

Part 1 General

1.1 WORK COVERED BY CONTRACT DOCUMENTS

- .1 Work of this Contract comprises replacement of private sewage disposal systems at 9 designated residences, own and managed by Parks Canada Agency, hereafter referred to as PCA, or the Owner, or the Client. PCA rent the residences to private tenants.
- .2 Stantec Consulting Ltd, hereafter referred to as Stantec, or the Consultant, developed the detailed design for this project, and is to provide part time site supervision.
- .3 List of sites and short description of works is provided under the Form of Tender.
- .4 The following is a non-exhaustive general description of the scope of work.
 - .1 Conducting a Pre-Construction meeting with PCA and Stantec to discuss installation, site access, installation schedule and other pertinent information. The selected Contractor must also supply a sample of the sand fill, filter sand and septic stone from the source pit to Stantec for laboratory testing to ensure adherence to the OBC specifications and the design.
 - .2 Preparing and submitting shop drawings describing equipment and materials to be supplied and installed under this contract, in a format as prescribed in the Contract Document.
 - .3 Planning and coordinating temporary sanitary service interruption with PCA and Tenants.
 - .4 Hiring a specialized subcontractor for pumping and disposing of domestic sewage and septic sludge at existing septic tank, as often as required to complete the works in safe and secure way, to avoid contaminating the environment and exposing the public, and particularly the Tenants and their family to sewage water.
 - .5 Disconnecting existing residence gravity sewer, and installing new section of sewer to reconnect that existing line to the new septic tank.
 - .6 Pumping and disposing of raw domestic sewage, septage sludge and scum at existing septic tank, prior to undertake next step. This implies that sewer service shall be temporarily interrupted at the House, to prevent any sewage spillage in the trench or in the environment.
 - .7 Demolishing or removing and disposing of the existing septic tank at designated sites as per the Form of Tender.
 - .8 Preparing the new septic tank and sanitary line excavations in accordance to the OBC and the design.
 - .9 Supplying and installing CSA certified septic tanks and pump tanks, of an appropriate size, in the location, configuration, and elevation shown in the design.
 - .10 Supplying and installing access risers above all tank access openings for maintenance purposes. The access risers shall extend 10 cm above proposed finished grade and shall be outfitted with watertight, childproof access lids.
 - .11 Providing adequate venting for pump tank, and Level IV treatment tanks where such tank(s) is (are) required.

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- .12 Providing and installing an effluent filter, as per OBC specifications, within the outlet baffle of the septic tank.
- .13 Providing and installing specialized equipment and materials for Level IV (Class 4 under OBC) treatment system as identified in the Contract Documents, including installation and inspection work by specialized equipment supplier trained personnel, as per system supplier's requirements. Specialized equipment is to include effluent pumps, control floats and control panel as referred below, plus filtering media and accessories.
- .14 Providing a pumping wet well, including all associated excavation and backfilling works, plus gravity pipe from septic tank to wet well, at locations identified under the Form of Tender.
- .15 Providing and installing simplex submersible effluent pump (Little Giant WS30M, 1/3 HP Effluent Pump) on block within the pump tank with quick disconnect located beneath access lid for maintenance purposes.
- .16 Providing and installing a float tree (start/stop for appropriate dosage volume), and high level alarm float (at 75% full) securely within the pump tank.
- .17 Preparing an appropriate base cut, including stripping and scarification of the base soils, including topsoil for stockpiling and potential reuse, down to proposed base cut elevation, for raised leaching bed, at locations identified under the Form of Tender.
- .18 Providing and placing the imported sand fill and filter sand material, as specified, for the raised leaching bed, at locations identified under the Form of Tender.
- .19 Excavating trenches for conventional septic field, at locations identified under the Form of Tender.
- .20 Excavating trenches for shallow bed field, at locations identified under the Form of Tender.
- .21 Providing and installing 100 mm diameter effluent gravity drain from septic tank to split header at absorption bed, at location identified under the Form of Tender.
- .22 Providing and installing 50 mm diameter HDPE flexible forcemain from pump tank to split header.
- .23 Providing and installing 75 mm diameter solid PVC split header.
- .24 Providing and installing the 75 mm, perforated, PVC distribution pipe and septic stone, as per the design elevations and specifications.
- .25 Providing and installing permeable geotextile fabric over stone layer.
- .26 Providing and placing the imported sand fill material, as specified, over the stone layer to within 100-150 mm of proposed finished grade over leaching bed area.
- .27 Preparing drainage swales adjacent to leaching bed and tanks in accordance with the contract drawings.
- .28 Grading leaching bed and tank area in accordance with the design to direct runoff away from the leaching bed and tanks to the swales.
- .29 Supplying, installing, wiring, connecting and testing all electrical equipment required to complete the system, including underground conduits, disconnect switches and

intrinsically safe junction box at residence exterior wall, conduits from disconnect switches to pump control panel inside the house, connecting of pump control panel to the residence power distribution panel, and additional electrical works required to complete the system in conformance to Ontario Electrical Code, and as listed under the Form of Tender.

- .30 Placing 100mm of good quality topsoil over leaching bed area.
- .31 Seeding the leaching bed area, tank area, and swales.
- .32 Notifying the Stantec contact a minimum of 48 hours before an inspection.

1.2 CONTRACT METHOD

- .1 Construct Work under stipulated price contract.

1.3 WORK BY OTHERS

- .1 PCA hired Brookfield Global Integrated Solutions to maintain and repair as required the water supply and sewage disposal systems at the various tenanted properties. Brookfield personnel can grant access to unoccupied residences, provided the contractor contact them at least 24 hours or one working day in advance, which ever is the longest.
- .2 Co-ordinate work directly with Brookfield. If any part of work under this Contract depends for its proper execution or result upon work of Brookfield, report promptly to PCA and Consultant, by email, any defects which may interfere with proper execution of Work.

1.4 WORK SEQUENCE

- .1 Construct Work in stages to accommodate Tenant's continued use of premises during construction.
- .2 Co-ordinate Progress Schedule with PCA and Tenant Occupancy during construction.
- .3 Migratory bird timing window is from April 1st to August 15th, therefore, any underground work at site involving tree removal shall be starting after August 15th. Contractor may still proceed with works NOT involving tree removal before August 15th. Such works include electrical work at the house (new breaker and feed line, pump control panel at outside wall), installation of tanks, gravity sewers, forcemain, absorption bed, associated mantle, and any underground work located at least 6 metres away from nearest tree. Would Contractor decide to proceed with any such work prior to August 15th, and would such imply that the original private sewage disposal system is no longer functional because a portion of it has been demolished, removed, or replaced, then Contractor is fully responsible of regular pumping and disposal of raw sewage from original or new septic tank, at no extra cost to the Client.
- .4 PCA is to advise the Tenants of the following temporary service interruptions, over two separate week days, required to allow the contractor to complete the works:
 - .1 Hydro power will be interrupted for half a day, to allow connection of pump control panel to the house distribution panel.

- .2 No water to be flushed to sewer for one full working day, to allow contractor to remove original septic tank (if required) and to install and connect the new septic tank.
- .5 Contractor is fully responsible for selection of work schedule at each site, at no cost variation to the Owner:
 - .1 Under an accelerated schedule, replacement works are to be completed within a few consecutive days, so the entire system would be implemented and tested to allow transfer of treated effluent, without requiring any pumping of raw sewage at the septic tank to avoid discharge of effluent to a non -operational septic field.
 - .2 Under extended schedule, septic tank effluent would not be transferred to septic field, either because the field is not completed, or because the pumping station is not tested and operational, or any other reason. In such case, the Contractor is responsible for pumping and disposing raw sewage from both septic tank compartments, to avoid septic tank overflow.
 - .3 In any case, Contractor is fully responsible of regular pumping and disposal of raw sewage from original or new septic tank, at no extra cost to the Client. Cost of such pumping and disposal of raw sewage is to be borne by the Contractor, at no extra cost to the Client.
- .6 Maintain fire access to residence at all times.

1.5 CONTRACTOR USE OF PREMISES

- .1 Limit use of premises for equipment and material storage, for Work, and for access, to allow:
 - .1 Tenant occupancy.
 - .2 Work by Brookfield (repair works)
- .2 Co-ordinate use of premises under direction of PCA and Consultant.
- .3 Obtain and pay for use of additional storage or work areas needed for operations under this Contract.
- .4 Protect adjacent work against the spread of dust and dirt beyond the work areas.
- .5 Protect operatives and other users of site from all hazards.
- .6 Remove or alter existing work to prevent injury or damage to portions of existing work which remain.
- .7 Repair or replace portions of existing work which have been altered during construction operations to match existing or adjoining work, as directed by Consultant.
- .8 At completion of operations condition of existing work: equal to or better than that which existed before new work started.

1.6 TENANT OCCUPANCY

- .1 Tenant will occupy premises during entire construction period for execution of normal operations.

- .2 Co-operate with Tenant in scheduling operations to minimize conflict and to facilitate Tenant usage.
- .3 Tenants are to be advised that there would be planned serviced interruption (power, sewer) from time to time, during normal business hours, during normal working days. Service interruption is NOT permitted overnight or during weekend or statutory holidays. Services are to be restored and operational at the end of the day. Would original or new sewage disposal system NOT be operational by the end of the day, as it would be the case during the construction phase, then regular pumping and disposal of raw sewage from the original or new septic tank, to prevent any spillage / overflow, will be borne by Contractor, at no extra cost to the Client.

1.7 ALTERATIONS, ADDITIONS, OR REPAIRS TO EXISTING BUILDING

- .1 Execute work with least possible interference or disturbance to Tenants/occupants, and normal use of premises. Arrange with Consultant to facilitate execution of work.
- .2 Seal any new opening to building walls after drilling new holes and inserting conduits, to prevent water infiltration.

1.8 EXISTING SERVICES

- .1 Notify Tenants, Consultant, and utility companies of intended interruption of services and obtain required permission.
- .2 Where Work involves breaking into or connecting to existing services, give 48 hours notice for necessary interruption of mechanical or electrical service throughout course of work. Minimize duration of interruptions. Carry out work at times as directed by governing authorities with minimum disturbance to pedestrian, vehicular traffic, and Tenant operations.
- .3 Provide alternative routes for personnel, pedestrian and vehicular traffic.
- .4 Establish location and extent of service lines in area of work before starting Work. Notify Consultant of findings.
- .5 Submit schedule to and obtain approval from Consultant for any shut-down or closure of active service or facility including power and communications services. Adhere to approved schedule and provide notice to affected parties.
- .6 Where required, provide adequate bridging over trenches which cross sidewalks or roads to permit normal traffic.
- .7 Where unknown services are encountered, immediately advise Consultant, and confirm findings in writing / by email.
- .8 Protect, relocate or maintain existing active services. When inactive services are encountered, cap off in manner approved by authorities having jurisdiction.
- .9 Record locations of maintained, re-routed and abandoned service lines.
- .10 Set temporary barriers at trenches.

1.9 PARKS CANADA ENVIRONMENTAL IMPACT ANALYSIS CONSIDERATIONS

- .1 Parks Canada is completing an environmental impact analysis (EIA) at each site, as per the following requirements:
 - .1 Parks Canada has an environmental impact analysis (EIA) process to fulfill its requirements as a federal land manager under the Canadian Environmental Assessment Act, 2012 (S.C. 2012, c. 19, s. 52) as well as its legal and mandated obligations to protect Canada's natural, cultural, and agricultural heritage.
 - .2 The EIA process incorporates federal legislative requirements including the Migratory Birds Convention Act, Fisheries Act, Navigation Protection Act, Rouge National Urban Park Act and Species at Risk Act to meet legal and mandated obligations to protect the natural, cultural, and agricultural heritage in Rouge National Urban Park.
 - .3 Parks Canada's legal accountability under section 67 of CEAA 2012 is to ensure that no project on lands and waters it manages is authorized unless a determination is made that the project does not have the potential to result in significant adverse environmental effects.
- .2 Parks Canada will finalize the EIA at each site for this project upon the end of the Tender Period, so the Tenderers are to integrate the findings and recommendations of this EIA under their quote. The EIA will include the Parks Canada National Best Management Practice for Common Activities. A Copy of that document is included in the tender package as an example.
- .3 The selected Contractor must adhere to the site-specific safety protocols, including but not limited to, personal protective equipment at all times, as well as PCA documents attached to the specifications:
 - .1 Parks Canada Environmental Impact Analysis (EIA) – to come.
 - .2 Trimming, removal and planting of trees and shrubs for routine maintenance purposes in Rouge National Urban Park, dated March 3, 2016
- .4 Several sites are located close to archaeological features, and mitigation measures may have to be taken into consideration. Refer to EIA, that will be submitted before Tender Closing Date.

1.10 ADDITIONAL CONSIDERATIONS

- .1 Leaching bed investigations were completed for each site in December 2015 by WSP Canada Inc., which included excavating test pits to observe the underlying soils.
- .2 Percolation tests were conducted at all sites by Stantec in September 2018. Test results and design percolation times are provided at the end of this Section.
- .3 Raised septic fields were recommended at sites where the water table elevation was found close to the ground level.
- .4 Contractor shall assume that all excavated materials must be disposed off-site.
- .5 No excavation shall be left open without temporary fencing and appropriate signage around the excavation area.

- .6 All electrical work shall be completed by a licensed electrician certified in Ontario at the expense of the Contractor.
- .7 The Contractor shall provide a current Workplace and Safety Insurance Board (WSIB) certificate stating that the Contractor is in good standing with the WSIB and that all assessments have been paid by the Contractor to the date of the certificate.

1.11 WARRANTY

- .1 The Contractor warrants that the equipment/material supplied, and work performed their force and their subcontractors will be free of any construction defects or deficiencies.
- .2 Upon notification by the Project Engineer, any deficiencies identified during the inspection process (see Section 2) shall be corrected/remedied, to the satisfaction of the Consultant, at the expense of the Contractor. The Owner may apply a holdback on the bid amount until successful installation of the system has been completed and the Certification Letter is issued.
- .3 Contractor is to guarantee all workmanship, materials, and labour for a **one-year period**, from the time of project completion.
- .4 Before completion of work, Contractor is to collect all manufacturer's guarantees and warranties and deposit with Consultant for review. Both Brookfield Global Integrated Solutions (Operator) and Government of Canada will be listed on all guarantees and warranties.
- .5 Contractor is to coordinate extended warranties provided by equipment manufacturers, as per instructions under appropriate technical specifications.

1.12 DOCUMENTS REQUIRED

- .1 Maintain at job site, one hard copy of each document as follows:
 - .1 Contract Drawings.
 - .2 Specifications.
 - .3 Addenda.
 - .4 Reviewed Shop Drawings.
 - .5 List of Outstanding Shop Drawings.
 - .6 Contract Change Orders.
 - .7 Other Modifications to Contract.
 - .8 Field Test Reports.
 - .9 Copy of Approved Work Schedule.
 - .10 Health and Safety Plan and Other Safety Related Documents.
 - .11 Material Safety Data Sheet (MSDS) for each product used, when applicable
 - .12 Other documents as specified.

Part 2 Products

2.1 NOT USED

.1 Not used.

Part 3 Execution

3.1 NOT USED

.1 Not used.

Part 4 Additional Site Data

4.1 Percolation Times established at each site

Testing Location ID	Soil Substrate Tested	Percolation Time from Infil Rate	Safety Factor Over Maximum T	Safety Factor Over AVG	Max of Two Cases
		min/cm	1.1	1.5	
1085 Uxbridge-Pickering Townline, Claremont					
GP1	Gravelly SAND	7	17.4	15.2	17.4
GP2	Gravelly SAND	8			
GP3	Sandy CLAY, fine sand	16			
GP4	-				
GP5	-				
1509 Concession 2, Uxbridge					
GP1	CLAY	17	21.3	21.6	21.6
GP2	-				
GP3	Silty SAND	12			
GP4	CLAY, some gravel and cobbles	19			
GP5	CLAY, little sand and gravel	10			
4440 Sideline 34, Pickering					
GP1	Sandy Clayey SILT	9	16.1	14.3	16.1
GP2	Sandy Clayey SILT	15			
GP3	-				
GP4	Very fine SAND / SILT, trace clay and rootlets	8			
GP5	Silty Sandy CLAY, some gravel	7			
6445 19th Avenue, Markham					
GP1	Silty SAND, fine sand, some clay, trace roots	11	12.0	13.1	13.1
GP2	Fine SAND, some silt, trace coarse sand and roots	8			
GP3	Fine SAND, some clay, trace coarse sand - fine gravel and clay	7			
GP4	SAND and GRAVEL, fine-coarse sand	10			
GP5	Silty SAND, very fine sand, trace coarse sand	8			

Testing Location ID	Soil Substrate Tested	Percolation Time from Infil Rate	Safety Factor Over Maximum T	Safety Factor Over AVG	Max of Two Cases
		min/cm	1.1	1.5	
7056 Major Mackenzie Drive East, Markham					
GP1	Silty SAND, fine sand, trace clay	18	24.4	23.2	24.4
GP2	Sandy CLAY, fine sand, some silt	12			
GP3	Silty Clayey SAND, fine sand	15			
GP4	Silty Clayey SAND, fine sand	10			
GP5	Sandy CLAY, fine-coarse sand	22			
7528 Elgin Mills Road, Markham					
GP1	Silty CLAY, trace shale and rootlets	8	22.8	20.9	22.8
GP2	Clayey SILT, some fine sand	10			
GP3	Silty CLAY, trace fine sand - fine gravel	21			
GP4	Sandy Silty CLAY, fine sand	17			
GP5	-				
7558 Elgin Mills Road, Markham					
GP1	Silty CLAY, trace fine to coarse sand, trace shale	9	18.9	18.9	18.9
GP2	Silty CLAY, trace fine to coarse sand, trace shale	17			
GP3	Fine SAND, some silt and clay, trace coarse sand and gravel	16			
GP4	Fine SAND, some silt and clay, trace coarse sand, gravel, and shale	10			
GP5	Fine SAND, some silt and clay, trace coarse sand and gravel	11			
7630 Major Mackenzie Drive East, Markham					
GP1	Clayey SILT, trace coarse sand	15	16.9	18.1	18.1
GP2	Silty SAND, fine sand, trace coarse sand, gravel, and shale	7			
GP3	Silty SAND, fine sand, some clay	13			
GP4	Clayey SILT, trace-some sand and gravel	15			
GP5	Silty SAND, fine sand, trace clay	10			
10888 Reesor Road, Markham					
GP1	Clayey SILT, trace sand and gravel	7	14.7	15.3	15.3
GP2	Clayey SILT, trace sand, gravel, and rootelts	7			
GP3	Clayey SILT, trace sand and gravel	13			
GP4	-				
GP5	Silty CLAY, trace sand	13			

END OF SECTION

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Part 1 General Instructions

1.1 SCHEDULE OF COMPLETION

- .1 All works must be completed by November 15, 2018, except excavation and topsoil surface and seeding reinstatement works that shall be completed by October 31st, 2018.
- .2 On award of contract submit construction schedule for work, indicating anticipated progress stages within time of completion. Take necessary measures to complete work within scheduled time. Do not change schedule without notifying Project Manager.
- .3 All work can be performed during the following identified days/hours, **during regular hours (Monday thru Friday)** and during the following hours: **8:00 AM – 5:00 PM**. Works would not be allowed outside normal business hours, during statutory holidays or on weekends, unless these are emergency works required to repair or prevent damage to the property or a sewage spill to the environment.

1.2 MINIMUM STANDARDS

- .1 All construction must comply with applicable National, Provincial, and Municipal Building Codes. Products must be installed or applied in accordance to manufacturer's recommendation.
- .2 Materials shall be new, and work shall conform to the minimum applicable standards of the Canadian General Standards Board, the Canadian Standards Association, the National Building Code of Canada 2015 (NBC) and all applicable Provincial and Municipal codes. In the case of conflict or discrepancy the most stringent requirement shall apply.
- .3 Where deviation from any of these codes and standards is necessary or where strict compliance to them cannot be attained for any reason, notify the Consultant or Project Manager immediately.

1.3 PERMITS

- .1 Contractor shall obtain and pay for all applicable permits. Building Permits to be obtained and paid for by the Owner.

1.4 HEALTH AND SAFETY

- .1 All construction safety regulations and recommendations of national, provincial, and municipal governments must be observed, including the Workman's Compensation Board. Most stringent requirements apply.
- .2 If the presence of any toxic or hazardous substance is suspected, immediately stop the work and notify the Project Manager.
- .3 Contractor shall abide by and sign off the Brookfield Global Integrated Solutions Health and Safety Policies.
- .4 Contractor is to submit prior to construction; a job safety plan, workplace safety checklist, proof of WSIB/WCB, signed copy of and any other applicable proof of compliance regarding health and safety regulations.
- .5 Contractor to apply and receive a Brookfield Global Integrated Solutions work permit prior to scheduled work.

- .6 Maintain fire access to residence at all times.

1.5 SCOPE OF WORK

- .1 The scope of work shown on scope of work document, drawings, in specifications, and/or during job showings intends to represent finished work. Any tasks not explicitly shown but necessary to complete the project is included in the scope of work.

1.6 CHANGES IN WORK

- .1 No change to the Work shall be performed by the Contractor without prior written authorization from Project Manager only.
- .2 Approved Changes to Work, for OWN FORCES shall allow for a stipulated percentage mark-up of TEN PERCENT (10%) for overhead and profit to cover;
- .3 all other indirect costs;
- .4 field supervision, and field office administration;
- .5 small tools and expendables; and
- .6 general overheads and profits
- .7 Contractor to provide detailed breakdown of labour, material and services for all Changes of Work for Project Manager approval.
- .8 Approved Changes to Work, for Subcontractor's work shall allow for stipulated percentage mark-up of FIVE PERCENT (5%).

1.7 FIRE SAFETY REQUIREMENTS

- .1 Comply with the National Building Code of Canada 1995 (NBC) for fire safety in construction and the National Fire Code of Canada 1995 (NFC) for fire prevention, firefighting, and life safety in building in use.
- .2 Comply with Human Resources Development Canada (HRDC), Fire Commissioner of Canada (FCC) standards:
 - .1 No. 301: Standard for Construction Operations
 - .2 No. 302: Standard for Welding and Cutting
 - .3 No. 374: Fire Protection Standard for General Storage (In-door and Outdoor)
 - .4 Available from Fire Protection Project Managerial Services, Labour Program, HRDC or following internet site: <http://info.load-otea.hrdc-drhc.gc.ca/~fireweb/standards/fccen.htm>
 - .5 Retain all fire safety documents and standards on site.
- .3 Where work requires interruption of fire alarms or fire suppression, extinguishing or protection systems:
 - .1 Provide watchman service as described in FC 301; In general, watchman service is defined as an individual conversant with Fire Emergency Procedures, performing fire picket duty within an unprotected and unoccupied (no workers) area once per hour.

- .2 Retain services of manufacturer for fire protection systems on daily basis or as approved by FCC, to isolate and protect all devices relating to:
 - .1 modification of fire alarms, fire suppression, extinguishing or protection systems; and/or
 - .2 cutting, welding, soldering or other construction activities which might activate fire protection systems.
- .4 Immediately upon completion of work, restore fire protection systems to normal operation and verify that all devices are fully operational.
- .5 Inform fire alarm system monitoring agency and local Fire Department immediately prior to isolation and immediately upon restoration of normal operation.

1.8 USE OF SITE AND FACILITIES

- .1 Execute work with least possible interference or disturbance to the normal use of premises. Make arrangements with Project Manager to facilitate work as stated.
- .2 Maintain existing services to building and provide for personnel access.
- .3 Sanitary facilities will be assigned for Contractor's personnel. Others shall not be used. Keep facilities clean.

1.9 SITE STORAGE

- .1 On site storage space for use by the contractor is to be coordinated by project manager and Tenant.
- .2 Do not unreasonably encumber site with materials or equipment. Move stored products or equipment which interfere with operations of occupants.

1.10 CUT, PATCH AND MAKE GOOD

- .1 Cut existing surfaces as required to accommodate new work.
- .2 Remove all items so shown or specified.
- .3 Patch and make good surfaces cut, damaged or disturbed, to Project Manager's approval. Match existing material, colour, finish and texture.

1.11 EXAMINATION

- .1 Examine site and conditions likely to affect work and be familiar and conversant with existing conditions.
- .2 During tender period, Tenderers are to tour the residences requiring electrical works with their electrician, for the purpose assessing the level of effort and materials required to complete the electrical works. Schedule for such site visits is to be coordinated during tender period.
- .3 Any conditions or issues found to be causing deviation from original scope of work, creating potential health and safety concerns, or resulting in delay in implementing the work, must be immediately be brought to the Project Manager's attention.

1.12 SIGNS

- .1 Provide common-use signs related to health and safety, traffic control, information, instruction, use of equipment, public safety devices, etcetera, in both official languages or using commonly-understood graphic symbols to the Project Manager's approval.
- .2 No advertising will be permitted on this project.

1.13 SCAFFOLDS AND WORK PLATFORMS

- .1 Design, install, and inspect scaffolds and work platforms required for work in accordance with relevant municipal, provincial and other regulations.
- .2 Any person operating a work platform shall be trained for its operation and understand and apply all safety rules, in compliance with all applicable instructions and regulations.

1.14 GUARANTEES, WARRANTIES AND OPERATING/MAINTENANCE MANUALS

- .1 Before completion of work collect all manufacturer's guarantees and warranties and deposit with Consultant for review. Both Brookfield Global Integrated Solutions and Government of Canada will be listed on all guarantees and warranties.
- .2 All workmanship, materials, and labour is to be guaranteed for at least one year from the time of project completion.
- .3 Operating and maintenance manuals: Contractor shall provide three (3) copies of Operating and maintenance manuals.
- .4 CMMS sheet: For each product or system, Contractor shall complete the applicable sections of the Brookfield GIS CMMS sheet.

1.15 CLEANUP

- .1 Clean-up work area as work progresses. Work site must be left in a safe and clean condition at the end of each work period. Remove debris from site, at the end of each work period.
- .2 Final cleaning to be performed upon project completion. Clean areas under contract to a condition at least equal to that previously existing and to approval of Project Manager.

1.16 BUILDING SMOKING ENVIRONMENT

- .1 Smoking is not permitted in the building. Obey smoking restrictions on building property.

1.17 DUST AND TEMPORARY CONTROLS

- .1 Provide dust tight screens or partitions to localize dust generating activities, and for protection of workers, finished areas of work and public.
- .2 Maintain and relocate protection until such work is complete.

1.18 SECURITY

- .1 On award of contract the Contractor is responsible for ensuring that all required security clearance has been received for every employee and/or every subcontractors employee,

assigned to these specific projects. Employee means: Any employee, agent (including without limitation employees of such agents) and Subcontractors (including without limitation employees of such Subcontractors) of Contractor who supplies services.

1.19 INSPECTION SCHEDULE

- .1 In order to verify that the sewage system has been installed in accordance with the design and, at minimum, the standards outlined in the Ontario Building Code, periodic construction inspections are required by Consultant at the following stages of construction:
- .2 Pre-Construction Site Meeting
 - .1 Consultant will attend a Pre-Construction Site Meeting with the selected Contractor to discuss installation, site access, installation schedule and other pertinent information.
 - .2 During the pre-construction meeting samples of the sand fill, filter sand and septic stone shall be provided to Consultant from the Contractor for analysis prior to installation in order to help ensure material is appropriate and meets the OBC and design requirements prior to installation.
- .3 Base Cut Inspection
 - .1 Consultant will inspect the base-cut preparation of the tanks and leaching beds as prepared by the selected installer. Consultant will, at minimum, inspect that:
 - .1 The tanks, piping and leaching bed have been prepared in the proper location.
 - .2 The base soils are appropriate for the installation of the disposal system as designed, and have been scarified.
 - .3 The elevation of the tanks and base cut is accurate or is within the standards of good engineering practice.
 - .4 The base has been prepared with the proper dimensions.
 - .2 Consultant will inspect the imported material and distribution pipe for the leaching bed. Consultant will, at minimum, inspect that:
 - .1 The sand fill, filter sand and septic stone material is consistent with preliminary testing results based on a visual inspection and review of pit receipt obtained from installer/supplier (if available).
 - .2 The number of distribution pipe runs installed is as designed.
 - .3 The length of the distribution pipe is as designed.
 - .4 The spacing of the pipes, centre to centre, is appropriate.
 - .5 The elevation and elevation change across the distribution runs is appropriate.
 - .6 The thickness of the sand fill, filter sand and septic stone layers are appropriate;
 - .7 The stone layer is covered with permeable geotextile fabric;
 - .8 The sewage tanks are appropriately sized and CSA certified;
 - .9 The sewage tanks are installed in the proposed location as per the design; and,

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- .10 The gravity connections have sufficient fall and the connections are watertight.
- .3 Consultant will inspect the treatment system, the alarms and the pump discharge settings for the sewage system. Consultant will, at minimum, inspect that:
 - .1 The pump(s) are installed properly and are functional;
 - .2 The pump discharge rate meets the design dosage volume based on float settings;
 - .3 The high-level alarm is present and functional;
 - .4 The time based pump operating sequence (where required) has been set appropriately;
 - .5 The leaching bed has been backfilled with appropriate material in accordance with the design;
 - .6 The thickness of the cover on the leaching bed is appropriate;
 - .7 The topsoil on the leaching bed is of good quality;
 - .8 The leaching bed has been seeded to prevent erosion;
 - .9 The final grading on the leaching bed has been completed as designed and in a manner that will shed water from the surface of the leaching bed;
 - .10 Grading around the sewage tanks is appropriate and sheds water away from tank lids; and,
 - .11 Swales around the leaching bed and tanks have been installed in accordance with the design.
- .4 Consultant will inspect the electrical works. Consultant will, at minimum, inspect that:
 - .1 The pumps, floats, control panels, disconnect switches are properly wired
 - .2 The pump control panels are adequately supported;
 - .3 The conduits have been set appropriately;
 - .4 The power wiring and conduit from the pump control panel to the house breaker panel are satisfactory;
 - .5 The house breaker panel has been upgraded as per electrical drawings, where required.

Part 2 Products

2.1 NOT USED

- .1 Not used.

Part 3 Execution

3.1 NOT USED

- .1 Not used.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 Refer to various technical Sections for specific requirements.

1.2 REFERENCES

- .1 Refer to various technical Sections for specific requirements.

1.3 ADMINISTRATIVE

- .1 Submit to PCA Representative submittals listed for review. Submit promptly and in orderly sequence to not cause delay in Work. Failure to submit in ample time is not considered sufficient reason for extension of Contract Time and no claim for extension by reason of such default will be allowed.
- .2 Do not proceed with Work affected by submittal until review is complete.
- .3 Present shop drawings, product data, samples and mock-ups in SI Metric units.
- .4 Where items or information is not produced in SI Metric units converted values are acceptable.
- .5 Review submittals prior to submission to PCA Representative. This review represents that necessary requirements have been determined and verified, or will be, and that each submittal has been checked and co-ordinated with requirements of Work and Contract Documents. Submittals not stamped, signed, dated and identified as to specific project will be returned without being examined and considered rejected.
- .6 Notify PCA Representative, in writing at time of submission, identifying deviations from requirements of Contract Documents stating reasons for deviations.
- .7 Verify field measurements and affected adjacent Work are co-ordinated.
- .8 Contractor's responsibility for errors and omissions in submission is not relieved by PCA Representative's and Consultant's review of submittals.
- .9 Contractor's responsibility for deviations in submission from requirements of Contract Documents is not relieved by PCA Representative review.
- .10 Keep one reviewed copy of each submission on site.

1.4 SHOP DRAWINGS AND PRODUCT DATA

- .1 Submit shop drawings in PDF format suitable for annotation by the review engineer.
- .2 Only when specified, submit engineering stamped drawings in electronically stamped PDF format (such format does not allow third party annotation).
- .3 The term "shop drawings" means drawings, diagrams, illustrations, schedules, performance charts, brochures and other data which are to be provided by Contractor to illustrate details of a portion of Work.

- .4 Submit catalog cut and other standard documentation from manufacturers, when standard materials are suitable for this project.
- .5 Submit drawings stamped and signed by professional engineer registered or licensed in Ontario, only for material requiring non-standard design requirements, such as, but not limited to, a septic tank or a pumping wet well being installed at depth higher than standard design practice, and tank ballast system required to prevent tank hydrostatic uplifting at high water table site identified in plans and specifications.
- .6 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 are to be attached, or connected to other articles or equipment, indicate that such items have been co-ordinated, regardless of Section under which adjacent items will be supplied and installed. Indicate cross references to design drawings and specifications.
- .7 Allow 4 working days for Consultant's review of each submission.
- .8 Adjustments made on shop drawings by PCA Representative are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to PCA Representative prior to proceeding with Work.
- .9 Make changes in shop drawings as PCA Representative may require, consistent with Contract Documents. When resubmitting, notify PCA Representative in writing of revisions other than those requested.
- .10 Accompany submissions with transmittal email, containing:
 - .1 Date.
 - .2 Project title and number.
 - .3 Contractor's name and address.
 - .4 Identification and quantity of each shop drawing, product data and sample.
 - .5 Other pertinent data.
- .11 Submissions 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 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 final review, distribute PDF and printed copies to PCA as noted below. General Contractor foreman is to keep one complete hard copy of all shop drawings on site.
- .13 Submit one electronic copy and 2 prints of shop drawings for each requirement requested in specification Sections and as PCA Representative may reasonably request.
- .14 Submit 1 electronic copy and 2 printed copies of product data sheets or brochures for requirements requested in specification Sections and as requested by PCA Representative where shop drawings will not be prepared due to standardized manufacture of product.
- .15 Submit 1 electronic copy and 2 printed copies of test reports for requirements requested in specification Sections and as requested by PCA Representative.
 - .1 Report signed by authorized official of testing laboratory that material, product or system identical to material, product or system to be provided has been tested in accord with specified requirements.
 - .2 Testing must have been within 3 years of date of contract award for project.
- .16 Submit 1 electronic copy and 2 printed copies of certificates for requirements requested in specification Sections and as requested by PCA Representative.
 - .1 Statements printed on manufacturer's letterhead and signed by responsible officials of manufacturer of product, system or material attesting that product, system or material meets specification requirements.
 - .2 Certificates must be dated after award of project contract complete with project name.
- .17 Submit 1 electronic copy and 2 printed copies of manufacturers instructions for requirements requested in specification Sections and as requested by PCA Representative.
 - .1 Pre-printed material describing installation of product, system or material, including special notices and Material Safety Data Sheets concerning impedances, hazards and safety precautions.
- .18 Submit 1 electronic copy and 2 printed copies of Manufacturer's Field Reports for requirements requested in specification Sections and as requested by PCA Representative.
- .19 Documentation of the testing and verification actions taken by manufacturer's representative to confirm compliance with manufacturer's standards or instructions.

- .20 Submit 1 electronic copy and 2 printed copies of Operation and Maintenance Data for requirements requested in specification Sections and as requested by PCA Representative.
- .21 Delete information not applicable to project.
- .22 Supplement standard information to provide details applicable to project.
- .23 If upon review by PCA Representative, no errors or omissions are discovered or if only minor corrections are made, copies will be returned, and fabrication and installation of Work may proceed. If shop drawings are rejected, noted copy will be returned and resubmission of corrected shop drawings, through same procedure indicated above, must be performed before fabrication and installation of Work may proceed.
- .24 At least one week prior to the date of Substantial Completion, print three (3) additional copies of reviewed shop drawings, and integrate that documentation to three (3) separate Operation & Maintenance Binders, to be delivered to PCA main office. Include at the beginning of each binder a printed list of contact name and addresses of general contractor, all subcontractors, all major equipment suppliers and manufacturers (tanks, pumping equipment, Level IV treatment system).
- .25 The review of shop drawings by PCA is for sole purpose of ascertaining conformance with general concept.
 - .1 This review shall not mean that PCA 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 responsibility for meeting requirements of construction and Contract Documents.
 - .2 Without restricting generality of foregoing, 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 sub-trades.

1.5 SAMPLES

- .1 Submit for review samples in duplicate as requested in respective specification Sections. Label samples with origin and intended use.
- .2 Deliver samples prepaid to PCA Representative's main office.
- .3 Notify PCA Representative in writing, at time of submission of deviations in samples from requirements of Contract Documents.
- .4 Where colour, pattern or texture is criterion, submit full range of samples.
- .5 Adjustments made on samples by PCA Representative are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to PCA Representative prior to proceeding with Work.
- .6 Make changes in samples which PCA Representative may require, consistent with Contract Documents.

- .7 Reviewed and accepted samples will become standard of workmanship and material against which installed Work will be verified.

1.6 PHOTOGRAPHIC DOCUMENTATION

- .1 Submit electronic copy of digital photography in jpg format, high resolution, after initial site visit documenting site conditions, then on a monthly basis with progress statement, as directed by PCA Representative.
- .2 Project identification: name and number of project, site address, and date of exposure indicated.
- .3 Number of viewpoints:
 - .1 Viewpoints and their location as determined by PCA Representative.
- .4 Frequency of photographic documentation:
 - .1 At initial, pre-construction site inspection at all sites, to document original site conditions at current and future septic tank location, along future forcemain or gravity sewer line, and at proposed absorption field location, plus at exterior wall, foundation wall and house breaker panel where pumping equipment is required.
 - .2 Upon completion of: excavation, tank and wiring conduit installation, gravity sewer and forcemain trench backfilling, after excavation works at proposed absorption field, after installation of perforated pipe / shallow bed specialized equipment.

1.7 CERTIFICATES AND TRANSCRIPTS

- .1 Immediately after award of Contract, submit Workers' Compensation Board status.
- .2 Submit transcription of insurance immediately after award of Contract.

Part 2 Products

2.1 NOT USED

- .1 Not Used.

Part 3 Execution

3.1 NOT USED

- .1 Not Used.

END OF SECTION

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Part 1 General

1.1 PROJECT CLEANLINESS

- .1 Maintain Work in tidy condition, free from accumulation of waste products and debris, that caused by Owner or other Contractors.
- .2 Remove waste materials from site at daily regularly scheduled times or dispose of as directed by PCA Representative. Do not burn waste materials on site, unless approved by PCA Representative.
- .3 Clear snow and ice from access to building, bank/pile snow in designated areas only as designated by the PCA Representative.
- .4 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.
- .5 Provide on-site containers for collection of waste materials and debris.
- .6 Dispose of waste materials and debris at designated dumping as designated by the PCA Representative.
- .7 Store volatile waste in covered metal containers and remove from premises at end of each working day.
- .8 Provide adequate ventilation during use of volatile or noxious substances. Use of building ventilation systems is not permitted for this purpose.
- .9 Use only cleaning materials recommended by manufacturer of surface to be cleaned, and as recommended by cleaning material manufacturer.
- .10 Schedule cleaning operations so that resulting dust, debris and other contaminants will not fall on wet, newly painted surfaces nor contaminate building systems.

1.2 FINAL CLEANING

- .1 When Work is Substantially Performed 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 including that caused by Owner or other Contractors.
- .5 Remove waste materials from site at regularly scheduled times or dispose of as directed by PCA Representative. Do not burn waste materials on site, unless approved by PCA Representative.
- .6 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.

1.3 WASTE MANAGEMENT AND DISPOSAL

- .1 Dispose of waste materials at approved landfill sites.
- .2 Dispose of asbestos based construction materials as per Section 02 82 00.02 – Asbestos Abatement – Intermediate Precautions.

Part 2 Products

2.1 NOT USED

- .1 Not Used.

Part 3 Execution

3.1 NOT USED

- .1 Not Used.

END OF SECTION

Part 1 General

1.1 WASTE MANAGEMENT GOALS

- .1 Prior to start of Work conduct meeting with PCA Representative to review and discuss waste management goal and Contractor's proposed Waste Reduction Workplan for Construction, Renovation and /or Demolition (CRD) waste to be project generated.
- .2 Minimize amount of non-hazardous solid waste generated by project and accomplish maximum source reduction, reuse and recycling of solid waste produced by CRD activities.
- .3 Protect environment and prevent environmental pollution damage.
- .4 All waste generated as part of any work must be noted and a waste receipt provided for each site.
- .5 Top soil from site may be salvaged, and reused, provided it is cleaned, not contaminated, free of roots, branches, bushes, tree debris, any piping material.
- .6 Original septic system tank, piping and pumping materials and equipment are not to be recycled. Contractor is to remove and to disposed of those at approved landfill site.

1.2 REFERENCES

- .1 Definitions:
 - .1 Class III: non-hazardous waste - construction renovation and demolition waste.
 - .2 Construction, Renovation and/or Demolition (CRD) Waste: Class III solid, non-hazardous waste materials generated during construction, demolition, and/or renovation activities
 - .3 Inert Fill: inert waste - exclusively asphalt and concrete.
 - .4 Reuse: repeated use of product in same form but not necessarily for same purpose. Reuse includes:
 - .1 Salvaging reusable materials from re-modelling projects, before demolition stage, for resale, reuse on current project or for storage for use on future projects.
 - .2 Returning reusable items including pallets or unused products to vendors.
 - .5 Salvage: removal of structural and non-structural materials from deconstruction/disassembly projects for purpose of reuse or recycling.
 - .6 Separate Condition: refers to waste sorted into individual types.
 - .7 Source Separation: act of keeping different types of waste materials separate beginning from the point they became waste.

- .2 Reference Standards:
 - .1 Ontario Ministry of Environment
 - .1 Ontario 3 R's Regulations (regulation 102/94) for waste management programs applicable to construction and demolition projects greater than 2,000 m².
 - .2 Ontario Environmental Protection Act (EPA)
 - .1 Regulation 103/94, Source Separation Programs.
 - .3 Canadian Construction Association (CCA)
 - .1 CCA 81-2001: A Best Practices Guide to Solid Waste Reduction.

1.3 USE OF SITE AND FACILITIES

- .1 Execute Work with minimal interference and disturbance to normal use of premises.
- .2 Maintain security measures established by facility provide temporary security measures approved by PCA Representative.

1.4 STORAGE, HANDLING AND PROTECTION

- .1 Store materials to be reused, recycled and salvaged in locations as directed by PCA Representative.
- .2 Unless specified otherwise, materials for removal become Contractor's property.
- .3 Protect, stockpile, store and catalogue salvaged items.
- .4 Separate non-salvageable materials from salvaged items. Transport and deliver non-salvageable items to licensed disposal facility.
- .5 Protect structural components not removed and salvaged materials from movement or damage.
- .6 Support affected structures. If safety of building is endangered, cease operations and immediately notify PCA Representative.
- .7 Protect surface drainage, mechanical and electrical from damage and blockage.
- .8 Provide on-site facilities and containers for collection and storage of reusable and recyclable materials.
- .9 Separate and store materials produced during project in designated areas.
- .10 Prevent contamination of materials to be salvaged and recycled and handle materials in accordance with requirements for acceptance by designated processing facilities.
 - .1 On-site source separation is recommended.
 - .2 Remove co-mingled materials to off site processing facility for separation.
 - .3 Obtain waybills, receipts and/or scale tickets for separated materials removed from site.

- .4 Materials reused on-site are considered to be diverted from landfill and as such are to be included in all reporting.

1.5 DISPOSAL OF WASTES

- .1 Do not bury rubbish or waste materials.
- .2 Do not dispose of waste, volatile materials, mineral spirits, oil, grease, paint thinner into waterways, storm, or sanitary sewers.
- .3 Keep records of construction waste including:
 - .1 Number and size of bins.
 - .2 Waste type of each bin.
 - .3 Total tonnage generated.
 - .4 Tonnage reused or recycled.
 - .5 Reused or recycled waste destination.
- .4 Remove materials on-site as Work progresses.
- .5 Prepare project summary to verify destination and quantities on a material-by-material basis as identified in the waste audit.

1.6 SCHEDULING

- .1 Co-ordinate Work with other activities at site to ensure timely and orderly progress of Work.

Part 2 Products

2.1 NOT USED

- .1 Not Used.

Part 3 Execution

3.1 APPLICATION

- .1 Handle waste materials not reused, salvaged, or recycled in accordance with appropriate regulations and codes.

3.2 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
 - .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 Section 01 74 11 - Cleaning.

- .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.
- .2 Source separate materials to be reused/recycled into specified sort areas.

3.3 DIVERSION OF MATERIALS

- .1 From following list, separate materials from general waste stream and stockpile in separate piles or containers, as reviewed by PCA Representative, and consistent with applicable fire regulations.
 - .1 Mark containers or stockpile areas.
 - .2 Provide instruction on disposal practices.
- .2 On-site sale of salvaged, recovered, reusable, recyclable materials is not permitted.

END OF SECTION

Part 1 General

1.1 Related Sections

- .1 Excavating, Trenching and Backfilling - Section 31 23 33.01
- .2 Seeding - Section 32 92 19 16

1.2 Reference Standards

- .1 OPSS 570, 571 and 572 shall apply except as may be amended and extended herein.

1.3 Source Quality Control

- .1 Inform Engineer of proposed source of topsoil to be supplied and provide access for sampling. Acceptance of topsoil subject to inspection and/or soil analysis test results. Do not commence work until topsoil accepted by Engineer.
- .2 Inspection and testing of topsoil shall be carried out by an independent testing laboratory at no additional cost to the Owner.
- .3 Site topsoil stripped may be used provided it meets the quality control of this section.

1.4 Scheduling of Work

- .1 Schedule placing of topsoil and finish grading to permit seeding operations under optimum conditions.

Part 2 Products

2.1 Materials

- .1 Topsoil (provisional): friable, neither heavy clay nor of very light sandy nature consisting of 45% sand, 35% silt, 20% clay and pH value of 7.0. Free from subsoil, roots, vegetation, debris, toxic materials, stones over 50 mm dia.
- .2 Planting soil for planting of trees, shrubs, and ground covers; mix 9 parts topsoil with 1 part peatmoss. Incorporate bonemeal into planting soil at a rate of 3 kg/m³ of soil mixture.
- .3 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.

- .4 Fertilizer:
 - .1 Complete commercial synthetic fertilizer with minimum 65% insoluble nitrogen.
 - .2 Formulation ratio: 1:4:4.
 - .3 Bonemeal: finely ground with a minimum analysis of 20% phosphoric acid.
- .5 Limestone:
 - .1 Ground agricultural limestone containing minimum 85% of total carbonates.
 - .2 Gradation requirements: percentage passing by weight, 90% passing 1.0 mm sieve, 50% passing 0.125 mm sieve.

Part 3 Execution

3.1 Preparation of Existing Grade

- .1 Preserve topsoil that may reused on site, such topsoil shall be free of tree and bush roots, contaminated material, any piping or conduit material.
- .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 Engineer.
- .3 Cultivate entire area which is to receive topsoil to depth of 100 mm. Repeat cultivation in those areas where equipment used for hauling and spreading has compacted soil.
- .4 Remove surface debris, roots, vegetation branches and stones in excess of 50 mm diameter.

3.2 Spreading of Topsoil (native and provisional)

- .1 Spread topsoil after Engineer has inspected and approved subgrade.
- .2 Spread topsoil with adequate moisture in uniform layers over approved, unfrozen subgrade, where seeding is indicated.
- .3 Apply topsoil to a minimum compacted depth of 100 mm.
- .4 Manually spread topsoil around trees, shrubs and obstacles.

3.3 Soil Amendments

- .1 Apply soil amendment 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.

3.4 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.
- .3 Mix fertilizer thoroughly to full depth of topsoil.

3.5 Finish Grading

- .1 Fine grade and loosen topsoil. Eliminate rough spots and low areas to ensure positive drainage. Prepare loose friable bed by means of cultivation and subsequent raking.
- .2 Roll to consolidate topsoil for areas to be seeded leaving surface smooth, uniform, firm against deep foot printing, and with a fine loose texture to approval of Engineer.

3.6 Restoration of Stockpile Sites

- .1 Grade and hydroseed to the satisfaction of the Contract Administrator Engineer.

3.7 Surplus Material

- .1 Dispose of materials not required on-site and where directed by Engineer.

END OF SECTION

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Part 1 General

1.1 SUMMARY

- .1 Tenderers are informed that Parks Canada have already validated the presence, location and nature of asbestos containing construction materials at some of the sites under this project, under two categories:
 - .1 Non-friable asbestos sites – Type 1 asbestos work
 - .2 Friable asbestos sites – Type 2 asbestos work
 - .3 There is no high-risk Type 3 asbestos work anticipated under this project.
- .2 **With their submittal, all Tenderers are to submit the name and coordinates of a specialized asbestos removal firm, with their hourly rates, minimum number of hours per site visit, and cost of safe disposal of asbestos containing materials (friable and non-friable) on a per kg basis.**
- .3 Parks Canada will forward the complete list of locations and extent of material containing asbestos to the Contractor under an Addendum, following tender period site review (refer to instructions below)
- .4 For confidentiality purpose, the Contractor, their electrical subcontractor, their specialized asbestos removal contractor, and any other concerned subcontractor, trade and/or supplier(s), are to sign a confidentiality agreement.
- .5 Parks Canada personnel will not be directly involved in any physical removal and disposal of asbestos containing materials. Specialized subcontractor hired by the Contractor will be used for all type 1 and type 2 asbestos removal work.
- .6 Sequence of events as part of tender site visit:
 - .1 PCA to review list of locations and extent of material containing asbestos to identify sites where asbestos containing materials may be present;
 - .2 PCA to identify preferred location of conduit through exterior wall, to connect new pump control panel to house breaker panel, and to identify location of new pump control panel and disconnect switch on exterior wall (where applicable); whenever possible, electrician is to move location of hose at exterior wall to avoid drilling through asbestos containing materials;
 - .3 PCA to advise Tenderers of preferred location of hole at exterior wall, and extent of asbestos containing material removal, if required; If removal is unavoidable, the location must be confirmed by providing distance to nearest window, corner of house, and height above ground level.
 - .4 Parks Canada is to validate presence of asbestos containing material at drilling location identified.
- .7 Sequence of events following tender visit:
 - .1 PCA is to issue an Addendum, documenting findings and site instructions related to asbestos abatement.

- .2 Tenderers are to consider that information while preparing their tender budget and submittal.
- .3 Tenderers are to identify the name
- .8 Sequence of event during construction period:
 - .1 Upon coordination with Contractor, Parks Canada, Tenants and Specialized Subcontractor, that firm is to remove and dispose of asbestos containing materials, as per requirements under this Section; Specialized firm is to clean site.
 - .1 Electrician to proceed with conduit and wiring installation;
 - .2 Contractor to reinstate wall section left over following asbestos containing material removal, by adding wall insulation, or other procedure accepted by Parks Canada.
 - .3 Contractor is to forward Specialized Subcontractor reports to Parks Canada, as per requirements under this Section.
- .9 For Type 1 asbestos work, comply with requirements of this Section when performing following works where applicable:
 - .1 Removing ceiling tiles that are asbestos-containing material, if the tiles cover an area less than 7.5 square metres and are removed without being broken, cut, drilled, abraded, ground, sanded or vibrated.
 - .2 Removing non-friable asbestos-containing materials, other than ceiling tiles, if the material is installed or removed without being broken, cut, drilled, abraded, ground, sanded or vibrated at locations indicated on list provided by Parks Canada.
 - .3 Break, cut, grind, sand, drill, scrape, vibrate or abrade non-friable asbestos containing materials using non-powered hand-held tools, and the material is wetted to control the spread of dust or fibres.
 - .4 Removing less than one square metre of drywall in which joint-filling compounds that are asbestos containing materials have been used.
- .10 For Type 2 asbestos works, comply with requirements of this Section when performing following works where applicable:
 - .1 Removal or disturbance of one square metre or less of friable asbestos containing material during the repair, alteration, maintenance or demolition of all or part of machinery or equipment, or of a building.
 - .2 Enclosure of friable asbestos containing material as indicated.
 - .3 Application of tape or sealant or other covering to pipe insulation containing asbestos.
 - .4 Removal all or part of a false ceiling to obtain access to a work area, if asbestos containing is likely to be lying on the surface of the false ceiling.
 - .5 Removing non-friable asbestos containing materials by breaking, cutting, drilling, abrading, grounding, sanding or vibrating at locations indicated on list provided by Parks Canada, if:
 - .1 The material is not wetted to control the spread of dust or fibres, and
 - .2 The work is done only by means of non-powered hand-held tools.

- .6 Removing non-friable asbestos containing materials by breaking, cutting, drilling, abrading, grounding, sanding or vibrating at locations indicated on list provided by Parks Canada if the work is done by means of power tools that are attached to dust-collecting devices equipped with HEPA filters.
- .7 Removing more than one square metre of drywall in which joint-filling compounds that are asbestos containing materials have been used.
- .8 Removing of asbestos containing material from a pipe, duct or similar structure using a glove bag.
- .9 Removing or cleaning filters used in an air handling unit in a building that has sprayed-on asbestos containing fireproofing.

1.2 REFERENCE STANDARDS

- .1 Parks Canada
 - .1 Asbestos Management Guide, dated January 2014 (attached to specifications)
 - .2 Asbestos Management Standard, dated January 2014 (attached to specifications)
- .2 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-1.205-[94], Sealer for Application of Asbestos Fibre Releasing Materials.
- .3 Department of Justice Canada (Jus)
 - .1 Canadian Environmental Protection Act, 1999 (CEPA).
 - .2 Canada Labour Code: [*Part II Occupational Health and Safety*](#)
 - .3 Canadian Occupational Health and Safety Regulations: [*Part X of the COHSR, Hazardous Substances*](#)
 - .4 [*Hazardous Products Act*](#)
 - .5 [*Transportation of Dangerous Goods Act \(1992\)*](#)
 - .6 Consolidated Transportation of Dangerous Goods Regulations (*including Amendment SOR/2011-239*)
 - .7 [*Canadian Environmental Protection Act \(1999\)*](#)
 - .8 [*Parks Canada Agency- Occupational Health and Safety policies*](#)
- .4 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
 - .1 Material Safety Data Sheets (MSDS).
- .5 Transport Canada (TC)
 - .1 Transportation of Dangerous Goods Act, 1992 (TDGA).
- .6 Underwriters' Laboratories of Canada (ULC)
- .7 Treasury Board Publications:
 - .1 Occupational Health Evaluation Standard
 - .2 Procedures for occupational exposure to asbestos

1.3 DEFINITIONS

- .1 Amended Water: water with non-ionic surfactant wetting agent added to reduce water tension to allow wetting of fibres.
- .2 Asbestos: Naturally-occurring mineral silicates which are capable of being separated into fibres.
- .3 Asbestos Containing Materials (ACMs): materials that contain 0.5 per cent or more asbestos by dry weight and are identified under Existing Conditions including fallen materials and settled dust.
- .4 Asbestos Work Area: area where work takes place which will or may disturb ACMs.
- .5 Authorized Visitors: Consultant, Parks Canada Project Manager, or designated representative[s], and representative[s] of regulatory agencies.
- .6 Competent worker: in relation to specific work, means a worker who:
 - .1 Is qualified because of knowledge, training and experience to perform the work.
 - .2 Is familiar with the provincial and federal laws and with the provisions of the regulations that apply to the work.
 - .3 Has knowledge of all potential or actual danger to health or safety in the work.
- .7 Friable Materials: asbestos-containing material that, when dry, can be crumbled, pulverized or powdered by hand pressure. This definition also includes dust or debris arising from non- friable materials that are, or will become, crumbled, pulverized or powdered, i.e., asbestos- containing plaster disturbed by demolition. Friable asbestos-suspect products include: Sprayed asbestos products, (fireproofing, thermal insulation, acoustic insulation or decorative products), applied in 1974 or earlier; Acoustic or texture plaster applied in 1990 or earlier; Mechanical insulation installed in 1983 or earlier, (jacketed or not); Compressed mineral fibre ceiling tiles installed in 1983 or earlier.
- .8 Glove Bag: prefabricated glove bag as follows:
 - .1 Minimum thickness 0.25 mm (10 mil) polyvinyl-chloride bag.
 - .2 Integral 0.25 mm (10 mil) thick polyvinyl-chloride gloves and elastic ports.
 - .3 Equipped with reversible double pull double throw zipper on top and at approximately mid-section of the bag.
 - .4 Straps for sealing ends around pipe.
- .9 HEPA vacuum: High Efficiency Particulate Air filtered vacuum equipment with filter system capable of collecting and retaining fibres greater than 0.3 microns in any dimension at 99.97% efficiency.
- .10 Non-Friable Material: material that when dry cannot be crumbled, pulverized or powdered by hand pressure.
- .11 Occupied Area: any area of building or work site that is outside Asbestos Work Area.
- .12 Polyethylene: polyethylene sheeting or rip-proof polyethylene sheeting with tape along edges, around penetrating objects, over cuts and tears, and elsewhere as required to provide protection and isolation.

- .13 Specialized Subcontractor: subcontractor hired by the Contractor to work with asbestos containing materials (including survey, testing, removal, etc.), Parks Canada will require that this Specialized Subcontractor demonstrates that they meet the applicable provincial requirements and accreditations (including disposal plans), and that they certify that they meet those requirements and assume related liability for the contracted work.
- .14 Sprayer: garden reservoir type sprayer or airless spray equipment capable of producing mist or fine spray. Must have appropriate capacity for scope of work.
- .15 Tenant: person(s) renting the residence own by Parks Canada, and any person living at that residence.
- .16 Type 1 and Type 2 asbestos work: Small scale operations on asbestos-containing material that may generate limited airborne asbestos fibres. Type 1 work is often referred to as «low risk» and type 2 work as «moderate risk».
- .17 Type 3 asbestos work: Large scale operations on asbestos-containing material that may generate significant airborne asbestos fibres. Type 3 work is often referred to as «high risk».

1.4 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submittals in accordance with Section 01 33 00- Submittal Procedures.
- .2 Submit proof satisfactory to Parks Canada Representative that suitable arrangements have been made to dispose of asbestos containing waste in accordance with requirements of applicable authority.
- .3 Submit Provincial and/or local requirements for Notice of Project Form.
- .4 Demonstrates that the Specialized Subcontractor meet the applicable provincial requirements and accreditations (including disposal plans), and that they certify that they meet those requirements and assume related liability for the contracted work. Specialized Contractor must also complete and sign the “[*Attestation and Proof of Compliance with Occupational Health and Safety \(OHS\)*](#)”
- .5 Contractor and their Specialized Subcontractor will be provided with, and be required to adhere to, all existing documentation (inventory information, surveys, test results, etc.), and all applicable Parks Canada directives and policies.
- .6 Submit proof of Contractor's Asbestos Liability Insurance, insurance shall specifically include professional liability with pollution coverage.
- .7 Submit to Parks Canada Representative necessary permits for transportation and disposal of asbestos containing waste and proof that asbestos containing waste has been received and properly disposed.
- .8 Submit proof satisfactory to Parks Canada Representative that all asbestos workers have received appropriate training and education by a competent person in the hazards of asbestos exposure, good personal hygiene, entry and exit from Asbestos Work Area, aspects of work procedures and protective measures while working in Asbestos Work Areas, and the use, cleaning and disposal of respirators and protective clothing.

- .9 Submit proof that supervisory personnel have attended asbestos abatement course, of not less than two days duration, approved by Parks Canada Representative. Minimum of one supervisor for every ten workers.
- .10 Submit Worker's Compensation Board status and transcription of insurance.
- .11 Submit documentation including test results, fire and flammability data, and Material Safety Data Sheets (MSDS) for chemicals or materials including:
 - .1 Encapsulants;
 - .2 Amended water;
 - .3 Slow drying sealer.
- .12 Submit proof satisfactory to Parks Canada Representative that employees have respirator fitting and testing. Workers must be fit tested (irritant smoke test) with respirator that is personally issued.
- .13 Sign the [Parks Canada Contractor Notification and Acknowledgement Form](#) prior to commencement of the work (signed by the Contractor and their Specialized Subcontractor).

1.5 QUALITY ASSURANCE

- .1 Regulatory Requirements: comply with Federal, Provincial and local requirements pertaining to asbestos, provided that in case of conflict among these requirements or with these specifications more stringent requirement applies. Comply with regulations in effect at the time work is performed.
- .2 Health and Safety applicable to Type 1 and Type 2 asbestos works:
 - .1 Safety Requirements: worker and visitor protection.
 - .1 Protective equipment and clothing to be worn by workers while in Asbestos Work Area include:
 - .1 Air purifying half-mask respirator with N-100, R-100 or P-100 particulate filter, personally issued to worker and marked as to efficiency and purpose, suitable for protection against asbestos and acceptable to Provincial Authority having jurisdiction. The respirator to be fitted so that there is an effective seal between the respirator and the worker's face, unless the respirator is equipped with a hood or helmet. The respirator to be cleaned, disinfected and inspected after use on each shift, or more often if necessary, when issued for the exclusive use of one worker, or after each use when used by more than one worker. The respirator to have damaged or deteriorated parts replaced prior to being used by a worker; and, when not in use, to be stored in a convenient, clean and sanitary location. The employer to establish written procedures regarding the selection, use and care of respirators, and a copy of the procedures to be provided to and reviewed with each worker who is required to wear a respirator. A worker not to be assigned to an operation requiring the use of a respirator unless he or she is physically able to perform the operation while using the respirator.

- .2 Disposable type protective clothing that does not readily retain or permit penetration of asbestos fibres. Protective clothing to be provided by the employer and worn by every worker who enters the work area, and the protective clothing to consist of a head covering and full body covering that fits snugly at the ankles, wrists and neck, in order to prevent asbestos fibres from reaching the garments and skin under the protective clothing. It includes suitable footwear, and it to be repaired or replaced if torn.
- .2 Eating, drinking, chewing, and smoking are not permitted in Asbestos Work Area.
- .3 For Type 1 asbestos works, on leaving work area, proceed to washroom and wash all exposed skin on hands and face.
- .4 For Type 2 asbestos works, on leaving work area, use vacuum or wet cloth to clean hands, face, respirator and boots. Remove protective equipment and proceed to nearest washroom to wash exposed skin on hands and face. The worker can decontaminate his or her protective clothing by using a vacuum equipped with a HEPA filter, or by damp wiping, before removing the protective clothing, or, if the protective clothing will not be reused, place it in a container for dust and waste. The container to be dust tight, suitable for asbestos waste, impervious to asbestos, identified as asbestos waste, cleaned with a damp cloth or a vacuum equipped with a HEPA filter immediately before removal from the work area, and removed from the work area frequently and at regular intervals.
- .5 Ensure workers wash hands and face when leaving Asbestos Work Area. Facilities for washing are located close to the Asbestos Work Area, either at specialized firm service truck or other facility.
- .6 Ensure that no person required to enter an Asbestos Work Area has facial hair that affects seal between respirator and face.
- .3 Additional Health and Safety applicable to Type 2 asbestos works:
 - .1 Visitor Protection:
 - .1 Provide protective clothing and approved respirators to Authorized Visitors to work areas.
 - .2 Instruct Authorized Visitors in the use of protective clothing, respirators and procedures.
 - .3 Instruct Authorized Visitors in proper procedures to be followed in entering into and exiting from Asbestos Work Area.

1.6 WASTE MANAGEMENT AND DISPOSAL

- .1 Remove from site and dispose of packaging materials at appropriate recycling facilities.
- .2 Collect and separate for disposal polystyrene, corrugated cardboard, paper and/or plastic packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.
- .3 Place materials defined as hazardous or toxic in designated containers.
- .4 Handle and dispose of hazardous materials in accordance with the CEPA, TDGA, Regional and Municipal regulations.

- .5 Fold up metal banding, flatten and place in designated area for recycling.
- .6 Disposal of asbestos waste generated by removal activities must comply with Federal, Provincial and Municipal regulations. Dispose of asbestos waste in sealed double thickness 6 mils bags or leak proof drums. Label containers with appropriate warning labels.
- .7 Provide manifests describing and listing waste created. Transport containers by approved means to licenced landfill for burial.

1.7 EXISTING CONDITIONS

- .1 Refer to list of locations and extent of material containing asbestos issued by Parks Canada.
- .2 Reports and information pertaining to ACMS to be handled, removed, or otherwise disturbed and disposed of during this Project will be forwarded to Contractor after award of contract.
- .3 Notify Parks Canada Representative of friable material discovered during Work and not apparent from drawings, specifications, or report pertaining to Work. Do not disturb such material until instructed by Parks Canada Representative.

1.8 SCHEDULING OF WORK

- .1 Hours of Work: perform work involving normal working hours. Include in Contract Sum additional costs due to this requirement.
- .2 Contractor is to coordinate scheduling of work with their subcontractors, Parks Canada representative, Tenant(s).
- .3 Schedule type 2 asbestos work when occupants are absent. If persons are present, do not start work.
- .4 If work above ceiling is required on an emergency basis when area is occupied, arrange for occupants to vacate area until work is complete, and clearance is given to return.

1.9 PERSONNEL TRAINING

- .1 Before beginning Work, provide Parks Canada Representative and Consultant satisfactory proof that every worker has had instruction and training in hazards of asbestos exposure, in personal hygiene and work practices, in use of glove bag procedures, and in use, cleaning, and disposal of respirators and protective clothing.
- .2 Instruction and training related to respirators includes, at minimum:
 - .1 Fitting of equipment.
 - .2 Inspection and maintenance of equipment.
 - .3 Disinfecting of equipment.
 - .4 Limitations of equipment.
- .3 Instruction and training must be provided by competent, qualified person.

Part 2 Products

2.1 MATERIALS (Type 1 and Type 2 asbestos works, unless stated otherwise)

- .1 Drop and Enclosure Sheets:
 - .1 Polyethylene: 0.15 mm thick.
 - .2 FR polyethylene: 0.15 mm thick woven fibre reinforced fabric bonded both sides with polyethylene.
- .2 Wetting Agent: 50% polyoxyethylene ester and 50% polyoxyethylene ether mixed with water in concentration to provide thorough wetting of asbestos containing material. 15ml of the solution shall be mixed per liter of water.
- .3 Pump sprayer with container: to hold wetting agent and provide thorough wetting of asbestos containing material.
- .4 If encountered during asbestos removal activities, any suspected ACMs not accessible and/or identified in Parks Canada assessment reports shall be considered as asbestos-containing and handled as such, unless proven otherwise through analytical testing.
- .5 HEPA Vacuum: Asbestos-approved vacuum equipped with brushes and fittings.
- .6 Protective Clothing:
 - .1 Disposal coveralls with attached elasticized hood.
 - .2 Boot covers or dedicated boots.
- .7 Respirators: Half-face piece respirators with HEPA filters.
- .8 Waste Containers:
 - .1 contain waste in two separate containers.
 - .1 Inner container: 0.15 mm thick sealable polyethylene bag [or where glove bag method is used, glove bag itself].
 - .2 Outer container: sealable metal or fibre type where there are sharp objects included in waste material; otherwise outer container may be sealable metal or fibre type or second 0.15 mm thick sealable polyethylene bag.
 - .2 Containers which can hold wastewater contaminated with asbestos fibers.
 - .3 Labelling requirements: affix preprinted cautionary asbestos warning, in both official languages, that is visible when ready for removal to disposal site.
- .9 Glove bag (Type 2 asbestos work only):
 - .1 Prefabricated, 0.25 mm minimum thickness polyvinyl-chloride bag with integral 0.25 mm thick polyvinyl- chloride gloves and elasticized port.
 - .2 Acceptable materials: safe-T-Strip products in configuration suitable for Work, or Alternative material approved by addendum during tendering period in accordance with Instructions to Tenderers.
 - .3 Securing Straps:
 - .1 Reusable nylon straps at least 25 mm wide with metal buckle for sealing ends of bags around pipe and/or insulation.

- .4 The glove bag to be equipped with:
 - .1 Sleeves and gloves that are permanently sealed to the body of the bag to allow the worker to access and deal with the insulation and maintain a sealed enclosure throughout the work period.
 - .2 Valves or openings to allow insertion of a vacuum hose and the nozzle of a water sprayer while maintaining the seal to the pipe, duct or similar structure.
 - .3 A tool pouch with a drain.
 - .4 A seamless bottom and a means of sealing off the lower portion of the bag.
 - .5 A high strength double throw zipper and removable straps, if the bag is to be moved during the removal operation.
- .10 Tape: tape suitable for sealing polyethylene to surfaces under both dry and wet conditions using amended water.
 - .1 18 mm double-sided tape is recommended for attaching polyethylene to T-bar ceiling.
- .11 Slow - drying sealer: non-staining, clear, water - dispersible type that remains tacky on surface for at least 8 hours and designed for purpose of trapping residual asbestos fibres.
 - .1 Sealer: flame spread, and smoke developed rating less than 50 and be compatible with new fireproofing.
- .12 Encapsulant (Type 2 asbestos work only): surface film forming type conforming to CAN/CGSB-1.205, ULC listed.
- .13 Warning signs: Signs indicating asbestos hazard area in both official languages. The warning shall be in upper case (Helvetica Medium) letters and reading as follows, where number in parentheses indicates font size to be used: 'CAUTION ASBESTOS HAZARD AREA (25 mm) / NO UNAUTHORIZED ENTRY (19 mm) / WEAR ASSIGNED PROTECTIVE EQUIPMENT (19 mm) / BREATHING ASBESTOS DUST MAY CAUSE SERIOUS BODILY HARM (7 mm)'.
- .14 Wood framing or clips: to support polyethylene sheeting.

Part 3 Execution

3.1 PROCEDURES FOR TYPE 1 ASBESTOS WORKS

- .1 Before beginning Work, isolate Asbestos Work Area using, minimum, preprinted cautionary asbestos warning signs in both official languages that are visible at access routes to Asbestos Work Area.
 - .1 Remove visible dust from surfaces in the work area where dust is likely to be disturbed during course of work.
 - .2 Use HEPA vacuum or damp cloths where damp cleaning does not create a hazard and is otherwise appropriate.
 - .3 Do not use compressed air to clean up or remove dust from any surface.

- .2 If encountered during asbestos removal activities, any suspected ACMs not accessible and/or identified in Parks Canada assessment reports shall be considered as asbestos-containing and handled as such, unless proven otherwise through analytical testing.
- .3 Prevent spread of dust from Asbestos Work Area using measures appropriate to work to be done.
 - .1 Use FR polyethylene drop sheets over flooring such as carpeting that absorbs dust and over flooring in Asbestos Work Area where dust and contamination cannot otherwise be safely contained. Drop sheets are not to be reused.
- .4 Wet materials containing asbestos to be cut, ground, abraded, scraped, drilled, or otherwise disturbed unless wetting creates hazard or causes damage.
 - .1 Use garden reservoir type low - velocity fine - mist sprayer.
 - .2 Perform Work to reduce dust creation to lowest levels practicable.
 - .3 Work will be subject to visual inspection and air monitoring.
 - .4 Contamination of surrounding areas indicated by visual inspection or air monitoring will require complete enclosure and clean-up of affected areas.
 - .5 Do not use electric powered scrapers.
 - .6 Break material only is unavoidable. Whenever possible, remove asbestos cement panels intact.
- .5 Frequently and at regular intervals during Work and immediately on completion of work:
 - .1 Dust and waste to be cleaned up and removed using a vacuum equipped with a HEPA filter, or by damp mopping or wet sweeping, and placed in a waste container.
 - .2 Drop sheets to be wetted and placed in a waste container as soon as practicable, and
 - .3 Do not break waste material into small pieces.
- .6 Cleanup:
 - .1 Place dust and asbestos containing waste in sealed dust-tight waste bags. Treat drop sheets and disposable protective clothing as asbestos waste; wet and fold these items to contain dust, and then place in plastic bags.
 - .2 Clean exterior of each waste-filled bag using damp cloths or HEPA vacuum and place in second clean waste bag immediately prior to removal from Asbestos Work Area.
 - .3 Seal waste bags and remove from site. Dispose of in accordance with requirements of Provincial/Territorial and Federal Authority having jurisdiction. Supervise dumping and ensure that dump operator is fully aware of hazardous nature of material to be dumped and that the appropriate guidelines and regulations for asbestos disposal are followed.
 - .4 Perform final thorough clean-up of Work areas and adjacent areas affected by Work using HEPA vacuum.

3.2 SUPERVISION FOR TYPE 2 ASBESTOS WORKS

- .1 Minimum of one Supervisor for every ten workers is required.

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- .2 Approved Supervisor must remain within Asbestos Work Area during disturbance, removal, or other handling of asbestos-containing materials.

3.3 PROCEDURES FOR TYPE 2 ASBESTOS WORKS

- .1 Before beginning Work, at each access to Asbestos Work Area, install warning signs in both official languages.
- .2 Before beginning Work remove visible dust from surfaces in work area where dust is likely to be disturbed during course of work.
 - .1 Use HEPA vacuum or damp cloths where damp cleaning does not create hazard and is otherwise appropriate.
 - .2 Do not use compressed air to clean up or remove dust from any surface.
- .3 Before beginning Work shut down ventilation systems to and from the work area. Seal over all ventilation openings, diffusers, grilles, etc., with plastic and tape.
- .4 Before beginning Work, clear areas of movable furnishings or equipment. Any equipment not removed shall be adequately covered and sealed with 0.15mm polyethylene and tape.
- .5 Prevent spread of dust from Asbestos Work Area using measures appropriate to work to be done.
 - .1 Use FR polyethylene drop sheets over flooring such as carpeting that absorbs dust and over flooring in work areas where dust or contamination cannot otherwise be safely contained.
 - .2 When [and when] [removing asbestos containing material from piping or equipment and "glove bag" method is not used] [removing suspended ceilings and walls themselves do not enclose work area] erect enclosure of polyethylene sheeting around work area, shut off mechanical ventilation system serving work area and seal ventilation ducts to and from work area.
- .6 During work:
 - .1 Vacuum must not be opened, except by a fully protected worker.
 - .2 Respirators must be kept in position throughout the entire time the staff is in the work area from the first disturbance of an asbestos containing material until final cleaning of the area and disposal of the contaminated wastes.
 - .3 Coveralls should be worn with the hood at all times, for a maximum of 8 cumulative wear hours. Coverall may be vacuumed or wet wiped for re-use, but must meet the maximum cumulative hours of wear.
- .7 Any where applicable, before removing suspended ceilings, remove friable material on upper surfaces using HEPA vacuum equipment.
 - .1 Remove and clean surfaces of each ceiling panel using HEPA vacuum, wrap clean panels in 0.15 mm thick polyethylene, and store in building as directed by Parks Canada Representative, or Consultant.
 - .2 Clean "T" grid suspension system, disconnect, wrap in 0.15 mm thick polyethylene, and store in building as directed by Consultant.

- .8 Remove loose material by HEPA vacuum; thoroughly wet friable material containing asbestos to be removed or disturbed before and during Work unless wetting creates hazard or causes damage.
 - .1 Use garden reservoir type low - velocity sprayer or airless spray equipment capable of producing mist or fine spray.
 - .2 Perform Work in a manner to reduce dust creation to lowest levels practicable.
- .9 Pipe Insulation Removal Using Glove Bag:
 - .1 A glove bag not to be used to remove insulation from a pipe, duct or similar structure if:
 - .1 It may not be possible to maintain a proper seal for any reason including, without limitation:
 - .1 The condition of the insulation.
 - .2 The temperature of the pipe, duct or similar structure.
 - .2 The bag could become damaged for any reason including, without limitation.
 - .1 The type of jacketing.
 - .2 The temperature of the pipe, duct or similar structure.
 - .2 Upon installation of the glove bag, inspect bag for any damage or defects. If any damage or defects are found, the glove bag is to be repaired or replaced. The glove bag to be inspected at regular intervals for damage and defects, and repair or replaced, as appropriately. The asbestos containing contents of the damaged or defective glove bag found during removal are to be wetted and the glove bag and its contents are to be removed and disposed of in an appropriate waste disposal container. Any damaged or defective glove bags are not be reused.
 - .3 Place tools necessary to remove insulation in tool pouch. Wrap bag around pipe and close zippers. Seal bag to pipe with straps.
 - .4 Place hands in gloves and use necessary tools to remove insulation. Arrange insulation in bag to obtain full capacity of bag.
 - .5 Insert nozzle of garden reservoir type sprayer into bag through valve and wash down pipe and interior of bag thoroughly. Wet surface of insulation in lower section of bag.
 - .6 If bag is to be moved along the same pipe during work, loosen securing straps, move bag, re-seal to pipe and repeat.
 - .7 If the bag is ripped, cut or opened during work, cease work and repair opening before proceeding. All spilled material must be cleaned and removed with HEPA vacuum or wet cleaning.
 - .8 To remove bag after completion of stripping, wash top section and tools thoroughly. Remove air from top section through elasticized valve using a HEPA vacuum. Pull polyethylene waste container over glove bag before removing from pipe. Release one strap and remove freshly washed tools. Place tools in water. Remove second strap and zipper. Fold over into waste container and seal.
 - .9 After removal of bag ensure that pipe is free of residue. Remove residue using HEPA vacuum or wet cloths. Ensure that surfaces are free of sludge which after

- drying could release asbestos dust into atmosphere. Seal exposed surfaces of pipe and ends of insulation with slow drying sealer to seal in any residual fibres.
- .10 Upon completion of Work shift, cover exposed ends of remaining pipe insulation with polyethylene taped in place.
- .10 Work is subject to visual inspection and air monitoring. Contamination of surrounding areas indicated by visual inspection or air monitoring will require complete enclosure and clean-up of affected areas.
- .11 Cleanup:
- .1 Frequently during Work and immediately after completion of work, clean up dust and asbestos containing waste using HEPA vacuum or by damp mopping.
- .2 Place dust and asbestos containing waste in sealed dust tight waste bags. Treat drop sheets and disposable protective clothing as asbestos waste and wet and fold to contain dust and then place in waste bags.
- .3 Immediately before their removal from Asbestos Work Area and disposal, clean each filled waste bag using damp cloths or HEPA vacuum and place in second clean waste bag.
- .4 Seal and remove double bagged waste from site. Dispose of in accordance with requirements of Provincial/Territorial and Federal authority having jurisdiction. Supervise dumping and ensure that dump operator is fully aware of hazardous nature of material to be dumped and that guidelines and regulations for asbestos disposal are followed.
- .5 Decontaminate equipment, tools and materials used in the work area by wet cleaning or by using HEPA vacuum.
- .6 Perform final thorough clean-up of Asbestos Work Areas and adjacent areas affected by Work using HEPA vacuum.
- .7 Before leaving the work area, shoes and protective clothing shall be decontaminated using HEPA vacuum or damp wiping. When protective clothing is to be disposed, it must be fully decontaminated and disposed in a labelled disposal bag. All staff shall vacuum exposed skin, suit, and respirator and proceed to nearest washroom to wash hands and face.

3.4 AIR MONITORING FOR ASBESTOS WORKS

- .1 Contractor and their Specialized Subcontractor will be responsible for monitoring inside Asbestos Work Area enclosure[s] in accordance with applicable Provincial Occupational Health and Safety Regulations.
- .2 Asbestos-specific air monitoring or inspection outside the work enclosure is not mandatory but may be requested and arranged by the Parks Canada Asset Manager, based on site-specific concerns or other factors. Would this be the case, from beginning of Work until completion of cleaning operations, Parks Canada representative is to take air samples on daily basis outside of Asbestos Work Area enclosure in accordance with Provincial Occupational Health and Safety Regulations.
- .3 If air monitoring shows that areas outside Asbestos Work Area enclosure[s] are contaminated, enclose, maintain and clean these areas in same manner as that applicable to Asbestos Work Area.

- .4 Ensure that respiratory safety factors are not exceeded.
- .5 During the course of the work, asbestos-specific air monitoring or inspection outside the work enclosure will not be mandatory but may be requested and arranged by the Parks Canada Asset Manager, based on site-specific concerns or other factors. Would this be the case, from beginning of Work until completion of cleaning operations, Parks Canada representative is to take air samples on daily basis outside of Asbestos Work Area enclosure in accordance with Provincial Occupational Health and Safety Regulations. Parks Canada representative is to measure fibre content of air outside Work areas by means of air samples analyzed by Phase Contrast Microscopy (PCM).
 - .1 Specialized Subcontractor is to stop work when PCM measurements exceed 0.05 f/cc and to correct work procedures.

3.5 INCIDENT REPORTING

- .1 In the case of potential exposure to asbestos fibres by the Specialized Subcontractor staff member, the staff member will report the incident without delay to their immediate supervisor who will take steps to prevent a recurrence by following Policy and Procedures on Hazardous Occurrence Reporting and Recording.
- .2 Incident shall be reported immediately to the Contractor, who will report immediately any incidents involving their staff and/or the Specialized Subcontractor's staff to the Parks Canada manager responsible for the contract, including their actions in response to the incident and to prevent re-occurrence.
- .3 Contractor and their Specialized Subcontractor are advised that, for internal Parks Canada monitoring purpose, Parks Canada Chief, Environmental Management and Security, in collaboration with the Director, Asset Management Services and the Manager, Occupational Health and Safety and Disability management Program (Human Resources), will monitor the application of Parks Canada Asbestos Abatement Standard using existing systems, procedures, and practices for the management of Parks Canada assets and facilities. Parks Canada Office of Internal Audit and Evaluation may periodically conduct audits or evaluations as deemed appropriate.

3.6 RESPONSE TO ACCIDENTAL RELEASE OF AIRBORNE ASBESTOS

- .1 Specialized Subcontractor shall report incident immediately to the Contractor, who shall report it immediately to Parks Canada representative. Parks Canada Asset Manager will be responsible to determine the appropriate level of response, actions to be taken, and to inform staff and contractors who may have been exposed.
- .2 The general principle of emergency response is to protect the staff performing the repair and to minimize the exposure of others to airborne asbestos, and particularly the Tenant, the Consultant, and other contractor and subcontractor staff on site.
- .3 The general procedures given below should be followed to the extent possible in the circumstances of the emergency:
 - .1 Vacate the area of unnecessary personnel.
 - .2 Limit the spread of asbestos contamination.
 - .3 Shut down ventilation system serving work area.

- .4 Contact Parks Canada Asset Manager for guidance on contamination and to arrange for removal, clean-up or repair of the asbestos material
 - .5 Construct barriers around area if time permits.
 - .6 In the case of potential exposure to asbestos fibres by Specialized Subcontractor, the Contractor's staff or any other subcontractor's staff, the staff member shall report the incident to their immediate supervisor and follow the established Hazardous Incident/Accident reporting protocols for the Field Unit.
 - .7 Before removing an enclosure, have Parks Canada representative or other authorized person monitor the air to confirm acceptable levels and document readings.
 - .8 Obtain verification from Parks Canada or other qualified person on air monitoring requirements.
 - .9 Arrange for a qualified person to inspect the work as soon as possible and, in conjunction with the regulatory bodies (if applicable), to oversee the work and approve the corrective work required.
 - .10 Document the disposal of the asbestos and the procedures used.
- .4 MINOR INCIDENT: Examples of minor incidents include an accidental puncture of an insulated pipe, contact with an insulated structural beam, or breakage of a corner of a tile or wall panel, where a small amount of ACM is dislodged. These minor incidents can be treated with standard wet cleaning and HEPA vacuum techniques. In such cases, and for reference, procedures should consist of the following:
- .1 Immediately control all access to the affected area. Unauthorized persons shall not be allowed into the area.
 - .2 Specialized Subcontractor workers must wear a respirator appropriate to the hazard based on the potential asbestos fibre exposure or at a minimum a half-face, negative pressure, air-purifying respirator equipped with HEPA filters.
 - .3 Specialized Subcontractor workers must thoroughly saturate the debris with amended water using a spray container with a very fine spray. The debris must then be carefully placed in double 0.15 mm plastic bags that are properly labelled as containing asbestos waste, for disposal. Alternatively, the debris can be collected with a HEPA equipped vacuum cleaner.
 - .4 The area where the debris is located shall be thoroughly cleaned with a damp cloth/mop or vacuumed with a HEPA equipped vacuum.
 - .5 Materials used in the clean up shall be double bagged, labelled and properly disposed of as asbestos waste.
 - .6 The damaged ACM shall be repaired with asbestos-free spackling, plaster, cement, insulation or sealed with latex paint or an approved encapsulant.
- .5 MAJOR INCIDENT: Examples of a major incident include water or physical damage to pipe insulation resulting in missing sections or insulation falling from structural beams onto the back of ceiling tiles. In these cases, immediate and rigorous control and clean up procedures are required, and Specialized Subcontractor is to do the work (not Parks Canada staff). In major release incidents, the following procedures must be followed:
- .1 The area must be isolated as soon as possible after the ACM is discovered and access to the area restricted to persons wearing personal protective equipment.

- .2 The air handling system must be shut off or temporarily modified to prevent the distribution of fibres from the affected area to other areas of the building.
- .3 Establish the extent of contamination through a thorough visual inspection and/or area asbestos air monitoring. All persons determining the extent of contamination should wear powered air-purifying respirators equipped with HEPA filters (at a minimum) or select an appropriate respirator based on the potential asbestos fibre exposure, protective clothing, boots and head covers.
- .4 Fallen debris must be sprayed with amended water, double bagged, labelled and properly disposed of as asbestos waste.
- .5 Horizontal and vertical surfaces must be thoroughly cleaned using wet mopping/wiping and vacuumed with a HEPA vacuum cleaner.
- .6 Walls, ceilings, pipes, boilers or other surfaces where ACM was damaged must be repaired temporarily. This may involve plastering with asbestos-free material, spraying with an encapsulant, taping with duct tape, or covering with canvas.
- .7 All equipment and tools used in the clean-up operation must be washed or wiped with damp cloths. All HEPA vacuums must be immediately emptied and decontaminated. All disposable materials (e.g., cloths, mop heads, filters, and coveralls) must be discarded as asbestos waste.
- .8 If the release is significant and warrants a high risk clean up the following applies:
- .9 Notification of municipal, provincial, and federal authorities having jurisdiction may be required (in many cases, emergency clean up does not require normal asbestos notification procedures i.e., clean up may begin immediately after submittal of notification).
- .10 The contractor must construct an enclosure system of at least 0.15 mm polyethylene, spray glue adhesive and waterproof duct tape. Construction of temporary walls to reinforce the polyethylene barriers may be required.
- .11 Once the containment has been properly constructed, the contractor must install a sufficient quantity of negative air units (equipped with HEPA filters) to create a pressure differential between the contaminated work area and the area outside the enclosure. The pressure differential must be a minimum 5 Pascal (as measured by a Magnehelic Pressure Differential gauge). The efficiency of HEPA equipment must be challenged on-site through HEPA integrity testing. Certification verifying that HEPA equipment has passed the integrity testing should be attached to each unit.
- .12 A visual inspection of the enclosure system shall be conducted before the removal is started and at the beginning and end of each shift and at least once on days when there are no shifts. Any defect found during inspection must be remedied immediately.
- .13 Air monitoring for airborne asbestos fibres should be completed in at least one location outside the work area.
- .14 Air monitoring should also be completed inside the removal area to verify the effectiveness of removal techniques and to ensure that workers are utilizing the appropriate respiratory protection according to the requirements of applicable regulations.

- .15 Where a visual examination of the enclosure system reveals a problem, or air monitoring performed outside the enclosure is found to be in excess of the occupational exposure limit, removal activities must be stopped at once until the defect in the enclosure has been remedied.
 - .16 Air monitoring must be performed before the enclosure is removed and the area re-occupied. Final air clearance samples must not exceed 0.01 fibres/cubic centimetre.
 - .17 Appropriate worker decontamination procedures must be followed throughout the removal process.
 - .18 All normal procedures for asbestos removal must be followed.
- .6 REPORTING ANY INCIDENT: Each minor or major incidents of accidental asbestos fibre release must be documented, with resulting reports to be included in building specific records. Specialized Sub report shall include a description where the event occurred, a description of what caused or may have caused the incident, and a detailed account of what actions were taken and by whom. In cases where Parks Canada staff may have been exposed to asbestos, this will be communicated to both the staff and to the members of the local OSH Committee. Note that according to the Canada Occupational Health and Safety Regulations, Parks Canada must retain all incident and accident reports involving hazardous substances for a period of thirty (30) years.

END OF SECTION

Part 1 General

1.1 MEASUREMENT PROCEDURES

- .1 Excavated materials for removal of utilities, installation of new facilities, including but not limited to gravity sewer, septic tanks, pumping wet well, other treatment tanks, conduits, forcemain, any type of absorption field, and any other works, will not be measured separately. The cost for these works is to be included in the lump sum price for works at the site, as per PCA Payment Procedures.
- .2 Where applicable, rock quantities measured will be actual volume removed within following limits:
 - .1 Width for trench excavation as safely required for removal of utilities.
 - .2 Width for excavation for structures to be bounded by vertical planes up to 500 mm outside of and parallel to neat lines of footings as indicated.
 - .3 Depth from rock surface elevations immediately prior to excavation, to elevation as indicated.
 - .4 Where design elevation is less than 300 mm below original rock surface, depth will be considered to be 300 mm below original rock surface.
 - .5 Volume of individual boulders and rock fragments will be determined by measuring three maximum mutually perpendicular dimensions.
- .3 If ever required, sheeting and bracing left in place on direction of PCA Representative will be measured in square metres of surface area of plane surface of sheeting.
- .4 Shoring, bracing, cofferdams, underpinning and de-watering of excavation will not be measured separately for payment.
- .5 Backfilling to authorized excavation limits will not be measured separately for removal of utilities, for construction of foundations, piping, septic tank, pumping station, forcemain, absorption field, fence post foundation, and any other works identified in the project documents. The cost for these works is to be included under the unit price per linear meter or the lump sum price for the respective items.
- .6 Contractor will not be compensated for over-excavation and additional backfilling, beyond what is required to complete the works as per contract documents.
- .7 Placing and spreading of topsoil will not be measured separately for payment.
 - .1 Double handling of topsoil (stockpiling and later placing) is allowed, but will not imply additional payment..

1.2 REFERENCES

- .1 Ontario Provincial Standard Specifications (OPSS)
 - .1 As indicated on the drawing(s).
- .2 Ontario Provincial Standard Drawings (OPSD)
 - .1 As indicated on the drawing(s).

- .3 Canadian Council of Ministers of the Environment (CCME) *Canadian Soil Quality Guidelines for Protection of the Environment and Human Health*. 1999, as updated.
- .4 Ontario Ministry of the Environment. Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act Full Depth Background Site Condition Standards, Soil (other than sediment), Property Use other than Agricultural. April 15, 2011.

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 1.00 m³ and which cannot be removed by means of heavy duty mechanical excavating equipment with 0.95 to 1.15 m³ bucket. 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 mm (1") 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 Any fill and other deleterious materials such as topsoil, organic material and rootmat must be entirely removed from within the tank and/or piping excavation
- .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.
- .9 Contaminated Soil: Soil considered to be contaminated greater than the Canadian Soil Quality Guidelines for Protection of the Environment and Human Health ((commercial land use, coarse-textured soil) CCME) based on chemical analyses completed by the PCA Representative prior to Contract and documented in the "Contaminant Letter". Soil may be sampled and analysed for contaminants by the PCA Representative during the Contract at their discretion.
- .10 Clean Backfill Material: Soil and granular material imported to the site for the purpose of backfilling for which concentrations of parameters of concern are less than the Ontario

Regulation 153/04 Soil, Groundwater and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act (Table 1 – All Other Types of Property Use (MOE)) based on chemical analyses completed by the Contractor.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Make submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Preconstruction Submittals:
 - .1 Submit construction equipment list for major equipment to be used in this section prior to start of Work.
 - .2 Submit records of underground utility locates, indicating: location plan of existing utilities as found in field, clearance record from utility authority when applicable, location plan of relocated and abandoned services, as required.
- .3 Samples:
 - .1 Submit samples in accordance with Section 01 33 00 - Submittal Procedures.
 - .2 Inform PCA Representative at least 4 weeks prior to beginning Work, of proposed source of fill materials and provide access for sampling.
 - .3 Submit 23 kg samples of type of fill specified including representative samples of excavated material.
 - .4 Ship samples prepaid to PCA Representative, in tightly closed containers to prevent contamination and exposure to elements.
 - .5 At least two (2) weeks prior to beginning Work, inform PCA Representative source of fly ash and submit samples to PCA Representative.
 - .1 Do not change source of Fly Ash without written approval of PCA Representative.
- .4 Comply with PCA standards and procedures referenced in 1.1 of this specification section.

1.5 QUALITY ASSURANCE

- .1 Qualification Statement: submit proof of insurance coverage for professional liability.
- .2 Where PCA Representative is employee of Contractor, submit proof that Work by PCA Representative is included in Contractor's insurance coverage.
- .3 Submit design and supporting data at least two (2) weeks prior to beginning Work.
- .4 Design and supporting data submitted to bear stamp and signature of qualified professional engineer registered or licensed in Province of Ontario.
- .5 Keep design and supporting data on site.
- .6 Engage services of qualified professional Engineer who is registered or licensed in Province of Ontario in which Work is to be carried out to design and inspect cofferdams, shoring, bracing and underpinning required for Work.
- .7 Do not use soil material until written report of soil test results are reviewed by PCA Representative.

- .8 Health and Safety Requirements:
 - .1 Do construction occupational health and safety in accordance with Provincial Regulations.

1.6 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate waste materials for reuse / with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
- .2 Divert excess materials from landfill to local facility for reuse as directed by PCA Representative.
- .3 Manage and dispose of excavated soil material in accordance with Article 3 of this Section.

1.7 EXISTING CONDITIONS

- .1 Examine soil and groundwater information available in the borehole and monitoring well logs, provided with the Tender Documents.
- .2 Buried services:
 - .1 Before commencing work verify and establish 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: pay costs of relocating services.
 - .3 Remove obsolete buried services within a minimum of 2 m or as indicated within the project documents (whichever is greater) of foundations: cap cut-offs.
 - .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 PCA Representative establish location and state of use of buried utilities and structures. PCA Representative to clearly mark such locations to prevent disturbance during Work.
 - .6 Confirm locations of buried utilities by careful test excavations, or soil hydrovac methods.
 - .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 PCA Representative before removing. Costs for such Work to be paid by PCA Representative.
 - .9 Record location of maintained, re-routed and abandoned underground lines.
 - .10 Confirm locations of recent excavations adjacent to area of excavation.
- .3 Existing buildings and surface features:
 - .1 Conduct, with PCA Representative, condition survey of existing buildings, trees and other plants, lawns, fencing, service poles, wires, rail tracks, pavement, survey bench marks and monuments which may be affected by Work.

- .1 Protect existing buildings and surface features from damage while Work is in progress. In event of damage, immediately make repair as directed by PCA Representative
- .2 Where required for excavation, cut roots or branches as directed by PCA Representative in accordance with PCA site Standards.

Part 2 Products

2.1 MATERIALS

- .1 In accordance with:
 - .1 Backfill material to meet the definition of Clean Backfill Material as per 1.3.4.
 - .2 Section 33 36 33 Utility Drainage Field.
- .2 Geotextiles:
 - .1 Anti-siltation filter fabric to be non-woven needle punch polypropylene geotextile membrane to be set around filtering material, perforated piping and at trench as shown on drawings and as prescribed under Part 3.0 below, to be EPURTEX by Soleno Textiles Inc., Tel; 450-668-2545, Toll free 1-888-241-9600, or approved equal- Geotextiles.

Part 3 Execution

3.1 TEMPORARY EROSION AND SEDIMENTATION CONTROL

- .1 At all sites, 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, according to requirements of MOECC, and sediment and erosion control plan, specific to site, that complies with federal or Ontario requirements of MOECC, whichever is more stringent.
- .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.
- .4 Some sites have been designated by PCA on contract drawings, requiring special attention to protect sensitive areas. Contractor is to document in writing all erosion and sediment control activities, and report those

3.2 SITE PREPARATION

- .1 Remove obstructions, ice and snow, from surfaces to be excavated within limits indicated.
- .2 Cut pavement or sidewalk neatly along limits of proposed excavation in order that surface may break evenly and cleanly in accordance with Section 02 41 13 – Selective Site Demolition.

3.3 PREPARATION/PROTECTION

- .1 Protect existing features in accordance with Section 01 56 00 - Temporary Barriers and Enclosures and 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 PCA Representative 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 indicated by PCA Representative after area has been cleared of brush, weeds and grasses, and removed from site.
- .2 Strip topsoil to depths as indicated by PCA Representative.
 - .1 Do not mix topsoil with subsoil.
- .3 Stockpile in locations as indicated by PCA Representative.
 - .1 Stockpile height not to exceed 2 m and should be protected from erosion.
- .4 Dispose of unused topsoil to location off site, as indicated by PCA Representative.

3.5 STOCKPILING

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

3.6 COFFERDAMS, SHORING, BRACING AND UNDERPINNING

- .1 Maintain sides and slopes of excavations in safe condition by appropriate methods and in accordance with Health and Safety Requirements, and Health and Safety Act for the Province of Ontario.
- .2 Obtain permit from authority having jurisdiction for temporary diversion of water course.
- .3 Construct temporary Works to depths, heights and locations approved by PCA Representative.
- .4 During backfill operation:
 - .1 Unless otherwise indicated or directed by PCA Representative, remove sheeting and shoring from excavations.
 - .2 Do not remove bracing until backfilling has reached respective levels of such bracing.

- .3 Pull sheeting in increments that will ensure compacted backfill is maintained at elevation at least 500 mm above toe of sheeting.
- .5 When sheeting is required to remain in place, cut off tops at elevations as indicated.
- .6 Upon completion of substructure construction:
 - .1 Remove cofferdams, shoring and bracing.
 - .2 Remove excess materials from site and restore watercourses as indicated by PCA Representative.

3.7 DEWATERING AND HEAVE PREVENTION

- .1 It is anticipated that groundwater will be encountered during excavation at some, but not necessarily all for the proposed construction sites. Refer to borehole log attached to Tender Documents for water table depth data. Some dewatering may be required to control water entering the excavations because of precipitation and run-off. If encountered during construction, it is expected that surface water may be controlled by sump and pumping methods. It is the responsibility of the contractor to protect the bearing surface from being disturbed due to infiltration.
- .2 Keep excavations free of water while Work is in progress.
- .3 Provide for PCA Representative's review 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 01 35 43 - Environmental Procedures 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.
- .7 Provide flocculation tanks, settling basins, or other treatment facilities to remove suspended solids or other materials before discharging to storm sewers, watercourses or drainage areas.

3.8 EXCAVATION

- .1 Advise PCA Representative at least seven (7) days in advance of excavation operations for initial cross sections to be taken.
- .2 Excavate to lines, grades, elevations and dimensions as indicated by PCA Representative.
- .3 Remove concrete, masonry, paving, walks, demolished foundations and rubble, and other obstructions encountered during excavation.
- .4 Excavation must not interfere with bearing capacity of adjacent foundations.

- .5 Do not disturb soil within branch spread of trees or shrubs that are to remain.
 - .1 If excavating through roots, excavate by hand and cut roots with sharp axe or saw.
- .6 For trench excavation, unless otherwise authorized by PCA Representative in writing, do not excavate more than 30m of trench in advance of installation operations and do not leave open more than 15 m at end of day's operation.
- .7 Keep excavated and stockpiled materials safe distance away from edge of trench as directed by PCA Representative.
- .8 Restrict vehicle operations directly adjacent to open trenches.
- .9 Dispose of surplus and unsuitable excavated material in accordance as directed by PCA. If excavated material is to be removed from the PCA facility, disposed of excavated material in accordance with the Ontario Environmental Protection Act.
- .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 PCA Representative when bottom of excavation is reached.
- .13 Obtain PCA Representative 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 PCA Representative.
- .15 Correct unauthorized over-excavation as directed by PCA Representative, at no additional cost to PCA.
- .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.
 - .2 Clean out rock seams and fill with concrete mortar or grout to approval of PCA Representative.

3.9 FILL TYPES AND COMPACTION

- .1 In accordance with:
 - .1 Section 33 36 33 Utility Drainage Field.

3.10 BEDDING AND SURROUND OF UNDERGROUND SERVICES

- .1 In accordance with:
 - .1 Section 33 36 33 Utility Drainage Field.
- .2 Place bedding and surround material in unfrozen condition.

3.11 BACKFILLING

- .1 In accordance with:
 - .1 Section 33 36 33 Utility Drainage Field.

- .2 Vibratory compaction equipment: to be confirmed ten (10) working days in advance to PCA Representative.
- .3 Vibratory compaction equipment to be adequately sized to achieve minimum compaction requirements.
- .4 Do not proceed with backfilling operations until completion of following:
 - .1 PCA Representative has inspected and approved installations.
 - .2 PCA Representative 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.
- .5 Areas to be backfilled to be free from debris, snow, ice, water and frozen ground.
- .6 Do not use backfill material which is frozen or contains ice, snow or debris.
- .7 Place backfill material in uniform layers not exceeding 150 mm compacted thickness up to grades indicated. Compact each layer before placing succeeding layer.
- .8 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 0.30 m.
 - .4 Where temporary unbalanced earth pressures are liable to develop on walls or other structures:
 - .1 Permit concrete to cure for minimum 14 days or until it has sufficient strength to withstand earth and compaction pressure and approval obtained from PCA Representative:
 - .2 If approved by PCA Representative, erect bracing or shoring to counteract unbalance, and leave in place until removal is approved by PCA Representative.
- .9 Place unshrinkable fill in areas as indicated.
- .10 Consolidate and level unshrinkable fill with internal vibrators.
- .11 Install drainage & filter system in backfill as indicated by PCA Representative.

3.12 RESTORATION

- .1 Upon completion of Work, remove waste materials and debris, trim slopes, and correct defects as directed by PCA Representative.
- .2 Replace topsoil as indicated by PCA Representative.
- .3 Reinstate lawns to elevation which existed before excavation, or as per revised elevations, following installation of septic tanks and septic field.

- .4 Reinstall pavements and sidewalks disturbed by excavation to thickness, structure and elevation which existed before excavation.
- .5 Clean and reinstall areas affected by Work as directed by PCA Representative.
- .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

Part 1 General

1.1 SCOPE OF WORK

- .1 This Section of the Contract includes reconstruction of the existing granular access driveways identified on the drawings and specifications, following installation of new gravity sewer and/or electrical conduit and/or forcemain, together with all incidentals whether referred to or not, as will be required to complete the work to the full intent and meaning of the drawings and specifications. The work includes but is not limited to the following:
 - .1 Fine grading and compaction of sub-grade
 - .2 Supply, place and compact Granular 'B' base course
 - .3 Supply, place and compact Granular 'A' surface course

1.2 RELATED WORK SPECIFIED ELSEWHERE

- .1 Excavation, Backfilling and Compacting - Section 02200

1.3 CODES AND REFERENCE STANDARDS

- .1 All materials, equipment and methods shall conform to the specifications to the Ontario Ministry of Transportation and OPSS (Latest Revision).

1.4 PAYMENT

- .1 There is no separate payment for road surface reinstatement. Cost of supply, placement, and compaction of road structure is deemed to be part of the lump sum price for surface reinstatement, Contractor is to include in their lump sum price the complete, full Granular A and Granular B thicknesses as specified below, over the entire width of service trench, plus a 1.5 m wide transition on each side of the trench, to connect to existing road structure.
- .2 Payment of supply and placement of geotextile (non-woven) only where indicated or requested by the Engineer, following site observation, is to be on a square meter basis, as per the provisional item unit price in the Form of Tender.

Part 2 Products

2.1 GRANULAR BASE MATERIALS

- .1 Granular 'B' Base Course - Crushed or uncrushed bank or pit gravel or stone obtained from an approved source, conforming to requirements for Granular 'B' aggregate, Ontario Provincial Standard, Specification 1010.
- .2 Granular 'A' Surface Course - Crushed gravel or stone, obtained from an approved source conforming to requirements for Granular 'A' aggregate, Ontario Provincial Standard, Specification 1010.

2.2 GEOTEXTIEL MEMBRANE (PROVISIONAL)

- .1 Geotextile (non-woven): Thrace-LINQ 150 EX or equal. To be used under granular base only where indicated or requested by the Engineer, following site observation, where natural soil material at bottom of trench is too fine.

Part 3 Execution

3.1 SURFACE CONDITIONS

- .1 Check rough grading, re-grade, re-level and re-compact as required. Soft spots, wet holes, shall be dug out and filled with granular fill placed in not over 150 mm layers and compacted. Remove surplus material from the site.
- .2 Sub-grade shall be fully stabilized, compacted to 95% of Standard Proctor Density and leveled to a tolerance of not more than 12 mm measured on a 3-m straight edge.
- .3 In the event of discrepancy immediately notify the Engineer.
- .4 Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.2 PLACEMENT OF BASE COURSES

- .1 After sub-grade has been completed as described in Section 31 23 33.01 of these Specifications and has been approved by the Engineer, roll the surface to a smooth and uniform texture free from lumps, rock pockets, soft spots, and spongy areas.
- .2 Install geotextile under the granular base of roads to be improved, when requested by the Engineer (Provisional Item).
- .3 Spread granular base courses on the prepared sub-grade surface in layers not exceeding 200 mm loose thickness. Compact to a minimum of 100% of Standard Proctor Density. Ensure smooth finish.
- .4 Maintain access road until final acceptance/substantial performance.
- .5 Rebuild road structure applying surface course and base course thickness as follows: 150 mm of Granular A for surface layer, and 300 mm of Granular B for base layer. Would existing driveway structure differ from the above, Contractor is to set a transition from new structure to existing one, over a 1.0 m width on each side of the trench.

END OF SECTION

Part 1 General

1.1 SCOPE OF WORK

- .1 Materials and installation for 0.9 or 1.2 m high page wire (farm) fence, including one gate, to be supplied and installed at shown on drawings.

1.2 MEASUREMENT PROCEDURES

- .1 Measurement will be based on liner meters of fence erected, i.e. supplied and installed, including all site works, posts, wiring fencing, accessories. There is no separate payment for posts and corner posts.
- .2 There is no separate payment for demolition / removal of existing fence, as such cost is borne to be part of lump sum price for site works for a given site in the Form of Tender.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit shop drawings and product data sheets in PDF format, that can be modified / commented by a PDF writer software by the Engineer. Following review of final version of the product data / shop drawings, the Contractor is to print two (2) copies and keep those in a binder: one for their site foreman, and one to be available for review by the Client and the Consultant.

Part 2 Products

2.1 PAGE WIRE FENCING

- .1 For cattle and horses, use fencing 1200 mm high; for sheep and pigs only, use fencing 900 mm high. For cattle and horses, use 2400 mm total posts length, and for sheep and swine, use 2100 mm total post length.
 - .1 Farm field type: to CSA G42, standard 748, suitable for up to 1.2 m high fence
 - .2 Barbed wire: at top of fence, to ASTM A121. Galvanized steel wire size: 2 mm diameter. Barbs: 4 point at 125 mm spacing.
- .2 Anchor, corner and stretch posts must be wood (preferably cedar), sound, seasoned wood, peeled, with ends cut square, but line posts may be wood or steel. Use 125 mm top diameter posts and 150 mm top diameter for corner and brace posts.
- .3 Wood posts pressure-treated with chromated copper arsenate (CCA) according to CAN/CSA-O80 SERIES-15 - Wood preservation, dated 2015.
- .4 Brace rail shall be minimum 100 mm diameter. Use 4 mm (No. 9) brace wire, twist at two locations to tighten.
- .5 Do not tighten the fence staples or wire ties.
- .6 Paint portion of posts above ground with CAN/CGSB 1.28 [98], Alkyd, Exterior House Paint. Confirm choice of color with Client prior to order paint.

- .7 Touch up wiring and ties with CAN/CGSB 1.181 [99], Ready Mixed Organic Zinc Rich Coating.

Part 3 Execution

3.1 GRADING

- .1 Remove debris and correct ground undulations along fence line to obtain smooth uniform gradient between posts.
- .2 Provide clearance between bottom of fence and ground surface of no more than 150 mm.

3.2 ERECTION OF FENCE

- .1 Erect fence as per alignment shown on drawing, and as directed by the Client and the Engineer.
- .2 Space corner, end and gate posts 3 m from adjacent post, measured parallel to ground surface.
- .3 Space line (intermediate) posts 5 m apart, measured parallel to ground surface.
- .4 Locate and erect gate posts on both sides of gate opening, at location identified by Engineer (front property limit).
- .5 Install additional straining posts at sharp changes in grade and where directed by Engineer.
- .6 Fencing with wood posts:
 - .1 Excavate post holes as per fence material supplier recommendations, by methods approved by Engineer.
 - .2 Slant of post tops to be perpendicular to fence line and facing outward.
 - .3 Install cleats for anchoring at corner, gate, end and anchor posts.
 - .4 Backfill around posts and compact to same density as surrounding ground. Dispose of surplus excavation material as directed by Engineer.
 - .5 Install braces at end, corner and gate posts. Join braces into posts and spike securely.
 - .6 Erect wires and stretch to have uniform tension. Splice wires with standard wire splices.
 - .7 Attach top wires to posts with minimum two staples. Fasten other wires to posts and cross braces with at least one staple. Staple wires securely at end, anchor and gate posts.
 - .8 Stretch two strands of barbed wire along tops of posts and double staple on posts.
 - .9 Painting of posts:
 - .1 Apply two coats of paint. Allow initial coat to dry before applying second coat.
 - .2 Apply paint only when relative humidity is below 85% and ambient temperature is greater than 5°C.

3.3 INSTALLATION OF GATES

- .1 Install gates at location identified by Engineer.
- .2 Level ground between gate posts and set gate bottom approximately 100 mm above ground surface.
- .3 Locate anchor pipe for drop bolt, and install pipe flush with surface.

3.4 TOUCH UP

- .1 Clean damaged surfaces with wire brush removing loose and cracked coatings. Apply two coats of same paint to damaged areas.

3.5 CLEANING

- .1 Clean and trim areas disturbed by operations.
 - .1 Dispose of surplus material and replace damaged turf with as directed by Engineer.

END OF SECTION

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Part 1 General

1.1 RELATED REQUIREMENTS

- .1 Section 33 36 00 – Septic Tank

1.2 MEASUREMENT PROCEDURES

- .1 Measurement will be based on units of pumping station supplied and installed, including stripping, excavating, bedding and backfilling, mechanical works, and supply of associated electrical equipment.
- .2 Simplex pumping stations downstream a conventional septic tank is paid as a pumping station, including concrete tank works described under Section 33 36 00, plus mechanical works under this Section
 - .1 Pumping systems being part of a Level IV treatment system for mixing, plus effluent recirculation and/or transfer purpose, are deemed to be part of the Level IV treatment system package, and are not to be paid under this Section. Instead, payment is to be part of works under Section 32 32 14.
- .3 Electrical works associated to any simplex pumping systems, including installation of pump wiring, floats, and control panel, plus supply and installation of additional conduits, supplementary wiring, connections, junction boxes, disconnect switch, are deemed to be part of electrical work subcontractor scope of work, and are not to be measured separately. General contractor is still responsible for coordination between trades (civil, mechanical, and electrical).

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit shop drawings and product data sheets in PDF format, that can be modified / commented by a PDF writer software by the Engineer. Following review of final version of the product data / shop drawings, the Contractor is to print two (2) copies and keep those in a binder: one for their site foreman, and one to be available for review by PCA and the Consultant.
- .2 General info: some material / equipment is to be the same at more than one site, and possibly all sites.
- .3 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for sewage lift and include product characteristics, performance criteria, physical size, finish, and limitations. Contractor is to identify on front page / transmittal letter the model and options selected, specific for a given site.
- .4 Shop Drawings:
 - .1 When applicable, submit shop drawings stamped and signed by professional engineer registered or licensed in Province of Ontario.

1.4 QUALITY ASSURANCE

- .1 Installer of pumping system mechanical equipment shall be a certified plumber or mechanical subcontractor specialized in sewage equipment installation.

1.5 CLOSEOUT SUBMITTALS

- .1 Submit in accordance with Section 01 78 00 - Closeout Submittals.
- .2 Operation and Maintenance Data: submit operation and maintenance data for sewage lift station for incorporation into manual.
- .3 Include information as follows:
 - .1 Record drawings, wiring diagrams, electrical schematics of equipment as installed.
 - .2 Interconnections with numbers and wire sizes.
 - .3 Certified pump characteristic curves.
 - .4 Detailed operation and maintenance instructions.
 - .5 Parts list comprising complete schedule clearly identified to facilitate re-ordering.

1.6 DELIVERY, STORAGE, AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements with manufacturer's written instructions.
- .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 off ground, indoors, in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect packaged sewer lift from nicks, scratches, and blemishes.
 - .3 Replace defective or damaged materials with new.

Part 2 Products

2.1 DESCRIPTION

- .1 Reinforced concrete wet well.
 - .1 Simplex pumping station wet well, separated from septic tank, to consist of a precast concrete tank with one access chimney above the pump.
 - .2 Supply separately and install vents complete with screen.
- .2 Pumping equipment:
 - .1 Pump and Control Float Tree: factory assembled and disassembled for shipment with mating components clearly identified.

- .2 Principal items of equipment at each simplex pumping system to include one submersible sewage pump, station internal piping and valves, float tree assembly, pump lifting assembly, electrical wiring long enough to reach the splitter box, a splitter box at top of access chimney
- .3 At each installation, a pump control panel c/w alarm annunciation capacity, with circuit breakers and motor starters for each of the simplex pumping systems serviced by that panel.
- .3 Equipment and installation including the following:
 - .1 Excavation for sewage lift station.
 - .2 Connection of power to control panel as indicated.
 - .3 Connections to sanitary sewers and force main.
 - .4 Connection to vent pipe
 - .5 Supply and installation of sewage lift station equipment in accordance with manufacturer's recommendations.
- .4 Wet well sewage lift station:
 - .1 Fully automatic, consisting of submersible pump mounted on rail system. Ensure control is by liquid level float.
 - .2 Fully automatic alarm system, consisting of liquid level float at wet well, and alarm panel inside the building.

2.2 PUMPING STATION WET WELL STRUCTURE

- .1 Refer to Section 33 36 00 – Septic Tank requirements, as modified hereafter.
- .2 Wet well chamber to include the following:
 - .1 Precast concrete tank, having a working capacity of 675 L , one 100 mm diameter PVC inlet with Polyseal, one 50 mm diameter PVC outlet with Polyseal at pump forcemain, one 75 mm (3") vent pipe inlet, one 610 mm (24") opening, by Newmarket Precast, Uxbridge, ON, Tel: 1-800-263-1297, email: info@newmarketprecast.com, or approved equal. Model at each site as per Chart in Part 4.
 - .2 75 mm (3") diameter vent pipe extension as shown on contract drawings, c/w insect screen, consisting of PVC DR35 piping and fitting c/w rubber gaskets up to 0.30 m below ground surface, and welded aluminum construction for upper portion, c/w insect screen.
 - .3 One 610 mm (24") diameter chimney extension section, with rubber gasket Tuf-Tite Riser System, or approved equal.
 - .4 One 610 mm (24") diameter plastic construction watertight safety lid, attached to riser section with six (6) stainless steel screws set vertically, by Tuf-Tite Inc. or approved equal
 - .5 Would openings not being precast at the tank plant, Contractor is to core drill opening, to install conduits and seal openings, for the following conduits:
 - .1 One 100 mm (4") PVC inlet pipe with seal or approved equal.
 - .2 One 75 mm (3") PVC forcemain outlet pipe with seal or approved equal.

- .3 One 100 mm (4") PVC vent pipe with seal or approved equal.
- .4 Opening sealing system to consists of Link-Seal joints c/w stainless steel bolts, mortar applied at the gap between conduit and concrete wall on the tank inside and outside wall, U-clamp and 12 mm diameter stainless steel rods anchored into tank concrete wall or top slab as applicable to restrain conduit movement.
- .6 At designated locations only, experiencing high water table conditions, Contractor is to supply and install an anti-flotation device at pumping wet well, as described in Section 33 36 00.

2.3 SUBMERSIBLE PUMPS

- .1 Submersible, single stage, bottom suction, non-clog, heavy duty, totally submersible centrifugal pump, direct connected to motor by solid stainless-steel shaft and fitted with thrust bearings.
- .2 Characteristics:
 - .1 Capacity: 8.2 L/ at 1.5 m (130 USGPM @ 5 ft.)
 - .2 Shut off head: 13.7 m (45 ft.)
 - .3 Maximum speed: 3450 rpm.
 - .4 50 mm (2" NPT) discharge
 - .5 1/2 HP, 115v/1ph/60Hz (15 Amp full load amperage), CSA rated, cast iron pump and motor housing, with automatic reset
 - .6 Power cord" 6 m (20') long oil & water resistant 16-3 SJTW-A/SJTW, sealed at motor housing, with integrally grounded: electrical sub-contractor is to connect power cord inside the splitter box mounted at top of access chimney, flush with ground level. Surplus power cord length to be rolled, attached and left at top of access chimney.
 - .7 No need for control float mounted on pump, as control floats and control panel are provided separately.
 - .8 CSA 108, UL 778
 - .9 Volute casing: cast iron, minimum grade Class 30, close coupled.
 - .10 Motor shaft: 416 stainless steel
 - .11 Impeller: cast iron solids handling non-clog impeller
 - .12 Capable of passing 19 mm (3/4") solid sphere.
 - .13 Double ball bearing and mechanical carbon/ceramic seal
 - .14 Casing with epoxy coating
- .3 Submersible pumps to be Little Giant, WS Effluent Series, 1/2 HP 115 VAC, model WSV50HM by Franklin Electric, P.O. Box 12010, Oklahoma City, OK 73157-2010, USA, Tel 1-800-701-7894. No other model to be accepted.

.4 Warranty:

- .1 At time of ordering material, Contractor and their subcontractor are to advise the pump supplier / manufacturer that the end client of this project is Parks Canada Agency, and that any remaining portion of their limited warranty is to be transferred to the Agency, upon expiration of the Contractor project warranty period.
- .2 Pump manufacturer provides a 24-month limited warranty on their material.
- .3 It is the responsibility of the Contractor to verify date of fabrication by manufacturer and/or purchase of the pump by their mechanical subcontractor, as this would affect start date of above-mentioned limited warranty.
- .4 The above does not relieve Contractor from his contractual obligation to provide a 12-month warranty on all labor and material under this contract, starting at date of substantial completion of the contract.
- .5 Prior to the expiration of the 12-month contract warranty period, Contractor is to transmit all pertinent documentation to the Client, to transfer the balance of the 24-month limited warranty period to the Client.

2.4 PUMP LIFTING SYSTEM

- .1 Polypropylene rope for pump, accessible from the underside of the access cover.
- .2 Never use the pump power cord to lift pump.

2.5 SIMPLEX PUMP CONTROL PANEL

- .1 Simplex Pump Control Panel is to be supplied by panel manufacturer official supplier / distributor for Ontario. Panel fabricated by any other jurisdiction will NOT be accepted. All panels are to be of same manufacturer and be supplied by a single supplier.
- .2 Simplex Control Panel
 - .1 All components to be UL listed, with safety certification for Canada.
 - .2 Enclosure base measures 25.4 cm X 20.32 cm X 15.24 cm (10" X 8" X 6"). NEMA 4X ultraviolet stabilized thermoplastic with removable mounting feet for outdoor or indoor use, including locking latch.
 - .3 Operation to be demand based, i.e. to be controlled by floats. Contractor to adjust float elevations on site, to set pumped volume per cycle as per Engineer's instructions.
 - .4 Panel to be complete with required power components including but not limited to:
 - .1 Enclosure base measures 25.4 cm X 20.32 cm X 15.24 cm (10" X 8" X 6"). NEMA 4X ultraviolet stabilized thermoplastic with removable mounting feet for outdoor or indoor use, including locking.
 - .2 Red Alarm Beacon provides visual check of alarm condition.
 - .3 Exterior Alarm Test/Silence Switch allows horn and light to be tested and horn to be silenced in an alarm condition. Alarm automatically resets once alarm condition is cleared.

- .4 15 Amp Circuit Breaker provides pump power disconnect and branch circuit protection, plus control/alarm power disconnect.
- .5 Power Relay controls pump by switching electrical lines.
- .6 Float Connection Terminal Block
- .7 Incoming Control/Alarm Power & Pump Power Terminal Block
- .8 Control Power Indicator light illuminates if control power is present in panel.
- .9 Alarm Power Indicator light illuminates if alarm power is present in panel.
- .10 Pump Run Indicator will illuminate when pump is called to run.
- .11 LED Display shows system information including: pump elapsed time (hh:mm), events (cycles).
- .12 Menu/Enter Button used for viewing panel settings.
- .13 Set/Change Button used for programming panel settings.
- .14 Pump 1 Push To Run Momentary Switch - Pump activates when pressed
- .15 Alarm Horn located inside panel on cover to provide audio warning of alarm condition.
- .16 Starter to be 120 VAC, rated for 7 to 15 FLA.
- .17 Demand dose operation
- .18 Panel to be model EZS21W124H3A6A8AC10E15A33D, as fabricated by SJE Rhombus, P.O. Box 1708, Detroit Lakes, MN 56502, tel: 1-888-DIAL-SJE • 1-218-847-1317, as distributed by EMCO Corp. or approved authorized distributor. No other panel model to be accepted.
- .19 For reference, local EMCO representative is Powell Plumbing Supply, 460 Elgin Mills Road Units 6-9, Richmond Hill ON, L4C 5E7, Tel: 905-883-1616, Fax: 905-883-1837, Cell: 289-775-4291, email: mtasca@emcoltd.com
- .5 Schematic/wiring diagram and pump specification label: mounted inside panel door.
- .6 Power wire: as per manufacturer's recommendations.
- .3 Wire:
 - .1 Numbered with printed permanent indelible identifying plastic tapes to correspond to schematic diagram.
 - .2 Terminated for external control connections by screw type terminal blocks with barriers and labels as required.
 - .3 Equipped with grommets, strain reliefs and shields for mechanical protection.
 - .4 Adequately supported and installed to approval of engineer consultant.

.4 **Warranty:**

- .1 At time of ordering material, Contractor and their subcontractor are to advise the panel and float supplier / manufacturer that the end client of this project is Parks Canada Agency, and that any remaining portion of their limited warranty is to be transferred to the Agency, upon expiration of the Contractor project warranty period.
- .2 Panel manufacturer provides a 5-year limited warranty on their material.
- .3 It is the responsibility of the Contractor to verify date of fabrication by manufacturer and/or purchase of the panel by their subcontractor, as this would affect start date of above-mentioned limited warranty.
- .4 The above does not relieve Contractor from his contractual obligation to provide a 12-month warranty on all labor and material under this contract, starting at date of substantial completion of the contract.
- .5 Prior to the expiration of the 12-month contract warranty period, Contractor is to transmit all pertinent documentation to the Client, to transfer the balance of the 5-year limited warranty period to the Client.

2.6 CONTROL FLOATS

- .1 Control floats: EZconnex® 3-port, 7.6 m (25 ft) cable length, w 10' floats and pipe clamp: provide 3 floats for demand based operation (stop pump float, start pump float, alarm float), at elevations specified under Part 4 below.
- .2 Floats to be mounted on a single float tree, consisting of a 50 mm (2") diameter PVC tube, secured to access chimney, set with a union disconnect fitting to allow removal from ground surface. Floats to be secured to float tree with pipe clamp system made of non-corrosive material.
- .3 Set float cables to allow removal of float tree off tank, while float cables are still connected to the access chimney splice box (refer to Section 33 35 00 - Precast Concrete Tanks, Item 2.1.8.5). Neatly coil excess cable, attach it with Velcro strap (supplied by Contractor) and hang in the upper portion of access chimney.
- .4 Set plastic tap on each float as per following color coding:
 - .1 Top float (alarm): Yellow
 - .2 Second float (start pump): Green
 - .3 Lowest float (stop pump): Blue
- .5 Additional control float wiring and conduit from access chimney splice box to junction box by Division 26.

2.7 PIPING AND VALVES

- .1 Internal discharge piping to be 50 mm (2") diameter PVC SCH80 piping with glued joints, and ANSI flanges where appropriate, as shown on drawings. Supply and install a 50 mm (2") diameter union disconnect fitting.

- .2 Provide union fitting and polypropylene cord, terminating below the access chimney cover, to allow remove and reinstallation of pump from ground level, without having to enter the wet well.
- .3 Piping and valve supports to be secured to tank walls with 12 mm diameter HILTI stainless steel anchoring bolts. Provide neoprene gaskets at point of contact.
- .4 Contractor to drill 4.7 mm (3/16") diameter hole at discharge elbow, to allow drainage of forcemain by gravity into the tank.

2.8 ELECTRICAL POWER AND CONTROLS WIRING AND CONDUITS BY SEWAGE SYSTEM SUBCONTRACTOR

- .1 Use only CSA approved components.
- .2 Electrical equipment in pumping station and up to intrinsically safe junction box and disconnect switches to be in accordance with requirements for Hazardous Locations, Class 1, Group D, Division 2.
- .3 Supply and install conduits below ground and above ground, up to intrinsically safe junction box and disconnects. Conduits are to conform to Division 26 specifications. Conduits are to be connected to the precast concrete tank. Connection of conduits to any of the plastic chimneys, or the tank vent pipe, is not acceptable.
- .4 Supply and install all pump control cables into conduits up to intrinsically safe junction box, then up to pump control panel. Conduits from the pump control panel to the house breaker panel is by Div. 26.
- .5 At the pump control panel, connect power wiring, pump wiring and control wiring.
- .6 Schematic wiring diagram: mounted inside pump control panel door, varnish protected. See Division 26 specifications for additional labelling requirements.
- .7 Conductors: refer to specification section 26 05 00 – Common Work Results for Electrical.
- .8 Supply and install one post and concrete base nearby pumping station, to allow installation of control panel and accessories.
- .9 Wires:
 - .1 Numbered with printed permanent indelible identifying plastic tapes to correspond to schematic diagram.
 - .2 Terminated for external control connections by tubular screw type terminal blocks with barrier and labels.
 - .3 Equipped with grommet and shields for mechanical protection.
 - .4 Adequately supported and installed in accordance with written approval of Consultant.
 - .5 Refer to specification section 26 05 00 – Common Work Results for Electrical for additional installation information.
 - .6 Coordinate wiring numbering system with Division 26 Subcontractor.

2.9 ADDITIONAL ELECTRICAL POWER AND CONTROLS WIRING AND CONDUITS BY DIVISION 26

- .1 Use only CSA approved components.
- .2 Division 26 refers to work to be completed by electrician hired by the General Contractor. Refer to specifications on Drawing E00. Refer to site specific electrical works on E series drawings.
- .3 Supply and install one (1) weather proof disconnect switch and grounding wiring at control panel
- .4 Supply and install pump power wiring and conduits from splice box at top of access chimney up to pump control panel, as shown on electrical drawings. Division 26 to connect wiring at disconnect boxes only.
- .5 Supply and install power wiring and conduits from disconnect boxes on post up to house breaker panel inside building, as shown on electrical drawings. Type of breaker panel is indicated on electrical drawings, for each site as per one of the following condition:
 - .1 Supply, install and wire new breakers at existing residence breaker panel, as shown on drawings, and as per Division 26.
 - .2 Supply, install and wire new pony panel c/w new breakers and connection to existing house power supply facilities, as shown on drawings, and as per Division 26.
 - .3 Replace existing house breakers panels or fuse panels by a single, larger capacity breaker panel, c/w breakers and full breaker description, as shown on drawings and as per Division 26.
- .6 Although the sewage subcontractor is responsible for supply and final wiring connection of the simplex pump control panel, Division 26 is responsible for conduit and wiring installation up to that panel.
- .7 After all pump and cable tests have been successfully completed and accepted, Division 26 electrician is to seal the EYS fittings between the intrinsically safe junction box and the disconnect boxes.

2.10 SOURCE QUALITY CONTROL

- .1 Provide certification that the pump and controls have been factory tested and deficiencies rectified prior to delivery to site.
- .2 Perform operational tests on pumps at factory to check for excessive vibration, for leaks in piping or seals and for correct operation of automatic control system and auxiliary equipment. Pump suction and discharge lines to be coupled to reservoir and pumps to recirculate water for minimum of ten minutes under simulated service conditions.

Part 3 Execution

3.1 EXAMINATION

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for septic tank installation in accordance with manufacturer's written instructions.
 - .1 Visually inspect substrate in presence of Client Representative.
 - .2 Inform Client Representative 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 Client Representative.

3.2 INSTALLATION

- .1 Install and test precast concrete tank as per Section 33 36 00 requirements.
- .2 Install pump equipment, piping, and floats in accordance with manufacturers' recommendations
- .3 Secure piping and valves to concrete tank wall using 12 mm diameter anchor bolts, and galvanized steel U-Clamps.

3.3 FIELD QUALITY CONTROL

- .1 After completion of installation, demonstrate functional operation of systems, including sequence of operation, to approval of Client Representative.
- .2 Test in presence of Client Representative and representative from equipment supplier.
- .3 Provide labour and ancillary equipment necessary to fulfill tests.
- .4 Fill in the pumping station wet well with clean water (could be either water taken from a municipal water distribution system delivered by truck at Contractor's cost, or clear underground water, or water from house only upon approval from the Client and the Tenant). No domestic sewage water, grey water or storm runoff water loaded with sediments is to be used for the pump test. Fill in the wet well tank 24 hours in advance. Not more than 25 mm of water shall be absorbed by tank wall by the time the test would be completed.
- .5 Test to demonstrate that:
 - .1 Wet well is not leaking
 - .2 Pump and equipment run free from heating, or vibration.
 - .3 Water level drop in one minute is within acceptable limits (to be specified by Consultant, as it varies from site to site)
 - .4 Operation meets requirements of these specifications.
 - .5 Pump and associated piping and accessories are free and clear of debris and obstructions.
 - .6 Alarm float and annunciation panel operates to the satisfaction of Client Representative

- .6 Locate and repair leaks. Replace equipment found defective.
 - .1 Repeat test until equipment is accepted by Client Representative
- .7 After all pump and cable tests have been successfully completed and accepted, Division 26 electrician is to seal the EYS fittings between the intrinsically safe junction box and the disconnect boxes.

3.4 DEMONSTRATION

- .1 Operating Personnel Training
 - .1 Provide on-site training by qualified personnel for designated operating personnel prior to final commissioning.
 - .1 Schedule and deliver training in accordance with training plan approved in writing by Client Representative
 - .2 Include training for two (2) designated personnel on routine maintenance procedures, minor repairs, replacement of parts, including disassembly of major components.
 - .3 Include safety precaution procedures for systems.
 - .4 Training to be provided at time of first pump installation completed, and possibly a second one would second designated personnel not be available at first time. There is no need to repeat training for the other installations.

3.5 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
 - .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 Section 01 74 11 - Cleaning.

3.6 VENT PIPE

- .1 Coordinate vent pipe installation with other trades. Vent pipe to be set upward, toward the building foundation.

Part 4 Site Requirements

4.1 CONTROL FLOAT ELEVATIONS

- .1 Table on next page provides control float elevations, as measured from the bottom of the pumping wet well, for the purpose of delivering constant dosing volume to the absorption field at each pump cycle.

CONTROL FLOAT ELEVATION TABLE (from bottom of the tank)

Address	Stop Pump Float Elevation (m)	Start Pump Float Elevation (m)	Alarm Float Elevation (m)
7630 Major Mackenzie Drive, Markham	0.30	0.59	0.69
7528 Elgin Mills Road, Markham	0.30	0.54	0.64
7558 Elgin Mills Road, Markham	0.30	0.56	0.66
6445 19 th Avenue, Markham	0.30	0.55	0.65

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 Section 33 36 00 – Septic Tank
- .2 Section 32 32 13.13 – Sewage Lift, Wet Well Type

1.2 MEASUREMENT PROCEDURES

- .1 Measurement will be based on units of Level IV treatment systems supplied and installed, including stripping, excavating, bedding and backfilling, specialized precast concrete tanks, interconnecting piping between and inside tanks, specialized materials/filtering media/equipment, mechanical works (two or three pumps and accessories, as specified, plus any process related transfer piping and diffusers), plus supply of associated electrical equipment (pump control panel c/w alarm functionality, control floats and accessories).
- .2 Electrical works associated to any simplex pumping system integrated to the Level IV treatment system, including installation of pump wiring, floats, and control panel, plus supply and installation of additional conduits, supplementary wiring, connections, junction boxes, disconnect switch, are deemed to be part of electrical work subcontractor scope of work, and are not to be measured separately. General contractor is still responsible for coordination between trades (civil, mechanical, and electrical).

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit shop drawings and product data sheets in PDF format, that can be modified / commented by a PDF writer software by the Engineer. Following review of final version of the product data / shop drawings, the Contractor is to print two (2) copies and keep those in a binder: one for their site foreman, and one to be available for review by the Client and the Consultant.
- .2 General info: some material / equipment is to be the same at more than one site, and possibly all sites.
- .3 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for sewage lift and include product characteristics, performance criteria, physical size, finish, and limitations. Contractor is to identify on front page / transmittal letter the model and options selected, specific for a given site.
- .4 Shop Drawings:
 - .1 When applicable, submit shop drawings stamped and signed by professional engineer registered or licensed in Province of Ontario.

1.4 QUALITY ASSURANCE

- .1 Installer of pumping system mechanical equipment shall be a certified plumber or mechanical subcontractor specialized in sewage equipment installation.

1.5 CLOSEOUT SUBMITTALS

- .1 Submit in accordance with Section 01 78 00 - Closeout Submittals.
- .2 Operation and Maintenance Data: submit operation and maintenance data for sewage lift station for incorporation into manual.
- .3 Include information as follows:
 - .1 Record drawings, wiring diagrams, electrical schematics of equipment as installed.
 - .2 Interconnections with numbers and wire sizes.
 - .3 Certified pump characteristic curves.
 - .4 Detailed operation and maintenance instructions.
 - .5 Parts list comprising complete schedule clearly identified to facilitate re-ordering.

1.6 DELIVERY, STORAGE, AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements with manufacturer's written instructions.
- .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 off ground, indoors, in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect packaged sewer lift from nicks, scratches, and blemishes.
 - .3 Replace defective or damaged materials with new.

Part 2 Products

2.1 DESCRIPTION

- .1 Reinforced concrete tanks.
 - .1 Specialized Level IV tanks, including tanks of capacities as recommended by specialized manufacturer to develop the sewage flow rated capacity, to consist of two precast concrete tanks:
 - .1 Upstream tank to be Anaerobic Digester with Internal Pump Chamber (ADIPC), including one 6" Polylok Riser and one Internal Pump Chamber cast-in, one 12" Polylok Riser Separate, two Insulated Polylok Covers, plus Appropriate Sized InnerTube connected to the inet. InnerTube is pre-connected for all single piece tanks. Contractor is to install InnerTube in clam shell tanks.
 - .2 Basket Biofilter Tank (BT), including three 6" Polylok Riser Cast-in, two 12" Polylok Risers Separate with 2" Manifold Through, two Insulated Vented Covers and one Standard Insulated Cover.

- .2 Access risers are set above each of the pumps (two or three, as specified elsewhere).
- .3 Such tanks are provided in lieu of a conventional septic tank, and shall have internal divisions, settings and rated capacities as per specialized manufacturer's recommendations.
- .4 Tanks to be fabricated to specialized manufacturer's requirement by Newmarket Precast, 20 Victoria Street North, P.O. Box 1179, Uxbridge, Ontario L9P 1N4, tel: 1-800-263-1297, email: info@newmarketprecast.com, or approved equal.
Tank models to be as per following chart:

Rated Capacity	Waterloo Biofilter	Newmarket Precast Tank Models	
		Upstream Tank	Downstream Tank
1,600 L/d	AD-BA16	ADIPC-4500	BT-4500
2,100 L/d	AD-BA25	ADIPC-6800	BT-5900
2,700 L/d	AD-BA30	ADIPC-9000	BT-5900
4,300 L/d	AD-BA45	ADIPC-13500	BT-9000

- .2 Pumping equipment:
 - .1 Pump and Control Float Tree: factory assembled and disassembled for shipment with mating components clearly identified.
 - .2 Principal items of equipment at each pumping system to include one submersible effluent pump, station internal piping and valves, float tree assembly, pump lifting assembly, electrical wiring long enough to reach the external electrical splice box, an external electrical splice box at the top of each riser with that has electrical components underneath.. At each Level IV treatment system, a pump control panel c/w alarm annunciation capacity, with circuit breakers and motor starters for each of the simplex pumping systems serviced by that panel.
- .3 Equipment and installation including the following:
 - .1 Excavation for both concrete tanks
 - .2 Connection of power to control panel as indicated.
 - .3 Connections to sanitary sewers and force main.
 - .4 Connection to vent pipe
 - .5 Supply and installation of specialized equipment in accordance with manufacturer's recommendations.

2.2 TREATMENT TANKS

- .1 Refer to Section 33 36 00 – Septic Tank requirements, as modified hereafter.
- .2 First tank (digester) to include the following:
 - .1 Precast concrete tank, model at each site as per Chart in Part 4. There is no intermediate wall (normally set at 2/3 of tank length) in tank.
 - .2 Two 610 mm (24") diameter riser extension sections, with rubber gasket PolylokRiser System, or approved equal.

- .3 Two 610 mm (24") diameter plastic construction watertight safety lid, attached to riser section with six (6) stainless steel screws set vertically, by Polylok or approved equal
- .4 One splice box, at chimney designated by Level IV Treatment manufacturer, conforming to Section 33 36 00, Item 2.1.8.5.
- .3 Second tank (biofilter) to include the following:
 - .1 Precast concrete tank, model at each site as per Chart in Part 4. There is no intermediate wall (normally set at 2/3 of tank length) in tank.
 - .2 Three 610 mm (24") diameter riser extension sections, with rubber gasket PolylokRiser System, or approved equal.
 - .3 Three 610 mm (24") diameter plastic construction watertight safety lid, attached to riser section with six (6) stainless steel screws set vertically, by Polylok or approved equal
 - .4 One or two splice box,es at chimney designated by Level IV Treatment manufacturer, conforming to Section 33 36 00, Item 2.1.8.5; use one splice box for biofilter tank with only one pump, and two for biofilter tank with two pumps.

2.3 INSULATION

- .1 Rigid insulation above forcemain at location indicated on drawings, to be extruded polystyrene, having a R value of $10 \text{ ft}^2 \cdot \text{h} \cdot ^\circ\text{F}/\text{Btu}$ / $1.76 \text{ m}^2 \text{ } ^\circ\text{C}/\text{W}$, and a minimum compressive strength of 40 PSI / 275 MPA at 10% deformation, to be Styrofoam™ Highload 40 Insulation, or approved equal.

2.4 SPECIALIZED TREATMENT MATERIAL

- .1 All specialized equipment, and other generic equipment and materials as identified by manufacturer, are to be supplied by Waterloo Biofilter, 143 Dennis Street, PO Box 400, Rockwood ON N0B 2K0 Tel: 519-856-0757 Fax: 519-856-0759 www.waterloo-biofilter.com
- .2 Waterloo Biofilter Media c/w Wire Mesh Basket, to the following dimensions and daily sewage flow rated capacities:

Rated Capacity	Model	Wire Mech Basket Dimensions
1,600 L/d	AD-BA16	42" (Ø) x 54" (H)
2,100 L/d	AD-BA25	58.5" (Ø) x 48" (H)
2,700 L/d	AD-BA30	58.5" (Ø) x 52.5" (H)
4,300 L/d	AD-BA45	70.5" (Ø) x 54" (H)

2.5 SUBMERSIBLE PUMPS

- .1 Submersible, single stage, bottom suction, non-clog, heavy duty, totally submersible centrifugal pump, direct connected to motor by solid stainless-steel shaft and fitted with thrust bearings.

- .2 Number of pumps for each type of system:
 - .1 Two-pump systems to include a dosing pump at first tank with a two-float tree, and a dual-purpose recirculation/effluent transfer pump at second tank with a two-float tree;
 - .2 Three-pump systems to include a dosing pump at first tank with a two-float tree, and a recirculation pump effluent transfer pump at second tank with a three-float tree.
- .3 Characteristics:
 - .1 Capacity: 8.2 L/ at 1.5 m (130 USGPM @ 5 ft.)
 - .2 Shut off head: 13.7 m (45 ft.)
 - .3 Maximum speed: 3450 rpm.
 - .4 50 mm (2" NPT) discharge
 - .5 1/2 HP, CSA rated, cast iron pump and motor housing, with automatic reset, 115v/1ph/60Hz, 15 Amp full load amperage
 - .6 Power cord" 6 m (20') long oil & water resistant 16-3 SJTW-A/SJTW, sealed at motor housing, with integrally grounded: electrical sub-contractor is to connect power cord inside the splitter box mounted at top of access chimney, flush with ground level. Surplus power cord length to be rolled, attached with tie-rop, and left at top of access chimney.
 - .7 CSA 108, UL 778
 - .8 Volute casing: cast iron, minimum grade Class 30, close coupled.
 - .9 Motor shaft: 416 stainless steel
 - .10 Impeller: cast iron solids handling non-clog impeller
 - .11 Capable of passing 19 mm (3/4") solid sphere.
 - .12 Double ball bearing and mechanical carbon/ceramic seal
- .4 Submersible pumps to be Little Giant, WS Effluent Series, 1/2 HP 115 VAC model WSV50HM by Franklin Electric, P.O. Box 12010, Oklahoma City, OK 73157-2010, USA, tel: 1-800-701-7894. Pumps and accessories are to be provided by Level IV treatment supplier, to guarantee full compatibility with their process. No other model to be accepted, unless the Level IV treatment system manufacturer and PCA approves it.
- .5 Warranty:
 - .1 At time of ordering material, Contractor and their subcontractor are to advise the pump supplier / manufacturer that the end client of this project is Parks Canada Agency, and that any remaining portion of their limited warranty is to be transferred to the Agency, upon expiration of the Contractor project warranty period.
 - .2 Pump manufacturer provides a 24-month limited warranty on their material.
 - .3 Level IV treatment system manufacturer 5-year pump extended warranty is part of this contract.

- .4 It is the responsibility of the Contractor to verify date of fabrication by manufacturer and/or purchase of the pump by their mechanical subcontractor, as this would affect start date of above-mentioned limited warranty, and extended warranty.
- .5 The above does not relieve Contractor from his contractual obligation to provide a 12-month warranty on all labor and material under this contract, starting at date of substantial completion of the contract.
- .6 Prior to the expiration of the 12-month contract warranty period, Contractor is to transmit all pertinent documentation to the Client, to transfer the balance of the 24-month limited warranty period and the 5-year extended warranty period to the Client.

2.6 PUMP LIFTING SYSTEM

- .1 Polypropylene rope for pump, accessible from the underside of the access cover.
- .2 Never use the pump power cord to lift pump.

2.7 PUMP CONTROL PANEL

- .1 Pump Control Panel is to be supplied by specialized Level IV treatment system manufacturer / authorized supplier. Panel fabricated by any other firm will NOT be accepted.
- .2 SMART Control Panel by Waterloo Biofilter:
 - .1 Model CP2-B12-3G for the two-pump / four-float system;
 - .2 Model CP2-B12-3G for the three-pump / five-float system.
- .3 SMART Control Panel by Waterloo Biofilter, with the following characteristics:
 - .1 All components to be UL listed, with safety certification for Canada.
 - .2 Enclosure base measures 25.4 cm X 20.32 cm X 15.24 cm (10" X 8" X 6"). NEMA 4X ultraviolet stabilized thermoplastic with removable mounting feet for outdoor or indoor use, including locking latch.
 - .3 Operation to be demand based, i.e. to be controlled by floats. Contractor to adjust float elevations on site, to set pumped volume per cycle as per Engineer's and Level IV treatment system supplier's instructions.
 - .4 Panel to be complete with required power components including but not limited to:
 - .1 Enclosure base measures 25.4 cm X 20.32 cm X 15.24 cm (10" X 8" X 6"). NEMA 4X ultraviolet stabilized thermoplastic with removable mounting feet for outdoor or indoor use, including locking.
 - .2 Red Alarm Beacon provides visual check of alarm condition.
 - .3 Exterior Alarm Test/Silence Switch allows horn and light to be tested and horn to be silenced in an alarm condition. Alarm automatically resets once alarm condition is cleared.
 - .4 15 Amp Circuit Breaker provides pump power disconnect and branch circuit protection, plus control/alarm power disconnect.
 - .5 Power Relay controls pump by switching electrical lines.

- .6 Float Connection Terminal Block
- .7 Incoming Control/Alarm Power & Pump Power Terminal Block
- .8 Control Power Indicator light illuminates if control power is present in panel.
- .9 Alarm Power Indicator light illuminates if alarm power is present in panel.
- .10 OMRON timers
- .11 Pump Run Indicator will illuminate when pump is called to run.
- .12 LED Display shows system information including: pump elapsed time (hh:mm), events (cycles).
- .13 Menu/Enter Button used for viewing panel settings.
- .14 Set/Change Button used for programming panel settings.
- .15 Pump 1 Push To Run Momentary Switch - Pump activates when pressed
- .16 Alarm Horn located inside panel on cover to provides audio warning of alarm condition.
- .17 Starter to be 120 VAC, rated for 7 to 15 FLA.
- .18 Demand dose operation, with the following adjustment: the SMART panel would be programmed such that the two (2X) pumps at the Biofilter Tank cannot operate at the same time. This does not apply where there is only one pump at the Biofilter Tank (used for recirculation and for effluent transfer to disposal bed).
- .5 Schematic/wiring diagram and pump specification label: mounted inside panel door.
- .6 Control floats:
 - .1 SJE Rhombus: provide 2 floats for timer based operation (timer enable float, alarm float), provide 2 floats for demand based operation (stop/start pump float, , alarm float)
 - .2 Provide one PVC tube as the float tree, with connection and accessories at each tank.
- .7 Power wire: as per manufacturer's recommendations.
- .4 Wire:
 - .1 Numbered with printed permanent indelible identifying plastic tapes to correspond to schematic diagram.
 - .2 Terminated for external control connections by screw type terminal blocks with barriers and labels as required.
 - .3 Equipped with grommets, strain reliefs and shields for mechanical protection.
 - .4 Adequately supported and installed to approval of engineer consultant.
- .5 Project Specific Conditions:
 - .1 Client advise the Level IV treatment system supplier & manufacturer that they will not take the remote alarm transmission service normally provided with the SMART panel, due to local conditions (limited telecommunication capability).

- .2 Therefore, the associated monthly connection fee (invoiced annually) is NOT to be charged to the project, or to the Contractor, their subcontractors, or the Client, or the Consultant.
- .6 Warranty:
 - .1 At time of ordering material, Contractor and their subcontractor are to advise the panel and float supplier / manufacturer that the end client of this project is Parks Canada Agency, and that any remaining portion of their limited warranty is to be transferred to the Agency, upon expiration of the Contractor project warranty period.
 - .2 Panel manufacturer provides a 5-year limited warranty on their material.
 - .3 It is the responsibility of the Contractor to verify date of fabrication by manufacturer and/or purchase of the panel by their subcontractor, as this would affect start date of above-mentioned limited warranty.
 - .4 The above does not relieve Contractor from his contractual obligation to provide a 12-month warranty on all labor and material under this contract, starting at date of substantial completion of the contract.
 - .5 Prior to the expiration of the 12-month contract warranty period, Contractor is to transmit all pertinent documentation to the Client, to transfer the balance of the 5-year limited warranty period to the Client.

2.8 PUMP ACCESSORIES, PIPING AND VALVES

- .1 Internal pump discharge piping to be 50 mm diameter PVC SCH80 piping with glued joints, and ANSI flanges where appropriate, as shown on drawings.
- .2 Process piping to be 50 mm diameter, of material and pressure rating as recommended by Level IV treatment system manufacturer, to be supplied loose, for field installation by contractor or their mechanical subcontractor. Other components include a 2" x 1" PVC Reducer Coupling, and a Nozzle Assembly TF20-170 c/w Nozzles and Drops.
- .3 Provide union fitting and polypropylene cord, terminating below the access riser cover, to allow remove and reinstallation of pump from ground level, without having to enter the wet well.
- .4 Piping and valve supports to be secured to tank walls with 12 mm diameter HILTI stainless steel anchoring bolts. Provide neoprene gaskets at point of contact.
- .5 At final treated effluent transfer pump discharge piping only, Contractor to drill 2 mm diameter hole at discharge elbow, to allow drainage of forcemain by gravity into the tank.
- .6 Contractor to supply, install, secure to tank walls, test and commission additional process related piping and diffusers as per Level IV treatment system manufacturer's instructions. That involves piping inside and outside the tanks, i.e. directly buried. Contractor is to secure pipe and backfill appropriately the tank trench to avoid any damage to these pipes. Contractor shall pressure test successfully those pipes prior to backfilling. No leakage allowed.

2.9 ELECTRICAL POWER AND CONTROLS WIRING AND CONDUITS BY SEWAGE SYSTEM SUBCONTRACTOR

- .1 Use only CSA approved components.
- .2 Supply and install conduits below ground and above ground, from splice boxes up to pump control panel, and from control panel to disconnects. Conduits are to conform to specifications on Drawing E00. Conduits are to be connected to the precast concrete tank splice box. Connection of conduits directly to the plastic chimneys, or the tank vent pipe, is not acceptable.
- .3 Supply and install all pump control cables into conduits up to splice box, then up to up to pump control panel. Conduits from the pump control panel to the house breaker panel is by electrician, as per Drawing E00.
- .4 At the pump control panel, connect power wiring, pump wiring and control wiring.
- .5 Schematic wiring diagram: mounted inside pump control panel door, varnish protected.
- .6 Wires:
 - .1 Numbered with printed permanent indelible identifying plastic tapes to correspond to schematic diagram.
 - .2 Terminated for external control connections by tubular screw type terminal blocks with barrier and labels.
 - .3 Equipped with grommet and shields for mechanical protection.
 - .4 Adequately supported and installed in accordance with written approval of Consultant.
 - .5 Refer to specification on Drawing E00 for additional installation information.
 - .6 Coordinate wiring numbering system with Electrical Subcontractor.

2.10 ADDITIONAL ELECTRICAL POWER AND CONTROLS WIRING AND CONDUITS BY DIVISION 26

- .1 Use only CSA approved components.
- .2 Division 26 refers to work completed by electrician hired by the General Contractor. Refer to specifications on Drawing E00. Refer to E series drawings for site specific electrical work description.
- .3 Supply and install one (1) weather proof disconnect switch and grounding wiring, at simplex pump control panel.
- .4 Supply and install pump power wiring and conduits from external electrical splice box at top of access riser up to pump control panel, as shown on electrical drawings. Division 26 to connect wiring at disconnect boxes only.
- .5 Supply and install power wiring and conduits from disconnect boxes at exterior wall up to house breaker panel inside building, as shown on electrical drawings.
- .6 Although the sewage subcontractor is responsible for supply and final wiring connection of the pump control panel, Division 26 is responsible for conduit and wiring installation up to that panel.

2.11 SOURCE QUALITY CONTROL

- .1 Provide certification that the pump and controls have been factory tested and deficiencies rectified prior to delivery to site.
- .2 Perform operational tests on pumps at factory to check for excessive vibration, for leaks in piping or seals and for correct operation of automatic control system and auxiliary equipment. Pump suction and discharge lines to be coupled to reservoir and pumps to recirculate water for minimum of ten minutes under simulated service conditions.

Part 3 Execution

3.1 EXAMINATION

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for septic tank installation in accordance with manufacturer's written instructions.
 - .1 Visually inspect substrate in presence of Client Representative.
 - .2 Inform Client Representative 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 Client Representative.

3.2 INSTALLATION

- .1 Install and test precast concrete tank as per Section 33 36 00 requirements.
- .2 Install pump equipment, piping, and floats in accordance with manufacturers' recommendations
- .3 Install filtering media and other specialized materials / equipment as per Level IV treatment system manufacturer's instructions.
- .4 Refer to Design & Installation Guide CAN/BNQ 3680-600, version 1.4 dated May 2017 or latest version, as issued by Waterloo Biofilter Systems.

3.3 FIELD QUALITY CONTROL

- .1 After completion of installation, demonstrate functional operation of systems, including sequence of operation, to approval of Client Representative.
- .2 Test in presence of Client Representative and representative from equipment supplier.
- .3 Provide labour and ancillary equipment necessary to fulfill tests.
- .4 Fill in the pumping station wet well with clean water (could be either water taken from a municipal water distribution system delivered by truck at Contractor's cost, or clear underground water, or water from house only upon approval from the Client and the Tenant). No domestic sewage water, grey water or storm runoff water loaded with sediments is to be used for the pump test.

- .5 Test to demonstrate that:
 - .1 Pump and equipment run free from heating, or vibration.
 - .2 Operation meets requirements of these specifications.
 - .3 Pump and associated piping and accessories are free and clear of debris and obstructions.
 - .4 Alarm float and annunciation panel operates to the satisfaction of Client Representative
- .6 Locate and repair leaks. Replace equipment found defective.
 - .1 Repeat test until equipment is accepted by Client Representative
- .7 After all pump and cable tests have been successfully completed and accepted, Division 26 electrician is to seal the EYS fittings between the intrinsically safe junction box and the disconnect boxes.

3.4 DEMONSTRATION

- .1 Operating Personnel Training
 - .1 Provide on-site training by qualified personnel for designated operating personnel prior to final commissioning.
 - .1 Schedule and deliver training in accordance with training plan approved in writing by Client Representative
 - .2 Include training for two (2) designated personnel on routine maintenance procedures, minor repairs, replacement of parts, including disassembly of major components.
 - .3 Include safety precaution procedures for systems.
 - .4 Training to be provided at time of first pump installation completed, and possibly a second one would second designated personnel not be available at first time. There is no need to repeat training for the other installations.

3.5 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
 - .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 Section 01 74 11 - Cleaning.

3.6 VENT PIPE

- .1 Coordinate vent pipe installation with other trades. Vent pipe to be set upward, toward the building foundation.

Part 4 Site Requirements

4.1 CONTROL FLOAT ELEVATIONS

.1 Table below provides type of Waterloo Biofilter system at each site.

Address	Rated Capacity (L/d)	Waterloo Biofilter Rated Capacity (L/d)	Waterloo Biofilter Basket Model	Pump Arrangement (first tank / second tank)
1509 Concession 2, Pickering	2000	2000	AD-BA20	1 / 2
10888 Reesor Road, Markham	1600	1600	AD-BA16	1 / 2
1085 Uxbridge-Pickering Townline, Claremont	2000	2000	AD-BA20	1 / 1
4440 Sideline 34, Pickering	2525	2500	AD-BA25	1 / 2

.2 Table below provides control float elevations, as measured from the bottom of the pumping wet well, to be validated with Level IV treatment system supplier prior to delivery of equipment to site.

CONTROL FLOAT ELEVATION TABLE (from bottom of the tank)

Tank & Pump Combination	Stop Pump Float Elevation (m)	Start Pump Float Elevation (m)	Alarm Float Elevation (m)
ADIPC Upstream Tank / dosing pump (on timer)			
BT Downstream Tank / recirculation pump (on timer)		N/A	N/A
BT Downstream Tank / effluent transfer pump			

END OF SECTION

Part 1 General

1.1 SCOPE OF WORK

- .1 This section of the Contract includes any hydraulic seeding work called for or implied by the drawings and specifications, together with all necessary incidentals whether referred to or not, as will be required to complete the work to the full intent and meaning of the drawings and specifications. The work includes but is not limited to the following:
 - .1 supply and install seeding and mulch;
 - .2 maintain grassed areas; Anchor, corner and stretch posts must be wood (preferably cedar), but line posts may be wood or steel. Use 125 mm top diameter posts and 150 mm top diameter for corner and brace posts.

1.2 RELATED WORK SPECIFIED ELSEWHERE

- .1 Excavation, Backfilling and Compacting - Section 31 23 33.01
- .2 Site Restoration - Section 02 29 21

1.3 SEEDING MEASUREMENT PROCEDURE

- .1 Seeding and sodding will not be measured for payment in but considered part of the lump sum price and included:
 - .1 Grass mixture including fertilizer.
 - .2 Areas of blending into existing turf grass will not be measured for payment.
 - .3 Maintenance during establishment period.

1.4 HYDRAULIC SEEDING MEASUREMENT PROCEDURE

- .1 Provide product data for:
 - .1 Seed.
 - .2 Mulch.
 - .3 Tackifier.
 - .4 Fertilizer.
- .2 Submit in writing to Engineer ten days prior to commencing work:
 - .1 Volume capacity of hydraulic seeder in liters.
 - .2 Amount of material to be used per tank based on volume
 - .3 Number of tank loads required per hectare to apply specified slurry mixture per hectare.

1.5 SCHEDULING

- .1 Schedule hydraulic seeding to coincide with preparation of soil surface.
- .2 Schedule sodding and hydraulic seeding using grass mixtures and mixtures containing Crown vetch between dates recommended by the Provincial Agricultural Department.

Part 2 Products

2.1 MATERIALS

- .1 Seed: "Canada pedigreed grade" in accordance with Government of Canada Seeds Act and Regulations.
- .2 Grass mixture: "Certified", "Canada No. 1 Lawn Grass Mixture" in accordance with Government of Canada "Seeds Act" and "Seeds Regulations".
- .3 Mixture composition:
 - .1 55% Creeping Red Fescue
 - .2 27 % Kentucky Blue Grass
 - .3 15 % Perennial Ryegrass
 - .4 3% White Clover
- .4 Mulch: specially manufactured for use in hydraulic seeding equipment, non-toxic, water activated, green coloring, free of germination and growth inhibiting factors with following properties:
 - .1 Type I mulch:
 - .1 Made from wood cellulose fibre.
 - .2 Organic matter content: 95% plus or minus 0.5%.
 - .3 Value of pH: 6.0.
 - .4 Potential water absorption: 900%.
 - .2 Type II mulch:
 - .1 Made from newsprint, raw cotton fibre and straw, processed to produce fibre lengths of 15 mm minimum and 25 mm maximum. Greater proportions of ingredients to be straw.
- .5 Tackifier: liquid dispersion.
- .6 Water: free of impurities that would inhibit germination and growth.
- .7 Fertilizer:
 - .1 To Canada "Fertilizers Act" and "Fertilizers Regulations".
 - .2 Complete synthetic, slow release with 35% of nitrogen content in water-insoluble form.
- .8 Inoculants: inoculant containers to be tagged with expiry date.

Part 3 Execution

3.1 WORKMANSHIP

- .1 Do not spray onto structures, signs, guiderails, fences, plant material, utilities and other than surfaces intended.
- .2 Clean-up immediately, any material sprayed where not intended, to satisfaction of Engineer.

- .3 Do not perform work under adverse field conditions such as wind speeds over 10 km/h, frozen ground or ground covered with snow, ice or standing water.
- .4 Protect seeded areas from trespass until plants are established.

3.2 PREPARATION OF SURFACE

- .1 Fine grade areas to be seeded free of humps and hollows. Ensure areas are free of deleterious and refuse materials.
- .2 Cultivated areas identified as requiring cultivation to depth of 25 mm.
- .3 Ensure areas to be seeded are moist to depth of 150 mm before seeding.
- .4 Obtain Engineer's approval of grade and topsoil depth before starting to seed.

3.3 FERTILIZING PROGRAM

- .1 Fertilize prior to fine grading incorporating fertilizer equally distributed in accordance with the following program:
- .2 Fertilize during establishment and warranty periods to following program:

	TIME CONSTRAINTS FOR SEEDING & MULCHING
Seeding with Start-up Hydraulic Mulch Type 'C'	April 15 to June 14 and August 1 to September 30
Seeding Cut-off Date	October 31

3.4 PREPARATION OF SLURRY

- .1 Measure quantities of materials by weight or weight-calibrated volume measurement satisfactory to Engineer. Supply equipment required for this work.
- .2 Charge required water into seeder. Add material into hydraulic seeder under agitation. Pulverize mulch and charge slowly into seeder.
- .3 After all other material is in the seeder and well mixed, charge tackifier into seeder and mix thoroughly to complete slurry.

3.5 SLURRY APPLICATION

- .1 Hydraulic seeding equipment:
 - .1 Slurry tank.
 - .2 Agitation system for slurry to be capable of operating during charging of tank and during seeding, consisting of recirculation of slurry and /or mechanical agitation method.
 - .3 Capable of seeding by 50 mm hand operated hoses and appropriate nozzles.
 - .4 Tank volume to be certified by certifying authority and identified by authorities "Volume Certification Plate".

- .2 Slurry mixture applied per hectare:
 - .1 Seed: Grass mixture 100 kg.
 - .2 Hydraulic Mulch: 2000 kg.
 - .3 Water: Minimum 30,000 L.
 - .4 8-32-16 Fertilizer: 350 kg.
- .3 Apply slurry uniformly, at optimum angle of application for adherence to surfaces and germination of seed.
 - .1 Using correct nozzle for application.
 - .2 Using hoses for surfaces difficult to reach and to control application.
- .4 Blend application 300 mm into adjacent grass areas or sodded areas to form uniform surfaces.
- .5 Re-apply where application is not uniform.
- .6 Remove slurry from items and areas not designated to be sprayed.
- .7 Protect seeded areas from trespass satisfactory to Engineer.
- .8 Remove protection devices as directed by Engineer.

3.6 MAINTENANCE DURING ESTABLISHMENT PERIOD

- .1 Perform following operations from time of seed application until acceptance by Engineer.
- .2 Grass Mixture:
 - .1 Repair and reseed dead or bare spots to allow establishment of seed prior to acceptance.
 - .2 Mow grass to 50 mm whenever it reaches height of 70 mm. Remove clippings which will smother grass as directed by Engineer.
 - .3 Fertilize seeded areas after first cutting 10 weeks after germination provided plants have mature true leaves in accordance with OPSS 572. Spread half of required amount of fertilizer in one direction and remainder at right angles.
 - .4 Control weeds by mechanical or chemical means utilizing acceptable integrated pest management practices.
 - .5 Water seeded area to maintain optimum soil moisture level for germination and continued growth of grass. Control watering to prevent washouts.

3.7 ACCEPTANCE

- .1 Seeded and sodded areas will be accepted by Engineer provided that:
 - .1 Areas are free of rutted, eroded, bare or dead spots.
 - .2 Areas have been mown at least twice.
 - .3 Areas have been fertilized.

- .2 Areas seeded or sodded in fall will achieve final acceptance in following spring, one month after start of growing season provided acceptance conditions are fulfilled.

END OF SECTION

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Part 1 General

1.1 RELATED REQUIREMENTS

- .1 Section 31 23 33.01 - Excavating, Trenching and Backfilling

1.2 TYPES OF CONCRETE TANKS

- .1 This section provides construction details applicable to pre-cast concrete tanks, including conventional septic tanks, pumping wet wells, flow division boxes, and tanks for Level IV treatment system, modified as per manufacturer's instructions to meet their specialized equipment needs.
- .2 Refer to Part 4 of Section 01 11 00 – Summary of Work for a list of each type and rated capacity of tanks required at each site.

1.3 MEASUREMENT PROCEDURES

- .1 New tank will be paid at lump sum price, including supply, installation, testing and commissioning of precast tanks stripping, excavating, bedding and backfilling, plus all tank accessories (access risers, inlet and outlet piping, sealant, etc). Here are the types of tanks:
 - .1 Conventional septic tanks identified and paid as such in the form of tender.
 - .2 Simplex pumping station wet wells, to be paid under the pumping station package as described under Section 32 32 13.13 for mechanical works.
 - .3 Flow distribution box upstream the absorption field, to be paid under the absorption field package as described under Section 33 36 33.
 - .4 Two-tank package for Level IV treatment system for dosing, plus effluent recirculation and/or transfer purpose, are deemed to be part of the Level IV treatment system package. Payment is to be part of works under Section 32 32 14.
- .2 No electrical work is paid under this Section, as it is part of lump sum price for electrical works. General contractor is still responsible for coordination between trades (civil, mechanical, and electrical).

1.4 REFERENCES

- .1 ASTM International
 - .1 ASTM C117-13, Standard Test Method for Material Finer Than 0.075 mm (No. 200) Sieve in Mineral Aggregates by Washing.
 - .2 ASTM C136-14, Standard Method for Sieve Analysis of Fine and Coarse Aggregates.
 - .3 ASTM D312/D312M-16a, Standard Specification for Asphalt Used in Roofing
 - .4 ASTM D698-12e2, Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³(600 kN-m/m³)).

- .2 NSF/ANSI
 - .1 NSF/ANSI 46 "Evaluation of Components Used in Wastewater Treatment"
- .3 CSA International
 - .1 CSA A23.1/A23.2-14, Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete.
 - .2 CSA A23.4-16, Precast Concrete-Materials and Construction.
 - .3 CSA-A123.4-15, Asphalt for Constructing Built-Up Roof Coverings and Waterproofing Systems.
 - .4 CSA B66-16, Design, Material and Manufacturing Requirements for Prefabricated Septic Tanks and Sewage Holding Tanks.

1.5 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 septic tank and include product characteristics, physical size, finish and limitations.
- .3 Shop Drawings:
 - .1 Submit drawings stamped and signed by professional engineer registered or licensed in Province of Ontario, only where the tank would be installed at a depth deeper than standard design depth.
 - .2 Submit drawings for civil and structural elements.
 - .3 Submit shop drawings in PDF format suitable for annotation by the review engineer. QUALITY ASSURANCE
- .4 Manufacturers and installer of precast concrete elements are to be certified by CSA as meeting requirements of CSA A23.4.

1.6 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements with manufacturer's written instructions.
- .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 off ground, indoors, in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect septic tank from nicks and scratches.
 - .3 Replace defective or damaged materials with new.

Part 2 Products

2.1 CONCRETE TANK STRUCTURE

- .1 Design precast concrete septic tank in accordance with CSA B66, and to carry handling stresses and indicated service loads
- .2 Concrete mixes and materials
 - .1 Concrete mixes and materials: to CSA B66, CSA A23.1/A23.2.
 - .2 Use type 1 cement.
 - .3 Concrete exposure classification: C-3.
- .3 Structure: leak free, two-compartment precast cast-in-place reinforced concrete septic tank with access openings, and designed for following forces:
 - .1 Dead load of pumping equipment and Level IV treatment specialized equipment dynamic and kinetic forces of rotating equipment and recirculated flow distribution, where applicable.
 - .2 Dead load from soil over structure, superimposed live load of 12 kN/m² or single wheel load of 54 kN over area of 750 mm diameter.
 - .3 Hydrostatic uplift forces.
 - .4 Horizontal earth loading and full hydrostatic pressure assuming water at ground elevation.
 - .5 Maximum allowable burial depth (i.e. from top of cover to ground surface level):
 - .1 Normal Installation Tanks: 1000 mm unless noted otherwise;
 - .2 Deep Burial Tanks: up 2000 mm, at designated locations only; to be used where burial depth is higher than a meter but lower than two meters;
 - .3 Vehicle Traffic Tanks: up to 1000 mm depth combined with vehicle traffic load, because the tank would be installed close to, partially or entirely below a driveway.
- .4 Manufacture units in accordance to CSA A23.4.
- .5 Finish tanks to CSA A23.4, commercial grade
- .6 Joints below ground level at tank, gravity sewer pipe, forcemain and chimney to be sealed with butyl tape
- .7 At conventional septic tank outlet end only, effluent filter to conform to the requirements of NSF/ANSI 46 "Evaluation of Components Used in Wastewater Treatment", be sized to filter particles of 1.6 mm, have a minimum area of 550 cm², having a minimum rated capacity of 5680 L/d (1500 USGPD) to be Polylok PL-525, or TUF-TITE Effluent Filter EF-6, or approved equal. Filter to be supplied with a pipe support, and extended lift out handle terminating below the outlet access cover. Filter shall be centered below the cover.
 - .1 No effluent filter is required at the inlet or outlet of the simplex pumping stations, as an effluent filter is already provided at the septic tank outlet upstream the station.

- .8 Chamber Materials:
- .1 Precast concrete to ASTM C478M, CAN/CSA-A25, CPA certified, concrete 35MPa/5000PSI, air entrainment: 6-8%, conform to CAN/CSA-B66-00, reinforcement conform to A23.1 /A23.3 G30.18 Fy=400MPa, 26,896 lbs / 12,200 kg, CSA approved, with two 610 mm (24") openings on top. Tank model and rated capacity at each site to be as specified under Part 4 of Section 01 11 00 Summary of Work.
 - .2 Intermediate precast concrete wall, dividing the entire volume in two third / one third arrangement, with three (3) 100 mm diameter holes at mid-level. For Level IV treatment system, intermediate wall is set, modified or possibly eliminated, as per specialized manufacturer's instructions.
 - .3 One 100 mm (4") PVC inlet pipe with Polyseal or approved equal, with baffle anchored to inlet wall. Internal arrangement to be modified at Level IV treatment unit as per specialized manufacturer's instructions.
 - .4 Access risers: 610 mm diameter chimney extension section, with rubber gasket PolylokRiser System, c/w 610 mm diameter plastic construction watertight safety lid, each attached to riser section with six (6) stainless steel screws set vertically, by Polylok or approved equal. Number of access risers to be as follows:
 - .1 Two risers at each septic tank (one at inlet end, one at outlet end);
 - .2 One riser above effluent pump at pumping wet well downstream the septic tank, where applicable;
 - .3 Two or three risers at Level IV treatment system, i.e. one riser above each of the pumps (digester, recirculation/treated effluent) and one riser above each spray nozzle.
 - .5 External splice boxes, one at each access riser above a submersible pump only, to be attached at the top of the access riser so the splice box cover (threaded cap) will be flush with ground level, to be Orenco® External Splice Box model **SBEX1-4-P**, as fabricated by Orenco Systems® Inc., 814 Airway Ave., Sutherlin, OR 97479 USA, tel: 1-800-348-9843, <tel:541-459-4449>, www.orenco.com, or approved equal, to conform to the following:
 - .1 Quantity of splice boxes per tank:
 - .1 One at the 675 L wet well
 - .2 One at the first tank (digester) of a Level IV Treatment System
 - .3 One at the second tank (Biofilter) of a Level IV Treatment System having a single pump for recirculation/transfer purpose
 - .4 Two at the second tank (Biofilter) of a Level IV Treatment System having two pumps, one for recirculation and one for transfer. Both splice boxes are mounted at same chimney as per Treatment System manufacturer's recommendations.
 - .5 No splice box at regular septic tank.
 - .2 Watertight for prolonged submergence per UL listing (Type 6P)
 - .3 Attachment external to access riser to allow inspection with no need to open the riser lid

- .4 Volume of 1639 cm³ (100 inch³) for easy wiring access and to accommodate multiple wiring configurations
- .5 Bottom entry, so conduit or direct-bury cable always remains below minimum burial depth
- .6 Molded of UL (f1) rated plastic, resistant to cold and UV exposure, suitable for external applications
- .7 Divider plate for isolating power and float wires from separate conduits
- .8 4 Nylon cord grips, 3 EPDM rubber cord grip plugs, accommodating 4.3 to 11.9 mm diameter cords;
- .9 1 conduit hub plug, made of PVC (per ASTPM D-1784)
- .10 Buna rubber O-rings
- .11 EPDM rubber 4-inch (100 mm) grommets
- .6 One 100 mm (4") PVC outlet pipe with Polyseal or approved equal
- .9 Concrete tank manufacturer to be Newmarket Precast, 20 Victoria Street North, P.O. Box 1179, Uxbridge, Ontario L9P 1N4, Tel: 1-800-263-1297, email: info@newmarketprecast.com, or approved equal.

2.2 SEPTIC TANK RATED CAPACITY

- .1 Precast concrete septic tank rated capacity as per Newmarket Precast standard product list is as follows: 3600 L, 4500 L, 5900 L, 6800 L, 9000 L, 13500 L. Alternate rated capacities shall not be lower than the mentioned values for a given site, to be accepted upon approval of alternate tank manufacturer, at no cost increase to the Client.

2.3 PUMPING WET WELL RATED CAPACITY

- .1 Precast concrete pumping wet well rated capacity as per Newmarket Precast standard product list is 675 L. Alternate rated capacities shall not be lower than the mentioned values for a given site, to be accepted upon approval of alternate tank manufacturer, at no cost increase to the Client.

2.4 FLOW DISTRIBUTION BOX

- .1 Supply and install flow distribution box upstream a conventional septic field, or a raised bed with mantle. There is no flow division box upstream any shallow bed downstream a Level IV treatment system, as the pumped effluent is distributed directly by closed pressurized pipes.
- .2 Box to be designed for up to one-meter burial over top of tank, away from any vehicular traffic.
- .3 Box to consist of a lower portion including base, internal concrete wall, exterior walls with plastic knockouts cast to accommodate 75 and 100 mm (3" & 4") diameter PVC pipes, plus a separate concrete cover c/w two lifting rods cast into the cover. Inlet pipe invert is set 50 mm above outlet pipe invert, with one of the following inlet-outlet pipe combinations:
 - .1 Small Distribution Box, 1 inlet, 8 outlets
 - .2 Large Distribution Box, 1 inlet, 14 outlets

- .3 Contractor to coordinate type of box, number and diameter of openings prior to order the boxes.
- .4 Contractor is to open the appropriate number of openings on site.
- .4 Precast concrete to ASTM C478M, CAN/CSA-A25, CPA certified, concrete 35MPa/5000PSI, air entrainment: 5-7%, conform to CAN/CSA-B66-00, reinforcement conform to CSA CAN A23.1/A23.2. G30.18 Fy = 400 MPa. Concrete is fibre reinforced.
- .5 Distribution box to be installed over a 150 mm (6") thick layer of compacted Granular A, over undisturbed natural ground.
- .6 Accessories to be as follows:
 - .1 Rigid insulation on top of flow distribution box and forcemain (where applicable), as shown on drawings. Rigid insulation to be extruded polystyrene, having a R value of 10 ft²• h•°F/Btu / 1.76 m² °C/W, and a minimum compressive strength of 40 PSI / 275 MPA at 10% deformation, to be Styrofoam™ Highload 40 Insulation, or approved equal.
 - .2 Equalizer Fittings, weir type opening, with adjustable opening in 1.6 mm (1/16") increment, for a total vertical movement of 11 mm (7/8"), plastic construction, c/w water tight gasket, suitable for installation on any 100 mm (4") diameter PVC SCH40 or SDR35 pipe, as fabricated by Polylok™ Inc., tel: 1-877-765-9565, sales@polylok.com.
 - .3 PVC SCH40 transition pipes section, from distribution box to PVC distribution piping, including tees and 100-reducers, as shown on contract drawings.
 - .4 Concrete block base, as per contract drawings
 - .5 Concrete base, consisting of concrete mix prepared on site, for the purpose of providing a flat, stable base; 25 MPa concrete mix
 - .6 Granular material base, as per contract drawings
- .7 Flow distribution box manufacturer to be Newmarket Precast, 20 Victoria Street North, P.O. Box 1179, Uxbridge, Ontario L9P 1N4, tel: 1-800-263-1297, email: info@newmarketprecast.com, or approved equal.

2.5 WATERLOO BIOFILTER TANK RATED CAPACITY

- .1 Tanks to be fabricated to specialized manufacturer's requirement by Newmarket Precast, or approved equal. Alternate rated capacities shall not be lower than the mentioned values for a given site, to be accepted upon approval of alternate tank manufacturer, at no cost increase to the Client. Tank models to be as per char in Part 4.

2.6 TANK BEDDING MATERIAL

- .1 Granular material in accordance with Section 31 05 16 - Aggregate Materials and following requirements:
 - .1 Crushed or screened stone, gravel or sand.

2.7 TANK WATER PROOFING

- .1 Waterproof exterior surfaces below grade (underside, walls and top of slab) with asphalt: to CAN/CSA A123.4, ASTM D312 Type 2.

- .2 Waterproofing of tank to be completed either by tank manufacturer or by Contractor on site. Underside of tank to be treated before to set tank on bedding material.
- .3 Avoid damaging access chimneys with waterproofing material.

2.8 BACKFILL MATERIAL

- .1 As indicated on drawings.
- .2 Granular B Type 1 (native material), in accordance with Section 31 23 33.01 - Excavating, Trenching and Backfilling.

Part 3 Execution

3.1 EXAMINATION

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for septic tank installation in accordance with manufacturer's written instructions.
 - .1 Visually inspect substrate in presence of Client Representative.
 - .2 Inform Client Representative 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 Client Representative.

3.2 DECOMMISSIONING OF EXISTING TANK

- .1 Coordinate temporary sewage service interruption at septic tank with Client and Tenants.
- .2 Pump out of raw sewage, septage sludge and scum at the existing tank, and dispose of such at an approved site (local municipal sewage treatment plant, or specialized septage treatment plant), authorized for such work by the Ontario Ministry of the Environment and Climate Change (MOECC).
- .3 Where new septic tank is to be installed at same location as the original tank:
 - .1 Remove chimney and cover, leave chimney inside tank;
 - .2 Remove original tank, set it on truck, secure cover on top of tank, carry material off site, and dispose of it at an approved landfill site authorized to receive such waste;
 - .3 Proceed with new tank installation as specified below, considering additional excavation and additional backfilling to set appropriate tank bedding as required.
- .4 Where new septic tank is to be installed away from / beside original tank, allowing normal sewage drainage from the house to the original tank while the new tank is installed:
 - .1 Disconnect existing gravity sewer from original tank, and reconnect it to new septic tank;
 - .2 Excavate material on top of existing tank;

- .3 Remove original tank, set it on truck, secure cover on top of tank, carry material off site, and dispose of it at an approved landfill site authorized to receive such waste;
- .4 Backfill excavation with sand, compact sand at 90% of Modified Proctor Density, up to 150 mm from final ground level; Contractor may backfill original tank excavation with material excavated from new tank trench if such material is suitable.
- .5 Backfill balance of existing tank trench as per final backfilling instructions below.
- .5 Where existing tank is to remain as indicated on drawings:
 - .1 Disconnect existing gravity sewer from original tank, and reconnect it to new septic tank;
 - .2 Remove and dispose of existing tank cover and upper portion of chimney;
 - .3 Backfill tank and lower portion of chimney with sand.
- .6 In all cases, reinstate ground surface with topsoil and seeding.

3.3 INSTALLATION OF NEW TANK

- .1 Place bedding and surround material in unfrozen condition.
- .2 Do excavation in accordance with Section 31 23 33.01 - Excavating, Trenching and Backfilling.
- .3 Place tank bedding material in accordance with details as indicated.
 - .1 Compact to 98% maximum dry density to ASTM D698.
- .4 Excavation shall be ready, safe and accessible for unloading directly from the rear of delivery crane-equipped truck. Minimum overhead clearance for crane to be 6 m or as requested by tank manufacturer.
- .5 Install septic tank and accessories in accordance with manufacturers' recommendations.
 - .1 Set access chimneys, and seal connection of chimney to top slab;
 - .2 Install effluent filter in accordance with manufacturer's recommendations. Effluent filter is to be accessible from ground surface via an extension handle set at the septic tank downstream access chimney.
 - .3 At Class 4 treatment systems, install all additional piping, valving, filtering material;
 - .4 At pumping wet wells, install all mechanical and electrical equipment
- .6 Make inlet and outlet joints of septic tank watertight. Joints below ground level at chamber, vent pipe and chimney to be sealed with butyl tape, prior to application of waterproofing.
- .7 Waterproof in accordance with Section 07 52 00 - Modified Bituminous Membrane Roofing.

- .8 Conduct leakage test on septic tank in presence of Client Representative, before backfilling.
 - .1 Fill tank to level of effluent pipe and allow to stand for 24 hours.
 - .2 Allowable leakage is zero.
 - .3 If leakage occurs, remove seal materials and reseal as directed by Client Representative.

3.4 FINAL BACKFILLING AND SURFACE REINSTATEMENT

- .1 Do backfilling in accordance with Section 31 23 33.01 - Excavating, Trenching and Backfilling, up to 150 mm from final ground surface
 - .1 Compact to 95% maximum dry density to ASTM D698.
- .2 Grade areas surrounding tanks as indicated, to provide for diversion of surface run off waters.
- .3 Complete surface reinstatement with 150 mm of top soil.
- .4 Complete seeding.

3.5 CLEANING OF SITE

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
 - .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 Section 01 74 11 - Cleaning.

Part 4 Site Requirements

4.1 TANK MODELS

- .1 Table on next page provides the tank size / model at each site, based on Newmarket Precast model numbers, for septic tanks, pumping wet wells, Waterloo Biofilter specialized tanks, and flow division boxes (or forcemain manifold where applicable). Deep installation refers to tank capable to support up to 2 m burial depth, although the actual burial depth on site would be less.

Site	Septic Tank (L)	Pumping Wet Well Tank (L)	Waterloo Biofilter Primary Tank	Waterloo Biofilter Secondary Tank	Deep Installation Tank	Precast Concrete Division Box Model OR PVC Manifold
1085 Uxbridge-Pickering Townline, Claremont, ON	---	---	ADIPC 5900	BT 5900	---	2-pipe manifold
1509 Concession 2, Pickering, ON	---	---	ADIPC 5900	BT 5900	YES	4-pipe manifold
4440 Sideline 34, Pickering, ON	---	---	ADIPC 6800	BT 5900	---	2-pipe manifold
6445 19th Av, Markham, ON	4500	675	---	---	YES	SSDB-14-1
7056 Major Mackenzie Drive, Markham, ON	3600	---	---	---	---	SSDB-14-1
7528 Elgin Mills Road, Markham, ON	3600	675	---	---	YES	3-pipe manifold
7558 Elgin Mills Road, Markham, ON	4500	675	---	---	---	4-pipe manifold
7630 Major Mackenzie Drive, Markham, ON	4500	675	---	---	---	SSDB-14-1
10888 Reesor Road, Markham, ON	---	---	ADIPC 4500	BT 4500	---	2-pipe manifold

END OF SECTION

Part 1 General

1.1 SCOPE OF WORKS

- .1 This Section describes all underground sewage utility piping, including:
 - .1 Gravity sewer section upstream septic tanks or Level IV treatment system upstream tanks;
 - .2 Gravity sewer downstream the septic tank, down to the pumping well or to the absorption field;
 - .3 Forcemains from pumping wet well to absorption field
 - .4 Forcemain at Level IV treatment systems
 - .5 Perforated piping and associated field works at absorption fields flush with ground level or raised beds with mantle;
 - .6 Shallow bed perforated piping and accessories, either flush or above natural ground level.

1.2 RELATED REQUIREMENTS

- .1 Section 31 23 33.01 - Excavating, Trenching and Backfilling
- .2 Section 32 91 19.13 - Topsoil Placement and Grading
- .3 Section 32 92 23 - Seeding

1.3 MEASUREMENT PROCEDURES

- .1 Cost in the form of tender for supply and installation piping includes top soil stripping, excavating, bedding, backfilling with specified material, fittings, joint restrainers where applicable, supply and placing of geomembrane where specified, plus testing and commissioning.
- .2 Absorption field at a site is to be paid at lump sum price, including all the above-mentioned works and materials, plus any special work procedure to minimize over pressure on natural soil, to prepare natural soil surface after excavation and prior to backfilling, any additional vent piping, additional topsoil stripping and soil excavation to prepare ground surface for raised beds and mantle, and additional backfill material at mantle.
- .3 There is no measurement for gravity sewer section upstream septic tank or Level IV treatment upstream tank or pumping wet well; cost of such gravity sewer is to be integrated to lump sum price for tank.
- .4 Gravity sewer pipe from septic tank to absorption field is paid at lump sum price. Cost of fittings (elbows, etc) shall be integrated into the cost per of gravity sewer.
- .5 Forrcemain pipe from pumping wet well to absorption field is paid at lump sump price. Cost of fittings (elbows, etc) and joint restrainers shall be integrated into the cost per linear meter of gravity sewer and is not paid separately.

- .6 Measure rigid insulation on a square meter basis, including supply, placement and backfilling.

1.4 REFERENCES

- .1 American National Standards Institute/American Water Works Association (ANSI/AWWA)
 - .1 ANSI/AWWA C900-16, Standard for Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 4 Inch Through-60 Inch (100 mm-1,500 mm), for Water Transmission and Distribution.
 - .2 ASTM International
 - .1 ASTM C88 - 13 Standard Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate
 - .2 ASTM C117-13, Standard Test Method for Material Finer Than 0.075 mm (No. 200) Sieve in Mineral Aggregates by Washing.
 - .3 ASTM C123 / C123M – 14, Standard Test Method for Lightweight Particles in Aggregate
 - .4 ASTM C127 – 15, Standard Test Method for Relative Density (Specific Gravity) and Absorption of Coarse Aggregate
 - .5 ASTM C131 / C131M – 14, Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
 - .6 ASTM D461, Standard Methods of Testing Felt
 - .7 ASTM D4318-10e1, Standard Test Method for Liquid Limit, Plastic Limit and Plasticity Index of Soils.
 - .8 ASTM D2241-15, Standard Specification for Poly(Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series).
 - .9 ASTM D2310-12, Standard Classification for Machine-Made "Fiberglass" (Glass-Fiber-Reinforced Thermosetting-Resin) Pipe.
 - .10 ASTM D2992-12, Standard Practice for Obtaining Hydrostatic or Pressure Design Basis for "Fiberglass" (Glass-Fiber-Reinforced Thermosetting Resin) Pipe and Fitting.
 - .11 ASTM D2996-15, Standard Specification for Filament-Wound "Fiberglass" (Glass-Fiber- Reinforced Thermosetting Resin Pipe).
 - .12 ASTM D3034-16, Standard Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
 - .3 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB 148.1 No. 2-M85, Methods of Testing Geotextiles and Geomembranes Mass per Unit Area
 - .2 CGSB 148.1 No. 3, Methods of Testing Geosynthetics – Thickness of GeotextilesCAN/CGSB 148.1 No. 4-94, Methods of Testing Geosynthetics - Geotextiles - Normal Water Permeability Under No Compressive Load

- .3 CAN/CGSB-148.1 No. 7.3 -92, Grab Tensile Test for Geotextiles (Tensile Strength and Elongation at Break)
- .4 CAN/CGSB-148.1 No. 10 -94, Geotextiles - Filtration Opening Size
- .5 CAN/CGSB-4.2 No. 11.1-94, Textile Test Methods - Bursting Strength - Diaphragm Pressure Test
- .6 CAN/CGSB-4.2 No. 12.2-95, Textile Test Methods - Tearing Strength - Trapezoid Method
- .4 CSA International
 - .1 CAN/CSA-B137 Series-13-2015, Thermoplastic Pressure Piping Compendium. (Consists of B137.0, B137.1, B137.2, B137.3, B137.4, B137.4.1, B137.5, B137.6, B137.8, B137.9, B137.10, B137.11 and B137.12).
 - .2 CAN/CSA-B137.1-09, Polyethylene Pipe, Tubing, and Fittings for Cold-Water Pressure Services
 - .3 CAN/CSA-B1800-15, Thermoplastic Non-Pressure Piping Compendium. (Consists of B181.1, B181.2, B181.3, B181.5, B182.1, B182.2, B182.4, B182.6, B182.7, B182.8 and B182.11)
 - .4 CAN/CSA-B182.2-13, PVC Sewer Pipe and Fittings (PSM Type).
- .5 Environmental Guide for Erosion and Sediment Control during Construction of Highway Projects, September 2015, Ministry of Transportation Ontario
- .6 Ontario Provincial Standard Specifications (OPSS):
 - .1 OPSS 412 Construction Specification for Sewage Forcemain Installation in Open Cut, dated November 2012
 - .2 As indicated on the drawing(s).
- .7 Ontario Provincial Standard Drawings (OPSD)
 - .1 As indicated on the drawing(s).
- .8 Canadian Council of Ministers of the Environment (CCME) Canadian Soil Quality Guidelines for Protection of the Environment and Human Health. 1999, as updated.
- .9 Ontario Ministry of the Environment Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act Full Depth Background Site Condition Standards, Soil (other than sediment), Property Use other than Agricultural.

1.5 ADMINISTRATIVE REQUIREMENTS

- .1 Scheduling:
 - .1 Schedule Work to minimize interruptions to existing domestic sewage services.
 - .2 Submit schedule of expected interruptions and adhere to schedule approved by Client Representative.
 - .3 Notify Client Representative and Tenants a minimum of 24 hours in advance of interruption in service.

1.6 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 piping and drainage field materials, including complete product characteristics, performance criteria, physical size, finish and limitations.
- .3 Shop Drawings:
 - .1 No stamped piping shop drawings required on this project.
- .4 Samples:
 - .1 Submit 20 kg sample of each granular material 4 weeks minimum before beginning Work:
 - .1 Granular A for bedding at piping distribution box
 - .2 Sand
 - .3 Granular material having percolation time (T) of 10 to 15 min/cm
- .5 Certificates:
 - .1 Submit copy of certification or licence of approved pipe and septic bed installers.
- .6 Test Reports:
 - .1 Submit 2 certified copies of factory tests of pipe material upon request.
 - .2 Erosion and Sedimentation Control: submit copy of erosion and sedimentation control plan in accordance with Ontario Ministry of Environment and Climate Change (MOECC). Refer to Item 3.2.1 below.

1.7 QUALITY ASSURANCE

- .1 Use certified licensed installers who comply with local authority having jurisdiction.

1.8 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with manufacturer's written instructions.
- .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 off ground in dry location and in accordance with manufacturer's recommendations.
 - .2 Store and protect drainage field materials from nicks, scratches, and blemishes.
 - .3 Replace defective or damaged materials with new.

Part 2 Products

2.1 GRAVITY SEWER MATERIALS

- .1 Type PSM Polyvinyl Chloride (PVC): to ASTM D3034 and CSA B182.2.
 - .1 Standard Dimensional Ratio (SDR): 35.
 - .2 Type PSM Poly (Vinyl) Chloride: to CSA B182.2
 - .3 Plastic pipe: to CSA B182.1, with push-on joints.
 - .4 Separate gasket and integral bell system.
 - .5 Nominal length: 6 m.
 - .6 Nominal diameter: 100 mm

2.2 FORCEMAIN PIPE MATERIAL

- .1 Polyvinyl chloride (PVC) pipe: to ASTM D2241, white in color.
 - .1 Standard Dimensional Ratio (DR): 18
 - .2 Diameter: 50 mm (2") nominal diameter
 - .3 Pressure Class: 1034 MPa. (150 PSI)
 - .4 Gasket bell end.
 - .5 Pipe joints: bell and spigot joints with rubber gaskets or mechanical joints to ANSI/AWWA C111/A21.11, with transition gaskets to pipe manufacturers specifications.
 - .6 Rubber gaskets: to ANSI/AWWA C111/A21.11. Gaskets for mechanical joints to be duck-tipped transition gaskets for PVC.
 - .7 Fittings for PVC piping to be one of the following (only one type permitted for the entire project):
 - .1 Ductile Iron according to AWWA C110/A21.10
 - .2 Ductile Iron according to AWWA C153/A21.53 and cement lines according to AWWA C104/21.4
 - .3 Injected moulded polyvinyl plastic according to CSA B137.2

2.3 FORCEMAIN ACCESSORIES

- .1 Joint restrainers at forcemain elbows and pipe sections nearby the pumping station and at flow distribution box:
 - .1 Ductile Iron construction, high strength low alloy steel double ended rods and nuts, minimum safety factor of 2.
 - .2 Anchor and restrain forcemain pipe to concrete tank/box;
 - .3 Supply and install joint restrainers at both vertical elbows, from tank/box up to 2 meters beyond the second elbow;
 - .4 Supply and install rigid insulation above forcemain portion near ground surface.
- .2 Rigid insulation on top of forcemain (where applicable), as shown on drawings, to be extruded polystyrene, having a R value of $10 \text{ ft}^2 \cdot \text{h} \cdot ^\circ\text{F}/\text{Btu}$ / $1.76 \text{ m}^2 \text{ } ^\circ\text{C}/\text{W}$,

and a minimum compressive strength of 40 PSI / 275 MPA at 10% deformation, to be Styrofoam™ Highload 40 Insulation, or approved equal.

2.4 GRAVITY SEWER AND FORCEMAIN PIPE BEDDING AND SURROUND MATERIALS

- .1 Granular material to Section 31 05 16 - Aggregate Materials and following requirements:

- .1 Crushed or screened stone, gravel or sand.
.2 Gradations within limits specified when tested to ASTM C136.
.3 Table

Sieve Designation	% Passing	
	Stone/Gravel	Gravel/Sand
25 mm	[100]	-
19 mm	-	-
12.5 mm	[65-90]	[100]
9.5 mm	-	-
4.75 mm	[35-55]	[80-100]
2.00 mm	-	[50- 90]
0.425 mm	[10-25]	[10- 50]
0.180 mm	-	-
0.075 mm	[0- 8]	[0- 10]

2.5 CLEAR STONE

- .1 Clear stone bed at raised bed and mantle septic system to be 19 mm diameter washed stone, free of fine material, with gradation within limits specified hereafter when tested to ASTM C136:

Particle Size	Percent Passing
53 mm	100%
19 mm	0-5%
75 µm	0-1%

2.6 FILTER MEDIUM BELOW CLEAR STONE LAYER

- .1 Filter medium to consist of clean sand comprised of particles ranging in size between the limits of:
- .1 An effective size of 0.25 mm with a uniformity coefficient not less than 3.5;
.2 An effective size of 2.5 mm with a uniformity coefficient not greater than 1.5,
and

2.7 ANTI-SILTATION FILTER FABRIC

- .1 Anti-siltation filter fabric to be non-woven needle punch polypropylene geotextile membrane to be set around filtering material, perforated piping and at trench as shown on

drawings and as prescribed under Part 3.0 below, to be EPURTEX by Soleno Textiles Inc., Tel; 450-668-2545, Toll free 1-888-241-9600, or approved equal.

.2 Geotextile properties

Properties	Test Method	Test Results
Weight	CAN-148.1 No. 2	75 g/m ² +/- 15%
Thickness	CAN-148.1 No. 3	0.6 mm +/- 15%
Tensile Strength	CAN-148.1 No. 7.3	180 N
Elongation at break	CAN-148.1 No. 7.3	55 – 95%
Tear Strength	CAN-4.2 – No 12.2	60 N
Burst Strength	CAN-4.2 – No 11.1	500 kPa
Hydraulic Permittivity	CAN-148.1 – No 4	6.0 s ⁻¹
Filtration Opening Size (FOS)	CAN-148.1 – No 10	180 µm
Standard Roll	ASTM D461	1.50 m X 50 m +/- 0.5%

2.8 IMPORTED FILTER MATERIAL

- .1 Fill material below raised be
- .2 Sand conforming to requirements of local authority having authority.
- .3 Imported sand percolation time (T) to be between 6 and 10 min/cm, with no more than 5% of silt and clay content on a weight basis;
- .4 Submit soil sample at least four (4) weeks in advance to independent laboratory

2.9 LOW PRESSURE DISTRIBUTION PIPING FOR CONVENTIONAL BED AND RAISED BEDS

- .1 Straight PVC pipe and fittings to CAN/CSA-B182.2, perforated or unperforated (solid) as indicated on contract drawings. IPEX BDS Sewer Pipe available in third-party certified to CSA B182.1 and conforms to ASTM. IPEX BDS fittings, made to SDR35 wall, are third party certified to CSA 182.2 and conform to ASTM D2729.
- .2 Perforated piping system to be PVC SDR35, nominal diameter as shown on site drawings, 3 m long, solvent weld pipe and fittings. Perforations to be set in two rows at 120° apart, installed at 4 and 8 o'clock.
- .3 Solid piping at header to be PVC SDR35, 75 mm (3") nominal diameter, 3 m long, solvent weld pipe and fittings.

2.10 LOW PRESSURE DISTRIBUTION PIPING FOR SHALLOW BEDS

- .1 Shallow bed material to consist of pressurized application piping installed below a diffuser chamber set horizontally over backfill material. Shallow bed could be installed either flush with existing ground level, or as a raised bed, as shown on drawings.
- .2 Perforated piping system to be PVC Schedule 32 mm (1 1/4") nominal diameter, 3 m long, solvent weld pipe and fittings.
 - .1 3.2 mm (1/8") orifice holes shall be spaced evenly (1.0 m c/c) along the top of the pipe, and 3.2 mm (1/8") drain holes spaced every 2.0 m on the bottom.

- .2 Supply and install at the downstream end of perforated pipe a 0.15 m radius elbow, 32 mm diameter PVC ball valve, a PVC removable threaded cap with a 3.2 m orifice, a plastic construction valve enclosure and access cover. Set perforated pipes on 150 mm or higher supports, of model, material and quantity recommended by the septic leaching chamber's manufacturer.
- .3 Solid piping at manifold (header) to be PVC 32 mm (1 1/4") nominal diameter, 3 m long, solvent weld pipe and fittings.
 - .1 Manifold shall be set vertically.
 - .2 At 3-row manifold only, supply and install a 32-mm diameter bronze gate valve, c/w threaded female connections; connect to rigid PVC piping using threaded male connectors, and Teflon tape.
- .4 Septic leaching chambers:
 - .1 BioDiffuser chambers to be made from high-density polyethylene resin as defined and described in IAPMO PS 63, with an open bottom, solid top and louvered sidewalls. Sidewall louvers shall be designed to minimize soil intrusion.
 - .2 Chamber shall meet the load rating of H-10 (16,000 lb per axle) with a minimum of 12-inches (0.3m) of cover when tested in accordance with IAPMO PS 63 and installed in accordance with ADS installation procedures.
 - .3 Each chamber shall interlock with the beginning of the next chamber by overlapping post and dome while engaging overlapping flanges. Each chamber to be 380 mm (15") wide and 305 mm (12") high.
 - .4 Chambers to be 27.6 cm (11") high, to be Bio 2 (15" narrow) model No. 1500BD, ADS-BioDiffuser™ septic leaching chambers as fabricated by Advanced Drainage Systems Inc., Tel: 1-800-733-9554, or approved equal.

2.11 ACCESSORIES AT LOW PRESSURE DISTRIBUTION PIPING (ANY TYPE)

- .1 Vent pipe to be 100 mm (4") diameter rigid PVC piping, with insect screen.
- .2 14-gauge TW solid copper light coloured plastic-coated tracer wire to be set above perforated distribution pipe / shallow bed chamber, non-perforated header pipes, and vent pipes.

2.12 BACKFILL MATERIAL

- .1 As indicated on drawings.
- .2 Granular B Type 1 (native material), in accordance with Section 31 23 33.01 - Excavating, Trenching and Backfilling. Material
- .3 Unshrinkable fill in accordance with Section 31 23 33.01 - Excavating, Trenching and Backfilling. At raised bed mantle, backfill material between the imported sand layer (T = 6 to 10 min/cm) and top soil layer to be either:
 - .1 Imported sand having percolation time (T) between 6 and 15 min/cm.
 - .2 Native soils fill, having percolation time (T) between 1 and 50 min/cm.

Part 3 Execution

3.1 EXAMINATION

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for drainage field installation in accordance with the manufacturer's written instructions.
 - .1 Visually inspect substrate in presence of a PCA Representative.
 - .2 Inform the PCA Representative of any unacceptable condition immediately upon discovery.
 - .3 Proceed with the installation once the unacceptable conditions have been remedied and after reception of a written approval to proceed from a PCA Representative.

3.2 PREPARATION

- .1 Temporary Erosion and Sedimentation Control:
 - .1 Provide temporary erosion and sedimentation control measures at all sites to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, as per the more stringent of:
 - “Environmental Guide For Erosion and Sediment Control during Construction of Highway Projects, September 2015, Ministry of Transportation Ontario”,
 - Ontario Ministry of the Environment Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act (MOE, April 15, 2011, PIBS 7382e01).
 - .2 Inspect, adjust, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.
 - .3 Remove erosion and sedimentation control measures, restore and stabilize any areas that may have been disturbed during the removal process.
 - .4 Erosion and Sedimentation Control Measures are more critical at sites identified on contract drawings. For these designated sites, Contractor is to document in writing construction date, inspection, cleaning and maintenance activities, and removal date. Such report is to be forwarded in PDF format to Parks Canada at the end of the works at the identified sites.
- .2 Pipes and fittings to be clean and dry.
- .3 Prior to installation, obtain approval from a PCA Representative relative to pipes and fittings.

3.3 DISTRIBUTION BOX AND PIPING

- .1 Coordinate the installation of the distribution box and piping with the forcemain and insulation installation.
- .2 Set and compact 150 mm of Granular A bedding at distribution box and rigid piping.

3.4 GRANULAR BEDDING AT DISTRIBUTION BOX AND FORCEMAIN

- .1 Conform to Section 31 23 33.01 - Excavating, Trenching and Backfilling, as amended hereafter.
- .2 Place granular bedding in unfrozen condition.
- .3 Place granular bedding material in uniform layers not exceeding 150 mm compacted thickness to depth as indicated.
- .4 Shape bed true to grade and to provide continuous, uniform bearing surface for pipe.
- .5 Shape transverse depressions as required to suit joints.
- .6 Compact each layer over the full width of bed to at least 98% maximum dry density to ASTM D698.
- .7 Fill excavation below design bottom elevation of specified bedding with compacted bedding material.

3.5 AREA TYPE SEWAGE DISPOSAL FIELD INSTALLATION

- .1 Top soil, and organic loam layer if any, must be removed from filter bed and slope extension areas prior to placement of filtering material.
- .2 Rough grade to depths as indicated. Scarify subsoil prior to fill placement.
- .3 Place a 450 mm thick layer of imported sand material in unfrozen condition as indicated.
- .4 Leaching bed fill material (imported filter material) to have a percolation rate of 10 to 15 min/cm and shall have been pre-approved in a written manner by a PCA Representative before delivering to site.
- .5 Prior to any excavation on site, confirm the bottom excavation depth with PCA Representative.
- .6 In order not to decrease the permeability of the absorption field, all excavations at the absorption field shall be corrected by means of backfilling with uncontaminated native soil, compacted to 92 % corrected maximum dry density to ASTM D698.
- .7 After the placement of leaching bed fill, a PCA Representative will conduct three (3) on-site percolation tests in sand mound before bed construction. To consider the material layer acceptable, all test results are to be within the 10 to 15 min/cm range.
- .8 Operate construction equipment across disposal only after reception of written approval from a PCA Representative.
- .9 Set sampling pipe c/w geotextile within upper portion of imported sand material, as shown on drawings.
- .10 Place 150 mm Specified Sand layer.
- .11 Set plastic pipes, supports and diffusers as per manufacturer's instructions. Do not cover immediately the top portion.
- .12 Install manifold / header between forcemain and leaching bed. The installation is to be of water-tight construction.

- .13 Set manifold / header level as indicated.
- .14 Connect lengths and place distribution pipe on filtering material as indicated.
- .15 Connect each distribution pipe individually to header.
- .16 Only at raised bed with mantle, interconnect free ends of perforated distribution lines with rigid piping. At other septic fields (conventional gravity beds, shallow beds), perforated line downstream ends are to be capped, and not to be interconnected.
- .17 Maintain pipe elevations within 5 mm of inverts indicated.
- .18 Place geotextile over filtering material and perforated piping as indicated. Geotextile membrane is to overlap by at least 500 mm.
- .19 Set tracing wire above trench as indicated on drawings.
- .20 Backfill and align trenches until pipe grade only after receipt of written approved from a PCA Representative.
- .21 Cover disposal field as indicated below.
 - .1 Use only material approved in writing by a PCA Representative.
 - .2 Do not compact.
 - .3 Overfill to allow for settlement.
- .22 Grade surrounding disposal field bed areas as indicated, to provide for diversion of surface run off waters.
- .23 Complete surface reinstatement with 150 mm of top soil in accordance with Section 32 91 19.13 - Topsoil Placement and Grading, with the following procedures: topsoil to be light tamped only, and shall not be compacted.
- .24 Complete seeding in accordance with Section 32 92 23 – Seeding.

3.6 MANIFOLD

- .1 Set manifold at pressurised systems as shown on drawings.
- .2 At 3-row manifold servicing shallow bed, set manifold, plus perforated piping secured to support, and bronze valve, Contractor to pump clean water to piping system using a pump generating same flow rate and hydraulic head as the effluent pumps described under Section 32 32 13.13 – Sewage Lift, Wet Well Type. Contractor is to adjust valve opening in presence of Client's representative or Consultant, to demonstrate that the incoming flow rate is distributed equally over the 3 perforated lines. Once valve setting would be satisfactory, valve handle is to be removed, top of valve is to be covered with plastic sheet, and shallow bed diffusers are to be set. Contractor is to complete shallow bed construction. Contractor is to return valve handle to Client, for future use.

3.7 BACKFILL

- .1 Place backfill material in unfrozen condition.
- .2 Place backfill material above pipe surround, imported granular material, concrete sand and piping in uniform layers not exceeding 150 mm compacted thickness up to grades as indicated.

- .3 Under paving, driveways, access road up to 1 m from the edge of these, and below walks, compact backfill to at least 100% maximum dry density to ASTM D698.
- .4 Within grassed area outside absorption field limit (including raised bed mantle), compact to at least 98% standard proctor maximum density to ASTM D698.
- .5 Within absorption field area, including raised bed and mantle, compact to 92 % corrected maximum dry density to ASTM D698, in order not to decrease the permeability of the absorption field, and to minimize material erodibility and differential settlements over time.
 - .1 This rule applies to natural soil backfilling and compaction, where new absorption field to be set close to the new septic tank excavation.

3.8 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
 - .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 Section 01 74 11 - Cleaning.

END OF SECTION