



**Request for Quotation#
RFQ-303-2020-A-005-DCAM
for
Uxville Well Holding Tank Relocation**

**Appendix B, B-1 and B-2
The Deliverables and Material Disclosures**

Document 3 of 3

Appendix B, B-1 The Deliverables



The Regional Municipality of Durham
Works Department
605 Rossland Road East, Whitby ON, L1N 6A3

Uxville Well Holding Tank Relocation
15 Anderson Boulevard, Uxville, Ontario L9P 0C7

Cambium Inc.
PO Box 325, 52 Hunter Street East, Peterborough, Ontario K9H 1G5
11054-001

and

J.L. Richards and Associates Limited
314 Countryside Drive, Sudbury, ON P3E 6G2
31008-000




These specifications (Divisions 00-33) were prepared under the supervision of the following registered coordinating professionals:

Written by: Cambium & J.L. Richards

Date: January 2021

Checked by: Jeremy Kraemer, Ph.D., P.Eng.
(Consultant Project Manager)

Date: March 2021

Civil – Sewage	Civil – Roads / Drainage	Electrical
		

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Not used

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Not used

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Not used

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1 General

1.1 Section includes

- .1 This Section specifies requirements for the warranty security holdback.

1.2 Related requirements

- .1 Section 01 33 00 - Submittals

1.3 Warranty security holdback

- .1 A warranty security holdback will be retained progressively, commencing on the first payment certificate, from monies that would otherwise be payable to the Contractor, up to a maximum value of \$3,000.
- .2 The maximum Warranty Security Holdback will be held commencing on the Substantial Performance Payment Certificate.
- .3 The Warranty Security Holdback withheld on progress payments prior to the Substantial Performance Payment Certificate will be based on the percentage of work completed up to the end of the payment period for the respective progress payment. For this purpose, the "percentage of work completed" will be calculated based on the original tendered scope of work. Change Orders will not be considered in the calculation of this "percentage of work completed".
- .4 The retained amount is strictly to be used as a warranty security and is in addition to the regular holdback and finishing holdback retained in accordance with the Construction Act and any monies withheld due to known incomplete and/or deficient work.
- .5 Where Change Orders are issued which increase the final Contract Price, the Owner reserves the right to withhold additional warranty security at the same rate (as is determined by dividing the specified maximum warranty security by the awarded Contract Price) on the value of such additional work. The Owner will notify the Contractor if the Owner intends to invoke this right on any Change Order and payment for any carrying costs on additional warranty security shall be deemed to be included in the respective Change Order.

- .6 Except as otherwise provided hereunder, the warranty security, less any deductions made therefrom as provided for in the Contract, shall be released to the Contractor following the issuance by the Owner of the Final Acceptance Certificate at the end of the warranty period.

- .7 No substitute form of security will be permitted.**

1.4 Basis of payment

- .1 Payment for all carrying costs associated with the warranty security holdback, including interest thereon, shall be made under this Section on the appropriate line item in the payment certificate. No other compensation for warranty security holdbacks will be considered. Progress payments will be made as follows:
- 25% on the first progress payment certificate
 - 25% on the Substantial Performance Payment Certificate
 - 50% on the Final Payment Certificate, together with the release of the warranty security holdback at the end of the warranty period, as may be extended in accordance with the Contract.
- .2 The sum of prices bid for insurance and warranty security holdback carrying costs shall not exceed 2% of the lump sum tendered price.

2 Products – not used

3 Execution – not used

End of section

1 General

1.1 Section includes

- .1 This Section specifies requirements for an extension of the Contract warranty period.

1.2 Extension of warranty period

- .1 Provide extension of warranty period for one (1) additional year (for a total of two (2) years).

1.3 Basis of payment

- .1 Payment for this Section shall be made on the Substantial Performance Payment Certificate

2 Products – not used

3 Execution – not used

End of section

1 General

1.1 Section includes

- .1 Documents and terminology.
- .2 Associated requirements.
- .3 Work expectations.
- .4 Work by other parties.
- .5 Premises usage.

1.2 Related requirements

- .1 Section 01 32 00 Construction Progress Documentation
- .2 Section 01 78 00 Closeout Submittals

1.3 Complementary documents

- .1 Drawings, Specifications, and schedules are complementary each to the other and what is called for by one to be binding as if called for by all. Should any discrepancy appear between documents which leave doubt as to the intent or meaning, abide by Precedence of Documents article below or obtain direction from the Consultant.
- .2 Install plumbing piping not shown or indicated diagrammatically in schematic or riser diagrams to provide an operational assembly or system.
- .3 Locate devices with primary regard for convenience of operation and usage.
- .4 Examine all discipline Drawings, Specifications, and schedules and related Work to ensure that Work can be satisfactorily executed. Conflicts or additional work beyond work described to be brought to attention of Consultant.

1.4 Location

- .1 The Place of the Work is located at 15 Anderson Boulevard, Uxbridge.
- .2 The materials and/or services shall be delivered FOB Destination(s), Prepaid.

1.5 Description of the Work

- .1 Work of this Contract comprises demolition and removal of an existing sewage holding tank and installation of a new holding tank complying with Ontario Building Code setbacks including a new float assembly and alarm panel, as well as road and drainage improvements.
- .2 Division of the Work among Subcontractors, suppliers and vendors is solely the Contractor's responsibility. Neither the Owner nor Consultant assumes any responsibility to act as an arbiter to establish subcontract terms between sectors or disciplines of work.
- .3 Refer to the Drawings and Specifications for the required Work.
- .4 Division 01 General Requirements, of the Specifications generally specify work and coordination of the work that is the direct responsibility of the Contractor but shall not be interpreted to define absolutely the limits of responsibility that must be established between the Contractor and their Subcontractors by their separate agreements.
- .5 Ensure that the work includes all labour, equipment and products required, necessary or normally recognized as necessary for the proper and complete execution of the work of each trade.
- .6 The Work also includes the examination of the site, submission of samples, scheduling and coordination, project meetings, protection of the existing facility, repair and preparation of surfaces, quality control, inspection reports, project cleanliness, maintenance of data, preparation of as-built drawings, final cleaning and warranty.

1.6 Contract method

- .1 Construct Work under a single, lump Sum price contract.
- .2 Assume responsibility for assigned contracts as Subcontracts forming part of the Work.
- .3 Quotation Documents were prepared by the Consultant for the Region of Durham. Any use which a third party makes of the Contract Documents, or any reliance on or decisions to be made based on them, are the responsibility of such third parties. The Consultant and Region accept no responsibility for damages, suffered by any third party as a result of decisions made or actions based on the Contract Documents.

1.7 Documents provided

- .1 The Region will not supply hard copies of contract documents to the contractor for construction purposes.

1.8 Performance of the Work

- .1 Commence the Work within 7 calendar days of receipt of the Order to Commence Work letter issued by the Project Manager and, subject to adjustment in Contract Time as provided for in the Contract Documents, attain Substantial Performance of the Work, within twelve (12) weeks after issuance by the Project Manager of an Order to Commence Work and complete the Work in its entirety within fourteen (14) weeks after issuance by the Project Manager of an Order to Commence Work. No work is to be started until the Project Manager has issued an Order to Commence Work letter.

1.9 Discrepancies and clarifications

- .1 Advise Consultant of discrepancies discovered in requirements of the Contract Documents and request clarification from Consultant in written form.
- .2 Advise Consultant when clarifications are required pertaining to meaning or intent of requirements of Contract Documents and request clarification from Consultant in written form.
- .3 Do not proceed with related work until written clarification is provided by Consultant.
- .4 Failure to notify Consultant shall result in Contractor incurring responsibility for resulting deficiencies and expense at no additional cost to the Owner.
- .5 Written instructions issued by Consultant for clarification, implicitly supersede applicable and relevant aspects of the Contract Documents irrespective of whether these documents are explicitly or specifically cited in clarification requests or clarification instructions.

1.10 Work by Owner

- .1 Permit the Owner and/or their other contractors to inspect the work at any reasonable time, and to perform such work and install such equipment as the Owner may require.

1.11 Basis of payment

- .1 **There shall be no payment for this Section as no actual Work is specified herein.**

1.12 Qualifications of Contractor

- .1 The General Contractor for this Contract, or its Subcontractor executing the portion of work permitted by the Building Permit for Sewage Disposal System, shall have the following experience:
 - .1 Substantially performed at least five (5) projects of similar and related scope in the past three (3) years. Similar and related project scope includes installing any Class 4 or 5 sewage system under a valid building permit (septic permit) in Ontario.
 - .2 Be registered with Ontario's QuARTS Public Search Registry as an On-Site Sewage System (OSS) Installer Firm with a status of "Current".

2 Products – not used

3 Execution – not used

End of section

1 General

1.1 Section includes

- .1 Owner access.
- .2 Contractor's use of site.
- .3 Connecting to existing services.
- .4 Site access.
- .5 Continuity of existing service.
- .6 Working hours.
- .7 Special scheduling requirements.

1.2 Related requirements

- .1 Section 01 32 00 Construction Progress Documentation
- .2 Section 01 33 00 Submittal Procedures.
- .3 Section 01 50 00 Temporary Facilities and Controls.
- .4 Section 01 53 00 Temporary Construction.
- .5 Section 01 55 00 Vehicular Access and Parking.
- .6 This section describes requirements applicable to all Sections within Divisions 02 to 33.

1.3 Owner access

- .1 The building and parking areas, which are not immediately affected by the Work, will remain occupied by the Owner during the Work.
- .2 Ensure adequate access to areas not occupied for the Work.

1.4 Contractor's use of site

- .1 Accept full responsibility of assigned work and storage areas from the time of Contract award until completion of the Work.
- .2 Do not unreasonably encumber site with materials or equipment.
- .3 Use of site is limited to areas indicated on drawings.
- .4 Do not obstruct entrances, stairs or fire exits.

- .5 Do not prop open any doors.
- .6 Maintain free access route for emergency vehicles, waste disposal trucks and delivery vehicles.
- .7 Provide for all vehicular and pedestrian traffic.
- .8 The placement of a refuse bin will be allowed in an area agreed by the Owner.
- .9 Repair all damage to paving, grass, walkways, curbs, trees, planting beds, and any other areas, caused by the Contractor's operations.

1.5 Existing services

- .1 Operation of existing facility shall take precedence over Contractor's operations. Keep existing buildings in operation at all times.
- .2 Notify Owner, Consultant and utility companies of intended interruption of services and obtain required permission.
- .3 Where Work involves breaking into or connecting to existing services, give Consultant and Owner minimum seven (7) Calendar Days of notice for necessary interruption of electrical or communications services throughout course of work. This lead time is required so the Owner can adequately prepare and test backup power and communications systems prior to interruption.
- .4 Keep duration of interruptions minimum.
- .5 Perform utility interruptions only during business days between the hours of 7:00 am and 3:00 pm to allow the Owner to monitor the status of backup power systems in operation.
- .6 Construct barriers in accordance with Section 01 53 00.

1.6 Site access by Contractor

- .1 Unless stated otherwise, the Contractor will be permitted access to the site from start of construction until Substantial Performance of the Contract.

- .2 Access Roads and Walks:
 - .1 All construction vehicles and personnel required for construction shall use existing access roads and walks as determined at later date by Owner. When no longer required, or at completion of Work, make good all disturbed surfaces. Maintain roads and walks, removing dirt, mud, debris, ice, snow and other obstructions during use.
 - .2 Provide for access of emergency vehicles at all times.
- .3 After Substantial Performance of the Contract, the Contractor shall not enter the facility without prior written authorization from the Owner and the Contractor's activities shall be restricted to the work duly authorized by the Owner, including modifications and rectification of deficiencies. If the Contractor proposes to perform additional work other than the authorized work, further written approval must be obtained by the Contractor from the Owner prior to proceeding with such additional work.
- .4 Workers employed on the site shall sign a "Daily Register" provided showing "IN" and "OUT" times and number of hours worked on each shift. Times shall be recorded in 24-hour time (i.e. 00:00 to 23:59).

1.7 Working hours

- .1 Carry out Work between the hours of 7:00 a.m. and 5:00 p.m. local time, Monday through Friday except statutory holidays.
- .2 If the Contractor wishes to complete any work outside of these regular hours, obtain permission from the facility operator through the Owner at least forty-eight (48) hours prior.
- .3 The Owner will not be responsible for additional costs associated with working after regular hours unless such after-hours work is ordered by the Owner and not specified as a requirement in the Contract Documents.
- .4 The Owner will not be responsible for additional costs associated with working after regular hours if such after-hours work is required for the Contractor to return to the agreed upon construction schedule.

2 Products – not used

3 Execution – not used

End of section

1 General

1.1 Section includes

- .1 Special procedures for progress payments on Region of Durham Tenders.

1.2 Related requirements

- .1 Section 01 33 00 – Submittals

1.3 Construction Act Holdback

- .1 In accordance with the Construction Act, a 10% holdback will be deducted from each progress payment.
- .2 The Owner shall have the right to withhold the 10% Construction Act regular and finishing holdbacks until the Owner is in receipt of the submissions specified in Section 01 33 00, Articles 3.1.1.2 (submissions at Substantial Performance) and 3.1.1.3 (submissions at Completion) as applicable.

1.4 Submission of Proper Invoices for payment

- .1 Applications for payment shall be preceded by a payment review meeting to be held no less than five (5) calendar days before the end of the payment period.
- .2 Email draft invoices to the Consultant and the Owner at least one (1) business day prior to the scheduled payment review meeting.
- .3 At the payment review meeting, review with Owner and Consultant the Contractor's draft invoice, status of Change Orders and Change Directives, holdbacks and net amount due for that billing period.
- .4 Consultant and Owner will provide a marked-up copy of the Contractor's draft invoice within five (5) business days of the payment review meeting.
- .5 **Submit Proper Invoice by email to the Consultant and the Owner's Project Manager, Mr. Mark McLester, P.Eng. and Contract Services Coordinator, Ms. Sally Arnott** for processing no earlier than seven (7) calendar days after the end of the billing period. **Do not mail a hardcopy.** Email title shall include **"URGENT – PROGRESS PAYMENT REQUEST for Contract Q-303-2020-A-005-DCAM"** and be marked as High Priority.

2 Products – not used

3 Execution – not used

End of section

1 General

1.1 Section includes

- .1 This Section includes administrative provisions for coordinating construction operations including, but not limited to, the following:
 - .1 General project coordination procedures
 - .2 Coordination of Drawings
 - .3 Administrative and supervisory personnel
- .2 Each Subcontractor shall participate in coordination requirements. Certain areas of responsibility will be assigned to specific Subcontractors by Contractor.

1.2 Related requirements

- .1 Section 01 32 00 Construction progress documentation
- .2 Section 01 33 00 Submittal procedures
- .3 Section 01 45 00 Quality control
- .4 Section 01 78 00 Closeout submittals
- .5 This section describes requirements applicable to all Sections within Divisions 02 to 33.

1.3 Administrative requirements

- .1 General Coordination: Coordination that generally applies to all components of the Contract Documents as follows:
 - .1 Subcontractor shall coordinate construction activities as required with Contractor's Schedule to ensure efficient and orderly installation of each part of Work.
 - .2 Subcontractors shall notify Contractor where the Subcontractor's installation of one part of Work is dependent on installation of other components.

- .3 Schedule and coordinate construction activities of other Subcontractors in sequence required to obtain best results. Where availability of space is limited, Subcontractor shall coordinate installation of different components to assure maximum accessibility for required maintenance, service, and repair.
- .4 Subcontractors shall make adequate provisions to accommodate items scheduled for later installation by other Subcontractors, under separate contract or by Contractor's own forces.

1.4 Quality assurance

- .1 Designate an on-site party responsible for instructing workers and overseeing the environmental goals for the project.
- .2 Review environmental procedures and status of Waste Management Plan and Environmental Protection Plan at each construction meeting.

1.5 Existing site conditions

- .1 Existing construction shown has been taken from available information. When specific details are unavailable, assumptions have been made regarding probable construction. Any variance from construction, as shown on the Drawings shall be immediately brought to the attention to the Owner.
- .2 Make careful examination of the site and investigate and be satisfied as to all matters relating to the nature of the Work to be undertaken.
- .3 Check all site dimensions prior to fabrication of materials and construction.
- .4 Report any inconsistencies, discrepancies, omissions and errors between site conditions and Contract Documents to the Consultant prior to the commencement of Work.
- .5 Ensure that each Subcontractor performing work related to the site conditions has examined the site so that all are fully informed on anything which may affect their Work thereon in order that construction proceeds competently and expeditiously.

1.6 Coordination

- .1 Cooperate with the Owner's representatives at the Place of the Work to minimize disruptions to the building operation and services.

- .2 Coordinate with the Owner's representative regarding access and use of site.
- .3 Coordinate performance and sequencing of the Work with the Owner.

1.7 Submittals

- .1 Provide submittals in accordance with Section 01 33 00.

1.8 Dimensions

- .1 Do not scale directly from Drawings. Obtain clarification from the Consultant if there is ambiguity or lack of information.
- .2 Details and measurements of any Work which is to fit or to conform with Work installed shall be taken at the Place of the Work.
- .3 Verify dimensions at the Place of the Work before commencing Shop Drawings or other submittals. Before fabrication commences report discrepancies to the Consultant in writing. Incorporate accepted variances on Shop Drawings and as-built records.
- .4 In areas where equipment is scheduled to be installed, check dimensional data on equipment to ensure that the area and equipment, including future known equipment are compatible with necessary access and clearances provided. Equipment supplied shall be dimensionally suitable for space allocation.
- .5 Verify that the Work is executed in accordance with dimensions and positions indicated which maintain levels and clearances to adjacent Work, as set out in accordance with the requirements of the Contract Documents and ensure that Work installed in error is rectified at Contractor's expense before construction continues.
- .6 Owner will accept no claims for extra expense on the part of the Contractor for non-compliance.

1.9 Supervision of the Work

- .1 Provide all superintendence, labour, equipment, and materials necessary to complete the project in an orderly, competent, and expeditious manner.
- .2 While work is in progress, maintain site superintendence capable of acting competently on site instructions given by the Owner.

- .3 Maintain good order and discipline among workers engaged on the project.

1.10 Maintenance of documents on site

- .1 Maintain at the job site, one copy of each of following:
 - .1 Drawings
 - .2 Specifications
 - .3 Addenda
 - .4 Change Orders and Change Directives
 - .5 Shop Drawings and samples
 - .6 Other modifications to the Contract
 - .7 Site instructions
 - .8 Copy of approved work schedule
 - .9 Copy of manufacturer's installation instructions
 - .10 SDS sheets
 - .11 Contractor's health and safety policy
 - .12 Ministry of Labour Notice of Project
 - .13 Building permit for sewage disposal system
- .2 Maintain documents in a clean, dry, legible condition and make documents available at all times for inspection by the Owner

1.11 Security and protection of construction site and equipment

- .1 Protect the construction site and equipment from damage. Repair any damage to the construction site or equipment to the satisfaction of the Owner.
- .2 Take precautions to protect the site and equipment until Completion.
- .3 The Owner shall not be responsible for damaged, lost or stolen materials and equipment. Contractor is responsible for all materials and equipment left on site until the work is complete. Provide for proper security or storage of any material or equipment left on site.
- .4 When not at the Place of the Work, ensure that the work area is secured, and that all tools and materials are locked up.

1.12 Existing utilities

- .1 Protect all utilities at the Place of the Work for the duration of the work.
- .2 Maintain all existing services including power and data to the entire building and occupied areas of the suites used by the Region. Any and all shutdowns or disruptions in service are to be approved by the Owner or building Owner.
- .3 Have all utilities located and staked out and provide the Owner with all cable locations supplied by the utilities prior to commencing any excavation or demolition.
- .4 Contact the local municipality, utilities or any other agencies for further information regarding the exact location of all existing utilities, to exercise the necessary care in excavation and demolition operations, and to take such precautions necessary to safeguard the utilities from damage.
- .5 All utilities located within the limits of proposed excavations shall be exposed by hand excavation and carefully supported and protected by the Contractor.
- .6 Removal, relocation, or supporting of existing utilities shall be carried out in consultation with the respective authorities:
 - .1 Bell Canada
 - .2 Hydro One Connections
 - .3 any other utility/contractor as required.
- .7 Be responsible for paying charges by the Utilities or Agencies for locating cables and the Contractor shall pay any charges for repairs and lost revenue if utility equipment, cables, pipes or other assets are damaged and is responsible to make good any ground and surface damages as well.
- .8 Prior to the commencement of demolition, provide a sign-off sheet from the existing water, gas, electrical, telephone, and sewer service providers.
- .9 Verify that services are cut off, capped, diverted and/or removed as required by local regulating authorities. Ensure all services are in the proper state prior to commencing work.

- .10 Ensure all utilities are capped off at the property line and identify the termination locations on reference drawings.
- .11 No claims will be considered which are based on delays or inconvenience resulting from the removal or relocation of services not being completed before the start of this Contract.

1.13 Contact for after-hours or emergency services

- .1 When after-hours work is permitted by the Owner, provide an after-hours phone or pager number to respond to emergencies or requirements that arise when offices are closed.

1.14 Road occupancy restrictions

- .1 Do not close any lanes of road without prior approval of Owner and authorities having jurisdiction. Submit written request to Owner, including relevant information and details of closure requirements, a minimum of seven (7) days in advance of the date when road closure is required.
- .2 If approved by Owner, apply for and obtain a temporary street occupation permit sufficiently in advance of the required road closures so as to cause no delay in the progress of the Work.
- .3 Costs for any delays in the Work caused as a result of failure to obtain the necessary road closure permits shall be borne by the Contractor at no increase in either the Contract Price or the Contract Time.

1.15 Signs and identification

- .1 Display no signs or advertisements without the Owner's approval. When signs are permitted, maintain signs in good condition during the Work and remove signs as directed by the Owner upon completion of the Work.

2 Products – not used

3 Execution

3.1 Coordination

- .1 Coordinate all construction operations to verify efficient and orderly installation of each part of Work.
- .2 Coordinate construction operations, included in different Sections, that depend on each other for proper installation, connection, and operation with Subcontractors.
- .3 Schedule construction operations in sequence required where installation of one part of Work depends on installation of other components, before or after its own installation.
- .4 Coordinate installation of different components with Subcontractors to verify maximum accessibility for required maintenance, service, and repair.
- .5 Make adequate provisions to accommodate items scheduled for later installation.
- .6 Prepare memoranda where necessary, for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.
- .7 Prepare similar memoranda for Owner where coordination of Owner-installed Work is required.
- .8 Ensure all Subcontractors coordinate scheduling and timing of required administrative procedures with other construction activities, and activities of other contractors and Subcontractors, if any, to avoid conflicts and to verify orderly progress of Work.

3.2 General installation provisions

- .1 Ensure that installer of each major component inspects both substrate and conditions under which Work is to be performed. Do not proceed until unsatisfactory conditions have been corrected in an acceptable manner.

- .2 Comply with manufacturer's installation instructions and recommendations, to extent that those instructions and recommendations are more explicit or stringent than requirements contained in the Contract Documents.
- .3 Inspect Materials immediately upon delivery and again prior to installation. Reject damaged and defective items and arrange for replacement.
- .4 Provide attachment and connection devices and methods necessary for securing Work. Secure Work true to line and level. Allow for expansion and building movement.
- .5 Supervise all Subcontractor work.
- .6 Provide uniform joint widths in exposed Work. Arrange joints in exposed Work to obtain the best visual effect.
- .7 Isolate each part of completed construction from incompatible material as necessary to prevent deterioration.
- .8 Coordinate temporary enclosures with required inspections and tests, to minimize necessity of uncovering completed construction for that purpose.
- .9 Install individual components at standard mounting heights recognized within the industry for the applications indicated where mounting heights are not indicated. Confirm non-standard specified mounting heights with Consultant prior to installation.
- .10 Coordinate construction activities to ensure that no part of Work completed or in progress is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during construction period.

3.3 Layout of Work

- .1 Be responsible for laying out the work in compliance with the Drawings, Shop Drawings and schedules.
- .2 Rectify all errors resulting from failure to follow or verify Products, Drawings or the proper layout of any element of the installation.

3.4 Protection of existing facility and personnel

- .1 Do not endanger in any way the personnel, equipment, offices and existing structures of the Owner. Exercise caution to keep the existing facilities free from damage due to the Contractor's work. If the measures observed by the Contractor are not considered sufficient, the Owner may order additional precautions to be taken.
- .2 Take all necessary precautions to adequately protect the building and property from damage. Make good all damage at no extra cost.
- .3 Erect suitable safety barriers as required for security and to make the site safe for pedestrians.
- .4 Supply and erect temporary barricades where required.
- .5 Remove the barriers from the site at the completion of the work or when directed by the Owner.
- .6 Adequately protect the Work at all stages and maintain the protection until the Work is completed. Remove and replace any work and materials damaged that cannot be satisfactorily repaired at no extra cost.
- .7 Motorized equipment shall be powered electrically or by battery only. Internal combustion powered equipment shall not be permitted within construction areas unless approved in writing by the Owner.

3.5 Restoration of disturbed areas

- .1 Fill all holes left from mechanical and electrical services removed or relocated to maintain the required fire separations and to maintain the intended finished appearance of the surface.
- .2 Patch and make good all existing floor, wall and ceiling materials and finishes disturbed by construction work.

3.6 Restoration work for uncovered site hazards

- .1 Make restorations to uncovered or disrupted mechanical or electrical services where such services pose a potential health or safety risk.
- .2 Restorations shall be an extra to the Contract only where such work could not have been reasonably foreseen by examination at the time of bidding in the sole opinion of the Owner.

End of section

1 General

1.1 Section includes

- .1 Pre-construction meeting.
- .2 Regular progress meetings.

1.2 Related Requirements

- .1 Section 01 29 00 Payment procedures
- .2 Section 01 32 00 Construction progress documentation
- .3 Section 01 50 00 Temporary facilities and controls

1.3 Pre-construction meeting

- .1 Owner will arrange for a pre-construction meeting to discuss and resolve administrative procedures and responsibilities prior to the commencement of the Work. Owner's project team, the Consultant and a representative from the facility user department will participate in the pre-construction meeting.
- .2 Coordinate and organize attendance at the pre-construction meeting by representatives of major Subcontractors and other parties in contract with the Contractor.
- .3 Owner will arrange attendance of other interested parties not responsible to the Contractor.
- .4 Agenda will include, but not be limited to, the following topics as are pertinent to the Contract:
 - .1 Introduction of key personnel participating in the project
 - .2 Project communications procedures
 - .3 Restrictions on working hours, access, movements on site, etc.
 - .4 Reviewing the approved project schedule
 - .5 Contract administration requirements including submittals, payment procedures, and Change Order procedures
 - .6 Identify any product availability problems and substitution requests and procedures
 - .7 Review Consultant's inspection requirements

- .8 Schedule for project meetings
- .9 Temporary services to be provided by the Contractor
- .10 Emergency contact numbers
- .11 Site-specific safety training
- .12 Site security requirements

1.4 Progress meetings

- .1 Consultant will schedule and administer bi-weekly project meetings throughout progress of Work.
- .2 Consultant will distribute written notice of each progress meeting four (4) days in advance of meeting date to the Owner, the Contractor and other affected parties.
- .3 Due to the Covid-19 pandemic, meetings will be held either by phone / video conference, or if in person, will be outdoors with all health and safety requirements in effect.
- .4 Consultant will prepare agenda for meetings.
- .5 Agenda will include, but not be limited to, the following topics as are pertinent to the Contract.
 - .1 Review, approval of minutes of previous meeting.
 - .2 Construction safety
 - .3 Coordination
 - .4 Review of Work progress since previous meeting.
 - .5 Field observations, problems, conflicts.
 - .6 Problems which impede construction schedule.
 - .7 Review of off-site fabrication delivery schedules.
 - .8 Revision to construction schedule.
 - .9 Progress schedule, up to next scheduled meeting.
 - .10 Review submittal schedules: expedite as required.
 - .11 Maintenance of quality standards.
 - .12 Review proposed changes for effect on construction schedule and on completion date.
 - .13 Review site safety and security issues.

- .14 Requests for information/clarification
- .15 Contemplated changes
- .16 Other business.
- .6 Inform the Consultant three (3) days in advance of meetings regarding any other items the Contractor wishes to be added to the agenda.
- .7 Ensure key project personnel attend regularly scheduled progress meetings to be held on site at times and dates that are mutually agreed to by the Owner and Contractor.
- .8 Coordinate and organize attendance of individual Subcontractors and material suppliers when requested. Relationships and discussions between Subcontractor participants are not the responsibility of the Consultant and do not form part of the meetings content.
- .9 Ensure that Contractor representatives in attendance at meetings have required authority to commit Contractor to actions agreed upon. Assign same persons to attend such meetings throughout the contract period.
- .10 Consultant will preside at meetings.
- .11 Consultant will record minutes.
- .12 Consultant will reproduce and distribute copies of minutes within three (3) business days after each meeting and transmit to meeting participants and affected parties not in attendance.

2 Products – not used

3 Execution – not used

End of section

1 General

1.1 Section includes

- .1 Construction schedule.
- .2 Schedule of submittals.
- .3 Progress photographs.

1.2 Related requirements

- .1 Section 01 11 00 Summary of work
- .2 Section 01 33 00 Submittal procedures.
- .3 This section describes requirements applicable to all Sections within Divisions 02 to 33.

1.3 General requirements

- .1 Reference Section 01 11 00 for required phasing and sequencing of the Work.
- .2 Be responsible for planning and scheduling of the Work.
- .3 Be responsible for ensuring that Subcontractors plan and schedule their respective portions of the Work within the overall project schedule.

1.4 Construction schedule

- .1 Submit a construction schedule, in PDF format, within seven (7) calendar days after the date of the Order to Commence Work.
- .2 Consultant will review schedule and return review copy within five (5) Working Days after receipt.
- .3 Revise and resubmit construction schedule within seven (7) calendar days.
- .4 Indicate submittal dates, and all critical Product delivery dates, including those furnished by Owner and required by allowances.
- .5 Include dates for commencement and completion of each major element of the contract including, but not limited to, the following:
 - .1 Submittals.

- .2 Site preparation.
- .3 Installation of new sewage holding tank.
- .4 Removal of existing sewage holding tank.
- .5 Electrical and plumbing.
- .6 Rip-rap drainage trench.
- .7 Driveway extension.
- .8 Final completion.
- .6 Submit updated construction schedule with each application for payment and whenever requested by the Consultant, identifying changes since the previous version.
- .7 Construction schedule updates:
 - .1 Indicate projected percentage of completion of each item as of first day of month.
 - .2 Indicate progress of each activity to date of submission schedule.
 - .3 Indicate changes occurring since previous submission of schedule:
 - .1 Major changes in scope.
 - .2 Activities modified since previous submission.
 - .3 Revised projections of progress and completion.
 - .4 Other identifiable changes.
 - .4 Provide a narrative report to define:
 - .1 Problem areas, anticipated delays, and impact on schedule.
 - .2 Corrective action recommended and its effect.
 - .3 Effect of changes on schedules of other prime contractors.

1.5 Progress photographs

- .1 Digital photography:
 - .1 Submit electronic copy of colour digital photography in *.jpg format, minimum 6 Megapixel resolution.
 - .2 Identification: Name and number of project and date of exposure indicated.
- .2 Submit digital photographs on a USB flash drive or other Owner-approved electronic file transfer method.

- .3 Number of viewpoints: Locations of viewpoints determined by Consultant.
- .4 Submission Frequency: Submit progress photographs monthly with progress statement.

2 Products – not used

3 Execution – not used

End of section

1 General

1.1 Section includes

- .1 Shop Drawings and Product data.
- .2 Samples.
- .3 Certificates and transcripts.

1.2 Related requirements

- .1 Section 01 32 00 Construction Progress Documentation.
- .2 Section 01 78 00 Closeout Submittals.
- .3 This section describes requirements applicable to all Sections within Divisions 02 to 33.

1.3 Administrative requirements

- .1 Submit to Consultant all submittals listed for review.
- .2 Work affected by a submittal shall not proceed until review is complete.
- .3 Present Shop Drawings, samples and mock-ups in SI (metric) units unless Imperial measurements are used on the Drawings.
- .4 Review submittals prior to submission to Consultant. This review represents that necessary requirements have been determined and verified, or will be, and that each submittal has been checked and coordinated with requirements of Work and Contract Documents.
- .5 Submittals not stamped, signed, dated, identified as to specific project, and attesting to their being reviewed will be returned without being examined and shall be considered rejected.
- .6 Time required by the Consultant and Owner to review the fourth and subsequent re-submittals to correct errors and address previous comments will be charged back to the Contractor.
- .7 Notify Consultant in writing at time of submission identifying deviations from requirements of Contract Documents stating reasons for deviations.
- .8 Verify field measurements and affected adjacent Work are coordinated.

- .9 Contractor's responsibility for errors and omissions in submission is not relieved by Consultant's review of submittals.
- .10 Contractor's responsibility for deviations in submission from requirements of Contract Documents is not relieved by Consultant review.
- .11 Keep one (1) reviewed copy of each submission on site.

1.4 Shop Drawings, Product data and engineered submissions

- .1 The term "Shop Drawings" means drawings, diagrams, illustrations, schedules, performance charts, brochures Product data and other data which are to be provided by Contractor to illustrate details of a portion of Work.
- .2 Indicate materials, methods of construction and attachment or anchorage, erection diagrams, connections, explanatory notes and other information 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 Section under which adjacent items will be supplied and installed. Indicate cross references to Drawings and Specifications.
- .3 Shop Drawings shall carefully consider architectural intent and shall be coordinated to ensure items to be exposed in finished work are located to provide best aesthetics as directed or required by the Consultant. Show orientation and relationships between materials where deemed necessary by the Consultant.
- .4 Include in every shop drawing submission, a copy of the relevant specification section, with addendum updates included where applicable, and all referenced and applicable sections, with addendum updates included where applicable. Check-mark each paragraph to indicate compliance with the specification or mark otherwise to indicate requested deviations from specified requirements. Check marks denote full compliance with a paragraph in its entirety. If deviations from the specifications are indicated, underline each point of deviation and denote by a number in the margin to the right of the identified paragraph. The remaining portions of the paragraph not underlined will signify compliance with the specified requirements. Provide in the submittal a detailed, written justification for each deviation.

- .5 Failure to include a copy of the marked-up specification sections, along with justifications for any requested deviations to specified requirements, with the submittal shall be sufficient cause for rejection of the entire submittal with no further consideration.
- .6 Submit all Shop Drawings electronically. Each submittal shall be a single PDF file complete with transmittal letter, check marked specifications, and Shop Drawings. The Owner reserves the right to require that a submittal be submitted in hard copy.
- .7 Allow five (5) Working Days for Consultant's review of each submission.
- .8 Adjustments made on Shop Drawings by the Consultant are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Consultant prior, and obtain Consultant's approval prior to proceeding with Work.
- .9 Make changes in Shop Drawings as the Consultant may require, consistent with Contract Documents. When resubmitting, notify the Consultant in writing of any revisions other than those requested.
- .10 Accompany submissions with transmittal letter, containing:
 - .1 Date
 - .2 Make
 - .3 Company
 - .4 Region's project title and tender number.
 - .5 Contractor's name and address.
 - .6 Identification and quantity of each Shop Drawing, Product data and sample.
 - .7 Other pertinent data
- .11 Submissions shall include:
 - .1 Date and revision dates.
 - .2 Project title and number.
 - .3 Name and address of:
 - .1 Subcontractor.
 - .2 Supplier.
 - .3 Manufacturer.

- .4 Contractor's stamp, signed by Contractor's authorized representative certifying approval of submissions, verification of field measurements and compliance with Contract Documents.
- .5 Details of appropriate portions of the Work as applicable:
 - .1 Fabrication.
 - .2 Layout, showing dimensions, including identified field dimensions, and clearances.
 - .3 Setting or erection details.
 - .4 Capacities.
 - .5 Performance characteristics.
 - .6 Standards.
 - .7 Operating weight.
 - .8 Wiring diagrams.
 - .9 Single line and schematic diagrams.
 - .10 Relationship to adjacent work.
- .12 After Consultant's review, distribute copies.
- .13 Delete information not applicable to project.
- .14 Supplement standard information to provide details applicable to project.
- .15 If upon review by the Consultant, no errors or omissions are discovered or if only minor corrections are made, the electronic shop drawing submission will be stamped "reviewed" or "reviewed as modified" and returned and fabrication and installation of Work may proceed. If Shop Drawings are returned stamped "not reviewed", noted copy will be returned and re-submission of corrected Shop Drawings, through same procedure indicated above, must be performed before fabrication and installation of Work may proceed.

- .16 The review of Shop Drawings by the Consultant is for sole purpose of ascertaining conformance with general design concept. This review shall not mean that the Consultant approves detail design inherent in Shop Drawings, responsibility for which shall remain with Contractor submitting same, and such review shall not relieve Contractor of responsibility for errors or omissions in Shop Drawings or of his responsibility for meeting all requirements of the Contract Documents. The Contractor is responsible for dimensions to be confirmed and correlated at job site, for information that pertains solely to fabrication processes or to techniques of construction and installation and for co-ordination of Work of all sub-trades.
- .17 Whenever there is a requirement for the Contractor to submit drawings with the seal of a Professional Engineer, such submissions shall be within the timelines of the project.

1.5 Samples

- .1 Submit for review samples as requested in respective Specification Sections. Label samples with origin and intended use.
- .2 When requested by Consultant, provide samples within seven (7) Working Days of such request.
- .3 Deliver samples prepaid to the Consultant's business address.
- .4 Notify the Consultant in writing, at time of submission, of deviations in samples from requirements of Contract Documents.
- .5 Where colour, pattern or texture is criterion, submit full range of samples.
- .6 Adjustments made on samples by the Consultant are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Consultant, and obtain the Consultant's approval prior to proceeding with Work.
- .7 Make changes in samples which Consultant may require, consistent with Contract Documents.
- .8 Reviewed and accepted samples will become standard of workmanship and material against which installed Work will be verified.

2 Products – not used

3 Execution

3.1 Submissions

- .1 Submit the following to the Owner:
 - .1 During Construction
 - .1 Progress Reports
 - .2 Update of any Insurance Certificates about to expire
 - .3 Current valid WSIB Clearance Certificate
 - .4 Shop Drawings, Product data and samples
 - .5 Minutes of Meetings
 - .6 Inspection Reports
 - .7 Change Orders and Change Directives
 - .8 Requests for Information (RFI)
 - .9 Updated construction drawings
 - .10 Updated construction schedule
 - .2 At Substantial Performance, provide originals of:
 - .1 Statutory Declaration
 - .2 Occupancy Permit
 - .3 Substantial Performance Release of Claims Letter
 - .4 Update of any Insurance Certificates about to expire
 - .5 Current Valid WSIB Certificate of Clearance
 - .6 Extended Warranties, if applicable
 - .7 Closeout Submittals. Refer to Section 01 78 00.
 - .3 At Completion
 - .1 Approved ESA Electrical Inspection report
 - .2 Update of any Insurance Certificates about to Expire
 - .3 Current Valid WSIB Certificate of Clearance
 - .4 Completion Release of Claims Letter
 - .5 Region of Durham Standard Form for Property Owner's Release of Land used by the Contractor

- .4 At end of Warranty Period
 - .1 Final Release of Claims Letter

End of section

1 General

1.1 Section includes

- .1 Health and safety administrative requirements for contractors performing work for the Region of Durham.

1.2 References

- .1 Province of Ontario website
 - .1 Construction site health and safety during COVID-19
 - .1 <https://www.ontario.ca/page/construction-site-health-and-safety-during-covid-19>
 - .2 Resources to prevent COVID-19 in the workplace
 - .1 <https://www.ontario.ca/page/resources-prevent-covid-19-workplace#construction>
- .2 Canadian Construction Association
 - .1 [COVID-19 - Standardized Protocols for All Canadian Construction Sites](#)

1.3 Health and safety policy

- .1 Obtain copies of all Subcontractors' Health and Safety Policies and Programs prior to such Subcontractor commencing work on the site if and when requested.
- .2 Provide a copy of Contractor's current Health and Safety Policies and Program, to implement that policy prior to the commencement of construction.
- .3 Comply with all Federal and Provincial Health and Safety Acts, Regulations and Lower Tier Municipality By-Laws and with all applicable industry safety standards.
- .4 Comply with 213/91 (Construction Projects) made under the Occupational Health and Safety Act (OHSA) and all amendments thereto. Copies of the Regulations may be obtained from the Ministry of Labour at their Scarborough office, Publications Ontario at 880 Bay Street, Toronto, Ontario M7A 1N8 (Tel. 416-326-5300).

- .5 Provide any and all personal protective equipment for Contractor's own workers where prescribed.

1.4 Health and safety legislation and requirements

- .1 Comply with all applicable industry safety standards.
- .2 Comply with legislative requirements for work performed including, but not limited to, qualifications of workers, training, supervision and use of onsite equipment.
- .3 Provide any and all personal protective equipment for Contractor's own workers where prescribed by legislation.

1.5 COVID-19 Health and Safety

- .1 Contractor will have submitted a signed copy of the Region's Health and Safety Practices form which was updated on October 12, 2021, with new requirements related to COVID-19. The requirements listed on that form shall apply in addition to the requirements of this Section.
- .2 Ensure that all workers comply with the Government of Ontario's guidelines for [Construction Site Health and Safety During COVID-19](#) including but not limited to:
 - .1 washing hands often with soap and water or alcohol-based hand sanitizer
 - .2 sneeze and cough into sleeve
 - .3 avoid touching eyes, nose or mouth
 - .4 avoid contact with people who are sick
 - .5 stay home if you are sick
 - .6 avoid close contact with other people. Close contact includes being within two (2) metres of another person.
 - .7 wear face masks and appropriate PPE as required
- .3 The Contractor shall monitor the latest recommendations from public health officials related to protecting workers from COVID-19 and adjust work procedures and provide personal protective equipment as per those recommendations.

- .4 **All workers attending the Place of the Work shall complete an online COVID-19 pre-screening checklist each day prior to arriving on site. The online pre-screening checklist can be accessed using the following link: this URL:**

[Region of Durham Wellness Screening](#)

- .5 The Contractor is encouraged to follow the latest edition of the Canadian Construction Association's document "[COVID-19 - Standardized Protocols for All Canadian Construction Sites](#)."

1.6 Safety data sheets (SDS)

- .1 Provide to the Consultant a list of Designated Substances that will be brought to the site prior to commencing work. Safety Data Sheets (SDS) and the hazardous material inventory for each substance listed must be kept on the Project.
- .2 Maintain copies of current SDS at the Place of the Work at a location accessible to all workers, the Consultant, and the Owner.

1.7 List of designated substances at the site

- .1 In accordance with the requirements of Section 30(1) of the Occupational Health and Safety Act, the Bidder is hereby advised that the designated substances as listed hereunder are or may be present on the site and within the limits of this Contract:

Designated Substance	Identified on this Site?	Location
Acrylonitrile	No	
Arsenic	No	
Asbestos	No	
Benzene	No	
Coke Oven Emissions	No	
Ethylene Oxide	No	
Isocyanate	No	

Designated Substance	Identified on this Site?	Location
Lead	No	
Mercury	Not identified	Existing holding tank float switches
Silica	No	
Vinyl Chloride	No	

- .2 Comply with the governing Ministry of Labour regulations respecting protection of workers, removal, handling and disposition of any Designated Substances encountered in carrying out the Work proposed on this contract.
- .3 Comply with the governing environmental and disposal regulations respecting handling and disposition of designated substances.
- .4 Should a Designated Substance not herein identified be encountered, immediately notify the Consultant and the Owner of the Contractor's findings. Management of such substance shall be treated as extra work.

1.8 Health and safety warnings

- .1 The Consultant and the Owner shall have the right to document all Contractors for all health and safety warnings and/or to stop any Contractor's work if the Contractor fails to comply with any requirements under this Section.
- .2 Similarly, the Consultant and the Owner shall have the right to issue warnings and/or to stop work for any Contractor violations of the contract including Regional health and safety policy and programs and/or if the Contractor creates a health or safety hazard.
- .3 Written warnings and/or stop work orders shall be given to the Contractor using the Owner's Contractor Health and Safety Warning / Stop Work Order Form.

- .4 If the Contractor fails to adequately respond to the Consultant's or the Owner's order to correct a hazard, the Owner reserves the right to have the hazard corrected by a third party at the Contractor's expense. The Consultant's or the Owner's decision, as the case may be, as to the urgency for such correction shall be final.

1.9 Notice of project

- .1 Notify all regulatory bodies required for construction activities, (i.e., Notice of Project, employer notification, etc.). Notifications shall include, but not be limited to, the notification requirements laid out in OHSA Sec 51-53 and the requirements of Ontario Regulation 213/91 for Construction Projects, Sections 5, 6 and 7. For the purpose of this contract the Contractor shall be the "Constructor".

1.10 Confined space

- .1 Persons intended to work in confined spaces, as defined by the Owner, must have formal training in performing work in confined spaces.
- .2 Provide proof of valid certificates of such training for all workers prior to entry of such workers into confined spaces.
- .3 Provide all necessary safety equipment for entry into confined spaces.
- .4 Where workers are required to enter a confined space, as defined by the OHSA, O. Reg. 632/05 Section 221.2, ensure that workers of the Contractor and all Subcontractors follow the requirements of the above legislation, including but not limited to:
 - .1 having a method for recognizing each confined space to which the program applies
 - .2 having a method for assessing the hazards to which workers may be exposed
 - .3 having a method for the development of confined space entry plans (which include on-site rescue procedures)
 - .4 having a method for training workers
 - .5 having an entry-permit system.

- .5 Supply the necessary tools and equipment for workers to perform the confined space entry. These items include, but are not limited to, required documentation, gas detectors, breathing equipment, fall protection and rescue equipment.

1.11 Fire safety requirements

- .1 Protect persons and properties.
- .2 Maintain operable fire protection equipment.
- .3 Maintain fire fighters' access.
- .4 Provide temporary fire extinguishing equipment.
- .5 Maintain existing and temporary fire exit.
- .6 Where the work requires the Contractor to shut down fire and life safety systems, provide a fire watch for the duration of the shutdown.
- .7 In occupied buildings, schedule the use of flame, such as torches and volatile substances well in advance with the approval of the Owner and the Consultant.
- .8 Maintain a fire watch after all welding operations for a period of not less than seven (7) hours.

2 Products – not used

3 Execution

End of section

1 General

1.1 Section includes

- .1 Laws, notices, permits and fees.
- .2 Discovery of hazardous materials.
- .3 Codes and standards.
- .4 Regulations.
- .5 Permits.

1.2 Related requirements

- .1 This section describes requirements applicable to all Sections within Divisions 02 to 33.

1.3 Laws, notices, permits and fees

- .1 The laws of the Place of the Work shall govern the Work.
- .2 The Contractor shall be responsible for obtaining all permits (including Building Permit for Sewage Disposal System from the Durham Region Health Department), licenses and certificates necessary for the performance of the Work which were in force at the date of executing the Agreement.
- .3 Provide the required notices and comply with the laws, ordinances, rules, regulations or codes which are or become in force during the performance of the Work and which relate to the Work, to the preservation of the public health and to construction safety.
- .4 Construction of the Work is subject to the approval, inspection, by-laws, and regulations of municipal, provincial and federal authorities and organizations concerned with roads, streets, railways, telephones, electrical supplies, gas supplies and other public services having jurisdiction in respect to any matter in the Contract.

- .5 If the Contractor knowingly performs or allows work to be performed that is contrary to any laws, ordinances, rules, regulations or codes, the Contractor shall be responsible for and shall correct the violations thereof; and shall bear the costs, expenses and damages attributable to the failure to comply with the provisions of such laws, ordinances, rules, regulations or codes.
- .6 Determine detailed requirements of authorities having jurisdiction.
- .7 Pay all fees associated with applications, permits and inspections required by authorities having jurisdiction.
- .8 Pay construction damage deposits levied by municipality in connection with the issuance of a building permit.
- .9 Keep a copy of all permits on site.

1.4 Hazardous material discovery

- .1 Asbestos: If material resembling asbestos is encountered which has not been identified in the Contract Documents, immediately stop work and notify the Consultant.

1.5 Codes and standards

- .1 Perform the Work in accordance with the requirements of the latest editions of the following statutes and codes in force at the time of the Agreement:
 - .1 Ontario Building Code
 - .2 Municipal by-laws
 - .3 Electrical Safety Authority
 - .4 Ontario Electrical Safety Code
 - .5 National Fire Protection Association
 - .6 Ontario Construction Safety Act
 - .7 Ontario Hydro
 - .8 WHIMS
- .2 Comply with any applicable revisions to codes and regulations after the date of the agreement. Costs of such revisions shall be compensated for through a Change Order.

- .3 Complete all required electrical connections and provide Electrical Safety Authority (ESA) approval on such work.
- .4 Revise the installation and engineered drawings at no additional cost to the Owner until they meet the requirements and approval of the ESA and Region of Durham Health Department. Provide copies of all authority sign-offs.
- .5 Review Contract Drawings and Specifications for any conflicts with the above regulations and where there are apparent discrepancies, notify the Owner in writing and obtain clarification before proceeding with the Work.

1.6 Precedence of standards

- .1 Where applicable, ensure that all materials and equipment conform to the applicable standards listed.
- .2 Canadian standards take precedence over American standards in the case of duplication or conflict.

1.7 Permits

- .1 Obtain all necessary permits and approvals required for this project.
- .1 Provide a copy of all permits to the Consultant immediately upon receipt.
- .2 Keep a copy of all permits on site.

2 Products

2.1 Equipment

- .1 Provide electronically powered equipment, components, and supplies that are CSA or ULC approved.

3 Execution – not used

End of section

1 General

1.1 Section includes

- .1 Inspection and testing, administrative and enforcement requirements.

1.2 Related requirements

- .1 This section describes requirements applicable to all Sections within Divisions 02 to 33.

1.3 Reference standards

- .1 ISO/IEC 17025-2005 - General Requirements for the Competence of Testing and Calibration Laboratories.
- .2 SCC (Standards Council of Canada).
- .3 Electrical tests and inspections will comply with NETA, International Electrical Testing Association.

1.4 Review by Consultant

- .1 Consultant may order any part of the Work to be reviewed or inspected if Work is suspected to be not in accordance with Contract Documents.
- .2 If, upon review such work is found not in accordance with Contract Documents, correct such Work and pay cost of additional review and correction.
- .3 If such Work is found in accordance with Contract Documents, Owner will pay cost of review and replacement.

1.5 Quality of Products and materials

- .1 All materials, fixtures, fittings, appliances and apparatus supplied and installed by the Contractor shall be new, the best of their kind for the application and free from any defects.

1.6 Quality control inspection and testing

- .1 At reasonable times and giving reasonable notice of at least twenty-four (24) hours, the Owner may inspect the work site and/or those areas of the Contractor's place of business that are related to the performance of the Contract. If the Owner requires an inspection, the Contractor must provide reasonable assistance and arrangements for the inspection to take place.
- .2 Where required by the Consultant, the Contractor shall supply certified copies of all tests upon, all materials to be used in the construction of the works, indicating that materials comply with the Specifications. Such tests shall be made by a testing company which has been approved by the Consultant and shall be at the Contractor's expense.
- .3 Any and all materials or manufactured products, including pipe, may be tested by the Owner. The Contractor shall, at their own expense, supply samples for quality assurance (QA) testing as directed of any and all materials or manufactured products which he is using or proposes to use in the work, and he shall not be entitled to any extra remuneration nor any extension of the time allowed to complete the work, as a result of any delays which may be caused or occasioned as a result of compliance with these Specifications
- .4 Materials whose test specimens fail to meet specified requirements and those materials which are rejected upon inspection shall not be permitted to remain on the site of the work and shall be immediately removed from the site of the work by the Contractor at their own expense.
- .5 In addition to the above items, the Contractor shall arrange and pay for the following:
 - .1 Inspection and testing required by law, ordinances, rules, regulations or Authorities having jurisdiction
 - .2 Inspection and testing performed exclusively for the Contractor's convenience
 - .3 Testing, adjustment and balancing of mechanical and electrical equipment and systems.
 - .4 Mill tests and certificates of compliance
 - .5 Vibration monitoring

- .6 Tests specified to be carried out by the Contractor under the supervision of the Consultant
- .7 The cost of all specified testing of piping systems, tanks, etc. shall be included in the cost in the Contract

1.7 Receipt and acceptance of materials

- .1 During the process of unloading any equipment and materials, inspect equipment and materials in the presence of the Consultant for loss or damage in transit. Notify the agent of the carrier of any loss or damage to the shipment.
- .2 All equipment and materials supplied by the Contractor and found faulty or defective upon delivery will be rejected by the Consultant and shall be replaced by the Contractor at their own expense, but failure to discover same shall not relieve the Contractor of responsibility for removing all faulty materials supplied by him and replacing same with good materials which he shall supply all at his own cost and expense.
- .3 The unloading of all equipment shall be carefully performed in an approved manner to avoid damage to such equipment. Ample facilities shall be provided by the Contractor for handling the equipment.

1.8 Metric vs. Imperial equipment

- .1 Notwithstanding the requirements set out in the preceding paragraphs, because not all trades have adopted metric material or in cases of adapting to existing, where metric and Imperial types of equipment are to be installed under the same contract, the Contractor shall ensure that mating of metric and non-metric equipment is possible.
- .2 Supply shop drawings of proposed transition couplings, etc., to the Consultant prior to assembly. The supply and installation of such couplings, adapters, etc., shall be at no additional cost to the Owner.

1.9 Quality assurance testing by the Owner

- .1 The Owner may request any required samples at any reasonable time.

- .2 The Owner will perform quality assurance testing using its own forces which are CSA certified. Alternatively, the Owner may appoint a CSA-certified agency to conduct quality assurance testing on its behalf. Quality assurance testing will be at a frequency determined by the Owner.
- .3 All costs of quality assurance testing, except as noted otherwise, shall be borne by the Owner.
- .4 The Contractor may request that the Owner's, or their agent's, quality assurance equipment be tested for CSA compliance. All costs for such tests shall be at the Contractor's expense where such equipment is found to be in compliance.
- .5 Provide clear access to work areas to be inspected and assist as required by providing safety equipment, ladders, materials, etc., for these inspections, including but not necessarily limited to, welding x-ray inspections, concrete testing, painting inspections and compaction tests.
- .6 Additional testing required to prove the adequacy of construction shall be at the Contractor's expense, where the routine test shows the construction to be inadequate, or where the Contractor's materials and procedures have not been as specified, or when work has proceeded without approval or inspection.
- .7 Where the Owner's quality assurance testing differs from the Contractor's quality control results, the Owner's results shall govern and all additional quality assurance testing shall be billed to the Contractor at a rate of not less than \$250 per re-test except where such re-tests are carried out by the Owner's agency in which case such re-tests shall be billed at a rate of 110% of the invoiced amount.

1.10 Electrical Testing Scope

- .1 For the following items affected under this contract, test the following for proper operation and adjustments:
 - .1 Cable
 - .2 Electrical Trench
 - .3 Alarm Panel and Float.
 - .4 Junction Box and Terminals.
 - .5 Panelboard Breaker.

- .6 Low voltage feeders.

2 Products

2.1 Electrical Test Equipment

- .1 General:
 - .1 Ensure suitable power supply is available for test equipment, be it 120 Vac or battery-powered devices. Record make, model, and calibration date of test instrument(s).
 - .2 All test equipment to have valid calibration stickers displayed on the equipment and must be calibrated within the last 12 months by a company who regularly engages in this service.
- .2 Insulation Resistance Metre (Megger):
 - .1 DC megger to have insulation scale to 100,000 megohms (1000 V scale).
 - .2 Output voltages on dc megger units to be 500 V, 1000 V, 2500 V and 5000 V.
 - .3 DC megger units to be suitable for 10-minute megger tests and polarization index tests.
- .3 Thermographic Scan Equipment:
 - .1 Test equipment to be minimum equal to Agema Thermo Vision 570 Portable Infrared camera system. Must be capable of taking a colour infrared image of all irregularities.

2.2 Electrical Test Reports

- .1 Reports of all tests to be in written form.
- .2 Include copy of test results in maintenance manuals.
- .3 General:
 - .1 All test results to be input to an electronic test sheet program.
 - .2 All test sheets to include equipment nameplate data, customer identification, time and date of tests, environmental conditions during tests and test results.

- .4 Test Results and Reporting – Data For Inclusion:
 - .1 The following data to be included in the test report:
 - .1 Adjustments, modifications and repairs made on the equipment on site with explanation on such work (necessity and method of execution).
 - .2 A summary of conclusions of the inspection and testing.
 - .1 The acceptable criteria and limiting values of measured figures by the equipment manufacturer. These are to include the insulation resistance, (megohm) contact resistance (microhm), leakage current (microampere).
 - .3 Recommendations for long-term and short-term remedial work.
- .5 Report Format:
 - .1 Final report to be submitted in electronic and print format in three (3) bound copies neatly in 3-ring binders with separate sections for each item as listed therein.
 - .2 Photographs to be mounted on background sheet complete with labels. Curves and graphs to be neatly plotted on appropriate graph paper. Result tables to be made electronically and logically arranged.
 - .3 The contractor to submit all forms necessary to fully describe the inspection, testing and maintenance of all items.

3 Execution

3.1 Electrical Test Procedures

- .1 Coordinate all tests and shutdowns with Owner.
- .2 Pre-service Inspection and Testing, (Post-service Inspection and Testing) of equipment will be as described in section 2.2 and defined as follows:
 - .1 Incoming Power and Bell cable
 - .2 Insulation resistance tests;

- .3 Low Voltage Feeder Cables:
 - .1 In and out of main board to be meggered at 1,000 V DC and terminals checked for torque. Any reading less than 50 Megohms to be investigated.
 - .2 Insulation Resistance.
 - .3 Continuity Check.
 - .4 Proper Phasing, ABC.
- .4 Cables:
 - .1 General:
 - .1 Conduct inspection and testing. Compile test results in accordance with Equipment Test Schedule.
 - .2 Record type and size of cables on test sheets and check against the single-line drawing.
 - .3 Confirm all hardware to torque requirements of the manufacturer, and mark off all hardware after verification.
 - .2 Cabling Inspection:
 - .1 For cables likely to have sheath current, check to ensure metal supports are not used, e.g., fibre plates used.
 - .2 Check for the proper physical protection of cables through concrete opening or metal plating.
 - .3 Check all power cables, e.g., Teck cables properly spaced (by one cable diameter unless specifically indicated otherwise) and secured by proper clips.
 - .4 Check insulators and bushings for cracks and other physical defects.
 - .5 Visually inspect cables where possible throughout their run and check conditions of the following:
 - .1 Use of proper lugs.
 - .2 Cables are properly shaped without sharp bends.
 - .6 Open cables are properly supported on racks, trays or ladders in buildings. No concentrated stress points exist.
 - .7 Insulation jacket damage.
 - .8 Cables at duct mouth for wear or cracking.

- .9 For rubber insulated cables inspect stress cones or terminations, check the following:
 - .1 Terminals for tightness and overheating.
 - .2 Stress cones and terminations for cracks, dirt, or tracking.

3.2 Electrical Commissioning

- .1 Complete all equipment information forms as supplied in the specification or by the Consultant. The information will detail the electrical equipment as installed.
- .2 Document all equipment start-up and testing. The system testing will include, but not be limited to, the following:
 - .1 Pre-service main incoming power and communications.
 - .2 Post-service main incoming power and communications.
 - .3 Alarm Panel and float.
- .3 Prove the proper operation of all building electrical distribution systems relevant to the work.
- .4 Verify and demonstrate the sequence of the alarm control panel in the presence of the Consultant.
- .5 Include all start-up/testing documentation, authority inspection reports and equipment information forms in the operations & maintenance manual.
- .6 Instruct the owner on the operation of the installed electrical and control systems once commissioning is complete.

End of section

1 General

1.1 Section includes

- .1 Storage of Products and materials.
- .2 Temporary sanitary facilities Owner and Consultant.
- .3 Temporary sanitary facilities and shelter for Contractor's workers.
- .4 Temporary fire protection
- .5 First aid
- .6 Security of construction site

1.2 Related requirements

- .1 Section 01 51 00 Temporary Utilities.
- .2 This section describes requirements applicable to all Sections within Divisions 02 to 33.

2 Products – not used

3 Execution

3.1 General

- .1 Facility operations take priority over Contractor operations. When Contractor operations necessarily impact facility operations and use, review impacts with the Consultant, the Owner and the facility operator and provide temporary facilities to the satisfaction of the Consultant.
- .2 All schedules must indicate contingency and alternate date and times in the event of postponement for any reason, or breakdown of temporary bypass equipment during the shutdown.
- .3 Comply with local Police, Fire Department and Paramedic requirements regarding notification of all interested parties concerning the construction work and provisions for traffic movement.

3.2 Storage of Products, materials and equipment

- .1 Storage areas are defined on the Drawings, or as designated by the Consultant. Store materials to ensure the preservation of their quality and fitness for the work. Store materials on wooden platforms or other hard, clean surfaces off the ground or in a watertight storage shed of sufficient size for the storage of materials that might be damaged by storage in the open. Provide the shed with a wood floor raised a minimum of 150 mm clear of the ground.
- .2 Store materials to ensure the preservation of their quality and fitness for the work. Store materials on wooden platforms or other hard, clean surface off the ground. Locate stored materials to facilitate prompt inspection.
- .3 Provide weathertight heated storage sheds with raised floors for the storage of equipment, as required by the Consultant and/or equipment manufacturers. Provide all storage instructions from equipment suppliers well in advance of the scheduled delivery dates.
- .4 Handle and store products in a manner to prevent damage, adulteration, deterioration and soiling and in accordance with manufacturer's instructions.
- .5 Store packaged or bundled products in original and undamaged condition with manufacturer's seal and labels intact. Do not remove from packaging or bundling until required in the work.
- .6 Store products subject to damage from weather in weatherproof enclosures.
- .7 Store cementitious products clear of earth or concrete floors, and away from walls.
- .8 Keep sand, when used for grout or mortar materials, clean and dry. Store sand on wooden platforms and cover with waterproof tarpaulins during inclement weather.
- .9 Store sheet materials, lumber, etc. on flat, solid supports and keep clear of ground. Slope to shed moisture.

- .10 Store and mix paints in a heated and ventilated room. Remove oily rags and other combustible debris from the site daily. Take every precaution necessary to prevent spontaneous combustion.
- .11 Remove and replace damaged products to the satisfaction of the Consultant.
- .12 Do not use private property for storage purposes without the written permission of the property owner. Pay rental charges and damages associated with occupying private lands.

3.3 Temporary sanitary facilities for Owner and Consultant

- .1 Provide suitable sanitary facilities for Owner and Consultant in accordance with governing regulations and ordinances. Such facilities shall be for the exclusive use of the Owner and Consultant; Contractor's workers shall use separate facilities in accordance with 3.4 below.
- .2 Keep sanitary facilities clean, properly maintained and fully stocked with the necessary supplies at all times.
- .3 Install and confirm operation of temporary sanitary facilities prior to decommissioning existing sewage holding tank. Leave temporary sanitary facilities in place and fully operational until Substantial Performance.

3.4 Temporary shelter and sanitary facilities for Contractor's workers

- .1 Provide suitable sanitary facilities for work force in accordance with governing regulations and ordinances.
- .2 Keep sanitary facilities clean, properly maintained and fully stocked with the necessary supplies at all times.
- .3 Provide and maintain drinking water and washing facilities in accordance with governing regulations and ordinances.
- .4 Post notices and take such precautions as required by local health authorities.
- .5 Periodically remove wastes from Site.
- .6 Existing permanent facilities may not be used.
- .7 Provide shelter for workers.

3.5 Location of temporary facilities

- .1 Coordinate the location of temporary facilities with the Owner and Consultant.

3.6 Installation and removal of temporary facilities

- .1 Provide temporary facilities and controls to execute the work expeditiously.
- .2 Remove temporary facilities and controls at the conclusion of the Work, unless otherwise directed by Consultant.
- .3 Site to be left in tidy and clean condition after removal of all temporary facilities.

3.7 Temporary fire protection

- .1 During the entire construction period provide fire extinguishers in each construction shed and temporary office, as well as in other locations reasonably required, and all other fire protection necessary to protect the project and to comply fully with the requirements of insurance underwriters for the project and local, provincial and federal authorities.

3.8 Temporary first aid facilities

- .1 Provide and maintain the necessary first aid items and equipment as required.
- .2 Designate employees who are properly instructed to be in charge of first aid. Ensure that at least one such employee is always available on the site while work is being conducted.

3.9 Drainage ditches and storm sewers

- .1 All ditches, drainage channels and/or storm sewer systems, which may be affected by construction shall have their flows maintained at all times during construction, unless permission to the contrary has been obtained from the Consultant. No extra cost shall be incurred by the Owner for this work.

- .2 Make allowance in prices for any problems that may be encountered because of ditch flows or storm sewer flows. Drainage shall not be impeded, nor shall blockages or water backups be permitted. Any damage because of water or flooding shall be the responsibility of the Contractor.

3.10 Security for construction site

- .1 Be responsible for the security of construction site materials, tools, equipment, temporary facilities and storage and all construction.

3.11 Removal and restoration of temporary facilities and controls

- .1 Remove temporary facilities and controls from the site on completion of the works, or as otherwise ordered in writing by the Consultant. Unless specifically stated otherwise in the Contract Documents, maintain ownership over the temporary facilities including furnishings.
- .2 As each portion of the work is completed, as determined by the Consultant, restore disturbed areas, roadways, fences, building, etc. equal to or better than the initial condition and clean up the construction area as instructed by the Consultant.
- .3 Leave clean and in good order, roads, parking areas, walks, grassed areas and other areas disturbed by the construction and Contractor's activities. Failure to make satisfactory progress in the execution of this work within 48 hours of receipt of written notice from the Consultant may result in the Consultant having the surplus material removed, or re-grading any area or performing any work necessary to leave the site in a satisfactory condition and having the costs deducted from payments due under the Contract.

End of section

1 General

1.1 Section includes

- .1 Temporary utilities.

1.2 Related requirements

- .1 Section 01 52 00 Construction facilities.
- .2 Section 01 53 00 Temporary construction.
- .3 This section describes requirements applicable to all Sections within Divisions 02 to 33.

1.3 Temporary utilities

- .1 Make arrangements for the supply of water, electrical power, gas, sanitary facilities, heat, and any other temporary services as may be required during construction.
- .2 Be responsible for all fees, permits and charges, including arrangements for all necessary applications, incurred throughout the construction period until the date of Substantial Performance.
- .3 Provide power generators as required to maintain construction activities and all temporary facilities at no extra cost to the Owner.
- .4 Permanent utilities installed as part of the Work may not be used for construction requirements.
- .5 Operate equipment according to the requirements of the Ontario Ministry of Labour under the Occupational Health and Safety Act and Regulations for Construction Projects.

1.4 Installation and removal

- .1 Provide temporary utilities and controls to execute work expeditiously.
- .2 Salvage and assist in recycling products for potential reuse.
- .3 Remove from site all such work after use.

1.5 Dewatering

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

1.6 Temporary water supply

- .1 Provide all water required for construction activities and Contractor's workers at Contractor's expense. Existing water service may not be used.
- .2 Supply all hoses and water containers as may be required.
- .3 Use of hydrants or fire hoses is not permitted without written consent from the Owner.

2 Products – not used

3 Execution – not used

End of section

1 General

1.1 Section includes

- .1 Construction aids.

1.2 Related requirements

- .1 Section 01 50 00 Temporary Facilities and Controls.
- .2 This section describes requirements applicable to all Sections within Divisions 02 to 33.

1.3 Installation and removal

- .1 Provide construction facilities in order to execute work expeditiously.
- .2 Remove from site all such work after use.

1.4 Scaffolding

- .1 Provide and maintain temporary scaffolding required to perform the Work.

1.5 Hoisting

- .1 Provide, operate and maintain hoists and cranes required for moving of workers, materials and equipment.
- .2 Cranes and hoists, if used, shall be operated by qualified operator.

2 Products – not used

3 Execution – not used

End of section

1 General

1.1 Section includes

- .1 Site enclosure.
- .2 Protection for off-site and public property.
- .3 Protection of surrounding Work.

1.2 Related requirements

- .1 Section 01 51 00 Temporary Utilities.
- .2 This section describes requirements applicable to all Sections within Divisions 02 to 33.

1.3 Installation and removal

- .1 Provide temporary controls to execute Work expeditiously.
- .2 Remove from site all such work after use.

1.4 Site enclosure

- .1 Low-security temporary site enclosure:
 - .1 Erect enclosure using 1.2 m high snow fence wired to rolled steel "T" bar fence, posts spaced at 2.4 m on centre.
 - .2 Provide one (1) lockable truck gate.
 - .3 Maintain fencing in good repair.
 - .4 Protect from damage by equipment and construction procedures.

1.5 Protection of open trenches and excavations

- .1 In addition to the provisions of Ontario Regulation 213/91 made under the Occupational Health and Safety Act, R.S.O. 1990, and in particular Part III - Excavations, employ the following protection measures for trenches and excavations left open at the end of the work day or where, during any work day, a trench or excavation is left unattended by the Contractor:

- .2 Where the public has access to the perimeter of an excavation, install a barrier at least 1.1 m high around the complete perimeter of the excavation. Vertical supports must be secure, have a spacing of not more than 1.1 m and be a minimum distance of 300 mm from the top of the wall of the excavation. The barrier shall include a fencing fabric, with openings not exceeding 100 mm, securely attached to the vertical supports at the top, center and bottom and spacing not exceeding 100 mm. If the excavation is greater than 0.3 m in depth, install toe board with the fencing fabric securely fastened to it to prevent persons from slipping under the fabric and into the excavation. If an excavation is adjacent to a sidewalk or an area commonly used by the public as a walkway or recreation area, the fencing fabric shall be a metal mesh.
- .3 Where an excavation is greater than 1.0 m in depth, and the public has access to the perimeter, signs shall be posted indicating "Danger Due to Excavation".
- .4 Ensure barriers are in good condition and stable prior to vacating the project at the end of each work day.

1.6 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.

1.7 Protection of surrounding work

- .1 Provide protection for finished and partially finished Work from damage.
- .2 Provide necessary cover and protection.
- .3 Be responsible for damage incurred due to lack of or improper or inappropriate protection.

2 Products – not used

3 Execution – not used

End of section

1 General

1.1 Section includes

- .1 Access to site.
- .2 Working on public roadways.
- .3 Informational and warning devices.
- .4 Traffic control on public roadways.
- .5 Temporary parking.
- .6 Fire routes.

1.2 Related requirements

- .1 Section 01 14 00 Work Restrictions
- .2 Section 01 50 00 Temporary facilities and controls.
- .3 This section describes requirements applicable to all Sections within Divisions 02 to 33.

1.3 Reference standards

- .1 Ontario Traffic Manual (OTM), Book 7 - Temporary Conditions, current revision.
- .2 Ontario Provincial Standards, available for download at <https://www.library.mto.gov.on.ca/SydneyPLUS/TechPubs/Portal/tp/opsVIEWS.aspx?lang=en-US>
 - .1 OPSS.MUNI 310 (November 2017) – Construction Specification for Hot Mix Asphalt
 - .2 OPSS.MUNI 314 (November 2016) – Construction Specification for Untreated Subbase, Base, Surface, Shoulder, Selected Subgrade and Stockpiling
 - .3 OPSS.MUNI 1010 (November 2013) – Material Specification for Aggregates - Base, Subbase, Select Subgrade, and Backfill Material
 - .4 OPSS.MUNI 1101 (November 2016) – Material Specification For Performance Graded Asphalt Cement

- .5 OPSS.MUNI 1150 (November 2018) – Material Specification for Hot Mix Asphalt

1.4 Access to site

- .1 Do not obstruct entrances, stairs or fire exits.
- .2 Provide and maintain access roads, sidewalk crossings, ramps and construction runways as may be required for access to the work.
- .3 Obtain approval from the Consultant before constructing temporary roads. Keep temporary road surfaces over backfilled excavations free from potholes.
- .4 Provide for mud and snow removal and dust suppression, as required during the construction period.
- .5 Maintain vehicular access to all properties within and adjacent to the Place of the Work at all times except when Contractor's operations reasonably necessitate a temporary restriction. Such restrictions shall be kept to a minimum and shall be coordinated with the affected property owner or occupant.
- .6 All traffic arrangements shall be subject to the approval of the Consultant and the authority having jurisdiction.
- .7 Plan and schedule the routes of vehicles transporting all materials to, from or within the Place of the Work, so that vehicular movements are accomplished with minimum interference and interruptions to traffic.
- .8 The Owner reserves the right to alter or reject proposed delivery and trucking routes as considered necessary. The Contractor shall notify suppliers of materials and equipment of the above requirements.

1.5 Working on public roadways

- .1 Comply with requirements of Acts, Regulations and By-Laws in force for regulation of traffic or use of or storage of vehicles, materials and equipment on public roadways.
- .2 When working on public-travelled way:
 - .1 Obtain Road Occupancy Permit from authority having jurisdiction.

- .2 Prepare and submit a Traffic Control Plan acceptable to the Consultant.
 - .3 Erect temporary traffic control signs and devices according to OTM Book 7.
 - .4 Place equipment and materials in position to present minimum of interference and hazard to traveling public.
 - .5 Keep equipment units as close together as working conditions permit and preferably on same side of travelled way.
 - .6 Do not leave equipment on travelled way overnight. Store equipment outside the roadway "clear zone" when not in use
 - .7 Do not close any lanes of road without approval of Consultant and the authority having jurisdiction.
 - .8 Keep travelled way graded, free of pot holes and of sufficient width for required number of lanes of traffic.
- .3 Provide minimum 7.0 m wide temporary roadway for traffic in two-way sections (3.5 m per traffic direction) through Work and on detours.
 - .4 Provide minimum 5.0 m wide temporary roadway for traffic in one-way sections through Work and on detours.

1.6 Informational and warning devices

- .1 Provide and maintain signs and other devices required to indicate construction activities or other temporary and unusual conditions resulting from the Contractor's operations which requires road user response.
- .2 Supply and erect signs, delineators, barricades and miscellaneous warning devices as specified in OTM Book 7.
- .3 Place signs and other devices in locations recommended in OTM Book 7.
- .4 Meet with Consultant prior to commencement of Work to prepare list of signs and other devices required for project. If situation on site changes, revise list for approval of Consultant.
- .5 Continually maintain traffic control devices in use by:
- .6 Checking signs daily for legibility, damage, suitability and location. Clean, repair or replace to ensure clarity and reflectance.

- .7 Removing or covering signs which do not apply to conditions existing from day to day.

1.7 Traffic control on public roadways

- .1 Provide traffic control according to the current revision of Ontario Traffic Manual (OTM), Book 7 - Temporary Conditions, and guidelines of the Infrastructure Health and Safety Association.
- .2 Provide competent, properly equipped flag persons:
 - .1 When public traffic is required to pass working vehicles or equipment which block all or part of travelled roadway.
 - .2 When it is necessary to institute one-way traffic system through construction area or other blockage where traffic volumes are heavy, approach speeds are high and traffic signal system is not in use.
 - .3 When workmen or equipment are employed on travelled way over brow of hills, around sharp curves or at other locations where oncoming traffic would not otherwise have adequate warning.
 - .4 Where temporary protection is required while other traffic control devices are being erected or taken down.
 - .5 For emergency protection when other traffic control devices are not readily available.
 - .6 In situations where complete protection for workers, working equipment and public traffic is not provided by other traffic control devices.
 - .7 At each end of restricted sections where pilot cars are required.
- .3 Delays to public traffic due to Contractor's operators: maximum two (2) minutes.
- .4 Where roadway carrying two-way traffic is to be restricted to one (1) lane for twenty-four (24) hours each day, provide portable traffic signal system as required by the Region of Durham.
- .5 Adjust as necessary, and regularly maintain system during period of restriction.

- .6 Provide secure, rigid guardrails and barricades around deep excavations and open shafts as required by governing authorities.
- .7 Provide paid duty police officers for traffic control in or near intersections where traffic is required to move against normal traffic signal cycles.
- .8 Submit a traffic control and staging plan for review by the Consultant at least two (2) weeks prior to commencement of construction activities and material deliveries.
- .9 Include both a narrative description of the proposed construction methods and a dimensioned drawing showing typical layout of traffic control measures in each stage of the work and how the Contractor intends to maintain traffic as specified in the Contract Documents providing specific references to appropriate typical layouts in the OTM.
- .10 Traffic control plan shall consider the movement of both vehicular and pedestrian traffic and the impacts on abutting properties and businesses. Ensure that properties with more than one entrance have at least one (1) entrance maintained at all times.
- .11 Design roadway work zones with specific consideration for worker safety, road user and pedestrian safety, and community mobility, with proper advanced warning of the work zone and proper site identification.
- .12 If the Contractor requires any temporary deviations from the above the Contractor must receive approval from the Consultant. Provide a minimum of three (3) working days' notice prior to the Contractor's proposed temporary deviations.
- .13 Maintain all traffic lanes in good condition, free of mud and dirt.
- .14 Unless otherwise specified, surface all temporary and existing traffic lanes with hot mix asphalt. Immediately repair any rutting, potholes or other significant surface deterioration.
- .15 The Owner reserves the right to order the Contractor to retain the services of an acceptable traffic control specialist firm if, in the Consultant's sole opinion, the Contractor continually fails to provide acceptable traffic control measures.

- .16 The Consultant may issue a Stop Work Order to the Contractor if the Contractor's operations jeopardize the safety of the public. In such case, the Contractor shall immediately make the Work Area safe and comply with the Stop Work Order. The Contractor shall not be permitted to continue working until he can demonstrate to the satisfaction of the Consultant that traffic control shall be carried out in an acceptable manner.
- .17 Issuance of a Stop Work Order for this, or any other cause, shall be at the sole expense of the Contractor. The Consultant shall not consider an extension of the time to substantially perform or complete the Work due to issuance of any Stop Work Order with regards to traffic control.

1.8 Parking for Consultant

- .1 Locate and maintain in good order a parking area for the Consultant on the project site as directed by the Consultant.
- .2 Provide parking space to accommodate one (1) vehicle.

1.9 Parking for construction personnel

- .1 Parking for Contractor's, Subcontractors, suppliers and/or their employee's vehicles shall be limited to restricted area as designated by the Owner.
- .2 Parking for will be permitted on site provided it does not disrupt performance of Work and continuing operation of the facility.
- .3 The Owner and their employees will not be responsible for parking fines incurred by the Contractor, Subcontractors, suppliers and/or their employees.
- .4 Provide and maintain adequate access to project site.
- .5 If authorized to use existing roads for access to project site, maintain such roads for duration of Contract and make good damage resulting from Contractors' use of roads.

1.10 Fire routes

- .1 Maintain access to property including overhead clearances for use by emergency response vehicles.

2 Products

2.1 Granular materials

- .1 Granular materials to be according to OPSS.MUNI 1010.

2.2 Hot mix asphalt

- .1 Asphalt to be hot mix asphalt according to OPSS.MUNI 1150 using
PGAC 58-28 asphalt cement according to OPSS.MUNI 1101.

3 Execution – not used

End of section

1 General

1.1 Section includes

- .1 Erosion and sediment control plan.
- .2 Prevent loss of soil by storm water runoff and wind erosion.
- .3 Protect stockpiled topsoil.
- .4 Prevent sedimentation of storm water and receiving streams.
- .5 Prevent pollution of the air with dust and particulate matter.

1.2 Related requirements

- .1 Section 31 00 00.01 Earthwork

1.3 Reference standards

- .1 Ontario Provincial Standards, available for download at
<http://www.ragsa.mto.gov.on.ca/techpubs/ops.nsf/OPSHomepage>
 - .1 OPSS.MUNI 805 (November 2018) – Construction Specification for Temporary Erosion and Sediment Control Measures.

1.4 Definitions

- .1 Reference Section 805.03 of OPSS.MUNI 805.

2 Products

2.1 Erosion and sediment control measures

- .1 Reference Section 805.05 of OPSS.MUNI 805.

3 Execution

3.1 Construction erosion and sediment control measures

- .1 Construct temporary erosion and sediment control measures according to Contract Drawings and Section 805.07 of OPSS.MUNI 805.
- .2 Prevent cleared topsoil and excavated earth stockpiled on site from being eroded by rain storm, snow melt or wind.

- .3 Install erosion and sediment control measure prior to commencing any excavation.
- .4 Limit operation of vehicles on site to minimize disturbing soil.
- .5 Clean vehicle tires before leaving Place of the Work in order to minimize tracking of soil onto roadways. Contractor is responsible for costs to clean roadway of tracked soil and debris.

3.2 Municipal storm water systems

- .1 Protect catch basins, drains, culverts and other points of entry into municipal storm water collection systems.

3.3 Maintenance of erosion and sediment control measures

- .1 Each Week: Inspect for erosion and sediment control measures, to ensure proper function.
- .2 Remove accumulated sediment according to Subsection 805.07.15 of OPSS.MUNI 805.

3.4 Removal of erosion and sediment control measures

- .1 Remove temporary erosion and sediment control measures according to Subsection 805.07.16 of OPSS.MUNI 805 when no longer required on the project.

End of section

1 General

1.1 Section Includes

- .1 Product options.
- .2 Procedures for substitution requests submitted after award of the Contract.

1.2 General Product requirements

- .1 All Products and materials supplied shall have a low V.O.C. rating.

1.3 Specified product options

- .1 Performance or prescriptive standards:
 - .1 Select any product, assembly or component material that meets or exceeds the specified standards for products specified only by referenced standards and performance criteria.
- .2 Acceptable products:
 - .1 Products specified by component material name, manufacturer, catalogue number, model number, or similar reference establishing the standard of acceptance that the Consultant will consider appropriate for the Work. Select any named Product, assembly or component material contained in the listing of Acceptable Products.
- .3 Acceptable manufacturers:
 - .1 Select any product, assembly or component material manufactured by the listed Manufacturers that meets or exceeds the specified standards and performance criteria.
 - .2 Submit required Shop Drawing and Product data submissions before starting any work of the relevant Specification Section for review by Consultant.

1.4 Product substitutions

- .1 Owner is under no obligation to accept proposed substitute Products unless the Contractor can provide evidence satisfactory to the Consultant that such proposed substitute Product meets or exceeds the specified performance and other criteria.

1.5 Incorporation of specified Products

- .1 Coordinate the installation of the selected Products into the Work:
 - .1 Make any changes in the Work as may be required to accommodate the selected Products.
 - .2 Notify Consultant where a selected Product is inconsistent with the layouts and configurations indicated on Drawings and Schedules.
 - .3 Bear costs and waive claims for additional compensation for costs that are implicit in the use of the selected Products.

2 Products – not used

3 Execution – not used

End of section

1 General

1.1 Section includes

- .1 Product delivery requirements and conditions.

1.2 Delivery requirements and conditions

- .1 Fully indemnify the Owner for all damages to persons or property resulting from the services and operations performed by employees of the Contractor and all Subcontractors and suppliers, and all contracted agents or carriers, including the delivery and unloading of goods or equipment at (and transfer and unloading of bulk chemicals or fuels to) Regional facilities.
- .2 Employ delivery vehicles that are suitably licensed, insured, operated and maintained in accordance with the Contract requirements, the Contractor's (and its agent's or carrier's) applicable policies and procedures, and all applicable federal, provincial and municipal legislation, statutes and by-laws.
- .3 Ensure that the Contractor's forces receive and sign off on all deliveries and shipments required for the Work. The Owner will not be responsible for the sign off on any deliveries for the Contractor.
- .4 Equip all delivery vehicles with any other material handling equipment required for the delivery person to safely unload the shipment at the receiving location(s) at the Place of the Work and move the Products to the designated receiving area(s) identified in the Contract.
- .5 Equip delivery vehicles, where required, with a hydraulic tailgate for unloading heavy equipment, packages, drums, pallets and similar large, heavy items at receiving locations which are not equipped with a truck loading dock.

2 Products – not used

3 Execution – not used

End of section

1 General

1.1 Section includes

- .1 Progressive cleaning.
- .2 Cleaning prior to application for Substantial Performance.
- .3 Cleaning prior to Completion.

1.2 Related Requirements

- .1 This section describes requirements applicable to all Sections within Divisions 02 to 33.

2 Products

2.1 Cleaning materials

- .1 Cleaning agents and materials: Low VOC content.

3 Execution

3.1 Progressive cleaning

- .1 Maintain site in tidy condition, free from accumulation of waste products and debris, other than that caused by Owner or other contractors.
- .2 Remove waste materials from site or dispose of waste materials as directed by Consultant. Do not burn waste materials on site.
- .3 Clear snow and ice from area of construction, bank or pile snow in designated areas only.
- .4 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.
- .5 Remove waste material and debris from site, or deposit in waste container(s), at end of each working day.
- .6 Waste containers, if allowed:
 - .1 Provide on-site steel framed, hinged lid containers for collection of waste materials and debris.

- .2 Provide and use clearly marked, separate bins for recycling.
- .3 Place waste containers in an area directed by the Owner. Pay for all associated costs and permits. Do not locate bins on a structural slab.
- .4 Remove and replace waste containers promptly when full and upon completion of the work.
- .7 Storage of waste material and debris outside of the waste containers is not permitted.
- .8 Clean interior areas at the end of each work day and keep interior walkways clear for Owner's staff to continue normal operation of the well house.
- .9 Store volatile waste in covered metal containers and remove from premises at end of each working day.
- .10 Provide adequate ventilation during use of volatile or noxious substances. Use of enclosure ventilation systems is not permitted for this purpose.
- .11 Use only cleaning materials recommended by manufacturer of surface to be cleaned, and as recommended by cleaning material manufacturer.
- .12 Schedule cleaning operations so that resulting dust, debris and other contaminants will not fall on wet, newly painted surfaces nor contaminate building systems.
- .13 Collect and separate recyclable materials in accordance with Region of Durham sorting requirements and transport to a Regional recycling location.
- .14 Divert unused aggregate materials from landfill to facility for reuse as approved by Consultant and Owner.
- .15 Dispose of unused paint and paint thinner materials at official hazardous material collections site as approved by Consultant and Owner. Do not dispose of unused paint and paint thinner material into sewer system, into streams, lakes, onto ground or in other location where it will pose health environmental hazard.
- .16 Divert unused asphalt from landfill to facility capable of recycling materials.

3.2 Cleaning prior to application for Substantial Performance

- .1 Prior to applying for Substantial Performance of the Work, remove surplus products, tools, construction machinery and equipment not required for performance of remaining Work.
- .2 Remove waste products and debris other than that caused by others and leave Work clean and suitable for occupancy.
- .3 Prior to final review, remove surplus products, tools, construction machinery and equipment.
- .4 Remove waste products and debris other than that caused by Owner or other contractors.
- .5 Remove waste materials from site at regularly scheduled times or dispose of as directed by Consultant. Do not burn waste materials on site.
- .6 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.
- .7 Remove stains, spots, marks and dirt from electrical fixtures.
- .8 Inspect finishes, fitments and equipment and ensure specified workmanship and operation.
- .9 Broom clean and wash exterior walks, steps and surfaces; rake clean other surfaces of grounds.
- .10 Remove dirt and other disfiguration from exterior surfaces.
- .11 Sweep and wash clean paved areas.
- .12 Remove snow and ice from access to facilities.

3.3 Cleaning prior to Completion

- .1 Execute final cleaning prior to Completion acceptance review.
- .2 Clean site; sweep paved areas, rake clean landscaped surfaces.
- .3 Remove waste and surplus materials, rubbish, and construction facilities from the site.

End of section

1 General

1.1 Section includes

- .1 Inspections and declarations.
- .2 Spare parts, maintenance materials and special tools.
- .3 Operation and maintenance manual
- .4 Recording actual site conditions.
- .5 Record (as-built) documents and samples.
- .6 Record documents.
- .7 Final survey.
- .8 Extended Warranties.

1.2 Related requirements

- .1 Section 01 31 00 Project management and coordination
- .2 Section 01 33 00 Submittal Procedures
- .3 Section 01 45 00 Quality control
- .4 This section describes requirements applicable to all Sections within Divisions 02 to 33.

1.3 Inspections and declarations

- .1 **Contractor's inspection:** Contractor and all Subcontractors shall conduct an inspection of the Work, identify deficiencies and defects, issue list of deficiencies and repair as required to conform to the Contract Documents.
- .2 Notify the Consultant in writing of satisfactory completion of the Contractor's Inspection and that corrections have been made.
- .3 Request the Consultant's Inspection.
- .4 **Consultant's inspection:** Consultant and Contractor will perform an inspection of the Work to identify obvious defects or deficiencies. Consultant will generate a list of deficiencies. Correct defective and deficient Work accordingly.

- .5 Consultant will identify in inspection report all items deemed to affect issuance of Substantial Performance.
- .6 **Substantial Performance:** Contractor shall submit a written certificate that the following has been performed:
 - .1 Work has been completed and inspected for compliance with Contract Documents.
 - .2 Defects have been corrected and deficiencies have been completed.
 - .3 Equipment and systems have been tested and are fully operational.
 - .4 Certificates required by authorities having jurisdiction have been submitted.
 - .5 Operation of systems have been demonstrated to Owner's personnel.
 - .6 All required documentation has been submitted.
 - .7 Work is complete and ready for Substantial Performance Inspection.
- .7 **Substantial Performance inspection:** When items noted in 1.3.6 above are completed, request Substantial Performance Inspection of the Work by the Consultant and the Owner. If Work is deemed incomplete by Consultant or Owner, complete all such outstanding items and request re-inspection.
- .8 **Declaration of Substantial Performance:** When the Owner considers deficiencies and defects have been corrected and it appears requirements of the Construction Act with respect to Substantial Performance have been met, make application for Substantial Performance of the Work.
- .9 **Commencement of warranty period:** The date of Substantial Performance of the Work, as certified by the Owner, shall be the date for commencement of the warranty period.
- .10 **Commencement of lien period:** The date of publication of the certificate of Substantial Performance of the Work shall be the date for commencement of the lien period.

- .11 **Release of basic (statutory) holdback:** After issuance of certificate of Substantial Performance of the Work, submit an application for payment of the basic holdback retained by the Owner under the Construction Act.
- .12 **Payment of finishing holdback:** After issuance of Certificate of Completion, submit an application for payment of finishing holdback retained by the Owner under the Construction Act.
- .13 **Final inspection:** Consultant and Owner will conduct a Final Inspection within three (3) months of the end of the warranty period. If deficient or defective Work is identified by Owner, correct deficient or defective Work and request re-inspection.
- .14 **Final payment:** When the Owner considers that all deficiencies and defects have been corrected and it appears all Contractor obligations under the Contract have been fulfilled, the Owner will issue a Final Acceptance Certificate and issue final payment.

1.4 Operation and maintenance manual

- .1 Prepare an operation and maintenance manual during the course of construction for all equipment installed.
- .2 Prepare instructions and data using personnel experienced in maintenance and operation of described Products and systems.
- .3 At least two (2) weeks prior to Substantial Performance of the Work, submit to the Consultant, one (1) electronic copy in PDF format of the draft Operation and Maintenance Manual in Canadian English.
- .4 Operation and Maintenance Manual shall include copies of the manufacturer's Product data sheets and operating and maintenance manuals for all equipment installed. PDF file shall not have any security protection applied (i.e. no passwords).
- .5 Consultant will return a copy after the Substantial Performance inspection with Consultant's and Owner's comments.
- .6 Revise content of documents of the Operation and Maintenance Manual as required prior to final submittal.

- .7 Provide **a single PDF file** of the complete, final Operation and Maintenance Manual after acceptance by the Owner. The PDF file shall not have any security protection applied (i.e. no passwords).
- .8 **Substantial Performance will not be granted until an acceptable Operation and Maintenance Manual has been submitted.**

1.5 Operation and maintenance manual format

- .1 Hard copy binders:
 - .1 Organize data in the form of an instructional manual.
 - .2 Provide vinyl, hard covered, 3 'D' ring, 8.5 inch x 11 inch binder with spine and face pockets.
 - .3 When multiple binders are used, correlate data into related consistent groupings. Identify contents of each binder on spine.
 - .4 Cover:
 - .1 Identify each binder with type or printed title 'Project Record Documents'; list title of project and identify subject matter of contents.
 - .5 Arrange content by systems under Section numbers and sequence of Table of Contents.
 - .6 Provide tabbed fly leaf for each separate product and system, with typed description of product and major component parts of equipment.
 - .7 Text: Manufacturer's printed data, or typewritten data.
 - .8 Drawings: provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.
- .2 Electronic files:
 - .1 Single file in PDF format duplicating hard copy manual.
 - .2 Organize PDF file same as hard copy binders.
 - .3 Use PDFs from original electronic files, combined into a single file. Avoid scanning hard copy documents to PDF files.

1.6 Operation and maintenance manual contents

- .1 Each volume of the operation and maintenance manual shall include each item specified in this article.
- .2 Provide table of contents including:
 - .1 Title of project.
 - .2 Date of submission.
 - .3 Names, addresses, and telephone numbers of Consultant and Contractor with name of responsible parties.
 - .4 Schedule of products and systems, indexed to content of volume.
 - .5 For each product or system, list names, addresses and telephone numbers of subcontractors and suppliers, including local source of supplies and replacement parts.
- .3 Product Data
 - .1 Mark each sheet to clearly identify specific products and component parts, and data applicable to installation; delete inapplicable information. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions specified in Section 01 45 00.
- .4 Drawings
 - .1 Supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams.
- .5 Certificates of Acceptance
 - .1 Provide relevant certificates issued by Authorities Having Jurisdiction, including Durham Region Health Department and Electrical Safety Authority.

1.7 Recording actual site conditions

- .1 Record information on set of black line drawings, and within the project manual, provided by Owner.
- .2 Annotate with red coloured felt tip marking pen, for recording changed information. As requested by the Consultant, use multiple colored marking pens to differentiate between systems.

- .3 Record information concurrently with construction progress. Do not conceal Work until required information is accurately recorded.
- .4 Drawings and Shop Drawings
 - .1 Legibly mark each item to record actual construction, including:
 - .1 Measured depths of elements of foundation in relation to finish first floor datum.
 - .2 Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
 - .3 Measured locations of internal utilities and appurtenances referenced to visible and accessible features of construction.
 - .4 Field changes of dimension and detail.
 - .5 Changes made by change orders.
 - .6 Details not on original Contract Drawings.
 - .7 References to related shop drawings and modifications.
- .5 Specifications
 - .1 Legibly mark each item to record actual construction, including:
 - .1 Manufacturer, trade name, and catalogue number of each product installed, particularly optional items and substitute items.
 - .2 Changes made by Addenda and change orders.
- .6 Other Documents
 - .1 Maintain inspection certifications required by individual specifications sections.

1.8 As-built documents and samples

- .1 In addition to requirements in Section 01 31 00, maintain at the site one record copy of:
 - .1 Reviewed shop drawings, product data, and samples.
 - .2 Field test records.
 - .3 Inspection certificates.
 - .4 Manufacturer's certificates.

- .2 Store as-built documents and samples in field office apart from documents used for construction. Provide files, racks, and secure storage.
- .3 Label as-built documents and file in accordance with technical specification section number. Label each document "As-Built Documents" in neat, large, printed letters.
- .4 Maintain as-built documents in clean, dry and legible condition. Do not use as-built documents for construction purposes.
- .5 Keep as-built documents and samples available for inspection by Consultant.
- .6 Prior to Substantial Performance of the Work, provide final draft redline mark-up As-Built Drawings to Consultant with as-built dimensions and spatial arrangements.
- .7 Consultant will review the As-Built Drawings and provide comments to the Contractor with a copy to the Owner.
- .8 Revise As-Built Drawings taking the comments from the Consultant into account.
- .9 Submit final As-Built Drawings to the Consultant prior to requesting Substantial Performance.
- .10 Substantial Performance will not be granted until final, acceptable As-Built Drawings have been submitted.**

2 Products

2.1 Materials and finishes

- .1 Building Products, Applied Materials, and Finishes: Provide product data, with catalogue number, size, composition, and colour and texture designations. Provide information for re-ordering custom manufactured products.
- .2 Provide instructions for cleaning agents and methods; precautions against detrimental agents and methods; and recommended schedule for cleaning and maintenance.

- .3 Moisture-Protection and Weather-Exposed Products: Include manufacturer's recommendations for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.
- .4 Building Envelope: Include copies of drawings of building envelope components, illustrating the interface with similar or dissimilar items to provide an effective air, vapour and thermal barrier between indoor and outdoor environments. Include an outline of requirements for regular inspections and for regular maintenance to ensure that on-going performance of the building envelope will meet the initial building envelope criteria.
- .5 Additional Requirements: as specified in individual specifications sections.

2.2 Spare parts, maintenance materials and special tools

- .1 Receive and catalog all items. Check inventory against operation and maintenance manual. Include approved listing in operation and maintenance manual.
- .2 If requested, furnish evidence as to type, source and quality of products provided.
- .3 If requested, provide receipts for delivered spare parts, materials and tools prior to Substantial Performance of the Work.
- .4 Defective products will be rejected regardless of previous inspections. Replace defective products at own expense.
- .5 Pay all costs of transportation, duties, tariffs, etc.
- .6 Spare parts
 - .1 Provide spare parts, in quantities specified in individual specification sections.
 - .2 Provide identical items of same manufacturer, dye-lot or production run as items in the Work
 - .3 Receive and catalogue all items. Submit inventory listing to Consultant. Include approved listings in operation and maintenance manual.

- .4 Obtain receipt for delivered products and submit prior to final payment.
- .7 Maintenance materials
 - .1 Provide maintenance and extra materials, in quantities specified in individual specification sections.
 - .2 Provide items of same manufacture and quality as items in Work.
 - .3 Receive and catalogue all items. Submit inventory listing to Consultant. Include approved listings in operation and maintenance manual.
 - .4 Obtain receipt for delivered products and submit prior to final payment.
- .8 Special tools
 - .1 Provide special tools, in quantities specified in individual specification section.
 - .2 Provide items with tags identifying their associated function and equipment.
 - .3 Receive and catalogue all items. Submit inventory listing to Consultant. Include approved listings in operation and maintenance manual.

3 Execution

3.1 Deliver to site

- .1 Deliver spare parts, maintenance materials, and special tools to location as directed; place and store.

3.2 Storage, handling and protection

- .1 Store spare parts, maintenance materials, and special tools in manner to prevent damage or deterioration.
- .2 Store in original and undamaged condition with manufacturer's seal and labels intact.
- .3 Store components subject to damage from weather in weatherproof enclosures.

- .4 Store paints and freezable materials in a heated and ventilated room.
- .5 Remove and replace damaged products at own expense and to satisfaction of Consultant.

End of section

1 General

1.1 Related work

- .1 General Instructions: Division 01.
- .2 Breaking and Patching: Division 01.
- .3 Demolition: Division 02.
- .4 Materials and equipment not specifically outlined in this section to be demolished under another Division.

1.2 References

- .1 Canadian Standards Association (CSA International):
 - .1 CSA S350-M1980 (R2003), Code of Practice for Safety in Demolition of Structures.

1.3 General

- .1 Dispose of demolished materials except where specifically noted otherwise.
- .2 Where existing materials are to be reused, the Contractor for this division is responsible for their removal, storage, cleaning and reinstallation.
- .3 Where existing materials are to be turned over to the Owner, the Contractor for this Division is responsible for their removal and delivery to the Owner on site.
- .4 Where electrical equipment is to be demolished, the Contractor for this Division is responsible to ensure that they have been isolated from the power supply prior to demolition under another division.
- .5 Where some existing materials are to be retained in place, it is the responsibility of the Contractor for this Division to identify the materials and equipment to remain prior to commencement of demolition.
- .6 Maintain adequate structural support for equipment and material during demolition process.

1.4 Action and informational submittals

- .1 Provide submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Shop Drawings:
 - .1 Provide shop drawings and product data in accordance with Section 01 33 00 - Submittal Procedures.

1.5 Maintain services

- .1 It is the responsibility of the Contractor for this Division to maintain electrical services and systems at all times to areas beyond the construction area.
- .2 Reinstate immediately any existing circuits disrupted during construction not intended to be removed as part of this contract.

1.6 Relocation of existing equipment

- .1 Refer to Site Plan and Demolition drawing C-001 and Proposed Site Plan drawing C-002 and details for relocation of buried services.
- .2 Include for disconnection of electrical services as required to facilitate the removal of the in ground tank.
- .3 Include for reconnection of electrical services removed to facilitate construction.

1.7 Bell telephone

- .1 Be responsible for arranging with Bell Canada for the removal and/or reinstatement of their equipment and cables as required.
- .2 Any Bell Canada equipment and cables to be removed as required to facilitate removal of the in ground tank.

1.8 Site conditions

- .1 Take precautions to protect environment and the public.

2 Products

2.1 Equipment

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

3 Execution

3.1 Preparation

- .1 Perform Work in accordance with Section 01 35 29 - Health and Safety Procedures.
- .2 Protection:
 - .1 Prevent movement, settlement, or damage to adjacent structures, building and utilities. Provide bracing and shoring required.
 - .2 Keep noise, dust, and inconvenience to occupants to minimum.
 - .3 Protect building systems, services and equipment.
 - .4 Provide temporary dust screens, covers, railings, supports and other protection as required.
- .3 Disconnect electrical, telephone and communication service lines as required to facilitate the tank removal and reconnect all cables to building following backfilling operations
- .4 Locate and protect utility lines. Do not disrupt active or energized utilities.
- .5 Remove and dispose of existing sanitary line from cleanout to holding tank.
- .6 Remove and dispose of any redundant electrical/communications conduit and/or cable. Make safe.
- .7 Remove and dispose of existing holding tank in accordance with Owner requirements.

3.2 Demolition salvage and disposal

- .1 No components are to be salvaged.

3.3 Removal from site

- .1 The Owner will be responsible for pumping out and disposal of the tank contents. The contractor must coordinate with the Owner to facilitate emptying the tank.
- .2 Following pumping of contents, remove and dispose of tank and all materials in accordance with applicable regulations using a licensed hauler.

3.4 Cleaning and restoration

- .1 Keep site clean and organized throughout demolition procedure.
- .2 Upon completion of removal and backfill procedures reinstate areas affected by Work to condition which existed prior to beginning of Work or better.

End of section

1 General

1.1 Delivery, storage and handling

- .1 Deliver, store and handle materials in accordance with Division 01.
- .2 Delivery and Acceptance Requirements: Deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
 - .1 Store materials indoors and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect wire and box connectors
 - .3 .Replace defective or damaged materials with new.

1.2 Cleaning

- .1 Progress Cleaning: Clean in accordance with Division 01.
 - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: Upon completion remove surplus materials, rubbish, tools and equipment in accordance with Division 01.

1.3 Commissioning

- .1 Reference Division 01.
- .2 The Contractor to make themselves, their subcontractors, and their suppliers aware of the commissioning requirements for this project.
- .3 The contractor shall work to achieve a completely commissioned system. The contractor shall provide all material and labour to achieve the project commissioning objectives as specified.
- .4 Be prepared to participate in Alarm Panel Controls.
- .5 Prepare and submit Commissioning Report outlining the testing and commissioning activities carried out for all systems, equipment, and controls. Identify seasonal commissioning work to be carried out and report on commissioning work after completion.

- .1 Commissioning Plan to include, as a minimum, the following key activities:
 - .1 Power and Bell Cable re-installation if required.
 - .2 Alarm Panel and Float.
- .6 Electrical Contractor to meet with the Mechanical Contractor to assist in the preparation of interference drawings. Coordinate equipment and layouts with the mechanical trades.

1.4 Documents

- .1 These specifications are an integral part of the Contract Documents. Refer to other Sections to ensure a completed operational product and fully coordinated standard of work.
- .2 "Provide" in this Division means to "supply and install".
- .3 Conform to Canadian Metric Practice Guide CSA CAN3- 234.1.
- .4 Provide all required adapters between "metric" and "Imperial" installations.
- .5 Metric descriptions in this Division are nominal equivalents of Imperial values.

1.5 References

- .1 Carry out all work in accordance with these drawings and specifications; meet latest regulations of Electrical Code and applicable Municipal and Provincial Codes and Regulations. In each and every instance of application, the Code, Regulation, Statute, Bylaw or Specification having most stringent requirements applies.
- .2 Canadian Standards Association (CSA International):
 - .1 CSA C22.1-18, Canadian Electrical Code, Part 1 (27th Edition), Safety Standard for Electrical Installations.
 - .2 CAN3-C235-83(R2000), Preferred Voltage Levels for AC Systems, 0 to 50,000 V.

1.6 Definitions

- .1 Electrical and electronic terms: Unless otherwise specified or indicated, terms used in these specifications, and on drawings, are those defined by IEEE SP1122.

1.7 Action and informational submittals

- .1 Shop drawings:
 - .1 Submit drawings stamped and signed by professional engineer registered or licensed in Province of Ontario, Canada.
 - .2 Submit wiring diagrams and installation details of equipment indicating proposed location, layout and arrangement, Alarm panels, and other items that must be shown to ensure coordinated installation.
 - .3 Identify on wiring diagrams circuit terminals and indicate internal wiring for each item of equipment and interconnection between each item of equipment.
 - .4 Indicate of drawings clearances for operation, maintenance, and replacement of operating equipment devices.
 - .5 Provide CSA certified equipment
 - .6 Submit test results of installed electrical systems and instrumentation.
 - .7 Permits and fees: In accordance with General Conditions of contract.
 - .8 Submit certificate of acceptance from authority having jurisdiction upon completion of Work to Consultant.
- .2 Manufacturer's Field Reports: submit to Consultant manufacturer's written report, within 3 days of review, verifying compliance of Work.

1.8 Quality assurance

- .1 Quality Assurance: In accordance with Division 01.

- .2 Qualifications: Electrical Work to be carried out by qualified, licensed electricians who hold valid Master Electrical Contractor license or apprentices in accordance with authorities having jurisdiction as per the conditions of Provincial Act respecting manpower vocational training and qualification.
- .3 Site Meetings:
 - .1 In accordance with Division 01.
- .4 Health and Safety Requirements: do construction occupational health and safety in accordance with Division 01.
 - .1 Contractor is solely responsible for the control, charge and supervision of construction means, methods, techniques, sequences and procedures, and for safety precautions and programs required in connection with the work.
 - .2 Contractor is solely responsible for the discovery and correction of deficiencies, errors and omissions in the execution and performance of the work and for the preparation of submissions (shop drawings, reports, etc.) relating to the work.
 - .3 Contractor is solely responsible for providing the appropriate quality assurance program to ensure that the work is carried out and performs in accordance with the Contract Documents, industry standards and relevant codes and legislation. Contractor Quality Assurance Program is to ensure the following:
 - .1 The use of qualified tradesmen, experts and professionals with the level of skill and experience required for the proper execution and performance of the work.
 - .2 The level of direction, supervision and inspection required for the proper execution and performance of the work.
 - .3 The level of coordination between trades, field conditions, material requirements and product requirements required for the proper execution and performance of the work.

- .4 The level of management required for the quality assurance program to operate effectively so that deficiencies, errors and omissions in the work are identified by the Contractor on a continuous basis and that corrective action is carried out promptly.
- .5 The level of management and communication required for the status of the work to be properly monitored and reported to the Consultant.
- .4 Field review (observations) of the work by the Consultant are not to be considered part of the Contractor Quality Assurance Program.

1.9 Field quality control

- .1 Contractor to have qualified personnel to continuously direct and monitor all electrical work.
- .2 Contractor may be required to list names and qualifications of supervisory personnel on tender form.
- .3 Supervisory personnel to attend all site meetings.
- .4 All electrical work to be carried out by qualified, licensed electricians or apprentices as per the conditions of the Provincial Act respecting manpower vocational training and qualification. Employees registered in a provincial apprentices program shall be permitted, under the direct supervision of a qualified licensed electrician, to perform specific tasks - the activities permitted shall be determined based on the level of training attained and the demonstration of ability to perform specific duties.
- .5 The work of this division to be carried out by a contractor who holds a valid Master Electrical contractor license as issued by the Province that the work is being constructed.
- .6 Conduct and pay for following tests:
 - .1 Power Cable Test.
 - .2 Circuits originating from branch distribution panels.
 - .3 Systems: Alarm Control Panel and Float.

- .7 Furnish manufacturer's certificate or letter confirming that entire installation as it pertains to each system has been installed to manufacturer's instructions and the Owner's personnel have been trained in its operation and maintenance.
- .8 Insulation Resistance Testing:
 - .1 Megger circuits, feeders and equipment up to 350 V with a 500 V instrument.
 - .2 Megger 350-600 V circuits, feeders and equipment with a 1000 V instrument.
 - .3 Check resistance to ground before energizing.
- .9 Carry out tests in presence of Consultant.
- .10 Provide instruments, metres, equipment and personnel required to conduct tests during and at conclusion of project.
- .11 Submit test results for Consultant's review.

1.10 System start-up

- .1 Instruct Consultant and operating personnel in operation, care and maintenance of systems, system equipment and components.
- .2 Arrange and pay for services of manufacturer's factory service engineer to supervise start-up of installation, check, adjust, balance and calibrate components and instruct operating personnel.
- .3 Provide these services for such period, and for as many visits as necessary to put equipment in operation, and ensure that operating personnel are conversant with aspects of its care and operation.
- .4 Provide 72 hours written notice for de-energizing, transferring and re-energizing of any and all systems. Arrange and pay for all associated costs outside normal working hours.

1.11 Permits, fees and inspection

- .1 Contractor to procure and pay for permits required to complete the scope.
- .2 Notify Consultant of changes required by Electrical Safety Authority prior to making changes.

- .3 Furnish Certificates of Acceptance from Electrical Safety Authority on completion of work to Consultant
- .4 Obtain a Certificate of Acceptance from Inspection Authority on completion of work and hand it over to the Consultant
- .5 Notify Inspection Authority in sufficient time for them to inspect work.
- .6 Consultant will carry out inspections and prepare deficiency lists for correction by Contractor during and on completion of construction.
- .7 Contractor to correct deficiencies and advise the Consultant in writing that they have been corrected.

2 Products

2.1 Materials and equipment

- .1 Material and equipment to be CSA certified. Where CSA certified is not available, obtain special approval from authority having jurisdiction before delivery to site and submit such approval as described in PART 1 - SUBMITTALS.
- .2 Factory assemble control panels and component assemblies.

2.2 Electric motors, equipment and controls

- .1 Control wiring and conduit: In accordance with Section 26 29 03 – Control Devices

2.3 Wiring terminations

- .1 Ensure lugs, terminals, screws used for termination of wiring are suitable for either copper or aluminum conductors.
- .2 As specified and to meet requirements of Electrical Safety Authority

2.4 Equipment identification

- .1 Identify all electrical equipment supplied under this Division. Hand-painted identification will not be accepted.
- .2 Use phenolic plastic laminate, machine engraved nameplates attached with self-tapping screws

- .3 Use black plates with white letters for normal power and red plates with white letters for emergency power.
- .4 Identify electrical equipment with nameplates as follows:
 - .1 Nameplates: Imacon 3 mm thick plastic engraving sheet black face, white core, lettering accurately aligned and engraved into core mechanically attached with self-tapping screws.
 - .2 Sizes as follows:

NAMEPLATE SIZES

	DIMENSIONS (Metric)	# LINES	LETTER HEIGHT
Size 4	20 x90 mm	1	8 mm
.5	Labels: Embossed plastic labels with 8 mm high letters unless specified otherwise. Secure each label with 2 self-tapping screws or tie to cables with Ty-raps.		
.6	Nameplates for terminal cabinets and junction boxes to indicate system and/or voltage characteristics.		
.7	All identification to be in English		
.8	Terminal cabinets and pull boxes: indicate system and voltage.		
.9	Correct existing panel legends and nameplates to reflect changes made.		
.10	Nameplates, size 5, for terminal cabinets, pull boxes and junction boxes to indicate system and/or voltage characteristics.		
.11	At underground service entrance, size 9 on outside wall stating "Underground Service Entrance".		

3 Execution

3.1 Installation

- .1 Do complete installation in accordance with CSA C22.1 except where specified otherwise.
- .2 Do overhead and underground systems in accordance with CSA C22.3 No.1 except where specified otherwise.

3.2 Nameplates and labels

- .1 Ensure manufacturer's nameplates, CSA labels and identification nameplates are visible and legible after equipment is installed.

3.3 Conduit and cable installation

- .1 Install conduit and sleeves prior to pouring of concrete.
- .2 sleeves through concrete: plastic, sized for free passage of conduit, and protruding 50 mm.
- .3 If plastic sleeves are used in fire rated walls or floors, remove before conduit installation.
- .4 Install cables, conduits and fittings embedded or plastered over, close to building structure so furring can be kept to minimum.
- .5 Holes through exterior walls and roof to be flashed and made waterproof. Seal inside the conduit with suitable compound to prevent entry of water through conduit.
- .6 Provide all cutting of chases, drilling holes and other structural work required to install electrical conduits, cables, pull boxes and outlet boxes.

3.4 Coordination of protective devices

- .1 Ensure circuit protective devices such as overcurrent trips, relays and fuses are installed to required values and settings.
- .2 Conduct following tests in accordance with Section 01 45 00 – Quality Control.
 - .1 Power distribution system, including phasing, voltage, grounding and load balancing.

- .2 Insulation resistance testing:
 - .1 Megger circuits, feeders and equipment up to 350 V with a 500 V instrument.
 - .2 Megger 350-600 V circuits, feeders and equipment with a 1000 V instrument.
 - .3 Check resistance to ground before energizing.
- .3 Carry out tests in presence of Consultant.
- .4 Provide instruments, metres, equipment and personnel required to conduct tests during and at conclusion of project.
- .5 Manufacturer's Field Services:
 - .1 Obtain written report from manufacturer verifying compliance of Work, in handling, installing, applying, protecting and cleaning of product and submit Manufacturer's Field Reports as described in PART 1 - SUBMITTALS.
 - .2 Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.
 - .3 Schedule site visits, to review Work, as directed in PART 1 - QUALITY ASSURANCE.

End of section

1 General

1.1 Product data

- .1 Provide product data in accordance with Division 01.

1.2 References

- .1 Wire and Box Connectors:
 - .1 CSA International:
 - .1 CAN/CSA-C22.2 No.18-98 or Latest Edition, Outlet Boxes, Conduit Boxes and Fittings.
 - .2 CAN/CSA-C22.2 No.65-03 or Latest Edition, Wire Connectors (Tri-National Standard with UL 486A-486B and NMX-J-543-ANCE-03).
 - .2 National Electrical Manufacturers Association (NEMA).
- .2 Building Wire:
 - .1 Teck cable to CAN/CSA C22.2 No. 131.
- .3 Connectors and Terminations:
 - .1 Canadian Standards Association (CSA International):
 - .1 CSA C22.2 No. Latest Edition.
- .4 Grounding Secondary:
 - .1 American National Standards Institute /Institute of Electrical and Electronics Engineers (ANSI/IEEE):
 - .1 ANSI/IEEE 837-02 or Latest Edition, IEEE Standard for Qualifying Permanent Connections Used in Substation Grounding.
 - .2 CSA International:
 - .1 CSA Z32-09 or Latest Edition, Electrical Safety and Essential Electrical Systems in Health Care Facilities.
- .5 Splitter, Junction Boxes, Pull Boxes and Cabinets:
 - .1 Canadian Standards Association (CSA International):

- .1 CSA C22.1-06 or Latest Edition, Canadian Electrical Code, Part 1, 20th Edition.
 - .2 Junction box CSA C22.2 No. 40.
 - .3 Enclosures CSA Type 1 to CSA C22.2 No. 14.
 - .4 Enclosures CSA Type 2, 3, 4 and 5 to CSA C22.2 No. 94.
- .6 Raceways and Boxes for Electrical Systems:
 - .1 CSA International:
 - .1 CSA C22.2 No.40-M1989 or Latest Edition, Cut-out, Junction and Pull Boxes.
- .7 Conduits, Conduit Fastenings, and Conduit Fittings:
 - .1 Canadian Standards Association (CSA International):
 - .1 CAN/CSA C22.2 No. 18-98 or Latest Edition, Outlet Boxes, Conduit Boxes, Fittings and Associated Hardware, A National Standard of Canada.
 - .2 CSA C22.2 No. 45-M1981 or Latest Edition, Rigid Metal Conduit.
 - .3 CSA C22.2 No. 56-04 or Latest Edition, Flexible Metal Conduit and Liquid-Tight Flexible Metal Conduit.
 - .4 CSA C22.2 No. 83-M1985 or Latest Edition, Electrical Metallic Tubing.
 - .5 CSA C22.2 No. 211.2-M1984 or Latest Edition, Rigid PVC (Un-plasticized) Conduit.
 - .6 CAN/CSA C22.2 No. 227.3-05 or Latest Edition, Non-metallic Mechanical Protection Tubing (NMPT), A National Standard of Canada (February 2006).
- .8 Wiring Devices:
 - .1 Receptacles, plugs, and similar wiring devices to CSA C22.2 No. 42.

2 Products

2.1 Building wires

- .1 Conductors: Stranded for 10 AWG and larger. Minimum size: 12 AWG.
- .2 Copper conductors: size as indicated, with 600 V insulation of cross-linked thermosetting polyethylene material rated RWU90 XLPE, Jacketed
- .3 Type RW90-40 at working temperatures lower than -7°C 20°F.
- .4 #14 for control circuits for mechanical equipment.
- .5 Type RWU90 for underground wiring.
- .6 Size all wiring as per Electrical Code.

2.2 Teck 90 cable

- .1 Cable: In accordance with Section 26 05 00 - Common Work Results for Electrical.
- .2 Conductors:
 - .1 Grounding conductor: as indicated.
 - .2 Circuit conductors: as indicated, size as indicated.
- .3 Insulation:
 - .1 RWU90.
 - .2 Rating: 600V.
- .4 Armour: interlocking galvanized steel.
- .5 Overall covering: thermoplastic polyvinyl chloride, compliant to applicable Building Code classification for this project.
- .6 Fastenings:
 - .1 One-hole steel straps to secure surface cables 50 mm and smaller.
Two-hole steel straps for cables larger than 50 mm.
- .7 Connectors:
 - .1 Watertight, approved for TECK cable.

2.3 Armoured cables

- .1 Conductors: Insulated, copper, size as indicated.

- .2 Armour: Interlocking type fabricated from galvanized steel strip.
- .3 Type: ACWU90jacket over armour and compliant to applicable Building Code classification for this project wet locations.
- .4 Connectors: Anti-short connectors.

2.4 Connectors and terminations

- .1 Use twist-on connectors for #14 to #8 wires.
- .2 Contact aid for aluminum cables where applicable.

2.5 Wire identification

- .1 Each conductor to be identified with a numbered stick-on exclusive number.

2.6 Junction and pull boxes

- .1 Construction: PVC.
- .2 Covers Flush Mounted: 25 mm minimum extension all around.
- .3 Covers Surface Mounted: Screw-on turned edge covers.

2.7 Enclosures

- .1 Use CSA Type 4x (NEMA Type 4x) for all control and protective devices subject to corrosive environments.

2.8 Conduit fastenings

- .1 Use straps for fastening of conduit or cables to building construction or support systems.
 - .1 One-hole steel straps to secure surface conduits 50 mm and smaller.
 - .2 Two-hole steel straps for conduits larger than 50 mm.
- .2 Suspended support systems.
 - .1 Support individual cable or conduit runs with 6 mm threaded rods and spring clips.
- .3 Beam clamps to secure conduits to exposed steel work.
- .4 Threaded rods, 6 mm diameter, to support suspended channels.

- .5 Provide metal brackets, frames, hangers, clamps and related types of support structures where indicated or as required to support conduit and cable runs.
- .6 Do not use wire lashing, Ty-raps or perforated strap to support or secure raceways or cables.
- .7 Provide adequate support for raceways and cables dropped vertically to equipment where there is no wall support.

2.9 Conduit Fittings

- .1 General:
 - .1 Fittings: to CAN/CSA C22.2 No. 18, manufactured for use with conduit specified. Coating: same as conduit.
 - .2 Ensure factory "ells" where 90 degree bends for NPS 1 / 25 mm and larger conduits.
 - .3 Steel couplings and connectors for EMT conduit:
 - .1 Cast couplings and connectors are not acceptable.
 - .4 Watertight connectors and couplings for EMT in damp locations:
 - .1 Set screw couplings and connectors are not acceptable.
 - .5 All fittings used to be manufactured as accessories to the associated raceway and of consistent material, i.e., PVC where PVC conduit is used.
 - .6 Bushings and connectors with nylon insulated throats.
 - .7 Push-pennies to prevent entry of foreign materials.
 - .8 Conduit outlet bodies for conduit up to 32 mm and pull boxes for larger conduits.
- .2 Fittings and connectors for PVC conduits to be solvent weld. Use manufactured bends.
- .3 Fittings in wet or damp locations to be watertight in areas indicated.

2.10 Control Cables

- .1 Conductors: Size: 14 AWG.
- .2 Copper conductors: size as indicated, with 600 V insulation of cross-linked thermosetting polyethylene material rated RWU90 XLPE, Jacketed.

2.11 Identification

- .1 Refer to Section 26 05 00 - Common Work Results for Electrical.

3 Execution**3.1 Field quality control**

- .1 Perform tests in accordance with Section 26 05 00 - Common Work Results for Electrical.
- .2 Perform tests before energizing electrical system.

3.2 Damaged conductors

- .1 Replace at no cost to Owner any wire or cable showing evidence of mechanical injury after installation.

3.3 General cable installation

- .1 Install cable in trenches in accordance with Section 33 71 73.02 - Underground Electrical Service.
- .2 Install cable in trenches in accordance with OESC.
- .3 Terminate cables in accordance with Section 26 05 20 - Wire and Box Connectors - (0-1000 V).
- .4 Conductor length for parallel feeders to be identical.

3.4 Installation of building wires

- .1 Install wires in conduits in accordance with Section 26 05 34.
- .2 Do not pull spliced wires in conduits or ducts.
- .3 Use CSA certified lubricants of type compatible with insulation to reduce pulling tension.

3.5 Wire identification

- .1 Each conductor to be identified with a numbered stick-on exclusive number.

3.6 Installation of Teck90 cable (0 -1000 V)

- .1 Group cables wherever possible on channels.
- .2 Install single-conductor cables with spacing to provide free-air current rating. Do not encircle cables with continuous ferrous metal clamps or conduit sleeves.
- .3 Install ground wire with all single conductor cable runs.
- .4 Install cable in trenches in accordance with OESC.
- .5 Terminate cables as defined in Section 2 of this specification.

3.7 Installation connectors and terminations

- .1 Install stress cones, terminations, and splices in accordance with manufacturer's instructions.
- .2 Bond and ground as required to CSA C22.2 No.41.
- .3 Remove insulation carefully from ends of conductors and install above connections to manufacturer's recommendations.
- .4 Accommodate all strands of conductor in lugs of switches, panels, etc. Where insulation on conductors is stripped to excess, neatly tape conductor so that only lug remains exposed.

3.8 Grounding examination

- .1 Verification of Conditions: Verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for grounding equipment installation in accordance with manufacturer's written instructions.
 - .1 Visually inspect substrate in presence of Consultant.
 - .2 Inform Consultant of unacceptable conditions immediately upon discovery.
 - .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Consultant.

3.9 Installation general - grounding

- .1 Protect exposed grounding conductors from mechanical injury.
- .2 Use mechanical connectors for grounding connections to equipment provided with lugs.
- .3 Soldered joints not permitted.

3.10 Junction, pull boxes and cabinets installation

- .1 Provide boxes as noted or in inconspicuous but accessible locations.
- .2 Mount cabinets with top not higher than 2 m above grade / finished floor except where indicated otherwise.
- .3 Provide terminal blocks as indicated.

3.11 Manufacturer's instructions

- .1 Compliance: Comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheets.
- .2 Install fastenings and supports as required for each type of equipment, cables and conduits, and to manufacturer's installation recommendations.

3.12 Installation – conduits, conduit fastening and conduit fittings

- .1 Install conduits to conserve headroom in exposed locations and cause minimum interference in spaces through which they pass.
- .2 Drawings do not show all conduits. Those shown are in diagrammatic form only. Install conduits to conserve headroom in exposed locations and cause minimum interference in the spaces through which they pass.
- .3 Surface mount conduits.
- .4 Use electrical metallic tubing (EMT). All work except where specified otherwise.
- .5 Use rigid PVC conduit underground.
- .6 Use rigid PVC conduit with manufactured solvent weld bends and fittings for:
 - .1 Underground work.

- .2 Work under or in floor slab on grade with rigid heavy galvanized steel elbows to exit from slab.
- .3 Specifically indicated applications.

3.13 Surface conduits

- .1 Run parallel or perpendicular to building lines.
- .2 Locate conduits behind infrared or gas fired heaters with 1.5 m clearance.
- .3 Run conduits in flanged portion of structural steel.
- .4 Group conduits wherever possible.
- .5 Do not pass conduits through structural members except as indicated.

3.14 Concealed conduits

- .1 Run parallel or perpendicular to building lines.

3.15 Conduits underground

- .1 Slope conduits to provide drainage.
- .2 Waterproof joints (PVC excepted) with heavy coat of bituminous paint.

3.16 Protection

- .1 Protect installed products and components from damage during construction.
- .2 Protect stainless steel cover plate finish with paper or plastic film until painting and other work is finished.
- .3 Repair damage to adjacent materials caused by wiring device installation.

End of section

1 General

1.1 References

- .1 Canadian Standards Association (CSA International):
 - .1 CSA C22.1, Canadian Electrical Code, Part 1, Latest Edition.
 - .2 Outlet boxes, conduit boxes and fittings to CSA C22.2 No. 18.
- .2 Action and informational submittals
 - .1 Provide submittals in accordance with Division 01.

2 Products

2.1 Junction Box

- .1 Size boxes in accordance with CSA C22.1.

2.2 Fittings for rigid conduit

- .1 Threaded-type steel couplings and fittings.
- .2 Double locknuts and insulated bushings on sheet metal boxes.
- .3 Use explosion-proof fittings in areas indicated.

2.3 Fittings for PVC conduit

- .1 Solvent weld fittings and connectors.
- .2 Manufactured bends.

3 Execution

3.1 Installation

- .1 Support boxes independently of connecting conduits.
- .2 Fill boxes with paper, sponges or foam or similar approved material to prevent entry of debris during construction. Remove upon completion of work.
- .3 Provide correct size of openings in boxes for conduit, mineral-insulated and armoured cable connections. Do not install reducing washers.

- .4 Vacuum clean interior of outlet boxes before installation of wiring devices.
- .5 Identify systems for outlet boxes as required.

End of section

1 General

1.1 References

- .1 CSA International:
 - .1 CAN/CSA-Z809-08, Sustainable Forest Management.
- .2 Forest Stewardship Council (FSC):
 - .1 FSC-STD-01-001-2004, FSC Principle and Criteria for Forest Stewardship.
- .3 Insulated Cable Engineers Association, Inc. (ICEA):
- .4 Sustainable Forestry Initiative (SFI):
 - .1 SFI-2010-2014 Standard.

1.2 Action and informational submittals

- .1 Submit in accordance with Division 01.
- .2 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for cables and include product characteristics, performance criteria, physical size, finish and limitations.

2 Products

2.1 Cable or conduit protection

- .1 38 x 140 mm planks, pressure treated with coloured, 5% pentachlorophenol solution, water repellent preservative.

2.2 Markers

- .1 Concrete type cable markers: 600 x 600 x 100 mm with words: cable, joint or conduit impressed in top surface, with arrows to indicate change in direction of cable and duct runs.

3 Execution

3.1 Examination

- .1 Verification of Conditions: Verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for conduit installation in accordance with manufacturer's written instructions.
 - .1 Visually inspect substrate in presence of Consultant.
 - .2 Inform Consultant of unacceptable conditions immediately upon discovery.
 - .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from the Consultant.

3.2 Direct burial of conduits

- .1 After sand bed in accordance with Section 31 23 33.01 - Excavating, Trenching and Backfilling, is in place, lay conduits maintaining 75 mm clearance from each side of trench to nearest conduit.
- .2 Include offsets for thermal action and minor earth movements.
- .3 Underground cable splices not acceptable.
- .4 Minimum permitted radius at cable bends for rubber, plastic or lead covered cables, 8 times diameter of cable or in accordance with manufacturer's written recommendations; for metallic armoured cables, 12 times diameter of cables or in accordance with manufacturer's instructions.
- .5 Cable Separation:
 - .1 Maintain 75 mm minimum separation between cables of different circuits.
 - .2 Maintain 300 mm minimum horizontal separation between low and high voltage cables.
 - .3 When low voltage cables cross high voltage cables maintain 300 mm vertical separation with low voltage cables in upper position.
 - .4 At crossover, maintain 75 mm minimum vertical separation between low voltage cables and 150 mm between high voltage cables.

- .5 Install treated planks on lower conduits 0.6 m minimum in each direction at crossings.
- .6 After sand protective cover specified in Section 31 23 33.01 - Excavating, Trenching and Backfilling, is in place, install continuous row of 38 x 140 pressure treated planks as indicated to cover length of run.

3.3 Cable installation in conduits

- .1 Install cables as indicated in conduits.
- .2 Do not pull spliced cables inside conduits.
- .3 Install multiple cables in conduit simultaneously.
- .4 Use CSA approved lubricants of type compatible with cable jacket to reduce pulling tension.
- .5 To facilitate matching of colour coded multi-conductor control cables reel off in same direction during installation.
- .6 Before pulling cable into conduits and until cables are properly terminated, seal ends of lead covered cables with wiping solder; seal ends of non-leaded cables with moisture seal tape.
- .7 After installation of cables, seal conduits ends with sealing compound.

3.4 Field quality control

- .1 Perform tests in accordance with Section 26 05 00 - Common Work Results for Electrical.
- .2 Perform tests using qualified personnel.
- .3 Pre-acceptance Tests:
 - .1 After installing cable but before splicing and terminating, perform insulation resistance test with 1000V megger on each phase conductor.
 - .2 Check insulation resistance after each splice and/or termination to ensure that cable system is ready for acceptance testing.
- .4 Acceptance Tests:
 - .1 Ensure that terminations and accessory equipment are disconnected.

- .2 Ground shields, ground wires, metallic armour and conductors not under test.
- .5 Provide Consultant with list of test results showing location at which each test was made, circuit tested and result of each test.
- .6 Remove and replace entire length of cable if cable fails to meet any of test criteria.

3.5 Protection

- .1 Repair damage to adjacent materials caused by cables installation.

End of section

1 General

1.1 References

- .1 CSA International:
 - .1 CSA C22.2 No.14-10, Industrial Control Equipment.
- .2 National Electrical Manufacturers Association (NEMA):
 - .1 NEMA ICS 1-2000(R2008), Industrial Control and Systems: General Requirements.

1.2 Action and informational submittals

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for control devices and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Shop Drawings:
 - .1 Include schematic, wiring, interconnection diagrams.

1.3 Quality assurance

- .1 Conduct tests in accordance with Section 26 05 00 - Common Work Results for Electrical.

1.4 Closeout submittals

- .1 Submit in accordance with Section 01 78 00 - Closeout Submittals.
- .2 Operation and Maintenance Data: Submit operation and maintenance data for control devices for incorporation into manual.

2 Products

2.1 Alarm panel

- .1 Enclosure: surface mounting.
- .2 Provide SJE Rhombus Tank Alert XT or approved equivalent.

2.2 Level Float Switch

- .1 Rated for sewage or wastewater applications.
- .2 Provide SJE SignalMaster control float switch or approved equivalent.
- .3 Float to include integral cable of sufficient length to terminate in junction box as described.

3 Execution

3.1 Examination

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for control devices installation in accordance with manufacturer's written instructions:
 - .1 Visually inspect substrate in presence of Consultant.
 - .2 Inform Consultant of unacceptable conditions immediately upon discovery.
 - .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Consultant.

3.2 Installation

- .1 Install alarm panel, provide with power, and interconnect the float switch.

3.3 Field quality control

- .1 Perform tests in accordance with Section 26 05 00 - Common Work Results for Electrical.

End of section

1 General

1.1 References

- .1 American Society for Testing and Materials International (ASTM):
 - .1 ASTM D 698-07e1, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (600kN-m/m³).
- .2 Canadian Standards Association (CSA International):
 - .1 CSA-A23.1/A23.2-09, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
- .3 Ontario Provincial Standard Specifications (OPSS):
 - .1 OPSS.MUNI 401, Construction Specifications for Trenching, Backfilling and Compacting
 - .2 OPSS.MUNI 510, Construction Specification for Removals
 - .3 OPSS.MUNI 206, Construction Specification for Grading
 - .4 OPSS.MUNI 1010, Material Specification for Aggregates – Base, Sub-base, Select Subgrade, and Backfill Material.

1.2 Administrative requirements

- .1 Coordination: arrange with authority having jurisdiction for relocation of buried services that interfere with execution of work.
 - .1 Pay costs of relocating services.

1.3 Sub-surface investigation

- .1 No sub-surface investigation report available.

1.4 Examination

- .1 Prior to construction, examine site and note all characteristics and features affecting the work.
- .2 Ensure in examination that all possible factors concerning work are investigated, and that following are known in particular:
 - .1 Methods and means available for material handling, disposal, storage and transportation.

- .2 Physical conditions of site, including ground water table and drainage courses.
- .3 Conformation and condition of ground surfaces.

1.5 Utility lines

- .1 Assume full responsibility for protection of known under and above ground utilities, such as water, sewer and gas mains, hydro and telephone poles, wires and conduits, whether or not they are shown on the plans. Where depth or location of any of these utilities has been shown on the plans, such information is not guaranteed. The Contractor shall be responsible for location of all utilities. All utilities are not necessarily shown on Contract Drawings.
- .2 Items encountered below grade not shown on Contract Drawings shall be immediately brought to the attention of the Consultant and/or the Owner.
- .3 Before commencing work, establish location and extent of underground utility lines in area of excavation. Notify Consultant of findings. Known underground and surface utility lines are indicated on drawings.
- .4 Buried Services:
 - .1 Before commencing work verify location of buried services on and adjacent to site.
 - .2 The Contractor will be responsible for hiring and arranging for the location of any underground services and utilities in the areas of work.
 - .3 Exercise proper caution in excavation of underground services or utilities. The Contractor will be responsible for any costs as a result of damage caused by the Contractor to any underground services or utilities.
 - .4 Before commencing work, conduct, with Consultant or Owner, a condition survey of existing structures, infrastructure, trees and other plants, lawns, fencing, service poles, wires, paving, survey benchmarks, and monuments which may be affected by work.

- .5 No payment shall be made for additional work or delays resulting from the presence of structures including pipes, conduits, poles and overhead wires that are known to exist but do not require permanent realignment or relocation, although they may require temporary relocation, support or protection.

1.6 Shoring

- .1 Notify utility companies and Municipal Authorities of work and cooperate with them in location and protection of their services.
- .2 Maintain existing services in areas of excavation that must remain active.
- .3 Relocate utilities as required to facilitate the work and pay costs for this work.
- .4 Remove abandoned utility lines to 2 m outside of main work area and cap or seal at cut-off points.
- .5 Record locations of maintained, rerouted and abandoned underground utility lines.
- .6 Make good damage to existing utility lines resulting from work.
- .7 Submit detailed drawings and design calculation of shoring scheme for all works that require temporary support from shoring. Drawings to indicate sizes, strengths, spacing and connection details. Drawings and calculations to be stamped and signed by the registered Engineer responsible for the shoring design.
- .8 Coordinate excavation, installation, bracing and removal of shoring with safety plan.

2 Products

2.1 Materials

- .1 Granular A, Granular B Type II and Select Subgrade to OPSS.MUNI 1010.
- .2 Sand to OPSS.MUNI 1004.
- .3 Unshrinkable fill: proportioned and mixed to provide:
 - .1 Maximum compressive strength of 0.4 MPa at 28 days.

- .2 Maximum Portland cement content of 25 kg/m³.
- .3 Minimum strength of 0.07 MPa at 24 hours.
- .4 Concrete aggregates: to CSA A23.1/A23.2.
- .5 Cement: to CSA A3000, Type GU.
- .6 Slump: 160 to 200 mm.

3 Execution

3.1 Examination

- .1 Evaluation and Assessment:
 - .1 Examine any available soils report or geotechnical report.
 - .2 Before commencing work verify locations of buried services on and adjacent to site.

3.2 Preparation

- .1 Temporary erosion and sedimentation control:
 - .1 Temporary Erosion and Sedimentation Control should be in accordance with the measures outlined in Section 01 57 13 – Erosion and Sedimentation Control.
 - .2 Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.
 - .3 Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.
 - .4 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.
- .2 Protection of in-place conditions:
 - .1 Protect excavations from freezing.
 - .2 Keep excavations clean, free of standing water, and loose soil.
 - .3 Where soil is subject to significant volume change due to change in moisture content, cover and protect to Consultant's approval.

- .4 Protect natural and man-made features required to remain undisturbed. Unless otherwise indicated or located in an area to be occupied by new construction, protect existing trees from damage.
- .5 Protect buried services that are required to remain undisturbed.
- .3 Removal:
 - .1 Remove exposed boulders and debris within areas designated on drawings.
 - .2 Remove paving below slab, and remove paving to 600 mm below finished grade elsewhere.
- .4 Remove from site and dispose of cleared items.
- .5 Remove obsolete buried services within 2 m of work area: cap cut-offs.

3.3 Dewatering

- .1 Refer to Section 31 23 34, Dewatering for additional requirements.
- .2 Provide all labour and equipment necessary to draw and pump all excavations free of water under any circumstances and take all necessary measures to prevent flow of water into excavation.
- .3 Seal or divert any springs found on site in a manner acceptable to Consultant.
 - .1 Keep excavations free of water while Work is in progress.
 - .2 Provide for Consultant's approval details of proposed dewatering or heave prevention methods, including dikes, well points, and sheet pile cut-offs.
- .4 Avoid excavation below groundwater table if quick condition or heave is likely to occur.
 - .1 Prevent piping or bottom heave of excavations by groundwater lowering, sheet pile cut-offs, or other means.
- .5 Protect open excavations against flooding and damage due to surface run-off.
- .6 Dispose of water in accordance with Section 31 23 34 - Dewatering in a manner not detrimental to public and private property, or portion of Work completed or under construction.

- .1 Provide and maintain temporary drainage ditches and other diversions outside of excavation limits.
- .7 Remove suspended solids or other materials before discharging to storm system, watercourses or drainage areas.

3.4 Excavation

- .1 Shore and brace excavations, protect slopes and banks and perform work in accordance with Provincial regulations.
- .2 Perform blasting in accordance with Provincial regulations: repair damage as authorized by Consultant.
 - .1 Do not blast within 3 m of buildings and where damage may result.
- .3 Strip topsoil over areas to be covered by new construction, over areas where grade changes are required, and so that excavated material may be stockpiled without covering topsoil.
 - .1 Stockpile topsoil on site for later use.
- .4 Excavate as required to carry out work.
 - .1 Do not disturb soil or rock below bearing surfaces.
 - .2 Notify Consultant when excavations are complete.
 - .3 If bearing conditions are unsatisfactory, additional excavation will be authorized in writing and paid for as additional work.
- .5 Protect from freezing excavated surfaces against which concrete or fill is to be placed.
- .6 Excavate trenches to provide uniform continuous bearing and support for 150 mm thickness of pipe, conduit or ducts bedding material on solid and undisturbed ground.
- .7 Shoring designer to visit site and submit a written report to Consultant stating shoring is in accordance with requirements.
- .8 Excavate for slabs and paving to subgrade levels.
 - .1 In addition, remove all topsoil, organic matter, debris and other loose and harmful matter encountered at subgrade level.

3.5 Field quality control

- .1 Testing of materials and compaction of backfill and fill will be carried out by testing laboratory designated by Consultant. Materials and compaction testing to be paid directly by the Contractor at no cost to the Owner.
- .2 Not later than 1 week minimum before backfilling or filling, arrange for submission of representative material samples to designated testing laboratory.
- .3 Do not begin backfilling or filling operations until material has been approved for use by Consultant.
- .4 Not later than 48 hours before backfilling or filling with approved material, coordinate with testing laboratory to allow compaction tests to be carried out.

3.6 Backfilling

- .1 Remove snow, ice, construction debris, organic soil and standing water from spaces to be filled.
- .2 Ensure backfilling operations are fully compliant with recommendations from Geotechnical Investigation.
- .3 Lateral support: maintain even levels of backfill around structures as work progresses, to equalize earth pressures.
- .4 Compaction of subgrade: compact existing subgrade under walks, paving, and slabs on grade, to same compaction as fill.
 - .1 Fill excavated areas with selected subgrade material compacted as specified for fill.
- .5 Placing:
 - .1 Place backfill, fill and base course material in 150 mm lifts: add water as required to achieve specified density.
- .6 Compaction: compact each layer of material to following densities for material to ASTM D 698:
 - .1 To underside of base courses: 95%.
 - .2 Base courses: 100%.
 - .3 Elsewhere: as per the drawings.

- .7 Under slabs and paving:
 - .1 Use Granular B Type II up to bottom of granular base courses.
 - .2 Use Granular A for base courses.
- .8 In trenches and excavations:
 - .1 Up to 300 mm above pipe, ducts or conduit: sand or granular 'A' placed by hand.
 - .2 Over 300 mm above pipe, ducts or conduit: native material approved by Consultant.
- .9 Under seeded and sodded areas: use site excavated material to bottom of topsoil except in trenches and within 600 mm of foundations.
- .10 Blown rock material, not capable of fine grading, is not acceptable, imported material must be placed on this type of material.
- .11 Against foundations (except as applicable to trenches and under slabs and paving): excavated material or imported material with no stones larger than 200 mm diameter within 600 mm of structures.
- .12 Underground tanks: use sand to bottom of granular base courses or to bottom of topsoil, as applicable.

3.7 Grading

- .1 Grade so that water will drain away from buildings, walls, surface infrastructure and paved areas, to catch basins and other disposal areas approved by Consultant.
- .2 Grade to be gradual between finished spot elevations shown on drawings.

3.8 Additional excavation

- .1 Carry excavations to levels shown on drawings. If excavations to levels shown disclose unsatisfactory bearing conditions, Consultant may order further excavation to a point where satisfactory bearings can be obtained.
- .2 Excavation below levels indicated on drawings, or called for or implied in this specification, done under Consultant's orders will be classed as additional work, and determined on basis of unit prices agreed upon at time of signing of contract.

3.9 Shortage and surplus

- .1 Supply all necessary fill to meet backfilling and grading requirements and with minimum and maximum rough grade variance.
- .2 Dispose of surplus material off site, as directed by Consultant and/or Owner. Backfill must be sorted into types (concrete, asphalt, rock, soil, etc.) prior to disposal.

3.10 Cleaning

- .1 Progress Cleaning: clean in accordance with Section 01 74 00.
 - .1 Leave Work area clean at end of each day.
 - .2 Dispose of cleared and grubbed material off site daily.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00.
- .3 Waste Management: separate waste materials for reuse and recycling and organics in accordance with Section 01 74 00.

End of section

1 General

1.1 Related sections

- .1 Section 01 74 00 – Cleaning and Waste Management
- .2 Section 31 00 00.01 - Earthwork

1.2 References

- .1 Canadian Standards Association (CSA International):
 - .1 CSA-A23.1-09/A23.2-09, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
- .2 Ontario Provincial Standard Specifications (OPSS):
 - .1 OPSS.MUNI 401, Construction Specifications for Trenching, Backfilling and Compacting
 - .2 OPSS.MUNI 510, Construction Specification for Removals
 - .3 OPSS.MUNI 206, Construction Specification for Grading
 - .4 OPSS.MUNI 805, Construction Specification for Temporary Erosion and Sediment Control Measures.
- .3 There is no geotechnical report available.

1.3 Definitions

- .1 Excavation classes: two classes of excavation will be recognized; common excavation and rock excavation.
 - .1 Rock: solid material in excess of 1.0 m³ and which cannot be removed by means of heavy-duty mechanical excavating equipment. Frozen material not classified as rock.
 - .2 Common excavation: excavation of materials of whatever nature, which are not included under definitions of rock excavation.
- .2 Unclassified excavation: excavation of deposits of whatever character encountered in Work.
- .3 Topsoil:
 - .1 Material capable of supporting good vegetative growth and suitable for use in top dressing, landscaping, and seeding.

- .2 Material reasonably free from subsoil, clay lumps, brush, objectionable weeds, and other litter, and free from cobbles, stumps, roots, and other objectionable material larger than 25 millimeters in any dimension.
- .4 Waste material: excavated material unsuitable for use in Work or surplus to requirements.
- .5 Borrow material: material obtained from locations outside area to be graded and required for construction of fill areas or for other portions of Work.
- .6 Recycled fill material: material, considered inert, obtained from alternate sources and engineered to meet requirements of fill areas.
- .7 Unsuitable materials:
 - .1 Weak, chemically unstable, and compressible materials.
- .8 Unshrinkable fill: very weak mixture of cement, concrete aggregates, and water that resists settlement when placed in utility trenches, and capable of being readily excavated.

1.4 Waste management and disposal

- .1 Separate waste materials for recycling in accordance with Section 01 74 00.

1.5 Existing conditions

- .1 There are no soils reports or geotechnical reports available.
- .2 Buried Services:
 - .1 Before commencing work verify location of buried services on and adjacent to site.
 - .2 Arrange with appropriate authority for relocation of buried services that interfere with execution of work.
 - .3 Remove obsolete buried services within 2 m of extents of main work area.
 - .4 Size, depth, and location of existing utilities and structures as indicated are for guidance only. Completeness and accuracy are not guaranteed.

- .5 Prior to beginning excavation Work, notify applicable Consultant and Owner to establish location and state of use of buried utilities and structures. Contractor to coordinate with Owner so such locations are clearly marked to prevent disturbance during Work.
- .6 Confirm locations of buried utilities by careful test excavations.
- .7 Maintain and protect from damage, water, sewer, gas, electric, telephone, and other utilities and structures encountered as indicated.
- .8 Where utility lines or structures exist in area of excavation, obtain direction of Consultant and Owner.
- .9 Record location of maintained, rerouted, and abandoned underground lines.
- .10 Confirm locations of recent excavations adjacent to area of excavation.
- .3 Existing buildings and surface features:
 - .1 Conduct, with Consultant and Owner, condition survey of existing buildings, trees and other plants, lawns, fencing, service poles, wires, rail tracks, pavement, infrastructure, survey benchmarks, and monuments, which may be affected by Work.
 - .2 Protect existing buildings and surface features from damage while Work is in progress. In event of damage, immediately make repair as directed by Consultant and Owner.

2 Products

2.1 Materials

- .1 Granular A, Granular B Type II and Select Subgrade to OPSS.MUNI 1010.
- .2 Sand to OPSS.MUNI 1004.
- .3 Engineered fill and clean fill.
- .4 Unshrinkable fill: proportioned and mixed to provide:
 - .1 Maximum compressive strength of 0.4 MPa at 28 days.
 - .2 Maximum Portland cement content of 25 kg/m³.
 - .3 Minimum strength of 0.07 MPa at 24 hours.

- .4 Concrete aggregates: to CSA A23.1/A23.2.
- .5 Cement: to CSA A3000, Type GU.
- .6 Slump: 160 to 200 mm.
- .7 Materials for erosion and sediment control as per OPSS.MUNI 805.

3 Execution

3.1 Temporary erosion and sedimentation control

- .1 Temporary Erosion and Sedimentation Control should be in accordance with the measures outlined in Section 01 57 13 – Temporary Erosion and Sediment Control.
- .2 Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.
- .3 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

3.2 Site preparation

- .1 Remove obstructions, ice, and snow from surfaces to be excavated within limits indicated.

3.3 Preparation/ protection

- .1 Protect existing features in accordance with applicable local regulations.
- .2 Keep excavations clean, free of standing water and loose soil.
- .3 Where soil is subject to significant volume change due to change in moisture content, cover and protect to Consultant and Owner approval.
- .4 Protect natural and man-made features required to remain undisturbed. Unless otherwise indicated or located in an area to be occupied by new construction, protect existing trees from damage.
- .5 Protect buried services that are required to remain undisturbed.

3.4 Stripping of topsoil

- .1 Begin topsoil stripping of areas as directed by Consultant and Owner after area has been cleared of brush, weeds, and grasses and removed from site.
- .2 Strip topsoil to depths as directed by Consultant and Owner.
- .3 Do not mix topsoil with subsoil.
- .4 Stockpile in locations as directed by Consultant and Owner.
- .5 Stockpile height not to exceed 2m and should be protected from erosion.
- .6 Dispose of unused topsoil off site, as per Section 31 00 00.01 - Earthwork. Topsoil must be separated from rock, concrete, and asphalt for disposal.

3.5 Stockpiling

- .1 Stockpile fill materials in areas designated by Consultant and Owner.
- .2 Stockpile granular materials in manner to prevent segregation.
- .3 Protect fill materials from contamination.
- .4 Implement sufficient erosion and sediment control measures to prevent sediment release off construction boundaries and into water bodies.

3.6 Dewatering and heave prevention

- .1 Keep excavations free of water while Work is in progress.
- .2 Provide for Consultant and Owner's approval details of proposed dewatering or heave prevention methods, including dikes, well points, and sheet pile cut-offs.
- .3 Avoid excavation below groundwater table if quick condition or heave is likely to occur.
 - .1 Prevent piping or bottom heave of excavations by groundwater lowering, sheet pile cut-offs, or other means.
- .4 Protect open excavations against flooding and damage due to surface run-off.
- .5 Dispose of water to approved runoff areas and in manner not detrimental to public and private property, or portion of Work completed or under construction.

- .1 Provide and maintain temporary drainage ditches and other diversions outside of excavation limits.
- .6 Provide flocculation tanks, settling basins, geotubes or other treatment facilities to remove suspended solids or other materials before discharging to storm sewers, watercourses, or drainage areas.

3.7 Excavation

- .1 Excavate to lines, grades, elevations, and dimensions as directed by Consultant and Owner.
- .2 Remove all fill material to expose native soils or native bedrock below the footprint of the new structure. Proof roll native soil material with heavy construction equipment.
- .3 Remove paving and other obstructions encountered during excavation with care.
- .4 Excavation must not interfere with bearing capacity of adjacent foundations.
- .5 For trench excavation, unless otherwise authorized by Consultant and Owner in writing, do not excavate more than 30 m of trench in advance of installation operations and do not leave open more than 15 m at end of day's operation.
- .6 Keep excavated and stockpiled materials a safe distance away from edge of trench as directed by Consultant and Owner.
- .7 Restrict vehicle operations directly adjacent to open trenches.
- .8 Dispose of surplus stripped topsoil, sod, and soil materials off site, as directed by Consultant and Owner. Soil must be separated from rock, concrete, and asphalt for disposal.
- .9 Disposal of all materials to be coordinated through the Consultant and Owner.
- .10 Do not obstruct flow of surface drainage or natural watercourses.
- .11 Earth bottoms of excavations to be undisturbed soil, level, free from loose, soft or organic matter.
- .12 Notify Consultant and Owner when bottom of excavation is reached.

- .13 Obtain Consultant and Owner approval of completed excavation.
- .14 Remove unsuitable material from trench bottom including those that extend below required elevations to extent and depth as directed by Consultant and Owner.
- .15 Correct unauthorized over-excavation as follows:
 - .1 Fill under bearing surfaces and footings with Granular 'B' (Type II) fill compacted to not less than 100% Standard Proctor maximum dry density.
 - .2 Fill under other areas with Granular 'B' (Type II) fill compacted to not less than 95% Standard Proctor maximum dry density.
- .16 Hand trim, make firm and remove loose material and debris from excavations.
 - .1 Where material at bottom of excavation is disturbed, compact foundation soil to density at least equal to undisturbed soil.

3.8 Fill types and compaction

- .1 Under concrete slabs: provide compacted granular material as per structural drawings.
- .2 Under grass areas: provide Type 3 fill to 100 mm below finished grade compacted to 95% SPMDD.

3.9 Bedding and surround of underground services

- .1 Place and compact granular material for bedding and surround of underground services and conduit, as specified.
- .2 Place bedding and surround material in unfrozen condition.

3.10 Backfilling

- .1 Do not proceed with backfilling operations until completion of following:
 - .1 Consultant and Owner has inspected and approved installations.
 - .2 Consultant and Owner has inspected and approved of construction below finish grade.
 - .3 Inspection, testing, approval, and recording location of underground utilities.

- .4 Removal of concrete formwork.
- .5 Removal of shoring and bracing; backfilling of voids with satisfactory soil material.
- .2 Areas to be backfilled to be free from debris, snow, ice, water, and frozen ground.
- .3 Do not use backfill material which is frozen or contains ice, snow, or debris.
- .4 Place backfill material in uniform layers not exceeding 150mm compacted thickness up to grades indicated. Compact each layer before placing succeeding layer.
- .5 Backfilling around installations:
 - .1 Place bedding and surround material as specified elsewhere.
 - .2 Do not backfill around or over cast-in-place concrete within 24 hours after placing of concrete.
 - .3 Place layers simultaneously on both sides of installed Work to equalize loading. Difference not to exceed 0.5 m.

3.11 Restoration

- .1 Upon completion of Work, remove waste materials and debris in accordance to Section 01 74 00 - Cleaning, trim slopes and correct defects as directed by Consultant and Owner.
- .2 Replace topsoil as directed by Consultant and Owner.
- .3 Reinstall lawns to elevation which existed before excavation.
- .4 Reinstall pavements disturbed by excavation to thickness, structure, and elevation which existed before excavation.
- .5 Clean and reinstall areas affected by Work as directed by Consultant and Owner.
- .6 Use temporary plating to support traffic loads over unshrinkable fill for initial 24 hours.
- .7 Protect newly graded areas from traffic and erosion and maintain free of trash or debris.

End of section

1 General

1.1 Waste management and disposal

- .1 Separate and recycle waste materials in accordance with Section 01 74 00.

1.2 References

- .1 OPSS.MUNI 511, Construction Specification for Rip-Rap, Rock Protection, and Granular Sheeting.
- .2 OPSS.MUNI 1004, Aggregates, Miscellaneous.
- .3 OPSS.MUNI 1860, Geotextiles.

2 Products

2.1 Stone

- .1 Hard, dense, durable quarry stone, free from seams, cracks or other structural defects, to meet following size distribution for use intended:
 - .1 Hand placed rip-rap:
 - .1 Minimum size of individual stones and gradation requirements to be as per Table 8 in OPSS 1004 for R-10 rip-rap.
 - .2 Supply rock spalls or cobbles to fill open joints.

2.2 Geotextile filter

- .1 Geotextile to be Class II, Non-Woven in accordance with OPSS 1860.

3 Execution

3.1 Placing

- .1 Fine grade area to be rip-rapped to uniform, even surface. Fill depressions with suitable material and compact to provide firm bed.
- .2 Place geotextile on prepared surface as indicated on drawings. Avoid puncturing geotextile. Vehicular traffic over geotextile not permitted.

- .3 Place rip-rap to thickness and details as indicated.
- .4 Hand Placing:
 - .1 Use larger stones for lower courses and as headers for subsequent courses.
 - .2 Stagger vertical joints and fill voids with rock spalls or cobbles.
 - .3 Finish surface evenly, free of large openings and neat in appearance.

End of section

1 General

1.1 References

- .1 American Society for Testing and Materials (ASTM):
 - .1 ASTM D 4791-10, Standard Test Method for Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate.
- .2 Ontario Provincial Standard Specifications (OPSS):
 - .1 OPSS.MUNI 501, Construction Specification for Compacting
 - .2 OPSS.MUNI 1010, Material Specification for Aggregates – Base, Sub-base, Select Subgrade, and Backfill Material.

1.2 Action and informational submittals

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.

1.3 Delivery, storage and handling

- .1 Deliver, store and handle materials in accordance with Section 01 65 00 and with manufacturer's written instructions.
- .2 Storage and Handling Requirements:
 - .1 Store materials in accordance with manufacturer's recommendations, erosion and sedimentation control plan.
 - .2 Replace defective or damaged materials with new.

2 Products

2.1 Materials

- .1 Granular 'B' Type II sub-base to OPSS.MUNI 1010.

3 Execution

3.1 Examination

- .1 Verification of Conditions: verify that condition of substrate is acceptable for granular sub-base placement in accordance with contract documents:

- .1 Inform Consultant and Owner of proposed source of aggregates and provide access for sampling at least 4 weeks prior to commencing production.
- .2 If, in opinion of Consultant and Owner, materials from proposed source do not meet, or cannot reasonably be processed to meet, specified requirements, locate an alternative source or demonstrate that material from source in question can be processed to meet specified requirements.
- .3 Advise Consultant and Owner 4 weeks in advance of proposed change of material source.
- .4 Acceptance of material at source does not preclude future rejection if it fails to conform to requirements specified, lacks uniformity, or if its field performance is found to be unsatisfactory.

3.2 Preparation

- .1 Aggregate source preparation:
 - .1 When excavation is completed dress sides of excavation to nominal 1.5:1 slope, and provide drains or ditches as required to prevent surface standing water.
 - .2 Trim off and dress slopes of waste material piles and leave site in neat condition.
- .2 Processing:
 - .1 Process aggregate uniformly using methods that prevent contamination, segregation and degradation.
 - .2 Blend aggregates, if required, to obtain gradation requirements, percentage of crushed particles, or particle shapes, as specified.
 - .3 Wash aggregates, if required to meet specifications.
 - .4 When operating in stratified deposits use excavation equipment and methods that produce uniform, homogeneous aggregate.
- .3 Handling:
 - .1 Handle and transport aggregates to avoid segregation, contamination and degradation.

3.3 Placing

- .1 Place granular sub-base after subgrade is inspected and approved by Consultant and Owner.
- .2 Construct granular sub-base to depth and grade in areas indicated.
- .3 Ensure no frozen material is placed.
- .4 Place material only on clean unfrozen surface, free from snow or ice.
- .5 Place granular sub-base materials using methods which do not lead to segregation or degradation.
- .6 For spreading and shaping material, use spreader boxes having adjustable templates or screeds which will place material in uniform layers of required thickness.
- .7 Place material to full width in uniform layers not exceeding 150 mm compacted thickness.
- .8 Shape each layer to smooth contour and compact to specified density before succeeding layer is placed.
- .9 Remove and replace portion of layer in which material has become segregated during spreading.

3.4 Compaction

- .1 Compaction equipment to be capable of obtaining required material densities.
- .2 Compact to density of not less than 100% Standard Proctor maximum dry density or as indicated in other sections..
- .3 Shape and roll alternately to obtain smooth, even and uniformly compacted sub-base.
- .4 Apply water as necessary during compaction to obtain specified density.
- .5 In areas not accessible to rolling equipment, compact to specified density with mechanical tampers approved by Consultant.
- .6 Correct surface irregularities by loosening and adding or removing material until surface is within specified tolerance.

3.5 Cleaning

- .1 Progress Cleaning: clean in accordance with Section 01 74 00.
- .2 Leave Work area clean at end of each day.
- .3 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00.

3.6 Site tolerances

- .1 Finished sub-base surface to be within 10 mm of elevation as indicated but not uniformly high or low.

3.7 Protection

- .1 Maintain finished sub-base in condition conforming to this section until succeeding base is constructed, or until granular sub-base is accepted by Consultant.

End of section

1 General

1.1 References

- .1 American Society for Testing and Materials International, (ASTM):
 - .1 ASTM D 698, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort.
- .2 Ontario Provincial Standard Specifications (OPSS):
 - .1 OPSS.MUNI 302-November 2016, Construction Specification for Priming Granular Base.
 - .2 OPSS.PROV 308-April 2012, Construction specification for Tack Coating and Joint Painting.
 - .3 OPSS.MUNI 310-November 2012, Construction Specification for Hot Mix Asphalt.
 - .4 OPSS.MUNI 314-November 2016, Construction Specification for Untreated Subbase, Base, Surface, Shoulder, Subgrade and Stockpiling.
 - .5 OPSS 710-November 2010, Construction Specification for Pavement Marking.
 - .6 OPSS.MUNI 1010-November 2013, Material Specification for Aggregates-Base, Subbase, Select Subgrade, and Backfill Material.
 - .7 OPSS.MUNI 1103-November 2016, Material Specification for Emulsified Asphalt.
 - .8 OPSS.MUNI 1150-November 2010, Material Specification for Hot Mix Asphalt.
 - .9 OPSS 1716- February 1991, Material Specification for Water-Borne Traffic Paint.
- .3 Canadian General Standards Board (CGSB):
 - .1 CAN/CGSB-1.5-M91, Low Flash Petroleum Spirits Thinner (Reaffirmation of December 1991).
 - .2 CAN/CGSB-1.74-2001, Alkyd Traffic Paint

1.2 Samples

- .1 Submit asphalt mix design and samples in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit to Consultant, samples of material for sieve analysis at least 4 weeks before beginning Work.

1.3 Waste management and disposal

- .1 Separate and recycle waste materials in accordance with Section 01 74 00 – Cleaning and Waste Management.
- .2 Remove from site and dispose of all packaging materials at appropriate recycling facilities.
- .3 Collect and separate for disposal paper, plastic, polystyrene, corrugated cardboard packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.
- .4 Place materials defined as hazardous or toxic in designated containers.
- .5 Divert unused aggregate materials from landfill to facility for reuse as approved by Consultant and Owner.
- .6 Dispose of unused paint and paint thinner materials at official hazardous material collections site as approved by Consultant and Owner.
- .7 Fold up metal banding, flatten and place in designated area for recycling.
- .8 Do not dispose of unused paint and paint thinner material into sewer system, into streams, lakes, onto ground or in other location where it will pose health environmental hazard.
- .9 Divert unused asphalt from landfill to facility capable of recycling materials.

2 Products

2.1 Materials

- .1 Aggregates to: OPSS.MUNI 1010:
 - .1 Granular A
 - .2 Granular B Type II.
 - .3 Select subgrade.

- .2 Prime Coat: SS-1 to OPSS.MUNI 1103.
- .3 Tack Coat: SS-1 to OPSS.MUNI 1103.
- .4 Asphalt concrete: to OPSS.MUNI 1150.

3 Execution

3.1 Pavement thickness

- .1 Refer to drawings for asphalt and granular thicknesses.

3.2 Pavement construction

- .1 Application of prime coat: OPSS.MUNI 302.
- .2 Construction of asphalt concrete: OPSS.MUNI 310.

3.3 Traffic markings

- .1 No traffic markings required.

End of section

1 General

1.1 Source quality control

- .1 No testing required.

1.2 Scheduling of finish work

- .1 Schedule the placing of the topsoil and grading to permit sodding within seven (7) days.

1.3 Definitions

- .1 Compost: should be a mixture of soil and decomposing organic matter, for use as a fertilizer, mulch, or soil conditioner. Compost should be processed organic matter, containing 40% or more organic matter. The product must be sufficiently decomposed (i.e., stable) so that any further decomposition does not adversely affect plant growth (a C:N ratio below 25 or 50,) and contain no toxic or growth inhibiting contaminants. Composed bio-solids must meet the requirements of the Guidelines for Compost Quality, Category (A) (B) produced by the Canadian Council of the Ministers of the Environment (CCME), Jan. 1996.
- .2 Friable: Soil which is easily crumbled through fingers when held by hand.

2 Materials

2.1 Topsoil

- .1 All topsoil supplied by the Contractor will be fertile, friable, natural sandy loam containing not less than 5% of organic matter for sandy loams with an acidity value ranging from pH 6.0 to pH 7.5 and capable of sustaining vigorous plant growth. It will be free of stems or roots, stones and clods more than 50 mm diameter or other extraneous matter. Screening of topsoil will be required if designated by the Consultant. Topsoil will not be supplied in a frozen state.

- .2 Topsoil to be imported:
 - .1 Friable, neither heavy clay nor very light sandy nature consisting of 45% sand, 35% silt, 20% clay and pH value of 5.5 to 7.5. Free from subsoil, roots, vegetation, debris, toxic materials, stones and clods over 20mm in any dimension.
 - .2 Organic Matter, 4% for clay loams, and 2% for sandy loams too maximum of 20% by volume.
 - .3 Contain no toxic elements or growth inhibiting materials.
 - .4 Finished surface free from:
 - .1 Debris and stones more than 50 mm diameter.
 - .2 Coarse vegetative material, 10 mm diameter and 100-mm length, occupying more than 2% of soil volume.
 - .3 Consistency: friable when moist.
 - .5 Native topsoil is acceptable provided it meets or is augmented to meet the quality standards specified in this Section
 - .6 Topsoil is only to be imported if there is a shortage of suitable topsoil available on site for reuse, at no cost to the Owner. Imported topsoil shall be screened prior to delivery to the site.

2.2 Gravel paving

- .1 Granular 'A'.

2.3 Soil amendments

- .1 Fertilizer:
 - .1 Complete commercial synthetic fertilizer with minimum 65% insoluble nitrogen.
 - .2 Formulation ratio - 10 6 4, 10% nitrogen, 6% phosphoric acid, 4% potash.
- .2 Peatmoss:
 - .1 Derived from partially decomposed fibrous or cellular stems and leaves of species of Sphagnum Mosses.
 - .2 Elastic and homogeneous, brown in colour.
 - .3 Free of wood and deleterious material which could prohibit growth.

- .4 Shredded particle minimum size 5 mm.
- .3 Sand: washed coarse silica sand, medium to coarse textured.
- .4 Limestone:
 - .1 Ground agricultural limestone containing minimum calcium carbonate equivalent of 85%.
 - .2 Gradation requirements: percentage passing by weight, 90% passing 1.0 mm sieve, 50% passing 0.125 mm sieve.
- .5 Bonemeal: finely ground with a minimum analysis of 20% phosphoric acid.

2.4 Source quality control

- .1 Advise Consultant topsoil sources to be utilized with sufficient lead time for testing.
- .2 Contractor is responsible for amendments to supply topsoil as specified.
- .3 Soil testing by recognized testing facility for PH, P and K, and organic matter.
- .4 Testing of topsoil will be carried out by a testing laboratory designated by the Consultant. Soil sampling, testing and analysis to be in accordance with Provincial standards.

3 Execution

3.1 Preparation of existing grade

- .1 Verify that grades are correct. If discrepancies occur, notify the Consultant and do not commence work until instructions have been received.
- .2 Grade soil, eliminating uneven areas and low spots, ensuring positive drainage. Remove soil contaminated with toxic materials. Dispose of removed materials as directed by Consultant.
- .3 Remove debris, roots, branches, stones in excess of 50 mm diameter and other deleterious materials. Remove soil contaminated with calcium chloride, toxic materials and petroleum products. Remove debris which protrudes more than 75 mm above surface. Dispose of removed material off site.

- .4 Cultivate entire area which is to receive topsoil to depth of minimum 25 mm. Cross cultivate those areas where equipment used for hauling and spreading has compacted soil.

3.2 Placement and spreading of topsoil - planting soil

- .1 Spread topsoil after subgrade has been approved. Refer to Drawings for direction of surface drainage.
- .2 Spread topsoil with adequate moisture in uniform layers not exceeding 150 mm, over approved, unfrozen subgrade, where sodding, seeding and planting is indicated.
- .3 For sodded areas keep topsoil 15 mm below finished grade.
- .4 Spread topsoil to following minimum depths after settlement, 80% compaction:
 - .1 100 mm for seeded areas
 - .2 500 mm for shrub beds
- .5 Manually spread topsoil around trees, shrubs and obstacles.

3.3 Soil amendments

- .1 Apply soil amendments at rate as specified and as determined from soil sample test.
- .2 Mix soil amendments into full depth of topsoil prior to application of fertilizer.
- .3 Place topsoil at depth of 135 mm for sodded areas unless otherwise specified in the drawings.
- .4 Apply planting soil as indicated on drawings and details.

3.4 Application of fertilizer

- .1 Apply fertilizer at least one week after limestone application.
- .2 Spread fertilizer uniformly over entire area of topsoil at manufacturer's recommended rate of application or rate determined on basis of soil sample test.
- .3 Mix fertilizer thoroughly to the full depth of topsoil.

3.5 Finish grading

- .1 Grade to eliminate rough spots and low areas and ensure positive drainage. Prepare loose friable bed by means of cultivation and subsequent raking.
- .2 Consolidate topsoil to required bulk density using equipment approved by the Consultant. Leave surfaces smooth, uniform and firm against deep foot printing.

End of section

1 General

1.1 Section includes

- .1 This section specifies requirements for sod and seeding and initial maintenance.
- .2 Work included:
 - .1 Sodding.
 - .2 Fertilizer and watering.
 - .3 Maintenance and warranty.

1.2 Reference standards

- .1 Ontario Provincial Standard Specifications
 - .1 OPSS 802 (November 2010) – Construction Specification for Topsoil.
 - .2 OPSS.MUNI 803 (November 2018) – Construction Specification for Sodding.
 - .3 Landscape Ontario Horticultural Trades Association, Landscape Standards Section #8.
 - .4 Nursery Sod Growers Association of Ontario: “Classification of Turf Grass for Ontario”.

1.3 Measurement and payment

- .1 No measurement will be made for the work of this Section. The “Measurement for Payment” and “Basis of Payment” clauses of the referenced OPS Specifications shall not apply to this Contract.
- .2 Lump sum price for this Section shall include all labour, equipment and materials to do the specified work and supply the specified materials.

1.4 Qualifications

- .1 Firm performing work of this Section shall have at least 3 years’ experience in performing work of similar scope.

1.5 Quality assurance

- .1 Subsection 803.08.02 of OPSS.MUNI 803 is amended by the addition of the following:

“If surface soil should be visible between the rolls of sod the Contract Administrator may, at his sole discretion, request the Contractor to correct the open joints by providing topsoil and seed, in lieu of repositioning the displaced rolls of sod.”

1.6 Delivery, storage & handling

- .1 The Contractor shall provide, upon request by the Consultant, a label or statement certifying the quality grade, location of sod source and species of grass in the sod, and that the sod meets the specifications or requirements of this Standard for the stated grade.
- .2 Sod shall be protected during transportation (i.e. tarpaulin) for load security and reduction of wind exposure to prevent drying out and shall arrive at the site in a fresh and healthy condition.
- .3 Sod delivered to the job site shall be stored in such a manner to minimize drying out or overheating of product.
- .4 Small, irregular or broken pieces of sod shall not be accepted.
- .5 Allow sod to dry sufficiently from wet weather to prevent tearing during handling.
- .6 Sod shall not be dropped or dumped from vehicles.
- .7 Deliver and store fertilizers and amendments in waterproof bags showing weight, analysis and name of manufacturer.

1.7 Scheduling

- .1 Schedule delivery of sod for no later than 48 hours after being cut and in place no later than 48 hours after being cut. Sodding is prohibited when soil is saturated, frozen and when ice or snow is on the fine graded surface. Where an irrigation system has been specified, the system shall be completely installed and functional prior to the commencement of sodding.

1.8 Warranty

- .1 Warranty all sod until completion of the first cut of the last roll of sod has been installed. First cut shall occur when turf type grasses have achieved 100 – 125 mm in overall growth, with a cutting height of 75 – 87 mm.
- .2 Repair any deterioration, bare spots, breaks or displacement of sod during warranty period. Be responsible for all maintenance of sodded areas during the warranty period, including watering and first two cuts (mowing).
- .3 Replacement of materials broken or damaged due to circumstances beyond the Contractor's control after completion shall not be an obligation under this warranty. The Contractor is responsible for watering during severe drought and this will be considered within the control of the Contractor during the warranty period.
- .4 At the conclusion of the warranty period, the sod should be predominantly green and succulent, showing evidence of rooting into the underlying soil. Sod shall not have greater than 3% scattered dead patches and these patches shall not exceed 0.15 m² on an individual basis. Any sod which fails to meet these requirements must be corrected by the Contractor to bring the sod within these criteria, including the warranty period for new, replacement sod.

1.9 Maintenance

- .1 Water immediately upon installation. Water sodded areas in sufficient quantities and at required frequency to maintain topsoil immediately under sod continuously moist for depth of 75 to 100 mm.
- .2 Water sufficiently thereafter to maintain optimum growing conditions during the warranty period. Ensure adequate moisture in root zone at freeze up.
- .3 Provide all maintenance and protection of sodded areas until the Owner takes over responsibility for maintenance after the first two cuts of the last sod laid.
- .4 All areas which at the end of the warranty period are not in a healthy growing state or have ruts or other damage will not be accepted until repairs are made to the satisfaction of the Consultant. Repairs will be made at the Contractor's expense and to the specifications above.

- .5 Restore the site to original conditions from damage arising out of the replacement operations at no cost to the Owner.

2 Products

2.1 Topsoil

- .1 Topsoil in accordance with Section 32 91 19.13 Topsoil and Finish Grading. Topsoil not meeting the minimum specification must be amended and retested. Fertilizer and mineral amendments must be made as per soil testing agency recommendations.
 - .1 All Topsoil for the Intensive-use lawn areas shall be sandy loam textural class only.
 - .2 Topsoil shall not be moved, delivered or worked on while in a frozen, wet or muddy state or condition.

2.2 Sod

- .1 Subsection 803.05.01 of OPSS.MUNI 803 is amended by the deletion of the third sentence in paragraph 2, and replacing it with the following sentence:

“There shall be no more than 5 broadleaf weeds per 40 square metres of sod.”
- .2 Sod: Ontario No. 1 Grade, Kentucky Bluegrass/Fine Fescue nursery sod in vigorous growing condition, free from weeds and crabgrass, cut from well-established turf, soil permeated with roots and containing sufficient moisture to maintain vitality during transport and storage. Sod mix shall contain by weight at time of seeding, 90 to 95% Kentucky Bluegrass cultivars and 5 to 10% Creeping Red, Chewings or Hard Fescue cultivars. Seed must be certified, and cultivars must be improved type.
 - .1 Cut thickness sod shall be cut at a uniform thickness of soil (excluding thatch and leaf growth) of 15 mm.
 - .2 Sod to be a minimum age of 12 months, root development to support weight without breaking
 - .3 All Sod provided shall have an average leaf blade height between 40 -60 mm.

- .4 All Sod is to be free from diseases, fungi, nematodes and soil born insects.
- .5 All Sod is to have no more than 10 mm of thatch (uncompressed).
- .6 Field turf grass sod not to contain more than 5 weeds per 10m2.

2.3 Materials

- .1 Fertilizer: complete commercial fertilizer with 50% of the elements derived from organic sources.
 - .1 All Fertilizers shall be granular, pelletized or pill form, and shall be dry and free flowing, unless specified.
 - .2 Fertilizers shall be packed in standard waterproof containers, clearly marked with the name of the manufacturer, weight and analysis.
 - .3 The types, formulations, and rates of application for fertilizers shall be as recommended by the laboratory soil specialist, based on the test results of the growing medium, and as approved by the Consultant.
 - .4 Substitution or variations in fertilizers and methods shall be made only upon pre-approval by the Consultant.
- .2 Water:
 - .1 Potable only.
- .3 Biodegradable Pegs:
 - .1 plant-based biodegradable sod peg; 17 x 17 mm size, minimum 150 mm long; tapered and barbed end, as manufactured by Greenstake Inc. Tel: 877-205-2400; Fax: 877-202-8466, or alternate as approved by Consultant. Install per manufacturer's recommendations. Contractor to provide biodegradable peg sample with manufacturer's product, installation and warranty information to Project Manager and Consultant for approval.

2.4 Source quality control

- .1 Test proposed topsoil prior to shipment to the site and provide Consultant with a copy of test results confirming conformance with the requirements of this Section.

3 Execution

3.1 Examination

- .1 Verify existing conditions are ready to receive work.
- .2 Commencement of work implies acceptance of existing conditions.

3.2 Preparation of areas to receive sod and seed

- .1 Subsection 802.07.02 of OPSS 802 is deleted in its entirety and replaced with the following:

“Areas where topsoil is to be placed shall be fine graded to a uniform surface according to OPSS 206. The subgrade shall be compacted to 95% Standard Proctor Density. The surface shall then be loosened to a depth of 25 mm. The prepared subgrade surface shall be at a depth to allow for placement of 150 mm of topsoil.”
- .2 Using approved topsoil, spread topsoil over areas to be sodden to a minimum depth of 150 mm. In intensive-use turf area, place topsoil to greater depths over completed sub grade and subsurface drainage, to specified finished grades. Do not fill above specified sub grade with any material other than approved topsoil. Topsoil shall be placed during dry weather and on unfrozen sub grade.
- .3 Any surplus topsoil may be spread to increased depths under the direction of the Consultant.
- .4 Pulverize all clods or lumps of soil and rake up and remove any roots or foreign matter. Fine grade to produce a smooth even surface free from debris and clumps of sod, stones and roots over 25 mm diameter. Finish Grades are to correspond with those shown on the drawings. Compact to 85 percent Standard Proctor density. Do not over compact.
- .5 The topsoil shall be loose and scarified to a depth of 25 mm at the time of placing the sod. The required fertilizer shall be applied to and well worked into the topsoil by disking, raking or harrowing, at the rates specified prior to placing the sod. Obtain Consultant's approval of finished grading prior to sodding.

3.3 Placement of topsoil

- .1 Subsection 802.07.03 of OPSS 802 is deleted in its entirety and replaced with the following:

“Topsoil shall be placed to a uniform depth of 150 mm on areas specified in the Contract Documents.”

3.4 Placement of sod

- .1 Subsection 803.07.04 of OPSS.MUNI 803 is amended by the addition of the following:

“Sod shall be placed within 24 hours after delivery to the job site unless otherwise authorized by the Contract Administrator. Sod not placed within the permitted time shall be removed and disposed of off-site and replaced with new sod meeting specifications. Sod shall be rolled within 24 hours of being placed. Sod shall be saturated immediately after rolling. On all slopes 2:1 or steeper, every sod piece shall be pegged. Sod along ditch inverts and one row on both sides of the ditch invert shall be pegged. Minimum width of sod to be pegged in ditches shall be 1.2 m.”

- .2 Subsection 803.07.05 of OPSS.MUNI 803 is deleted in its entirety and replaced with the following:

“Sod shall be maintained for a 30 consecutive calendar day maintenance period following completion of placement. For sod placed after September 30 in any calendar year, sod shall be maintained until May 30 of the following calendar year. All sod placed shall be kept healthy, actively growing and green in leaf colour. The Contractor shall provide maintenance watering as required during the maintenance period.”

- .3 Sodding shall not commence prior to completion of topsoil placement and installation of the irrigation system. Lay sod immediately upon delivery or as soon as possible thereafter, but no later than 48 hours after cutting. Water immediately to a minimum penetration depth of 75 mm.

- .4 Lay individual sod pieces in a checkerboard fashion so that joints in adjacent rows are staggered a minimum of 25 cm, in smooth and even rows, closely knit, tight together in such a manner with no open joints visible and no pieces are stretched or overlapped.
- .5 Sod shall be laid perpendicular to slopes or the flow of water. On slope areas, sodding shall be started at the bottom of the slope. On slopes steeper than 2:1 every row shall be pegged with wooden lath pegs, of sufficient length to ensure satisfactory anchorage of the sod, at intervals of not more than 0.5 metres. Pegs shall be driven flush with sod.
- .6 Countersink sod to the existing grade level at all edges. Sod shall be cut where necessary only with a sharp knife or edging tool.
- .7 After the sod is laid, tamp and roll the sodded area to a uniform surface. Blend all final sod grades smoothly to have a clean flush bond into adjacent surfaces. Do not use heavy power rollers. Maximum weight allowed: 450 kg. Hand roller shall have a minimum weight of 90 kg and a maximum weight of 135 kg.
- .8 Initially water sod within 4 hours of placement. Apply sufficient quantity of water to penetrate the top 75 mm surface of the topsoil. Verify water penetration by lifting strips at random and examining the soil. Apply water uniformly and in a manner to prevent erosion.
- .9 For initial cutting, cut sod on a graduated cutting schedule as follows.
- .10 Do 3 cuttings after sod has been placed.
- .11 Do first cut 25 days after sod placement. Cut sod to 115 mm (4.5") height.
- .12 Within a few days, do a second cut to a height of 100 mm (4")
- .13 At end of maintenance period, do final cut to a height of 90 mm (3.5").

3.5 Fertilizing and amending

- .1 Sodded Areas: fertilize and amend topsoil as recommended by the soil testing agency. Fertilizer shall have an N-P-K analysis and applied at the rate recommended by the soil testing agency. Fertilizer and amendments shall be thoroughly worked into the soil by raking, disking or harrowing. Smooth and fill all depressions or lumps following fertilization. Apply fertilizer not more than 48 hours before sod is placed.

3.6 Protection

- .1 Maintain and protect work until final acceptance. Newly sodded areas shall be protected from heavy foot traffic during laying. Planks shall be placed if necessary, to prevent damage.
- .2 Before pedestrian traffic is permitted on the turf, and after the turf is well rooted into the growing medium, all pegs or stakes shall be removed or driven at least 50 mm below the surface.
- .3 Consultant will accept the Work only if areas are properly established, the turf is free of eroded, bare and dead spots and is 98 percent free of weeds. On completion and approval by the Owner and the Consultant, give all necessary instructions for proper maintenance to ensure the continuing establishment of the stock in healthy condition.

3.7 Sod maintenance

- .1 Subsection 803.07.05 of OPSS.MUNI 803 is amended by the addition of the following:

“If surface soil should be visible between the rolls of sod the Contractor Administrator may, at his sole discretion, request the Contractor to correct the open joints by providing topsoil and seed, in lieu of repositioning the displaced rolls of sod.”

End of section

1 General

1.1 Section includes

- .1 Precast tank requirements.

1.2 Related requirements

- .1 Section 01 11 00 Summary of Work.
- .2 Section 01 33 00 Submittal Procedures.
- .3 Section 01 45 00 Quality Control

1.3 Reference Standards

- .1 CAN/CSA B66, Design, Material, and Manufacturing Requirements for Prefabricated Septic Tanks and Sewage Holding Tanks

1.4 Design Requirements

- .1 Design precast sewage holding tanks to CAN/CSA B66 and Ontario Building Code 8.2.2. and 8.8.2.
- .2 Design precast elements to carry loads in accordance with applicable codes.

1.5 Submittals

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Shop Drawings: Prior to manufacture, submit drawings of precast tanks including plans, sections and details as necessary to demonstrate conformance with specified requirements
- .3 Manufacturer's Instructions: Submit manufacturer's installation instructions and special handling criteria, installation sequence and cleaning procedures.
- .4 Quality Assurance Submittals:
 - .1 CAN/CSA B66 Certificate of Compliance: submit certificate signed by manufacturer certifying that design and manufacture of precast tanks meets the specified performance characteristics and physical properties of CAN/CSA B66.

- .2 Provide copy of the plant's quality management plan outlining procedures used to verify product quality to specified performance.

1.6 Qualifications

- .1 Precast concrete manufacturer certified in accordance with CSA's certification procedures for precast concrete plants prior to submitting Bid and to verify as part of Bid that plant has current certification in appropriate category.
- .2 Only precast elements fabricated in certified plants are acceptable. Plant certification must be maintained for duration of fabrication and installation.

1.7 Delivery, Storage, and Handling

- .1 Deliver, handle and store precast tanks according with manufacturer's instructions.
- .2 Protect unit corners from damage during transport and installation.

2 Products

2.1 Precast Concrete Tank

- .1 One (1) precast concrete sewage holding tank to CAN/CSA B66 standards, Ontario Building Code 8.2.2.2, and Ontario Building Code 8.2.2.4.
- .2 Sewage Storage Capacity: minimum 9,000 L.
- .3 Single compartment.
- .4 Sewer pipe inlet fitted with integral cast-in-place rubber connection to fit standard 100 mm (4") PVC sewer pipe.
- .5 Design Cover Depth: deep burial up to 2 m.
- .6 Concrete:
 - .1 Min. 35 MPA at 28 days with 5-7% air
 - .2 Structural fibre added
 - .3 Rebar cover min. 25 mm

- .7 Steel reinforcing bar:
 - .1 As required to meet specified standards and design burial depth
- .8 May be comprised of up to two pieces. Where there are two pieces, the joint shall be located above the normal water level and sealed with watertight fibrous mastic sealant.
- .9 Provide two (2) plastic 610 mm diameter access risers to facilitate access, inspection, servicing and pumping of the tank. Risers shall be integrally cast-in-place; bolting risers to top of tank is not acceptable.
- .10 Provide vent in accordance with Ontario Building Code 8.8.2.1.(3) and terminate with activated charcoal odour control.
- .11 Coordinate electrical penetrations with electrician. Float switch shall be attached to a float tree with sufficient extra cable length to allow removing the entire float tree without cutting the cable. Refer to drawings for detailed requirements.
- .12 Sewage inlet shall be located under one access riser and the float tree located under the opposite access riser.

3 Execution

3.1 Fabrication

- .1 Precast concrete work in accordance with CAN/CSA B66.

3.2 Installation

- .1 Install tank according to manufacturer's instructions.
- .2 Install tank to be 3.0 m from outer-most edge of tank to property line as established by an Ontario Land Surveyor.
- .3 Install sewer pipe connection to precast tank through the side inlet. Coordinate with tank manufacturer for side inlet connection requirements.
- .4 Field verify sewer depth and coordinate with tank manufacturer to place tank at depth required to maintain minimum pipe slope as specified in drawings.
- .5 Slope finished grade away from access hatches to prevent surface water from entering the tank.

3.3 Field quality control

- .1 Test tank bedding compaction as specified in drawings and Section 01 45 00 Quality Control.
- .2 Inspection of tank will be carried out by Consultant following installation. Leave tank manufacturer's stamp on the outside of the tank visible (i.e. do not backfill) until inspected by Consultant.
- .3 Coordinate with Durham Region Health Department for inspections required under the Building Permit for Sewage Disposal Systems.

3.4 Cleaning

- .1 Upon completion of installation, but prior to testing, commissioning or filling with water or sewage, clean tank to a broom-swept condition.

End of section

Appendix B, B-2 Material Disclosures**1. List of Designated Substance at the Site**

In accordance with the Region of Durham Corporate Health and Safety Policy and Program a list of designated substances must be provided to all Contractors. Refer to Section 01 35 29 – Health and Safety Procedures for more details.

2. Drawings

As issued with quote and listed below:

Sheet No.	Drawing No.	Description
1	- -	COVER SHEET
2	C-001	EXISTING SITE PLAN AND DEMOLITION
3	C-002	PROPOSED SITE PLAN
4	C-003	DETAILS
5	C-004	NOTES