Tender	June 07, 2024
ISSUED FOR	**DATE**

PROJECT MANUAL

Seal will be added in Construction Issue		
CIVIL ENGINEER		

Issued For	Date	Issued For	Date

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1 Drawings

.1 The Drawings upon which Tender and Contract are to be based include that listed below. The "SK Rev" column reflects revisions to the Drawings which are issued in a reduced sheet:

Dwg. No.	SK Rev.	Rev. No.	Title	Date
C001		00	Legend and Notes	JUNE-04-2024
C002		00	Topographic Survey Plan	JUNE-04-2024
C003		00	Removals Plan	JUNE-04-2024
C101		00	New Construction Plan	JUNE-04-2024
C102		00	Details	JUNE-04-2024

End of Section

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INDEX

1 Summary of Work

1.1 **GENERAL**

.1 Unless specified otherwise, instructions and requirements specified in this section shall apply to all sections of the Work.

.2 It is the responsibility of the Contractor to direct and implement all the Work shown and specified, including construction facilities and requirements specified herein.

.3 Work specified in the Specification has been divided into technical sections for the purpose of ready reference. Division of Work among Subcontractors and Suppliers is solely the Contractor's responsibility and Consultant assumes no liability to act as an arbiter to establish subcontract limits between sections or divisions of Work.

.4 Do not scale Drawings. Use dimensions indicated.

1.2 **DEFINITIONS**

.1 Provide: This term means to Furnish, Install and connect, complete and in place, including accessories, finishes, tests, and services required to render item so specified complete ready for use.

.2 Furnish: This term means fabrication or procurement of materials, equipment, or components, or performance of services to the extent specified and shown. Where used with respect to materials, equipment, or components, the term includes crating and delivery to Project site but is not intended to include installation of item, either temporary or final.

.3 Install: This term means placement of materials, equipment, or components, including receiving, unloading, transporting, storage, uncrating and installing, and performance of such testing and finish Work as is compatible with degree of installation specified.

1.3 **EXAMINATION OF BID DOCUMENTS**

.1 The Contractor shall have read all the Bid Documents in conjunction with one another and Consultant shall assume that they are in agreement. Contractor shall have examined all the Bid Documents as soon as possible after receipt thereof and if he had discovered any discrepancies, omissions, errors, ambiguities or conflicts in or among the Bid Documents, or be in doubt as to their meaning or intent, shall have brought the matter to the attention of the Consultant at least four Business Days prior to the date set for receiving Bids.

.2 The Contractor shall understand and agree that where a discrepancy in Products or systems between Consultant Drawings exists, Contractor shall have allowed in its Bid for the most expensive Product or system indicated, and a Request for Information (RFI) issued to the Consultant to clarify the issue at no increase in Contract Price.

.3 Contractor shall avoid submitting RFI's on information readily available within the Contract Documents.

1.4 **WORK OF CONTRACT**

.1 Work of this Contract comprises the supply of all material, equipment and labour necessary for the complete construction of new works, alterations and additions and all other related Work as shown on the Contract Drawings, specified herein or both, all in accordance with the terms of the Contract.

1.5 DRAWINGS AND INSTALLATION

.1 The Drawings are intended to show the general character and scope of the Work and not necessarily the detail design, or exact details of the installation. Contractor shall provide all items, articles, materials, services and incidentals, including detail design with Drawings, whether or not expressly specified or shown on Drawings, to make finished Work complete and fully operational, consistent with the intent of the Contract Documents.

.2 Supply and install all items of Work, goods and services that are listed or shown, or that may reasonably be inferred from the Contract Documents, as being required to produce the intended result.

.3 The location, arrangement and connection of equipment and materials shown on the Drawings represent a close approximation to the intent and requirements of the Contract. The right is reserved by the Consultant to make reasonable changes required to accommodate conditions arising during the progress of the Work, at no extra cost to the Owner.

.4 The location and size of existing services shown on the Drawings are based on the best available information. The actual location of existing services shall be verified in the field before Work is commenced. Particular attention shall be paid to buried or concealed services and structures.

.5 Changes and modifications necessary to ensure coordination and avoidance of interference and conflicts with other trades or to accommodate existing conditions, shall be made at no extra cost to the Owner.

.6 The Contractor shall reimburse the Consultant for the latter's time spent on answering any questions or requests for information where the answer is clearly stated or shown on the Drawings or Specifications.

1.6 EXISTING CONDITIONS

.1 In the case of renovation projects, certain new installations may be dependent upon existing conditions for support as indicated on Drawings. The Contractor shall, by way of a Site visit during Bidding period, carefully examine such existing conditions and satisfy itself as to the structural adequacy of such existing substrates. By commencing Work in the field, Contractor implies acceptance of existing conditions.

1.7 CULTURAL HERITAGE RESOURCES

.1 If cultural heritage resources (such as archaeological sites, artifacts, building and structural remains, and/or human burials) are encountered during performance of Work, contact Consultant immediately and suspend Work in immediate area until assessment has been completed by Ministry of Culture, Tourism and Recreation. Perform required measures to mitigate negative impacts on found resources to acceptance of Consultant.

1.8 REGULATORY DOCUMENTS

.1 Nothing contained in the Drawings and Specifications 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. Work shall be performed in conformity with all such laws, by-laws and regulations.

.2 Contract forms, codes, Specifications, standards, manuals and installation, application and maintenance instructions referred to in the Specifications are to be of the latest published editions at the date of signing the Contract.

.3 In addition to codes and standards specified in individual sections of the Specifications, comply with the latest edition of the following:

.1 American Society for Testing and Materials

.2 Canadian Gas Association

.3 Canadian General Standards Board

.4 Canadian Standards Association

.5 Illuminating Engineering Society of North America

.6 National Building Code of Canada

.7 National Fire Prevention Association

.8 National Standards of Canada

.9 Ontario Building Code

.10 Ontario Hydro Electrical Safety Code

.11 Ontario Ministry of the Environment

.12 Ontario Ministry of Labour

.13 Ontario Occupational Health and Safety Association

.14 Underwriters' Laboratories of Canada

1.9 **PERMITS**

.1 The Owner will apply and pay for the building permit. Contractor shall expedite and pick up the building permit.

.2 The Contractor shall apply and pay for all other permits from all authorities having jurisdiction, including, where required, inspection fees and permits. Additionally, the Contractor shall:

.1 Ensure that no Work whatsoever is undertaken which is conditional on permits, approvals, guarantees, until certain that all conditions necessary to obtain these are met. No time extensions will be allowed by the Owner for obtaining necessary permits.

.2 Report to the Consultant in writing, any condition which would prohibit granting of any permit or approval before any Work affecting such items is commenced.

1.10 **CONSTRUCTOR**

.1 The Contractor shall be the “Constructor” as defined in the Occupational Health and Safety Act. As such, the Contractor shall be responsible for ensuring that the provisions of the statutes, regulations and by-laws pertaining to the duties, obligations, and safe performance of the Work in accordance with the obligations of the Constructor as set out in the Occupational Health and Safety Act are observed.

2 Environmental Protection

2.1 **GENERAL**

.1 Be responsible for monitoring, reporting and ensuring the Work is done in compliance with the requirements of all environmental legislation and regulations governing the Place of the Project.

.2 Protection of the environment in all aspects of the Project is of prime importance to the Owner.

.3 Should the Contractor fail to comply with any environmental requirements when instructed, the Owner will undertake the corrective action and the costs for such corrective action shall be borne by the Contractor.

.4 Directions given by the Owner or Consultant with respect to action to be taken to correct environmental deficiencies must be acted upon immediately.

3 Project Coordination

3.1 **GENERAL**

.1 Ensure that the Contract Documents are fully coordinated with all trades involved in the Project.

.2 Coordinate progress of the Work, progress schedules, submittals, use of Site, temporary utilities, construction facilities and construction Work, in conjunction with the progress of work of other Contractors.

.3 Ensure all trades cooperate with and work together so that the Work will fit together and make a complete and satisfactory job in every detail. Ensure each Subcontractor maintains its own quality assurance program.

.4 Comply with Owner's instructions for access to Owner occupied areas.

3.2 **CONSTRUCTION ORGANIZATION AND START-UP**

.1 Comply with Contract requirements for staging areas of the Site; field offices and storage areas; access and parking facilities, and temporary utilities and construction facilities.

3.3 **WORK SEQUENCE**

.1 Coordinate the stages of Work to accommodate Project requirements during construction; and the sequence and direction of execution to meet Project schedule.

.2 Coordinate the progress schedule with the Owner's requirements during construction.

.3 Construct Work in stages or manner to provide for continuous operation of the entire facility. Do not close off public or Owner usage of any area of the Site which are not defined as part of the Contractor’s work areas.

3.4 **COORDINATION**

.1 Coordinate placement of materials and equipment to ensure that all components will be properly accommodated within the spaces provided prior to commencement of Work.

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

.3 Ensure that all accesses and clearances required by jurisdictional authorities and/or for easy maintenance of equipment are provided in the layout of equipment and services.

.4 Prepare and distribute minutes of interference coordination meetings to all parties.

3.5 **CONTRACTOR'S USE OF PREMISES**

.1 Carry out Work in such manner as to cause a minimum of noise or interference to adjacent properties. Secure the approval of authorities having jurisdiction before proceeding with any Work which may cause interference. Provide all necessary precautions to protect existing property and people.

.2 Coordinate use of premises with Owner to avoid interference with the Owner's normal operations of the facility.

.3 Assume full responsibility for protection and security of Products and Work under this Contract.

.4 Limit operations to the prescribed areas including installation operations, storage areas and movement of vehicles and equipment.

.5 Access and egress to and from the Site of Work areas shall be by the prescribed routes only.

.6 Allow free and unrestrictive access to the Site by Owner, Consultant or his Representatives, or by any authorized person representing the Owner, and allow them to enter upon and inspect any or all parts of the Work under this Contract.

3.6 **HOURS OF WORK**

.1 Schedule and perform the Work to meet completion date.

3.7 **SUPERINTENDENCE**

.1 Provide the following full time staff with responsibilities as stated below. All staff shall have relevant formal training and experience with similar Project size and complexity.

.1 Project Manager/Construction Manager/Site Superintendent whose responsibilities include managing all administrative aspects of the Project including administration of Contracts and changes with the Owner, the Subcontractors and Suppliers. This role will also include for administration of all Contract administration documents required by the Contract Documents including schedules, logs, reports, meeting minutes, RFI's, Site instruction, change orders, change directives, and monthly progress payment invoice. This person shall be on Site full time for the complete duration of the Project and must chair the site kick-off meeting, and the regular progress and coordination meetings.

.2 Site Engineer or Site Coordinator whose responsibility includes planning and coordination of the Work, review of submittals and Shop Drawings, maintaining as-built records, and assisting the Site Superintendent and Construction Manager. This person shall be on Site full time for the complete duration of the Project.

.2 Provide other foremen as necessary to direct and control the Work on Site, such personnel to be well experienced, competent in their specialized fields and having full knowledge and experience in directing the Work under their charge.

.3 In addition to the full time superintendent that the Contractor shall place in full charge of the Work on Site, ensure that each major Subcontractor maintains a full time superintendent to be in charge and responsible for their respective Work and who shall report to the Contractor's site superintendent.

4 Cutting and Patching

.1 Not applicable.

5 Field Engineering

5.1 **QUALIFICATIONS OF SURVEYOR**

.1 All setting out of the Work and survey Work shall be performed by a qualified registered Ontario Land Surveyor (OLS) or Engineer.

5.2 **SURVEY REFERENCE POINTS**

.1 Existing base horizontal and vertical control points are designated on Drawings.

.2 Locate, confirm and protect control points prior to starting Site Work. Preserve permanent reference points during construction.

.3 Make no changes or relocations without prior written notice to Owner.

5.3 **SURVEY REQUIREMENTS**

.1 Establish property boundaries based on the Topographic Survey provided by the Owner or included in the Contract Documents.

.2 Establish temporary bench marks on Site, referenced to established bench marks by survey control points. Record locations, with horizontal and vertical data in Project Record Documents.

.3 Establish lines and levels, locate and lay out, by instrumentation.

5.4 **RECORDS**

.1 Maintain a complete, accurate log of control and survey Work as it progresses.

.2 Record all authorized field changes of dimension and detail.

5.5 **SUBSURFACE CONDITIONS**

.1 Promptly notify Consultant in writing if subsurface conditions at the Place of the Work differ materially from those indicated in the Contract Documents.

.2 After investigation, should the Consultant determine that the subsurface conditions do differ materially from those indicated in the Documents instructions will be issued for changes in the Work as provided in the Contract.

5.6 **UTILITY SURVEYS**

.1 Locate and mark the routing of embedded or subsurface utilities located within the construction Site. This includes, but is not limited to, electrical conduits, telephone lines, storm sewers, sanitary sewers, water mains, communication cabling, gas lines, duct banks, and hidden or obtrusive plants.

6 Project Meetings

6.1 **ADMINISTRATIVE**

.1 Schedule and administer Project meetings throughout the progress of the Work.

.2 Notify in writing, Owner and Consultant to attend meeting a minimum of one week in advance of meeting.

.3 Prepare agenda for the meeting.

.4 Provide physical space and make arrangements for meetings.

.5 Record the minutes. Include significant proceedings and decisions. Identify "action by" parties.

.6 Reproduce and distribute copies of minutes no later than three Working Days after each meeting and transmit to meeting participants, including affected parties not in attendance.

.7 Representatives of Contractor, Subcontractor and Suppliers attending meetings shall be qualified and authorized to act on behalf of the party each represents.

6.2 **KICK-OFF MEETING**

.1 Arrange a kick-off meeting immediately upon award of Contract. Ensure attendance by authorized Representatives of Owner, Consultant and Subcontractors. The purpose of this meeting is to commence the Work under this Contract, to acquaint the Contractor's and Owner's designated personnel with each other, and to discuss methods and means by which full cooperation and coordination of all participants can be achieved during the execution of the Work.

6.3 **SAFETY MEETING**

.1 Conduct safety meetings as required by the Owner and OHSA.

.2 Agenda may include the following:

.1 Safe work practices

.2 Accident reporting and investigations

.3 Health and safety inspections

.4 Health and safety committees

.5 Orientation and training

.6 Emergency preparedness

7 Submittals

.1 Refer to Section 01 33 00 Submittal Procedures.

7.2 **REQUEST FOR INFORMATION (RFI)**

.1 Requests for Information shall be completed and submitted by the Contractor if items are not indicated on the Drawings or contained in the Project Manual that is required to properly perform the Work. RFI’s shall include a detailed written statement that indicates the specific Drawings or specification sections that require clarification.

.2 Upon receipt of a RFI the Consultant will provide a response to the Contractor within five Working Days.

7.3 **MONTHLY EARNED VALUE PROGRESS**

.1 With each monthly progress claim provide an “S” curve indicating the actual earned progress compared against the planned earned progress.

8 Schedules

8.1 **SCHEDULES REQUIRED**

.1 Construction schedules.

.2 Work schedule with manpower loading.

.3 Submittal Schedule for System Design and Engineering, Shop Drawings, Product Data, As-Built Drawings, Operating and Maintenance Manuals, Samples.

.4 Cash Flow Schedule.

8.2 **SUBMISSION**

.1 Submit initial schedules within seven days after award of Contract.

.2 Owner will review schedule and return reviewed copy within two days after receipt.

.3 Resubmit finalized schedule within three days after return of reviewed copy.

.4 Submit updated progress schedule with each application for payment and as otherwise instructed by Owner.

.5 Distribute copies of the reviewed schedule to job Site, Subcontractors and other concerned parties.

8.3 **WEATHER**

.1 Incorporate into the Contract schedule, allowances for the number of Working Days lost due to inclement weather, which can be anticipated on the basis of analysis of information from Environment Canada.

.2 The Contractor may be entitled to a schedule extension for those activities on the critical path that are delayed on account of inclement weather. This is assessed based on average seasonal public records on file with the Ministry of Environment and 10-year weather patterns.

.3 No additional payment will be made on account of any such schedule extension. For the purpose of this clause the quarters are defined as January 1st to March 31st, April 1st to June 30th, July 1st to September 30th and October 1st to December 31st.

8.4 **RESPONSIBILITY**

.1 Perform overall planning and control of the Project.

.2 Plan and schedule the Work to provide a continuous and efficient flow of the Work to achieve the Contract completion date.

.3 Develop a detailed schedule as previously described, based on sequencing, phasing, and direction of installation required by the Project.

.4 At the regular scheduling meetings, report on the actual progress of each element of Work, including work of Subcontractors.

.5 Report on firm established delivery and/or start dates for all critical material and equipment, of own trades and of Subcontractors. Immediate notice shall be given to the Owner of all problems or anticipated problems in respect of deliveries of critical materials or trade operations.

8.5 **CONSTRUCTION SCHEDULES**

.1 Develop a detailed schedule in the following format, as previously described, based on sequencing, phasing, and direction of installation required by the Project.

.1 Prepare schedule in the form of a horizontal bar chart and with manpower loading figures based on average weekly loading.

.2 Provide a separate bar line for each trade or operation. Identify all tie-ins to Owner's existing facilities.

.3 Provide horizontal time scale identifying the first work day of each week.

.4 Format in chronological order of the start of each item of Work.

.5 Format schedules to allow plotting of actual progress against scheduled progress.

.2 Update for progress and submit weekly or as requested by Owner.

8.6 **WEEKLY SCHEDULE WITH MANPOWER LOADING**

.1 For weekly coordination meeting provide a detailed two-week work schedule outlining Work activities and manpower requirements (by trade) planned for that period. Update and submit weekly.

.2 Identify problems on the past week's operation and submit proposed solutions at coordination meetings.

8.7 **SHOP DRAWINGS AND PRODUCT DATA**

.1 Contractor's detailed schedule of Work or a separate schedule shall identify the development and submission of Shop Drawings and submission of Product data.

.2 Agree with Owner on a Shop Drawing numbering system to be used for this Project.

.3 At the start of the Project, review the Contract Documents and compile a submittal schedule which shall include all submittals required by the Contract Documents. Coordinate the submittal schedule with the construction schedule, show all scheduled dates the submittals are to be submitted, and the latest review return date from the Consultant.

8.8 **CASH FLOW SCHEDULE**

.1 Submit one month prior to the first application for payment, a cash flow schedule by month for the duration of the Contract, based on net payments. Identify holdback releases.

.2 Update as required to reflect Contract changes or as requested by Owner.

9 Quality Control

9.1 **INSPECTION AND TESTING BY CONTRACTOR**

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

9.2 **INSPECTION AND TESTING BY INDEPENDENT AGENCIES**

.1 Independent inspection/testing firms may be engaged by Owner for the purpose of inspecting and/or testing portions of Work. Cost of such services will be borne by Owner.

.2 Employment of inspection/testing firms does not relieve the Contractor's responsibility to perform Work in accordance with Contract Documents. Defective materials and/or workmanship may be rejected, regardless of previous inspection, whenever found.

.3 Provide assistance required for executing inspection and testing by the appointed firms. Allow access and facilities for inspection and testing.

.4 If defects are revealed during inspection and/or testing, the Owner will request additional inspection and/or testing to ascertain the full degree of the defect. Correct defects and irregularities as advised by Owner at no cost to Owner. Pay costs for retesting and re-inspection.

9.3 **PROCEDURES**

.1 Allow inspection/testing agencies access to the Work on the Site, at off-site manufacturing and fabrication plants.

.2 Notify the appropriate agency and Owner and Consultant in advance of the requirement for tests, in order that attendance arrangements can be made.

.3 Submit samples and/or materials required for testing. Submit with reasonable promptness and in an orderly sequence so as not to cause delay in the Work.

9.4 **REPORTS**

.1 Copies of inspection and test reports will be issued to prime Contractor, Owner and Consultant.

.2 Provide copies to Subcontractor of work being inspected/tested.

9.5 **TESTS AND MIX DESIGN**

.1 Furnish test results and mix designs as may be required.

.2 The cost of tests and mix designs beyond those called for in the Contract Documents or beyond those required by the law of the Place of Work shall be appraised by the Consultant and may be authorized as recoverable.

10 Temporary Construction Facilities And Controls

10.1 **INSTALLATION/REMOVAL**

.1 Provide construction facilities and temporary controls in order to execute the Work expeditiously.

.2 Remove from Site all such Work after use.

10.2 **GUARD RAILS, BARRICADES AND TRAFFIC CONTROL**

.1 Provide secure, rigid guard railings and barricades where required for protection of Work, workers and public.

.2 Provide flag-persons, traffic signals, flares, lights or lanterns as required to perform the Work and protect the public.

.3 Provide as required by governing authorities.

10.3 **HOARDING**

.1 Provide hoarding where required to protect the public, workers and private property from injury or damage.

.2 Provide around trees and plants designated to remain. Protect from damage by equipment and construction procedures.

10.4 **WEATHER ENCLOSURES**

.1 Provide weathertight closures to unfinished door, wall and window openings, tops of shafts or other openings in floors, walls and roofs.

.2 Provide weathertight enclosures to floor slabs to keep them dry in preparation for application of finishes. Any remedial Work as required to bring floor slabs to a dry state following penetration of water from the atmosphere shall be at the Contractor's expense.

.3 Close off floor areas where walls are not finished; seal off other openings; enclose building interior Work area for temporary heat.

10.5 **DUST TIGHT SCREENS**

.1 Provide dust tight screens or partitions to localize dust generating activities and for the protection of workers, finished areas of the Work and the public.

.2 Maintain and relocate protection until such Work is complete.

10.6 **DEWATERING**

.1 Provide temporary drainage and pumping facilities to keep excavations and Site free from standing water.

10.7 **SCAFFOLDING**

.1 Provide and maintain scaffolding, ramps and ladders.

.2 Construct and maintain scaffolding in a rigid, secure and safe manner, independent of walls.

10.8 **ACCESS AND CONSTRUCTION PARKING**

.1 Before Contractor enters the Site with vehicles or equipment, the Contractor shall coordinate with the Owner and appropriately barricade, stake off or snow fence the access routes and storage areas and around the construction area in order to prevent damage to buildings, grounds, plantings, turf and surrounding facilities at the Site, and to restrict unauthorized persons from entering the construction area. The Contractor shall be responsible for making good any and all damages caused by his operations on Site.

Restoration of such damages shall be to the original condition or better, and to the satisfaction of, and at no extra cost to, the Owner.

10.9 **USE OF THE WORK**

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

.2 Storage of material shall be outside of the building with exception of material for each day's work requirements.

.3 Fabrication shops shall not be set up within the building except as directed by the Owner.

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

.5 Be responsible for careful and reasonable use of any Owner-supplied water and power.

10.10 **TEMPORARY SIGNAGE**

.1 Ensure that employees and the public are informed of the Work being performed in the work area a minimum of 5 days in advance of Work commencing and that signage is installed noting the nature of Work being performed, anticipated start and end dates and any dangers that may result from the Work.

.2 Replace existing signage as it is removed in the course of the Work with temporary signage. Replace with new signage where indicated on Drawings upon completion of the Work.

.3 Fabricate temporary signage from corrugated plastic. Where required, add grommets for installation.

10.11 **PROJECT IDENTIFICATION**

.1 Provide and erect, within three weeks prior to commencing Work on Site, one Project sign in English, size 3.6 m wide x 2.4 m high in a location designated or as directed by the Owner.

10.12 **SANITARY FACILITIES**

.1 Provide weatherproof sanitary facilities as required (portable, trailer type washrooms which consist of flush toilets and wash basins) in accordance with local health and other authorities.

.2 Maintain in clean condition.

10.13 **WATER SUPPLY**

.1 Provide and pay for a supply of potable water for construction use until permanent system is available.

.2 City water and sewer lines will be constructed during July or August 1992. Contractor may use these permanent systems when available and Owner will pay for water.

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

10.14 **OFFICES/FIRST AID/CAFETERIA**

.1 Provide and maintain in a clean condition during progress of Work adequately lighted, heated and ventilated office with space for filing and layout of Contract Documents.

.2 Provide adequate first aid facilities.

.3 Provide adequate facilities for food service. Do NOT use Owner's cafeteria.

10.15 **EQUIPMENT/TOOL/MATERIALS STORAGE**

.1 Provide and maintain, in a clean and orderly condition, lockable weatherproof sheds for storage of tools, equipment and materials. Locate as directed by Owner.

.2 Locate materials not required to be stored in weatherproof sheds on Site in a manner to cause the least interference with Work activities, as directed by Owner.

10.16 **PROTECTION FOR OFF-SITE AND PUBLIC PROPERTY**

.1 Protect surrounding private and public property from damage during performance of Work.

.2 Be responsible for damage incurred and pay all costs for correction.

10.17 **SECURITY**

.1 Be responsible for the security of Work and material supplied, stored and installed until all Work is complete and accepted by Owner.

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

10.18 **PROJECT CLEANLINESS**

.1 The Contractor shall maintain the Work in a safe and tidy condition and free from the accumulation of waste products and debris, other than that caused by the Owner, other contractors or their employees.

.2 The Contractor shall remove waste products and debris, other than that resulting from the work of the Owner, other contractors or their employees and shall leave the Work clean and suitable for use or occupancy by the Owner. The Contractor shall remove products, tools, Construction equipment and temporary Work not required for the performance of the remaining Work.

.3 The Owner reserves the right to perform clean-up Work not expeditiously completed by the Contractor and deduct such costs from the Contract Price.

10.19 **ROAD CLEAN-UP**

.1 Take all precautions to avoid depositing materials, debris and mud on the Owner's roadways and parking areas and on roads and streets adjoining the Owner's property from vehicles and equipment operating to and from the construction Site, and be responsible for removal of such deposits by brooming and washing.

10.20 **SNOW REMOVAL**

.1 Maintain all access routes, Site roads, trailer area and storage areas as well as Work areas of this Contract and assigned Subcontracts free of ice and snow to maintain safe operating

conditions and to maintain progress of the Work. Cleared snow shall be placed in areas on the Site as directed by the Owner.

11 Fire and Life Safety

11.1 **SAFETY PLAN**

.1 Submit to the Consultant for review, three weeks prior to commencing Work on Site, unless specified otherwise in this section, the following:

.1 Evidence of Safety Supervisor's training qualifications (supervisor to have successfully complete IHSA (Infrastructure Health and Safety Association) Supervisory Basics training or equivalent).

.2 The Contractor's occupational health and safety policy and procedures.

.3 The Contractor's site-specific safety plan and associated procedures.

.4 The site-specific emergency response plan listed below:

.1 Site-specific emergency response plan guideline.

.2 Emergency Response Planning for Construction Projects by the Provincial Labour-Management Health and Safety Committee.

.5 The site-specific traffic control plan.

.6 The Contractor's site orientation package.

11.2 **FIRE PROTECTION**

.1 Provide and maintain temporary fire protection equipment e.g. portable fire extinguishers, during performance of Work required by authorities having jurisdiction, governing codes, regulations and by-laws, to the satisfaction of the Owner and all local and insurance authorities in order to protect the property of the Owner and the Contractor against fire hazards during construction.

.2 Bulk storage of flammable liquids and other hazardous materials is not allowed on the Site.

.3 Flammable liquids must be handled in approved containers.

.4 The bringing in, use, and disposal of gasoline, benzine or other flammable materials shall be handled with good and safe practice as required by authorities having jurisdiction.

.5 Provide fire extinguishers of the non-freezing chemical type in each temporary building, enclosure and trailer.

.6 Use fire-proofed tarpaulins.

.7 A fire watch shall be required for each of the following activities regardless of the number, duration or size of the activity in operation on a single floor:

.1 Any open flame activities (e.g. soldering and welding);

.2 Shutdown of fire detection system;

.3 Shutdown of sprinkler system;

.4 Connection to drain line.

11.3 **OCCUPATIONAL HEALTH AND SAFETY**

.1 Safety is of prime importance on this Project.

.2 Conform to safe Work practices in accordance with regulations and authorities having jurisdiction.

.3 Promptly report to Owner all accidents or if any claim is made by anyone against the Contractor or Subcontractor on account of any accident.

.4 Provide at the Site, equipment to supply first aid service.

.5 Enforce proper Work methods and act immediately on directions regarding safety and Work practices given by authorities having jurisdiction or the Owner at no additional cost to Owner.

.6 Failure of Contractor to comply with verbal or written instructions or orders from the Ministry of Labour inspector or other authorities as well as instructions from the Owner or Consultant regarding safe Work practices or provision of specified requirements under the act shall be considered non-compliance of the Contract.

.7 Fully indemnify the Owner and Consultant for any charges or convictions flowing as a result of Work performed under this Contract.

.8 Maintain on Site a copy of the latest edition of the "Occupational Health and Safety Act, Construction Projects, issued April 2009", and "Occupational Health and Safety Act, Industrial Establishments, issued October 2006".

.9 Ensure that all personnel are adequately equipped to comply with safety regulations and that sufficient safety equipment is available.

.10 Lack of equipment will not be reason for non-compliance.

11.4 **SAFETY SUPERVISOR**

.1 Designate a senior employee as Contractor's safety supervisor.

.2 Duties will include involvement in training, instruction, planning, safety patrols, and enforcement of rules.

.3 Give name and telephone number (site, office and residential) to Owner.

.4 Ensure that a designated person is certified by IHSA (Infrastructure Health and Safety Association).

.5 Workplace Hazardous Materials Information System (WHMIS).

.6 Be familiar with WHMIS regulations and be responsible for compliance.

.7 Controlled Products shall be properly labeled.

.8 Provide proper warning labels and training at the workplace.

.9 Provide copies of material safety data sheets for any controlled Product in the workplace.

.10 Be responsible for all other requirements of the regulations as applicable to employers.

.11 Before commencing any Work on the Site, attend Owner's safety orientation meeting and provide Owner with a proposal as to how hazardous materials will be stored and dispensed

on the Site area, in addition, specifically outline the measures which Contractor will undertake to prevent damage or injury in the event of an accidental spill.

.12 The Contractor's "Handling Procedure" will be provided no later than ten days following the health and safety orientation meeting.

12 Material and Equipment

12.1 **PRODUCTS - GENERAL**

.1 The Specifications may contain Product brands that form the basis of some design, and the Specifications will explicitly state so. Such “basis of design” Products are indicated as first listed item in the Product Specifications.

.1 Other listed manufacturers’ Products are acceptable only on the condition that they comply with, or are modified as necessary, to comply with specified and indicated requirements and conform to quality levels and functional requirements of “basis of design” Product.

.2 Inclusion of a manufacturer’s model number does not void any specified or indicated requirements.

.2 When manufacturers’ catalogued trade name and model number is specified for a Product, any specified Product will be acceptable.

.3 When a Product is specified by reference to a standard only, any Product that meets the specified standard may be selected. Products meeting minimum reference standards will be accepted subject to the Consultant’s review for compliance with the Specifications.

.4 When a Product is specified by performance Specification without manufacturers specified, any Product meeting the requirements of the Specification may be accepted subject to Consultant’s review.

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

.6 Where a warranty isn’t specified in the specification section, the manufacturer’s standard warranty shall apply.

12.2 **PRODUCT AND MATERIAL QUALITY**

.1 Products, materials, equipment and articles (referred to as Products throughout the Specifications) incorporated in the Work shall be new, not damaged or defective, and of the best quality (compatible with Specifications) for the purpose intended. If requested, furnish evidence as to type, source and quality of Products provided.

.2 Defective Products will be rejected, regardless of previous inspections. Inspection does not relieve responsibility, but is a precaution against oversight or error. Remove and replace defective Products at own expense and be responsible for delays and expenses caused by rejection.

.3 Unless otherwise indicated in the Specifications, maintain uniformity of manufacturers for any particular or like item.

12.3 **SUBSTITUTIONS**

.1 Refer to Section 01 62 01 Substitution Request Form.

12.4 **EXPEDITING**

.1 Immediately after award of Contract, review Product delivery requirements and anticipate foreseeable supply delays for any item. If delays in supply of Products are foreseeable, notify the Owner of such, in order that substitutions or other remedial action may be authorized in sufficient time to prevent delay in performance of Work.

.2 In the event of failure to notify the Owner at commencement of Work and should it subsequently appear that Work may be delayed for such reason, the Owner reserves the right to substitute more readily available Products of similar character at no increase in Contract Price.

.3 Utilize Canadian materials and Products if available and equivalent in price and quality.

.4 Submit, when requested by Owner, an updated material procurement/expediting record indicating clearly the status of material delivery and fabrication. Particulars to be covered by this record shall include the item identification, sub-vendor, order date, order number, Shop Drawing submission date(s) and review date(s), required delivery date, promised delivery date, date received, date checked and general remarks.

.5 Accumulate and submit similar records from (assigned) Subcontractors and ensure that Subcontractors are properly and frequently expediting all equipment and material to meet delivery deadlines to suit installation schedule.

.6 Allow the Owner or their Representative free access to the Contractor's plant and to Subcontractor's plants for visual inspection of allotted material and/or progress of the Work.

12.5 **TRANSPORTATION**

.1 Pay transportation costs to Site of Products required in the performance of Work.

12.6 **STORAGE, HANDLING AND PROTECTION**

.1 Handle and store Products in a manner to prevent damage and deterioration.

.2 Remove and replace damaged Products at own expense and to the satisfaction of Owner.

12.7 **WORKMANSHIP**

.1 Workmanship shall be the best quality, executed by workers experienced and skilled in the respective duties for which they are employed.

.2 Immediately notify the Owner if required Work is such as to make it impractical to produce required results.

.3 Do not employ any unfit person or anyone unskilled in their required duties. The Owner reserves the right to require the dismissal from the Site of workers deemed incompetent, careless, insubordinate or otherwise objectionable.

12.8 **PROTECTION OF WORK**

.1 Adequately protect Work completed or in progress. Work damaged or defaced due to failure in providing such protection is to be removed and replaced, or repaired, as directed by the Owner, at no increase in Contract Price.

.2 Prevent overloading of any part of the Work or building. Do not cut, drill or sleeve any load bearing structural member, unless specifically indicated without written approval of the Owner.

.3 Maintain and monitor protection of roofing membrane when Work is done on or above finished roofing system.

12.9 **EXISTING UTILITIES**

.1 Connect to existing services or utilities at times directed by Owner or local governing authorities, with a minimum of disturbance to Work, building occupants, pedestrian and vehicular traffic.

.2 Protect and maintain existing active services. When inactive services are encountered cap off in a manner approved by authority having jurisdiction and stake or otherwise record location of capped service.

13 Testing and Balancing of Systems

.1 Not applicable

14 Systems Demonstrations

.1 Not applicable.

15 Contract Closeout

15.1 **FINAL CLEANING**

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

.2 Remove waste materials and debris from the Site at regularly scheduled times or dispose of as directed by the Owner. Do not burn waste materials on Site, unless approved by the Owner.

15.2 **DOCUMENTS**

.1 Collect reviewed submittals and assemble documents executed by Subcontractors, Suppliers, and manufacturers.

.2 Submit material in a neatly indexed package, prior to final application for payment.

.3 All Warranties shall commence from date of Certificate of Substantial Performance unless indicated otherwise.

.4 Contractor shall be responsible for obtaining and enforcing all required warranties.

.5 Examine all sections of the Specification to ensure inclusion of all warranties specified.

15.3 **PROJECT RECORD DOCUMENTS**

.1 Submittals shall include but not limited to that listed below.

.1 Individual Specifications sections: Specific requirements for operation and maintenance data.

15.4 **INSPECTION/TAKEOVER PROCEDURES**

.1 Prior to application for certificate of Substantial Performance, carefully inspect the Work and ensure it is complete, that major and minor construction deficiencies are complete,

defects are corrected in condition for occupancy. Notify the Owner in writing of satisfactory completion of the Work and request an inspection.

.2 Consultant will allow a maximum of two final inspections for each discipline for rectifying all defects. Beyond this all additional visits will be charged to the General Contractor at a rate of $1000.00 per visit/report.

.3 During inspection by the Owner and Consultant, a list of deficiencies and defects will be tabulated. Correct within agreed time schedules.

End of Section

1 General

.1 This section is intended to provide basic identification of the Work, for the Contractor to determine upfront, the nature of the Work involved in this Contract. In no way shall this section be interpreted as being a full representation of the Work of this Contract.

.2 It is the Contractor's sole responsibility to examine the Commercial Documents, Specifications and Drawings issued to establish/determine total scope of Work.

2 Project Overview

.1 The City of Toronto's will be undergoing exterior modifications. The site of the Work is located at 255 Spadina, Toronto, Ontario.

3 Description of Contract (General Contract)

.1 This Contract comprises the following:

.1 General

.1 Erosion and sedimentation control

.2 Construction facilities, washrooms, parking, laydown areas, site fencing/hoarding.

.2 Site Preparation

.1 Cutting, filling and grading.

.2 Site services and appurtenances.

.3 Protection of Municipal drainage ditch.

.4 Place and compact granular fill.

.5 Protection of storm sewers, manholes and catch basins.

.3 Site Work

.1 Mew asphalt paving.

.2 New painted line markings.

.3 Granular base and sub-base for construction road.

.4 Restore damaged or disturbed Work.

.5 Dust control during the operations of the Work.

.6 Be responsible for providing and performing items required and necessary other than specified, in order to complete the Work.

End of Section

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1 General

.1 Items to be submitted for review

.1 Shop Drawings

.2 Samples

.3 “As-Built” Drawings

.4 Certificates and transcripts

.5 Progress photographs

.2 Submittals MUST be accompanied by “Standard Submittal Form” with all blank spaces filled in. A copy of the form is bound into the Specifications following this section.

.3 Submit with reasonable promptness and in an orderly sequence so as not to cause delay in the Work. Failure to submit in adequate time is not considered sufficient reason for an extension of Contract Time and no claim for an extension by reason of such default will be allowed.

.4 Work affected by the submittal shall not proceed until review is complete.

.5 Contractor shall retain one reviewed and stamped copy of each submission on Site. Only the stamped copies shall be used on the Work.

2 Shop Drawings

2.1 **GENERAL**

.1 The term "Shop Drawing" 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.

.2 The Contractor shall arrange for the preparation of clearly identified Shop Drawings as called for by the Contract Documents or as the Consultant may reasonably request.

.3 Prior to submission to the Consultant, the Contractor shall review and stamp 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 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.

.4 Submittals not stamped, signed, dated and identified as to the specific Contract requirements may be returned without being examined and shall be considered rejected.

.5 The Contractor shall submit Shop Drawings to the Consultant for his review with reasonable promptness and in orderly sequence so as to cause no delay in the Work or in the work of other Contractors. If either the Contractor or the Consultant so requests they shall jointly prepare a schedule fixing the dates for submission and return of Shop Drawings. At the time of submission the Contractor shall notify the Consultant in writing of any deviations in the Shop Drawings from the requirements of the Contract Documents.

.6 The Consultant will review and return Shop Drawings in accordance with schedule agreed upon, or otherwise with reasonable promptness so as to cause no delay. The Consultant's

review will be for conformity to the design concept and for general arrangement only and such review shall not relieve the Contractor of responsibility for errors or omissions in the Shop Drawings or of responsibility for meeting all requirements of the Contract Documents unless a deviation on the Shop Drawings has been approved in writing by the Consultant.

.7 The Contractor shall make any changes in Shop Drawings which the Consultant may require consistent with the Contract Documents and resubmit unless otherwise directed by the Consultant. When resubmitting, the Contractor shall notify the Consultant in writing of any revisions other than those requested by the Consultant.

.8 The Contractor shall secure from all his Subcontractors and material Suppliers, uniform size Shop Drawings showing the construction materials, etc., or as required and upon which the respective Bids have been based.

.9 Shop Drawings shall define the division of responsibility between the trades, and all items shown on the Shop Drawings shall be supplied as part of the Contract unless it is specifically noted that certain items are not part of the Contract.

.10 Any work done before receiving the Consultant's final review of the Shop Drawings shall be at the Contractor's risk.

2.2 SHOP DRAWINGS IDENTIFICATION

.1 An electronic stamp will be sized and placed to fit on each Shop Drawing:

ARCADIS

The review of this Shop Drawing is solely for the limited purpose of checking general conformance with the general design concept and general arrangement only. This review does not constitute approval or verification of the design inherent in the Shop Drawings, and any omissions or errors therein remain the responsibility of the Contractor. The Contractor remains entirely responsible for complying with the Contract Documents, confirming all field dimensions and site conditions, for information that pertains to fabrication, techniques of construction and installation, and coordination of the Work.

Reviewed	Reviewed As Noted	Revise & Resubmit	Not Reviewed
☐	☐	☐	☐
Reviewed By:		Date:	

CCDC2

2.3 REPRODUCTION OF ENGINEERING DRAWINGS

.1 Reproduction of the engineering Drawings, to serve as background or reference for Shop Drawings, will be permitted. Cost of reproduction shall be based on the number of electronic Drawing files as indicated below, and shall be paid for by the Contractor in accordance with rates indicated below. Rates are exclusive of HST. The Consultant will prepare the files by removing logos, seals and other identification or reference to the Owner or Consultant, checking all reference files and removing unnecessary external references, and packaging files for release. Any identification or reference to the Owner or Consultant is to be removed from all Drawings that are used by the Contractor for this Contract. Costs incurred for the reproduction of engineering Drawings shall be paid by the Contractor directly to the Consultant.

.1 One to ten files: $1,000.00

.2 Eleven to twenty files: $1,900.00

.3 Twenty-one to fifty files: $4,500.00

.4 Fifty-one to one hundred files: $8,000.00

.5 More than one hundred files: $75 rate per file, plus $500.00 administration fee

.6 The submission of a copy of the Consultant's Drawings as a Shop Drawing without additional detailed installation, fabrication or Product information added is not an acceptable form of submittal and is grounds for automatic rejection.

.2 Prior to the release of digital or electronic files, the Consultant will issue to the Contractor the Digital Transfer Agreement form attached to the end of this section.

.1 The Contractor shall review and return to the Consultant an electronic copy of the agreement with the Contractor's signature.

.2 By this review and signing of the agreement, the Contractor has acknowledged and agreed to the terms contained within the Digital Transfer Agreement.

.3 The Consultant will not release digital files to the Contractor until the agreement is signed and executed. The Consultant will retain an executed copy of the Digital Transfer Agreement.

2.4 **SUBMITTAL SYSTEM - GENERAL**

.1 Submit Portable Data Files (PDF's) of fully detailed and dimensioned Shop Drawings of the Work.

.2 Shop Drawings will be returned to the Contractor stamped and marked "REVIEWED", or "REVIEWED AS NOTED", or "REVISE & RESUBMIT" or " NOT REVIEWED". These stamps are defined as follows:

Stamp	Meaning
REVIEWED	Drawings reviewed without comments. Proceed with construction
REVIEWED AS NOTED	Incorporate corrections or comments and proceed with construction. No other alterations are to be made to the Drawings by the Contractor subsequent to receipt of Drawings stamped and marked as above. If further changes are made in addition to the Consultant's notations, then the Drawings must be resubmitted for further review.
REVISE & RESUBMIT	Revise Drawing in accordance with corrections or comments and re-submit to the Engineer for further review
NOT REVIEWED	Drawing does not require Engineer's review

.3 Shop Drawing numbering shall be in numerical sequence beginning with the specification Section number followed by "001". If a revision is submitted it shall be followed up in sequence beginning with ".R1". See below table for example:

Section 02 41 19	**Selective Structure Demolition**
02 41 19.001	Demolition Plan
02 41 19.001.R1	Demolition Plan
02 41 19.002	Conflict with Buried Fiber Cable

.4 Coordinate Shop Drawing file sizes with Consultant in advance of submittal. Generally, submit up to 10 megabytes file size only.

.5 Drawings shall be blackline as much as possible to obtain good resolution when printed.

.6 Consultant may mark up the Shop Drawings electronically or may print and mark up manually.

.7 A copy of Shop Drawings with Consultant's comments in colour and shall be emailed back to the Contractor or posted on a File Transfer Protocol (ftp) site or project website, if such site exists. The Consultant will retain on its electronic folder, a PDF copy of Shop Drawings returned to the Contractor. Original marked up hardcopy if applicable will also be retained by the Consultant.

2.5 **SUBMITTAL SYSTEM**

.1 Shop Drawings shall be submitted in electronic format for obtaining reviews from the Consultant.

.2 Electronic submittals shall be uploaded by the Contractor in PDF format. Any other format will result in delays in the review of submittals.

.3 Contractor shall electronically notify various people of each submittal according to a communications plan determined at the beginning of the Work.

.4 Consultant will apply the review stamp to the submittals and upload a PDF version of the reviewed Drawings complete with comments. Consultant will return submittals and will be named to align as closely as possible.

.5 Consultant will electronically notify the various parties of a reviewed submittal as determined at the beginning of the Work in the communications plan.

.6 Contractor shall download "Reviewed" submittal and print out the files in order to obtain the Consultant's review comments.

.7 Contractor is responsible for opening and checking all documents and shall confirm the following and if there are any discrepancies, the Contractor shall contact the Consultant immediately.

.1 That the files contained have been correctly transmitted.

.2 That the transmittal sheet accurately lists the files that were sent.

.3 That the files match-up with files previously submitted by the Contractor to the Consultant.

2.6 **INFORMATION REQUIRED**

.1 Indicate materials, methods of construction and attachment or anchorage, erection diagrams, connections, explanatory notes and other information requested in the individual Specification sections or as necessary for completion of Work. Where articles or equipment attach or connect to other articles or equipment, indicate that such items have been coordinated, regardless of the section under which the adjacent items will be supplied and installed. Indicate cross references to design Drawings and Specifications.

.2 All submittals shall be clearly drawn with CAD or typewritten to be legible.

2.7 **ENGINEER'S STAMP AND SIGNATURE**

.1 Shop Drawings of components, apparatus and equipment which are designed by the Contractor shall bear the stamp and signature of an Engineer licensed to practice in the Province of Ontario in accordance with the Ontario Building Code and the Professional Engineer's Act.

2.8 **CHANGES**

.1 Adjustments made on Shop Drawings by the Consultant are not intended to change the Contract Price. If adjustments affect the value of Work, state such in writing to the Consultant prior to proceeding with the Work.

.2 Make changes in Shop Drawings as the Consultant may require and which are consistent with Contract Documents. When resubmitting, notify the Consultant in writing of any revisions other than those requested by the latter.

2.9 **UNITS OF MEASUREMENT**

.1 Shop Drawings shall show weights and dimensions in either metric (S.I. units) or Imperial units, consistent with the Consultant's Drawings and Specifications.

2.10 **MISCELLANEOUS**

.1 The Contractor and each Subcontractor is expected to operate as an expert in his respective field. The Contractor shall save Owner and Consultant harmless from any defect resulting from failure in this regard including cost of remedial action necessary before or after completion of the Work.

.2 Drawings shall be prepared specifically for the Work.

2.11 **RECORD SUBMISSIONS**

.1 Record purpose submissions for:

.1 Piping specialties.

.2 Valves.

.3 Any inspection certificate/report submitted by authorities shall be stamped "FOR RECORD PURPOSES ONLY".

.4 For each size or model as applicable for equipment, submit two copies or one copy on a USB drive, scanned file copies in Adobe Acrobat Version 9 or later.

2.12 **SUBMISSIONS TO AUTHORITIES HAVING JURISDICTION**

.1 Contact authorities having jurisdiction over the Place of Work for required list of submissions for their review.

.2 All detailed design Drawings or other submittals required to be submitted to the authority for approval shall be prepared, submitted, and paid for by the Contractor.

2.13 **BROCHURES**

.1 Submit two copies of Product data sheets or brochures, or one copy on a USB drive, scanned file copies in Adobe Acrobat Version 9 or later. Data sheets or brochures are for requirements requested in Specification sections and as the Consultant may reasonably request where customized Shop Drawings will not be prepared due to standardized manufacture of Product.

.2 Brochures or Drawings of standard production equipment shall be for one size or model and include all performance data and characteristic curves for such equipment.

.3 Wiring diagrams and schematics shall accompany Shop Drawings for all equipment which have electrical controls furnished with the equipment.

3 Samples

3.1 **SAMPLES**

.1 Submit for review all samples as requested in the respective Specification sections. Label samples as to origin and intended use in the Work.

.2 Deliver samples prepaid to Consultant's business address, unless otherwise approved by Consultant. Large, heavy items such as concrete block samples may be reviewed on site if arranged in advance with the Consultant.

.3 Notify the Consultant in writing at the time of submission, of deviations in samples from requirements of Contract Documents.

.4 Adjustments made on samples by the Consultant are not intended to change the Contract Price. If such adjustments affect the value of Work, state such in writing to the Consultant prior to proceeding with the Work.

.5 Make changes in samples which the Consultant may require consistent with the Contract Documents.

4 As-Builts

4.1 **AS-BUILT DRAWINGS AND CCTV**

.1 Provide at own cost, additional sets of Drawing prints for use in maintaining “As-Built” information.

.2 Be responsible for creating “As-Builts” from field data collected during the course of the Project. Neatly record complete with legible dimensions and notes.

.3 “As-Built” Drawings are those prepared by the Contractor as it constructs the Project and upon which it documents the actual locations of the building components and changes to the original Contract Documents.

.4 Field data is defined as information that is not available from the Contract Documents, addenda, Change Orders, or Site instructions. It is of importance that the Contractor record on the “As-Builts” all field information relating to concealed conditions.

.5 “As-Built” information MUST have a high degree of accuracy in all respects.

.6 Recording must be done on the same day that deviation is made to ensure that important information is not missed from the “As-Builts”.

.7 Hand-mark all recording using red ink. “Clouded” method is unacceptable and “As-Builts” showing such method will be returned to the Contractor.

.8 Identify as "Project As-Built Copy". Maintain in good condition; clean, dry and legible, and make available for inspection on Site by Consultant at all times.

.9 Upon completion of the Work and prior to final inspection, submit a clean and legible copy of “As-Built” Drawings to Consultant.

4.2 **PROGRESS PHOTOGRAPHS**

.1 On commencement of the Work and at every two-week interval thereafter, supply the Consultant with minimum twelve digital colour photographs, taken from different views, indicating status and progress of the Work by each section of Work. Indicate date photograph was taken with appropriate description and email to the Consultant or upload to FTP site or project website, where the latter exists.

.2 Maintain a binder on site with 4 x 6 photographs for easy reference.

End of Section

Digital Transfer Agreement

This Digital Transfer Agreement (the "**Agreement**") is made as of **[Month, Day, Year]**, between **[Insert Client Name]** and **[Insert correct Arcadis IBI Group entity legal name]** as provided below:

[Insert Recipient Name **Office Address** **City, Province/State, Country** **Postal/ZIP Code]**	and	**[Insert correct Arcadis IBI Group entity name and address.]**
the "**Recipient**"		the "**Consultant**"

The Consultant and the Recipient are providing services for the **[insert project name and brief description] (**the "**Project**"). The Recipient and Consultant wish to enter into this Agreement whereby the Consultant will provide digital documents to the Recipient to assist the Recipient in carrying out its Project-related services.

NOW THEREFORE, in consideration for being given access to information that is confidential and proprietary, and for other good and valuable consideration the receipt and sufficiency of which are hereby acknowledged, the parties hereby agree and covenant as follows:

Section 1 – Transfer of Files

1.01 The Consultant will, following execution of this Agreement **[and payment to Consultant by the Recipient of $X]**, transfer to the Recipient the digital files listed at *Schedule 1 – Digital Files* (the "**Files**"). By separate amendment executed by both parties hereto, the parties may agree to transfer additional Files to be included in additional schedules in the form attached hereto at Schedule 2.

1.02 The Recipient acknowledges and agrees that it:

(a) may use the Files, and any portion or component thereof, only for its own use in relation to the Project, and only for the following express purposes:

(i) [background on which to prepare design, shop or other drawings and other submittals]
(ii) [3D coordination / clash detection / schedule simulation (4D)]
(iii) [take offs / quantity estimates of specific items (list)]
(iv) [fabrication / procurement of components]
(v) [integration with Geographic Information System (GIS) or Asset Management System]
(vi) [insert other]

(b) may not transfer, forward, sell, trade, distribute, or permit access to, the Files, to any third party, including without limitation Project contractors, subcontractors, consultants and sub consultants, unless the Consultant has expressly agreed to such transfer in writing, it being understood that such agreement will not be forthcoming from the Consultant unless and until such proposed third party has executed a digital transfer agreement similar to the terms contained herein in favour of the Consultant; and

(c) may not alter, modify, amend or change in any manner the contents of Files, or separate any content, schedules, materials, wall types or legends which are included as elements within the Files, or in any portion of the Files.

Section 2 – Liability of Consultant and Recipient Indemnity

2.01 The parties agree that the Consultant is not responsible for, and does not warrant or guarantee the accuracy, correctness or completeness of, the Files or the data contained therein, including without limitation any reference notes to “as-built” or similar. The Consultant offers no assurances that the information in the Files is reflective of previous contract or as-built conditions, and disclaims all responsibility for the accuracy or use of the data contained within the Files.

2.02 The Recipient agrees to verify and check all information contained within the Files and acknowledges it is solely responsible for fully ascertaining all site conditions and measurements relevant to its Project deliverables..

2.03 The Recipient agrees to waive any and all actions, claims, demands, proceedings, charges, fines, sanctions, penalties, damages, losses, consequential losses, damages related to loss of use, loss of profit, loss of opportunity, loss income or diminution of property value and the like, and costs and expenses (including legal and other professional fees) of whatsoever nature or kind (together “Claims and Damages”), that the Recipient, the entity procuring the Project and any third party involved in the Project, and each of their respective employees and agents (together “Project Parties”) may suffer, on any theory of liability, whether in contract, strict liability, tort, negligence, or otherwise (as against the Consultant), which arise out of or result from the Recipient’s use of or reliance on the Files or use of or reliance of the Files by the Recipient’s third party recipient, whether or not authorized as permitted hereunder.

2.03 The Recipient agrees to indemnify, defend and hold harmless the Consultant, and each of its related and affiliated companies, their officers, directors, unit holders, partners, associates, and employees (together “Consultant Indemnified Parties”) from and against any and all Claims and Damages suffered by any Consultant Indemnified Party, arising out of, in connection with, or result from use of the Files by the Recipient or its representatives.

Section 3 – Consultant Retention of Rights

3.01 The Consultant retains all common law, statutory law and other intellectual property rights relating to the Files and the data contained therein, including, but not limited to, title, copyright, industrial design rights and moral rights.

3.02 The Recipient hereby assigns to the Consultant all copyrights in all materials produced from the Files and except with the Consultant prior written consent, the Recipient shall not use the Files or any part thereof to produce any materials not expressly required for the Project, including without limitation views, graphics, renderings, physical models or marketing materials, nor may the Recipient use those materials for any purpose other than the Project. If, in its sole discretion, Consultant does consent to any other use, such consent will be conditioned, at a minimum, to the Consultant receiving credit as the producer and (to the extent applicable) copyright holder.

Section 4 – Recipient Acknowledgments

4.01 While the Consultant has taken reasonable precaution to ensure that Files are “virus-free”, the Recipient takes full responsibility of assuring that this is the case, and that the Recipient shall have

no entitlement to any Claims and Damages connected to damages to its computing systems and/or files in the transfer or use of the Files.

4.02 The Recipient acknowledges that:

(a) the Files provide a representation of then dated design, are not construction documents, nor do the Files reflect construction or contract documents, and that there may be differences between the Files and any corresponding construction or contract documents, including but not limited to previously prepared construction or contract documents;

(b) the Files do not represent or confirm specific Project elements, including without limitation those relating to fire and life safety, assembly details, systems, building envelope assemblies or details and the like; and

(c) data contained in the Files may change subsequent to the issue of Files to the Recipient due to changes or additions, however the Consultant is under no requirement to advise the Recipient of any such changes or additions and no liability accrues to the Consultant for not advising the Recipient of any changes or additions.

4.03 The Recipient shall, at its sole expense, remove all references to the name and logo of the Consultant, the name and logo of any other consultant, and all professional seals, in the use of the Files. Furthermore, the Consultant reserves the right to remove all references to the name and logo of the Consultant, the name and logo of any other consultant, and all professional seals, in the Files provided to the Recipient.

4.04 If the Files are provided as linked components, the Recipient takes full responsibility for any 'binding' which may be required by the Recipient. The Recipient acknowledges that in some cases Files are linked because of size constraints, and agrees that file corruption which may be a consequence thereof is at the Recipient's sole cost, risk and expense.

Section 5 – Term and Termination

5.01 Unless extended by mutual agreement of the Recipient and the Consultant, this Agreement will terminate on the earliest of: (a) [**DATE**]; and (b) the date of termination in accordance with this Section 5.

5.02 If the Recipient fails to comply with any of the terms or conditions of this Agreement, the Consultant may terminate this Agreement and all rights of the Recipient created herein.

5.03 Upon completion of the Project, or upon termination of this Agreement for whatever cause, all rights and privileges granted to the Recipient hereunder will immediately terminate and the Recipient shall immediately return to Consultant, or destroy, the Files and all related copies and materials. The Consultant reserves the right to require a certificate of a Director of the Recipient attesting to the return or destruction of the Files and all related copies and materials.

Section 6 – Confidentiality

6.01 Recipient shall not divulge any specific information identified as confidential, communicated to or acquired, or disclosed by the Consultant. No such information shall be used by Recipient on any other project without the written approval of the Consultant. These obligations of confidentiality shall not apply to information which is in the public domain; which is provided to Recipient by a third party without obligation of confidentiality; which is independently developed by Recipient without use of the Consultant's information; or which is required to be disclosed by law or by court order.

Section 7 – Miscellaneous

7.01 The express rights and remedies of the parties set out in this Agreement are in addition to and will not limit any other rights and remedies available to the Recipient or the Consultant at law or in equity. Any failure by either party to insist on strict performance and compliance by the other of any term, right or remedy under this Agreement will not be construed as a waiver by such party its right to require strict performance of any such term, right or remedy, and the duties of the party with respect to such contractual performance will continue in full force and effect.

7.02 Neither party will transfer, sublet or assign any rights or duties under, or interest in, this Agreement, without the prior written consent of the other party.

7.03 If any term, condition or obligation of this Agreement, or the application of any term, condition or obligation to the parties or to any other persons (including firms, partnerships, corporations or any combination), is to any extent held invalid or unenforceable under any applicable legislation or rule of law, such holding will be applied only to that provision(s), with the remainder of this Agreement remaining in full legal force and effect.

7.04 The parties agree that this Agreement and legal actions concerning its validity, interpretation and performance will be governed and interpreted in accordance with **[INSERT JURISDICTION OF CONSULTANT ENTITY]**; and it is further agreed by the parties that any legal action arising under this Agreement will be brought in a court of competent jurisdiction in that jurisdiction.

7.05 This Agreement constitutes the entire agreement between the Recipient and the Consultant regarding the transfer of Files and cancels and supersedes any prior understandings and agreements, whether written or oral in respect of the same. Except as expressly provided in this Agreement, no other terms, conditions or warranties, express or implied, form a part of this Agreement. Amendments to this Agreement must be in writing and signed by both parties.

7.06 Notwithstanding any amendment, completion or termination of this Agreement, all indemnifications in favour of the Consultant will survive and will remain in full legal force and effect.

7.07 The Recipient and the Consultant agree to be bound, as are their respective successors, executors, administrators and legal representatives, in respect of all terms, conditions and obligations pursuant to this Agreement.

7.08 This Agreement may be signed in counterparts and each such counterpart will constitute an original document and such counterparts, taken together, will constitute one and the same instrument. This Agreement may be executed and delivered by electronic transmission and the Recipient and the Consultant may rely on such electronic signature as though such were an original signature.

This Agreement is executed with effect as of the date set out on the first page of this Agreement.

[Recipient]

	_____		_____
Name:	_____	Name:	_____
Title:	_____	Title:	_____

[insert correct Arcadis IBI Group entity legal name]

	_____		_____
Name:	_____	Name:	_____
Title:	_____	Title:	_____

Schedule 1 – DIGITAL FILES

[NTD: Insert Description of Digital Files including format (use a screen capture to include Name, Date and Size of the files. Extensions should be listed.)]

Schedule 2 – ADDITIONAL DIGITAL FILES

The defined terms used in Schedule 2 have the meaning ascribed to them in the Agreement.

For and in consideration of good and valuable consideration, the receipt and sufficiency of which is hereby acknowledged, the parties hereto agree that except for the addition of Files as described below, the provisions of Agreement shall remain in full force and effect and the Files described below shall be subject to the terms and conditions of the Agreement in full.

The Consultant will, following execution of this Agreement ***[and payment to Consultant by recipient of $X]***, transfer to the Recipient the digital files listed at *Schedule 2 – Additional Digital Files* (the "**Files**"). By separate amendment executed by both parties hereto, the parties may agree to transfer additional Files to be included in additional schedules in the form attached hereto at Schedule 2.

[Recipient]

	_____		_____
Name:	_____	Name:	_____
Title:	_____	Title:	_____

[insert correct Arcadis IBI Group Entity legal name]

	_____		_____
Name:	_____	Name:	_____
Title:	_____	Title:	_____

[NTD: Insert Description of Additional Digital Files including format (use a screen capture to include Name, Date and Size of the files. Extensions should be listed.)]

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Attachment "A" to Specification Section 01 33 00
Standard Submittal Form

1. Submittal Title:					
2. To: ATTN:	3. From: ATTN:	4. Project Title & Location:	5. Submittal Date	6. New ☐ Resubmittal ☐	
			7. Submittal No.		
		8. Specification Section No:	9. Partial Submittal No.	10. Resubmittal No.	
11. Contract		12. Project No:		Arcadis/Owner Use Contract No:	

13. Page No.	14. Mfr/Contractor	15. Item I.D.	Description	16. Electronic Copy (Yes) (No)	17. No. of Hard Copies Print	Cat.	Samp	Other		Date: Received: Action Code #	Dept. File

18. Contractor's Remarks:

The undersigned certifies that the above submitted items have been reviewed in detail and are correct and in strict conformance with all requirements of the Contract Documents, except as otherwise noted. Note: Approval of items submitted does not relieve Contractor from complying with all requirements of the Contract Documents.

Name of Contractor _____

Signature _____

Action Codes: Refer to Section 01 33 00 for full text of codes below

1. Revise & Resubmit — Revise and resubmit to the Consultant for further review ☐
2. Reviewed as Noted — Incorporate corrections or comments and proceed with construction ☐
3. Reviewed — Drawings reviewed without comments. Proceed with construction ☐
4. Not Reviewed — Drawing does not require Consultant's review ☐

Consultant Comment:

Route	Dept.	Ck'd by	Date	Action
	Civil			
	Arch.			
	Struc.			
	Mech.			
	Elect.			
	I &C			
	Process			
	PM			

Received

Tracking Number

Copies to:

Primary Dept. Checker

Review completed on

Control Administrator

Returned to Contractor on

By _____

Date _____

Arcadis

Instructions for Use of Standard Submittal Form

1. Use an individual copy of this form for each and every required Project submittal.
2. Contractor shall fill in all blank spaces above the "Owner Comment" box and to the left of the "Action Codes", including the following:
    - Box 1 - Indicate generically what is being submitted i.e. "structural steel", "overhead doors", "plumbing fixtures", "wiring diagrams", etc.
    - Box 3 - Contractor's return address
    - Box 5 - Submittal date
    - Box 6 - Indicate "New" or "Resubmittal"
    - Box 7 - Submittal number
    - Box 8 - Specification section number submittal is in response to
    - Box 9 - Indicate if this is a partial submittal by using root number with part number (A5-00-01 – Part A, A5-00-01 – Part B, etc.)
    - Box 10 - Indicate if this is a resubmittal by using original root number with revision number
    - Box 11 - Indicate appropriate Contract name
    - Box 13 - Indicate Specification page number
    - Box 14 - Identify the manufacturer/Vendor/Subcontractor
    - Box 15 - Describe the submitted item
    - Box 16 - Indicate if electronic submittal
    - Box 17 - Indicate the quantity of submittal copies
    - Box 18 - Include appropriate remarks as required and sign the certification
3. The remainder of the submittal form will be completed by the Consultant, and returned to the Contractor with the submittal.

End of Attachment

1 Description

.1 This section covers Work for protection of environment as applicable to this Project.

.2 Provisions of this section supplement requirements of Contract Documents.

2 Environmental Practices

.1 Implement environmentally sound practices in this Project by incorporating Products that lessen burden on environment in production, use and final disposition. Support implementation of reduction, reuse and recycling strategies and use of environmentally sound Products. Promote use of environmentally responsible packaging practices by reducing and/or eliminating Products with excessive packaging in this Project where these practices do not negatively affect the proper protection of materials from inclement weather, especially water damage.

.2 Employ environmentally sound Products which are made, used and disposed of in a manner that significantly reduces harm to environment.

3 Surface Drainage and Watercourses

.1 Maintain ditches and watercourses for surface water drainage of Site and external properties during construction. Be responsible for damage due to negligence.

.2 Incorporate appropriate retention, detention and settling ponds, or similar methods, reviewed by Consultant, to control surface water run-off to adjacent ditches or other watercourses and to prevent oil, sediment or de-icing materials being carried into such ditches and/or watercourses. Tested quality of water discharged to ditches and/or watercourses shall not be of worse quality than that present in ditches and/or watercourses prior to any discharge of Site surface water. Monitor and test discharge water at least weekly and provide copies of test result to Consultant.

.3 Locate and protect stockpiles of semi-permanent nature to satisfaction of authorities having jurisdiction to ensure minimum environmental interference.

4 Noise Control

.1 Adhere to local noise bylaws.

.2 Equip vehicles and equipment with efficient noise attenuation devices (mufflers) to minimize noise levels in vicinity of Site.

.3 Where necessary place noise attenuation devices (barriers) around stationery pumps and compressors.

5 Dust Control

.1 Undertake control measures to prevent nuisances due to dust in any phase of construction.

.2 Application of calcium chloride shall be kept to a minimum and shall be restricted to vehicle right-of-way. In close proximity to watercourses, frequent application of water is preferred method. Obtain Consultant's approval before chemicals for dust control are used.

.3 Transport dusty materials in covered haulage vehicles.

.4 Transport wet materials in suitable watertight haulage vehicles.

6 Equipment Fuelling, Maintenance and Storage

.1 Procedures for interception and rapid clean-up and disposal of fuel spillages shall be submitted to Consultant for review prior to starting Work.

.2 Ensure that materials required for clean-up of fuel spillages are readily accessible on Site at all times.

.3 Carry out refueling of equipment at acceptable refueling areas.

.4 Ensure that water used for cleaning of equipment does not drain into streams, lakes or watercourses. Do not empty fuel, lubricants and/or pesticides into any watercourse, or on ground.

.5 Clean Construction Equipment prior to entering public roadways to prevent littering. Debris from cleaning equipment shall not be permitted into storm sewers or watercourses.

.6 Store equipment and materials in orderly manner and in location acceptable to Consultant.

7 Spills Reporting

.1 In event of spill or other emission of pollutant into natural environment, notify:

.1 Local office of the Ministry of Environment and MOE Spill Action Centre (SAC).

.2 Municipality or regional municipality within boundaries of which spill occurred.

.3 Person having control of pollutant, if known, of spill, of circumstances surrounding the spill and of any action taken or intended to be taken.

8 Plan for Control and Clean-Up of Spill.

.1 Ensure immediate availability of Products with which to effect temporary repair to broken pipelines and other services so spill or other emission of pollutant is immediately controlled and stopped and to mitigate damages.

End of Section

1 PROPOSED EQUIVALENT PRODUCTS

.1 Whenever a material or article is specified or described by using the name of a proprietary Product or the name of a particular manufacturer or Vendor, the specific item mentioned shall be understood as establishing type, function, dimension, appearance, and quality of Product desired.

.2 The words "or accepted equal", “or accepted equivalent” and “or accepted alternative” as used in the Specifications are to be regarded as synonymous in meaning, and are applicable to all Specifications unless specifically stated otherwise. Any material, Product, or equipment which will fully perform or meet the service or function and/or aesthetics represented by a specified Product will be considered for acceptance as a "substitution", provided the Contractor submits proof that such material, Product or equipment is of acceptable equivalent substance and function and is accepted by the Owner. The burden of proof of acceptability rests with the Contractor.

2 PROPOSED SUBSTITUTIONS

.1 Requests for substitutions must be submitted in writing using Section 01 62 01 Substitution Request Form.

.2 The net cost of proposed substitution, weighed versus the cost of review, will be a factor in the Owner’s final decision.

.3 Contractor is responsible to determine suitability of accepted substitute Products for general construction purposes and scheduling requirements.

.4 Acceptability of proposed substitutions is at the sole discretion of the Owner. The Owner however, is under no obligation to consider any or all proposed substitutions. Acceptance of substitutions shall in no way be interpreted as a waiver from full compliance with other Specification requirements.

.5 Contractor shall declare that such substitution will fit within all constraints of the intended location and operating system in the Work without modification, or clearly described and defined modification, to allied specified systems, materials or assemblies.

.6 Contractor shall save harmless the Owner, Consultant and their Subconsultants from any costs or third party action as a consequence of accepted substitution. Failure to comply with these requirements will result in rejection of the request.

3 NOTIFICATION OF ACCEPTANCE

.1 Materials and equipment accepted as substitutions will be formally notified to the Contractor by a Change Order, Supplementary Instruction (SI) or Shop Drawings, as the case may be.

End of Section

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Substitution Request Form (SRF) No.: _____ Date: _____

Project: _____

General Contractor: _____Subcontractor_____

Owner's Authorization: _____ Proceed (per _____)

1 General

.1 This section applies to proposed substitutions submitted after Contract award.

.2 Within two weeks of Contract award, the Consultant will receive requests for substitutions from General Contractor for consideration. Proposed substitutions received after the expiration of the specified period will be marked "substitution review expired" and returned to Contractor.

.3 Copy Owner on all substitution requests. The Owner will forward authorized substitution requests to Consultant by email. Consultant will not proceed with review without Owner's authorization.

.4 For the Consultant's services in reviewing submittal, pay a fee of $180.00/hour plus HST, minimum three hours or $540.00, per proposed substitution.

.5 Upon receipt of request, the Consultant will assess time required to review. If up to three hours is required, the Consultant will email Contractor and the Contractor will acknowledge by return email, authorizing the Consultant to proceed.

.6 If the Consultant requires additional time above the three hours, Consultant will email Contractor with proposed additional hours with a proper breakdown for Contractor's consideration. Contractor shall send an email response accepting the proposed budget to authorize Consultant to do the review.

.7 The Consultant will complete its review and submit a response back to Contractor in a timely manner.

.1 If accepted, a Change Order or Supplementary Instruction is issued.

.8 Whether rejected or accepted, the Consultant will invoice Contractor for the cost of the review, with a copy of the Contractor's email confirmation attached to the invoice.

.9 The Owner is under no obligation to consider any or all proposed substitutions.

.10 For substitutions where cost savings are proposed the cost saving amount proposed by the Contractor will be reduced by the cost for the review.

.11 Contractor shall declare that such substitution will fit within all constraints of the intended location and operating system in the Work without modification, or clearly described and defined modification, to allied specified systems, materials or assemblies. The proposed substitute shall be equal to or superior to the specified item as determined by Consultant.

.12 Save harmless the Owner, Consultant and their Subconsultants from any costs or third party action as a consequence of accepted substitution. Failure to comply with these requirements will result in rejection of the request.

.13 Any system, Product or material utilized without acceptance from the Consultant shall be removed from the Work, and replaced with complete installation of those specified without adjustment of Contract Price or Contract Time.

2 Details of Substitution Request

.1 Specified Product

.1 Section Number: _____

.2 Section Title: _____

.3 Paragraph Number: _____

.2 Proposed Substitution

.1 Manufacturer: _____

.2 Trade Name or Model Number: _____

.3 Manufacturer's Address: _____

.4 Contact Person: _____

.5 Phone No.: _____ Email: _____

.3 Product History

.1 ☐ New ☐ 2 to 5 yrs old ☐ 5 to 10 yrs old ☐ more than 10 yrs old

.2 Similar Installations:

.3 Project Name: _____

.4 Address: _____

.5 Consultant: _____

.6 Owner: _____

.7 General Contractor: _____

.4 Proposed Product Affects Other Parts of Work?

.1 ☐ No ☐ Yes

.2 If "Yes", explain:

_____
_____
_____
_____

.5 Differences between proposed substitution and specified Product:

_____
_____
_____

_____
_____

.6 Reason for not providing specified Product (substitution requests are considered under any of the following conditions only. Indicate conditions with a check (√) mark):

.1 ☐ Product(s) selected from those specified is/are unavailable.

.2 ☐ Method(s) specified is/are too intricate.

.3 ☐ Delivery date of Product(s), selected from those specified would unduly delay completion of Contract.

.4 ☐ Method(s) specified would unduly delay completion of Contract.

.5 ☐ Proposed substitute Product(s) or system(s) will result in a meaningful credit to the Contract Price.

.7 Change to Contract Price

.1 Add/Deduct $ _____ (_____)

.8 Change to Contract Time

.1 Add/Deduct _____ days

.9 Contractor's Declaration:

.1 Proposed substitution has been fully investigated and determined to be equivalent or superior in all respects to specified Product, and complies with requirements of authorities having jurisdiction.

.2 Same warranty will be furnished for proposed substitution as for specified Product.

.3 Cost data as stated above is complete. Claims for additional costs related to accepted substitution which may subsequently become apparent are to be waived.

.4 Proposed substitution does not affect dimensions and functional clearances.

.5 Proposed substitution is compatible with adjacent materials and assemblies.

.6 Coordination, installation, and changes in the Work as necessary for accepted substitution will be the responsibility of the Contractor.

Signed By Contractor: _____

Supporting Data Attached: ☐ Drawings ☐ Product Data ☐ Samples ☐ Reports ☐ Other

3 Consultant's Review

.1 Substitution Accepted - Provide submittals per Specification requirements.

.2 Substitution Not Accepted.

.1 Reason: _____

Signed By Consultant: _____Date _____

End of Form

1 General

1.1 **REQUIREMENTS INCLUDED**

.1 Product quality, availability, storage, handling, protection, handling on Site.

.2 Manufacturer's instructions.

.3 Workmanship, coordination, cutting, fastenings.

.4 Existing facilities.

2 Products

2.1 **QUALITY**

.1 Products, material, equipment and articles (referred to as Products throughout the Specifications) incorporated in the Work shall be new, not damaged or defective, and of the best quality, compatible with Specifications for the purpose intended.

.1 If requested, furnish evidence as to type, source and quality of Products provided.

.2 Defective Products, whenever identified prior to the completion of Work will be rejected, regardless of previous inspections. Inspection does not relieve responsibility, but is a precaution against oversight or error. Remove and replace defective Products at own expense and be responsible for delays and expense caused by rejection.

.3 Should any dispute arise as to the quality or fitness of Products, the decision rests strictly with the Consultant based upon the requirements of the Contract Documents.

.4 Unless otherwise indicated in the Specifications, maintain uniformity of manufacture for any particular or like item throughout the building.

.5 Permanent labels, trademarks and nameplates on Products are not acceptable in prominent locations, except where required for operating instructions, or when located in mechanical or electrical rooms as approved by the Consultant.

2.2 **AVAILABILITY**

.1 Immediately after award of Contract, review Product delivery requirements and anticipate foreseeable supply delays for any item. If delays in supply of Products are foreseeable, notify the Consultant of such, in order that substitutions or other remedial action may be authorized in sufficient time to prevent delay in performance of Work.

.2 In the event of failure to notify the Consultant at commencement of Work and should it subsequently appear that Work may be delayed for such reason, the Consultant reserves the right to substitute more readily available Products of similar character at no increase in Contract Price.

.3 Utilize Canadian materials and Products if available and equivalent in price and quality.

2.3 **STORAGE, HANDLING AND PROTECTION**

.1 Handle and store Products in a manner to prevent damage, deterioration and soiling and in accordance with manufacturer's instructions where applicable.

.2 Store packaged or bundled Products in original and undamaged condition with manufacturer's seals and labels intact. Do not remove from packaging, crating or bundling until required in the Work.

.3 Store Products subject to damage from the elements, in weatherproof enclosures.

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

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

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

.7 Store and mix paints in a heated and ventilated room. Remove oily rags and other combustible debris from Site daily. Take every precaution necessary to prevent spontaneous combustion.

.8 Remove and replace damaged Products at own expense and to the satisfaction of Consultant.

2.4 **TRANSPORTATION**

.1 Pay costs of transportation of Products required in the performance of Work.

.2 Transportation cost of Products supplied by the Owner and delivered to Site will be paid for by the Owner.

.1 Contractor shall unload, handle and store such Products.

2.5 **MANUFACTURER'S INSTRUCTIONS**

.1 Unless otherwise indicated in the Specifications, install or erect Products in accordance with manufacturer's instructions. Do not rely solely on labels or enclosures provided with Products.

.2 Obtain written instructions directly from manufacturers.

2.6 **ALTERNATIVE MATERIALS**

.1 Purchased items or materials must meet the requirements of the Specifications. Be responsible for all costs for any modifications required for use of such items.

.2 To receive approval of substitution, the proposed substitute shall be equal to or superior to the specified item. Requests for substitution shall be accompanied by documentary proof of equality and difference in price and delivery.

.3 Submit request to the Consultant in writing and provide all technical data, samples and other information requested. No substitution shall be made without the written authority of the Consultant whose decision shall be final.

.4 Products shall be applied, installed, connected, erected, cleaned and conditioned in accordance with the manufacturer's instructions or directions, unless specified to the contrary elsewhere in the Contract Documents.

.5 Assume responsibility for any additional material or installation costs resulting from the approved use of equivalent materials or equipment.

2.7 **EXPEDITING**

.1 The Contractor shall submit, when requested by Consultant, an updated material procurement/expediting record indicating clearly the status of material delivery and fabrication. Particulars to be covered by this record shall include the item identification, sub-vendor, order date, order number, Shop Drawing submission date(s) and review date(s), required delivery date, promised delivery date, date received, date checked and general remarks.

.2 The Contractor shall accumulate and submit similar records from (assigned) Subcontractors and shall ensure that Subcontractors are properly and frequently expediting all equipment and material to meet delivery deadlines to suit installation schedule.

.3 The Contractor shall allow the Owner, Consultant, or their representative free access to the Contractor's plant and to Subcontractor's plants for visual inspection of allotted material and/or progress of the Work.

3 Workmanship

3.1 **GENERAL**

.1 Workmanship shall be of the best quality, executed by workers experienced and skilled in the respective duties for which they are employed. Immediately notify the Consultant if required Work is such as to make it impractical to produce required results.

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

.3 Decision as to the quality or fitness of workmanship in cases of dispute rests solely with the Consultant whose decision shall be final.

.4 Whenever possible, give preference to the use of local labour. Establish rates of wages, and hours of work in accordance with provincial regulations and as generally recognized and accepted in the locality.

3.2 **CO-ORDINATION**

.1 Ensure co-operation of workers in laying out Work. Maintain efficient and continuous supervision.

.2 Be responsible for coordination and placement of openings, sleeves and accessories.

3.3 **CUTTING AND REMEDIAL WORK**

.1 Perform cutting and remedial Work required to make the parts of the Work come together.

.1 Coordinate the Work to ensure this requirement is maintained.

.2 Should Work performed outside this Contract necessitate cutting and/or remedial Work to be performed, the cost of such Work will be valued by the Consultant.

.3 Perform cutting and remedial Work by specialists familiar with the materials affected. Perform in a manner to neither damage nor endanger any portion of Work.

3.4 **FASTENINGS**

.1 Provide metal fastenings and accessories in same texture, colour and finish as adjacent material unless indicated otherwise.

.2 Prevent electrolytic action between dissimilar metals and materials.

.3 Use non-corrosive hot dipped galvanized steel fasteners and anchors for securing exterior Work, unless stainless steel or other material is specifically requested in the affected Specification section.

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

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

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

3.5 **PROTECTION OF WORK IN PROGRESS**

.1 Adequately protect Work completed or in progress. Work damaged or defaced due to failure in providing such protection is to be removed and replaced, or repaired, as directed by the Consultant, at no increase in Contract Price.

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

3.6 **EXISTING UTILITIES**

.1 Connect to existing services or utilities at times directed by Owner or local governing authorities, with a minimum of disturbance to Work, building occupants, pedestrian and vehicular traffic.

.2 Protect and maintain existing active services. When inactive services are encountered cap off in a manner approved by authority having jurisdiction and stake or otherwise record location of capped service.

End of Section

1 General

1.1 **SUMMARY**

.1 Section Includes

.1 Labour, Products, equipment and services necessary to complete the Work of this section.

1.2 **REFERENCES**

.1 MTRCA - Metro Toronto Region Conservation Authority

1.3 **GEOTECHNICAL INVESTIGATION**

.1 Refer to the geotechnical documents which accompany the Specifications. The contaminated soil is described therein.

2 Products

Not applicable.

3 Execution

3.1 **DISPOSAL OF UNCONTAMINATED MATERIAL**

.1 This clause applies to the disposal of "Reusable Fill".

.2 "Reusable Fill" is defined as soil which meets the guidelines for commercial/industrial land use, as specified in the latest edition “Guidelines for the Decommissioning and Clean-Up of Sites in Ontario” published by the Ministry of the Environment and Energy, Ontario.

.3 Select appropriate disposal or reuse sites, and all surplus soils and other materials at such sites. The Contractor may elect to use the Keele Valley landfill site located at Maple, Ontario.

.4 Submit to the Consultant for approval, details of all locations where surplus soils and other materials are to be disposed of or reused. Include for each disposal/reuse site and type of surplus soil or other material the following information:

.1 Location of the disposal/reuse site

.2 The operator's name and business address

.3 Type of license under which the site operates

.4 Criteria used by the site to access the suitability of the surplus material for disposal

.5 If Contractor proposes to dispose of reusable fill as cover material to the Keele Valley or Brock West landfill sites, the Contractor shall be responsible for confirming with the landfill operators the quantity of reusable fill that the latter will accept, and the rate at which fill will be accepted.

.6 Within forty-eight hours of a load of surplus soil or other material leaving the Site, submit to Consultant waybills or other documentation recording the time and place of disposal/ reuse of that load of surplus soil or other material.

.7 The results of the soil testing carried out prior to the award of Contract are provided in the geotechnical documents. Carry out any further testing required, as a condition of disposal/reuse, by the operators of the disposal/reuse sites.

.8 Where soil contains construction rubble, roots or organic materials, separate the soil from the rubble by sieving or other approved means.

.9 If the Contractor proposes to dispose of reusable fill as lakefill, the Contractor shall be responsible for obtaining bills of lading from the lakefill site operator. All of the tested soil showing exceedance for one or more parameters of the MTRCA lakefill criteria, and no reusable fill shall be disposed of as lakefill unless the MTRCA accepts the reusable fill as suitable for lakefill.

.10 Reusable fill may be rejected as lakefill because of excessive water content (based on the slump test). Such a rejection shall not be considered a basis for changing the designation of the material as reusable fill.

3.2 **DISPOSAL OF CONTAMINATED WASTE MATERIAL**

.1 This clause applies to excavated "Waste".

.2 "Waste" is defined as that material which does not meet the criterion for reusable fill given above, and which would not be classified as construction rubble or topsoil. Waste material is subdivided into three classifications depending on the results of acid leach tests carried out in accordance with the Ontario Environmental Protection Act, Regulation 347 Leachate Quality Criteria, Ontario Ministry of the Environment and Energy, 1993. Two waste classifications are given below.

.1 "Non-hazardous, Non-registerable Waste": Material where the leachate concentrations are less than ten times the values given in Schedule 4 of Regulation 347.

.2 "Non-hazardous, Registerable Waste": Material where the leachate concentrations are between ten and one hundred times the values given in Schedule 4 of Regulation 347.

.3 If there is any visual or other indication that a waste is encountered, immediately inform the Consultant. Stockpile material suspected of being a waste on Site to allow further testing by the Consultant. Chemical test results obtained by the Consultant will be forwarded to the Contractor.

.4 Remove waste from the Site in accordance with provincial regulations.

.5 The application of the "Guidelines for Decommissioning and Clean-Up Sites in Ontario" is subject to interpretation of the following parameters. Soil which is reused as a lakefill, backfill, or as landfill cover shall not be considered as waste and shall only be disposed of as waste if it is not acceptable to reuse it.

.6 Sections 3.9.2 to 3.9.5 inclusive noted in the above guidelines also apply to this section.

End of Section

1 General

1.1 **SUMMARY**

.1 Section Includes

.1 Labour, Products, equipment and services necessary to complete the Work of this section.

1.2 **REFERENCES**

.1 Conform to the latest edition of the following:

.1	ASTM D698	-	Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort
.2	CSA-A23.1	-	Concrete Materials and Methods of Concrete Construction
.3	CSA-G401	-	Corrugated Steel Pipe Products
.4	CSPI	-	Corrugated Steel Pipe Institute
.5	MOE	-	Ministry of the Environment of Ontario
.6	OPSS 180	-	General Specification for the Management of Excess Materials
.7	OPSS 212	-	Construction Specification for Borrow
.8	OPSS 421	-	Construction Specification for Pipe Culvert Installation in Open Cut
.9	OPSS 510	-	Construction Specification for Removal
.10	OPSS 1004	-	Material Specification for Aggregates - Miscellaneous
.11	OPSS 1010	-	Ontario Provincial Standard Specification, Material Specification for Aggregates - Base, Subbase, Select Subgrade, and Backfill Material

1.3 **GEOTECHNICAL INVESTIGATION**

.1 Geotechnical investigation of the Site was carried out for the Owner as a guide in design and construction. A report and borehole logs on the investigation were prepared and are bound into the Specifications.

.2 No responsibility is assumed by the Owner or Consultant for the scope, accuracy, or interpretation of the geotechnical investigation report. Soil conditions between boreholes may be at variance with the information shown on the soil investigation report.

.3 Be responsible for including in the Work, costs for all conditions identified or inferred in the report, including disposal of contaminated materials, if any, in accordance with MOE regulations.

1.4 **LINES AND LEVELS**

.1 Establish lines and elevations from existing lines and elevations shown on Drawings.

.2 Have lines and levels established by a registered Ontario land surveyor or a qualified registered Civil Engineer.

1.5 **SUBMITTALS**

.1 Submit a certificate issued by fill Supplier to substantiate that fill materials are free of contaminants.

1.6 **SITE ACCESS CLEANING**

.1 Keep site access clear of mud, debris and dirt resulting from work of this section.

1.7 **QUALITY ASSURANCE**

.1 Testing and Inspection

.1 Be responsible for granular/soil materials, placing and compaction throughout the Work of this Contract, as it progresses and on completion, to ensure specified materials, placing and required compaction densities are obtained.

.2 Owner may appoint a third party independent testing company at its own expense for checking or approval of the Contractor's material placing and compaction work. Pay charges for re-testing after making good defective areas. Coordinate construction schedule with Consultant so that Owner's testing company can be notified in advance.

.3 Provide the following and pay for all associated costs as part of the Contract:

.1 Retain an independent, well established and qualified commercial testing agency to, a) maintain field quality control operations such as compaction tests, and, b) perform material testing in the laboratory and prepare test reports and other submittals. Testing agency shall have enough personnel and resources to perform a) and b) in a timely manner.

.2 The testing agency personnel shall be qualified and have had experience on projects equal to the complexity of this Project. Upon request from the Owner, submit qualifications of the testing agencies and include their personnel for approval prior to retaining either one of the agencies.

.3 The Owner reserves the right to request change in personnel or testing agency at any time.

.4 Submit proposed material, including off-site borrow material, to the testing agency for its analysis and report, in sufficient time so as not to delay the progress of the Work. The testing agency shall approve all fill material prior to placement and shall observe placement to ensure lift thickness is as specified.

.5 Testing agency shall submit, in duplicate, test report which includes tests, investigations, findings and recommendations to the Contractor and to the Owner, within twenty-four hours of the tests.

.6 For field quality control of operations, testing agency shall determine the compaction of material placed and shall conduct the following minimum number of in-place density tests after monitoring the placing and compacting of each lift.

.1 Pavement subgrade: One test per final lift (subgrade) of fill or backfill for each 500 square metres, both after compaction and before base construction.

.7 If compaction tests indicate that a layer has not been brought to the required compaction, re-compact the area, prior to placement of additional material, until the required compaction is obtained. If the layer has been covered by a subsequent operation, remove such material before re-compacting the defective layer.

.4 Submit a testing and inspection program to account for all the items specified above. Submit to the Consultant at pre-construction meeting or prior to start of construction.

1.8 **PROJECT CONDITIONS**

.1 Cultural Heritage Resources

.1 If cultural heritage resources (such as archaeological sites, artifacts, building and structural remains, and/or human burials) are encountered during performance of Work, contact Consultant immediately and suspend Work in immediate area until assessment has been completed by Ministry of Culture, Tourism and Recreation. Perform required measures to mitigate negative impacts on found resources to acceptance of Consultant.

.2 Existing Buried Utilities and Structures

.1 Prior to commencing excavation, establish locations of existing buried service installations in the construction area. Notify service owners and obtain their approval to work in such areas. Place adequate markers and take protective measures to ensure that no damage is caused under the work of this section. Repair damaged work as required at no change in Contract Price.

.2 Temporarily cover local existing catchbasins and manholes exposed to construction traffic to prevent entry of earth or debris.

.3 Excavations

.1 Erect necessary hoardings, guardrails, markers; place temporary warning lights; take all other measures required to ensure that no damage or injury is caused to persons, or damage to property resulting from this work.

.2 Protect excavations and maintain warning devices during construction and during time when work is closed down for any cause.

.4 Other Contracts, Existing Buildings and Surface Features

.1 Protect work of other trades or of other contracts in progress or completed and protect Owner's existing properties, stored Products, services and utilities from damage.

.5 Environmental Requirements

.1 Dust control: Prevent any nuisance caused by dust and dirt rising throughout the area of operations with an adequate dust control system acceptable to the Consultant. Maintain system for the duration of the Work.

.2 Silt control: Prevent silt from entering any storm drainage system with an adequate silt control system acceptable to the Consultant. For the duration of the work, maintain system on a regular basis and after rainfall by removing trapped silt and re-aligning and re-staking control system as required.

.6 Existing Drainage

.1 Maintain existing drainage during construction. Manage the overland flows so as not to impact the existing flows from adjoining properties during construction.

2 Products

2.1 **MATERIALS**

.1 Granular materials - general: New materials conforming to OPSS 1010, imported from off-site, and sourced from a member of the Aggregate Producers Association of Ontario. Note: The use of slag and recycled aggregates is prohibited.

.2 Granular surfacing material: New Granular "A" material manufactured from crushed limestone.

.3 Clear stone: 20 mm conforming to OPSS 1004.

.4 Select fill: Native excavated site material approved by Consultant and capable of being compacted to required density and free of:

.1 Any vegetable or organic matter and roots

.2 Cinders or ashes

.3 Building debris

.4 Rocks and stones larger than 75 mm

.5 Geosynthetic filter cloth: Non-woven filter cloth; Terrafix Type 270R.

.6 Geogrid: internally formed grid structure of stress resistant polypropylene. Tensar type TriAx TX7.

.7 Pipe subdrains and granular bedding, surround and backfill: 1.32 mm (18 gauge), round perforated pipe, helically corrugated, galvanized steel conforming to CSA-G401 and CSPI Specification 501, complete with geotextile knitted sock. New granular material conforming to CSA-A23.1, Table 11, Group 1, 20-5 mm.

2.2 **STOCKPILING OF GRANULAR MATERIALS**

.1 Stockpile materials in a manner to prevent segregation.

.2 Protect materials from contamination.

.3 Separate different aggregates by strong, full depth bulkheads, or stockpile far enough apart to prevent intermixing.

.4 Do not use intermixed or contaminated materials. Remove and dispose of materials rejected by Consultant within forty-eight hours of rejection.

.5 Stockpiling sites to be level, well drained, and of adequate bearing capacity and stability to support stockpiled materials and handling equipment.

3 Execution

3.1 **GRADING**

.1 Grade to levels, profiles and contours indicated on Drawings or required depth of granular fill to be added to provide new finish elevations.

.2 Grade for drainage ditches for roads and railroads and elsewhere throughout the site.

.3 Graded areas shall be smooth to profile, free of debris, with local excavations and depressions filled and compacted as specified hereunder.

.4 Supply additional material required to obtain new grade levels.

.5 Maintain positive drainage.

.6 Remove surface debris, roots, vegetation, branches and stones in excess of 50 mm2” in size.

.7 Provide roundings at top and bottom of banks and at other breaks in grades.

.8 Do not disturb soil within branch spread of trees and shrubs remaining.

.9 Excavate existing subsoil from on-site as required to obtain design grades. Transport, grade and compact approved earth borrow material as required for use as fill over areas indicated. Compact to 98% standard proctor maximum dry density.

3.2 **FILL**

.1 Compact exposed sub-grade prior to placing any fill. Compact areas inaccessible to roller with portable mechanical tampers. Have Soils Consultant accept compacted sub-grade. Remove any soft spots prior to placing any fill material.

.2 Remove loose materials, debris, etc., from areas to receive fill.

.3 Place material only on clean unfrozen surface, properly shaped and compacted and free from snow and ice. Ensure no frozen material is used in placing.

.4 Fill areas receiving pavement with compacted courses of granular base and granular sub-base.

.5 Place granular fill in loose layers not exceeding 200 mm, with each layer thoroughly compacted.

.6 Grade materials using methods which do not lead to segregation or degradation of aggregate.

.7 Shape each layer to smooth contour and compact to specified density before succeeding layer is placed.

.8 Remove and replace that portion of layer in which material becomes segregated during spreading.

3.3 **GEOGRID**

.1 Place geogrid material by unrolling onto graded surface in accordance with manufacturer's instructions and to elevations and locations as indicated on drawings.

.2 Overlap successive strip of geogrid as per manufacturer's instructions or 300 mm over previously laid strips.

.3 Join strips of geogrid with wire ties , plastic ties or hooks or as per manufacturers recommendations.

3.4 **TRENCHING FOR CORRUGATED PIPE**

.1 Excavate pipe trenches to a minimum depth of 75 mm below invert elevation and slope established for the pipe.

.2 Place filter cloth in the pipe subdrain trench and wrap around the granular bedding and surround after placing of same.

.3 Refill to the invert elevation of the pipe with specified granular bedding material to a compacted depth of 75 mm.

.4 Compact bedding and grade as required to provide even and constant support on each length of pipe.

.5 If unstable soil conditions are encountered, excavate trenches to a depth directed by Consultant and then backfill to proper elevation with backfill material.

3.5 **CORRUGATED PIPE INSTALLATION**

.1 Lay in clean, dry trenches, with particular care being taken to prevent twigs, stones or other foreign matter from entering pipe. Cap or plug open end of pipe at all times during which work is not in progress to protect ends from damage and to prevent ingress of foreign material.

.2 Lay in true alignment and with constant grade to the required elevations. Make joints in accordance with manufacturer's printed instructions, and all fittings or couplings carefully embedded to ensure constant support of entire length of the pipe.

.3 Connect pipe subdrain into points of discharge.

.4 Grades and elevations for pipe subdrain are not shown on Drawings. Unless otherwise indicated, lay pipe subdrain parallel to grades on roads, with minimum slope recommended by manufacturer.

.5 After installation of pipe subdrain, and following inspection by Consultant, place bedding and surround material simultaneously 75 mm minimum on both sides, and up to top of pipe. Hand tamp to consolidate fill, exercising care to prevent displacement of pipe. Backfill over piping with same material in 150 mm deep layers. Compact each layer. Backfill to levels shown.

.6 Check and test pipe subdrain installations thoroughly for proper drainage function, to ensure falls are correct and connections complete, before backfill material is placed. Carry out such testing in the presence of Consultant (and applicable authorities having jurisdiction;) obtain approval for various areas as work progresses.

.7 Remove wood blocks or wedges used to prevent movement of piping during tests, prior to backfilling of trenches.

3.6 **COMPACTION**

.1 Use compaction equipment capable of obtaining required material densities.

.2 Compaction Densities

.1 Granular materials: To 100% modified proctor maximum dry density in accordance with ASTM D1557.

.2 Earth subgrade and select fill: To 98% standard proctor maximum dry density in accordance with ASTM D698.

.3 Shape and roll alternately to obtain smooth, even and uniform compaction.

.4 Apply water as necessary during compaction to obtain specified density.

.5 In areas not accessible to rolling equipment, compact to specified density with power operated portable plate compactors.

.6 Depth and layers specified are minimum dimensions of fill after compaction, except where loose layer is specified.

.7 Ensure compaction operations do not cause vibration and noise levels exceeding acceptable limits established by authorities having jurisdiction.

3.7 SURPLUS MATERIALS

.1 Remove from the site and legally dispose of, excess excavated material, waste material, trash, debris and rubble resulting from earthwork operations.

.2 Be responsible for obtaining all necessary regulatory approvals, consents and permits at own cost.

End of Section

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1 General

1.1 **SUMMARY**

.1 Section Includes

.1 Labour, Products, equipment and services necessary to complete the Work of this section.

1.2 **REFERENCES**

.1 Canadian Council of Ministers of the Environment (CCME).

.1 CCME PN1055, Environmental Code of Practice for Underground Storage Tank Systems Containing Petroleum Products and Allied Petroleum Products.

.2 Department of Justice Canada (Jus).

.1 Canadian Environmental Assessment Act (CEAA), 1992, c. 37.

.2 Canadian Environmental Protection Act (CEPA), 1999, c. 33.

.3 SOR/2003-2, On-Road Vehicle and Engine Emission Regulations.

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

.3 Underwriters' Laboratories of Canada (ULC).

.1 ULC/ORD-C107.19, Secondary Containment of Underground Piping.

.2 ULC/ORD-C58.15, Overfill Protection Devices for Underground Tanks.

.3 ULC/ORD-C58.19, Spill Containment Devices for Underground Tanks.

.4 Ministry of the Environment of Ontario

.5 Occupational Safety and Health Act; Ministry of Labour of Ontario

.6 Local municipal by-laws

1.3 **PROJECT CONDITIONS**

.1 Site Visit

.1 Visit the Site and determine the work extent and nature of existing conditions. In no circumstances will any claims against the Owner be allowed resulting from failure to ascertain the work herein described or implied.

.2 Report to Consultant, in writing, any conditions which will prejudice the proper completion of the Work. Commencement of Work constitutes acceptance of existing conditions.

.3 It must be noted that soil conditions between boreholes may be at variance with the information shown on borehole data. Borehole data is issued for information only.

1.4 **SUBMITTALS**

.1 Hazardous materials: Provide description of hazardous materials and notification of filing with proper authorities prior to beginning Work, as required.

.2 Certificates: Submit copies of weigh bills receipts from authorized disposal sites and reuse and recycling facilities for material removed from site upon request of Consultant.

1.5 **DELIVERY, STORAGE AND HANDLING**

.1 Waste Management and Disposal

.1 Divert excess materials from landfill to site approved by Consultant.

.2 Source separate for recycling materials that cannot be salvaged for reuse including wood, metal, concrete and asphalt, and gypsum.

.3 Remove materials that cannot be salvaged for reuse or recycling and dispose of in accordance with applicable codes at licensed facilities.

1.6 **SITE CONDITIONS**

.1 Site Environmental Requirements

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

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

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

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

.4 Control disposal or runoff of water containing suspended materials or other harmful substances as directed by Consultant.

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

1.7 **ACCESS ROADS**

.1 Maintain access roads used for hauling operations clean and as required by municipal authorities.

2 Products

2.1 **NOT APPLICABLE**

3 Execution

3.1 **DEMOLITION/REMOVALS**

.1 Break out and remove existing asphalt pavement within the confines of the work. Prior to breaking out, saw cut cut-off point to avoid damage to remaining pavement.

.2 Plug and abandon pipes where indicated.

3.2 **PROTECTION**

.1 Establish locations of service installations existing in the areas of work and obtain service Owners' approval to work in such areas. Provide adequate markers or take protective measures to ensure that no damage is caused under the work of this section. Repair damaged Work as required without cost to Owner.

.2 Notify Consultant and obtain clearance to proceed prior to commencement of Work.

.3 Temporarily cover existing catchbasins and manholes exposed to construction traffic to prevent entry of earth or debris.

.4 Provide all necessary hoardings, guardrails, markers, including temporary warning lights, or other means required, to ensure that no damage, injury or death is caused to persons or damage to property resulting from this work.

.5 Protect existing trees, shrubs, and plants to remain.

.6 Protect the work of other Contracts in progress or completed and protect the Owner's properties, stored Products, services and utilities from damage.

3.3 **ENVIRONMENTAL REQUIREMENTS**

.1 Dust control: Provide and maintain, to the Consultant's satisfaction, adequate system to avoid any nuisance caused by dust and dirt rising throughout the area of operations.

.2 Silt control: Provide and maintain, to Consultant's satisfaction, control systems to prevent silt from entering any storm drainage system.

3.4 **RESTORATION**

.1 Restore areas and existing works outside areas of demolition to match condition of adjacent, undisturbed areas at no extra cost to the Contract.

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

3.5 **CLEANING**

.1 Remove debris, trim surfaces and leave Work Site clean upon completion of work.

.2 Use cleaning solutions and procedures that are not harmful to health, are not injurious to plants, and do not endanger wildlife, adjacent watercourses or ground water.

3.6 **DISPOSAL OF WASTE AND SURPLUS MATERIALS**

.1 Except where specified or indicated on Drawings to be retained on site for reuse, remove from the site and legally dispose of, all waste and surplus materials resulting from Site preparation work on a daily basis.

End Of Section

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1 General

1.1 **SUMMARY**

.1 Section Includes

.1 Labour, Products, equipment and services necessary to complete the Work of this section.

1.2 **REFERENCES**

.1 Conform to the latest edition of the following:

.1	ASTM A500	-	Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes
.2	ASTM A820	-	Standard Specification for Steel Fibres for Fibre-Reinforced Concrete
.3	ASTM C260	-	Standard Specification for Air-Entraining Admixtures for Concrete
.4	ASTM C309	-	Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete
.5	ASTM C494	-	Standard Specification for Chemical Admixtures for Concrete
.6	ASTM C881	-	Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete
.7	CAN/CGSB 1.59	-	Alkyd Exterior Gloss Enamel
.8	CSA-A5	-	Portland Cements SUPERSEDED BY A3000-03
.9	CSA-A23.1/A23.2	-	Concrete Materials and Methods of Concrete Construction/Test methods and Standard Practices for Concrete
.10	CAN/CSA G30.18-M	-	Billet-Steel Bars for Concrete Reinforcement
.11	CSA G30.15-M	-	Welded Deformed Steel Wire Fabric for Concrete Reinforcement

1.3 **SUBMITTALS**

.1 Submit Shop Drawings in accordance with Section 01 33 00.

.2 Submit as Shop Drawings, Product data, performance and other criteria for each material specified in this section that is proposed for use, including:

.1 Admixtures

.2 Joint filler

.3 Joint sealant

.4 Curing compound

.3 Submit Shop Drawings of joint assemblies. Draw to a scale not smaller than 1:50 and include plans, sections and details.

.4 Concrete Supplier's latest statistical analysis of all concrete mixes to be used on this Project.

1.4 **QUALITY ASSURANCE**

.1 Testing and Inspection

.1 Work will be inspected and tested for conformance to CSA-A23.1 an independent inspection company selected and paid for by Owner.

.2 Notify Consultant at least twenty-four hours in advance of placing concrete to permit inspection of formwork, reinforcing, bearings, etc.

.3 Tests include the following:

.1 Obtaining verification of cement

.2 Tests of reinforcing

.3 Tests of aggregate

.4 Verification of steel fibre content

.5 Tests of setting mixes and design of mix

.4 Tests will be made in accordance with CSA-A23.2.

.5 Inspection company's reports of tests will be forwarded to Consultant and to Contractor with an opinion or reason for any abnormalities noted thereon.

.6 Cooperate with and assist inspection company's personnel during inspections and tests.

.7 Remove defective materials and completed work which fail tests and replace as directed by Consultant.

.8 Where work or materials fail to meet strength requirements as indicated by test results, the costs of additional inspection and testing required for the new replacement work or materials.

1.5 **PRODUCT DELIVERY, STORAGE AND HANDLING**

.1 Store materials on site in a manner to prevent damage. Protect from the weather. Comply with CSA-A23.1, Clause 5.1.

.2 Protect the materials and work of this section from damage. Protect other work from damage resulting from this work. Replace damaged work which cannot be satisfactorily repaired.

2 Products

2.1 **MATERIALS**

.1 Portland cement: CAN/CSA-A3001 Normal, Type GU Portland cement, (Moderate Type MSb - Mild Exposure) (High Early Strength Type HE) (Sulphate Resistant Type HS).

.2 Coarse aggregate: CSA-A23.1, Clause 4.2.3.4 and Table 11, Group I, 20-5 mm, 100% crushed, in cubular size.

.3 Fine aggregate CSA-A23.1, Clause 4.2.3.3 and Table 10.

.4 Reinforcing steel: CAN/CSA G30.18-M, Grade 400.

.5 Reinforcing mesh: CSA G30.15-M, flat sheets. Rolls are not acceptable.

.6 Shrinkage control fibres: Bekaert "Dramix" steel fibres conforming to ASTM A820, Type 1, deformed, cold drawn galvanized steel wire; RC-65/60-CN with a tensile strength of 895 MPa.

.7 Water: CSA-A23.1, Clause 4.2.2.

.8 Forms: New Douglas Fir plywood, G1S for all exposed concrete. Rough T and G lumber or used G1S Douglas Fir plywood for surfaces which will be concealed.

.9 Tubular forms for lighting pole bases: Sonoco Products Ltd. "Sonotube" spirally wound fibre forms free of dents and other irregularities, treated internally with release material.

.10 Air entraining admixture: Conforming to ASTM C260; Master Builders, "Micro-Air", Euclid "Airextra", or Grace "Darex AEA EH"/Catexol AE360 (for low slump concrete).

.11 Water reducing admixture: Conforming to ASTM C494 Type A, Master Builders "Pozzolith 200N", Euclid "WR75", Grace "WRDA 20" or Axim “Catexol 1000N”.

.12 Pigmented curing compound: Conforming to ASTM C309, Type 2, Class B, white pigmented resin based, Master Builders "Promulsion 200", W.R. Meadows "Sealtight 1220", Euclid "Kurez E-40" or Dayton Superior "Day-Chem White Pigmented Cure (J-10)".

.13 Form ties: Adjustable snap ties, formed to break 25 mm or more from surface of concrete after form removal, with a minimum working strength of 13 kN. Wire ties will not be permitted.

.14 Formwork release agent: Imperial Oil "Filmo No. 40", W.R. Meadows "Duogard II", Euclid "Super Slip" or Dayton Superior "Clean Strip (J-1)".

.15 Premoulded joint filler: Asphalt impregnated, W.R. Meadows “Fibre Expansion Joint”, CPD "Flexcell" or approved equivalent. Furnish with 13 x 13 mm removable "tacked-on" strip in the formation of the joint, to provide for proper sealant depth after stripping.

.16 Chairs or spacers: Rigid type by Drummond and Reeves Ltd., Acrow Richmond or Superior Concrete Accessories.

.17 Hot-poured joint sealant (sawcuts): Premium quality rubberized compound, black colour:

.1 W.R. Meadows "Hi-Spec"

.2 Henry "590-13A"

.3 Hydrotech "6165"

.18 Bonding agent: Meeting ASTM C-881, Sika "Sika-Dur Hi Mod", or W.R. Meadows "Rezi-Weld 1000", Euclid "452 MV", Cappar "Capbond E" or Dayton Superior "Resi-Bond (J-58)".

2.2 **CONCRETE PROPORTIONS**

.1 Concrete to be ready-mixed and proportioned in accordance with CSA-A23.1, Clause 4.3.1, and as follows:

.1 Minimum allowable compressive strength at twenty-eight days: 32 MPa, unless otherwise noted or shown.

.2 Minimum cement content: 325 kg/m³.

.3 Slump at point of deposit: 60 mm maximum and 20 mm minimum.

.4 Add shrinkage control fibres into the slab mix in the truck on site at the specified dosage rate to the next highest half bag. Minimum dosage rate: 19 kg/m³.

.5 In no case shall the total amount of steel fibres added to each load of the ready mix concrete average less than the specified dosage rate.

.6 Add superplasticizer as required to both fibre reinforced concrete and plain concrete.

.7 Confirm mix design to ensure conformance with requirements specified herein.

.8 Air entrain all concrete work. Conform to CSA-A23.1, Clause 4.3.3, Table 4.

.9 Exposure classification: C-2 as defined in Table 2 of CSA-A23.1.

.2 Add admixtures to concrete mix in accordance with the manufacturer's recommendations.

.3 The use of calcium chloride or additional admixtures, other than those specified, is prohibited.

3 Execution

3.1 **EXAMINATION**

.1 Confirm that surfaces on which concrete is to be placed are free of frost, water and debris before placing concrete.

.2 Ensure that substrates are compacted and acceptable, and that reinforcement, inserts and all other built-in work are in place and secured before pouring concrete.

3.2 **FORMWORK**

.1 Construct formwork according to CSA-A23.1, except where shown otherwise. Ensure no lumber remains in concrete.

.2 Form for depressions and recesses required in concrete to receive all other work.

.3 Form 13 mm x 13 mm minimum chamfered edges on all exposed concrete corners.

.4 Forms may be removed any time after seven days from date of placing concrete or otherwise as directed by the Consultant. Remove forms in accordance with CSA-A23.1.

3.3 **PLACING**

.1 Place concrete to prevent layering and segregation and vibrate sufficiently to ensure thorough compaction, maximum density, and according to CSA-A23.1 Clause 6.8.5.4. Hand spade concrete adjacent to forms with metal spatulas.

.2 Before placing fresh concrete against set or partially set concrete, clean surfaces to remove dirt, scum, shavings, debris, laitance, etc. On set surfaces, brush generously with bonding agent.

.3 Check Work frequently with accurate instruments during concrete placing.

3.4 **CONCRETE FINISHING - GENERAL**

.1 For concrete mixes containing steel fibre reinforcement, ensure that finishing process leaves surface free of protruding fibres. If fibres protrude from surface after concrete has set, remove protruding fibres.

3.5 **CONCRETE CURBS**

.1 Unless shown otherwise, form to the applicable OPSD. Finish concrete surface to a broom finish. Round outside curb edges to radii shown. Do not dust neat cement onto freshly placed concrete to facilitate finishing.

.2 During pouring, properly vibrate concrete to prevent honeycombs.

.3 Provide transverse joints by sawcutting at intervals not exceeding 5.5 m and filling with backer rod and sealant. Provide premoulded joint filler to form expansion joints between curb and abutting concrete work, and other dissimilar structures.

3.6 **SIDEWALKS**

.1 Screed concrete sidewalks to required levels, with falls indicated, to tolerance of 6 mm in 3 m.

.2 Wood float and finally, steel float or trowel. Avoid excessive trowelling.

.3 Finish concrete with one directional screed and coarse broom finish.

.4 Form dummy joints 6 mm deep at 1.5 m o.c. Tool joints with 6 mm wide steel trowel, radiusing edges 6 mm.

.5 Form expansion joints at 6 m o.c., maximum.

.6 Tool edges of sidewalk with 50 mm wide steel trowel, radiusing edges 6 mm.

.7 Apply one coat of curing and sealing compound to surface immediately after final finishing in accordance with manufacturer's printed instructions.

3.7 **EXPANSION/ISOLATION JOINTS**

.1 Form expansion/isolation joints at building face or other abutments. Place 12 mm thick joint filler keeping top 12 mm below concrete surface.

3.8 **SEALANT**

.1 Remove tacked-on strip on top of joint filler.

.2 Apply kraft paper or polyethylene bond breaker over premoulded filler and fill with self-levelling sealant applied in accordance with manufacturer's printed instructions.

.3 Install sealant in sawcut joints and in expansion/isolation joints.

.4 Comply with sealant manufacturer's primer, application and temperature requirements. After initial set, prime sealant surface and refill joints with sealant as required to produce slightly convex joint surface.

End of Section

1 General

1.1 **SUMMARY**

.1 Section Includes

.1 Labour, Products, equipment and services necessary to complete the Work of this section.

1.2 **REFERENCES**

.1 Conform to the latest edition of the following:

.1	CAN/CGSB-1.74	-	Alkyd Traffic Paint
.2	OPSS 310	-	Ontario Provincial Standard Specification, Construction Specification for Hot Mix Asphalt
.3	OPSS 1101	-	Ontario Provincial Standard Specification, Material Specification for Performance Graded Asphalt Cement
.4	OPSS 1150	-	Ontario Provincial Standard Specification, Material Specification for Hot Mix Asphalt

1.3 **SUBMITTALS**

.1 Submit Shop Drawings in accordance with Section 01 33 00. Submit the following:

.1 Asphalt mix designs.

.2 Information regarding manufacture and installation of pavement markings, blackout paint, asphalt crack sealant and road reinforcement mesh.

1.4 **QUALITY ASSURANCE**

.1 Refer to “Quality Control” in Section 01 10 00 – General Requirements.

.2 Implement a quality control program which includes testing and inspection to comply with the intent of these Specifications.

.3 Owner may employ an independent testing and inspection company to perform additional testing and inspection, and costs of such tests and inspections will be paid for by Owner.

.4 Consultant may have cores taken from finished pavement by an independent testing firm to ensure that paving has been placed to required thickness as shown and to specified degree of compaction. Testing will be at the expense of the Owner. Patch core holes resulting from the removal of samples, with asphaltic concrete material as specified herein.

.5 Remove and replace areas of asphalt work proven defective by the tests or contrary to requirements shown and specified, as directed by Consultant and at no cost to Owner.

1.5 **PROJECT CONDITIONS**

.1 Protection

.1 Protect buildings and work of other trades from damage caused by work of this section. Correct damage caused by work of this section at no cost to Owner.

.2 Erect temporary barriers, signs, protective covers, and rain protection as required. Remove protection when pavement is ready for traffic.

.3 Do not apply pavement during wet weather, or unless granular base is dry in terms of asphaltic concrete paving.

2 Products

2.1 **MATERIALS**

.1 Asphaltic concrete paving: Conforming to OPSS 310, composed of a base course and a surface course, of types as shown.

.1 Asphalt cement: Conforming to requirements of OPSS 1101, PGAC 58-28 for light duty traffic and PGAC 64-28 for heavy duty traffic.

.2 Asphalt primer: Liquid asphalt emulsion, slow drying for spray or brush application.

.3 Recycled content: Use recycled asphalt product (RAP) in binder/base course mixes only. Do not use for wearing course.

.2 Pavement Markings: Refer to Section 32 17 23.23 Pavement Markings.

3 Execution

3.1 **EXAMINATION**

.1 Inspect state of paving base preparation and other existing conditions upon which work of this section is dependent. Report to Consultant in writing any defects or discrepancies. Commencement of Work implies acceptance of existing conditions.

3.2 **PREPARATION**

.1 Shape bases as necessary to correspond with finish elevations of pavement, providing for slope as shown. Compact granular bases to densities and methods specified in Section 31 00 00.

.2 Correct irregularities or depressions that develop under rolling by loosening granular material at such locations and adding or replacing material and recompacting until the surface is smooth and uniform. Dig out and replace soft spots which develop in granular base during or after compaction operations.

.3 To aid in compaction work or to reduce dust nuisance or both, sprinkle granular base with water during rolling, tamping and blading. Where water is added for improvement of compaction, apply immediately ahead of the compacting unit pass.

.4 Maximum allowable tolerance in cross-sectional and longitudinal profile is 6 mm at any place measured with a 3 m straight edge.

3.3 **PRIMING**

.1 Prior to application of paving, prime paint vertical contact surfaces with liquid asphalt emulsion.

.2 Where paving of a course of asphalt has been delayed and/or will not be completed immediately after the underlying course of asphalt has been placed, thoroughly clean surfaces to be paved and apply one full coverage tack coat of asphalt primer immediately before paving.

3.4 TACK COAT

.1 Apply tack coat of asphalt emulsion diluted with an equal part of water. Apply tack coat to continuous uniform thickness in accordance with manufacturer's recommended rate of application, to bonding surfaces and allow to dry to manufacturer's recommended tackiness before placing hot mix.

3.5 APPLICATION

.1 Install asphaltic concrete paving to lines and compacted thicknesses shown conforming to methods of application and compaction requirements of OPSS 310.

.2 Clean prepared base of all foreign matter prior to application of the mixture to substrate.

.3 Form well bonded joints. Cut back bituminous course to full depth in straight line as required to expose fresh vertical surfaces. Remove broken or loose material. Paint exposed vertical edge of asphaltic joints with asphalt primer prior to placing asphalt courses.

.4 Form joints between new and existing work in same manner as specified herein for new work, and in such a manner as to ensure continuous bond at interface.

.5 Finish surface of pavement free from depressions exceeding 6 mm when measured with a 3 m straight edge. Remedy any low or defective areas by cutting out the course and replacing it with fresh hot mixture, and re-compact.

3.6 PROTECTION OF PAVING

.1 After completion of surface course, prevent vehicular parking on pavement until surface has cured and hardened.

End of Section

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1 General

1.1 **SUMMARY**

.1 Section Includes

.1 Labour, Products, equipment and services necessary to complete the Work of this section.

1.2 **REFERENCES**

.1 Conform to the latest edition of the following:

.1	OPSS 1714	-	Ontario Provincial Standard Specification, Material Specification for Field Reacted Polymeric Pavement Marking Materials
.2	OPSS 710	-	Ontario Provincial Standard Specification, Construction Specification for Pavement Markings.
.3	OPSS 1750	-	Ontario Provincial Standard Specification, Traffic Paint Reflectorizing Glass Beads
.4	OTM	-	Ontario Traffic Manual, Book 11

1.3 **SUBMITTALS**

.1 Submit Shop Drawings in accordance with Section 01 33 00. Submit the following:

.1 Product Information regarding manufacture and installation of pavement markings and asphalt crack sealant.

1.4 **QUALITY ASSURANCE**

.1 Refer to “Quality Control” in Section 01 10 00 – General Requirements.

.2 Installer qualifications: Manufacturer to certify this Subcontractor as an experienced installer who has completed thermoplastic pavement marking projects to the extent that is required for this Project.

.3 Implement a quality control program which includes testing and inspection to comply with the intent of these Specifications.

.4 Owner may employ an independent testing and inspection company to perform additional testing and inspection, and costs of such tests and inspections will be paid for by Owner.

.5 Remove and replace areas of asphalt work proven defective by the tests or contrary to requirements shown and specified, as directed by Consultant and at no cost to Owner.

1.5 **PROJECT CONDITIONS**

.1 Protection

.1 Protect Work of this section from damage according to manufacturer’s recommendations. Protect buildings and work of other trades from damage and replace damaged work that cannot be satisfactorily repaired at no cost to the Owner.

2 Products

2.1 **MATERIALS**

.1 Durable Pavement marking:

.1 Field reacted polymeric pavement marking: Flexible two-component, solvent-free, and lead-free cold-curing acrylic or methacrylate road marking material in accordance with OPSS 1714 and Ontario Traffic Manual Book 11, and with reflectorizing glass beads in accordance with OPSS 1750.

.1 Parking bays lines shall be identified with 100 mm (4") wide white or yellow painted lines in accordance with approved parking layout and/or in accordance with the requirements or authorities having jurisdiction.

.2 Blue: For barrier free accessible parking lot stalls and symbols. Barrier free accessible parking bays shall be identified with appropriate symbol designation and/or in accordance with the requirements or authorities having jurisdiction.

.3 Pedestrian walkways shall be identified with 150 mm (6") wide white or yellow painted lines at 45 degrees to path of travel spaced at 400 mm (16") o.c. and/or in accordance with the requirements or authorities having jurisdiction.

.2 Asphalt crack sealant: Hot poured rubberized asphalt thermoplastic sealing compound shall be in accordance with OPSS 1212. Ultraseal 1190 by Crafco Inc. Crack Sealant 164 by WR Meadows, or accepted equal.

3 Execution

3.1 **EXAMINATION**

.1 Inspect state of asphalt paving and other existing conditions upon which work of this section is dependent. Report to Consultant in writing any defects or discrepancies. Commencement of Work implies acceptance of existing conditions.

3.2 **PREPARATION**

.1 Immediately prior to application, clean the surface of any contaminants that would hinder adhesion.

.2 Verify pavement surface is free from ponding water, frozen matter, dust, oil, grease, scaling, or laitance, and other foreign matter detrimental to performance.

3.3 **APPLICATION**

.1 The material shall be applied to a dry surface in temperatures no lower than 7°C (45°F).

.2 Clean prepared base of all foreign matter prior to application of the mixture to substrate.

3.4 **PAVEMENT MARKINGS**

.1 Lay out pavement markings as indicated on Contract Drawings and in accordance with manufacturer’s instructions.

.2 Allow paving to cure before applying markings.

.3 Paint 100 mm wide lines on pavement for parking stalls and accessible symbol, unless indicated otherwise.

.4 Apply paint with mechanical equipment to clean, dry surface, to a minimum dry film thickness of 228 microns. Provide well defined and straight lines; do not overspray.

.5 Lines to be parallel and have neat, straight, clean, and sharp edges. Lines to be of uniform colour and density.

.6 Take precautions to protect freshly painted line work from being marked or otherwise disturbed by traffic, by use of fluorescent cones, barricades or other means until paint is dry.

.7 Remove spills or tracking of paint and clean up as required.

.8 Refinish ragged edges or lines incorrectly laid out. Remove incorrect lines and make them inconspicuous in accordance with manufacturer’s instructions.

3.5 **ASPHALT CRACK REPAIR**

.1 Clean out existing cracks with hot compressed air lance and let dry.

.2 Fill crack with sealant to minimum depth of 10 mm in accordance with manufacturer's recommendations.

3.6 **PROTECTION**

.1 Protect pavement marking until dry.

.2 Repair damage to adjacent materials caused by pavement marking application.

End of Section

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Appendix A

Geotechnical Investigation

Pavement Rehabilitation of Existing Asphalt Parking Lot

255 Spadina Road
Toronto Archives Building
Issued March 11, 2024 (Revised June 12, 2024)
by GHD Limited

Your Ref: GHD-23-047
Ref: 12629303

11 March 2024
(Revised 12 June 2024)

Ms. Anne Marie Hoekstra, EP
Environmental Project Manager – Project Management Office
Corporate Real Estate Management
City of Toronto
Metro Hall
55 John Street, 2nd Floor
Toronto, Ontario M5V 3C6

Pavement Rehabilitation of Existing Asphalt Parking Lot at 255 Spadina Road, Toronto, Ontario

Dear Ms. Hoekstra,

We are pleased to submit our report which summarizes the investigation methodology and the results of the pavement investigation completed for 255 Spadina Road.

The report is based on information obtained from pavement coring, borehole investigation and laboratory testing conducted in February 2024. Within the enclosed report, a summary of the site conditions is presented, followed by the provision of three rehabilitation options. A recommended rehabilitation option based on the above mentioned analysis is provided.

We trust that this report meets your present requirements. Please contact us if you have any questions.

Yours sincerely,

Ramon Miranda, P.Eng.

Principal Geotechnical/Pavement Engineer

Contents

Table index

Figures

Appendices

1. Introduction

GHD Limited (GHD) was retained by City of Toronto (the City) to provide pavement engineering services for the rehabilitation of the existing parking lot located at 255 Spadina Road, Toronto (the Site), Ontario as shown on Figure 1 below. The objective is to determine the existing pavement structure and subsurface conditions and develop a recommended pavement rehabilitation strategy for the existing parking lot and driveway. It is our understanding that some areas of the existing flexible (asphalt over granular fill) pavement in the driveway and parking lot of the above-mentioned site are exhibiting moderate to severe pavement distresses.

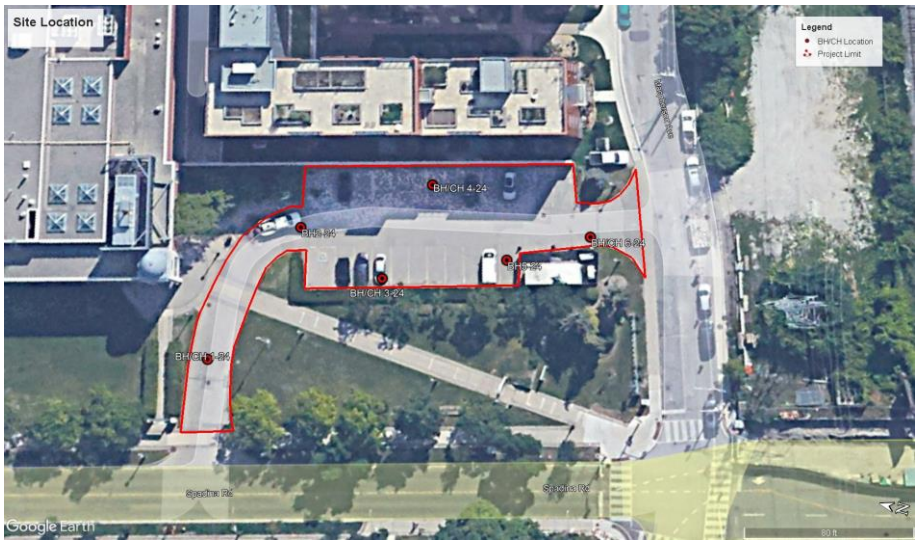


Figure 1 Project Limits

A visual pavement condition survey and borehole investigation were completed to assess the existing condition of the pavement surface and subsurface materials. The intent of this report is to provide a summary of the investigation findings and provide pavement rehabilitation recommendations.

The following items are presented in this report:

- Pavement visual condition summary
- Existing pavement structure layer thicknesses;
- Laboratory test result analysis;
- Assessment of aggregate/soil quality; and
- Pavement rehabilitation alternatives.

In addition to the above scope, chemical analysis testing and asbestos testing were also completed to support the evaluation of off-site management options of potential excess soils. This analysis and evaluation were completed by GHD's environmental team with their findings summarized in a separate report.

2. Site Description

The site is located at 255 Spadina Road, situated at the north-east corner of Spadina Road and Macpherson Avenue intersection in Toronto, Ontario. The site comprises a multi-storey building with flexible pavement area on the west side of the building.

It has been observed that the existing pavement has significant issue of water ponding and cracking in the area adjacent to or near the catch basins. The presence of standing water in the parking lot can have a negative impact on the pavement over time. As the water accumulates, it can infiltrate into the pavement's cracks and joints, weakening the base layers of the pavement and causing it to deteriorate at an accelerated rate.

Based on the Ontario Geological Survey (OGS) online database, the subsurface conditions within the project site primarily consist of course-textured (sand and gravel) and fine-textured (minor silt and clay) deposits. Based on a review of geologic mapping, bedrock topography at the Site as indicated on a map titled Ontario Department of Mines, Preliminary Map No. P.470 Bolton Sheet Southern Ontario, Bedrock Topography Series, it is our understanding that the bedrock depth ranges between about 50 and 55 meters below ground surface (mbgs) in the vicinity of the Site.

The frost penetration depth within the study area is 1.2 m based on MTO OPSD 3090.101.

3. Pavement Investigation

3.1 Pavement Condition Survey

The pavement condition survey was completed by GHD in accordance with the MTO SP-024 Manual for the Condition Rating of Flexible Pavement. Photographs of general site conditions were taken. General site photos showing the pavement condition and observed distresses are presented in **Appendix A**.

3.2 Core and Borehole Investigation

The drilling program for the pavement investigation was carried out on February 06, 2024 for the site. The investigation program included six (6) boreholes. Asphalt coring was also conducted at four (4) of the borehole locations. The boreholes were advanced at the locations shown on the Borehole Location Plan presented in **Figure 2.**

The drilling work was carried out utilizing truck mounted drill rigs supplied and operated by specialty drilling subcontractor Algarve Sampling Inc under the full-time supervision of a GHD technical representative. A member of GHD's geotechnical staff supervised the geotechnical investigation, measured and recorded the thickness of the observed material layers (asphalt, granular fill) and free water, where present. Representative samples of soil and cores were transported to our laboratory facilities in Mississauga, Ontario.

The boreholes were advanced using solid stem augers with 102 mm outer diameter. Boreholes were advanced to a depth of 1.5 m to identify the existing pavement structure layer thicknesses and material type of subgrade soils. SPT sampling was carried out at the borehole locations to assess the strength of in situ soils at regular intervals with a 50 mm outer diameter (O.D) sampler in general accordance with the specifications of the Standard Penetration Test (SPT) Method (ASTM D1586). The borehole logs are presented in **Appendix B**, and the core log and photos are presented in **Appendix D**.

Upon completion of sampling and layer thickness measurements, all boreholes were backfilled with excavated materials, bentonite, and boreholes explored on the flexible pavement was topped with cold-patch asphalt.

A summary of the investigation program quantities completed by GHD in 2024 are presented in **Table 3.1** below.

Table 3.1: Boreholes Investigation Quantities

Number of Boreholes	Borehole Designation
6	BH1-24 through BH6-24
4	CH1-24, CH3-24, CH4-24 and CH6-24

3.3 Laboratory Testing Program

Visual and textural characteristics examinations were completed on all of the collected samples. Laboratory testing and moisture content determinations were carried out for selected samples. Representative granular base and subbase samples were selected for sieve analysis testing, and representative subgrade soil samples were selected for hydrometer testing. The detailed sieve analysis and hydrometer test results are provided in **Appendix C**.

The collected soil samples will be stored for a period of three (3) months after the day of issuing the draft report, after which time these soil samples will be discarded unless we are advised otherwise in writing.

3.3.1 Geotechnical Testing

Selected soil samples were submitted to GHD's certified soils laboratory for geotechnical testing in accordance with **Table 3.2**. Geotechnical laboratory test results are presented on the borehole logs in **Appendix B.** A copy of the geotechnical laboratory test results is provided in **Appendix C.**

Table 3.2: Geotechnical Laboratory Testing Summary

Geotechnical Test	Procedure/Methodology	Number of Tests
Moisture Content	LS-701	8
Sieve and Hydrometer Analysis	LS-702	3
Sieve Analysis	LS-602	6

4. Existing Conditions

4.1 Visual Condition Survey

The observed pavement distresses within the parking lot and driveway are summarized below and photographs are included in **Appendix A.**

- Extensive, moderate to severe transverse and longitudinal cracking;
- Extensive, moderate to severe coarse aggregate loss and ravelling;
- Frequent, moderate segregation/ flushing;
- Frequent, moderate to severe alligator cracking;
- Frequent, moderate distortions/ shoving;
- Intermittent, moderate to severe pothole formation;
- Intermittent, moderate to severe pavement edge cracking;
- Extensive, moderate wheel track rutting and cracking;
- Moderate to severe cracking, settlement and distortions from frost heave movements around catch basins and maintenance access holes; and
- Asphalt patch in poor condition and moderate patch boundary deterioration.

The existing pavement surface is in poor condition, with some localized areas in very poor condition. The distresses in these areas appear to be primarily environmental (thermal) and structural in nature. The pavement surrounding the catch basins and maintenance access holes shows signs of frost-heave movements, which may indicate poor/soft subsurface soils/drainage. The majority of moderate to severe cracks were observed to be open and with their deterioration being exacerbated by surface water infiltration.

4.2 Existing Pavement Structure

Boreholes were advanced on existing distressed areas and on areas in fair condition. The table below summarizes the pavement structures encountered within the study limits and the borehole logs are presented in **Appendix B.**

Table 4.1: Existing Pavement Structure

BH No.	Hot-Mix Asphalt (mm)	Granular Fill (mm)	Total Pavement Thickness (mm)
BH/CH1-24	90	810	900
BH2-24	80	790	870
BH/CH 3-24	90	820	910
BH/CH4-24	75	825	900
BH5-24	85	815	900
BH/CH 6-24	90	810	900
Range	**75 – 90**	**790 – 825**	**870 – 910**
Average	**85**	**810**	**895**

4.3 Granular Fill

Granular fill was encountered directly below the asphalt, with an average thickness of 810 mm in the driveway and parking lot. The existing granular materials comprises primarily of gravel with sand to sandy gravel. The granular materials were found to contain trace to some amounts of soil fines (silt and clay), as listed in Table 2 below.

In general, the granular fill was observed to be brown in colour with an average moisture content of 3.2%, and a range of 2.6% to 3.6%.

Five (5) grain size distribution analyses were conducted in the laboratory on selected samples recovered from the granular fill and the results are presented in **Table 4.2** below.

Table 4.2: Grain Size Results – Existing Granular Fill

BH No.	Sample No.	Gravel (%)	Sand (%)	Fines (%)	Soil Classification	OPSS Material Specification
BH1-24	AS1	60	33	7	Sandy gravel, trace silt	Marginally acceptable Granular A
BH1-24	AS2	71	21	8	Gravel with sand, trace silt	Not acceptable Granular A Acceptable Granular B-I
BH3-24	AS1	53	37	10	Sandy gravel, some silt	Marginally acceptable Granular A
BH3-24	AS2	48	39	13	Sandy gravel, some silt	Not acceptable Granular A Marginally acceptable Granular B-I
BH6-24	AS1	71	22	7	Gravel with sand, trace silt	Not acceptable Granular A Acceptable Granular B-I

Out of the five (5) tested granular samples that were tested, two (2) samples marginally met the OPSS requirements for a Granular A material, while the remaining three (3) samples met the OPSS requirements for a Granular B Type I material. The laboratory testing results are presented in **Appendix C**.

4.4 Fill

Fill material consisting of sandy gravel was encountered underlying the granular fill in BH1-23, BH5-23 and BH6-23. The fill material was found to contain a trace amount of soil fines (silt and clay). The fill material extended to borehole termination depth of 1.5 meters below ground surface (mbgs).

In general, the fill was observed to be brown in colour with a moisture content of 4.7%.

One (1) grain size distribution analysis was conducted in the laboratory on selected sample recovered from the fill and the results are presented in **Table 4.3** below.

Table 4.3: Grain Size Results – Existing Fill

BH No.	Sample No.	Gravel (%)	Sand (%)	Fines (%)	Soil Classification	OPSS Material Specification
BH6-24	SS3	65	30	5	Sandy gravel, trace silt	Not acceptable Granular A Acceptable Granular B-I

The tested fill sample that was tested met the OPSS requirements for a Granular B Type I material. The laboratory testing results are presented in **Appendix C**.

4.5 Subgrade Conditions

4.5.1 Cohesive Native

A deposit of sandy clayey silt to silty clay was encountered below the granular fill in boreholes BH2-24, BH3-24 and BH4-23 advanced within the parking lot and driveway, with an average depth of 1.0 mbgs and extending to the borehole termination depth (1.5 mbgs). The sandy clayey silt to silty clay deposit was found to contain traces of gravel.

Topsoil was encountered overlying the cohesive native deposit in BH3-23 and BH4-23 with an approximate thickness ranging between 100 and 300 mm.

The natural moisture contents measured in the laboratory were found with an average of 11.1% and a range of 10.3% to 12.4%. Standard Penetration Test (SPT) N-values ranged between 10 and 24 blows per 0.3 m of penetration in the sandy clayey silt to silty clay deposit, which indicate a stiff to very stiff consistency.

Three (3) particle size distribution analyses were carried out in the laboratory on selected samples obtained from the cohesive deposit. The results are provided in **Table 4.4**.

Table 4.4: Particle Size Results – Existing Subgrade

BH No.	Sample No.	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	(5 to 75 µm)	Soil Classification	Susceptibility to Frost Heaving
BH2-24	SS3	3	31	48	18	41	Sandy Clayey silt, trace gravel	MSFH
BH3-24	SS3	3	13	52	32	33	Silty clay, some sand, trace gravel	LSFH
BH4-24	SS3	0	28	50	22	41	Sandy clayey silt	MSFH

The laboratory results indicate that the cohesive native is of low to moderate susceptibility to frost heave (LSFH to MSFH). The laboratory testing results are attached in **Appendix C**.

4.6 Frost Susceptibility

The frost susceptibility of the subgrade soils was assessed using the Ministry of Transportation of Ontario's guidelines, which are based on the percentage of silt sized particles in the 75µm to 5µm range as outlined in **Table 4.5**.

Table 4.5: MTO Frost Susceptibility Guidelines

Grain Size (75 – 5 µm)	Susceptibility to Frost Heaving
0 – 40%	Low (LSFH)
40 – 55%	Moderate (MSFH)
55 – 100%	High (HSFH)

Based on the MTO frost susceptibility guidelines presented above, the cohesive subgrade materials observed within the project site were generally noted to be of low to moderate susceptibility to frost heave (LSFH to MSFH).

4.7 Groundwater Conditions

Groundwater was encountered in one (1) borehole advanced within the site, specifically in borehole BH 2-24 at a depth of approximately 0.5 mbgs. The groundwater in the borehole was encountered within the frost penetration depth of 1.2 m per OPSD 3090.101. The remaining three (5) boreholes were dry upon completion.

At the time of investigation, the groundwater conditions were generally dry, although groundwater was locally present in one of the boreholes. It should be noted that the groundwater level is subject to seasonal fluctuations and precipitation events and should be expected to be higher during wet periods of the year. Perched water table condition could develop in the shallower soils and fill materials after heavy precipitation and/or during spring thaw.

5. Discussion and Recommendations

5.1 Investigation Findings and Pavement Analysis/Design

The visual pavement condition survey revealed that the parking lot and driveway (at 255 Spadina Road) is in a poor condition, with some localized areas in very poor condition. The predominant distresses observed were a result of structural or fatigue failure and poor drainage. Ponding of water on the pavement surface and within potholes was observed in the parking lot and driveway during the site reconnaissance and borehole drilling phase.

The findings from the borehole investigation and laboratory testing program indicate that the existing asphalt has an average thickness of 85 mm for the parking lot/driveway and granular fill materials consisting primarily of gravel with sand to sandy gravel which marginally meet OPSS specifications for Granular A or B Type I materials. The predominant existing sandy clayey silt to clayey silt subgrade materials were found to have low to moderate susceptibility to frost heaving (LSFH to MSFH), and consideration should be given to provide additional frost protection for this site for future full-depth reconstruction projects.

As noted above, water ponding was observed on the existing pavements indicating poor drainage and it was also observed that most of the cracks are unsealed, which allows for water infiltration. As the subgrade soils have silt content that makes it MSFH and more sensitive to water, poor subsurface drainage leads to frost heave action, loss of support and deterioration of the pavement structure. This can be seen along longitudinal and transverse cracks, and other areas showing alligator cracking.

Groundwater was also observed in one (1) borehole at a depth of 0.5 m below the pavement surface, within the frost penetration depth. If this subsurface water is not adequately drained away from the pavements and subgrade within the frost depth, frost-heave related distresses may occur on the pavement and can lead to premature deterioration. Routine maintenance operations such as crack sealing and asphalt patching may have to be carried out to extend the service life of the pavement and limit the amount of water that is able to infiltrate the pavement structure into the subgrade, thereby extending the life of the pavement.

5.2 Rehabilitation Alternatives

5.2.1 Parking lot and driveway

It is assumed that the vehicle traffic is primarily light-duty (passenger and other 2 axle, 4-tire single unit vehicles) and the flexible pavement areas will not experience heavy-truck movements besides a weekly garbage truck.

Three (3) design options have been developed by GHD and provided to City of Toronto for the rehabilitation and/or partial reconstruction of the existing flexible pavement areas of the parking lot/driveway. To determine the most feasible rehabilitation/reconstruction alternative, the following options were considered:

1. **Option 1 - Full Depth Asphalt Replacement**: Remove existing asphalt full-depth, regrade existing granular materials as needed, repair soft-spots and pave 90 mm of new of hot-mix asphalt.
2. **Option 2 - Partial Depth Reconstruction**: Remove existing asphalt full depth and granular materials to a maximum depth of 250 mm, install 150 mm thickness of new Granular A, and pave 100 mm of new hot-mix asphalt.
3. **Option 3 - Partial-Depth Reconstruction with Geogrid Reinforcement**: Remove existing asphalt full depth and underlying granular materials to a maximum depth of 420 mm, repair any observed soft-spots, install Triaxial Geogrid (Tensar TX7 or equivalent), install new 300 mm thickness of Granular A, and pave 120 mm new hot-mix asphalt.

For all options, it is assumed that subdrains will be installed.

The proposed pavement structures and advantages/disadvantages for each option is presented in the table below. It is important to note that the estimated service lives consider timely routine and preventative maintenance (i.e. crack sealing and pothole filling).

Table 5.1: Flexible Pavement Rehabilitation Options

	Option 1 Full Depth Asphalt Replacement	**Option 2 Partial Depth Reconstruction**	**Option 3 Reconstruction with Geogrid Reinforcement**
Estimated Service Life	5 years	8 – 10 years	15 years
Pavement Structure	40 mm HL-3 or SP12.5 50 mm HL-8 or SP19.0 805 mm Existing Granular Fill (on average)	40 mm HL-3 or SP12.5 60 mm HL-8 or SP19.0 150 mm New Granular A 645 mm Existing Granular Fill (on average)	50 mm HL-3 or SP12.5 70 mm HL-8 or SP19.0 300 mm New Granular A Geogrid layer 475 mm Existing Granular Fill (on average)
Advantage	- Full depth replacement of existing asphalt in parking lot/driveway. - Reuses existing granular materials - Riding Surface Grade is Corrected - Will not trigger excess soils regulations. - Lowest initial cost.	- Full depth replacement of existing asphalt in parking lot/driveway -Riding Surface Grade is Corrected - Replaces some of the existing deficient granular fill materials with new aggregates.	- Keeps Existing Granular Fill, saving resources - Riding Surface Grade is Corrected - Geogrid Stiffens Overall Structure and minimize the effect of the MSFH soils. - New granular materials improves subsurface drainage.- Longest service life.

	Option 1 Full Depth Asphalt Replacement	Option 2 Partial Depth Reconstruction	Option 3 Reconstruction with Geogrid Reinforcement
	- Least complex construction.	- Improves pavement structure strength and subsurface drainage. - Will not trigger excess soils regulations. - Longer service life than Option 1. - Lower initial cost than Option 3.	-Less maintenance will be required compared to Options 1 and 2
Disadvantage	- Deficient existing granular fill materials left in place. - MSFH clayey silt subgrade soils left in place. - Lowest service life. - - May not improve subsurface drainage (groundwater was found at a depth of 0.5 m in BH2-24). -will require more pavement maintenance	- Some deficient existing granular materials left in place (150 to 200 mm on average). - MSFH subgrade soils left in place. - - May not improve subsurface drainage (groundwater was found at a depth of 0.5 m). - Lower service life than Option 3. - Higher initial cost than Option 1. -will require some maintenance, but less than Option 1	- Highest initial cost. - Requires largest quantities of new materials. - MSFH subgrade soils left in place.

It should be noted that service life estimations are based on the appearance of severe distresses warranting rehabilitative effort. These estimations may also vary due to the actual maintenance activities that are completed on the pavement and on weather conditions that are unforeseeable.

5.3 Recommendations

Based on the findings from the investigation and laboratory testing program, the recommended rehabilitation option for the existing flexible pavement at the parking lot and driveway at 255 Spadina Road is Option 3: **Partial-depth reconstruction with Geogrid Reinforcement**. This option will increase the structural capacity of the pavement structure, improve the subsurface drainage (with subdrain installation), minimize the effect of frost susceptible subgrade soils and minimize future maintenance work. The recommended rehabilitation option is described as follows:

- Remove existing asphalt and underlying granular fill materials to a maximum depth of 420 mm below final grade;
- Perform frost treatment of catch basin structures;
- Proof-roll repair soft-spots and re-grade/repair as necessary;
- Install Triaxial Geogrid (Tensar TX7 or equivalent) as per manufacturer recommendations as required;
- Place and compact new 300 mm thickness of Granular A (OPSS 1010 Granular A) compacted to 100% Standard Proctor Maximum Dry Density (SPMDD);
- Place and compact new 70 mm thickness of HL-8 (OPSS 1150) or SP19 (OPSS 1151) hot-mix asphalt and compact to minimum 92% Maximum Relative Density (MRD);
- Place and compact new 50 mm thickness of HL-3 (OPSS 1150) or SP12.5 (OPSS 1151) hot-mix asphalt and compact to minimum 92% MRD; and
- Re-instate line markings to match the existing.

For the replacement of the concrete walkway crossing on the north side of the site, the following is recommended:

- Following removal of the existing pavements and underlying granular fill materials to maximum depth of 420 mm below final grade, proof-roll repairs and installation of geogrid as recommended above;
- Place and compact new 240 mm thickness of Granular A (OPSS 1010 Granular A) compacted to 100% Standard Proctor Maximum Dry Density (SPMDD); and
- Construct 180 mm concrete sidewalk slab (T-310.050-8).

It is recommended that geotechnical testing and inspections be carried out during construction operations to confirm construction is in accordance with the project specifications. Testing and inspections should include road granular proof-rolling inspections, compaction testing, monitoring of asphalt placement, etc.

The above pavement strategy assumes that the subgrade and/or exposed granular has been adequately prepared. If localized soft areas are encountered, it may be necessary to sub-excavate and replace with additional granular fill. It is recommended that qualified geotechnical personnel be retained to complete an inspection of the subgrade and placement of new granular during construction prior to placement of any hot-mix asphalt. Soft areas should be repaired by sub-excavating a minimum depth of 300 mm and installing 300 mm thickness of Granular A (OPSS 1010 Granular A) compacted to 100% of the Specified Maximum Dry Density (SPMDD).

The most severe loading conditions on paved areas and subgrades may occur during construction. Consequently, special provisions such as restricted drive lanes may be required, especially if construction is carried out during unfavorable weather conditions (i.e. cold weather or rain).

During seasonal high-water levels, there may be groundwater within or near the depth of construction. If groundwater is allowed to remain within the pavement structure depth (~<1m), it may compromise the integrity of the pavement structure and promote softening of the subgrade.

6. Construction Considerations

6.1 Drainage

Subsurface drainage (lateral and longitudinal) must be maintained in all areas of new construction.

The long-term performance of the proposed pavement structure is highly dependent upon subgrade support conditions. Stringent construction control procedures should be maintained to ensure that uniform subgrade moisture and density conditions are achieved. In addition, the need for adequate drainage cannot be over-emphasized. It is recommended that the finished pavement surface be provided with a minimum cross fall of 2% and the subgrade should be sloped at 3% towards subdrains/stub drains and catch basins. Surface water should not be allowed to pond adjacent to the outside edges of pavement areas.

To maintain the integrity of the pavement at the Site, subdrains should be installed at all catch basins, manholes and along the perimeter of the parking lot. It should be noted that shallow groundwater level was encountered in BH2-24 and the groundwater should be depressed to at least 1.2m below finished ground elevation by means of subdrains and storm sewers.

The invert of the subdrains should be at least 1.2 m below final grade and should be sloped to drain to adjacent catch basins or storm sewers. The subdrains should be installed in a 300 mm by 300 mm trench lined by suitable geotextile and consist of a 150 mm diameter perforated pipe wrapped in a suitable geotextile and surrounded with a minimum thickness of 50 mm of free draining material such as clear stone or concrete sand.

Grading adjacent to pavement areas should be designed so that water is not allowed to pond adjacent to the outside edges of the pavement. Also, the pavement subgrade should be free of depressions and sloped (preferably at a minimum grade of two percent) to provide effective drainage toward the edge of pavement/subdrain and toward catch basins.

6.2 Frost Treatment

Frost treatment of the existing catch basins and manholes is strongly recommended to facilitate effective and assured drainage of the storm structure as required, to intercept excess subsurface moisture and reduce the heaving actions.

The recommended frost treatment is to excavate 0.5 m length in all direction around catch basins and manholes structures to a minimum depth of 1.2 m. The excavation should be backfilled with clear stone and wrapped with geotextile before the placement of granular fill materials. The subdrains within the wrapped clear stone should then be outletted to the storm sewer or catch basin.

Limitations

This report is intended solely for The City of Toronto (the Client) and their designer and is prohibited for use by others without GHD's prior written consent. This report is considered GHD's professional work product and shall remain the sole property of GHD. Any unauthorized reuse, redistribution of or reliance on the report shall be at the Client and recipient's sole risk, without liability to GHD. Client shall defend, indemnify and hold GHD harmless from any liability arising from or related to Client's unauthorized distribution of the report. No portion of this report may be used as a separate entity; it is to be read in its entirety and shall include all supporting drawings and appendices.

The recommendations made in this report are in accordance with our present understanding of the project, the current site use, and are based on the limited available information described in the report. The services were performed in a manner consistent with that level of care and skill ordinarily exercised by members of geotechnical engineering professions currently practicing under similar conditions in the same locality. No other representations, and no warranties or representations of any kind, either expressed or implied, are made. Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties.

Should any conditions at the site be encountered which differ from those assumed in the report, we request that we be notified immediately in order to permit a reassessment of our recommendations. If changed conditions are identified during construction, no matter how minor, the recommendations in this report shall be considered invalid until sufficient review and written assessment of said conditions by GHD is completed.

All of Which is Respectfully Submitted

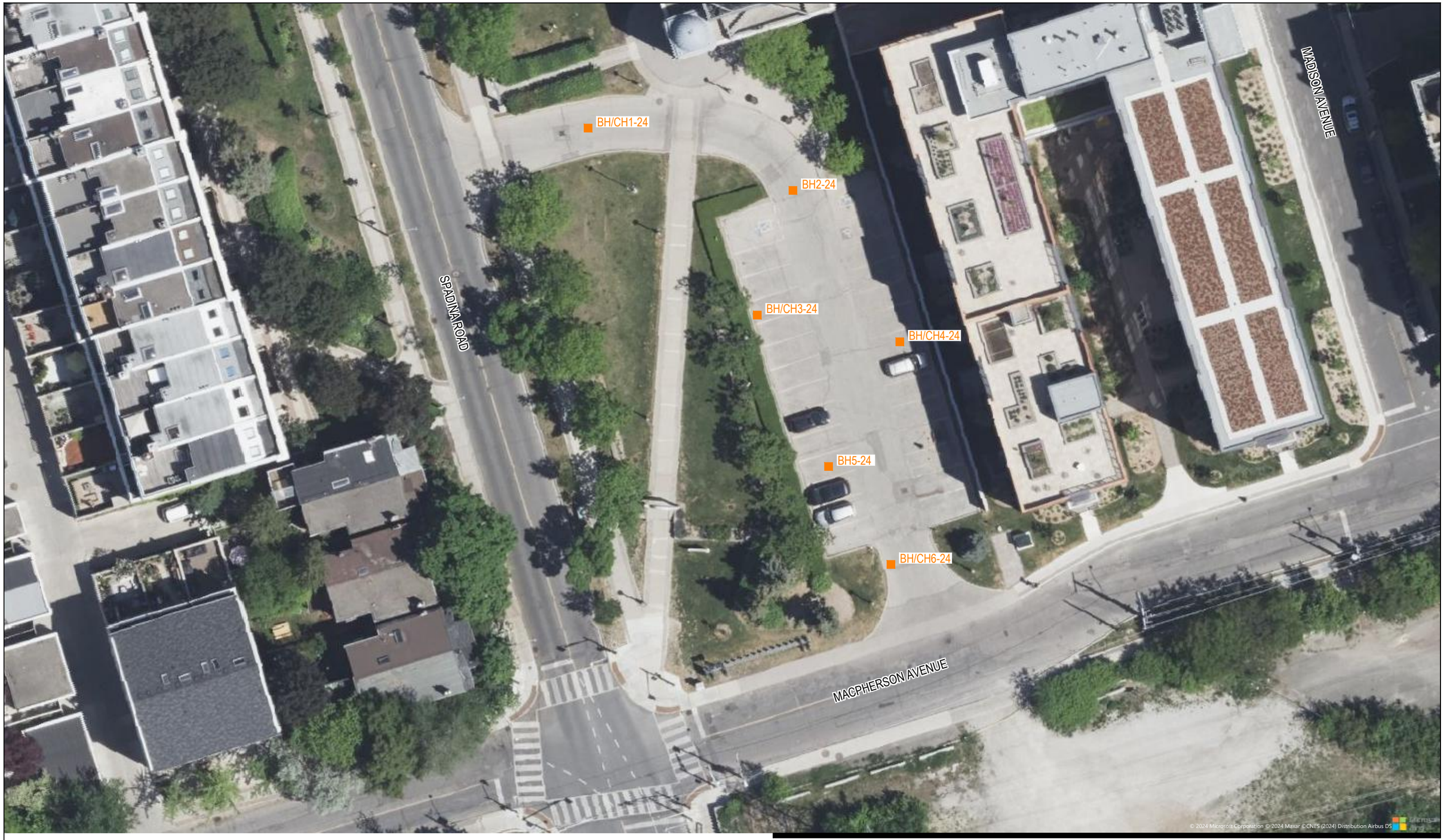
Regards,

Madlool Alsabak, P.Eng
Intermediate Pavement Engineer

Reviewed by

Ramon Miranda, P.Eng.
Principal Geotechnical/Pavement Engineer

Figures



LEGEND

■ BOREHOLE LOCATION

0 4 8 12m

1:400

Coordinate System: UTM83-17

N

GHD

THE CITY OF TORONTO
255 SPADINA ROAD, TORONTO, ONTARIO
GEOTECHNICAL INVESTIGATION

BOREHOLE LOCATION PLAN

Project No. **12629303**
Date **February 2024**

FIGURE 2

Filename: \\ghdnet\ghd\CA\Toronto\Projects\662\12629303\Digital_Design\ACAD\Figures\RPT-Geotech0001\12629303-GHD-00-00-RPT-EN-D101_WA-Geotech001.dwg
Plot Date: 16 February 2024 11:34 AM

Appendices

Appendix A

Pavement Condition Photos

Appendix A: Pavement Condition Photos
Toronto Archive – 255 Spadina Road
Parking Lot

Figure 1: Parking Lot Entrance from Macpherson Ave, Facing South. Extensive, severe longitudinal and transverse cracking. Frequent, moderate to severe alligator cracking. Frequent, moderate shoving. Extensive, slight to moderate coarse aggregate loss and raveling. Frost heave settlement and associated cracking around catch basin, moderate to severe random cracking along catch basin. [RG, January 2024]

Figure 2: Parking Lot Entrance from Macpherson Ave, Facing South. Frequent, Moderate longitudinal and transverse cracking. Frequent, moderate shoving. Extensive, slight to moderate coarse aggregate loss and raveling. Frost heave settlement and associated cracking around maintenance access holes, moderate to severe random cracking along maintenance access holes. [RG, January 2024]

Figure 3: Parking Lot Entrance from Spadina Ave, Facing East. Frequent, moderate to severe alligator cracking. Extensive, slight to moderate coarse aggregate loss and raveling. Frost heave settlement and associated cracking around catch basin, moderate to severe random cracking along catch basin. Asphalt patch in poor to fair condition and moderate patch boundary deterioration. [RG, January 2024]

Figure 4: Infront of the main building entrance, Facing South-East. Extensive, severe longitudinal and transverse cracking. Frequent, moderate to severe alligator cracking. Extensive, moderate to severe random cracking. Frequent, moderate to severe segregation. Extensive, moderate to severe coarse aggregate loss and raveling. Asphalt patch in poor to fair condition and moderate patch boundary deterioration. [RG, January 2024]

Figure 5: Facing South. Extensive, moderate to severe longitudinal and transverse cracking. Frequent, moderate to severe alligator cracking. Extensive, moderate to severe random cracking. Intermittent, moderate to severe edge of pavement cracking. Frequent, slight to moderate severe shoving. Extensive, slight to moderate coarse aggregate loss and raveling. [RG, January 2024]

Figure 6: Facing South. Extensive, moderate to severe longitudinal and transverse cracking. Frequent, moderate to severe alligator cracking. Frequent, moderate to severe segregation. Frequent, slight to moderate shoving. Extensive, slight to moderate coarse aggregate loss and raveling. [RG, January 2024]

Figure 7: Facing South. Extensive, severe longitudinal and transverse cracking. Frequent, slight to moderate segregation. few, slight to moderate distortions/shoving. Extensive, moderate to severe coarse aggregate loss and raveling with pothole formation. Intermittent, slight to moderate wheel track rutting. [RG, January 2024]

Figure 8: Facing South. Extensive, severe longitudinal and transverse cracking. Extensive, slight to moderate random cracking. Frequent, slight to moderate segregation. Extensive, slight to moderate coarse aggregate loss and raveling. Intermittent, slight to moderate wheel track rutting. Asphalt patch in poor to fair condition and moderate patch boundary deterioration. [RG, January 2024]

Appendix B

Borehole Stratigraphic Logs

REFERENCE No.: 12629303

BOREHOLE No.: BH/CH1-24

BOREHOLE REPORT

CLIENT: City of Toronto

PROJECT: Geotechnical Investigation

LOCATION: 255 Spadina Road - Parking Lot

DESCRIBED BY: Rushabh Gajiwala CHECKED BY: Madlool Alsabak

DATE (START): 6 February 2024 DATE (FINISH): 6 February 2024

LEGEND

- SS - SPLIT SPOON
- ST - SHELBY TUBE
- VA - VANE SHEAR
- AU - AUGER PROBE
- ▼ - WATER LEVEL (MEASURED)
- ▽ - WATER LEVEL (OBSERVED)

Latitude: 43.676495 Longitude: -79.407485 DRILLING METHOD: Solid Stem Auger

Depth (Feet)	Depth (Metres)	Elevation (m)	Stratigraphy	DESCRIPTION OF SOIL	SAMPLES State	SAMPLES Type and Number	LAB Testing Comments (Gravel Sand Silt Clay)	LAB Testing Unit Weight (Dry)	LAB Testing Moisture Content	Recovery/ TCR(%)	Blows per/15cm/ RQD(%)	'N' Value SCR(%)	COMMENTS
				GROUND SURFACE			%	KN/m3	%	%			
0	0			ASPHALT (90 mm)									
	0.1	0.1		GRANULAR FILL (810 mm) GRAVEL with SAND to SANDY GRAVEL, trace silt, brown, moist		AS1	60-33-(7)		--	--	--	--	
1													
	0.5					AS2	71-21-(8)		3	--	--	--	
2													
	0.9	0.9		FILL: SANDY GRAVEL, trace silt, brown, moist									
3	1.0												
4						SS3			--	75	3-11-9-8	20	
	1.5	1.5	1.5	END OF BOREHOLE Notes: 1) Borehole was drilled on the parking lot, 1.15 m south from north face curb. 2) Borehole was open and dry upon completion of drilling.									
5													
6	2.0												
7													
8	2.5												
9													
10	3.0												
11													
	3.5												
12													
13													

△ Undisturbed Vane Value (kPa)
□ Remoulded Field Vane Value (kPa)
△³ Number refer to Sensitivity
○ Water content (%)
W_p W_l Atterberg limits (%)
● "N" Value (blows/12 in.-30 cm)
☆ "DCPT" Value (blows/12 in.-30 cm)

10 20 30 40 50 60 70 80 90

COMMENTS: PIEZOMETER/ STANDPIPE INSTALLATION

REFERENCE No.: 12629303

BOREHOLE No.: BH2-24

BOREHOLE REPORT

CLIENT: City of Toronto

PROJECT: Geotechnical Investigation

LOCATION: 255 Spadina Road - Parking Lot

DESCRIBED BY: Rushabh Gajiwala CHECKED BY: Madlool Alsabak

DATE (START): 6 February 2024 DATE (FINISH): 6 February 2024

LEGEND

- SS - SPLIT SPOON
- ST - SHELBY TUBE
- VA - VANE SHEAR
- AU - AUGER PROBE
- ▼ - WATER LEVEL (MEASURED)
- ▽ - WATER LEVEL (OBSERVED)

Latitude: 43.676428 Longitude: -79.407201 DRILLING METHOD: Solid Stem Auger

Depth Feet	Depth Metres	Elevation (m)	Stratigraphy	DESCRIPTION OF SOIL	SAMPLES State	SAMPLES Type and Number	LAB Testing Comments (Gravel Sand Silt Clay)	LAB Testing Unit Weight (Dry)	LAB Testing Moisture Content	Recovery/ TCR(%)	Blows per/15cm/ RQD(%)	'N' Value SCR(%)	Undisturbed Vane Value (kPa) / Remoulded Field Vane Value (kPa) / Number refer to Sensitivity / Water content (%) / Atterberg limits (%) / "N" Value (blows/12 in.-30 cm) / "DCPT" Value (blows/12 in.-30 cm)	COMMENTS PIEZOMETER/ STANDPIPE INSTALLATION
				GROUND SURFACE			%	KN/m3	%	%			10 20 30 40 50 60 70 80 90	
0				ASPHALT (80 mm)										
	0.1	0.1		GRANULAR FILL (790 mm) SANDY GRAVEL, some silt, brown, moist		AS1			--	--	--	--		
1														
	0.5													2/6/2024 ▽
2						AS2			--	--	--	--		
	0.9	0.9												
3				SANDY CLAYEY SILT, trace gravel, greenish gray, wet										
	1.0													
4						SS3	3-31-48-18		10	50	3-7-11-19	18	⊖●	
	1.5	1.5	1.5	END OF BOREHOLE										
5				Notes: 1) Borehole was drilled on the parking lot, 2.10 m west from east face curb. 2) Groundwater at 0.5 m bgs upon completion of drilling.										
	2.0													
6														
7														
	2.5													
8														
9														
	3.0													
10														
11														
	3.5													
12														
13														

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Report: 12629303_SOIL LOG_PAVEMENT Date: 27/2/24

REFERENCE No.: 12629303

BOREHOLE No.: BH/CH3-24

BOREHOLE REPORT

CLIENT: City of Toronto

PROJECT: Geotechnical Investigation

LOCATION: 255 Spadina Road - Parking Lot

DESCRIBED BY: Rushabh Gajiwala CHECKED BY: Madlool Alsabak

DATE (START): 6 February 2024 DATE (FINISH): 6 February 2024

LEGEND

- SS - SPLIT SPOON
- ST - SHELBY TUBE
- VA - VANE SHEAR
- AU - AUGER PROBE
- - WATER LEVEL (MEASURED)
- - WATER LEVEL (OBSERVED)

Latitude: 43.676302 Longitude: -79.407254 DRILLING METHOD: Solid Stem Auger

Depth (Feet)	Depth (Metres)	Elevation (m)	Stratigraphy	DESCRIPTION OF SOIL	SAMPLES State	SAMPLES Type and Number	LAB Testing Comments (Gravel Sand Silt Clay)	LAB Testing Unit Weight (Dry)	LAB Testing Moisture Content	Recovery/ TCR(%)	Blows per/15cm/ RQD(%)	'N' Value SCR(%)	Undisturbed Vane Value (kPa) / Remoulded Field Vane Value (kPa) / Number refer to Sensitivity / Water content (%) / Atterberg limits (%) / "N" Value (blows/12 in.-30 cm) / "DCPT" Value (blows/12 in.-30 cm)	COMMENTS (PIEZOMETER/ STANDPIPE INSTALLATION)
				GROUND SURFACE			%	KN/m3	%	%			10 20 30 40 50 60 70 80 90	
0				ASPHALT (90 mm)										
	0.1	0.1		GRANULAR FILL (820 mm) SANDY GRAVEL, some silt, brown, moist										
1						AS1	53-37-(10)		3	--	--	--	○	
	0.5													
2						AS2	48-39-(13)		4	--	--	--	○	
3	0.9	0.9												
	1.0	1.0		TOPSOIL (100mm)										
		1.0		SILTY CLAY, some sand, trace gravel, brown, moist										
4						SS3	3-13-52-32		12	95.8	3-7-17-18	24	○ ●	
5	1.5	1.5		END OF BOREHOLE										
				Notes: 1) Borehole was drilled on the parking lot, 0.30 m east from west face curb. 2) Borehole was open and dry upon completion of drilling.										
6														
	2.0													
7														
8														
	2.5													
9														
10	3.0													
11														
	3.5													
12														
13														

REFERENCE No.: 12629303

BOREHOLE No.: BH/CH4-24

BOREHOLE REPORT

CLIENT: City of Toronto

PROJECT: Geotechnical Investigation

LOCATION: 255 Spadina Road - Parking Lot

DESCRIBED BY: Rushabh Gajiwala CHECKED BY: Madlool Alsabak

DATE (START): 6 February 2024 DATE (FINISH): 6 February 2024

LEGEND

- SS - SPLIT SPOON
- ST - SHELBY TUBE
- VA - VANE SHEAR
- AU - AUGER PROBE
- - WATER LEVEL (MEASURED)
- - WATER LEVEL (OBSERVED)

Latitude: 43.676272 Longitude: -79.407056 DRILLING METHOD: Solid Stem Auger

Depth (Feet)	Depth (Metres)	Elevation (m)	Stratigraphy	DESCRIPTION OF SOIL	SAMPLES State	SAMPLES Type and Number	LAB Testing Comments (Gravel Sand Silt Clay)	LAB Testing Unit Weight (Dry)	LAB Testing Moisture Content	Recovery/ TCR(%)	Blows per/15cm/ RQD(%)	'N' Value SCR(%)	Undisturbed Vane Value (kPa) / Remoulded Field Vane Value (kPa) / Number refer to Sensitivity / Water content (%) / Atterberg limits (%) / "N" Value (blows/12 in.-30 cm) / "DCPT" Value (blows/12 in.-30 cm)	COMMENTS (PIEZOMETER/ STANDPIPE INSTALLATION)
				GROUND SURFACE			%	KN/m3	%	%			10 20 30 40 50 60 70 80 90	
0	0.1	0.1		ASPHALT (75 mm)										
				GRANULAR FILL (825 mm) SANDY GRAVEL, some silt, brown, moist		AS1			--	--	--	--		
1						AS2			--	--	--	--		
	0.5													
2														
3	0.9	0.9		TOPSOIL (300mm)		SS3A			--	--	--	--		
	1.0													
4	1.2	1.2		SANDY CLAYEY SILT, brown, moist		SS3B	0-28-50-22		11	100	3-3-7-10	10	●	
5	1.5	1.5	1.5	END OF BOREHOLE										
				Notes: 1) Borehole was drilled on the parking lot, 1.55 m west from east face curb. 2) Borehole was open and dry upon completion of drilling.										
6														
	2.0													
7														
8	2.5													
9														
10	3.0													
11														
	3.5													
12														
13														

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Report: 12629303_SOIL LOG_PAVEMENT Date: 27/2/24

REFERENCE No.: 12629303

BOREHOLE No.: BH5-24

BOREHOLE REPORT

CLIENT: City of Toronto

PROJECT: Geotechnical Investigation

LOCATION: 255 Spadina Road - Parking Lot

DESCRIBED BY: Rushabh Gajiwala CHECKED BY: Madlool Alsabak

DATE (START): 6 February 2024 DATE (FINISH): 6 February 2024

LEGEND

- SS - SPLIT SPOON
- ST - SHELBY TUBE
- VA - VANE SHEAR
- AU - AUGER PROBE
- - WATER LEVEL (MEASURED)
- - WATER LEVEL (OBSERVED)

Latitude: 43.676148 Longitude: -79.407159 DRILLING METHOD: Solid Stem Auger

Depth (Feet)	Depth (Metres)	Elevation (m)	Stratigraphy	DESCRIPTION OF SOIL	SAMPLES State	SAMPLES Type and Number	LAB Testing Comments (Gravel Sand Silt Clay)	LAB Testing Unit Weight (Dry)	LAB Testing Moisture Content	Recovery/ TCR(%)	Blows per/15cm/ RQD(%)	'N' Value SCR(%)	COMMENTS
				GROUND SURFACE			%	KN/m3	%	%			
0	0.1	0.1		ASPHALT (85 mm)									
				GRANULAR FILL (815 mm) GRAVEL with SAND to SANDY GRAVEL, some silt, brown, moist		AS1			--	--	--	--	
1	0.5												
2						AS2			--	--	--	--	
3	0.9	0.9		FILL: SANDY GRAVEL, trace silt, brown, very moist									
	1.0					SS3			--	50	6-5-1-1	6	
4													
5	1.5	1.5		END OF BOREHOLE Notes: 1) Borehole was drilled on the parking lot, 1.60 m east from west face curb. 2) Borehole was open and dry upon completion of drilling.									
6													
7	2.0												
8	2.5												
9													
10	3.0												
11													
12	3.5												
13													

△ Undisturbed Vane Value (kPa)
□ Remoulded Field Vane Value (kPa)
△³ Number refer to Sensitivity
○ Water content (%)
W_p W_l Atterberg limits (%)
● "N" Value (blows/12 in.-30 cm)
✱ "DCPT" Value (blows/12 in.-30 cm)

10 20 30 40 50 60 70 80 90

COMMENTS: PIEZOMETER/ STANDPIPE INSTALLATION

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Report: 12629303 SOIL LOG_PAVEMENT Date: 27/2/24

REFERENCE No.: 12629303

BOREHOLE No.: BH/CH6-24

BOREHOLE REPORT

CLIENT: City of Toronto

PROJECT: Geotechnical Investigation

LOCATION: 255 Spadina Road - Parking Lot

DESCRIBED BY: Rushabh Gajiwala CHECKED BY: Madlool Alsabak

DATE (START): 6 February 2024 DATE (FINISH): 6 February 2024

LEGEND

- SS - SPLIT SPOON
- ST - SHELBY TUBE
- VA - VANE SHEAR
- AU - AUGER PROBE
- - WATER LEVEL (MEASURED)
- - WATER LEVEL (OBSERVED)

Latitude: 43.676048 Longitude: -79.407075 DRILLING METHOD: Solid Stem Auger

Depth (Feet)	Depth (Metres)	Elevation (m)	Stratigraphy	DESCRIPTION OF SOIL	SAMPLES State	SAMPLES Type and Number	LAB Testing Comments (Gravel Sand Silt Clay)	LAB Testing Unit Weight (Dry)	LAB Testing Moisture Content	Recovery/ TCR(%)	Blows per/15cm/ RQD(%)	'N' Value SCR(%)	Undisturbed Vane Value (kPa) / Remoulded Field Vane Value (kPa) / Number refer to Sensitivity / Water content (%) / Atterberg limits (%) / "N" Value (blows/12 in.-30 cm) / "DCPT" Value (blows/12 in.-30 cm)	COMMENTS PIEZOMETER/ STANDPIPE INSTALLATION
				GROUND SURFACE			%	KN/m3	%	%			10 20 30 40 50 60 70 80 90	
0				ASPHALT (90 mm)										
	0.1	0.1		GRANULAR FILL (810 mm) GRAVEL with SAND to SANDY GRAVEL, trace silt, brown, moist		AS1	71-22-(7)		3	--	--	--		
1														
	0.5					AS2			--	--	--	--		
2														
	0.9	0.9		FILL: SANDY GRAVEL, trace silt, brown, moist										
3	1.0													
						SS3	65-30-(5)		5	83.3	4-19-25-9	44		
4														
	1.5	1.5	1.5	END OF BOREHOLE										
5				Notes: 1) Borehole was drilled on the parking lot, 0.65 m east from west face curb. 2) Borehole was open and dry upon completion of drilling.										
6														
	2.0													
7														
8	2.5													
9														
	3.0													
10														
11	3.5													
12														
13														

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Report: 12629303_SOIL LOG_PAVEMENT Date: 27/2/24

Appendix C

Geotechnical Laboratory Test Results

Moisture Content of Soils
(ASTM D 2216)

Client:	City of Toronto	**Lab No.:**	GS#4
Project/Site:	255 Spadina Road, Toronto, Ontario	**Project No.:**	12629303

Apparatus Used for Testing

Oven No.: 1 **Scale No.:** 2

BH No.:	6-24	3-24	3-24	4-24	2-24	6-24	1-24	3-24
Sample No.:	AS1	AS1	SS3	SS3B	SS3	SS3	AS2	AS2
Depth:			3' - 5'	3' - 5'	3' - 5'	3' - 5'		
Container no.	A1	B3	B9	B12	D10	D12	E17	D5
Mass of container + wet soil (g)	1216.00	665.00	28.85	28.78	33.04	455.00	891.00	875.00
Mass of container + dry soil (g)	1185.00	644.00	26.59	26.81	30.73	435.00	863.00	845.00
Mass of container (g)	8.30	8.30	8.30	8.30	8.30	8.30	8.30	8.30
Mass of dry soil (g)	1176.7	635.7	18.3	18.5	22.4	426.7	854.7	836.7
Mass of water (g)	31.0	21.0	2.3	2.0	2.3	20.0	28.0	30.0
Moisture content (%)	2.6	3.3	12.4	10.6	10.3	4.7	3.3	3.6
BH No.:								
Sample No.:								
Depth:								
Container no.								
Mass of container + wet soil (g)								
Mass of container + dry soil (g)								
Mass of container (g)								
Mass of dry soil (g)								
Mass of water (g)								
Moisture content (%)								

Remarks: More information available upon request.

Performed By:	Riddhi Wilson	**Date:**	February 20, 2024
Verified by :	Raj Kadia, B.Eng., C.E.T.	**Date:**	February 26, 2024

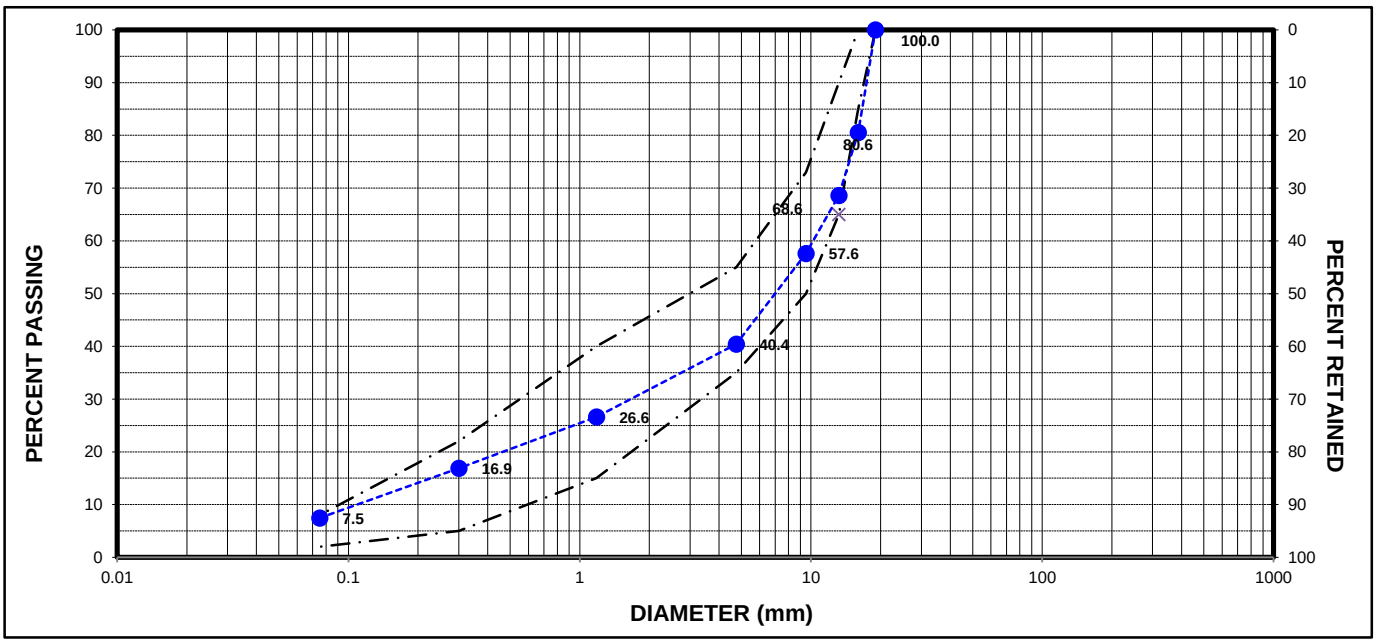
Granular A Sieve Analysis (LS-602)

Client:	City of Toronto	Lab No.:	GS4
Project:	255 Spadina Road, Toronto, Ontario	Project No.:	12629303

Soil Description:	Aggregate (Pit)	Sample Source:	Borehole
Type of Material:	Sandy Gravel, Trace Fines	Sample Location:	BH1-24 / AS1 - Test Pad - No
Proposed Use:	Other	Agg. Supplier/Source:	N/A
Sampled By:	C.B	Sample Date:	February 6, 2024

Sample Location Remarks: BH1-23 / AS1- Depth (0.09m - 0.41m)

Sieve Size (mm)	% Passing	OPSS 1010 Gradation Specification		
		Min. %	-	Max. %
19.0	**100**	100	-	100
16.0	* **81**	85	-	100
13.20	**69**	65	-	90
9.50	**58**	50	-	73
4.75	**40**	35	-	55
1.180	**27**	15	-	40
0.300	**17**	5	-	22
0.075	**7**	2	-	8



Remarks: Sandy Gravel, Trace Fines (Gravel 60%, Sand 33%, Fines 7%)

* Sieve result does not meet the OPSS 1010 Specification for: Granular A Sieve Analysis

Performed by:	Riddhi Wilson	**Date:**	February 12, 2024
Verified by:	Raj Kadia C.E.T	**Date:**	February 15, 2024

Granular B Type I Sieve Analysis (Quarry) (LS-602)

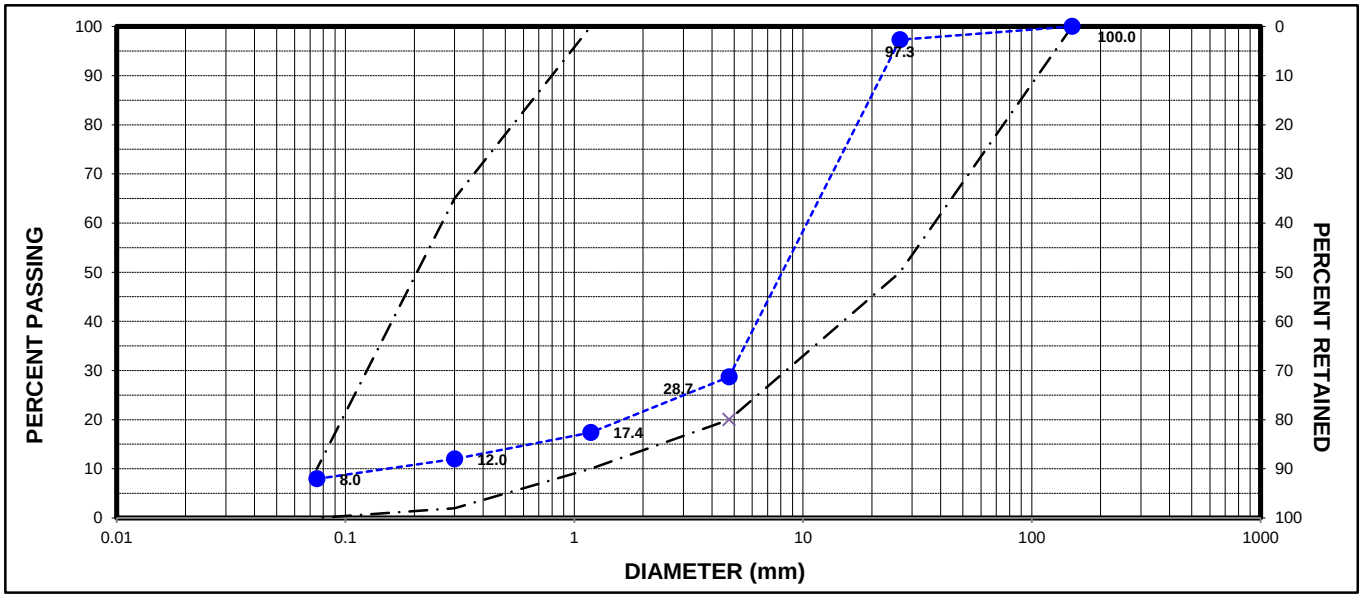
Client:	City of Toronto	**Lab No.:**	GS4
Project:	255 Spadina Road, Toronto, Ontario	**Project No.:**	12629303

Soil Description:	Aggregate (Quarry)	Sample Source:	Borehole
Type of Material:	Granular B Type I	Sample Location:	Borehole - Test Pad - No
Proposed Use:	Other	Agg. Supplier/Source:	N/A
Sampled By:	C.B	Sample Date:	October 10, 2023

Sample Location Remarks: BH1-24/ AS2/ Depth (0.41m - 1.5m)

Sieve Size (mm)	% Passing	OPSS 1010 Gradation Specification		
		Min. %	-	Max. %
150.0	**100**	100	-	100
26.5	**97.3**	50	-	100
4.75	**28.7**	20	-	100
1.18	**17.4**	10	-	100
0.300	**12.0**	2	-	65
0.075	**8.0**	0	-	10

Additional laboratory reporting information available upon request.



Remarks: Sandy Gravel, Trace Fines (Gravel 71%, Sand 21%, Fines 8%)

Sample meets the OPSS 1010 Specification for: Granular B Type I Sieve Analysis (Quarry)

Performed by:	Riddhi Wilson	**Date:**	February 12, 2024
Verified by:	Raj Kadia C.E.T	**Date:**	February 15, 2024
Laboratory Location:	5582 Tomken Rd., Mississauga, Ontario L4W 1P4		

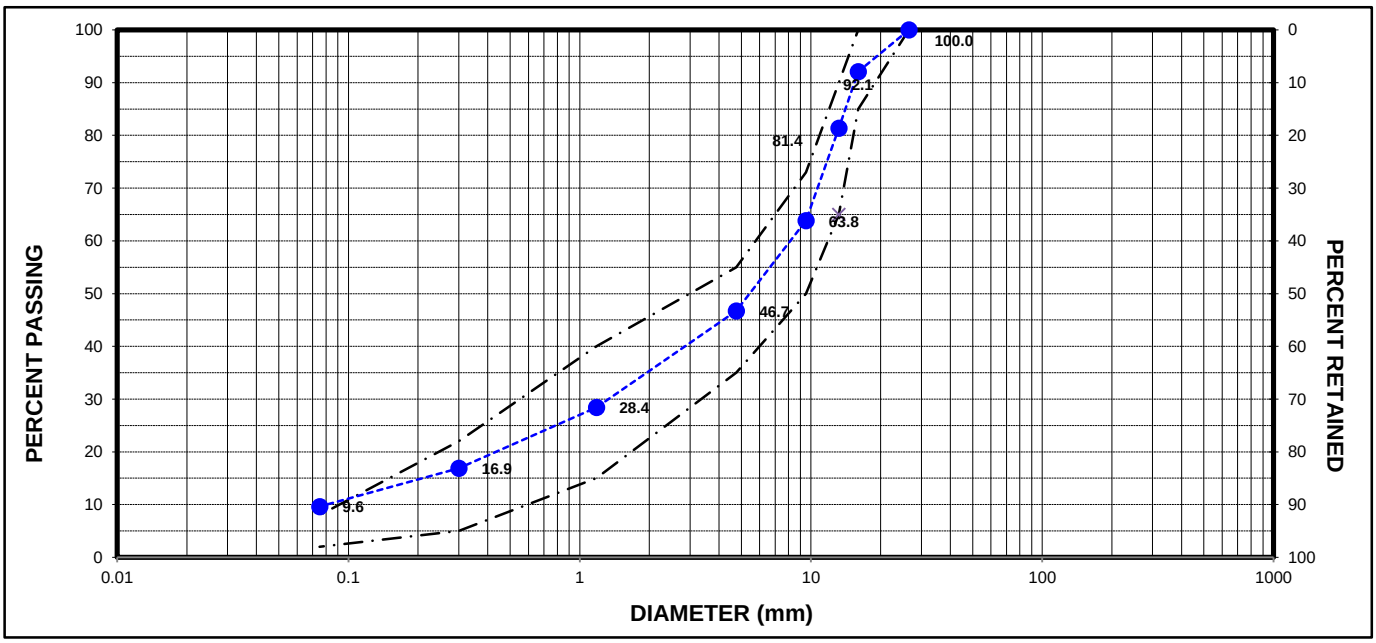
Granular A Sieve Analysis (LS-602)

Client:	City of Toronto	Lab No.:	GS4
Project:	255 Spadina Road, Toronto, Ontario	Project No.:	12629303

Soil Description:	Aggregate (Pit)	Sample Source:	Borehole
Type of Material:	Sandy Gravel, Trace Fines	Sample Location:	BH3-24 / AS1 - Test Pad - No
Proposed Use:	Other	Agg. Supplier/Source:	N/A
Sampled By:	C.B	Sample Date:	February 6, 2024

Sample Location Remarks: BH3-23 / AS1- Depth (0.09m - 0.44m)

Sieve Size (mm)	% Passing	OPSS 1010 Gradation Specification		
		Min. %	-	Max. %
26.5	**100**	100	-	100
16.0	**92**	85	-	100
13.20	**81**	65	-	90
9.50	**64**	50	-	73
4.75	**47**	35	-	55
1.180	**28**	15	-	40
0.300	**17**	5	-	22
0.075	* **10**	2	-	8



Remarks: Sandy Gravel, Trace Fines (Gravel 53%, Sand 37%, Fines 10%)

* Sieve result does not meet the OPSS 1010 Specification for: Granular A Sieve Analysis

Performed by:	Riddhi Wilson	**Date:**	February 20, 2024
Verified by:	Raj Kadia C.E.T	**Date:**	February 23, 2024

Granular B Type I Sieve Analysis (Quarry) (LS-602)

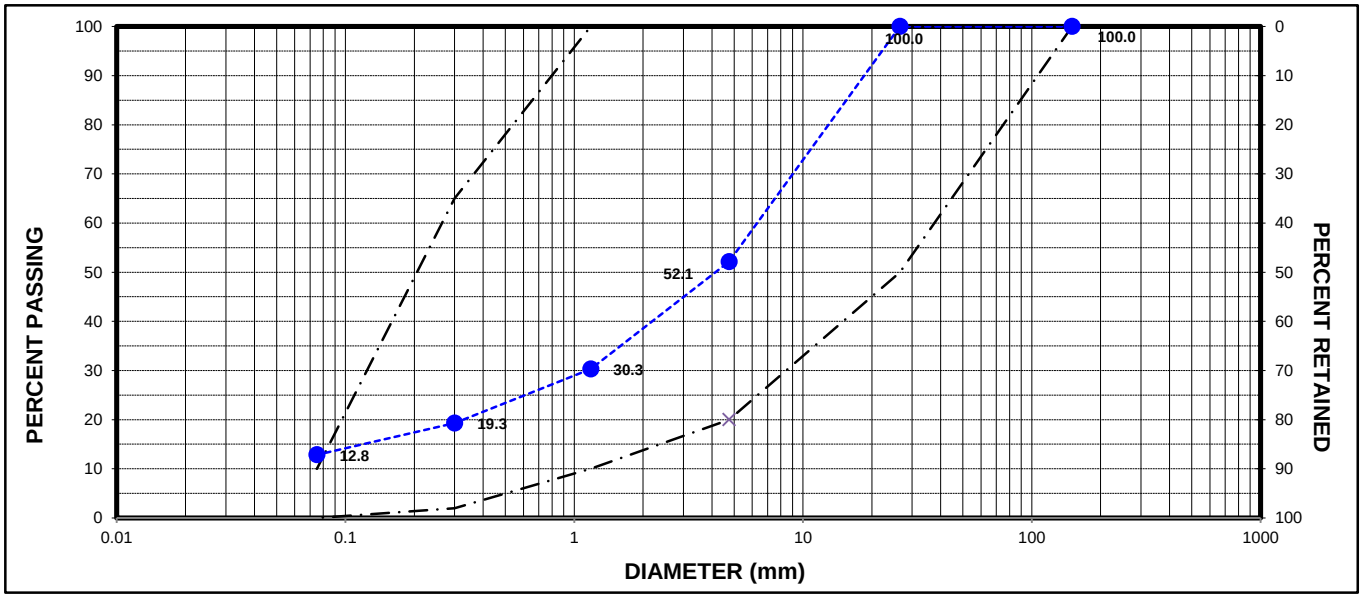
Client:	City of Toronto	**Lab No.:**	GS4
Project:	255 Spadina Road, Toronto, Ontario	**Project No.:**	12629303

Soil Description:	Aggregate (Quarry)	Sample Source:	Borehole
Type of Material:	Granular B Type I	Sample Location:	Borehole - Test Pad - No
Proposed Use:	Other	Agg. Supplier/Source:	N/A
Sampled By:	C.B	Sample Date:	February 6, 2024

Sample Location Remarks: BH3-24/ AS2/ Depth (0.44m - 0.81m)

Sieve Size (mm)	% Passing	OPSS 1010 Gradation Specification		
		Min. %	-	Max. %
150.0	**100**	100	-	100
26.5	**100.0**	50	-	100
4.75	**52.1**	20	-	100
1.18	**30.3**	10	-	100
0.300	**19.3**	2	-	65
0.075	* **12.8**	0	-	10

Additional laboratory reporting information available upon request.



Remarks: Sand and Gravel, Some Fines (Gravel 48%, Sand 39%, Fines 13%)

* Sieve result does not meet the OPSS 1010 Specification for: Granular B Type I Sieve Analysis (Quarry)

Performed by:	Riddhi Wilson	**Date:**	February 20, 2024
Verified by:	Raj Kadia C.E.T	**Date:**	February 23, 2024

Laboratory Location: 5582 Tomken Rd., Mississauga, Ontario L4W 1P4

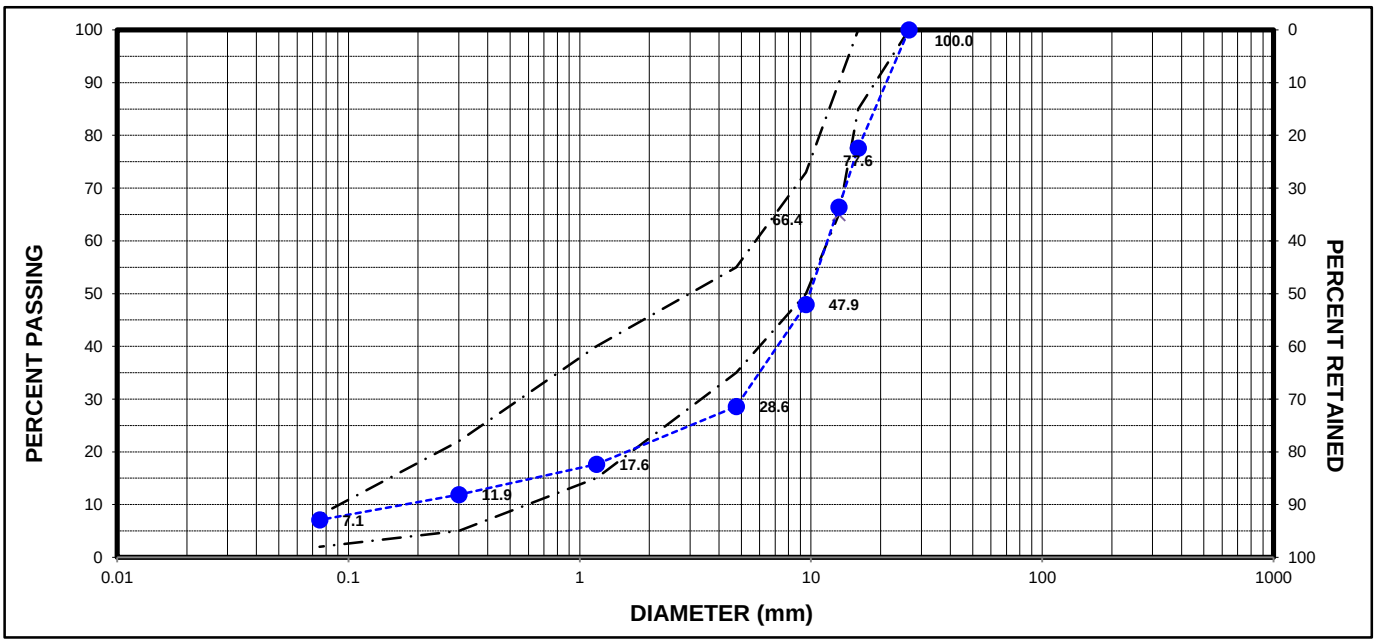
Granular A Sieve Analysis (LS-602)

Client:	City of Toronto	Lab No.:	GS4
Project:	255 Spadina Road, Toronto, Ontario	Project No.:	12629303

Soil Description:	Aggregate (Pit)	Sample Source:	Borehole
Type of Material:	Sandy Gravel, Trace Fines	Sample Location:	BH6-24 / AS1 - Test Pad - No
Proposed Use:	Other	Agg. Supplier/Source:	N/A
Sampled By:	C.B	Sample Date:	February 6, 2024

Sample Location Remarks: BH6-23 / AS1- Depth (0.09m - 0.34m)

Sieve Size (mm)	% Passing	OPSS 1010 Gradation Specification		
		Min. %	-	Max. %
26.5	**100**	100	-	100
16.0	* **78**	85	-	100
13.20	**66**	65	-	90
9.50	* **48**	50	-	73
4.75	* **29**	35	-	55
1.180	**18**	15	-	40
0.300	**12**	5	-	22
0.075	**7**	2	-	8



Remarks: Sandy Gravel, Trace Fines (Gravel 71%, Sand 22%, Fines 7%)

* Sieve result does not meet the OPSS 1010 Specification for: Granular A Sieve Analysis

Performed by:	Riddhi Wilson	**Date:**	February 20, 2024
Verified by:	Raj Kadia C.E.T	**Date:**	February 23, 2024

Granular B Type I Sieve Analysis (Quarry) (LS-602)

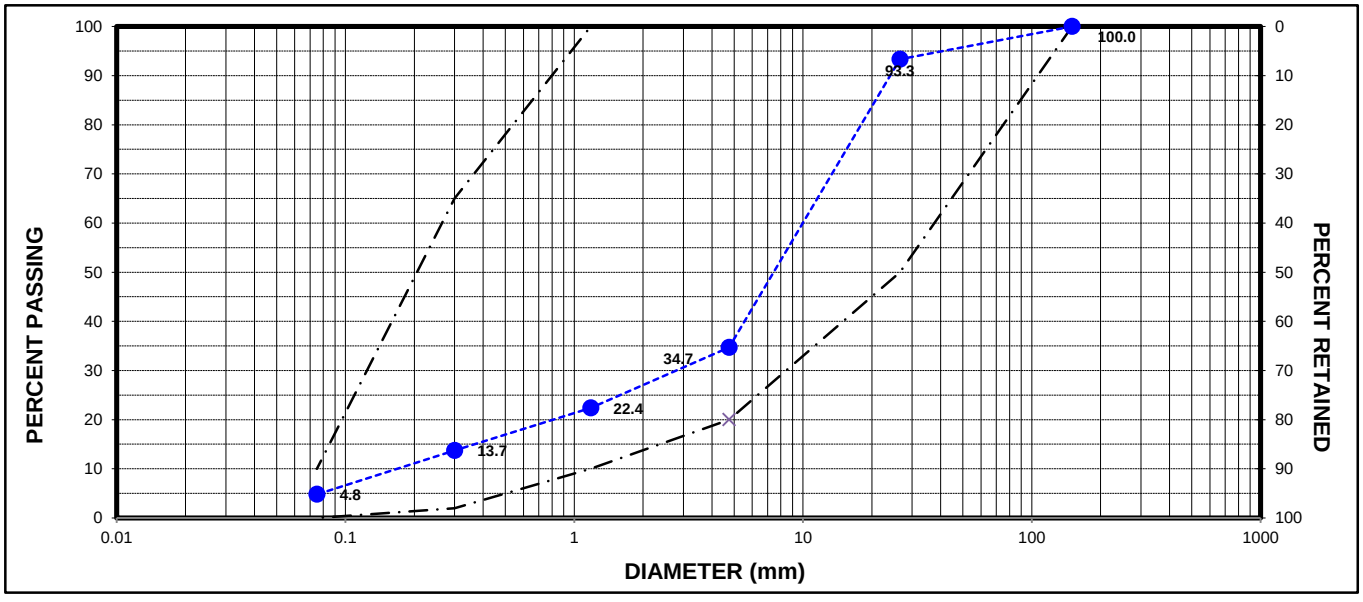
Client:	City of Toronto	**Lab No.:**	GS4
Project:	255 Spadina Road, Toronto, Ontario	**Project No.:**	12629303

Soil Description:	Aggregate (Quarry)	Sample Source:	Borehole
Type of Material:	Granular B Type I	Sample Location:	Borehole - Test Pad - No
Proposed Use:	Other	Agg. Supplier/Source:	N/A
Sampled By:	C.B	Sample Date:	February 6, 2024

Sample Location Remarks: BH6-24/ SS3/ Depth (0.9m - 1.5m)

Sieve Size (mm)	% Passing	OPSS 1010 Gradation Specification		
		Min. %	-	Max. %
150.0	**100**	100	-	100
26.5	**93.3**	50	-	100
4.75	**34.7**	20	-	100
1.18	**22.4**	10	-	100
0.300	**13.7**	2	-	65
0.075	**4.8**	0	-	10

Additional laboratory reporting information available upon request.



Remarks: Sandy Gravel, Trace Fines (Gravel 65%, Sand 30%, Fines 5%)

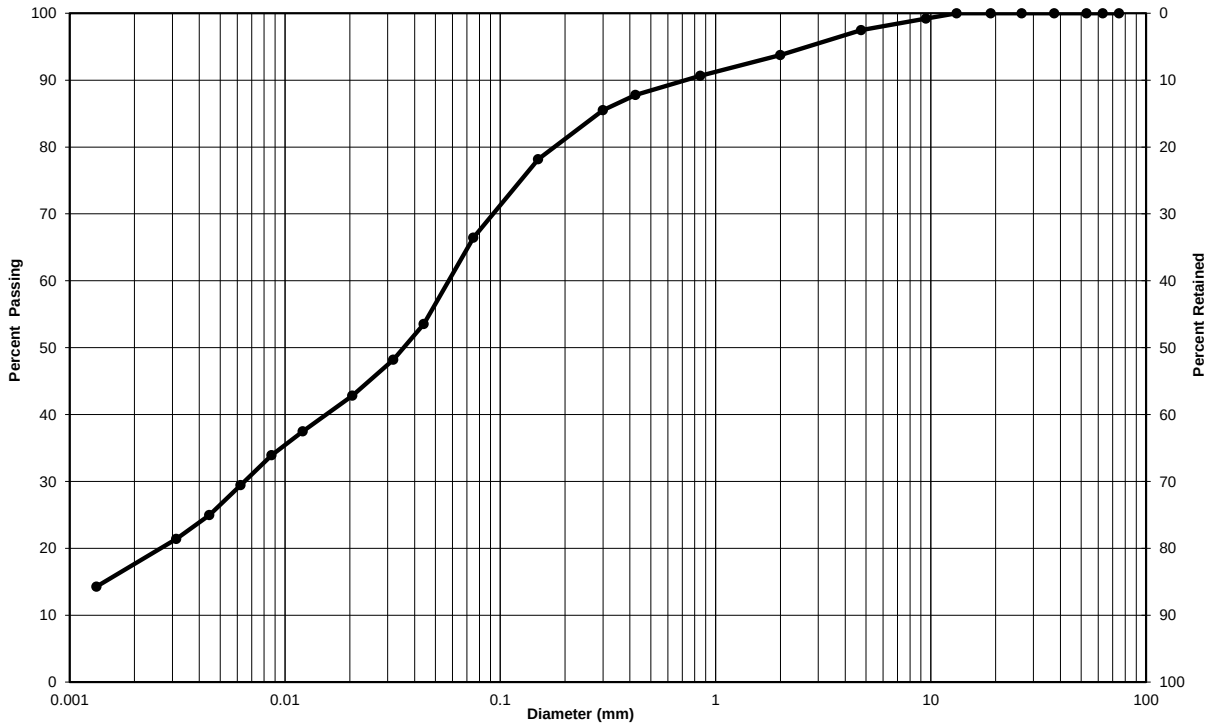
Sample meets the OPSS 1010 Specification for: Granular B Type I Sieve Analysis (Quarry)

Performed by:	Riddhi Wilson	**Date:**	February 20, 2024
Verified by:	Raj Kadia C.E.T	**Date:**	February 23, 2024
Laboratory Location:	5582 Tomken Rd., Mississauga, Ontario L4W 1P4		

Particle-Size Analysis of Soils (Geotechnical) (USCS) (ASTM D422)

Client:	City of Toronto	**Lab No.:**	GS4
Project/Site:	255 Spadina Road, Toronto, Ontario	**Project No.:**	12629303

Borehole no.:	BH2-24	Sample no.:	SS3
Depth:	0.87m - 1.5m	Enclosure:	



Clay & Silt	Sand			Gravel	
	Fine	Medium	Coarse	Fine	Coarse
Unified Soil Classification System					

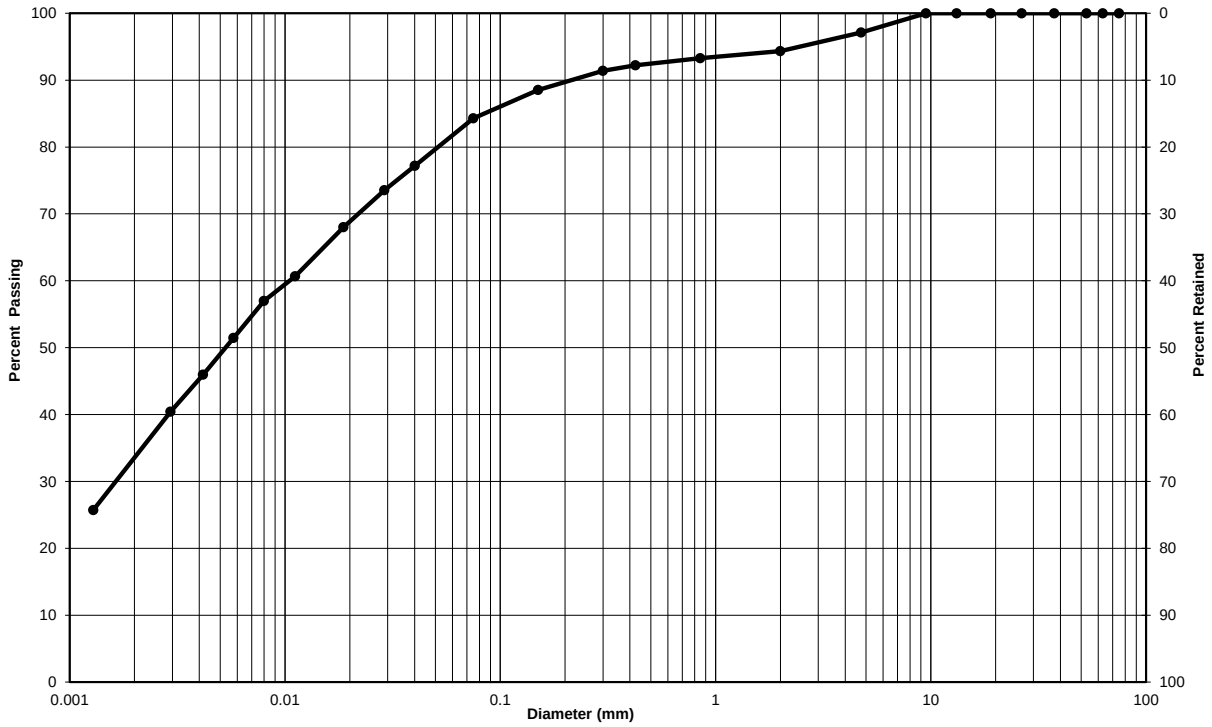
Soil Description	Gravel (%)	Sand (%)	Clay & Silt (%)
Sandy Silt, Some Clay, Trace Gravel	3	31	66
Silt-size particles (%):	48		
Clay-size particles (%) (<0.002mm):	18		

Remarks:

Performed by:	Riddhi Wilson	**Date:**	February 12, 2024
Verified by:	Raj Kadia C.E.T.	**Date:**	February 20, 2024

Particle-Size Analysis of Soils (Geotechnical) (USCS) (ASTM D422)

Client:	City of Toronto	**Lab No.:**	GS4
Project/Site:	255 Spadina Road, Toronto, Ontario	**Project No.:**	12629303
Borehole no.:	BH3-24	Sample no.:	SS3
Depth:	0.81m - 1.5m	Enclosure:	



Clay & Silt	Sand			Gravel	
	Fine	Medium	Coarse	Fine	Coarse
Unified Soil Classification System					

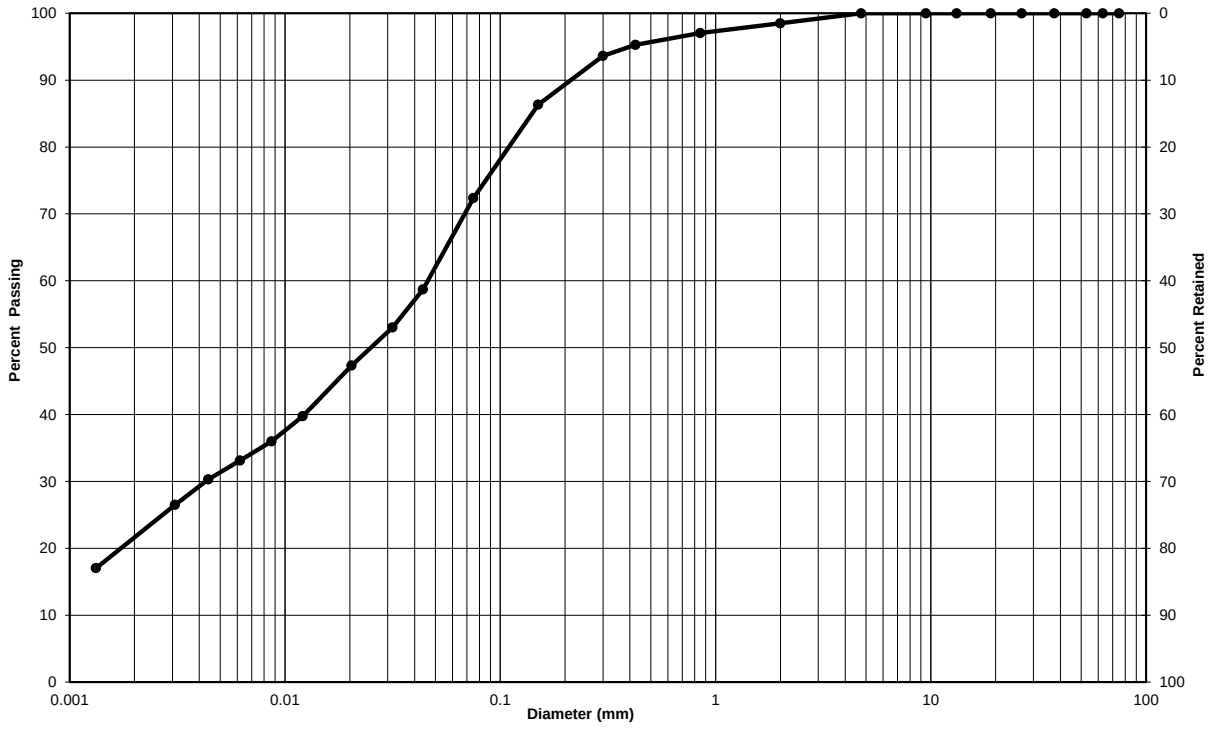
Soil Description	Gravel (%)	Sand (%)	Clay & Silt (%)
Silty Clay, Some Sand, Trace Gravel	3	13	84
Silt-size particles (%):	52		
Clay-size particles (%) (<0.002mm):	32		

Remarks:

Performed by:	Riddhi Wilson	**Date:**	February 12, 2024
Verified by:	Raj Kadia C.E.T.	**Date:**	February 20, 2024

Particle-Size Analysis of Soils (Geotechnical) (USCS) (ASTM D422)

Client:	City of Toronto	**Lab No.:**	GS4
Project/Site:	255 Spadina Road, Toronto, Ontario	**Project No.:**	12629303
Borehole no.:	BH4-24	Sample no.:	SS3B
Depth:	0.77m - 1.5m	Enclosure:	



Clay & Silt	Sand			Gravel	
	Fine	Medium	Coarse	Fine	Coarse
Unified Soil Classification System					

Soil Description	Gravel (%)	Sand (%)	Clay & Silt (%)
Clayey Silt Sandy	0	28	72
Silt-size particles (%):	50		
Clay-size particles (%) (<0.002mm):	22		

Remarks:

Performed by:	Riddhi Wilson	**Date:**	February 12, 2024
Verified by:	Raj Kadia C.E.T.	**Date:**	February 20, 2024

Appendix D

Pavement Core Logs and Core Photographs

Figure D.1
BH/CH01-24
Parking Lot
1.15 m South from North face curb

Type	Lift Thickness (mm)
HMA	40
HMA	50
Total	**90**

Figure D.2
BH/CH03-24
Parking Lot
0.30m East from West face curb

Type	Lift Thickness (mm)
HMA	40
HMA	50
Total	90

Figure D.3
BH/CH04-24
Parking Lot
1.55m West from East face curb

Type	Lift Thickness (mm)
HMA	30
HMA	45
Total	**75**

Figure D.4
BH/CH06-24
Parking Lot
0.65m East from West face curb

Type	Lift Thickness (mm)
HMA	50
HMA	40
Total	**90**