3.1 SCREENS

3.1.1 Provide temporary fire rated partitions, screens, enclosures, tarpaulins etc., as may be required to enclose work areas from other areas of the building, to maintain security and to confine dust, noise and workmen to the work area. Locate screens as directed by the Consultant.

3.1.2 It is essential that the existing building be maintained weather-tight at all times. Provide temporary protection, enclosures, tarpaulins, etc., as may be required to weatherproof any openings made in the Work.

3.1.3 Construct fire rated, dust proof and wind-proof screens as required to completely enclose the work areas and the access passages to the work areas from the other areas of the existing building. Locate partitions as directed by the Consultant.

3.1.4 Build screens of 3-5/8" metal studs at 16" centres sheathed with sheets of 5/8" sheetrock firecode 'c' panels on both sides with close joints smoke and fire sealed at junctions typical. Where exposed to the weather, fully cover screens with a heavy waterproof and dustproof paper with

lapped and sealed joints. Fill spaces between studs with 4" fibrous glass or mineral wool insulation batts to deaden sound.

3.1.5 Thoroughly pack framing and sealed at junctions of screens with floors, walls and ceilings with batt insulation in a manner to prevent infiltration of smoke, dust, dirt, etc. Over all junctions of screens with floors, walls and ceilings, apply continuous 1-1/2" wide strips of masking tape both sides of screen to ensure that rooms within closed off areas which are not being altered are kept dust free.

3.2 SEQUENCE OF ALTERATIONS

3.2.1 Schedule phasing of alterations and demolition as indicated on Drawings.

3.3 DEMOLITION

3.3.1 Demolition of, or alteration to, any portion of the existing buildings shall proceed only after approval of the Owner, and after weather-tight and dustproof partitions have been erected to provide thorough protection to the adjoining areas and rooms.

3.3.2 When permission has been granted to proceed with alterations in the existing buildings, work shall be carried out expeditiously and continuously to completion.

3.3.3 If suspected hazardous or contaminated materials are encountered, advise Consultant and await instructions regarding removal and disposal of such contaminants which may be considered hazardous to health, prior to demolition.

3.4 RECONSTRUCTION, ALTERATIONS AND MAKING GOOD

3.4.1 The work shown on the Drawings, Schedules and Specifications may or may not be all the work required, do all demolition, make good all finishes and execute all necessary work including incidentals to make a complete job of the alterations.

3.4.2 Do not undermine, damage, or endanger existing pipe lines, electrical conduit and wiring by digging, cutting or any other operation in the performance of the Work of the Contract. Immediately repair and make good to any existing work so affected to the Consultant's satisfaction at the Contractor's expense.

3.4.3 Cut off, cap, divert, or remove existing water, gas, electric and other services in areas being altered which are affected by the changes as required or as directed by the municipal authorities and the utility company concerned, and the Consultant. Protect and maintain active services to the existing building.

3.4.4 Perform the Work in such a manner so as to cause a minimum of noise or interference to the use of the existing building.

3.4.5 Whenever it becomes necessary to cut or interfere in any manner with existing apparatus for short periods of time, Do work at such times as agreed upon between the Owner, Consultant, and the Contractor.

3.4.6 Where new work connects with existing and where existing work is altered, all necessary cutting and fitting required to make satisfactory connections with the existing work shall be performed under this Contract, so as to leave the entire work in a finished and workmanlike condition.

3.4.7 Make good materials and finishes which are damaged or disturbed during the process of additions and reconstruction under the Contract.

3.4.8 Where existing work is to be made good, the new work shall match exactly the old work in material, form, construction and finish unless otherwise noted or specified.

3.4.9 Perform drilling of existing work carefully, leaving a clean hole no larger than required.

3.4.10 Provide, throughout the entire construction period, proper and safe means of fire exit from all zones of the existing building at all times to the approval of the authorities having jurisdiction.

3.4.11 Protect work in the existing buildings, such as floors, finishes, trim, etc., as completely as possible to hold the replacing of damaged work by each Section to a minimum.

3.4.12 Provide openings through existing roof as required by new mechanical equipment. Maintain watertight at all times. Provide new blocking, curbs and cants and make good roof and provide flashing as may be required.

3.4.13 Protect existing roofs, roof flashings, parapets and all items on roofs from damages of any cause, and make good damages at no cost to the Owner.

3.4.14 Ensure the public is protected against falling debris, chemicals and water.

3.4.15 Properly co-ordinate the various Sections taking into account also the existing installations to assure the best arrangement of pipes, conduits, ducts and mechanical, electrical and other equipment, in the available space. Under no circumstances will any extra cost be allowed due to the failure by the Contractor to co-ordinate the work. If required, in critical locations, interference and/or installation drawings shall be prepared showing the work of the various Sections as well as the existing installation, and these drawings shall be submitted to the Consultant for review before the commencement of work.

3.4.16 Removal and relocation of mechanical and electrical items indicated as relocated and reused are specified under respective Mechanical and Electrical Drawings. Co-ordinate the removal and relocation of these items.

3.4.17 Remove existing finishes as indicated on the Drawings to neat, straight lines and leave substrate clean and even, suitable for new finishes indicated.

3.4.18 Without limiting the generality of the foregoing, do the following repairs:

.1 Replace existing windows as located on the Drawings. Solidly anchor and make weather tight.

3.4.19 Remove temporary partitions and screens when no longer required, and make good damaged or blemished adjoining work as directed by Consultant.

END OF SECTION

PART 1 - GENERAL

1.1 WORK INCLUDED

1.1.1 For the purposes of this Section, independent inspection and testing agencies are referred to as "Inspector(s)".

1.1.2 The Owner, or the Consultant on his behalf, may obtain the services of Inspectors for the purpose of maintaining quality assurance and compliance with the Contract Documents. Reports by Inspectors shall in no way relieve the Contractor of his obligation to perform the work in accordance with the Contract Documents, or to maintain his own quality control.

1.1.3 The cost of supplying materials, products, and labour for testing purposes, and erection of entire mock ups, prototypes, and sample installations where specified, shall be borne by the Contractor and constitutes a part of the Work

1.2 REFERENCES

1.2.1 ASTM E329-14a Standard Specification for Agencies Engaged in Construction Inspection, Testing or Special Inspection.

1.3 QUALIFICATION OF INSPECTORS

1.3.1 Inspectors shall be authorized to operate in the Province in which the Project is located.

1.3.2 Inspectors required to provide laboratory services shall meet "Recommended Requirements for Independent Laboratory Qualification", published by the American Council of Independent Laboratories.

1.3.3 Where applicable, Inspector shall meet basic requirements of ASTM E329.

1.4 APPOINTMENT AND PAYMENT

1.4.1 Cost of inspection and testing shall be paid out of cash allowances listed in Section 01 21 00 Allowances, where so specified. Additional inspection and testing required for Owner's quality control will be paid by the Owner, except as otherwise stipulated in the Contract Documents.

1.4.2 The Contractor shall co-ordinate and the Owner shall pay independent inspection companies who shall inspect and test site conditions, procedures and materials related but not limited to the following:

Concrete Side Walk Paving
Wood Fencing
Wood Planters
Fill and compaction
Concrete
Gate and Fencing
Painting
Concrete
Waterproofing
Millwork (AWMAC)
Trellis

1.4.3 The Consultant will appoint Inspectors to perform services specified in respective Specification Sections, except for the following:

.1 Inspection and testing required by laws, ordinances, rules, regulations, or orders of public authorities.
.2 Inspection and testing performed exclusively for Contractor's convenience or their own quality control.
.3 Testing, adjustment, and balancing of conveying systems, mechanical and electrical equipment and systems.
.4 Mill tests and certificates of compliance.
.5 Tests specified to be carried out by Contractor under the supervision of the Consultant.

1.5 INSPECTOR'S RESPONSIBILITIES

1.5.1 Co-operate with the Consultant and the Contractor; provide qualified personnel after due notice.

1.5.2 Perform specified inspections, sampling, and testing of materials and methods of construction:

.1 Comply with specified standards, requirements of authorities having jurisdiction and as specified.
.2 Ascertain compliance of materials with requirements of Contract Documents.

1.5.3 Promptly notify Consultant, Owner, and Contractor of observed irregularities or deficiencies of work and products.

1.5.4 Submit within 4 days of inspection and testing 5 copies of reports of such inspection and tests to:

.1	Owner:	1 copy
.2	Consultant:	1 copy
.3	Contractor:	3 copies

1.5.5 Submit additional copies as directed or as specified under respective Sections.

1.5.6 Include in each report:

.1 Date issued.
.2 Project title and number.
.3 Testing and inspection agency name, address and telephone number.
.4 Name and signature of individual responsible for test or inspection.
.5 Date and time of sampling or inspection.
.6 Record of temperature and weather conditions.
.7 Date of Test.
.8 Identification of produce and reference to Specification Section.
.9 Location of sample or test in Project.
.10 Type of inspection or test.
.11 Results of tests and compliance with Contract Documents.
.12 Interpretation of test results, when requested by the Consultant.

1.5.7 Perform additional services as required by Owner.

1.5.8 Inspector is not authorized to:

.1 Revoke, alter, enlarge on, or release requirements of Contract Documents.
.2 Approve or accept any portion of the Work.
.3 Perform any duties of the Contractor's.

PART 2 - EXECUTION

2.1 CONTRACTOR'S RESPONSIBILITIES

2.1.1 Contractor shall maintain his own quality control to ensure that the requirements of the Contract Documents are attained.

2.1.2 Co-operate with Inspector's personnel. Provide access to work, and to manufacturer's operations to facilitate execution of required services.

2.1.3 Secure and deliver to Inspector adequate quantities of representative samples of materials proposed to be used which require testing.

2.1.4 Furnish mix designs proposed to be used for concrete, mortar, grout, and other material mixes with certification by an independent inspection and testing company that such mix designs meet the requirements of the Contract Documents.

2.1.5 Furnish copies of product tests, or mill test reports of steel products, as required.

2.1.6 Furnish labour and facilities to:

.1 Provide access to work to be inspected.

.2 Facilitate inspections and tests, including obtaining and handling samples at Project site or at source of product to be tested.

.3 Make good any work disturbed by inspection and test.

2.1.7 Provide storage on site for Inspector's exclusive use to store equipment and cure test samples.

2.1.8 Notify Inspector and Consultant sufficiently in advance of operations to allow assignment of personnel and scheduling of tests. When tests or inspections cannot be performed after such notice, reimburse Owner for Inspector's personnel and travel expenses incurred due to Contractor's negligence.

2.1.9 Pay costs for uncovering and make good work that has been covered before the required inspection or testing is completed and approved by the Consultant.

2.2 RESPONSIBILITIES OF THE CONSULTANT

2.2.1 The Contractor will submit a list of Inspection and Testing companies to the Consultant for his review.

2.2.2 The Consultant and Contractor will direct inspection and testing companies in the type and extent of inspection and testing to be undertaken.

2.2.3 The Consultant will receive submitted reports of inspections and tests for evaluation and will decide upon any actions that may be required.

2.2.4 The Consultant will provide Drawings and Specifications required by inspection and testing companies.

2.3 FAULTY WORK

2.3.1 Where tests or inspections reveal work not in accordance with Contract requirements, the Contractor shall bear costs for such additional tests or inspections as the Consultant deems necessary to verify the acceptability of corrected work.

2.3.2 All testing shall be conducted in accordance with the requirements of the Consultant.

2.3.3 Defective work discovered before expiration of the warranty period specified in the General Conditions of the Contract, as may be extended in this Specification, will be rejected, whether or

not is has been previously inspected. If rejected, defective materials or work incorporating defective materials or workmanship shall be promptly removed and replaced or repaired to the satisfaction of the Consultant, at no expense to the Owner.

2.4 TOLERANCES FOR INSTALLATION OF WORK

2.4.1 Unless acceptable tolerances are otherwise specified in a Section or a reference standard or are otherwise required for proper functioning of equipment, site services, and mechanical and electrical systems:

.1 "plumb and level" shall mean plumb or level within 3mm in 3048mm (1/8" in 10').
.2 "square" shall mean not in excess of 10 seconds lesser or greater than 90 degrees.
.3 "straight" shall mean within 3mm (1/8") under a 3048mm (10') long straight edge.

END OF SECTION

PART 1 - GENERAL

1.1 ABBREVIATIONS OF SPECIFYING AUTHORITIES

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

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

NEMA	National Electrical Manufacturers Association
NFPA	National Fire Prevention Bureau
NHLA	National Hardwood Lumber Association (USA)
NLGA	National Lumber Grades Authority
NRC	National Research Council
NSC	National Standards of Canada
OAA	Ontario Association of Architects
OBC	Ontario Building Code
OGCA	Ontario General Contractors Association
OHSA	Occupational Health and Safety Act
OIRCA	Ontario Industrial Roofing Contractor's Association
OFM	Ontario Fire Marshal
OPSS	Ontario Provincial Standard Specifications
PEI	Porcelain Enamel Institute (USA)
RAIC	Royal Architectural Institute of Canada
SCAQMD	South Coast Air Quality Management District
SSPC	Steel Structures Painting Council
TTMAC	Terrazzo, Tile and Marble Association of Canada
ULC	Underwriters Laboratories of Canada
UL or ULI	Underwriters Laboratories Incorporated
USSL	United States Sports Surfacing Laboratories (USA)
WCB	Workers' Compensation Board
WDMA	Window and Door Manufacturers Association
WHMIS	Workplace Hazardous Materials Information System

END OF SECTION

PART 1 - GENERAL

1.1 TEMPORARY OFFICES AND SHEDS

1.1.1 Provide an adequate site office for own use with space for the use of the Consultant. The office space for the Consultant shall have a separate bench or table for drawings and a drawer beneath the bench.

.1 Temporary field offices shall be designated on site until such time where an area located inside the constructed building, can be designated by the Owner. No other location shall be used for temporary field office. Temporary site office shall not exceed 3048mm (10') x 15240mm (50').
.2 Facilities shall consist of: an office desk and chair, a two drawer filing cabinet, two chairs, use of a telephone, use of facsimile machine, and a layout table for drawings located so that when drawings are spread out their orientation is same as that of building under construction.
.3 Heat, cool and light offices to minimum code requirements for office buildings.
.4 Keep temporary field office clean and remove all rubbish at the end of each work day.
.5 Include construction and operating hardware, with security locks, as required by the Owner.

1.1.2 Site Storage:

.1 Until such time where an area can be located inside the constructed building, designated by the Owner as a temporary site storage, provide storage trailers or construct weather-tight storage sheds for storage of materials that may be damaged or defaced by weather, in locations indicated by the Owner.
.2 Include security locks, as required.
.3 Install lighting in storage areas and heat in those storage areas containing materials damaged by low temperature.
.4 Provide separate shed located where directed in writing by Consultant for storage of volatile materials.
.5 Owner is not responsible for securing Products or materials at the Place of the Work.
.6 Handle and store materials so as to prevent damage or defacement to the Work and surrounding property.

1.2 TEMPORARY SERVICES

1.2.1 Power, light, water and heat are available on the site. Make arrangements with the Owner for use of these services.

1.2.2 Be responsible for the distribution of temporary power during construction. Exposed extension cords are not permitted outside the work areas.

1.2.3 Provide an adequate pure fresh water supply for the use of all Sections. Run supply pipe or pipes from the nearest available sources and maintain in good condition until the permanent system is installed and ready for use.

1.2.4 Provide temporary lighting to requirements of authorities having jurisdiction and at a level for the proper execution of the Work.

1.2.5 Provide and maintain sanitary temporary toilets of a chemical type for the use of the workmen engaged in the work in compliance with local by laws.

1.2.6 Provide a temporary telephone and fax machine on the site for own use and that of the Consultant. All long distance charges shall be paid for by the party making the call.

1.3 REMOVALS

1.3.1 Provide temporary and/or permanent supports and bracing as indicated, before demolition of walls, floors, roofs or other structural members that would endanger portion of building to remain.

1.3.2 Provide temporary and/or permanent mechanical and electrical service as indicated, to maintain Owner's operation without interruption, before cutting, relocating or removal of existing services.

1.4 HANDLING AND STORAGE

1.4.1 Handle and store materials and products on the job in such a manner that no damage shall be done to the material and products, the structure, the site and surrounding property. Construct and maintain such service roads as may be necessary to provide at all times safe, convenient and adequate access for materials, products and other supplies.

1.4.2 Confine operations of the work of this Contract to limits indicated on Drawings.

1.4.3 Allocate an area of the site for the storage of materials and products brought to the job by all Sections. Keep the storage area tidy at all times. Do not use other areas of the site for storage.

1.4.4 Lobbies, corridors, and washrooms shall be kept clean of construction materials at all times.

1.4.5 The building shall be properly closed and locked at nights, Sundays, holidays and other occasions when the work is not in progress.

1.4.6 Protect materials and products from damage during handling, storage and installation.

1.4.7 Store materials in dry weather-tight, lockable enclosures.

1.4.8 Store cementitious and clay products clear of the earth or concrete floors and away from walls.

1.4.9 Keep sand dry and clean and store on tight, wooden platforms, and covered with tarpaulins during inclement weather, if exposed to same.

1.4.10 Protect metals against damage, dirt or dampness.

1.4.11 Store packaged or bundled products in original and undamaged condition with manufacturer's seals and labels intact.

1.4.12 Provide flat, solid support for all sheet products during storage.

1.4.13 Store and mix paints in a room assigned for this purpose. Keep room under lock and key. Remove oily rags and any other combustible materials every night. Take every precaution to prevent spontaneous combustion.

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

1.5 SIGNS ON PROPERTY

1.5.1 Signs on the Project will be restricted to one sign showing the name of the Project, the names of Owner, Architect and Consultants designed by the Consultant to be supplied and erected by the

Contractor, one sign showing the Contractor's name and site safety signage specified in Section 01 00 00 General Requirements.

1.5.2 Do not exhibit other signs or advertisements other than warning signs on the site.

1.5.3 No construction signs will be permitted on the building or site.

1.5.4 Maintain signage until Certificate of Substantial Performance of the Work, unless otherwise directed by the Consultant.

1.5.5 Destroy and dispose of signage off site.

1.6 LIMITS OF THE SITE

1.6.1 Confine materials, products, equipment and temporary structures within the limits of the site as shown on the Drawings.

1.7 PLANT AND MACHINERY

1.7.1 Provide formwork, scaffolding, ladders, cranes, derricks, tackle, gangways, planks, fans, screens, gantries, tarpaulins, tools and machinery for the proper execution of the Work.

1.8 ACCESS/DELIVERIES AND TRAFFIC CONTROL

1.8.1 Arrange for delivery of materials, products and equipment to arrive when needed and at times to prevent interfering with vehicular traffic on the streets and pedestrian traffic on sidewalks.

1.8.2 Provide Access roads as may be necessary to provide safe and adequate access for materials, products and other supplies. Provide and maintain access sidewalks, roadways, and similar facilities as may be required for access to the Work. Do not block public roads, or impede traffic or danger safety of the students during work of this Project and to temporary block traffic then provide flag person to direct traffic acceptable to Ministry of Labour Standard. Remove accumulations of ice and snow from areas providing access to Site. Ensure that access is available for emergency vehicles. Comply with fire plan for vehicular traffic. Bridge excavations with construction and steel cover plate to safely support any load that could be imposed and provide personnel to assist in deliveries to building(s) as required.

1.8.3 Access to the site shall be as established by the Owner at the commencement of the Work.

1.8.4 Delivery of materials, removal of refuse, and disruption to vehicular traffic shall be restricted to occur before 7:00 am or after 4:00 pm. No such delivery or disruptions shall occur between 7:00 am and 4:00 pm.

1.9 HOURS OF WORK

1.9.1 Normal working hours shall be 8:00 am to 5:00 pm Monday through Friday, except holidays. Special permission shall be obtained from the Owner to change to a different time schedule during school year.

1.9.2 All core drilling required for electrical, telephone or mechanical installations is restricted to off normal hours; prior to 8:00 am and after 5:00 pm, and to be approved by Owner.

1.10 TEMPORARY FIRE PROTECTION

1.10.1 Operable fire extinguishers shall be provided by the Contractor, and shall be kept within the work areas throughout the construction period. Extinguishers shall be sufficient in number and of suitable types to combat potential fires in the work area.

1.11 SYSTEM SHUT DOWNS

1.11.1 Requests for any system shutdowns will be processed a week in advance.

1.12 GARBAGE REMOVAL

1.12.1 The Contractor shall ensure that all his subcontractors, including telephone company, remove all garbage and debris from the Work on a daily basis. Should it be necessary for the Owner to remove Contractor's garbage or debris due to inaction by the Contractor, the Contractor shall be invoiced for the cost thereof. Temporary storage of garbage or debris outside the Work areas is not permitted.

1.12.2 Corridors, lobbies, and other common areas are to be kept clear of any residual debris.

1.12.3 Garbage of a flammable nature (eg paper) shall not be allowed to accumulate, but shall be removed from the site as quickly as possible.

1.13 TRANSPORTING MATERIALS ON STREETS

1.13.1 The Contractor shall, if so directed by the Consultant or the City Engineer, provide "tight trucks", approved by the Engineer, to haul soft or wet material over streets, in order to prevent litter on the streets. In all cases where any materials are dropped from the trucks of the Contractor, he shall clean up same as often as directed and also keep all sidewalks clean and free from dirt and mud.

1.13.2 If the Contractor refuses or neglects to clean up said litter when order to do so by the Consultant or Engineer, the Owner will have the necessary cleaning and the cost of same will be deducted from monies due to the Contractor.

1.13.3 All construction and demolition materials shall be transported in accordance with the City requirements and by-laws, including all amendments.

1.14 PARKING

1.14.1 All parking by the Contractor is his responsibility. The Owner makes no representation that parking will be available. Under no circumstances shall vehicles impede or block access to the existing building.

1.15 HOISTS AND LIFTING FACILITIES

1.15.1 Install and operate an adequate number of elevators or hoists which shall be available for use by all trades and subcontractors. Hoists or elevators shall be properly positioned so as not to interfere with the construction, and if located outside the building, the exterior walls shall be protected against damage.

1.16 DUST NUISANCE

1.16.1 Prevent nuisance to adjacent properties near the work from dust, by taking appropriate anti-dust measures at such times as found necessary, and in response to complaints of dust received from the public.

1.17 SNOW AND ICE

1.17.1 Remove all accumulations of ice and snow from the property and sidewalks and access to the property. Ensure that access is provided at all times for all emergency vehicles.

1.18 REMOVAL OF TEMPORARY FACILITIES

1.18.1 Remove temporary facilities from the site when directed by the Consultant.

1.19 TRAFFIC CONTROL

1.19.1 Do not block roads or impede traffic. Keep construction traffic to designated roads only. Provide flag-person to direct traffic as required.

1.19.2 Provide a hard surface area at the Place of the Work for cleaning down trucks prior to entry onto municipal roads or private roads outside of the Place of the Work.

1.19.3 Keep public and private roads free of dust, mud and debris resulting from truck, machinery and vehicular traffic related specifically to this Project, for the duration of Work.

1.19.4 Clean roads regularly, public or private. Wash down and scrape flush roads at least daily when earth moving operations take place. Maintain public property in accordance with requirements of authorities having jurisdiction.

1.20 ENVIRONMENTAL/POLLUTION CONTROL/SITE CLEANING

1.20.1 Prevent the escape of untreated effluent, be it liquid or gaseous substance or any liquid or solid wastes, being objectionable or detrimental to adjoining areas of the construction site.

1.20.2 Burning or burying of rubbish, waste, and the like is not permitted on construction site.

1.20.3 Only fires for heating bitumen and temporary heaters as specified are permitted on site.

1.20.4 Take care to prevent staining or smoke damage to structure or materials. Replace stained or damaged work.

1.20.5 Make every effort to provide environmental protection, take precautionary measures to prevent excessive noise, sounds, vibrations, dust, air pollution, smoke, etc., which may become objectionable to people occupying adjacent areas.

1.20.6 Keep building site clean and free or unsightly collection of waste materials and debris. Provide for temporary storage and collection of waste materials, and dispose to local authorities having jurisdiction recommendations at intervals to maintain a clean site condition.

1.20.7 Confine apparatus, the storage of materials and the operations of workers to the site. Do not unreasonably encumber the premises with construction materials.

END OF SECTION

PART 1 - GENERAL

1.1 PRODUCT QUALITY

1.1.1 Products supplied for work shall be new and as far as possible and unless otherwise specified, of Canadian manufacture.

1.2 STANDARDS

1.2.1 The work of each trade shall be carried out by skilled, experienced personnel who have been certified to carry out the work by various trade associations and in accordance with the Apprenticeship and Trades Qualifications Act and applicable regulations.

1.2.2 Where reference is made to specification standards produced by various organizations, conform to the latest edition of the standards specified as amended and revised to the date of the Contract.

1.2.3 Each subcontractor must possess and be familiar with the specified standards which affect their work.

1.2.4 Generally, materials and workmanship shall meet or exceed the requirements of CAN/CSA, ASTM, CGSB, CAN/UL and manufacturer's printed instructions.

1.2.5 Where required, conform to the requirements of LEED® Certification.

1.3 SUBSTITUTIONS

1.3.1 The Contractor shall base his Tender Price upon the Tender Documents.

1.3.2 Prior to the Close of Tenders, the Owner and the Consultant may consider requests for substitutions from that specified in the Tender Documents, providing the requests are submitted in writing describing such substitutions in full detail, the type of material, equipment or method and reasons for deviating from the Tender Documents. In addition, submit any increase or decrease in price of any substitution.

1.3.3 In making a request for a substitution, confirm in writing that:

.1 The Contractor has investigated the proposed product and method and determined it to be equal or superior in all respects to that specified.

.2 The same guarantee is given for the proposed substitution as for the product and method originally specified.

.3 The installation of the proposed substitution will be coordinated into the Work, and such changes in the Work will be made as required to accept the substitution and to ensure the Work is complete in all respects. The cost of changes in the Work necessary to incorporate a proposed substitution is to be included in any proposed increase or decrease to the Contract Price associated with the proposed substitution.

.4 Do not substitute materials, equipment or methods unless such substitutions have been specifically approved in writing prior to the close of tenders by the Consultant.

.5 The Owner reserves the right to accept or reject, at its sole discretion, any proposed substitution.

1.4 WORKMANSHIP

1.4.1 All work shall be carried out in accordance with the best trade practice, by mechanics skilled in the type of work concerned.

1.4.2 Products, materials, systems and equipment shall be applied, installed, connected, erected, used, cleaned and conditioned in accordance with the applicable manufacturer's printed directions.

1.4.3 Where specified requirements are in conflict with manufacturer's written directions, follow manufacturer's directions, but inform the Consultant in writing prior to proceeding with affected work. Where specified requirements are more stringent than manufacturer's directions, comply with specified requirements.

END OF SECTION

PART 1 - GENERAL

1.1 SUBSTITUTIONS - MATERIALS AND PRODUCTS

1.1.1 Work of the Project shall be based upon using new materials and products specified or indicated by reference to standards, codes, specifications, to a manufacturer's name, by trade name or by catalogue reference, except where a material or product is indicated as being reused. Where two or more trade names are specified the choice shall be optional with the Contractor.

1.1.2 Contract Price shall be based on the materials and products specified, whether available or not at the time of bidding.

1.1.3 Requests for substitutions prior to Bid Date may not be accepted.

1.1.4 Materials and products specified without the "or other approved manufacture" clause following the name of the material or product shall be supplied without substitution.

1.1.5 Where the Specifications include the "or other approved manufacture" clause substitutions will be considered by the Consultant if:

.1 products specified are not available, or
.2 substitute products to those specified, which are brought to the attention of, and considered by the Consultant as equivalent to those specified will result in a credit to the Contract Price, or
.3 substitute products to those specified, which are brought to the attention of, and considered by the Consultant as superior to those specified will not result in a change to the Contract Price and Contract Time.

1.1.6 Substitutions may be proposed by the Contractor under the following conditions:

.1 Submission of proposed substitutions shall show the material and product names and complete specifications and shall state what difference, if any, will be made in the Contract Price and Contract Time for each substitution, should it be accepted.
.2 Indicate name and manufacturer of product specified, for which substitute is requested and where in Specification product is specified.
.3 Respective costs of items originally specified and the proposed substitution.
.4 Confirmation of proposed substitution delivery, in writing by Product manufacturer.
.5 Compliance with the building codes and requirements of authorities having jurisdiction.
.6 Affect concerning compatibility and interface with adjacent building materials and components.
.7 Compliance with the intent of the Contract Documents.
.8 Reasons for the request.

1.1.7 Should proposed substitution be accepted either in part or in whole the Contractor shall assume full responsibility when the substitution affects any other work. Any Contract Document changes required as a result of the substitution shall be executed by the Consultant at the Contractor's expense.

1.1.8 Proposed substitutions shall 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 to satisfy the space limitations, static and dynamic weight limitations, structural properties, audible noise levels, vibration generation, interchangeability of parts or components, accessibility for maintenance, possible removal or replacement, colours, textures and compatibility with other materials,

products, assemblies and components.

1.1.9 Cost of all changes in work of other Sections necessitated by use of proposed material and product substitutions shall be borne by the Contractor.

1.1.10 Bring to the attention of Owner and Consultant, in writing, the effect of all changes in the work of other Sections necessitated by use of proposed material and product substitutions. Should the contractor fail to bring to the attention of the Owner and the Consultant, the effect of any and all changes, due to the use of proposed materials or product substitutions, then cost of changes in the work of other Sections shall be borne by the Contractor.

1.1.11 Substitutions submitted on shop drawings without following requirements of this section prior to submission of the affected shop drawings will cause the shop drawings to be rejected.

1.2 SUBSTITUTIONS - METHODS OR PROCESSES

1.2.1 Contractor may suggest for consideration of the Consultant, substitutions to methods or processes described in the Specifications and/or shown on the Drawings and other Contract Documents. Any application for such substitutions shall indicate how such substitutions are advantageous to the Owner or to the better fulfilment of the Contract. There shall be no obligation on the parties concerned to accept any such suggestions.

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

1.2.3 Cost of all changes in work of other Sections, necessitated by the use of substituted methods or processes, shall be borne by the Contractor. Contract Document changes required as a result of the substitution shall be executed by the Consultant, at Contractor's expense.

1.2.4 Substituted methods or processes shall be accommodated by space allotted for the specified methods or processes.

1.3 CREDITS ARISING FROM SUBSTITUTIONS

1.3.1 Any and all credits arising from accepted substitutions shall be credited to the Contract in such sums as may be assessed by the Consultant and Contract Price will be adjusted accordingly. No substitutions will be permitted without prior written approval of the Consultant.

1.4 CODE REQUIREMENTS SUBSTITUTIONS

1.4.1 All proposed substitutions for materials, products, methods and processes shall meet the requirements of the National Building Code, Ontario Building Code, and the requirements of authorities having jurisdiction.

1.4.2 Proposed substitute materials, products, methods and processes shall not negate the compliance of adjacent materials, products and constructions with the requirements of the National Building Code, Ontario Building Code, and the requirements of authorities having jurisdiction, to which the proposed substitutions may be applied or attached.

1.4.3 Contractor shall obtain written approval of proposed substitutions from authority having jurisdiction and shall submit approval with the proposed substitution for the Consultant's consideration.

END OF SECTION

PART 1 - GENERAL

1.1 CLEAN UP DURING CONSTRUCTION

1.1.1 During construction, maintain the work in a tidy condition and free from accumulation of waste products, debris, snow and ice other than that caused by the Owner, Other Contractors or their employees.

1.1.2 At reasonable intervals during progress of the Work, clean-up site, building and access, and dispose of waste materials, rubbish and debris. Provide containers and locate on site for collection of waste materials, rubbish and debris. Do not allow waste materials, rubbish and debris to accumulate and become unsightly or hazardous.

1.1.3 Move waste materials in a controlled manner with as few handlings as possible; do not drop or throw materials from heights. Fog spray dusty debris with water.

1.1.4 Conduct clean up and disposal operations to comply with local ordinances and anti-pollution laws. Burning or burying of rubbish and waste materials on the Project site is not permitted. Do not dispose of volatile fluid wastes (such as mineral spirits, oil or paint thinner) in storm or sanitary sewer systems or into streams or waterways. Remove waste materials, rubbish and debris from the site and legally dispose of at public or private dumping areas off the Owner's property.

1.1.5 Vacuum clean interior building areas when ready to receive finish painting and continue vacuum cleaning on an as-needed basis until building is ready for acceptance or occupancy.

1.1.6 Wash down exterior exposed aluminum surfaces using a solution of mild domestic detergent in warm water, applied with soft clean wiping cloths. Take special care to remove all dirt from corners. Wipe interior surfaces clean when curtain wall work is completed.

1.1.7 Remove excess sealant by moderate use of mineral spirits or other solvent acceptable by the sealant manufacturer and the metal fabricator.

1.1.8 Where the accumulation of dirt does not respond to the washing or cleaning, refer the condition to the Consultant, with recommendations as to the remedial action required; but, do not undertake any cleaning procedure of a more severe nature without the written approval of the Consultant.

1.1.9 Remove concrete and alkali wash-offs on surfaces to prevent etching of glass and/or metal.

1.1.10 Remove temporary protective materials and coatings.

1.1.11 Clean exterior glass during construction, every 3 months or more frequently, to prevent the glass from being etched by alkaline bearing water.

1.2 CLEANING AT SUBSTANTIAL PERFORMANCE

1.2.1 Upon attaining Substantial Performance of the Work, remove surplus products, tools, construction machinery and equipment not required for the performance of the remaining work. Also remove waste products and debris and leave the work clean and suitable for occupancy by the Owner unless otherwise specified.

1.2.2 All final cleaning shall be carried out under this Section and the building shall be left in condition to meet the approval of the Consultant. The final cleaning shall not commence until authorized by the Consultant. This work shall include, without being limited to, the cleaning of floors, walls,

windows, ceilings, fixtures and equipment, the removal of debris and all work required on the interior and exterior to complete the building and site cleaning.

1.2.3 All floors shall be cleaned in a manner acceptable to the Consultant.

1.2.4 Stains, paint, grease, oil, temporary protection and covers, plaster, mortar droppings, labels, caulking and sealant compounds, and dirt shall be removed. Damaged painted areas shall be touched up. All surfaces and items, including without being limited to, walls, ceilings, doors, windows, glass, partitions, fixtures, hardware, mechanical and electrical equipment shall be dusted and/or polished.

1.2.5 Replace broken and scratched glass.

1.2.6 Remove debris off roofs. Sweep and wash clean paved areas outside the building. Rake clean landscaped areas.

1.2.7 Replace heating, ventilating and air conditioning filters if units were used during construction. Vacuum clean ducts, fans, blowers and coils if units were used without filters during construction.

1.2.8 Ensure that the inside of all air handling systems are clean and free from dust, and debris when building is turned over to Owner.

1.2.9 Vacuum out and wipe clean all electrical and signal panels, switchboards, transformers and other electrical equipment.

1.2.10 Use experienced workmen or professional cleaners for final cleaning. Use only cleaning materials recommended by manufacturer of surface to be cleaned. Use cleaning materials only on surfaces recommended by cleaning material manufacturer.

1.2.11 Completion of the Contract shall not be attained until the Contractor has removed surplus products, tools, construction machinery and equipment. Removed waste products and debris, other than that caused by the Owner, other Contractors or their employees.

1.3 HAZARD CONTROL

1.3.1 Conduct cleaning and disposal operations in strict accordance with all applicable codes, ordinances and anti-pollution laws.

1.3.2 Store volatile matters in covered metal containers and remove from site at end of each working day. Do not dispose of volatile and toxic wastes in storm or sanitary drains, streams or waterways.

END OF SECTION

PART 1 - GENERAL

1.1 CONTRACT COMMISSIONING

1.1.1 Expedite and complete deficiencies and defects identified by the Consultant.

1.1.2 Submit required administrative and technical documentation, such as Statutory Declarations, Worker's Compensation Certificate, warranties, certificates of approval or acceptance from regulating bodies.

1.1.3 Review inspection and testing reports to verify conformation to the intent of the Documents and that changes, repairs or replacements have been completed.

1.2 AS BUILT-DRAWINGS

1.2.1 Prior to application for Substantial Performance, allowing sufficient time for review, clearly, neatly, and accurately transfer information from marked up white prints to diskettes. Print lettering and numbers in size to match original. Lines may be drawn freehand but shall be neat and accurate. Add "AS-BUILT" at each drawing title block. Should extensive changes and deviations to a drawing make the information illegible, re draft the drawing. Submit one copy of printout from diskette for review. When printout is accepted by Consultant, submit diskettes, and three sets of "as-built" printouts from diskettes.

1.3 MAINTENANCE INSTRUCTIONS AND DATA BOOK

1.3.1 Provide one electronic copy and three sets of maintenance instructions and data books, together with the record drawings as specified in the preceding Article, to the Owner prior to the date of Substantial Performance.

1.3.2 Submit one copy of the book for the Consultant's review prior to submitting the books to the Owner.

1.3.3 The books shall contain the name of the Contractor and the date of Substantial Performance for the Project. Supply the following data:

.1 Complete listing of materials, products, and equipment including serial numbers, manufacturer's names, and sources of supply.
.2 Description of each system, with the description of each major component of the systems.
.3 Operation and installation instructions for each assembly, component and system.
.4 Complete maintenance instructions for each assembly, component and system. Include warnings of harmful practices.
.5 Lists of spare parts for each assembly, component and system complete with names and addresses of suppliers.
.6 Cleaning, maintaining and preserving instructions for all materials, products and surfaces. Include warnings of harmful cleaning, maintaining and preserving practices.
.7 A lubrication schedule of all equipment.
.8 Final reviewed shop drawings.
.9 Copies of all warranties.
.10 Operating curves of mechanical and electrical equipment.
.11 Page-size Valve Tag Schedule and Flow diagrams.
.12 Water treatment procedures and tests.
.13 Final balancing reports for the mechanical systems.
.14 "As-built" drawing white prints and "as-built" CADD diskette.

.15 Copies of all warranties.

1.3.4 Books shall be three-ring hard cover loose-leaf binders, indexed as to contents and identified on the binding edges as "Maintenance Instructions and Data Book", with name of project. The binders shall contain the name of the Contractor and the date of Substantial Performance for the Project.

1.3.5 Terminology used in the various indexed sections of the books shall be consistent.

1.4 MAINTENANCE MATERIALS

1.4.1 Deliver to the site, unload and store where directed, maintenance materials specified in the various Sections of the Specifications. Obtain receipt from the Owner for delivered materials.

1.4.2 Package materials so that they are protected from mechanical damage and loss of essential properties.

1.4.3 Label packaged materials for proper identification of contents. If applicable give colour and finish, room number or area where material is used.

1.5 DISTRIBUTION SYSTEM DIAGRAMS

1.5.1 Prior to application for Substantial Performance, submit framed single line diagrams of the electrical distribution systems.

1.6 TRIAL USAGE AND INSTRUCTIONS – MECHANICAL

1.6.1 Thoroughly instruct the Owner's authorized representative in the safe operation of the systems and equipment.

1.6.2 Arrange and pay for the services of qualified manufacturer's representatives to instruct Owner on specialized portions of the installation; such as, refrigeration machines, boilers, automatic controls, and water treatment.

1.6.3 Submit a complete record of instructions as part of the maintenance instructions and data book given to the Owner. For each instruction period, supply the following data:

.1 Date.
.2 System or equipment involved.
.3 Names of persons giving instructions.
.4 Names of persons being instructed.
.5 Other persons present.

1.6.4 Instructional period shall be carried out during a continuous period of 30 days.

1.6.5 The Owner shall be permitted trial usage of systems or parts of system for the purpose of testing and learning operational procedures. Trial usage shall not affect the warranties, not be construed as acceptance thereof; and no claim for damage shall be made against the Owner for any injury or breakage to any part or parts of such systems due to the aforementioned tests, where such injuries and/or breakage are caused, directly or indirectly, by a weakness or inadequacy of parts, or by defective materials or workmanship of any kind whatsoever.

1.7 TRIAL USAGE AND INSTRUCTIONS – ELECTRICAL

1.7.1 Provide services of manufacturer's specialized representatives to instruct Owner in operation of systems and equipment.

1.7.2 Permit the Owner's representatives, in order to familiarize themselves with the equipment, to operate systems for a reasonable period of time, as may be arranged.

1.7.3 Trial usage of any equipment by the Owner shall not affect the warranties, nor be construed as acceptance of the equipment or system, and no claim for damage shall be made against the Owner for injury or breakage to any part or parts of the aforementioned system or systems due to any such test, where such injuries or breakage are caused, in whole or in part, directly or indirectly, by a weakness or inadequacy of parts, or by defective materials or workmanship of any kind whatsoever.

1.7.4 Review information provided in maintenance instructions and data book with the Owner's representatives to ensure the Owner has a complete understanding of the electrical equipment and systems and their operation.

1.8 WARRANTIES

1.8.1 Extended warranties (warranties of more than two years duration) where specified in the Contract Documents, shall be provided by the Contractor and shall be in a form acceptable to the Consultant.

1.8.2 Where manufacturers offer, as a general policy, extended warranties on their products or other greater benefits than those called for in the specifications, the Contractor shall obtain the benefit of such extended warranties for the Owner and shall certify that he has done so before making the final claim for payment.

1.8.3 Upon completion of the Contract by the Contractor, or upon other termination of this Contract, the Contractor hereby agrees and covenants to assign to the Owner all warranties and guarantees which the Contractor has received from the sub trades employed by him on the Project.

1.8.4 Specified warranty periods shall not be construed as limiting the provisions of the General Conditions.

1.8.5 The carrying out of replacement work and making good of defects shall be executed at times convenient to the Owner and this may require work outside of normal working hours at the Contractor's expense.

1.9 SUBSTANTIAL PERFORMANCE OF THE WORK

1.9.1 Deficiency review:

.1 Neither Owner nor Consultant will be responsible for preparation or issuance of extensive lists of deficiencies. Contractor assumes prime responsibility for ensuring that items shown and described in the Contract Documents are complete. Any reviews to approve the certificate of Substantial Performance of the Work will be immediately cancelled if it becomes obvious to the Consultant that extensive deficiencies are outstanding.

.2 The Contractor shall conduct an inspection of the Work to identify deficiencies and defects, which shall be repaired. When the Contractor considers that the Work is substantially performed, the Contractor shall prepare and submit to the Consultant a comprehensive list of items to be completed or corrected and apply for a review of the Work by the Consultant to determine if Substantial Performance of the Work has been achieved.

.3 The Contractor's request described above shall include a statement by Contractor that the Work to be reviewed by Consultant for deficiencies is, to the best of the Contractor's knowledge, in compliance with Contract Documents, reviewed shop drawings, and samples, and that deficiencies and defects previously noted by Consultant have been repaired.

.4 No later than fifteen (15) working days after the receipt of the Contractor's request described above, but contingent upon the prior receipt, by the Consultant, of the closeout submittals in the manner and form specified in this section, the Consultant and the Contractor will review the Work to identify any defects or deficiencies. If necessary, the Contractor shall tabulate a list of deficiencies to be corrected prior to Substantial Performance of the Work being certified by the Consultant.

.5 During review, the Consultant and the Contractor will decide which deficiencies or defects must be rectified before Substantial Performance of the Work can be certified, and which defects are to be treated as warranty items.

.6 Provide a schedule of planned deficiency review having regard to the foregoing.

1.9.2 Certification of Substantial Performance of the Work:

.1 When the Consultant considers that the deficiencies and defects have been completed and that it appears that the requirements of the Contract Documents have been substantially performed, the Consultant shall issue a certificate of Substantial Performance of the Work to the Contractor, stating the date of Substantial Performance of the Work.

.2 The certificate of Substantial Performance of the Work shall be prepared in form required by Construction Lien Act.

1.9.3 Final Inspection for completion of the Contract:

.1 Deficiencies and defects shall be made good before the Contractor submits a written request for final review of the Work and before the Contract is considered complete.

.2 When Contractor is satisfied that the Work is complete, and after the Contractor has reviewed the Work to verify its completion in accordance with the requirements of the Contract Documents, the Contractor shall submit a written request for a final review by the Consultant, who in turn will notify the Owner.

.3 If there are any deficiencies identified as a result of this review, they shall be listed by the Consultant and submitted to the Contractor. This list shall be recognized as the final deficiency list for purposes of acceptance of the Work under the Contract.

.4 Such deficiencies shall be corrected by a date mutually agreed upon between Consultant and the Contractor, unless a specific date is required by Contract, and a further review by the Consultant shall be called for by the Contractor following his own review to take place within seven (7) days from date of request.

.5 Contractor shall thereafter submit invoice for final payment.

.6 Money shall be withheld for deficiency work and will be released only when all deficiencies have been completed. No partial payment to be recognized until all work is completed.

1.9.4 If the Contractor needs to return to the Place of the Work to complete deficiencies after the Owner has taken possession, the Contractor shall provide the Owner with a minimum of one (1) week's prior notice of such requirement.

END OF SECTION

PART 1 - GENERAL

1.1 WORK INCLUDED

1.1.1 Comply with Division 1, General Requirements and all documents referred to therein.

1.1.2 Section 03 30 00 shall be deemed to apply where applicable and to be part of this Section as if fully recited herein, unless otherwise specified herein.

1.1.3 CAN/CSA A23.4 and CAN/CSA A251 shall be deemed to apply and to be part of this Section as if fully cited herein unless otherwise specified herein.

1.1.4 Provide all labour, materials, equipment and services to complete the design, supply and erection of architectural precast concrete work required and/or indicated on the Drawings and Specified herein, including but not limited to:

- .1 Exterior architectural concrete wall panels;
- .2 Exterior precast sandwich panels;
- .3 Precast window sills;
- .4 All structural steel inserts, anchor units, plates, dowels and the like cast into precast concrete members. All loose structural steel anchor units, angles, supplementary framing plates and the like required to connect precast concrete units to the structural elements of the building and to make connections between precast concrete units.
- .5 Sealing of joints between precast concrete units and between precast concrete and adjacent construction, except where specifically excluded.
- .6 The supply only of materials under this Section to be installed by other trade Sections including:
  - .1 Anchor bolts;
  - .2 All structural steel inserts, anchor units, plates and the like, cast into cast-in-place concrete required for the connection or the support of precast concrete required for the connection or the support of precast concrete units;
  - .3 Special reinforcement, which may be required around cast-in-place anchor units when such reinforcement is required to maintain the integrity of the structural element and is shown on the Drawings;

1.2 REFERENCES

1.2.1	ASTM A36/A36M-14	Standard Specification for Carbon Structural Steel.
1.2.2	ASTM A123/A123M-13	Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
1.2.3	ASTM C39/C39M-15a	Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
1.2.4	CAN/CGSB 19.24-M90	Multi-Component, Chemical Curing Sealing Compound.
1.2.5	CSA-A3000-13	Cementitious Materials Compendium.
1.2.6	CAN/CSA-A23.1-14/A23.25-14	Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete.
1.2.7	CAN3-A23.3-14	Design of Concrete Structures.
1.2.8	CAN/CSA-A23.4-94 (R2014)	Precast Concrete - Materials and Construction.

1.2.9	CAN/CSA-S16.1-14	Design of Steel Structures.
1.2.10	CSA G40.20-13/G40.21-13	General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
1.2.11	CSA A82.56-M1976	Aggregate for Masonry Mortar.
1.2.12	CAN/CSA A251-00	Qualification Code for Manufacturers of Architectural and Structural Precast Concrete.
1.2.13	CSA G30.16-M1977	Weldable Low Allow Steel Deformed Bars for Concrete Reinforcement.
1.2.14	CSA G164-M92 (1998)	Hot Dip Galvanizing of Irregularly Shaped Objects.
1.2.15	CSA O121-M1978 (R1888)	Douglas Fir Plywood.
1.2.16	CSA W47.1-09(R2014)	Certification of Companies for Fusion Welding of Steel.
1.2.17	CSA W48-14	Filler Metals and Allied Materials for Metal Arc Welding.
1.2.18	CSA W55.3-08(R2013)	Certification of Companies for Resistance Welding of Steel and Aluminum.
1.2.19	CSA W59-13	Welded Steel Construction (Metal Arc Welding).
1.2.20	CSA W117.2-12	Safety in Welding, Cutting and Allied Processes.

1.3 DESIGN

1.3.1 Precast concrete sections and anchorages shall be designed by a Professional Engineer registered to practice in Ontario. The engineer shall be responsible for the content of the Shop Drawings, to which they shall affix their seal.

1.3.2 Design precast concrete work and connections to safely sustain or transmit loads shown or implied in accordance with the Ontario Building Code, the local building by-law, CAN/CSA A23.4, CSA A251 and CAN/CSA-S16.1 as appropriate.

1.3.3 Design all units so that they can safely withstand all gravity loads as set out in the Building Code, with temperature and shrinkage stresses, all within deflection limitations governed by the design of the supporting structure and attached sash units. If requested, provide complete calculations for the Consultant's inspection by a Professional Engineer registered in the Province of the place of building with his seal affixed.

1.3.4 Where certain details and sections show anchors, clips, etc., these are indicative and diagrammatic only, and are shown to alert trades other than Section 03 45 00, to the presence of such items and to be aware of and co-ordinate to Work of their Sections. Design, positioning, sizes, and configuration of all precast concrete anchoring devices, clips, angles, etc. shall be the sole responsibility of the precast concrete sub-contractor. Ensure that there is at least one (1) connection at the mid-height of the precast panels to eliminate differential lateral deflection between adjacent panels. Mid-height connections to be within the panel so as not to be visible.

1.3.5 Design units with the following characteristics:
- .1 Compressive strength – 35 MPa minimum
- .2 Absorption – not to exceed 3% measure after forty-eight (48) hour soaking.
- .3 Porosity – air entraining agent to produce “in place” 6% nominal (5% to 7%).

.4 Waterproofing (additive) – to be added in ratio as specified by manufacturer and mixed in strict accordance with their recommendations.
.5 Thickness – refer to Drawings for particular units. Units to be insulated and uninsulated.

1.3.6 Reinforce units, as required, so that the members can safely sustain loads that may be applied to them. Provide sufficient reinforcement to resist cracking and spalling due to thermal conditions.

1.3.7 All bearing areas shall be reinforced against diagonal tension, splitting, rupture and flexure. Extra ties, stirrups and reinforcing bars shall be placed at support points. No bearing pressure shall be allowed in edges of unreinforced sections.

1.3.8 In designing the structural framework of the building, assumptions have been made as to the magnitude, direction and points of application of the loads imposed on the structure by precast concrete units and these are shown on the Drawings.

1.3.9 The magnitude of the loads are based on the configuration of the precast concrete members shown on drawings and the design criteria of the Ontario Building Code.

1.3.10 Do not incorporate details without approval of the Consultant, which invalidate design assumptions. Any resulting alterations required to structure shall be the responsibility of the Contractor.

1.3.11 The structure supporting the precast concrete cladding will deflect due to various loadings imposed on it both initially and over a long term. Typical calculated predictions of the movements of the structure due to deflections will be provided upon request.

1.3.12 Precast concrete shall accommodate tolerances in cast-in-place concrete as specified in Section 03 30 00 and deflections in structural members of L/360 or as shown on the Drawings.

1.3.13 Design members longer than 6000 mm (20'-0"), and their connections, to safely withstand creep, temperature and shrinkage effects without exceeding the crack width specified in referenced CSA Standards and without impairing the safe capacity of connections. Reinforce other members to resist effects of creep, temperature and shrinkage in accordance with requirements of referenced CSA Standard.

1.3.14 Design all connections required in accordance with the requirements of CAN/CSA-S16.1 so that they can safely transmit all gravity loads, dead loads or loads due to thermal action, to the structural frame, while permitting deflection and other anticipated movements of the structural supporting elements.

1.3.15 Design all structural steel anchor units, anchor bolts, reinforcing and other connection material required for the attachment of the precast concrete work to the structural frame under this Section.

1.3.16 In general, follow profiles, elevations and sizes shown on the Drawings;

1.3.17 Follow the rain screen principle for non-insulated wall panels, and the modified rain screen principle (two sealant beads) for insulated wall panels.

1.3.18 The exposed components of the cladding systems shall have a uniform appearance, matching samples approved by the Consultant.

1.3.19 Locate sealants, air/vapour seals, thermal separations, drainage slots as shown on the Drawings and/or as specified in this Section;

1.3.20 Conceal fastenings, except where otherwise specified;

1.3.21 Provide accessories required and necessary to complete the work;

1.3.22 OPENINGS, BUILT-INS, ETC.

1.3.23 Provide all holes, openings, drips, reglets, etc. and build-in all items required building-in for Work of all sections as required to complete the Project.

1.4 FINISHES

1.4.1 All precast concrete which is exposed to view on the exterior of the building and all precast concrete which is exposed to view in the interior of the building where designated shall have finishes to match samples available for view at the Consultant's office and as follows:

.1 Precast Cladding Exterior Surfaces:

.1 Medium sandblast, limestone finish. Stain colour to be determined by the Consultant.
.2 Pigmented running bond brick-relief surface, brick module, colour, and texture to match existing Barrie Courthouse exterior walls.
.3 Pigmented vertical stack bond brick-relief surface, brick module, colour, and texture to match existing Barrie Courthouse exterior walls.

.2 Refer to elevations for information.

.3 Precast Cladding Interior Surfaces: Grey smooth, steel trowel, suitable for paint finish.

.4 Precast Window Sills: Pigmented soldier course brick-relief surface, brick module, colour, and texture to match existing Barrie Courthouse exterior walls.

1.4.2 The colour of individual members; uniform and the various components matched to Consultant's approval. Concrete shall have accurate definition at corners and at angle changes. Faces shall be true, plane and well-defined.

1.4.3 Concrete finish for smooth surfaces; dense, smooth, even concrete free of defects, such as honeycombing, voids, loss of fines, and the like. Patches or repair will not be permitted when, in the sole opinion of the Consultant, they mar the colour or texture of the surface.

1.5 QUALITY ASSURANCE

1.5.1 The precast concrete elements shall be fabricated and erected by a manufacturing plant certified by the Canadian Standards Association in the appropriate category (ies) according to CSA Standards A251-M, Qualification Code for Manufacturers of Architectural and Structural Concrete. The precast concrete manufacturer shall be certified in accordance with CSA's certification procedures for precast concrete plants prior to submitting his/her Bid and shall specifically verify as part of his/her Bid that his/her plant is currently certified in the appropriate category(ies).

1.5.2 The Consultant will appoint an inspection and testing firm to make inspections or perform tests as the Consultant directs. The inspection firm shall be responsible only to the Consultant, address his reports to the Consultant and make only such inspection or tests as the Consultant may direct. Authorized inspection and testing shall be paid from allowances specified in Section 01 21 00, except that the Contractor will be required to pay for tests which show results not meeting the requirements of the Drawings or Specifications and for subsequent test made necessary thereby.

1.5.3 Materials and workmanship shall be subject to inspection at any time. Co-operate in permitting

access for inspection to all places where work is being done or stock is being stored.

1.5.4 The inspection company shall employ on this project only fully qualified inspectors experienced in the class of work specified. Inspection shall be carried out under the direct control of a Professional Engineer registered in the Province of Ontario who has had adequate experience in this field.

1.5.5 The inspection company shall issue weekly reports to the Consultant. The reports shall indicate the progress of fabrication and erection, and give any necessary comments on the material, fabrication and erection operations.

1.5.6 The inspection company shall verify that shop drawings show that the work of this Section has been designed in accordance with established Building Envelope Design principles.

1.5.7 The inspection company shall perform the following shop inspection:

.1 Take minimum 3 cylinders of each strength of concrete once a week if the precast concrete Subcontractor has his own quality control facilities and twice a week if the precast concrete Subcontractor does not have his own quality control facilities when concrete is placed. Take and test cylinders in accordance with CAN/CSA A23.1 or in a manner which duplicates the procedure used for casting of units. Make any additional tests which the local authority may order. Take cylinders and properly mark for identification, leave to cure along side of the units which they represent. Comply with the latest requirements of CAN/CSA A23.1.
.2 Check the quality of the reinforcing steel against the mill test certificates and specifications. Test in accordance with CSA G30 two bars for each test required of each size and grade of steel in each 45 t (50 tons) incorporated.
.3 Inspect overall shop procedure including the forms, placing of reinforcement and bar clearances, concrete placing, weld plates, welded reinforcement, structural steel and curing.
.4 Take samples from the shop for bend and tension tests.
.5 Check dimensions of the completed units and their finishes.
.6 Report to the Consultant on the above work.

1.5.8 The inspection company shall perform the following field inspection:

.1 Inspect the erection of all members to ensure that the finished assembly will be plumb, level and within the permitted tolerances. Check joint widths and finishes.
.2 Check to ensure that damaged or deformed members are not incorporated in the work.
.3 To verify that the installation is being carried out in accordance with the established design principles and reviewed shop drawings.
.4 Approve the welding procedures. Check the qualifications of the welding individuals and check the quality of all welding.
.5 Check to ensure that all joints and connections are completed in accordance with the Drawings and Specifications.
.6 Carry out field inspection a minimum of once a week or twice a week on an irregular basis.
.7 Report to the Consultant on the above work.

1.5.9 At no cost to the Owner, core any unit containing concrete which has failed to meet the strength requirements of the Drawings and Specifications as directed by the Consultant. Units may be rejected and replaced at his discretion after core test. All precast concrete units not meeting the requirements of the drawings and specifications or which are damaged in handling operation will be rejected and shall be replaced.

1.5.10 Design precast and connections for seismic conditions in accordance with all local authorities

having jurisdiction.

1.6 TOLERANCES

1.6.1 Comply with the following dimensional requirements of precast concrete items: (per unit)

.1 Tolerance on any dimension plus/minus 3 mm (1/8").
.2 Tolerance on thickness - 3 mm + 6 mm (- 1/8" +1/4").
.3 Maximum out of squareness of the major and minor axes measured at the end of the minor axis; 3 mm / 3000 mm (1/8" / 10 foot) or part thereof.
.4 Maximum bowing (concave or convex) of any part of the flat surface; (length of bow)/360.
.5 Maximum warpage of one corner out of plane with the other three; the greater of 1.5 mm / 300 mm (1/16" / foot) distance from the nearest adjacent corner of 3 mm (1/8").
.6 Location of openings and cast-in items plus/minus 3 mm (1/8"), plus/minus 6 mm (1/4").

1.6.2 Manufacture and install precast concrete panels so that the joints between the panels are within the following limits:

.1 Face width of joint, plus/minus 5 mm (3/16"), 3 mm (1/8").
.2 Joint taper, 0.5 mm / 300 mm (1/40" / foot) length.
.3 Step in face 6 mm (1/4"), 3 mm (1/8").
.4 Jog in alignment of edge 6 mm (1/4"), 3 mm (1/8").

1.7 QUALIFICATIONS

1.7.1 Qualifications of Manufacturer: Fabricate precast concrete elements certified by the CSA in the appropriate categories according to CSA A23.4. The precast concrete manufacturer shall be certified in accordance with CSA Certification Program for Architectural and Structural Precast Concrete prior to submitting a tender and must specifically verify as part of his tender that he is currently certified in Non-Prestressed Precast Concrete.

1.7.2 Submit references indicating history of successful Work of this type and evidence of certification to Consultant for approval, within ten (10) days, prior to Bid closing.

1.7.3 Only precast concrete elements fabricated by certified manufacturers are acceptable. Certification must be maintained for the duration of the fabrication and erection of the project. Fabricate precast concrete elements in accordance with the OBC requirements.

1.7.4 The insulated precast concrete manufacturer shall have a proven record and satisfactory experience in the design, manufacture and erection of insulated precast concrete facing units of the type specified. The company shall have adequate financing, equipment, plant and skilled personnel to detail, fabricate and erect the work of this section as required by the Specifications and Drawings. The size of the plant shall be adequate to maintain the required delivery schedule.

1.7.5 Erect work by workmen skilled in this trade, set plumb, true and square, with joints parallel and uniform and align all horizontal joints with each other and all vertical joints with each and in accordance with approved Drawings and details.

1.7.6 Applicator of stain shall submit certificate stating he has a minimum of three years experience using the specified product.

1.8 SUBMITTALS

1.8.1 Prepare for the review of the Consultant shop and erection drawings fully describing all precast units. These drawings shall show, among other items, the following:

.1 location of each unit in the completed structure;
.2 all dimensions of each unit including holes, irregularities and thickness of facing unit;
.3 reinforcing details and grade of reinforcing;
.4 concrete strengths and any admixture proposed;
.5 jointing clearances and clearances between the units and the structural building framework.
.6 complete connections and insert details including materials, size and length of welds. Provide other trades with detailed drawings and setting information so that connection material can be readily erected in its required location:
.7 finish designation number and location on each precast item;
.8 identifying marks for each precast unit;
.9 location and details of lifting hooks and handling points;
.10 sequence of erection and any special handling instructions or bracing required;
.11 full size details of typical methods of sealant application, where required.
.12 special precautions to be taken by other trades affecting the work of this Section.
.13 air/vapour barrier, joining, thickness and finish of materials, types of sealants, expansion and contraction joint locations and details, thermal break locations and details, glazing details and methods, drainage and venting details and flow diagrams, provision for expansion and contraction, details of other pertinent components of the work of this section shall be attached.
.14 location and size of drainage slots required by rainscreen design.

1.8.2 Shop drawings shall bear the professional stamp and signature of a Professional Engineer licensed to design structures and registered in the Province of Ontario.

1.8.3 Connections and special prefabricated inserts may be required by the Consultant to be tested as part of the work of this Section. Provide complete design calculations, if required.

1.8.4 Submit a signed certificate from the sealant manufacturers prior to the commencement of this work which states:

.1 Sealant materials selected for use from those specified;
.2 Surface preparation requirements;
.3 Priming and application procedures;
.4 Verification that sealants are suitable for purposes intended and joint designs;
.5 Sealants are compatible with other materials and products with which they come in contact, including but not limited to sealants and caulkings provided under other Sections, insulation adhesives, bitumens, waterproofing, metals and metal finishes and stone;
.6 Verification that sealant is suitable for temperature, humidity and weather conditions at the time of application.

1.8.5 Stain applicator shall submit list of most recently completed projects where the specified material was used. Include name of project, location, architect and method of application.

1.8.6 Submit manufacturer’s technical literature, specifications and application instructions for the specified stain material for Consultant’s approval.

1.9 SAMPLE PANELS

1.9.1 Submit three 600 mm x 600 mm (24" square) panels for approval of each type, colour and finish of precast concrete. The Consultant will retain one panel. Keep the second panel in the shop as a production guide and the third on the job site.

1.9.2 Do not start fabrication until such samples and shop and erection drawings have been approved.

1.9.3 All work shall match the approved samples.

1.9.4 The first unit produced of each unit type will be examined by the Consultant and if satisfactory will be approved. The quality of finish shall be equivalent to that of the particular 600 mm x 600 mm (24" square) sample panel representing the finish of the unit. If the quality of the precast unit is not satisfactory to the Consultant, make the corrections necessary and produce a second unit of each type and use a standard by which the remainder of the work is judged.

1.10 MOCK UP

1.10.1 Construct at the fabricator's shop, for final review, one typical panel of each type of precast panel, and on the site for installation review.

1.10.2 Mock up wall panel shall be typical and shall include facing, insulation, backing, vapour barrier and flashing where applicable. Remove rejected sample walls from site. Approved sample wall may form part of completed work. All work shall match approved sample wall.

1.11 PRODUCT DELIVERY, STORAGE AND HANDLING

1.11.1 Handle, transport, and store material on the job in such a manner that no damage will be done to the materials or to the structure.

1.11.2 Prevent precast units coming into contact with earth or other materials which may damage the exposed surfaces, and handle with care to prevent damage to corners.

1.11.3 Protect holes and reglets from water and ice during freezing weather.

1.11.4 Stockpile aggregate in sufficient quantity for the entire project.

1.11.5 Stockpile units vertically on platforms or other approved supports. Secure waterproof covering entirely over each stockpile when work is not in progress. Protect stockpiles at all times from weather, dirt and damage.

1.11.6 Do not pile or store material on slabs, or wheel or handle materials over such slabs until the concrete has obtained the design strength and then take care to ensure that the slabs are not loaded over the design loads.

1.11.7 Keep erection equipment in good working order. Equipment shall not be bent, twisted, warped or damaged in any way. All wire ropes for cranes or lifting bars shall be of of full section, not bent, kinked, twisted, torn or stretched. Plainly mark lifting capacity on all lifting beams, platforms and trusses. The ultimate capacity of all erection equipment shall have safety factor of 4.

1.11.8 Make certain that all local and provincial safety regulations are complied with.

1.11.9 Make certain that the general public and all workmen not involved in erection are kept a safe distance from erection operations. Make necessary arrangements, and comply with the requirements of authorities having jurisdiction in connection with encroachment on adjacent properties for purposes of erecting precast concrete panels.

1.11.10 Handle, transport and erect precast concrete members in conformity with the Specifications and Plant Standards of the C.P.C.I. Handbook, except as altered herein.

1.11.11 Provide sufficient temporary bracing to brace the precast units adequately at all stages of construction so that units will safely withstand all loads to which they may be subjected. Leave temporary bracing in position until all connections have been completed.

1.12 WARRANTY

1.12.1 Execute and deliver a written warranty before final payment and in a form satisfactory to the Owner that all labour and materials provided are in accordance with the Specifications and that, should any defect develop within the warranty period, such as spalling, cracking, splitting, deformation, loosening of exposed aggregates due to water freezing, improper materials, workmanship or arrangement, such defect, together with any work affected in correcting such defect, upon written notice that the defect exists, such units shall be made good at the convenience of, and without expense to, the Owner.

1.12.2 The warranty shall be for a period of five years - commencing from the date of Substantial Performance of the work.

1.12.3 Submit a contractor/applicator joint warranty for the precast stain material against failure in material and workmanship for a period of twenty-five years from date of application.

1.12.4 Warrant all work under this Section whether or not any portion has been assigned or subcontracted. In the case of work performed by Sub-subcontractors and where warranties are specifically required or requested by the Consultant, secure such written warranties and deliver same, together with main warranty, to the Owner. Leave panels clean and free from all blemishes.

PART 2 - PRODUCTS

2.1 MATERIALS

2.1.1 Cement: Portland cement complying with CAN/CSA-A5.

2.1.2 Sand for the facing mix of exposed precast units: Complying with CAN/CSA-A23.1, Article 5 to provide finishes as specified.

2.1.3 Aggregates for leveling bed: Comply with CSA A82.56.

2.1.4 Aggregates: Conforming to CAN/CSA-A23.1-M, 5/32” to 23/32”, aggregate size.

2.1.5 Water: Free from deleterious foreign matter.

2.1.6 Stain: Hydrous, multi polymer formulation of resin solids, colour pigments which are light fast, UV resistant, penetrating, aspiratory, quick drying, mould, fungus and mildew resistant:
.1 Nawkaw Emulsion Colour Treatment by Nawkaw Corporation, or other approved manufacture.

2.1.7 Admixtures: Manufactured by Master Builders Technologies, Sika Canada Inc. or other approved manufacturer. All admixtures to be approved by the Consultant.

2.1.8 Reinforcing steel: Complying with CSA G30 Series. Reinforcing larger than diameter 10 M (1/4") deformed bars complying with CSA G30.6.

2.1.9 Reinforcing steel, metal connections, bearing materials, concrete inserts and lifting devices: Comply in all respects with CAN/CSA-A23.4 or requirements of authorities having jurisdiction, whichever are more stringent.

2.1.10 Anchors and Supports: Mild steel or structural steel sections of sizes and thickness to adequately secure and/or support units. All material cast in concrete to be hot dipped galvanized after fabrication.

2.1.11 Dowels, cramps and anchors for interior wall facing units shall be brass, bronze or stainless steel. Reinforcing steel galvanized where specified or shown.

2.1.12 Structural steel: New material complying with CAN3-G40.21 or ASTM A36/A36M.

2.1.13 Materials generally: The same as specified for Section 03 30 00 except that the concrete shall have a minimum compressive strength of 35 MPa (5000 psi) at 28 days when tested in accordance with ASTM C-39 and a maximum absorption of 6% when tested in accordance with ACI 704.44. All precast concrete units shall contain entrained air controlled at 5% plus or minus 1%, when tested in accordance with ASTM C-97 at time of batching.

2.1.14 Zinc rich touch-up paint: Galvafroid standard brushing grade supplied by W.R. Meadows of Canada Limited, or other approved equivalent zinc-rich paint.

2.1.15 Bituminous paint: Conforming to CGSB 1-GP-108M.

2.1.16 Waterproof membrane: Asphalt compound complying with CGSB 37-GP-2 or CGSB 37-GP-16.

2.1.17 Forms: Constructed of approved steel, fibreglass reinforced plastic or high density overlaid plywood complying with CSA 0121 or as required to obtain the quality of the finish specified.

2.1.18 The thickness of facing of exposed aggregate precast units not less than 25 mm (1") thick. Balance of units may be a Portland cement concrete.

2.1.19 Insulation: Extruded expanded, polystyrene complying with CAN/CGSB 51.20-M87, Type 4 RSI=0.98 per 25 mm (R=5.6 per 1") thickness and a minimum compressive strength of 200 kPa (30 psi) at 5% deformation or yield: thickness as indicated on Drawings:
.1 Styrofoam Ulta by Dow Chemical of Canada Ltd.,
.2 Pro-Tec Multi Purpose Insulation by Building Products of Canada Limited, or other approved manufacture.

2.1.20 Insulation tape: Waterproof, non-degradable, compatible with insulation, and with a permeability rating not exceeding that of the insulation.

2.1.21 Air cut-off baffles and spacers: Preformed filler, Rodofoam, GR grade by Sternson Limited or other approved manufacture.

2.1.22 Air entraining agent, conforming to ASTM C260 and CAN3-A266.1-M:
.1 MBVR by Master Builders Co. Ltd.,
.2 DAREX A.E.A. by W.R. Grace of Canada, or other approved alternate.

2.1.23 Cast-in fixing devices: Philblocks by W.R. Meadows of Canada Limited, or other approved manufacture.

2.1.24 Sealant: Multi-component chemical curing complying with CAN/CGSB 19.24-M80:
.1 Sikaflex 2CNS by Sika,
.2 Dymeric manufactured by Tremco Ltd., or other approved manufacture.

2.1.25 Sealant, cleaning solvents, fillers and primers: Compatible with each other.

2.1.26 Back-up for sealant: insert foam filler type (expanded polyethylene or polyurethane). Compression not less than 25%, non-staining type:
.1 Ethafoam by Dow Chemical Canada., or approved equal.

2.1.27 Colours for sealants: As selected by the Consultant, not necessarily from manufacturer's standard colours.

2.1.28 Joint backing: White, non-absorbent, closed cell, round-in-section, polyethylene foam or chemically compatible rod stock of butyl or neoprene. Diameter of backing shall be 50% greater than width of joint.

2.1.29 Primer: As recommended by the sealant manufacturer to suit job conditions.

2.1.30 Metal primer: Ready mixed, organic, zinc rich paint conforming to CGSB 1-GP-181M, for shop priming of exposed metal and filed touch-up after erection.

2.1.31 Cleaning material: Xylol, Methyl-ethyl-ketone, Toluol or as recommended by the sealant manufacturer.

2.1.32 Joint packing material for inner seal where specified. Material shall be sized such that it is compressed to 50% in the completed installation. Supply packing in as long lengths as possible.

.1 Poly-tite polyisobutylene impregnated foam polyurethane by Hanson Inc. or other approved manufacture.

2.1.33 Breathing tubes with screen: Round plastic weep tube with stainless steel insert.

2.1.34 Flashing: 0.79 mm (22 ga.) As shown on Drawings.

2.2 FABRICATION AND MANUFACTURE

2.2.1 Fabricate insulated and uninsulated units as indicated on Drawings and in accordance with reviewed Shop Drawings and to meet requirements of local by-laws and this section.

2.2.2 Reinforce units with welded steel reinforcing and shear ties sufficient to withstand handling stresses, temperature changes, wind load, dead loads and live loads, in accordance with requirements of local building code.

2.2.3 Cast in forms for brick patterns as required to suit design shown on drawings.

2.2.4 Cast in anchors, blocking, and inserts as required. Where possible, permanently attach anchors and inserts to reinforcing, provide required holes and sinkages. Include plastic inserts for nailing wood blocking at top of precast.

2.2.5 Fabricate weld plates, threaded inserts or other connection fitting of steel, properly located and anchored to reinforcement.

2.2.6 Handle slabs during stripping, utilizing embedded inserts in slab ends only, to prevent marking of slabs through conventional use or clings or ropes.

2.2.7 Handling of units shall be so designed that no face handling methods will be employed. Panels handled by inserts on exposed faces requiring subsequent patching, filling, etc. are unacceptable.

2.2.8 Cast in all necessary lintels, and the like, to support opening up to 12’-0” win width. Refer to Drawings for extent. Provide all necessary reglets for flashing and other necessary attachment thereto.

2.2.9 Execute work accurately, true to dimensions, square in true planes, free from waves, twists, cracks, checks, and broken edges. Edges shall be straight and clean with accurate arrises.

2.2.10 All reinforcing steel hooks, anchors, or other ferrous metal cast into concrete shall be galvanized after cutting, bending or fabrication to G-90 zinc coating. All steel units cut after fabrication shall be dipped in zinc rich paint.

2.2.11 Do not start fabrication until shop and erection drawings have been reviewed, and samples have been approved.

2.2.12 Insofar as practical, execute fitting and assembly in the shop with various parts or assemblies ready for erection at the building site.

2.2.13 Where possible, take field measurements and levels required to verify or supplement those shown on the Drawings for the proper layout and installation of work. Co-ordinate dimensional tolerances in adjacent building elements and confirm prior to the commencement of work.

2.2.14 Fabricate steel used for connections complying with CAN3-S16.1.

2.2.15 Batch all cement and aggregates used in the manufacture of the concrete carefully and separately by weight. Uniformity in quality and grading of the aggregate is essential.

2.2.16 Notify Consultant when the first set of precast concrete forms are ready for Consultant's examination and approval.

2.2.17 Execute the work accurately, true to dimension, square, in true planes, free from waves, twists, cracks, checks and broken edges and to tolerances specified. Fabricate edges straight and with clean accurate arises.

2.2.18 Provide for vertical expansion and contraction joints as necessary and install air cut-off baffles in continuous vertical members to prevent stack effect within enclosed air spaces as indicated.

2.2.19 Provide pressure equalizing and drain vents for enclosed air spaces.

2.2.20 Location of joints and pressure equalizing drain vents shall be subject to Consultant's acceptance.

2.2.21 Accurately fit together joints, corners and mitres. Match components carefully to produce perfect continuity of line and design. Make joints toward the exterior weathertight and joints toward the interior airtight in accordance with specified allowances.

2.2.22 Provide lift loops of recessed type adequately sized to handle the units safely according to the unit dimension and weight. Conceal anchors, inserts and loops where possible.

2.2.23 Remove rust, mill scale or foreign matter from all steel connection material, inserts, bolts, and plates by blast cleaning in accordance with CGSB 31-GP-404a to achieve a cleanliness defined as Type II Commercial Blast Cleaning.

2.2.24 Steel materials embedded wholly within concrete shall not be galvanized, other steel connection materials shall be galvanized.

2.2.25 Immediately after blast cleaning and pickling or heat treatment galvanize in accordance with CSA G164 or ASTM A123. The protective coating shall be such that no embrittlement of a connection can occur, and that no loss of strength of the connection can occur, which has not been anticipated and allowed for in the design.

2.2.26 Prior to galvanizing, flash pickle cold worked reinforcing steel or wrought steel products which have been cold formed. Heat teat malleable castings, prior to galvanizing, by heating to 676EC and water quench.

2.2.27 Hot-dip galvanize all anchors, inserts, loops and other structural steel or connections cast into the units - after cutting, bending or fabrication with 610 g/sq.m (2 ounces of zinc per square foot). Paint galvanized areas damaged during welding operations with 3 coats of zinc rich touch-up

paint.

2.2.28 Do not install metal closer than 40 mm (1-1/2") to any face of exterior precast concrete units.

2.2.29 Perform all welding in accordance with CSA W48.1, W59 and W117.2. Any organization undertaking to weld under this Section shall be fully cerfified by the Canadian Welding Bureau under the requirements of CSA W47.1 and W55.3. Take care during welding to minimize the effect of welding heat. Design welds to prevent tearing at end of welds. Detailed welding procedure for approval may be required by the Consultant. Where it is necessary to weld components already galvanized, remove galvanizing for 50 mm (2") around weld. Make good corrosion protection using 2 coats of zinc rich touch-up paint.

2.2.30 Cast panels face down in accurate moulds designed to withstand high-frequency vibration. Finish the backfaces of the panels smooth and with slight uniform texture. Vibrate panels continuously during the casting operation until the full thickness is reached.

2.2.31 Introduce admixtures with the concrete materials at the time of batching in accordance with the manufacturer's recommendations. Under no circumstances will the use of calcium chloride or an admixture containing calcium chloride be permitted.

2.2.32 Provide all cast-in fixing devices as are necessary for the attachment of the work of other Sections.

2.2.33 Leave joint at head of windows open and provide with flashing cast into precast concrete backing.

2.2.34 Install fixing devices supplied by Section 08410, and 08900 and other Sections as applicable.

2.2.35 Identify all precast concrete units on base face with numbering and a mark identifying the orientation of the unit in its final position.

2.3 CONNECTIONS

2.3.1 Connection of precast concrete work of this Section to concrete work is the responsibility of this Section.

2.3.2 Provide connections which can be adjusted to accommodate the tolerances specified for the structural frame under Section 03300 and CAN/CSA-A23.4.

2.3.3 Secure all precast units safely and adequately in position by positive, mechanical connections capable of maintaining all loads which may be applied to the unit.

2.3.4 Make all structural connections for precast concrete work with steel connections.

PART 3 - EXECUTION

3.1 INSPECTION

3.1.1 Before commencing erection, examine the work of other Sections to which the precast concrete work will be attached.

3.1.2 Report immediately in writing to the Consultant all discrepancies in accuracy and suitability in the location, bearing and retaining of structural members which will adversely affect the installation and permanency of the work of this Section.

3.1.3 Commencement of the erection shall imply acceptance of the work of other Sections, upon which the precast concrete erection depends.

3.2 ERECTION

3.2.1 Employ workers skilled in this trade, and co-ordinate with section 05 12 00, Structural Steel.

3.2.2 Set plumb, true and square, with joints parallel and uniform in accordance with reviewed Shop Drawings.

3.2.3 Provide all metal anchors, connectors, angles, and fastening devices to secure units, including bolts, nuts, washers, locks and expansion shields, Deliver anchors, plates, etc. to be built into Work to trades requiring them.

3.2.4 Repair or repace chipped, cracked, blemished or defective units to the Consultant's satisfaction. Replace units where variance of colour or shade of adjacent units are unacceptable.

3.2.5 Construct connections such that forces are transferred in directions of reaction indicated on the Drawings.

3.2.6 Install breathing tubes with stainless steel insect screens at the bottom of all vertical exterior joints.

3.2.7 Apply sealant and joint backing at exterior and interior joints between precast units, against dissimilar materials and between precast units and foundation walls, for complete weather tight installation in accordance with Section 07 90 00.

3.2.8 Prime paint all exposed metal. Following erection, touch-up paint damaged by welding and installation operations with zinc-rich prime paint.

3.2.9 Paint all galvanized surfaces damaged during erection, by welding or other means, with zinc rich touch-up paint.

3.2.10 The alignment face for exterior precast concrete panels shall be the outside face unless the inside face is specified.

3.2.11 Fasten work securely as erection progresses. Provide all units with suitable temporary braces, shores, and stays to hold them in position until permanently secured. Draw all nuts and bolts tight and upset bolt threads to prevent nuts from backing off or spot weld nut heads.

3.2.12 Under no circumstances shall any precast concrete unit butt directly against and/or bear directly upon another precast concrete unit. Where upper panels rest on lower panels or concrete, use stainless steel or other approved type shim and seal joint between the upper and lower panels with sealant. Do not use cement grout.

3.2.13 After panels are installed and the structure has deflected adjust all anchors so that the panels are level and joints plumb. After installation of related components make further adjustments as necessary, and when other dead loads which may affect panel alignment have been applied, align precast concrete and weld connections. Remove lifting inserts, which are visible or which interfere with the work of other trades.

3.2.14 As erection progresses, co-ordinate erection work with the installers of building insulation and sheet flashings. Where flashings are to be inserted into the joints of the precast panel system, co-operate to ensure that they are properly placed and secured as shown on the Drawings. Bear the cost of replacing flashings damaged as a result of the work of this Section and the cost of delays resulting therefrom.

3.2.15 Exterior precast concrete panels extending below grade shall be flat on the bottom and lead shimmed. Fill space with mortar to dispose load.

3.2.16 Units damaged in handling shall be patched to Consultant's approval. If patching is unsatisfactory, remove rejected panels.

3.3 STAINING

3.3.1 Apply stain to precast concrete in accordance with stain manufacturer’s instructions.

3.3.2 After sample treatment has cured in accordance with manufacturer’s recommendations, verify the substrate is coated with sufficient stain material to produce the desired appearance and colour.

3.3.3 Obtain Consultant’s approval of sample prior to full scale application. Sample shall become standard of quality.

3.4 SEALING

3.4.1 Seal joints between precast concrete panels as detailed. Coordinate sealing with sealing performed under other Sections so that junctions in sealant are continuous, uniform, and full strength.

3.4.2 Clean dust, foreign matter and any other material deleterious to the bond of sealing materials from the joints of the precast panels.

3.4.3 Handle, store, prepare and use sealing materials in accordance with the manufacturer's recommendations.

3.4.4 Pack joints continuously with joint backing material allowing a recess to receive sealant. Make recess depth equal to joint width.

3.4.5 Prime joints as recommended by the sealant manufacturer.

3.4.6 Insert through-joint plastic tubes for air pressure equalization to frequency and uniform arrangement as recommended by the engineer responsible for rainscreen design. Submit drawings of tube arrangement to Consultant prior to commencing work.

3.4.7 Provide drainage slots, sized and at locations required by rainscreen design.

3.4.8 Gun in sealant ensuring full bond to joint sides and no bond to backing material. Tool joints to profile shown by gun action or by separate operation. Surfaces of sealant shall be a full bead smooth, free from ridges, wrinkles, sags, air pockets and embedded impurities.

3.4.9 At the horizontal joints of precast concrete column covers and elsewhere where it is demonstratively impossible to place a gunned inner seal after the erection of the upper unit, provide the inner seal using the specified joint packing material. Adhere packing to the bottom unit in the correct position using the adhesive recommended by the packing manufacturer. Minimize joints in packing. Seal packing joints using the specified sealant. Remove excess polyisobutylene from upper surface of packing and ensure a full strength bond with the upper unit.

3.4.10 Comply with the applicable requirements of Section 07900.

3.5 CLEANING

3.5.1 Clean precast concrete in a manner which does not stain the surfaces. Obtain Consultant's approval of cleaning methods before commencing cleaning operations.

3.5.2 Clean precast concrete starting from the top of the building in a manner which will not stain the finish.

END OF SECTION

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

1.1.1 Supplementary Conditions, General Conditions and General Requirements shall govern work of this section.

1.2 QUALITY ASSURANCE

1.2.1 Personnel:

.1 The fabricator shall have a minimum of five years experience in the fabrication of the items under this Section.
.2 All welding shall be performed by a firm or company who have been certified by the Canadian Welding Bureau to the requirements of CSA W47.1, "Certification of Companies for Fusion Welding Structural Steel".

1.2.2 Codes and Standards:

.1 Comply with all pertinent building codes and regulations.
.2 Comply with CSA S16, "Steel Structures for Buildings", of the Canadian Standards Association.
.3 Comply with CSA W59, "General Specification for Welding of Steel Structures (Metal-Arc Welding)", of the Canadian Standards Association.

1.2.3 Conflicting Requirements: The more stringent requirements shall govern conflicts between building codes and regulations, the reference standards or their Specifications.

1.3 SUBMITTALS

1.3.1 Certificates: Within 14 days after notice of award of Contract, submit to the architect test certificates of the chemical and physical analysis for all the material proposed to be supplied and installed under this portion of the work, if required.

1.3.2 Proof of Qualification: Within 14 days after award of Contract, submit to the architect a copy welding certification and a list of all qualified welders to be used on this portion of the work, if required.

1.3.3 Within 14 days of completion of all welding work, submit certification by a Registered Professional Engineer that all welds have been produced in accordance with the drawings and specifications, if required.

1.3.4 Shop Drawings:

.1 Within 14 days after award of Contract, and before any metal fabrication items are delivered to the site, submit complete shop drawings to the landscape architect for review.
.2 Include with the shop drawings a bill of material, including quantities, materials, sizes and nominal weights.
.3 Show all locations, markings, sizes and shapes, and indicate all methods of connecting, anchoring, bracing and attaching to the work of other trades. Show all shop and field welds by the current recommended symbols of the Canadian Welding Bureau.

1.4 PRODUCT HANDLING

1.4.1 Delivery and Storage:

.1 Deliver and store materials to prevent damage.
.2 Handle materials so as to prevent permanent damage.

1.4.2 Protection:

.1 Provide adequate protection of materials and the work of this Section from damage by other trades.
.2 Protect the work of all other trades from damage resulting from the work of this Section.

1.4.3 Replacement: In the event of damage, make repairs or replacements necessary to the approval of the Architect at no additional cost to the Owner.

PART 2 - PRODUCTS

2.1 BARS, PLATES AND SHAPES

2.1.1 All bars, plates and shapes shall be new, free from rust and meet the requirements of CSA G40.21 M 300 W.

2.2 BOLTS AND NUTS

2.2.1 High Strength Bolts: All machine bolts, nuts and washers shall meet the requirements of ASTM A325.

2.2.2 Anchor Bolts: Anchor bolts shall be steel and meet the requirements of ASTM A307.

2.3 STEEL PIPE

2.3.1 All steel pipe shall be galvanized, seamless steel tubing, schedule 40 pipe, sizes as noted on drawings.

2.4 GALVANIZING

2.4.1 Galvanizing shall conform to ASTM A123 for structural shapes and ASTM A153 for miscellaneous steel and hardware. Zinc used for coating shall conform to the specification for slab, zinc, ASTM B6.

2.4.2 The following items shall be galvanized regardless of the general finishing specification:

.1 Embedded plates and shapes
.2 All bolts, nuts and washers unless they are completely encased in concrete or buried and coated, or painted as specified elsewhere.

2.5 OTHER MATERIALS

2.5.1 All other materials, not specifically described but required for a complete and proper installation, shall be new, first quality of their respective kinds and subject to the review of the architect.

PART 3 - EXECUTION

3.1 SURFACE CONDITIONS

3.1.1 Inspection:

.1 Inspect the existing work of all other trades on which the work of this Section is dependent, and verify that all such work is complete to the extent that the installation of metal fabrication items may commence.
.2 Make all required measurements in the field to ensure proper and adequate fit of the items to be installed.
.3 Verify that all metal fabrication items may be installed in accordance with all pertinent codes and regulations, the original design, the reviewed shop drawings and the referenced standards.

3.1.2 Errors and Omissions:

.1 Report all errors and omissions that may affect the installation of this work to the Engineer.
.2 Do not proceed with the installation in areas where errors and omissions occur until such errors and omissions have been resolved.

3.2 FABRICATION

3.2.1 General: Fabricate all items in accordance with the reviewed shop drawings and the referenced standards.

3.2.2 Prefabrication: Prefabricate all items, to the extent possible, complete and ready for installation.

3.2.3 Holes: Make all holes by punching or drilling. Burned holes will not be accepted.

3.3 WELDING

3.3.1 General:

.1 Welds shall be completed in accordance with the details shown on the drawings or as specified.
.2 Welds, welding equipment, procedures, etc. shall conform to CSA W59 and the National Building Code.
.3 All welding shall be done by personnel qualified in accordance with CSA W47.

3.3.2 Site Conditions:

.1 The Contractor shall note that the site is exposed and that welding operations must be suitably protected against the direct action of weather.
.2 The following provisions shall also apply:
.1 No welding shall be done when the temperature of the base metal is lower than -18°C, except with the express consent of the Engineer who will specify the precautions to be taken.
.2 At temperatures below 0°C, the surfaces of all areas within 75mm of the point where a weld is to be started shall be heated to a temperature at least warm to the hand before welding is commenced.

3.4 ERECTION

3.4.1 Coordination: Coordinate the installation of all items with that of related trades to ensure orderly and timely progress of the work.

3.4.2 Compliance: Erect and install all items in accordance with the reviewed shop drawings and the

referenced standards.

3.4.3 Tolerances: Align all items straight, plumb and level with a tolerance of not more than 1mm in 1 metre.

3.4.4 Correction of Errors:

.1 Immediately report to the Engineer and the fabricator any fabrication error which prevents the proper erection of the items.

.2 Do not proceed until the Engineer approves the method of correction proposed.

3.5 FINISHING

3.5.1 Standard Finishing: Finish according to specified manufacturer. Colour to be custom colour as determined by the Architect.

3.5.2 Custom Finishing – where a fabricator is not specified or does not provide standard finishing acceptable to the Architect, the following is to apply:

.1 Steel mesh or line fabric to be pre-galvanized steel with a wire zinc coating as per ASTM A641-Class I. Minimum coating weight of 150g/m.

.2 HSS components and other solid or hollow steel components shall be: pre-galvanized steel with a zinc coating weight of 275g/m^2, or hot-dipped galvanized steel with a minimum coating weight of 550g/m^2. Hollow components shall be galvanized on all surfaces.

.3 All components to be acid-cleaned and primed with an organic, zinc-rich primer followed with a high-build epoxy. All field cuts or welds must be thoroughly cleaned and primed with two (2) coats of cold galvanized compound, followed with an organic, zinc-rich primer followed with a high-build epoxy. All components to be finished with two (2) coats of urethane enamel. Colour to be determined by the Architect.

3.6 CLEAN-UP

3.6.1 Upon completion of the work of this Section, remove all material, trash, debris, equipment and tools. Leave the site in a neat and orderly condition acceptable to the Engineer.

END OF SECTION

PART 1 - GENERAL

1.1 WORK INCLUDED

1.1.1 Comply with Division 1, General Requirements and all documents referred to therein.

1.1.2 Provide all labour, materials, products, equipment and services required to complete the metal fabrications work necessary and/or indicated on the Drawings and specified herein including all metal work which is not specified elsewhere.

1.2 REFERENCES

1.2.1	ASTM A53/A53M-12:	Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
1.2.2	ASTM A123/A123M-13	Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
1.2.3	ASTM A143/A143M-07(2014)	Standard Practice for Safeguarding Against Embrittlement of Hot-Dip Galvanized Structural Steel Products and Procedures for Detecting Embrittlement.
1.2.4	ASTM A153 / A53M-09	Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
1.2.5	ASTM A167-99(2009)	Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate.
1.2.6	ASTM A307-14	Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60,000 PSI Tensile Strength.
1.2.7	ASTM A325-14	Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.
1.2.8	ASTM A394-08(2015)	Standard Specification for Steel Transmission Tower Bolts, Zinc-Coated and Bare.
1.2.9	ASTM A563-15	Standard Specification for Carbon and Alloy Steel Nuts.
1.2.10	ASTM A653/A653M-15	Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
1.2.11	ASTM A780/A780M-09(2015)	Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.
1.2.12	ASTM 1011/A1011M-14	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.
1.2.13	ASTM C939-10	Standard Test Method for Flow of Grout for preplaced-aggregate Concrete (Flow Cone Method)

1.2.14	ASTM C1107/1107M-14a	Standard Specification for Packaged Dry Hydraulic-Cement Grout (Nonshrink)
1.2.15	CAN/CGSB 1.108-M89	Bituminous Solvent Type Paint.
1.2.16	CAN/CGSB 1.171-98	Inorganic Zinc Coating.
1.2.17	CAN/CGSB 1.181-99	Organic, Ready Mixed, Zinc Rich Coating.
1.2.18	CAN/CSA-G40.20-04(R2009)	General Requirements for Rolled or Welded Structural Quality Steel.
1.2.19	CAN/CSA-G40.21-04(R2009)	Structural Quality Steel.
1.2.20	CAN/CSA G164-M92 (R2003)	Hot Dip Galvanizing of Irregularly Shaped Articles.
1.2.21	CISC/CPMA 2-75	Quick-Drying Primer For Use on Structural Steel.
1.2.22	CSA W47.1-09(R2014)	Certification of Companies for Fusion Welding of Steel Structures.
1.2.23	CSA W47.2-11	Certification of Companies for Fusion Welding of Aluminum.
1.2.24	CSA W59-13	Welded Steel Construction (Metal Arc Welding).
1.2.25	CAN/CSA W117.2-12	Safety in Welding, Cutting and Allied Processes.

1.3 QUALIFICATIONS OF WELDING

1.3.1 Welding of steel and aluminum shall be undertaken only by a fabricator fully approved by the Canadian Welding Bureau and CSA W47.1 and CSA W47.2, as may be applicable.

1.3.2 Conform to safety requirements of CAN/CSA W117.2 for welding operations.

1.4 DESIGN

1.4.1 Design the work of this Section in accordance with the Ontario Building Code and the by-laws of the local municipality.

1.4.2 Maximum deflection for individual members shall not exceed 1/360th, of the span.

1.4.3 Work of this Section which will support other items or will be required to support structural loads of any nature shall be designed by a Professional Structural Engineer registered in Ontario and who shall affix his/her professional seal and signature to the shop drawings for such items.

1.4.4 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.

1.5 SUBMITTALS

1.5.1 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.

1.5.2 Submit necessary templates and instructions where fastenings or anchors have to be built in by other trades.

1.5.3 Work designed by a Professional Engineer shall bear signature and stamp of the engineer.

1.5.4 Submit adequate written instructions for protection of completed work, and proper methods and materials to be used in cleaning.

1.6 STORAGE, DELIVERY, HANDLING AND PROTECTION

1.6.1 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.

1.6.2 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.

1.6.3 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.

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.

1.7 WARRANTY

1.7.1 Warrant Miscellaneous metals work of this Section against defects in materials and workmanship in accordance with General Conditions but for an extended period of two (2) years and agree to repair or replace faulty materials or work which appears during warranty period, without cost to the Owner/Tenant. Defects shall include, but not limited to, deflection, opening of joints, or deterioration of metal.

PART 2 - PRODUCTS

2.1 MATERIALS

2.1.1 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.

2.1.2 Hollow Structural Sections (HSS): New stock; to conform to CAN/CSA-G40.21, Grade 350W (50W), Class C, stress relieved.

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

2.1.4 Sheet Steel (Commercial Quality): Conforms to ASTM A653/A653M, stretcher levelled or temper rolled.

2.1.5 Tube: Conforms to ASTM A53.

2.1.6 Welding materials: Complying with CSA W59.

2.1.7 Interior primer: Complying with CISC/CPMA 2-75, oil alkyd type.

2.1.8 Stainless steel: Type 302 or 304 alloy, complying with ASTM A167.
2.1.9 Aluminum sheet: 1100 alloy, H14 temper, anodizing quality.

2.1.10 Aluminum extrusions: Alcan 6063 alloy, T5 temper.

2.1.11 Steel members, fabrications and assemblies shall be galvanized after fabrication by the hot dip process in accordance with CAN/CSA G-164 or ASTM A123.

2.1.12 Bolts, nuts and washers and iron and steel hardware components shall be galvanized in accordance with CAN/CSA G-164 or ASTM A153. Nuts and bolts shall be supplied in accordance with ASTM A307, A325, A394 and A563 as applicable.

2.1.13 Products shall be safeguarded against embrittlement in conformance with ASTM A143.

2.1.14 Organic zinc rich primer: Complying with CAN/CGSB 1.181 "Galvafroid SB Grade" by W.R. Meadows of Canada Ltd.,"Kem Organic Zinc Rich Primer No. 6430" by Sherwin-Williams Company of Canada Ltd., "Glid-Guard Glid-Zinc Organic Line 5526 Line" by the Glidden Company Limited, or other approved manufacture.

2.1.15 Inorganic zinc coating: Complying with CAN/CGSB 1.171, "Glid-Guard Glid-Zinc No. 5535 Line" by Glidden Company Limited, or other approved manufacture.

2.1.16 Interior primer for steel: Complying with CISC/CPMA 2-75a.

2.1.17 Bituminous paint: Complying with CAN/CGSB 1.108.

2.1.18 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.

2.2 FABRICATION

2.2.1 Verify all dimensions on the site before preparing Drawings or proceeding with shop work.

2.2.2 Insofar as practical, execute fitting and assembly in the shop with various parts of assemblies ready for erection at the building site.

2.2.3 Fabricate the work true to dimensions and square. Accurately fit members with hairline joints, and join using adequate fastening.

2.2.4 Construct finished work free from distortion and defects detrimental to appearance and performance.

2.2.5 File or grind exposed welds smooth and flush. Do not leave grinding marks. Construct internal and external corners with sharp lines. Provide continuous welds unless otherwise approved by the Consultant in writing.

2.2.6 Fabricate metal work complete with all components required for anchoring to concrete; bolting or welding to structural frames; standing free; or resting in frames or sockets in a safe and secure manner.

2.2.7 Weld all connections unless approved otherwise in writing by the Consultant.

2.2.8 Execute exposed fastenings neatly where approved and of the same material, colour and finish as the base metal, on which they occur.

2.2.9 Counter sink exposed fastenings, where such are approved in writing, and make as inconspicuous as possible with bolts cut off flush with nuts. Construct fastenings of the same material and finish as the base material on which they occur.

2.2.10 Insulate contact surfaces to prevent electrolysis due to metal to metal contact or between metal and masonry or concrete. Use bituminous paint, butyl tape, building paper or other approved means.

2.2.11 Thoroughly de-scale steel work before delivery to project site. Remove roughness and irregularities, clean with a wire brush, remove oil and grease and prime with one shop coat of paint to a 2 mil thickness.

2.2.12 Primer interior steel work supplied under this Section with one shop coat of interior primer.

2.2.13 Do not prime the following surfaces:

.1 steel to be encased in concrete;
.2 non-ferrous metals;
.3 surfaces and edges to be field welded. If painted, remove paint for field welding for a distance of at least 2" in all sides of the paint.

2.2.14 Hot-dip galvanize steel, where specified, in accordance with CAN/CSA G164 (coating weight as prescribed for type of article), or ASTM A653/G90 (coating weight;1.25 oz./sq.ft.) as applicable. Galvanize after fabrication where possible. Follow recommended precautions to avoid embrittlement of the base metal by overpickling, overheating or during galvanizing.

2.2.15 Touch-up galvanized steel where galvanizing is damaged during installation with zinc rich primer, in accordance with ASTM A780.

2.2.16 Stainless steel shall be finished in No. 4 bright, brush finish, unless otherwise noted.

2.3 ANCHOR BOLTS AND OTHER MEANS OF ANCHORAGE

2.3.1 Provide all anchor bolts and expansion bolts or other means of anchorage required for building into floors, walls and ceilings, where it is necessary to secure metal and wood to concrete, masonry or steel work. Supply anchor bolts, nuts and similar hardware to the respective Sections for fastening.

2.4 MISCELLANEOUS STEEL SECTIONS

2.4.1 Supply and install all steel items not indicated to be supplied under other Sections.

2.4.2 Where sections are required to be built into masonry or concrete supply such members to the respective Sections.

2.5 CONCEALED SUPPORT ELEMENTS AND FRAMING

2.5.1 Supply and install all support elements and framing as shown on the Drawings for the items listed herein. Construct supports from rolled steel sections assembled by welding.

2.5.2 Design supports to withstand, within acceptable deflection limitations, their own weight, the weight of the items to be supported, loads imposed by the motion of supported items, where applicable, and all live loads, static and dynamic which might be applied to the supported items in the course of their normal function. Design supports with a safety factor of 3. Design supports further as required to accommodate structural deflection.

2.5.3 Provide all accessories, inserts and fixings necessary for attachment of supports to building structure. Drill supports as required to receive attachment of supported items. Arrange supports to avoid conflicts with pipes, ducts, precast concrete connections, thermal and vapour barrier construction, framing provided under other sections, and such that supports and their fixings are fully concealed from view within the finished work.

2.5.4 Paint all supports unless galvanizing is specified.

2.5.5 Provide concealed support elements or framing as required for the following items:

.1 Vanities.
.2 Grab bars occurring on gypsum board partitions.

2.6 LINTELS

2.6.1 Supply loose steel lintels to other Sections where required for building into the work. Fabricate lintels as shown on the Drawings. Galvanize lintels which will be exposed to the exterior.

2.6.2 Lintels for wall of less than 8" nominal thickness shall be masonry lintels supplied and installed under Section 04200.

2.7 LADDER SCHEDULE

2.7.1 *******Elevator Pit Ladders: Provide one (1) ladder for each pit and confirm location with elevator supplier, and as follows:

.1 Side Rails: Nominal 63.5mm x 10mm (2-1/2” x 3/8”) side rails at 457mm (18”) O/C, extend side rails to 1220mm (4’) above the entry floor level.
.2 Rungs: Smooth bar stock, nominal 19mm (3/4") diameter shouldered and welded at maximum 305mm (12”) O/C, starting at 305mm (12”) above pit floor level.
.3 Ladder Mounts: 63.5mm x 10mm (2-1/2” x 3/8”) brackets mounted at maximum of 1524mm (5’) O/C with a support at the top of the side rails, and the rungs at 150mm (6”) from the wall face.
.4 Usage Classification: [Industrial] [Service]

2.7.2 *******High Parapet Access Ladder:

.1 Construct with 2.54mm (0.1”) minimum bent plate or steel channel stringers and grating treads, welded.
.2 Include 32mm (1-1/4”) outside dia. pipe handrails both sides.
.3 At top landing form tread 100mm (4”) wide, level with landing.
.4 Usage Classification: Service

2.7.3 *******Roof Access Ladders:

.1 *******Construct access ladders in accordance with Ontario MOL safety codes.

.2 *******Side Rails: Nominal 63.5mm x 10mm (2-1/2" x 3/8") at 457mm (18") O/C, extend side rails to 1220mm (4') above upper surface, loop and return side rails for roof access ladders.

.3 Rungs: Nominal 19mm (3/4") diameter rungs shouldered and welded at 305mm (12") O/C maximum, rungs starting at 305mm (12") maximum above lower entry level or roof surface, finished with acceptable non slip tread surface.

.4 Ladder Mounts: Nominal 63.5mm x 10mm (2-1/2" x 3/8") brackets at maximum spacing of 3048mm (10') with support at the top of the side rails, and centreline of rungs at 150mm (6") from the wall face.

.5 *******Safety Cages: Provide acceptable steel safety cage for ladders greater than 6096mm (20') in height starting from 2439mm (8') maximum above bottom entry level and continuous to top, and as follows:

.1 Primary Hoops: 8mm x 100mm (5/16" x 4") steel flat bar hoops at tops and bottoms of cages and spaced not more than 3658mm (12') O/C.

.2 Secondary Intermediate Hoops: 8mm x 50mm (5/16" x 2") steel flat bar hoops, spaced not more than 1220mm (4') O/C. between primary hoops.

.3 Vertical Bars: 8mm x 50mm (5/16" x 2") steel flat bars secured to each hoop, spaced approximately 229mm (9") O/C.

.4 Fasten assembled safety cage to ladder rails and adjacent construction by welding or riveting, unless otherwise indicated.

PART 3 - EXECUTION

3.1 INSTALLATION

3.1.1 Install miscellaneous metals work in the correct locations and positions, plumb, level, structurally sound, securely fastened, free from defects detrimental to finished appearance and to the approval of the Consultant.

3.1.2 Install the work of this Section using skilled craftsmen and in accordance with manufacturer's recommendations where applicable.

3.1.3 After installation, spot prime field bolt heads and nuts, field rivets, welds and any abrasions or damage to the shop coat of the primer.

3.1.4 Perform drilling of steel and/or concrete masonry to fasten the work of this Section.

3.1.5 All surfaces prime painted under the Section shall be free from runs, sags, crawls and other defects. This Section shall repair any such defects to the satisfaction of the Consultant.

END OF SECTION

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

1.1.1 General specifications shall govern the work in this section.

1.1.2 This Section includes requirements for supply and installation of exterior precast concrete unit paving on compacted sand bed.

1.2 REFERENCES

1.2.1 ASTM D698-12e2 Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12 400 ft-lbf/ft3 (600 kN-m/m3)).

1.3 RELATED WORK

1.3.1 Refer to applicable sections.

1.4 SUBMITTALS

1.4.1 Product Data: Submit manufacturers product data for each type of product specified.

1.4.2 Shop Drawings: Submit shop drawings incorporating plans, elevations, sections and details for all work in this Section. The details shall illustrate and note all material thicknesses, types and finishes, type of construction including joint sizing and edging requirements.

1.4.3 Samples for Verification: Submit samples for verification for each type and colour of precast concrete unit paver.

1.5 SOURCE QUALITY CONTROL

1.5.1 Obtain Landscape Architect's approval of stone / precast pavers if different from

1.5.2 Recommended supplier.

1.5.3 Supplier: Obtain precast units of a uniform blend within the ranges accepted for these characteristics, through one source from a single manufacturer.

1.5.4 Maximum weight loss after 50 cycles of freezing and thawing when totally immersed

1.5.5 in a 3% NaCl solution shall not exceed 0.35%.

1.5.6 Provide a written and signed warranty in the name of the Owner.

1.5.7 The warranty to cover the replacement of the defective materials and workmanship of all work specified for a period of one (1) year from the Substantial Performance of the Work.

1.5.8 Upon written instruction from the Owner that the stone / precast paving and related work is defective, promptly replace or repair the defective work.

1.6 DELIVERY AND STORAGE

1.6.1 Deliver stone / precast pavers as required for immediate installation.

1.6.2 Remove from the site all stones which have been chipped, broken, cracked or otherwise damaged.

1.6.3 Store sand and / or limestone fines on site in location designated by the Landscape Architect.

1.6.4 Keep stone / precast pavers free from contact with earth, concrete, mortar, roofing, bitumen, membrane waterproofing and other material which would stain or adhere to surfaces.

1.7 SITE CONDITIONS

1.7.1 Site Measurements: Verify dimensions by site measurements before fabrication and indicate measurements on shop drawings where precast units are indicated to fit around other construction; coordinate fabrication schedule with construction progress to avoid delaying the Work.

1.7.2 Established Dimensions: Establish dimensions and proceed with fabricating precast units without site measurements where site measurements cannot be made without delaying the Work; coordinate construction to ensure that actual site dimensions correspond to established dimensions; allow for trimming and fitting.

1.8 PROTECTION

1.8.1 Protect existing buildings, lawns, trees, pool surface, service poles, wires,

1.8.2 Underground services and concrete paving located on this or adjoining properties from damage while this work is in progress.

1.8.3 Make good damage resulting hereto.

PART 2 - PRODUCTS

2.1 MATERIALS

2.1.1 Concrete Unit Pavers: As per drawings.

2.1.2 Bedding Course: Limestone screenings; crushed limestone products of 50 % limestone dust and balance composed of even spread of particles up to 6 m maximum size.

2.1.3 Granular Base: 19 mm limestone to consist of clean, well-graded angular shaped particles of crushed stone, conforming to the following gradation.
Gradation for crusher-run stone and by weight passing Tyler sieve.

Tyler Sieve Size	19 Crusher-Run
63 mm	---
50 mm	---
33 mm	---
25 mm	100
16 mm	75-95
4.75 mm	35-55

1.18 mm	15-35
300 mm	7-20
75 mm	3-10

2.1.4 Sand: Clean, sharp and free of deleterious materials.

2.1.5 Joint Filler:
- .1 Mixture of polymer binders and sand, allowing firm lock between concrete paver joints once set.
- .2 Applications: Horizontal and sloped surfaces.
- .3 Maximum Joint Spacing: 38mm (1-1/2").
- .4 Basis of Design Material: Permapro XP Polymeric Sand by Permacon.

2.1.6 Edge Restraint: Galvanized steel angle.

2.1.7 Separation Geotextile: Nonwoven geotextile fabric, manufactured for separation applications, comprised of polypropylene fibres tangled together in a needle-punching process.

PART 3 - EXECUTION

3.1 ERECTION

3.1.1 Following approval of subgrade, place, grade and compact the stone base in 75 m layers in accordance with MTC Form 314 to a tolerance of maximum 12.5 mm.

3.1.2 Compact each layer to a minimum of 98% maximum dry density as determined by ASTM Designation D698. Supply and apply water, both to aid in compaction and to provide dust control.

3.1.3 Place geotextile layer as recommended by manufacturer.

3.1.4 Place and compact bedding course of limestone screenings.

3.1.5 Lay stone / precast pavers to finished grades shown on drawings.

3.1.6 Sawcut stone / precast pavers to fit accurately, neatly and without damaged edges in order to provide the layout as indicated on the drawings. Place stone / precast pavers in position with joints not exceeding 3 m. Mechanical cutting will not be permitted.

3.1.7 Compact stone pavers into bedding course with a heavy vibrating compactor. Fill all joints with sand and sweep over stones in several directions, and sprinkle with water to ensure compaction of sand in joints.

3.1.8 Edge Restraint: Install as per concrete unit paver manufacturer’s recommendations.

3.1.9 Unit pavers with sand joints:

- .1 Install pavers with joints dimensions indicated on Drawings.
- .2 Tamp down and level pavers with mechanical plate vibrator as recommended by the manufacturer until pavers are true to grade and free of movement.
- .3 Fill spaces between pavers by sweeping in sand joint filler.
- .4 Pass mechanical plate vibrator on sand cushion over surface course to achieve compaction of sand in joints.

.5 Surface of finished pavement: Free from depressions exceeding 3mm (1/8") as measured with 3m (10') straight edge.
.6 Sweep surface course clean.

3.2 CLEANING AND ADJUSTMENT

3.2.1 Cleaning: Perform final cleaning as required.

3.2.2 Adjustment and replacement work shall be performed as specified in this Section with materials of same size, variety and quality of material replaced.

3.2.3 Replacement work shall be done under an additional guarantee of the same length and conditions as described in this Specification. It shall date from time of Consultant's approval of replacement work.

END OF SECTION

PART 1 - GENERAL

1.1 WORK INCLUDED

1.1.1 Comply with Division 1, General Requirements and all documents referred to therein.

1.1.2 Provide labour, materials, products, equipment and services to complete the traffic, parking and pavement marking work.

1.2 REFERENCE DOCUMENT

1.2.1 CAN/CGSB 1.74-2001 Alkyd Traffic Paint.

1.3 SUBMITTALS

1.3.1 Submit two 1 litre (1 qt.) samples of each type of paint.

1.3.2 Clearly mark samples with name of Project and its location, paint manufacturer's name and address, name of paint, CGSB standard number, formulation number and batch number.

1.4 QUALITY ASSURANCE - QUALIFICATIONS

1.4.1 Work of this Section shall be performed by a company specializing in the type of work specified.

1.5 SITE CONDITIONS

1.5.1 Do not apply markings at ambient and surface temperatures below 10°C.

PART 2 - PRODUCTS

2.1 MATERIALS

2.1.1 Paint: CAN/CGSB 1.74, abrasion resistive traffic paint, colour yellow.

2.1.2 Thinner: To CAN/CGSB-1.5.

PART 3 - EXECUTION

3.1 APPLICATION

3.1.1 Ensure that substrates are properly cured and thoroughly cleaned before markings are applied.

3.1.2 Ensure surfaces are free from water, frost, ice, dust, oil, grease and other foreign materials.

3.1.3 Ensure that surfaces to receive line marking paint which are also to receive sealer have been sealed first, that sealer is dry and cured, and that paint is compatible with sealer.

3.1.4 Lay out traffic, parking and pavement markings including graphic symbols and curbs as indicated on the Drawings. Use standard graphic symbol for areas reserved for disabled persons.

3.1.5 Use approved pressure type paint applicator capable of applying paint in width required, that will ensure uniform application and a positive means of shut-off.

3.1.6 Apply sufficient number of coats by brush or marking machine until a uniform colour and density is obtained. Coverage shall not exceed 3 sq.m/L (150 sq.ft./gal).

3.1.7 Do not use spray application unless written approval has been obtained. Where spray application is permitted provide adequate shielding or masking.

3.1.8 Lines and markings shall have neat, straight and clean edges. Lines shall have edges parallel. Refinish ragged edges or lines incorrectly laid out. Remove incorrect lines. Make inconspicuous.

3.1.9 Make lines 100 mm (4") wide unless otherwise indicated. Arrows and other graphics as detailed. Pavement messages: Font type - Helvetica, thickness

3.2 PROTECTION OF APPLIED WORK

3.2.1 Protect pavement markings until cured.

END OF SE

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

1.1.1 General Conditions shall govern work of this section.

1.2 DESCRIPTION

1.2.1 This section specifies the requirements for planting.

1.3 RELATED WORK

1.3.1	Durolawn Surfacing	Section 32 18 00
1.3.2	Grading	Section 32 22 00
1.3.3	Topsoil and Fine Grading	Section 32 91 13
1.3.4	Sodding	Section 32 92 23

1.4 TESTING

1.4.1 Test existing stockpiled topsoil as specified in Section 02 83 00 Topsoil Spreading and Fine Grading, and as noted on drawings, and submit results to the Landscape Architect and the Town of Richmond Hill for review, prior to starting work on site.

1.5 INSPECTION

1.5.1 Make all materials available for inspection at source of supply or advise Landscape Architect two weeks in advance of delivery to site.

1.5.2 Approval of plant material at source does not overrule the right of the Landscape Architect to inspect plants upon arrival on the project site or during the course of construction and to reject trees at that time.

1.5.3 Planting of plant material, prior to inspection by the Landscape Architect will be the Contractor's responsibility. The Landscape Architect reserves the right to reject any plants, whether planted or not, which do not conform to the specifications and/or drawings. All material not conforming to the specification should be removed from site.

1.5.4 Furnish all inspection certificates as may be required by federal, provincial and other applicable regulatory bodies.

1.6 PRODUCT DELIVERY, STORAGE AND HANDLING

1.6.1 Store and protect fertilizer, limestone, bonemeal, mulching materials and similar products to prevent damage from moisture. Labels shall indicate weight, analysis and name of manufacturer.

1.6.2 Plants specified B/B (ball and burlap) or S/B (string ball) on the Plant List shall be moved with root systems as solid units, with balls of earth firmly wrapped with burlap. The diameter and depth must be sufficient to encompass a fibrous and feeding root system necessary for the healthy development of the plant. No plant shall be accepted when the ball of earth surrounding its roots has been cracked or broken preparatory to, or during planting, or after the burlap, stakes, ropes or platform required in connection with its transplanting has been removed. All balled plants that cannot be planted at once shall be kept watered and shaded from hot sun. The least possible time shall elapse between digging of the tree and its final planting. The entire root systems of all plant material shall be kept moist and at no time shall these root systems be exposed to drying winds or air.

1.6.3 Should temporary storage of plant material be necessary on the site, such plant material shall be heeled in the Contractor. Contractor shall be responsible for all necessary watering and maintenance to preserve the stock in good condition.

1.6.4 All plant material shall be properly top pruned to compensate for any loss of root when dug at the nursery, thus enabling the plant to attain more quickly a natural balance between root and top growth. Pruning shall be done at the centre rather than heading back.

1.6.5 Transport plants with branches tied to prevent damage and padded to avoid abrasion from equipment. Protect drying out of roots, root balls, trunks, branches and leaves of plants from time of removal at place of origin until they are planted.

1.6.6 Spray plant material with an anti-desiccant immediately before moving them from their original location. Apply a sufficient amount over trunks, branches and foliage. Plants may be re-sprayed after planting.

1.6.7 Installation shall be done under acceptable weather conditions and in suitable growth seasons for each specified material.

1.7 MAINTENANCE

1.7.1 Water plants immediately upon planting and continue watering to maintain optimum growing conditions for each plant.

1.7.2 Maintain all plant materials and planting areas immediately after plants have been planted and continue such maintenance until two years from date of Substantial Performance of the Contract. Maintenance shall include all measures necessary to establish and maintain plant materials in a vigorous, healthy, growing condition.

1.7.3 Remove plant material as soon as failure is apparent. Replace immediately. If not possible due to availability or season backfill holes with topsoil and mulch.

1.7.4 Maintenance shall include, but not limited to the following work:

.1 Maintain all plants and tree accessories, such as tree wrappings, tree guys, stakes, turnbuckles and similar items from time of installation until acceptance of work.
.2 Cultivate and keep planting beds and tree saucers free of weeds, debris and broken branches and maintain planting beds in a neat and tidy condition at all times.
.3 Spray at appropriate time to combat pests and diseases. Do not use DDT or spray prohibited by Agriculture Canada. All chemicals used for weed and pest control shall be approved by the City of Brampton and applied in accordance with manufacturer's recommendations by licensed applicators. Contractor is responsible for damage caused by chemicals.
.4 Regular inspections to ensure all plants shall be free of diseases and/or insect infestations.
.5 Fertilizing, watering and pruning as necessary. Water shall be considered the Contractors cost.
.6 Removal of weeds, cultivation of beds, and topping up of mulch as required to maintain planting beds in a neat condition.

1.7.5 Provide adequate protection against winter damage including damage caused by rodents. Wrap all conifers with burlap wrap prior to winter in first year after planting.

1.7.6 Failure to maintain plant material will result with the Owner paying separate contractors to do the work, and said value to be deducted from the contract price.

1.7.7 All plants shall be free of diseases and insect infestations in a healthy, good growing condition, and planting areas free of weeds and freshly cultivated, at time of final inspection.

1.7.8 Protect all planting areas against damage, including erosion and trespassing, by providing and maintaining proper safeguards. Remove safeguards at the end of the maintenance period.

1.7.9 All maintenance work required to maintain the planting in a healthy growing condition and to keep planting beds neat and tidy during the warranty will be carried out by the Landscape Contractor at no extra cost to the Owner.

1.8 GUARANTEE

1.8.1 Guarantee planting for a period of two years from the date of Substantial Performance of the Contract. Trees and shrubs found to be dead or defective at the end of the guarantee period shall be replaced and re-guaranteed for an additional one year dated from the date of replacement.

1.9 REPLACEMENTS

1.9.1 Replace during next planting season, trees and shrubs which failed to survive. Replacements are subject to same approval and a one year guarantee period. Continue this replacement until all specified trees and shrubs are well established.

PART 2 - PRODUCTS

2.1 MATERIALS

2.1.1 Topsoil: Friable natural loam, range 6.0 pH to 7.5 pH containing a minimum 4% organic matter, shall be free of stones, roots, lumps and other solid materials. Obtain topsoil from stockpile on site.

2.1.2 Peatmoss: Decomposed plant material, fairly elastic and homogenous, free of decomposed colloidal residue, wood, sulphur and iron and of brown colour containing minimum 6% organic matter by weight and moisture content not exceeding 15%. Minimum pH value of peat 4.5, maximum 6.0.

2.1.3 Bonemeal: Raw commercial, finely ground and with a content of minimum 4% nitrogen and 20% phosphoric acid.

2.1.4 Manure: Well rotted, unleached cattle manure, free from harmful chemicals and other injurious substances, at least height months old, but not more than two years old and with no more than 25% straw, leaves or other unacceptable materials for planting use.

2.1.5 Lime: Lime (to be used in all cases where the pH of the soil is less than 6.0) Limestone containing not less than 8% of calcium and magnesium carbonates combined, finely ground to pass a 10 mesh sieve with at lease one half passing a 100 mesh sieve. Rate of application shall be determined after determining the pH of the topsoil.

2.1.6 Sand: coarse concrete sand.

2.1.7 Peeler Bark Mulch: Shredded bark mulch – material remaining after bark is peeled from hardwood logs at a sawmill. Mulch is to be comprised of 90% bark and 10% wood. Mulch is not to contain any wood chips.

2.1.8 Fertilizer: Shall be complete commercial fertilizer 50% of the elements of which shall be derived from organic sources and shall contain no less than 60% urea formaldehyde with the following percentages by weight of nitrogen, phosphoric acid and potash in that order for: trees 10-6-4, shrubs 12-6-6 and/or as recommended by soil test.

2.1.9 Anti-desiccant: Emulsion to form permeable film over plant surfaces and mixed according to manufacturer's directions.

2.1.10 Amend existing topsoil using a mechanical shredder. Other means of blending shall be reviewed and

approved, only, by the Landscape Architect.

2.2 PLANT ACCESSORIES

2.2.1 Tree Wrapping for Trunks: First quality burlap.

2.2.2 Anchors (only if required): For support of large shrubs and trees larger than 75mm (3.0") in caliper use new metal "T" bars 38mm x 38mm x 5mm (1.5" x 1.5" x 3/16") painted black.

2.2.3 Eye Bolts and Turnbuckles: Zinc coated. Turnbuckles shall have 10mm (3/8") diameter bolts for trees over 75mm (3") caliper.

2.2.4 Hose: New black rubber hose 12.7mm (0.5") in diameter, two-ply reinforced.

2.2.5 Mulch: Shall be a shredded pine bark mulch. Red Canadian mulch supplied by All-Treat Farms Limited, or SPM by Gro-Bark Ltd., or approved equal. Submit sample for approval.

2.2.6 Water: Potable.

2.2.7 Guy Wires: Zinc coated pliable steel wire, #9 gauge.

2.2.8 Stakes: T-rail iron stakes 38mm x 38mm x 5mm x 2440mm long (1.5" x 1.5" x 3/16" x 8'-0") primed with one brush coat of black zinc rich paint to CGSB 1-GP-181.

2.2.9 Wound Dressing: Horticulturally accepted non-toxic, non-hardening emulsion.

2.2.10 Rodent Protection: (as directed) Round, metal or plastic extending 24" above grade. Supply shop drawing.

2.2.11 Weed Mat: by Terrafix Geosynthetics Inc. or approved equal, submit sample for approval.

2.3 SOIL MIXTURES FOR PLANTING

2.3.1 For planting of trees, shrubs and vines, mix 5 parts (50%) topsoil with 1 part (10%) peatmoss and 2 parts (20%) well rotted cow manure or mushroom compost, 2 parts (20%) coarse sand.

2.3.2 Incorporate into planting soil bonemeal at rate of 0.6 kg/m cubed (1 lb. per cubic yard) or soil mixture.

2.3.3 In planting soil for trees and shrubs, apply fertilizer and amend soil, if required, by soil analysis and/or as specified.

2.4 PLANT MATERIAL

2.4.1 Conform to the horticultural standards of the Canadian Nursery Trades Association with respect to size and quality. Supply in strict accordance with the Plant List.

2.4.2 Substitutions for the specified plants will not be accepted unless approved in writing by the Landscape Architect. All materials that are not available at tender time shall be brought to the attention of the Landscape Architect prior to closing.

2.4.3 Measure plants when branches are in their natural position. Height and spread dimensions refer to main body of plant and from branch tip to branch tip. Measure caliper 150mm (6") above ground level. Use trees and shrubs of no. 1 grade.

.1 Label each plant to type, grade and size.
.2 Use tree and shrubs with strong fibrous root system free of disease, insects, defects or injuries and structurally sound. Use trees with straight stems well and characteristically branched for species. Plants must have been transplanted or root pruned regularly but not

later than 9 months prior to arrival on site.

2.4.4 Trees and shrubs must have grown in container for minimum one growing season but no longer than two. Root system must be able to "hold" soil when removed from container. Plants that have become root bound are not acceptable.

2.4.5 Balled and Burlapped: The size of the ball shall be proportional to the caliper of the deciduous tree and to the height of the conifer. Measure caliper at 150mm (6") above ground level. A tree with 75mm (3") caliper required root ball of 1m (40") diameter. Increase diameter of root ball by 250mm (10") with each increase of 25mm (1") in caliper. Root balls of proper size must include 75% of fibrous and feeder root system. This excludes use of native trees grown in light sandy or rocky soil. Secure root balls with burlap, heavy twine and rope. Use hessian burlap. Frozen root balls will be permitted provided root balls are sufficiently protected to prevent breakage. Protect root balls from sudden changes in temperature and exposure to heavy rainfall.

2.4.6 Imported plant material must be accompanied by the necessary permits and import licences. Conform to federal and provincial regulations.

PART 3 - EXECUTION

3.1 WORKMANSHIP

3.1.1 Notify the Landscape Architect of the source of plant material at least seven days in advance of the commencement of work. No work is to proceed without the Landscape Architect's approval.

3.1.2 Plant material must be approved prior to planting. Planting locations must be approved prior to excavation of planting pits.

3.1.3 Acceptance of plant material at its source does not prevent rejection on site prior to or after planting operations. If required, apply anti-desiccant in accordance with material manufacturer's instructions.

3.1.4 Co-ordinate operations. Keep site clean and planting holes drained. Remove soil and debris spilled onto pavement immediately.

3.2 PLANTING TIME

3.2.1 Plant deciduous plant material during dormant period before buds have broken. Plant material imported from a region with warmer climatic conditions may only be planted in early spring.

3.2.2 When permission has been obtained to plant deciduous plant material after buds have broken, spray plants with anti-desiccant to slow down transpiration.

3.2.3 When permission has been obtained, trees and shrubs growing in containers may be planted throughout the growing season.

3.2.4 Ensure that watering facilities are available. Take particular care and use anti-desiccant when planting in the heat of the summer. Plant only under conditions that are conducive to health and physical conditions of plants. Plant material noted by the Landscape Architect for spring planting only must be planted in their dormant period.

3.3 PREPARATION

3.3.1 Stake out location of all trees for approval by the Landscape Architect.

3.3.2 Shrub beds are to be shown with outline indicating extent and specified shape for approval of the Landscape Architect.

3.3.3 The Landscape Architect may choose to alter layout of trees and shrub beds due to site conditions.

3.4 EXCAVATION

3.4.1 Verify locations of all below grade utilities prior to excavating. Stake locations of utilities in areas where excavation will occur.

3.4.2 Large Tree/Conifer: Excavate to depth of at least 200mm (8") deeper than height of root ball, with minimum width of 600mm (24") greater than diameter of root ball.

3.4.3 Increase the size of planting holes in heavy soils by 150mm (6") for every 300mm (12") of diameter root ball.

3.4.4 Excavate shrub beds to a minimum depth of 450mm (18").

3.4.5 Protect bottoms of excavations against freezing.

3.4.6 Remove water which enters excavations prior to planting.

3.4.7 Remove all excavated material from planting pits and beds off site.

3.4.8 Scarify subgrade of planting beds and tree pits to 200mm (8").

3.5 PLANTING MIX PREPARATION

3.5.1 Backfill planting beds and tree pits with the specified planting soil mixture.

3.5.2 Backfilling and mixing planting mix shall be done under favourable weather conditions.

3.6 PLANTING PROCEDURE

3.6.1 Prior to planting shrubs, install weed mat over prepared soil to the extent of the planting beds and turn edges and bury into soil. Cut weed mat cleanly at locations to plant trees and shrubs. Overlap joints in weed mat fabric.

3.6.2 Plant trees and shrubs vertically, in the centre of pits.

3.6.3 Place all plant material high, 100mm (4") allowing for settlement, so that the final depth will be equal to the depth originally grown in the nursery.

3.6.4 Trees that do not have a uniform head but are accepted by the Landscape Architect should be placed to give best appearance to the approval of the Landscape Architect.

3.6.5 Ensure that root balls rest on a minimum of 200mm (8") planting mix.

3.6.6 Tamp topsoil around root system in layers of 150mm (6") depth and eliminate air pockets. Frozen or saturated topsoil is unacceptable. When 2/3 of topsoil mixture has been placed, fill hole with water. After water has completely penetrated the soil, complete backfill. Form a 100mm high saucer around the rootball.

3.6.7 Remove top ring of wire basket or top 1/3 of burlap from the root ball prior to completion backfilling.

3.6.8 When planting is completed, give surface of planting hole a dressing of organic 10-6-4 fertilizer at the rate of 12 kg/100 sq.m. (21 lbs./ 100 sq.yds.) for shrubs and at a rate of 0.6 kg/25mm (1.3 lb./1") of caliper for trees. Mix fertilizer with top layer of topsoil mixture and water immediately after planting.

3.7 WRAPPING OF TREE TRUNKS

3.7.1 Obtain the Landscape Architect's approval of planting before wrapping is done.

3.7.2 Treat trunks with paste of long residual insecticide such as "Lindane" before wrapping.

3.7.3 Wrap deciduous trees spirally from the ground to the second branch only after receiving satisfactory approval.

3.7.4 Burlap wrap conifer trees in fall, prior to winter, in first year after planting. Remove burlap wrap early the following spring.

3.8 PRUNING

3.8.1 Do pruning only as necessary to remove dead and broken branches and to compensate for the loss of roots when transplanted.

3.8.2 Preserve the natural form and character of plants.

3.8.3 Use only sharp, clean tools and make cuts flush without leaving stubs. Treat all cuts, 25mm (1") in diameter and larger with approved tree paint.

3.8.4 Cut back cambium to living tissue where there are cuts, bruises and sears on the bark and treat with approved tree paint. Shape wood to prevent retention of water.

3.9 MULCHING

3.9.1 Remove surplus planting soil from weed mat surface and ensure overlapped joints prior to placing mulch.

3.9.2 Obtain the Landscape Architect's approval of planting before mulching material is applied.

3.9.3 Loosen soil in planting beds and pits and remove all debris and weeds. Spread mulch to indicated minimum depth 75mm (3") over weed mat. Mulch material susceptible to blowing must be moistened and mixed with a small amount of topsoil before application.

3.10 TREE SUPPORT

3.10.1 For trees and conifers on grade, stake tree/conifer with standard methods approved by Landscape Architect.

3.10.2 Ensure trees and conifers are set plumb in vertical position.

3.10.3 Keep guy wires taut at all times.

3.10.4 Remove all staking treatments at the end of the guarantee period.

3.11 RODENT PROTECTION

3.11.1 Provide rodent protection, only as directed, on all trees planted under this contract.

3.11.2 Rodent guards to be placed around all tree bases and should extend down through the mulch to the top of the root ball.

3.12 ACCEPTANCE

3.12.1 Planting will be inspected for Substantial Performance when Landscape Architect has been notified that it is completed. The two (2) years guarantee period starts from the date of landscape completion and inspection and approval by the City of Brampton.

3.12.2 Planting will have an interim inspection one (1) year from date of Substantial Performance.

3.12.3 Planting will be inspected for Final Acceptance at the end of the two years guarantee period.

3.13 MAINTENANCE

3.13.1 Refer to 1.7

END OF SECTION

PART 1 - GENERAL

1.1 GENERAL REQUIRMENTS

1.1.1 This section specifies the requirements for topsoil, hauling, spreading and fine grading.

1.1.2 General Conditions of the Contract shall apply as if repeated here.

1.2 RELATED WORK SPECIFIED ELSEWHERE

1.2.1	Durolawn Surfacing	Section 32 18 00
1.2.2	Grading	Section 32 22 00
1.2.3	Planting	Section 32 90 00
1.2.4	Sodding	Section 32 92 23

1.3 TESTING

1.3.1 Test stockpiled topsoil for N, P, K, Mg, soluble salt content, organic matter and pH value in place and other requirements as noted on the drawings prior to starting work on site.

1.3.2 Perform pH test to determine required lime treatment to bring pH value of soil within 5.5 to 7.5 level.

1.3.3 Submit two copies of soil analysis and recommendations for correction for review by the Landscape Architect.

1.3.4 Inspection and testing of topsoil will be carried out by testing laboratory designated by the Landscape Architect. Contractor to pay for cost of testing.

1.3.5 If required, adjust fertilizer requirements and other additives to conform to soil testing report recommendations.

PART 2 - PRODUCTS

2.1 MATERIALS

2.1.1 Topsoil: Friable natural loam, range 6.0 pH to 7.5 pH containing a minimum 4% organic matter, shall be free of stones, roots, lumps and other solid materials.

PART 3 - EXECUTION

3.1 TOPSOIL AND FINE GRADING

3.1.1 Submit topsoil testing analysis and recommendations to the Landscape Architect prior to hauling to and spreading topsoil on the work site. Failure to obtain topsoil samples and testing and submitting soil analysis report will delay commencement of work until reports are submitted and reviewed by the Landscape Architect. Provide proof that specified topsoil amendments were carried out.

3.1.2 Obtain approval by the Landscape Architect of prepared subgrades prior to hauling, placing and spreading of topsoil.

3.1.3 Topsoil obtained from designated stockpiles shall be amended by mechanical shredder; other

methods of blending shall be reviewed and approved only the Landscape Architect.

3.1.4 Spread topsoil to the following minimum depths (refer to Tender Proposal Form for extent of topsoil to be provided by the Landscape Contractor):

.1 450-600mm for all shrub, tree and flower beds
.2 150mm for all areas to be sodded; 150mm for all areas to be seeded
.3 Depth indicated is compacted depth.
.4 Spread topsoil on prepared subgrade of the work site.
.5 Fine grade topsoil to produce a smooth even surface, free debris, sod, stones and roots over 25mm in diameter.
.6 Compact to 85% Standard Proctor Density.
.7 Meet and match all existing sodded areas, curbs, sidewalks, manholes and catchbasin frames, asphalt and other surface areas in a smooth, uniform line to the satisfaction of the Landscape Architect.

3.1.5 Prepare topsoil mix for planting beds as specified in Section 02 48 80.

3.1.6 Maintain all topsoil so that it is erosion free. Correct erosion as required.

END OF SECTION

PART 1 - GENERAL

1.1 SUMMARY

1.1.1 Comply with Division 1, General Requirements and all documents referred to therein.

1.2 RELATED WORK

1.2.1 Topsoil Supply and Fine Grading Section 32 22 00

1.3 SOURCES QUALITY CONTROL

1.3.1 Obtain the Consultant's approval of supplier of sod

1.3.2 If required by the Consultant, top soil shall be tested for including but not limited to the following; N, P, K, other minor element values, soluble salts contents, organic matter contents and pH value. Arrange for assume all costs for such testing. Testing shall be carried out by a reputable testing company as approved by the Consultant.

1.3.3 Submit soils analysis report to the Consultant prior to commencement of the work of this Section. When the source of such top soil is exhausted, top soil from new source shall not be used until it has been tested and approved by the Consultant.

1.4 DELIVERY AND STORAGE

1.4.1 Schedule delivery in order to keep storage on the job site to a minimum without causing delays.

1.4.2 Deliver, unload and store sod on pallets. Deliver sod to site within 24 hours of being lifted and lay sod within 36 hours of being lifted.

1.4.3 Do not deliver small, irregular or broken pieces of sod.

1.4.4 During dry weather protect sod from drying and water sod as necessary to ensure its vitality and prevent dropping of soil in handling. Sod which has dried out will be rejected.

1.5 SCHEDULING OF WORK

1.5.1 Schedule sod laying to coincide with topsoil operations.

1.6 ACCEPTANCE

1.6.1 Sodded areas will be accepted by the Consultant:

.1 Sod is properly established.

.2 Turf is free of dead spots and weeds.

.3 Sodded areas have been cut within 24 hours prior to acceptance inspection.

.4 Minimum of 30 days have elapsed following laying.

.5 A minimum of two cuts has taken place.

1.7 WARRANTY

1.7.1 Warrant the work of this Section against defects in materials and workmanship in accordance with the General Conditions for a period of one (1) year, and agree to promptly make good defects which become evident during the warranty period without cost to the Owner. Any sod which, during the warranty period, shows deterioration, bare spots or damage resulting from faulty materials and/or workmanship, shall be replaced at no cost to the Owner. Also, erosion occurring as a result of faulty workmanship and/or materials shall be repaired at no cost to the Owner.

1.7.2 During the warranty period, provide monthly inspections and replace all sod which is dead or is not in a vigorous growing condition.

PART 2 - PRODUCTS

2.1 MATERIALS

2.1.1 Turf grass nursery sod: specially sown and cultivated in nursery fields in compliance with the specifications of the latest issue of the Nursery Sod Growers Association of Ontario (B) number one Kentucky Bluegrass-Fescue Sod.

2.1.2 Fertilizer shall be slow release, 10/20/20 commercial type fertilizer unless specified otherwise, containing not less than 60% urea-formaldehyde and the following percentages by weight;

.1 Nitrogen: 10.
.2 Phosphoric Acid: 20.
.3 Potash: 20.

2.1.3 Sod Pegs: Sod pegs shall be solid hardwood type, 1" x 1" square x minimum 9" long, with pointed end at one end. Ensure that sod pegs are of sufficient length to ensure satisfactory anchorage of the sod.

2.1.4 Top Soil: Shall be friable, fertile natural loam, capable of sustaining vigorous plant growth, containing not less than 4% organic matter for clay loams and not less than 2% organic matter for sandy loams to a maximum 15%, free of subsoil contamination, free of roots and weeds, free of rocks and stones over 2" in diameter and having a pH ranging from 6.0 to 7.5.

PART 3 - EXECUTION

3.1 WORKMANSHIP

3.1.1 Keep site well drained.

3.1.2 Clean up immediately any soil or debris spilled onto pavement and dispose of deleterious materials off the site.

3.1.3 Lay sod in areas as shown on the Drawings.

3.2 INSTALLATION OF TOP SOIL

3.2.1 Spread top soil during dry weather, over dry, unfrozen subgrade where sod is to be installed.

3.2.2 Fine grade top soil eliminating rough and low areas, and ensuring positive drainage.

3.2.3 Roll spread top soil with a roller to compact and retain surfaces. Finished depth of prepared top soil shall be minimum of 4". Keep top soil 1" below finished grade for sodded areas.

3.2.4 Ensure that finished top soil surface is smooth and firm against footprints, with a fine, loose texture before sod is installed.

3.2.5 Obtain approval of Consultant of the finished top soil surface prior to proceeding with installation of sod.

3.3 LAYING OF SOD

3.3.1 Lay sod during growing season. Sodding at freezing temperatures or on frozen ground is not permitted.

3.3.2 Sodding during dry weather is acceptable only if sufficient and continuous watering is assured.

3.3.3 Where necessary, sod shall be pegged to assure non-slippage is obtained and shall be at no extra cost to the Owner.

3.3.4 Obtain the approval of the Consultant of finished grade prior to beginning sodding.

3.3.5 Lay sod even with adjoining areas. The rows shall have staggered joints. Butt sections closely without over-lapping or leaving gaps between sections. Cut out irregular or thin sections with a sharp tool.

3.3.6 Provide close contact between sod and soil by means of light roller. Heavy rolling to correct irregularities in grade is not permitted.

3.3.7 Water immediately after laying to obtain moisture penetration through sod into top 100mm of topsoil.

3.3.8 Provide adequate protection of sodded areas against erosion and other damage. Remove this protection after sod has become established and if approved by the Consultant.

3.3.9 As necessary, peg sod to prevent movement. When sod is established, drive pegs flush with sod.

3.4 MAINTENANCE

3.4.1 Maintain sodded areas for a minimum of two (2) cuts following installation. Maintain at 75mm height.

3.4.2 Water and apply fertilizer to sustain healthy growth and prevent deterioration.

3.4.3 Remove silt traps installed around existing catch basins after completion of sodding work.

END OF SECTION

APPENDIX A

SOIL REPORT

SOLA ENGINEERING

RE: GEOTECHNICAL INVESTIGATION
URBAN ARTS ECO-REJUVENATION
5 BARTONVILLE AVENUE EAST
TORONTO, ONTARIO

FOR: City of Toronto
c/o
NGA Architects
220 Duncan Mill Road, Suite 319
Toronto, Ontario
M3B 3J5

ATTENTION: Ms. Maryam El-Naggar

REPORT NO.: 2021-15958

DATE: December 8, 2021

DISTRIBUTION:
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- Ms. Maryam El-Naggar [melnaggar@ngaa.ca]
City of Toronto
- Ms. Bettina Takacs [Bettina.takacs@toronto.ca]
Original: (File No. 10906-S0003-GEO)

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December 8, 2021 **REPORT NO.: 2021-15958**
FILE NO.: 10906-S0003-GEO

1.0 INTRODUCTION

Sola Engineering Inc. (Sola) was retained by NGA Architects on behalf of City of Toronto (the Client) to carry out a geotechnical investigation for the Urban Arts Eco-Rejuvenation project at 5 Bartonville Avenue East, Toronto, Ontario (the subject site or site). Authorization to proceed with the investigation was received on September 2, 2021, through the acceptance of Sola's Proposal No. 2021-2752 dated May 12, 2021.

As per the scope of services detailed in Sola's proposal, the purpose of this investigation is to collect information on the soil and groundwater conditions at the subject site and based on the investigation data, provide recommendations to assist with the design of the Urban Arts Eco-Rejuvenation.

This report presents the details of Sola's fieldwork and laboratory testing, outlines the soil and groundwater conditions at the site, and provides comments on the aforementioned items.

In this report, standard site investigation procedures have been adopted. The procedures including those developed by the Ontario Building Code, Canadian Foundation Engineering Manual, Ontario Ministry of Transportation and Toronto Transit Commission, are considered by far the most accepted methods by the geotechnical society for general engineering purposes. Soil Classification Systems used for developing this report have been in general conformance with those outlined in the above-mentioned procedures, with modifications where appropriate. Where in doubt, this office must be contacted for further interpretation or clarification.

This report has been prepared for the Client, and their nominated engineers and designers. Third-party use or reproduction, in part or in full, of this report, is prohibited without written authorization from Sola. This report is also subject to the Statement of Limitations which forms an integral part of this document.

2.0 SITE SETTING

2.1 SITE LOCATION, DESCRIPTION AND PROPOSED DEVELOPMENT

The subject site is located at 5 Bartonville Avenue East, Toronto, Ontario and is currently occupied by a one-story building with associated parking lot and a garden. The site is bounded to the north by Bartonville Avenue East, to the southwest by a laneway and to the southeast by commercial and residential properties.

It is understood that the Client is intending to renovate the site which consists of a new garden and some eco-rejuvenation work.

2.2 PUBLISHED GEOLOGY

Based on a review of the existing geological publication for the site area, Ontario Geological Survey (OGS) Map P2204: "*Quaternary Geology, Toronto and Surrounding Area (Southern Ontario)*", the site surrounding area is underlain by Glacial Lake Deposits, comprising Lake Iroquois, shallow-water deposits (sand, silty sand). According to the OGS Map M2544: "*Bedrock Geology of Ontario – Southern Ontario*", the overburden is underlain by the bedrock of the Upper Ordovician Georgian Bay Formation; Blue Mountain Formation; Billings Formation; Collingwood Member; and Eastview Member, comprising Shale, Limestone, Dolostone, and Siltstone.

3.0 GROUND INVESTIGATION

3.1 FIELD INVESTIGATION

3.1.1 Soil Investigation

Prior to undertaking field drilling, Sola obtained clearances of existing public utility services for the site from all applicable agencies and companies. In addition, private utility locates were also carried out.

The geotechnical investigation was carried out on September 30, 2021 and comprised the advancement of one (1) borehole (BH1). The borehole was advanced through the existing ground surface to a depth of approximately 2.7 m below the ground surface using continuous manual hammer drilling method for split spoon sampling. The approximate location of the borehole is shown in **Enclosure 1**. Additional chemical testing samples was collected at the location TP1, as shown in **Enclosure 1**, with shovel on October 28, 2021.

All drilling equipment was supplied and operated by Geotech Support Services Inc. of Markham, Ontario, and the drilling works were completed under the full-time supervision of a qualified Sola Technician.

Manual hammer (half weight of the Standard Penetration Test) split spoon samples were undertaken on a continuous basis using a 50 mm outer diameter and 35 mm inner diameter split barrel sampler driven with a manual hammer of mass 31.8 kg dropping 760 mm. All soil samples were logged in the field and returned to Sola's laboratory in Vaughan for review and subsequent laboratory testing.

The results of these tests (including equivalent SPT "N" values) are presented on the borehole log on **Enclosure 2**.

3.1.2 Groundwater Investigation

Groundwater level observations were made during drilling and in the open borehole upon completion of the borehole drilling. Details of groundwater observations for the borehole are presented on the borehole log on **Enclosure 2**. Further discussion on groundwater is provided in **Section 4.2** of this report.

3.1.3 Survey

The borehole location was established with reference to the existing site features (existing building, garages, poles, fence lines, etc.). The ground surface elevation for the borehole location was estimated from the spot elevation which is on Sheet No. A002 of the drawing set provided by the Client: "City of Toronto Urban Arts Eco-Rejuvenation and Innovative Garden Project", prepared by NGA Architects with Project No. 2190670, dated April 5, 2021 (Issue No. 2). The elevation provided should be considered approximate.

3.2 GEOTECHNICAL LABORATORY TESTING

All soil samples were submitted to Sola's laboratory for natural moisture content determination. The results of the moisture content tests are presented in the borehole log on **Enclosure 2**. In addition, one (1) representable soil sample was submitted for testing of particle size distribution. The results of this laboratory test are provided on **Enclosure 4**.

4.0 SUBSURFACE CONDITIONS

The detailed descriptions of the sub-soil conditions encountered at the borehole location are given in the Borehole Log on **Enclosure 2**.

The borehole data collected by Sola only represents the subsurface conditions at the borehole location. It should be pointed out that the material boundaries indicated on the Borehole Log is approximate and based on visual observations and interpolation between successive samples. These boundaries typically represent a transition from one material type to another and should not be regarded as an exact plane of geological change. It should also be noted that the subsurface conditions may vary across the site.

A summary of the characteristics for each unit of subsoil encountered within the borehole depths is given in the following paragraphs.

4.1 SOIL CHARACTERISATION

It should be noted that the existing tile has been removed before starting the borehole. The ground surface below refers to the surface after the removal of the tile. The soil strata consists of a layer of fill materials overlying a sand deposit and the borehole was terminated in the sand deposit.

4.1.1 Fill Materials

Fill materials were encountered surficially at the borehole location. The thickness of the fill materials at the borehole location was approximately 2.1 m. The fill materials were found to extend to a depth of approximately 2.1 m below the existing ground surface.

Fill materials generally consisted of sandy silt which included trace to some gravel. The fill was generally brown in colour. The equivalent in-situ resistance testing results were from 4 to 6 blows per 300 mm of spoon penetration, indicating that the fill was not constructed under an engineering control.

In the fill materials, the measured moisture contents of the samples recovered ranged from approximately 5.8% to 14.2%, indicating a moist condition.

4.1.2 Sand

A sand deposit was encountered below the fill materials at the borehole location at a depth of approximately 2.1 m below the ground surface. The borehole was terminated in this deposit at a depth of approximately 2.7 m below the ground surface.

An equivalent SPT "N" value for the sand deposit was recorded to be 14 blows per 300 mm of spoon penetration, indicating the soil to be in a compact condition.

In the sand deposit, the measured moisture content of the sample recovered was approximately 5.1%, indicating a moist condition.

4.2 GROUNDWATER

The groundwater condition encountered, and cave in-depth observations were made during drilling and in the open boreholes upon completion of the borehole drilling which are presented on the borehole log on **Enclosure 2**.

Borehole was open and dry upon completion of drilling. The ground surface elevation is approximately 123.9 m.

It should be noted that water levels can vary in response to seasonal fluctuations and major weather events. In addition, a perched water condition can occur due to the accumulation of surface water in the more pervious fill overlying less pervious deposits, especially during seasonally wetter periods.

Long-term "stabilized" groundwater level measurements should be determined by a hydrogeologist.

5.0 DISCUSSION AND RECOMMENDATIONS

The investigation and comments should be considered ongoing as new information about the underground conditions will continue to become available, for example, when foundation construction is underway and more specific information is available with respect to soil conditions. The interpretation and the recommendations of this report must, therefore, be checked through field inspections carried out by Sola to validate the information for use during construction.

It is understood that the Client is intending to renovate the site and this will consist of a new garden and some eco-rejuvenation work which includes a canopy and fences.

Based on the ground conditions found at the site, our recommendations are presented in the following sections.

5.1 FROST PROTECTION

For frost protection, any foundation elements or buried utilities that are sensitive to frost actions should have a permanent earth cover of at least 1.2 meters of soil cover, or equivalent artificial insulation.

5.2 SITE PREPARATORY WORKS

The site preparation work may include stripping of the ground cover (topsoil and organic-rich fill materials as well as pavement, where necessary) within the area with proposed improvements in order to develop the required construction. The stripping depths will likely vary locally and should be adjusted to remove all unsuitable material.

It is recommended that the Geotechnical Engineer monitors the stripping operations to ensure that unsuitable materials have been fully removed prior to construction works. Unacceptable areas identified are to be remediated as soon as practicable and the procedures would be dependent upon conditions encountered.

5.3 SHALLOW FOUNDATIONS

At the time of preparation of this report, the nature and design loading requirements for any types of foundations that may possibly be required have not been made available. The following discussions are provided to assist the design phase of the proposed renovation. For geotechnical design purposes, it is assumed that the foundation will be supported on undisturbed native stratum and below the frost penetration depth, i.e., 1.2 m below the finished grade.

Based on the borehole data, the footings can be founded on undisturbed native soil and designed based on a geotechnical reaction at Serviceability Limit States (SLS) of 120 kPa and a factored geotechnical resistance at Ultimate Limit States (ULS) of 200 kPa. The founding depth is approximately 2.1 m below the existing ground surface and the founding stratum is sand.

The design values provided above are based on the presumption that the allowable bearing pressure at SLS is governed by total and differential settlements of 25 mm and 19 mm respectively, and the structure will tolerate an angular distortion of 1 in 300. The settlements will however depend on the size of the foundations, and we will be pleased to comment on this aspect when the details are known.

Where competent native stratum is not on the even grade, "trench-and-pour" techniques may be considered where constructible. The trench should be excavated along the centreline of the footing units to contact the undisturbed competent native stratum. The width of the trench should extend to at least 200 mm outward of the edge of the proposed footing unit to each side. After the inspection by geotechnical personnel, the trench should be immediately backfilled with unshrinkable fill up to the foundation level. The design bearing values given above can be used if this technique is implemented.

Where it is necessary to place footings on the soil at a different level, the upper footing must be founded below an imaginary 10 horizontal to 7 vertical line (10H:7V) drawn up from the base of the lower footing. The lower footing must be installed first to minimize the risk of undermining the upper footing.

Footings and any foundation wall, if any, should be reinforced as per the design to be provided by the Structural Engineer of the project.

If piers are proposed, the uplifting friction resistance can be calculated with reference to Section 18.2.1.1 of Canadian Foundation Engineering Manual (CFEM), the 4th Edition. A geotechnical resistance factor (ϕ) of 0.3 could be used for uplifting resistance. The resistance coefficient (β) values are provided in the following **Table 1**:

Table 1: Resistance Coefficient β

Soil Type/Depth	Pier Resistance Coefficient β
Fill (within 1.2 mbgs)	-
Fill (from 1.2 mbgs to the surface of native stratum)	0.2
Native	0.3

*mbgs = meters below ground surface

The lateral load capacity can be calculated with reference to Section 18.4.1 of the CFEM, 4th Edition based on Broms' Method (1964a, b).

The recommended bearing resistances and the corresponding founding depth would need to be confirmed by geotechnical engineering staff at the site prior to pouring footing concrete.

It should be noted that the recommended bearing capacities have been calculated by Sola from the borehole information for the design stage only. Should higher bearing values be required, this office should be contacted to review this report.

Where construction is undertaken during winter conditions, footing subgrades should be protected from freezing. Foundation walls and columns, if any, should be protected against heave due to soil adfreeze.

5.4 EARTHQUAKE CONSIDERATIONS

Using the information provided by the site investigation, the general subsurface profile comprises "Stiff Soil – Site Class D" as defined by Table 4.1.8.4.A "Site Classification for Seismic Site Response" of the Ontario Building Code.

5.5 ENGINEERING FILL

On-site excavated clean inorganic native soil may be reused as engineered fill material, provided that the moisture contents are strictly controlled.

If imported inorganic mineral soils are used for engineered fill construction, they must meet the applicable environmental guidelines, and their moisture contents should preferably be close to their respective optimum water content values.

For the on-site excavated clean native soils or similar imported soils, the soil should be placed in thin lifts and heavy compaction equipment should be employed to achieve the specified degree of field density.

Consideration may be also given to backfilling excavations with a well-graded, compacted granular soil such as Granular B as it, if thoroughly compacted, would reduce the post-construction settlements to an acceptable level and may also expedite the compaction process.

Depending on the nature of the structure, or pavement supported by engineered fill, prior to the placement of the engineered fill, the subgrade should be properly prepared. The subgrade preparation should include stripping of any objectionable materials, e.g., loose fill with organics if found. In case of paved surfaces or possibly all the fill in case of structures, we will be pleased to look into this aspect if and when any details become available. The base should be properly shaped and thoroughly proof rolled. Soft and/or unstable subgrade areas should be further sub-excavated to a maximum depth of 450 mm and backfilled to the design subgrade level using inorganic soil, placed in thin lifts, and compacted to at least 98% of its Standard Proctor Maximum Dry Density (SPMDD).

Fill materials required for replacing locally softened soils or raising grades within the footprint of the structures are to comprise suitably organic free materials approved for use by the Geotechnical Engineer. Fill materials are to be placed in lifts of a maximum thickness of 300 mm and compacted, using appropriate compaction equipment, to at least 98 % of its SPMDD.

Fill located in areas outside of the footprint of any proposed structure or roadway should be compacted to at least 95 % of the material's SPMDD to within 1.0 m of the subgrade level, and then to at least 98 % of its SPMDD up to the required grade. Imported granular fill used in confined areas should be compacted using only handheld compaction equipment.

Sola recommends that any and all engineered subgrades beneath proposed structures be inspected and/or proof rolled prior to construction.

5.6 EXCAVATION AND BACKFILL

5.6.1 Excavatability and Site Excavations

It has been assumed that all excavations for the proposed renovation will be open cut. In order to enable entry into excavations during the construction process, all excavations must comply with the definitions prescribed by the "Occupational Health and Safety Act" (OHSA), Ontario Regulation 213/91 "Construction Projects".

The borehole data indicate that the fill materials should present as a Type 4 soil both above the groundwater level and below the groundwater level as defined in the OHSA and Regulations for Construction Projects (Part III Excavations, Section 226). Native sand deposit would be classified as a Type 3 soil above the groundwater level and Type 4 below the groundwater level. Excavations in these materials should be constructed in conformance with the regulations. It is noted that the above soil classifications have been estimated based on small samples from the boreholes. The excavation conditions must be confirmed and/or modified on the basis of field inspections during the construction stage when large-scale observations can be made with ease.

As defined by the OHSA, excavation walls within the Type 3 soils will require battering back at slopes no steeper than 1H (horizontal):1V (vertical) and flatter for Type 4 material. Depending on the construction feasibility the excavation walls can be supported by temporary shoring systems. During Excavations, adjacent existing structures, if present, must be protected by proper shoring or sloping.

Based on the findings of the investigation, it is considered that the excavation of the overburden fill and native soils at the site can be carried out using a conventional backhoe excavator.

It is important to note that the above discussion about the excavation is for information purposes only. Contractors bidding on the projects must make their own assessments based on the real site conditions.

It is assumed that the groundwater will be lowered to at least 0.8 m below the required excavation depth to enable the construction to be carried out in the 'dry' condition. It is expected that the 'perched water' can be controlled by the conventional 'sump and pump' methodology. Although unlikely, if a large volume discharge of water is required, the contractor should implement a more aggressive measure with the consultation of a dewatering specialist.

5.6.2 Construction Dewatering

The borehole data have indicated that no unusual groundwater seepage problems should be expected during excavations extending to about 2.0 m below the ground surface; the seepage volume due to bleeding of wet pockets in the fill or water-bearing silt/sand seams are expected to be nominal and can, if necessary, be controlled by conventional sump pumping. However, the construction dewatering requirements should be dictated by a hydrogeologist.

5.7 Construction Considerations

Load-bearing soils are susceptible to disturbance from environmental factors (temperature, moisture change, etc.) and construction activity and, as such, due care should be given to minimizing trafficking of such areas during periods of excavation and the construction of footings to minimize disturbance of the bearing soils.

Any excessive disturbances of the load-bearing and underlying soils affected during construction works could influence the long-term settlement of the structures and will, therefore, require further excavation and replacement of such impacted soils with suitable engineered fill.

During winter seasons, foundation construction should be carried out to avoid pouring concrete on frozen soil. Foundations must be adequately protected at all times from cold weather and freezing conditions.

A Geotechnical Engineer should evaluate all subgrade surfaces to confirm that the subgrade and founding conditions are consistent with the recommendations given by this report.

6.0 SOIL CHEMICAL TESTING

As part of the geotechnical investigation carried out for the Client, Sola conducted limited Soil Chemical Testing to scan for the general soil conditions and Topsoil testing at TP1 location. At the time of sampling, no obvious evidence of staining or odours was observed in the samples collected at the sampling location. one (1) soil sample was selected from the collected samples, named TP1 at an approximate depth from 0.2 m to 0.4 m below the ground surface. The sample was submitted to ALS Environmental (ALS) of Waterloo for laboratory analyses of Metals and Inorganics (M&I), Volatile Organic Compounds (VOCs) and Polycyclic Aromatic Hydrocarbons (PAHs) parameters under Ontario Regulation 153/04 (O. Reg 153/04).

The soil analytical results were compared to the Ontario Ministry of the Environmental and Climate Change (MOECC) "Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act", 2011, Table 1: Full Depth Background Site Condition Standards for Residential/Parkland/Institutional/Industrial/Commercial/ Community Property Uses and Table 2: Full Depth Generic Site Condition Standards in a Potable Ground Water Condition for Industrial/Commercial/Community Property Uses. The laboratory analysis results are enclosed in the Certificates of Analysis, in **Appendix A** and the approximate location of TP1 is shown on **Enclosure 1**.

Based on the comparison of the soil analysis results to the 2011 MOECC Standards, there are no parameter exceedances. Further details are presented in the Summary of Guideline Exceedances section of the Certificates of Analysis in **Appendix A**.

One (1) topsoil sample was collected at TP1 and was submitted to SGS Canada Inc. of Guelph for topsoil testing. The laboratory analysis results are enclosed in **Appendix B**.

It should be noted that the soil may vary within the site and further chemical testing may be required by the receiving site, if applicable.

7.0 MATERIAL TESTING AND INSPECTION

It is recommended that Sola be appointed to carry out field inspection and materials testing during construction to ensure that the construction complies with the design recommendations.

8.0 DRAWING REVIEW

Once the final design drawings for this project are prepared, it is recommended that one (1) set of the drawings should be submitted to Sola for review and to make any amendments to our recommendations that may be required, prior to starting construction.

Sola should also be retained for a general review of the final design and specifications to verify that this report has been properly interpreted and implemented. If not accorded the privilege of making this review, Sola will assume no responsibility for the interpretation of the recommendations in this report.

The comments given in this report are preliminary and intended only for the guidance of design engineers. Contractors bidding on or undertaking the works should make their own interpretations of the factual borehole results, so that they may draw their own conclusions on how the subsurface conditions may affect them.

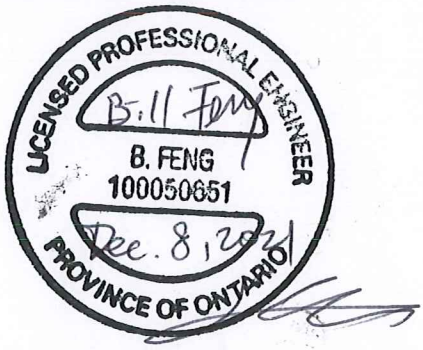
The information in this report only reflects on the environmental aspects of soil chemical testing for general scanning purposes. Any other environmental aspects of the soil conditions at the site were beyond the scope and terms of reference.

9.0 CLOSURE

This report is subject to the *Statement of Limitations* which forms an integral part of this document. The Statement of Limitations is not intended to reduce the level of responsibility accepted by Sola, but rather to ensure that all parties who have been given reliance for this report are aware of the responsibilities each assumes in so doing.

We trust that this report meets your needs. Should you have any queries, please contact the Sola office.

Sincerely,
SOLA ENGINEERING INC.



George Hao P. Eng.

Bill Feng P. Eng.
Chief Engineer

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Enclosures

STATEMENT OF LIMITATIONS

Standard of Care and Basis of this Report
Sola Engineering Inc. ("Sola Engineering") has prepared this report in a manner consistent with generally accepted engineering and/or environmental practices in the jurisdiction in which the specified services were provided. The information and conclusions set out in this report reflects Sola Engineering's best professional judgment in light of the information available to Sola Engineering at the time of preparation. Sola Engineering disclaims any and all warranties, express or implied, including without limitation any warranty of merchantability and/or fitness for a particular purpose, and makes no representations concerning the legal effect, interpretation or significance of this report or the information, conclusions or recommendations contained in it.

The conclusions and recommendations provided in this report have been prepared in relation to the specified site (the "Site") and the proposed project (the "Project"), as described by the Client to Sola Engineering. Given the nature of the work undertaken by Sola Engineering as part of this report, the Client acknowledges that ground conditions may vary over distances and may change over time. Should there arise any changes to the conditions of the Site or the Project (as to purpose or design), Sola Engineering is to be notified within a reasonable period of time, and in any event within 24 hours of the Client's learning of such changes, so as to give Sola Engineering an opportunity to review and revise this report in light of such changes. Sola Engineering accepts no liability or responsibility for any use of this report or reliance on this report following any changes to the conditions of the Site or the Project.

The scope of professional services provided by Sola Engineering for the Project are as set out in this report. Should such services be limited to those of a geotechnical nature, Sola Engineering shall not be held liable or responsible for any environmental services that may be required, nor shall this report be interpreted to reflect any environmental aspects of the Project. Alternatively, should such services be limited to those of an environmental nature, Sola Engineering shall not be held liable or responsible for any geotechnical services that may be required, nor shall this report be interpreted to reflect any geotechnical aspects of the Project.

This report is not intended to provide recommendations for possible future conditions or use of the Site or adjoining properties. Should the need arise for such recommendations Sola Engineering may need to conduct further investigations.

Use of this Report
This report is intended to be read and used in its entirety. No reliance may be made upon any individual portion or section of this report without reference to the entire report as a whole. In preparing this report, Sola Engineering has relied on information, instructions and communications given by the Client to Sola Engineering, the applicability, truth and accuracy of which is the sole responsibility of the Client.

This report with the information, sampling data, analysis, conclusions and recommendations contained in it (if any), has been prepared for and may only be used by the Client and only for the specific purpose as specified by the Client to Sola Engineering in connection with the Project. Without prior written consent from Sola Engineering, use of this report or any portion thereof by any person or entity other than the Client, or for any purpose other than as communicated by the Client to Sola Engineering, is strictly prohibited. Sola Engineering accepts no liability or responsibility for the unauthorized use of this report. This report and all documents that form part of it are the sole property of Sola Engineering. Sola Engineering relies on and retains any and all intellectual property rights it has in this report, including any copyright to which it is entitled. The Client shall not give, lend or sell this report, or any portion thereof, to any entity, person or association without the express prior written consent of Sola Engineering. This report and the information contained herein shall be treated as strictly confidential.

The contents of this report, inclusive of Sola Engineering's conclusions and recommendations in relation to the Project, are intended only for the guidance of the Client in carrying out the specified services for the Project, as described by the Client to Sola Engineering. Accordingly, Sola Engineering does not accept any liability or responsibility for any inaccuracy contained in this report arising as a result of or in any way connected with any exclusion, oversight or falsification of the information provided to Sola Engineering by the Client. This report, including the effect of the subsurface conditions as described in this report, is to be interpreted at the risk and discretion of the Client and any contractors or others bidding on or undertaking contractual work to be performed as part of the Project who may come into possession of or learn of this report or its contents. It is exigent that all contractors bidding or undertaking the work are to rely on their own interpretations of the data contained in this report in addition to their own investigations and conclusions. Sola Engineering shall not be held liable or responsible for any interpretation of or conclusions that may be drawn from the data or information contained in this report.

The information, recommendations and conclusions presented in this report are based on Sola Engineering's interpretation of conditions revealed through the limited investigation conducted within a defined scope of services. In no event will Sola Engineering be held responsible or liable to the Client or any other person or entity for any special, indirect, incidental, punitive or consequential loss or damage (including, loss of use, lost profits or expenses incurred) resulting from or in any way related to the independent interpretations, interpolations, conclusions or decisions of the Client or any other person or entity, based on the information contained in this report. The restriction of liability includes but is not limited to decisions made to develop, purchase or sell land.

Notwithstanding the exclusions of liability contained herein but without in any way limiting their effect or generality, if there is found to be any finding of liability or responsibility whatsoever on the part of Sola Engineering which in any way relates to or arises from this report, or the information, conclusions or recommendations contained in it, such liability and/or responsibility shall cease and forever be extinguished from and after the date which is two (2) years from the date of this report. In no event shall any liability or responsibility of Sola Engineering exceed the fees charged by Sola Engineering to the Client for the preparation of this report (excluding any arms' length disbursements or expenditures made or incurred by Sola Engineering as a result thereof and reimbursed by the Client).

Site Conditions
The material conditions, classifications, conclusions and recommendations contained in this report were based on the site conditions observed or tested by Sola Engineering or otherwise communicated to Sola Engineering by the Client. The description, identification and classification of soils, rocks, chemical contamination and other materials have been made based on limited investigations, sampling and testing of materials performed by Sola Engineering and its qualified representatives in reliance on the use of relevant or applicable equipment, all in accordance with commonly acceptable standards in the geotechnical and/or environmental disciplines. Accordingly, this report may include assumptions of conditions which are based on discrete sample locations and thus some conditions may not have been detected. The Client accepts all liability and risk for the use of this report and the information and data contained in it. Sola Engineering shall not be held liable or responsible for any conditions beyond the scope of tests conducted on samples of the subsurface and soil conditions of the subject property as set out in this report.

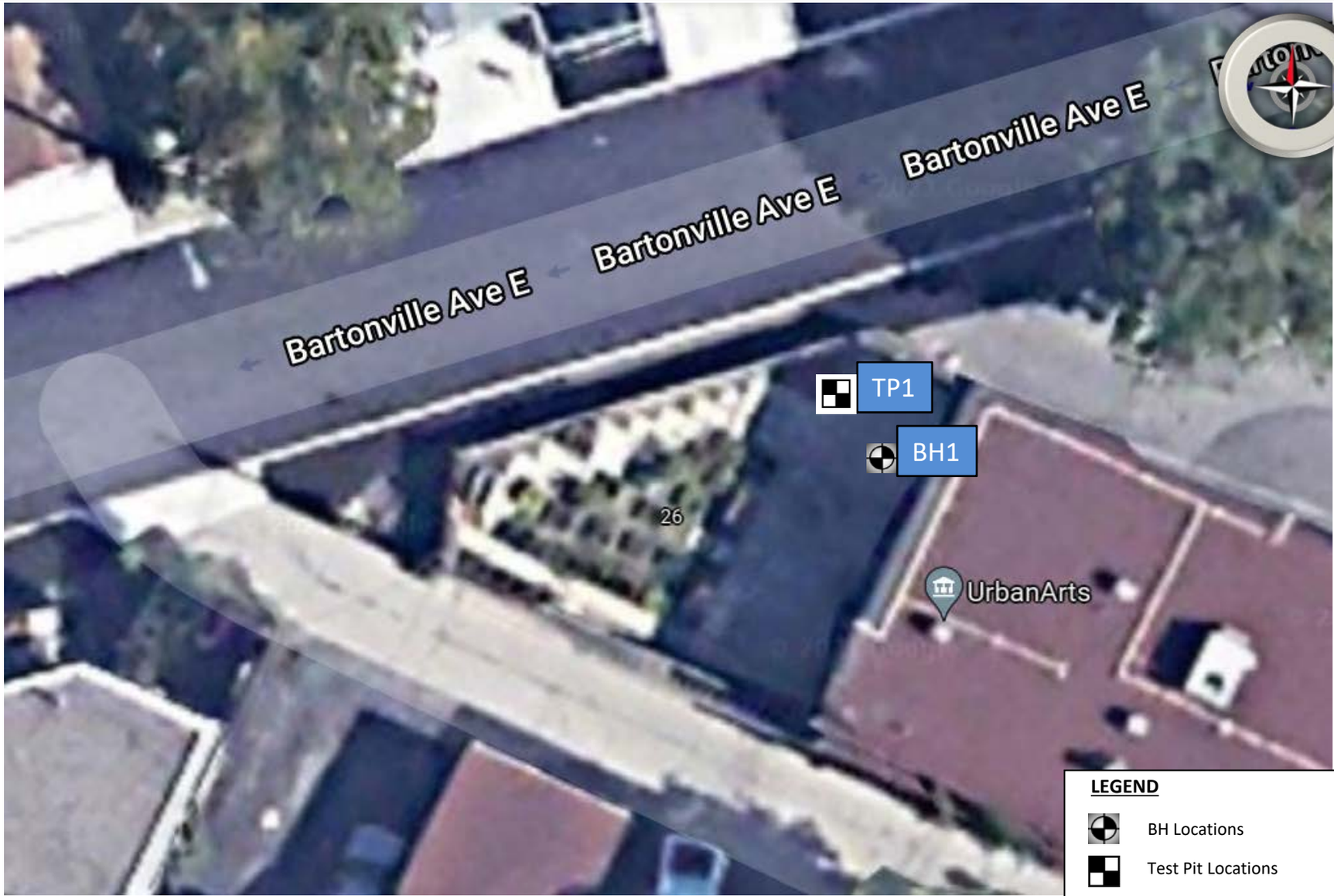
For clarity, the Client acknowledges and accepts that unique risks exist whenever engineering or related disciplines are applied to identify subsurface conditions and even a comprehensive sampling and testing program may fail to detect certain conditions. The environmental, geological, geotechnical, geochemical and hydrogeological conditions that Sola Engineering interprets to exist between sampling points may differ from those that actually exist. As a result, the Client acknowledges and accepts that because of the inherent uncertainties in subsurface evaluations, unanticipated underground conditions may occur or become known subsequent to Sola Engineering's investigation that could affect conclusions, recommendations, total Project cost and/or execution.

Indemnification of Risk
Though Sola Engineering adheres to the highest degree of integrity and employs due diligence in limiting the potential release of toxins and hazardous substances, the risk of accidental release of such substances is a possibility when providing geotechnical and environmental services.

In consideration of the provision of services by Sola Engineering, the Client agrees to defend, indemnify and hold Sola Engineering and its employees and agents harmless from and against any and all claims, liabilities, damages, causes of action, judgments, costs or expenses (including reasonable legal fees and disbursements), resulting from or arising by reason of the death or bodily injury to persons, damage to property, or other loss, whether related to an accidental release of pollutants or hazardous substances occurring as a result of carrying out this Project or otherwise, and whether or not resulting from Sola Engineering's negligent actions or omissions. This indemnification shall include and extend to any and all third party claims brought or threatened against Sola Engineering under any federal or provincial law or statute as a result of Sola Engineering conducting work on the Project. In addition to and notwithstanding the foregoing, the Client further agrees to unconditionally and irrevocably release Sola Engineering from, and not to bring any claims against Sola Engineering in connection with, any of the aforementioned claims or causes.

Subconsultants and Contractor Services
In conjunction with the services provided by Sola Engineering's own employees, external services provided by other persons or entities that are specializing in services other than those offered by Sola Engineering, such as drilling, excavation and laboratory testing, are often employed in order to carry out the defined scope of work. If such external services have been employed for this Project, the Client acknowledges that Sola Engineering is not in any way liable or responsible for any costs, claims or damages in relation to the services rendered by such other persons or entities or payment therefor, nor shall Sola Engineering be liable or responsible for damages for errors, omissions or negligence caused by such other persons or entities while providing such external services.

Work and Job Site Safety
Sola Engineering shall be responsible only for its activities and that of its employees on the Site. Sola Engineering shall not direct any of the fieldwork nor the work of any other person or entity on the Project. The presence of Sola Engineering staff on the Site does not relieve the Client or any contractor on the Site from their responsibilities pertaining to site safety. The Client at all times retains any and all responsibility for the safety of those individuals present on the Site and/or working on the Project, including Sola Engineering's employees.



SOLA ENGINEERING	File No.: 10906-S0003-GEO	**BH Location Plan**	The figure provided is for the intended purpose of presenting the approximate borehole locations. This figure should not be used for any other purposes including construction, architecture or for accuracy of dimensions and orientation of objects.	Enclosure No.: **1**
	Report Number: 2021-15958	**Urban Arts Eco-Rejuvenation**		
		5 Bartonville Avenue East, Toronto, Ontario		
	Date: November 23, 2021	**City of Toronto c/o NGA Architects**		Not to Scale

SOLA ENGINEERING

ENCLOSURE No. 2

RECORD OF BOREHOLE No. BH1 1 OF 1 METRIC

PROJECT NUMBER 10906 LOCATION 5 Bartonville Avenue East, Toronto ORIGINATED BY GH

DIST HWY BOREHOLE TYPE Continuous Split Spoon COMPILED BY CC

DATUM Geodetic DATE 2021.09.30 - 2021.09.30 LATITUDE LONGITUDE CHECKED BY GH

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: EQUIVALENT "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT / STANDARD PENETRATION TEST / SHEAR STRENGTH kPa (⊗ UNCONFINED, ● QUICK TRIAXIAL, + FIELD VANE, × LAB VANE) 20 40 60 80 100	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L — WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
123.9	Soil										
0.0	FILL - sandy silt, trace to some gravel, brown, moist		1	SS	4*		123		○		* N-Value adjusted by dividing the number of blows by two
			2	SS	4*				○		
			3	SS	6*		122				
121.8											
2.1	SAND - trace gravel, brown, compact, moist		4	SS	14*				○		
121.2											
2.7	End of Borehole at Targeted Depth; Borehole was Open and Dry upon Completion of Drilling.										

$+^3$, $\times^3$: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

SOLA ENGINEERING

KEY TO SYMBOLS

Enclosure No.: 3

PROJECT NUMBER 10906

PROJECT NAME Urban arts Eco-rejuvenation

LOCATION 5 Bartonville Avenue East, Toronto

CLIENT City of Toronto c/o NGA Architects

LITHOLOGIC SYMBOLS (Unified Soil Classification System)

FILL: TTC Fill (made ground)

SN: sand

SAMPLER SYMBOLS

Split Spoon Sample

WELL CONSTRUCTION SYMBOLS

Notes:

Terms describing RELATIVE DENSITY, based on Standard Penetration Test "N"-Value for COURSE GRAINED soils (major portion retained on No. 200 seive):

DESCRIPTIVE TERM ["N"-Value (blows/0.3m), Relative Density (%)]

- **Very Loose [less than 4, less than 15]**
- **Loose [4 to 10, 15 to 35]**
- **Compact or Medium [10 to 30, 35 to 65]**
- **Dense [30 to 50, 65 to 85]**
- **Very Dense [greater than 50, greater than 85]**

Terms describing CONSISTENCY, based on Standard Penetration Test "N"-Value for FINE GRAINED soils (major portion passing No. 200 sieve):

DESCRIPTIVE TERM [Unconfined Compressive Strength (kPa), "N"-Value (blows/0.3m)]

- **Very Soft [less than 25, less than 2]**
- **Soft [25 to 50, 2 to 4]**
- **Firm [50 to 100, 4 to 8]**
- **Stiff [100 to 200, 8 to 15]**
- **Very Stiff [200 to 400, 15 to 30]**
- **Hard [greater than 400, greater than 30]**

Particle Size Distribution Report

	% +3"	% Gravel		% Sand			% Fines
		Coarse	Fine	Coarse	Medium	Fine	
○	0	1	5	7	19	57	11

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			1.5162	0.3226	0.2530	0.1654	0.0896			

MATERIAL DESCRIPTION	TEST DATE	AS 1726	NM
○ SAND (VISUAL/MANUAL) SAND WITH SILT (LAB)			

Project No. 10906 **Client:** City of Toronto c/o NGA Architects

Project: Urban Arts Eco-Rejuvanation

○ **Location:** BH1 SS4 **Depth:** 7'-9' **Sample Number:** 21-429

Remarks:

○Sampled By:Clement
Date:September 30,2021
Report No: 2021-15958
Note: Additional information available upon request

SOLA ENGINEERING INC.

Enclosure 4

Appendix A

Soil Chemical Testing

Sola Engineering Inc. (Vaughan)
ATTN: Najla Hafizi
390 Edgeley Blvd
Unit 25
Vaughan ON L4K 3Z6

Date Received: 29-OCT-21
Report Date: 05-NOV-21 15:35 (MT)
Version: FINAL

Client Phone: 905-760-9501

Certificate of Analysis

Lab Work Order #: L2657184

Project P.O. #: 5 BARTONVILLE AVENUE EAST, YORK, ONTARIO
Job Reference: 10906
C of C Numbers:
Legal Site Desc:

Emily Hansen
Account Manager

Summary of Guideline Exceedances

ALS ID	Client ID	Grouping	Analyte	Result	Guideline Limit	Unit
Guideline						
Ontario Regulation 153/04 - April 15, 2011 Standards - T1-Soil-Res/Park/Inst/Ind/Com/Commu Property Use						
(No parameter exceedances)						
Ontario Regulation 153/04 - April 15, 2011 Standards - T2-Soil-Res/Park/Inst. Property Use (Fine)						
(No parameter exceedances)						

ANALYTICAL REPORT

Physical Tests - SOIL

Analyte	Unit	Guide Limits #1	Guide Limits #2	Lab ID: L2657184-1 Sample Date: 28-FEB-21 Sample ID: TP1
Conductivity	mS/cm	0.57	0.7	0.182
% Moisture	%	-	-	16.7
pH	pH units	-	-	7.26

Guide Limit #1: T1-Soil-Res/Park/Inst/Ind/Com/Commu Property Use
Guide Limit #2: T2-Soil-Res/Park/Inst. Property Use (Fine)

Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

ANALYTICAL REPORT

Cyanides - SOIL

		Guide Limits		
Analyte	Unit	#1	#2	
Lab ID				L2657184-1
Sample Date				28-FEB-21
Sample ID				TP1
Cyanide, Weak Acid Diss	ug/g	0.051	0.051	<0.050

Guide Limit #1: T1-Soil-Res/Park/Inst/Ind/Com/Commu Property Use
Guide Limit #2: T2-Soil-Res/Park/Inst. Property Use (Fine)

Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

ANALYTICAL REPORT

Saturated Paste Extractables - SOIL

				Lab ID	L2657184-1
				Sample Date	28-FEB-21
				Sample ID	TP1
		Guide Limits			
Analyte	Unit	#1	#2		
SAR	SAR	2.4	5	0.67	
Calcium (Ca)	mg/L	-	-	24.6	
Magnesium (Mg)	mg/L	-	-	9.11	
Sodium (Na)	mg/L	-	-	15.4	

Guide Limit #1: T1-Soil-Res/Park/Inst/Ind/Com/Commu Property Use
Guide Limit #2: T2-Soil-Res/Park/Inst. Property Use (Fine)

Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

ANALYTICAL REPORT

Metals - SOIL

Analyte	Unit	Guide Limits #1	Guide Limits #2	Lab ID: L2657184-1 Sample Date: 28-FEB-21 Sample ID: TP1
Antimony (Sb)	ug/g	1.3	7.5	<1.0
Arsenic (As)	ug/g	18	18	4.3
Barium (Ba)	ug/g	220	390	62.3
Beryllium (Be)	ug/g	2.5	5	<0.50
Boron (B)	ug/g	36	120	5.3
Boron (B), Hot Water Ext.	ug/g	36	1.5	0.40
Cadmium (Cd)	ug/g	1.2	1.2	<0.50
Chromium (Cr)	ug/g	70	160	18.7
Cobalt (Co)	ug/g	21	22	6.1
Copper (Cu)	ug/g	92	180	16.4
Lead (Pb)	ug/g	120	120	40.1
Mercury (Hg)	ug/g	0.27	1.8	0.0410
Molybdenum (Mo)	ug/g	2	6.9	<1.0
Nickel (Ni)	ug/g	82	130	13.4
Selenium (Se)	ug/g	1.5	2.4	<1.0
Silver (Ag)	ug/g	0.5	25	<0.20
Thallium (Tl)	ug/g	1	1	<0.50
Uranium (U)	ug/g	2.5	23	<1.0
Vanadium (V)	ug/g	86	86	27.7
Zinc (Zn)	ug/g	290	340	82.3

Guide Limit #1: T1-Soil-Res/Park/Inst/Ind/Com/Commu Property Use
Guide Limit #2: T2-Soil-Res/Park/Inst. Property Use (Fine)

Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

ANALYTICAL REPORT

Speciated Metals - SOIL

			Lab ID	L2657184-1
			Sample Date	28-FEB-21
			Sample ID	TP1
		Guide Limits		
Analyte	Unit	#1	#2	
Chromium, Hexavalent	ug/g	0.66	10	<0.20

Guide Limit #1: T1-Soil-Res/Park/Inst/Ind/Com/Commu Property Use
Guide Limit #2: T2-Soil-Res/Park/Inst. Property Use (Fine)

Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

Volatile Organic Compounds - SOIL

				Lab ID	L2657184-1
				Sample Date	28-FEB-21
				Sample ID	TP1
		Guide Limits			
Analyte	Unit	#1	#2		
Acetone	ug/g	0.5	28	<0.50	
Benzene	ug/g	0.02	0.17	<0.0068	
Bromodichloromethane	ug/g	0.05	1.9	<0.050	
Bromoform	ug/g	0.05	0.26	<0.050	
Bromomethane	ug/g	0.05	0.05	<0.050	
Carbon tetrachloride	ug/g	0.05	0.12	<0.050	
Chlorobenzene	ug/g	0.05	2.7	<0.050	
Dibromochloromethane	ug/g	0.05	2.9	<0.050	
Chloroform	ug/g	0.05	0.18	<0.050	
1,2-Dibromoethane	ug/g	0.05	0.05	<0.050	
1,2-Dichlorobenzene	ug/g	0.05	1.7	<0.050	
1,3-Dichlorobenzene	ug/g	0.05	6	<0.050	
1,4-Dichlorobenzene	ug/g	0.05	0.097	<0.050	
Dichlorodifluoromethane	ug/g	0.05	25	<0.050	
1,1-Dichloroethane	ug/g	0.05	0.6	<0.050	
1,2-Dichloroethane	ug/g	0.05	0.05	<0.050	
1,1-Dichloroethylene	ug/g	0.05	0.05	<0.050	
cis-1,2-Dichloroethylene	ug/g	0.05	2.5	<0.050	
trans-1,2-Dichloroethylene	ug/g	0.05	0.75	<0.050	
Methylene Chloride	ug/g	0.05	0.96	<0.050	
1,2-Dichloropropane	ug/g	0.05	0.085	<0.050	
cis-1,3-Dichloropropene	ug/g	-	-	<0.030	
trans-1,3-Dichloropropene	ug/g	-	-	<0.030	
1,3-Dichloropropene (cis & trans)	ug/g	0.05	0.081	<0.042	
Ethylbenzene	ug/g	0.05	1.6	<0.018	
n-Hexane	ug/g	0.05	34	<0.050	
Methyl Ethyl Ketone	ug/g	0.5	44	<0.50	
Methyl Isobutyl Ketone	ug/g	0.5	4.3	<0.50	
MTBE	ug/g	0.05	1.4	<0.050	
Styrene	ug/g	0.05	2.2	<0.050	

Guide Limit #1: T1-Soil-Res/Park/Inst/Ind/Com/Commu Property Use
Guide Limit #2: T2-Soil-Res/Park/Inst. Property Use (Fine)

Volatile Organic Compounds - SOIL

				Lab ID	L2657184-1
				Sample Date	28-FEB-21
				Sample ID	TP1
		Guide Limits			
Analyte	Unit	#1	#2		
1,1,1,2-Tetrachloroethane	ug/g	0.05	0.05	<0.050	
1,1,2,2-Tetrachloroethane	ug/g	0.05	0.05	<0.050	
Tetrachloroethylene	ug/g	0.05	2.3	<0.050	
Toluene	ug/g	0.2	6	<0.080	
1,1,1-Trichloroethane	ug/g	0.05	3.4	<0.050	
1,1,2-Trichloroethane	ug/g	0.05	0.05	<0.050	
Trichloroethylene	ug/g	0.05	0.52	<0.010	
Trichlorofluoromethane	ug/g	0.25	5.8	<0.050	
Vinyl chloride	ug/g	0.02	0.022	<0.020	
o-Xylene	ug/g	-	-	<0.020	
m+p-Xylenes	ug/g	-	-	<0.030	
Xylenes (Total)	ug/g	0.05	25	<0.050	
Surrogate: 4-Bromofluorobenzene	%	-	-	78.3	
Surrogate: 1,4-Difluorobenzene	%	-	-	89.2	

Guide Limit #1: T1-Soil-Res/Park/Inst/Ind/Com/Commu Property Use
Guide Limit #2: T2-Soil-Res/Park/Inst. Property Use (Fine)

Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

ANALYTICAL REPORT

Polycyclic Aromatic Hydrocarbons - SOIL

			Lab ID	L2657184-1
			Sample Date	28-FEB-21
			Sample ID	TP1
		Guide Limits		
Analyte	**Unit**	**#1**	**#2**	
Acenaphthene	ug/g	0.072	29	<0.050
Acenaphthylene	ug/g	0.093	0.17	<0.050
Anthracene	ug/g	0.16	0.74	<0.050
Benzo(a)anthracene	ug/g	0.36	0.63	0.146
Benzo(a)pyrene	ug/g	0.3	0.3	0.159
Benzo(b&j)fluoranthene	ug/g	0.47	0.78	0.231
Benzo(g,h,i)perylene	ug/g	0.68	7.8	0.126
Benzo(k)fluoranthene	ug/g	0.48	0.78	0.090
Chrysene	ug/g	2.8	7.8	0.157
Dibenz(a,h)anthracene	ug/g	0.1	0.1	<0.050
Fluoranthene	ug/g	0.56	0.69	0.323
Fluorene	ug/g	0.12	69	<0.050
Indeno(1,2,3-cd)pyrene	ug/g	0.23	0.48	0.118
1+2-Methylnaphthalenes	ug/g	0.59	3.4	<0.042
1-Methylnaphthalene	ug/g	0.59	3.4	<0.030
2-Methylnaphthalene	ug/g	0.59	3.4	<0.030
Naphthalene	ug/g	0.09	0.75	<0.013
Phenanthrene	ug/g	0.69	7.8	0.070
Pyrene	ug/g	1	78	0.291
Surrogate: 2-Fluorobiphenyl	%	-	-	87.5
Surrogate: d14-Terphenyl	%	-	-	94.6

Guide Limit #1: T1-Soil-Res/Park/Inst/Ind/Com/Commu Property Use
Guide Limit #2: T2-Soil-Res/Park/Inst. Property Use (Fine)

Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

Reference Information

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Method Reference**
B-HWS-R511-WT	Soil	Boron-HWE-O.Reg 153/04 (July 2011)	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 and as of November 30, 2020), unless a subset of the Analytical Test Group (ATG) has been requested (the Protocol states that all analytes in an ATG must be reported).

CN-WAD-R511-WT	Soil	Cyanide (WAD)-O.Reg 153/04 (July 2011)	MOE 3015/APHA 4500CN I-WAD

The sample is extracted with a strong base for 16 hours, and then filtered. The filtrate is then distilled where the cyanide is converted to cyanogen chloride by reacting with chloramine-T, the cyanogen chloride then reacts with a combination of barbituric acid and isonicotinic acid to form a highly colored complex.

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 and as of November 30, 2020), unless a subset of the Analytical Test Group (ATG) has been requested (the Protocol states that all analytes in an ATG must be reported).

CR-CR6-IC-WT	Soil	Hexavalent Chromium in Soil	SW846 3060A/7199

This analysis is carried out using procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846, Method 7199, published by the United States Environmental Protection Agency (EPA). The procedure involves analysis for chromium (VI) by ion chromatography using diphenylcarbazide in a sulphuric acid solution.

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).

EC-WT	Soil	Conductivity (EC)	MOEE E3138

A representative subsample is tumbled with de-ionized (DI) water. The ratio of water to soil is 2:1 v/w. After tumbling the sample is then analyzed by a conductivity meter.

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).

HG-200.2-CVAA-WT	Soil	Mercury in Soil by CVAAS	EPA 200.2/1631E (mod)

Soil samples are digested with nitric and hydrochloric acids, followed by analysis by CVAAS.

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).

MET-200.2-CCMS-WT	Soil	Metals in Soil by CRC ICPMS	EPA 200.2/6020B (mod)

Soil/sediment is dried, disaggregated, and sieved (2 mm). For tests intended to support Ontario regulations, the <2mm fraction is ground to pass through a 0.355 mm sieve. Strong Acid Leachable Metals in the <2mm fraction are solubilized by heated digestion with nitric and hydrochloric acids. Instrumental analysis is by Collision / Reaction Cell ICPMS.

Limitations: This method is intended to liberate environmentally available metals. Silicate minerals are not solubilized. Some metals may be only partially recovered (matrix dependent), including Al, Ba, Be, Cr, S, Sr, Ti, Tl, V, W, and Zr. Elemental Sulfur may be poorly recovered by this method. Volatile forms of sulfur (e.g. sulfide, H2S) may be excluded if lost during sampling, storage, or digestion.

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), unless a subset of the Analytical Test Group (ATG) has been requested (the Protocol states that all analytes in an ATG must be reported).

METHYLNAPS-CALC-WT	Soil	ABN-Calculated Parameters	SW846 8270
MOISTURE-WT	Soil	% Moisture	CCME PHC in Soil - Tier 1 (mod)

Reference Information

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Method Reference**
PAH-511-WT	Soil	PAH-O.Reg 153/04 (July 2011)	SW846 3510/8270

A representative sub-sample of soil is fortified with deuterium-labelled surrogates and a mechanical shaking techniqueis used to extract the sample with a mixture of methanol and toluene. The extracts are concentrated and analyzed by GC/MS. Results for benzo(b) fluoranthene may include contributions from benzo(j)fluoranthene, if also present in the sample.

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 and as of November 30, 2020), unless a subset of the Analytical Test Group (ATG) has been requested (the Protocol states that all analytes in an ATG must be reported).

PH-WT	Soil	pH	MOEE E3137A

A minimum 10g portion of the sample 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 and then analyzed using a pH meter and electrode.

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).

SAR-R511-WT	Soil	SAR-O.Reg 153/04 (July 2011)	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.

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 and as of November 30, 2020), unless a subset of the Analytical Test Group (ATG) has been requested (the Protocol states that all analytes in an ATG must be reported).

VOC-1,3-DCP-CALC-WT	Soil	Regulation 153 VOCs	SW8260B/SW8270C
VOC-511-HS-WT	Soil	VOC-O.Reg 153/04 (July 2011)	SW846 8260 (511)

Soil and sediment samples are extracted in methanol and analyzed by headspace-GC/MS.

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 and as of November 30, 2020), unless a subset of the Analytical Test Group (ATG) has been requested (the Protocol states that all analytes in an ATG must be reported).

XYLENES-SUM-CALC-WT	Soil	Sum of Xylene Isomer Concentrations	CALCULATION

Total xylenes represents the sum of o-xylene and m&p-xylene.

**ALS test methods may incorporate modifications from specified reference methods to improve performance.

Chain of Custody Numbers:

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA

Reference Information

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.
mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg wwt - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight
mg/L - unit of concentration based on volume, parts per million.
< - Less than.
D.L. - The reporting limit.
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

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. Guideline limits 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.

Quality Control Report

Workorder: L2657184 Report Date: 05-NOV-21

Client: Sola Engineering Inc. (Vaughan)
390 Edgeley Blvd Unit 25
Vaughan ON L4K 3Z6
Contact: Najla Hafizi

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
B-HWS-R511-WT	**Soil**							
Batch R5635870								
WG3651944-4 DUP		**L2658175-4**						
Boron (B), Hot Water Ext.		0.52	0.51		ug/g	2.3	30	04-NOV-21
WG3651944-2 IRM		**WT SAR4**						
Boron (B), Hot Water Ext.			109.0		%		70-130	04-NOV-21
WG3651944-3 LCS								
Boron (B), Hot Water Ext.			110.0		%		70-130	04-NOV-21
WG3651944-1 MB								
Boron (B), Hot Water Ext.			<0.10		ug/g		0.1	04-NOV-21
CN-WAD-R511-WT	**Soil**							
Batch R5635093								
WG3650166-3 DUP		**L2657196-1**						
Cyanide, Weak Acid Diss		<0.050	<0.050	RPD-NA	ug/g	N/A	35	02-NOV-21
WG3650166-2 LCS								
Cyanide, Weak Acid Diss			93.4		%		80-120	02-NOV-21
WG3650166-1 MB								
Cyanide, Weak Acid Diss			<0.050		ug/g		0.05	02-NOV-21
WG3650166-4 MS		**L2657196-1**						
Cyanide, Weak Acid Diss			100.2		%		70-130	02-NOV-21
CR-CR6-IC-WT	**Soil**							
Batch R5634464								
WG3649475-4 CRM		**WT-SQC012**						
Chromium, Hexavalent			84.5		%		70-130	02-NOV-21
WG3649475-3 DUP		**L2657049-6**						
Chromium, Hexavalent		<0.20	<0.20	RPD-NA	ug/g	N/A	35	02-NOV-21
WG3649475-2 LCS								
Chromium, Hexavalent			95.6		%		80-120	02-NOV-21
WG3649475-1 MB								
Chromium, Hexavalent			<0.20		ug/g		0.2	02-NOV-21
EC-WT	**Soil**							
Batch R5636224								
WG3651922-4 DUP		**WG3651922-3**						
Conductivity		0.591	0.584		mS/cm	1.2	20	04-NOV-21
WG3651922-2 IRM		**WT SAR4**						
Conductivity			99.4		%		70-130	04-NOV-21
WG3652638-1 LCS								
Conductivity			99.0		%		90-110	04-NOV-21
WG3651922-1 MB								

Quality Control Report

Client: Sola Engineering Inc. (Vaughan)
390 Edgeley Blvd Unit 25
Vaughan ON L4K 3Z6
Contact: Najla Hafizi

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
EC-WT	**Soil**							
Batch R5636224								
WG3651922-1 MB								
Conductivity			<0.0040		mS/cm		0.004	04-NOV-21
HG-200.2-CVAA-WT	**Soil**							
Batch R5635850								
WG3651500-23 CRM		**WT-SS-2**						
Mercury (Hg)			96.0		%		70-130	04-NOV-21
WG3651500-27 DUP		**WG3651500-26**						
Mercury (Hg)		0.0140	0.0131		ug/g	6.4	40	04-NOV-21
WG3651500-24 LCS								
Mercury (Hg)			98.5		%		80-120	04-NOV-21
WG3651500-22 MB								
Mercury (Hg)			<0.0050		mg/kg		0.005	04-NOV-21
MET-200.2-CCMS-WT	**Soil**							
Batch R5635780								
WG3651500-23 CRM		**WT-SS-2**						
Antimony (Sb)			114.5		%		70-130	03-NOV-21
Arsenic (As)			110.8		%		70-130	03-NOV-21
Barium (Ba)			117.5		%		70-130	03-NOV-21
Beryllium (Be)			103.6		%		70-130	03-NOV-21
Boron (B)			9.1		mg/kg		3.5-13.5	03-NOV-21
Cadmium (Cd)			113.6		%		70-130	03-NOV-21
Chromium (Cr)			106.3		%		70-130	03-NOV-21
Cobalt (Co)			108.5		%		70-130	03-NOV-21
Copper (Cu)			109.2		%		70-130	03-NOV-21
Lead (Pb)			107.2		%		70-130	03-NOV-21
Molybdenum (Mo)			116.6		%		70-130	03-NOV-21
Nickel (Ni)			107.3		%		70-130	03-NOV-21
Selenium (Se)			0.15		mg/kg		0-0.34	03-NOV-21
Silver (Ag)			113.2		%		70-130	03-NOV-21
Thallium (Tl)			0.087		mg/kg		0.029-0.129	03-NOV-21
Uranium (U)			121.5		%		70-130	03-NOV-21
Vanadium (V)			109.0		%		70-130	03-NOV-21
Zinc (Zn)			101.1		%		70-130	03-NOV-21
WG3651500-27 DUP		**WG3651500-26**						
Antimony (Sb)		0.17	0.15		ug/g	16	30	03-NOV-21

Quality Control Report

Client: Sola Engineering Inc. (Vaughan)
390 Edgeley Blvd Unit 25
Vaughan ON L4K 3Z6
Contact: Najla Hafizi

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-WT	**Soil**							
Batch R5635780								
WG3651500-27 DUP		**WG3651500-26**						
Arsenic (As)		6.49	6.29		ug/g	3.3	30	03-NOV-21
Barium (Ba)		126	114		ug/g	11	40	03-NOV-21
Beryllium (Be)		0.39	0.38		ug/g	1.9	30	03-NOV-21
Boron (B)		9.6	9.5		ug/g	0.6	30	03-NOV-21
Cadmium (Cd)		0.128	0.126		ug/g	1.1	30	03-NOV-21
Chromium (Cr)		13.0	12.5		ug/g	3.7	30	03-NOV-21
Cobalt (Co)		7.07	6.86		ug/g	3.1	30	03-NOV-21
Copper (Cu)		46.9	44.8		ug/g	4.6	30	03-NOV-21
Lead (Pb)		15.7	14.1		ug/g	11	40	03-NOV-21
Molybdenum (Mo)		0.59	0.54		ug/g	9.6	40	03-NOV-21
Nickel (Ni)		14.5	13.9		ug/g	3.8	30	03-NOV-21
Selenium (Se)		<0.20	<0.20	RPD-NA	ug/g	N/A	30	03-NOV-21
Silver (Ag)		<0.10	<0.10	RPD-NA	ug/g	N/A	40	03-NOV-21
Thallium (Tl)		0.111	0.100		ug/g	10	30	03-NOV-21
Uranium (U)		0.505	0.496		ug/g	1.9	30	03-NOV-21
Vanadium (V)		22.6	22.0		ug/g	2.4	30	03-NOV-21
Zinc (Zn)		51.2	53.4		ug/g	4.2	30	03-NOV-21
WG3651500-25 LCS								
Antimony (Sb)			107.1		%		80-120	03-NOV-21
Arsenic (As)			101.7		%		80-120	03-NOV-21
Barium (Ba)			108.6		%		80-120	03-NOV-21
Beryllium (Be)			94.8		%		80-120	03-NOV-21
Boron (B)			90.4		%		80-120	03-NOV-21
Cadmium (Cd)			103.0		%		80-120	03-NOV-21
Chromium (Cr)			96.9		%		80-120	03-NOV-21
Cobalt (Co)			98.9		%		80-120	03-NOV-21
Copper (Cu)			96.7		%		80-120	03-NOV-21
Lead (Pb)			101.0		%		80-120	03-NOV-21
Molybdenum (Mo)			107.3		%		80-120	03-NOV-21
Nickel (Ni)			97.3		%		80-120	03-NOV-21
Selenium (Se)			98.9		%		80-120	03-NOV-21
Silver (Ag)			106.6		%		80-120	03-NOV-21
Thallium (Tl)			101.4		%		80-120	03-NOV-21

Quality Control Report

Client: Sola Engineering Inc. (Vaughan)
390 Edgeley Blvd Unit 25
Vaughan ON L4K 3Z6
Contact: Najla Hafizi

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-WT	**Soil**							
Batch R5635780								
WG3651500-25 LCS								
Uranium (U)			102.7		%		80-120	03-NOV-21
Vanadium (V)			99.1		%		80-120	03-NOV-21
Zinc (Zn)			92.9		%		80-120	03-NOV-21
WG3651500-22 MB								
Antimony (Sb)			<0.10		mg/kg		0.1	03-NOV-21
Arsenic (As)			<0.10		mg/kg		0.1	03-NOV-21
Barium (Ba)			<0.50		mg/kg		0.5	03-NOV-21
Beryllium (Be)			<0.10		mg/kg		0.1	03-NOV-21
Boron (B)			<5.0		mg/kg		5	03-NOV-21
Cadmium (Cd)			<0.020		mg/kg		0.02	03-NOV-21
Chromium (Cr)			<0.50		mg/kg		0.5	03-NOV-21
Cobalt (Co)			<0.10		mg/kg		0.1	03-NOV-21
Copper (Cu)			<0.50		mg/kg		0.5	03-NOV-21
Lead (Pb)			<0.50		mg/kg		0.5	03-NOV-21
Molybdenum (Mo)			<0.10		mg/kg		0.1	03-NOV-21
Nickel (Ni)			<0.50		mg/kg		0.5	03-NOV-21
Selenium (Se)			<0.20		mg/kg		0.2	03-NOV-21
Silver (Ag)			<0.10		mg/kg		0.1	03-NOV-21
Thallium (Tl)			<0.050		mg/kg		0.05	03-NOV-21
Uranium (U)			<0.050		mg/kg		0.05	03-NOV-21
Vanadium (V)			<0.20		mg/kg		0.2	03-NOV-21
Zinc (Zn)			<2.0		mg/kg		2	03-NOV-21
MOISTURE-WT	**Soil**							
Batch R5633451								
WG3649328-3 DUP		**L2657138-5**						
% Moisture		3.27	3.45		%	5.3	20	01-NOV-21
WG3649328-2 LCS								
% Moisture			98.4		%		90-110	01-NOV-21
WG3649328-1 MB								
% Moisture			<0.25		%		0.25	01-NOV-21
PAH-511-WT	**Soil**							
Batch R5635427								
WG3650205-3 DUP		**WG3650205-5**						
1-Methylnaphthalene		<0.030	<0.030	RPD-NA	ug/g	N/A	40	03-NOV-21

Quality Control Report

Client: Sola Engineering Inc. (Vaughan)
390 Edgeley Blvd Unit 25
Vaughan ON L4K 3Z6
Contact: Najla Hafizi

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-511-WT	**Soil**							
Batch R5635427								
WG3650205-3 DUP		**WG3650205-5**						
2-Methylnaphthalene		<0.030	<0.030	RPD-NA	ug/g	N/A	40	03-NOV-21
Acenaphthene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	03-NOV-21
Acenaphthylene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	03-NOV-21
Anthracene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	03-NOV-21
Benzo(a)anthracene		0.062	0.069		ug/g	12	40	03-NOV-21
Benzo(a)pyrene		0.065	0.067		ug/g	3.7	40	03-NOV-21
Benzo(b&j)fluoranthene		0.080	0.082		ug/g	2.4	40	03-NOV-21
Benzo(g,h,i)perylene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	03-NOV-21
Benzo(k)fluoranthene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	03-NOV-21
Chrysene		0.065	0.069		ug/g	5.4	40	03-NOV-21
Dibenz(a,h)anthracene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	03-NOV-21
Fluoranthene		0.123	0.118		ug/g	4.3	40	03-NOV-21
Fluorene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	03-NOV-21
Indeno(1,2,3-cd)pyrene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	03-NOV-21
Naphthalene		<0.013	<0.013	RPD-NA	ug/g	N/A	40	03-NOV-21
Phenanthrene		0.056	<0.046	RPD-NA	ug/g	N/A	40	03-NOV-21
Pyrene		0.112	0.108		ug/g	3.7	40	03-NOV-21
WG3650205-2 LCS								
1-Methylnaphthalene			94.9		%		50-140	03-NOV-21
2-Methylnaphthalene			88.4		%		50-140	03-NOV-21
Acenaphthene			87.8		%		50-140	03-NOV-21
Acenaphthylene			83.4		%		50-140	03-NOV-21
Anthracene			81.3		%		50-140	03-NOV-21
Benzo(a)anthracene			91.5		%		50-140	03-NOV-21
Benzo(a)pyrene			80.5		%		50-140	03-NOV-21
Benzo(b&j)fluoranthene			87.2		%		50-140	03-NOV-21
Benzo(g,h,i)perylene			89.7		%		50-140	03-NOV-21
Benzo(k)fluoranthene			91.8		%		50-140	03-NOV-21
Chrysene			98.0		%		50-140	03-NOV-21
Dibenz(a,h)anthracene			92.7		%		50-140	03-NOV-21
Fluoranthene			89.7		%		50-140	03-NOV-21
Fluorene			84.1		%		50-140	03-NOV-21
Indeno(1,2,3-cd)pyrene			83.8		%		50-140	03-NOV-21

Quality Control Report

Client: Sola Engineering Inc. (Vaughan)
390 Edgeley Blvd Unit 25
Vaughan ON L4K 3Z6
Contact: Najla Hafizi

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-511-WT	**Soil**							
Batch R5635427								
WG3650205-2 LCS								
Naphthalene			87.6		%		50-140	03-NOV-21
Phenanthrene			90.7		%		50-140	03-NOV-21
Pyrene			89.6		%		50-140	03-NOV-21
WG3650205-1 MB								
1-Methylnaphthalene			<0.030		ug/g		0.03	03-NOV-21
2-Methylnaphthalene			<0.030		ug/g		0.03	03-NOV-21
Acenaphthene			<0.050		ug/g		0.05	03-NOV-21
Acenaphthylene			<0.050		ug/g		0.05	03-NOV-21
Anthracene			<0.050		ug/g		0.05	03-NOV-21
Benzo(a)anthracene			<0.050		ug/g		0.05	03-NOV-21
Benzo(a)pyrene			<0.050		ug/g		0.05	03-NOV-21
Benzo(b&j)fluoranthene			<0.050		ug/g		0.05	03-NOV-21
Benzo(g,h,i)perylene			<0.050		ug/g		0.05	03-NOV-21
Benzo(k)fluoranthene			<0.050		ug/g		0.05	03-NOV-21
Chrysene			<0.050		ug/g		0.05	03-NOV-21
Dibenz(a,h)anthracene			<0.050		ug/g		0.05	03-NOV-21
Fluoranthene			<0.050		ug/g		0.05	03-NOV-21
Fluorene			<0.050		ug/g		0.05	03-NOV-21
Indeno(1,2,3-cd)pyrene			<0.050		ug/g		0.05	03-NOV-21
Naphthalene			<0.013		ug/g		0.013	03-NOV-21
Phenanthrene			<0.046		ug/g		0.046	03-NOV-21
Pyrene			<0.050		ug/g		0.05	03-NOV-21
Surrogate: 2-Fluorobiphenyl			87.2		%		50-140	03-NOV-21
Surrogate: d14-Terphenyl			93.6		%		50-140	03-NOV-21
WG3650205-10 MS		**WG3650205-5**						
1-Methylnaphthalene			97.0		%		50-140	03-NOV-21
2-Methylnaphthalene			92.2		%		50-140	03-NOV-21
Acenaphthene			92.8		%		50-140	03-NOV-21
Acenaphthylene			87.5		%		50-140	03-NOV-21
Anthracene			86.6		%		50-140	03-NOV-21
Benzo(a)anthracene			101.4		%		50-140	03-NOV-21
Benzo(a)pyrene			85.8		%		50-140	03-NOV-21
Benzo(b&j)fluoranthene			94.2		%		50-140	03-NOV-21
Benzo(g,h,i)perylene			96.9		%		50-140	03-NOV-21

Quality Control Report

Client: Sola Engineering Inc. (Vaughan)
390 Edgeley Blvd Unit 25
Vaughan ON L4K 3Z6
Contact: Najla Hafizi

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-511-WT	**Soil**							
Batch R5635427								
WG3650205-10 MS		**WG3650205-5**						
Benzo(k)fluoranthene			95.2		%		50-140	03-NOV-21
Chrysene			100.4		%		50-140	03-NOV-21
Dibenz(a,h)anthracene			101.1		%		50-140	03-NOV-21
Fluoranthene			94.1		%		50-140	03-NOV-21
Fluorene			91.2		%		50-140	03-NOV-21
Indeno(1,2,3-cd)pyrene			94.1		%		50-140	03-NOV-21
Naphthalene			89.9		%		50-140	03-NOV-21
Phenanthrene			93.8		%		50-140	03-NOV-21
Pyrene			94.1		%		50-140	03-NOV-21
PH-WT	**Soil**							
Batch R5635892								
WG3649758-1 DUP		**L2657049-6**						
pH		8.12	8.10	J	pH units	0.02	0.3	04-NOV-21
WG3652187-1 LCS								
pH			6.98		pH units		6.9-7.1	04-NOV-21
SAR-R511-WT	**Soil**							
Batch R5636060								
WG3651922-4 DUP		**WG3651922-3**						
Calcium (Ca)		16.5	16.4		mg/L	0.6	30	04-NOV-21
Sodium (Na)		85.8	83.8		mg/L	2.4	30	04-NOV-21
Magnesium (Mg)		2.12	2.09		mg/L	1.4	30	04-NOV-21
WG3651922-2 IRM		**WT SAR4**						
Calcium (Ca)			96.5		%		70-130	04-NOV-21
Sodium (Na)			97.4		%		70-130	04-NOV-21
Magnesium (Mg)			101.7		%		70-130	04-NOV-21
WG3651922-5 LCS								
Calcium (Ca)			102.7		%		80-120	04-NOV-21
Sodium (Na)			101.2		%		80-120	04-NOV-21
Magnesium (Mg)			100.4		%		80-120	04-NOV-21
WG3651922-1 MB								
Calcium (Ca)			<0.50		mg/L		0.5	04-NOV-21
Sodium (Na)			<0.50		mg/L		0.5	04-NOV-21
Magnesium (Mg)			<0.50		mg/L		0.5	04-NOV-21
VOC-511-HS-WT	**Soil**							

Quality Control Report

Client: Sola Engineering Inc. (Vaughan)
390 Edgeley Blvd Unit 25
Vaughan ON L4K 3Z6
Contact: Najla Hafizi

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC-511-HS-WT	**Soil**							
Batch R5634500								
WG3650219-4 DUP		**WG3650219-3**						
1,1,1,2-Tetrachloroethane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	03-NOV-21
1,1,2,2-Tetrachloroethane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	03-NOV-21
1,1,1-Trichloroethane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	03-NOV-21
1,1,2-Trichloroethane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	03-NOV-21
1,1-Dichloroethane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	03-NOV-21
1,1-Dichloroethylene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	03-NOV-21
1,2-Dibromoethane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	03-NOV-21
1,2-Dichlorobenzene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	03-NOV-21
1,2-Dichloroethane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	03-NOV-21
1,2-Dichloropropane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	03-NOV-21
1,3-Dichlorobenzene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	03-NOV-21
1,4-Dichlorobenzene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	03-NOV-21
Acetone		<0.50	<0.50	RPD-NA	ug/g	N/A	40	03-NOV-21
Benzene		<0.0068	<0.0068	RPD-NA	ug/g	N/A	40	03-NOV-21
Bromodichloromethane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	03-NOV-21
Bromoform		<0.050	<0.050	RPD-NA	ug/g	N/A	40	03-NOV-21
Bromomethane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	03-NOV-21
Carbon tetrachloride		<0.050	<0.050	RPD-NA	ug/g	N/A	40	03-NOV-21
Chlorobenzene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	03-NOV-21
Chloroform		<0.050	<0.050	RPD-NA	ug/g	N/A	40	03-NOV-21
cis-1,2-Dichloroethylene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	03-NOV-21
cis-1,3-Dichloropropene		<0.030	<0.030	RPD-NA	ug/g	N/A	40	03-NOV-21
Dibromochloromethane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	03-NOV-21
Dichlorodifluoromethane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	03-NOV-21
Ethylbenzene		<0.018	<0.018	RPD-NA	ug/g	N/A	40	03-NOV-21
n-Hexane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	03-NOV-21
Methylene Chloride		<0.050	<0.050	RPD-NA	ug/g	N/A	40	03-NOV-21
MTBE		<0.050	<0.050	RPD-NA	ug/g	N/A	40	03-NOV-21
m+p-Xylenes		<0.030	<0.030	RPD-NA	ug/g	N/A	40	03-NOV-21
Methyl Ethyl Ketone		<0.50	<0.50	RPD-NA	ug/g	N/A	40	03-NOV-21
Methyl Isobutyl Ketone		<0.50	<0.50	RPD-NA	ug/g	N/A	40	03-NOV-21
o-Xylene		<0.020	<0.020	RPD-NA	ug/g	N/A	40	03-NOV-21
Styrene		<0.050	<0.050		ug/g			03-NOV-21

Quality Control Report

Client: Sola Engineering Inc. (Vaughan)
390 Edgeley Blvd Unit 25
Vaughan ON L4K 3Z6
Contact: Najla Hafizi

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC-511-HS-WT	**Soil**							
Batch R5634500								
WG3650219-4 DUP		**WG3650219-3**						
Styrene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	03-NOV-21
Tetrachloroethylene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	03-NOV-21
Toluene		<0.080	<0.080	RPD-NA	ug/g	N/A	40	03-NOV-21
trans-1,2-Dichloroethylene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	03-NOV-21
trans-1,3-Dichloropropene		<0.030	<0.030	RPD-NA	ug/g	N/A	40	03-NOV-21
Trichloroethylene		<0.010	<0.010	RPD-NA	ug/g	N/A	40	03-NOV-21
Trichlorofluoromethane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	03-NOV-21
Vinyl chloride		<0.020	<0.020	RPD-NA	ug/g	N/A	40	03-NOV-21
WG3650219-2 LCS								
1,1,1,2-Tetrachloroethane			95.4		%		60-130	02-NOV-21
1,1,2,2-Tetrachloroethane			102.7		%		60-130	02-NOV-21
1,1,1-Trichloroethane			105.5		%		60-130	02-NOV-21
1,1,2-Trichloroethane			102.9		%		60-130	02-NOV-21
1,1-Dichloroethane			105.9		%		60-130	02-NOV-21
1,1-Dichloroethylene			102.1		%		60-130	02-NOV-21
1,2-Dibromoethane			97.6		%		70-130	02-NOV-21
1,2-Dichlorobenzene			104.3		%		70-130	02-NOV-21
1,2-Dichloroethane			112.6		%		60-130	02-NOV-21
1,2-Dichloropropane			105.4		%		70-130	02-NOV-21
1,3-Dichlorobenzene			101.8		%		70-130	02-NOV-21
1,4-Dichlorobenzene			105.9		%		70-130	02-NOV-21
Acetone			110.9		%		60-140	02-NOV-21
Benzene			101.6		%		70-130	02-NOV-21
Bromodichloromethane			116.0		%		50-140	02-NOV-21
Bromoform			96.7		%		70-130	02-NOV-21
Bromomethane			94.1		%		50-140	02-NOV-21
Carbon tetrachloride			105.2		%		70-130	02-NOV-21
Chlorobenzene			99.2		%		70-130	02-NOV-21
Chloroform			105.5		%		70-130	02-NOV-21
cis-1,2-Dichloroethylene			101.1		%		70-130	02-NOV-21
cis-1,3-Dichloropropene			115.0		%		70-130	02-NOV-21
Dibromochloromethane			98.1		%		60-130	02-NOV-21
Dichlorodifluoromethane			60.5		%		50-140	02-NOV-21

Quality Control Report

Client: Sola Engineering Inc. (Vaughan)
390 Edgeley Blvd Unit 25
Vaughan ON L4K 3Z6
Contact: Najla Hafizi

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC-511-HS-WT	**Soil**							
Batch R5634500								
WG3650219-2 LCS								
Ethylbenzene			99.8		%		70-130	02-NOV-21
n-Hexane			99.9		%		70-130	02-NOV-21
Methylene Chloride			105.1		%		70-130	02-NOV-21
MTBE			102.5		%		70-130	02-NOV-21
m+p-Xylenes			101.5		%		70-130	02-NOV-21
Methyl Ethyl Ketone			109.4		%		60-140	02-NOV-21
Methyl Isobutyl Ketone			123.8		%		60-140	02-NOV-21
o-Xylene			99.4		%		70-130	02-NOV-21
Styrene			100.4		%		70-130	02-NOV-21
Tetrachloroethylene			98.5		%		60-130	02-NOV-21
Toluene			102.9		%		70-130	02-NOV-21
trans-1,2-Dichloroethylene			110.1		%		60-130	02-NOV-21
trans-1,3-Dichloropropene			116.4		%		70-130	02-NOV-21
Trichloroethylene			99.9		%		60-130	02-NOV-21
Trichlorofluoromethane			95.1		%		50-140	02-NOV-21
Vinyl chloride			78.7		%		60-140	02-NOV-21
WG3650219-1 MB								
1,1,1,2-Tetrachloroethane			<0.050		ug/g		0.05	02-NOV-21
1,1,2,2-Tetrachloroethane			<0.050		ug/g		0.05	02-NOV-21
1,1,1-Trichloroethane			<0.050		ug/g		0.05	02-NOV-21
1,1,2-Trichloroethane			<0.050		ug/g		0.05	02-NOV-21
1,1-Dichloroethane			<0.050		ug/g		0.05	02-NOV-21
1,1-Dichloroethylene			<0.050		ug/g		0.05	02-NOV-21
1,2-Dibromoethane			<0.050		ug/g		0.05	02-NOV-21
1,2-Dichlorobenzene			<0.050		ug/g		0.05	02-NOV-21
1,2-Dichloroethane			<0.050		ug/g		0.05	02-NOV-21
1,2-Dichloropropane			<0.050		ug/g		0.05	02-NOV-21
1,3-Dichlorobenzene			<0.050		ug/g		0.05	02-NOV-21
1,4-Dichlorobenzene			<0.050		ug/g		0.05	02-NOV-21
Acetone			<0.50		ug/g		0.5	02-NOV-21
Benzene			<0.0068		ug/g		0.0068	02-NOV-21
Bromodichloromethane			<0.050		ug/g		0.05	02-NOV-21
Bromoform			<0.050		ug/g		0.05	02-NOV-21
Bromomethane			<0.050		ug/g		0.05	02-NOV-21

Quality Control Report

Client: Sola Engineering Inc. (Vaughan)
390 Edgeley Blvd Unit 25
Vaughan ON L4K 3Z6
Contact: Najla Hafizi

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC-511-HS-WT	**Soil**							
Batch R5634500								
WG3650219-1 MB								
Carbon tetrachloride			<0.050		ug/g		0.05	02-NOV-21
Chlorobenzene			<0.050		ug/g		0.05	02-NOV-21
Chloroform			<0.050		ug/g		0.05	02-NOV-21
cis-1,2-Dichloroethylene			<0.050		ug/g		0.05	02-NOV-21
cis-1,3-Dichloropropene			<0.030		ug/g		0.03	02-NOV-21
Dibromochloromethane			<0.050		ug/g		0.05	02-NOV-21
Dichlorodifluoromethane			<0.050		ug/g		0.05	02-NOV-21
Ethylbenzene			<0.018		ug/g		0.018	02-NOV-21
n-Hexane			<0.050		ug/g		0.05	02-NOV-21
Methylene Chloride			<0.050		ug/g		0.05	02-NOV-21
MTBE			<0.050		ug/g		0.05	02-NOV-21
m+p-Xylenes			<0.030		ug/g		0.03	02-NOV-21
Methyl Ethyl Ketone			<0.50		ug/g		0.5	02-NOV-21
Methyl Isobutyl Ketone			<0.50		ug/g		0.5	02-NOV-21
o-Xylene			<0.020		ug/g		0.02	02-NOV-21
Styrene			<0.050		ug/g		0.05	02-NOV-21
Tetrachloroethylene			<0.050		ug/g		0.05	02-NOV-21
Toluene			<0.080		ug/g		0.08	02-NOV-21
trans-1,2-Dichloroethylene			<0.050		ug/g		0.05	02-NOV-21
trans-1,3-Dichloropropene			<0.030		ug/g		0.03	02-NOV-21
Trichloroethylene			<0.010		ug/g		0.01	02-NOV-21
Trichlorofluoromethane			<0.050		ug/g		0.05	02-NOV-21
Vinyl chloride			<0.020		ug/g		0.02	02-NOV-21
Surrogate: 1,4-Difluorobenzene			99.2		%		50-140	02-NOV-21
Surrogate: 4-Bromofluorobenzene			88.9		%		50-140	02-NOV-21
WG3650219-5 MS		**WG3650219-3**						
1,1,1,2-Tetrachloroethane			106.5		%		50-140	03-NOV-21
1,1,2,2-Tetrachloroethane			121.2		%		50-140	03-NOV-21
1,1,1-Trichloroethane			117.4		%		50-140	03-NOV-21
1,1,2-Trichloroethane			114.9		%		50-140	03-NOV-21
1,1-Dichloroethane			121.7		%		50-140	03-NOV-21
1,1-Dichloroethylene			120.4		%		50-140	03-NOV-21
1,2-Dibromoethane			110.1		%		50-140	03-NOV-21
1,2-Dichlorobenzene			116.2		%		50-140	03-NOV-21

Quality Control Report

Client: Sola Engineering Inc. (Vaughan)
390 Edgeley Blvd Unit 25
Vaughan ON L4K 3Z6
Contact: Najla Hafizi

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC-511-HS-WT	**Soil**							
Batch R5634500								
WG3650219-5 MS		**WG3650219-3**						
1,2-Dichloroethane			131.9		%		50-140	03-NOV-21
1,2-Dichloropropane			120.7		%		50-140	03-NOV-21
1,3-Dichlorobenzene			109.9		%		50-140	03-NOV-21
1,4-Dichlorobenzene			115.0		%		50-140	03-NOV-21
Acetone			148.7	MES	%		50-140	03-NOV-21
Benzene			115.5		%		50-140	03-NOV-21
Bromodichloromethane			131.7		%		50-140	03-NOV-21
Bromoform			111.7		%		50-140	03-NOV-21
Bromomethane			119.1		%		50-140	03-NOV-21
Carbon tetrachloride			116.9		%		50-140	03-NOV-21
Chlorobenzene			110.0		%		50-140	03-NOV-21
Chloroform			119.5		%		50-140	03-NOV-21
cis-1,2-Dichloroethylene			115.7		%		50-140	03-NOV-21
cis-1,3-Dichloropropene			128.9		%		50-140	03-NOV-21
Dibromochloromethane			111.6		%		50-140	03-NOV-21
Dichlorodifluoromethane			114.7		%		50-140	03-NOV-21
Ethylbenzene			108.7		%		50-140	03-NOV-21
n-Hexane			121.6		%		50-140	03-NOV-21
Methylene Chloride			123.4		%		50-140	03-NOV-21
MTBE			116.3		%		50-140	03-NOV-21
m+p-Xylenes			110.7		%		50-140	03-NOV-21
Methyl Ethyl Ketone			134.9		%		50-140	03-NOV-21
Methyl Isobutyl Ketone			149.2	MES	%		50-140	03-NOV-21
o-Xylene			109.2		%		50-140	03-NOV-21
Styrene			110.4		%		50-140	03-NOV-21
Tetrachloroethylene			103.0		%		50-140	03-NOV-21
Toluene			110.5		%		50-140	03-NOV-21
trans-1,2-Dichloroethylene			125.4		%		50-140	03-NOV-21
trans-1,3-Dichloropropene			126.7		%		50-140	03-NOV-21
Trichloroethylene			110.5		%		50-140	03-NOV-21
Trichlorofluoromethane			116.3		%		50-140	03-NOV-21
Vinyl chloride			105.4		%		50-140	03-NOV-21

Quality Control Report

Workorder: L2657184 Report Date: 05-NOV-21

Client: Sola Engineering Inc. (Vaughan)
390 Edgeley Blvd Unit 25
Vaughan ON L4K 3Z6
Contact: Najla Hafizi

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
J	Duplicate results and limits are expressed in terms of absolute difference.
MES	Data Quality Objective was marginally exceeded (by < 10% absolute) for < 10% of analytes in a Multi-Element Scan / Multi-Parameter Scan (considered acceptable as per OMOE & CCME).
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Quality Control Report

Workorder: L2657184 Report Date: 05-NOV-21

Client: Sola Engineering Inc. (Vaughan)
390 Edgeley Blvd Unit 25
Vaughan ON L4K 3Z6
Contact: Najla Hafizi

Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Physical Tests							
Conductivity (EC)							
	1	28-FEB-21 09:30	03-NOV-21 20:00	30	248	days	EHTR
pH							
	1	28-FEB-21 09:30	01-NOV-21 13:00	30	246	days	EHTR
Cyanides							
Cyanide (WAD)-O.Reg 153/04 (July 2011)							
	1	28-FEB-21 09:30	02-NOV-21 01:00	14	247	days	EHTR
Saturated Paste Extractables							
SAR-O.Reg 153/04 (July 2011)							
	1	28-FEB-21 09:30	03-NOV-21 20:00	180	248	days	EHTR
Metals							
Metals in Soil by CRC ICPMS							
	1	28-FEB-21 09:30	03-NOV-21 13:00	180	248	days	EHTR
Speciated Metals							
Hexavalent Chromium in Soil							
	1	28-FEB-21 09:30	01-NOV-21 03:00	30	246	days	EHTR
Polycyclic Aromatic Hydrocarbons							
PAH-O.Reg 153/04 (July 2011)							
	1	28-FEB-21 09:30	02-NOV-21 04:00	60	247	days	EHTR

Legend & Qualifier Definitions:

EHTR-FM: Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.
EHTR: Exceeded ALS recommended hold time prior to sample receipt.
EHTL: Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.
EHT: Exceeded ALS recommended hold time prior to analysis.
Rec. HT: ALS recommended hold time (see units).

Notes*:
Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.
Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L2657184 were received on 29-OCT-21 10:30.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes 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 pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

Appendix B

Topsoil Testing

Analysis Report

GS21-04976.001

Sola Engineering - George Hao
Unit 25 & 26, 390 Edgeley Blvd
Vaughan ON L4K 3Z6

905 760-9501

Received: 02-Nov-2021
Sample ID: Topsoil [10906]
Order Reference: Sola Engineering - George Hao

Completed: 10-Nov-2021

Test Description	Analysis	Typical Guidelines	Within Range (Y/N)
pH	7.4	5.5 - 7.5	Y
Buffer pH	-		
Organic Matter (%)	18.1	4 - 15	N
Total Salts (mmhos/cm)	0.22	< 1.5	Y
Phosphorus (ppm)	42	10 - 60	Y
Potassium (ppm)	86	80 - 250	Y
Calcium (ppm)	4350	1000 - 4000	N
Magnesium (ppm)	317	100 - 300	N
Sodium (ppm)	30	< 200	Y
Sodium Adsorption Ratio	0.3	< 15	Y
Chloride (ppm)	28.0	< 100	Y
CEC (meq/100g)	25.8		
Base Sat. K (%)	0.9		
Base Sat. Mg (%)	10.2		
Base Sat. Ca (%)	84.3		
Sand (%)	76	20 - 75	N
Silt (%)	21	5 - 50	Y
Clay (%)	3	5 - 30	N
Texture	Loamy Sand	Loam/Sandy Loam	

The ranges in the Typical Guidelines are for comparative purposes, and are characteristic of a Sandy Loam to Loam textured topsoil. These are considered to be optimal ranges for these soil types, and test results are compared to these ranges in the Within Range column with Yes/No designation. However, an N does not necessarily suggest a soil will not support growth, and some project specifications may differ from these Typical Guidelines. Soil modification recommendations are provided where possible or necessary to amend soil test values that fall beyond these optimal ranges.

Soil organic matter content greater than 15% is not detrimental provided the organic component is not over-contributing to fertility and salt levels, which is not occurring in this soil.

High levels of calcium and magnesium are typical of Ontario topsoil and pose no threat to plant growth.

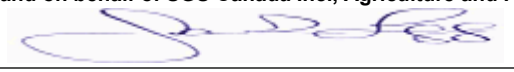
Soil Texture is a Loamy Sand, a productive but rapidly draining soil desirable in certain applications. The organic matter over 4% improves the water-holding capacity of this soil.
Including the organic matter of 18%, the adjusted sand silt clay values would be 62-18-2 respectively, but still have characteristics of a Loamy Sand.

General Fertility Guidelines for Nursery Stock: Apply 12-3-18 at an equivalent rate to supply 10 lbs per 1000 sq feet at the drip line of trees and incorporate to half rootball depth.

Recommendations	N	P205	K2O	Mg	Lime (te/ha)
nursery stock, new					
(lb/ac)	32		83	15	0.00
(lb/1000 sq.ft)	0.74		1.92	0.35	
(kg/100 sq.m)	0.36		0.93	0.17	

Signed and dated in Guelph, ON
On 10-Nov-2021

For and on behalf of SGS Canada Inc., Agriculture and Food



Jack Legg, CCA-ON, 4R NMS
Branch Manager, Agronomist

Report File Reference Number: 0000198207