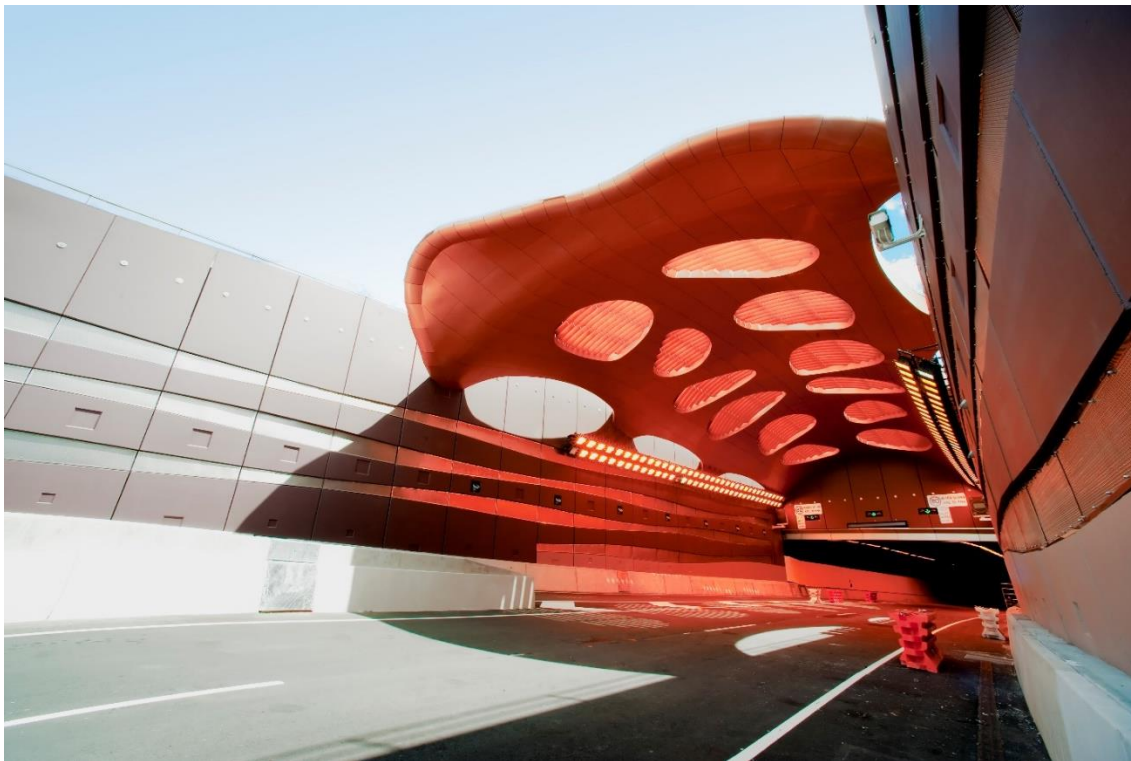


THE MUNICIPALITY OF SOUTHWEST MIDDLESEX
REQUEST FOR TENDER NUMBER:2025-01

LIMERICK LANDFILL CLOSURE, FINAL COVER AND STORMWATER DRAINAGE WORKS

TECHNICAL SPECIFICATIONS
OCTOBER 24, 2024

FINAL





LIMERICK LANDFILL
CLOSURE, FINAL
COVER AND
STORMWATER
DRAINAGE WORKS
TECHNICAL
SPECIFICATIONS
OCTOBER 24, 2024

THE MUNICIPALITY OF SOUTHWEST
MIDDLESEX

VERSION (0.0)
FINAL

PROJECT NO.: CA0030474.8667
CLIENT REF:2025-01
DATE: OCTOBER 24, 2024

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ATTACHMENT

- A** CONSTRUCTION DRAWINGS
- B** REFERENCE DOCUMENTS

1 GENERAL ITEMS

1.1 INTENT

1. The intent of this Contract is to facilitate the permanent closure of the Limerick Landfill through the completion of landfill cover application (capping), stormwater drainage and related Site improvements. Permanent Site closure will be achieved by clearing and grubbing, stripping of topsoil, regrading and spreading existing waste stockpiles, regrading the top of waste layer, applying a final cover system, and constructing stormwater management controls such as perimeter ditches, erosion controls, and flow control measures, and restoring the Site fencing, gates and vegetative cover.
-

1.1.1 SCOPE OF WORK

1. The scope of work for construction (herein referenced to as the “Works”) includes the following:
 - 1.1. Submit for review and execute a Site-Specific Health and Safety Plan, Erosion and Sediment Control Plan, Environmental Management Plan, Waste Management/Disposal Plan, Traffic Control Plan, and pre-constructions submittals for final cover – clayey soil and topsoil.
 - 1.2. Mobilize the Site and conduct a pre-construction topographic survey within the property limits.
 - 1.3. Supply and install protective fencing around on-Site groundwater monitoring wells.
 - 1.4. Supply and install erosion controls and environmental protection measures.
 - 1.5. Supply and install a temporary mud mat at the existing south Site entrance along Limerick Road.
 - 1.6. Engage a drilling subcontractor licensed in the Province of Ontario to install an extension to leachate monitoring well LW-101.
 - 1.7. Clear and grub vegetation within the construction areas located within inferred limit of waste and extents of the proposed perimeter ditches.
 - 1.8. Chip the cleared and grubbed vegetation and either:
 - 1.8.1. Dispose of at an approved off-Site facility; or
 - 1.8.2. Use on-Site as landscaping/restoration amendment.
 - 1.9. Strip and temporarily stockpile topsoil within the construction areas.
 - 1.10. Regrade the landfill within the inferred waste limit to the top of waste lines and grades shown on the Construction Drawings (includes regrading existing waste, gravel and soil stockpiles).
 - 1.11. Realign and regrade existing West Ditch 1 & 2, South Ditch 1 and East Ditch 2 & 3 to the lines and grades shown on the Construction Drawings.
 - 1.12. Construct and grade new East Ditch 1 to the lines and grades shown on the Construction Drawings.
 - 1.13. Supply and place rip rap aprons, complete with geotextile, within the ditches at the locations shown on the Construction Drawings.
 - 1.14. Supply and install 300 mm diameter corrugated steel pipe (CSP) culvert, complete with a 100 mm diameter orifice plate as shown on the Construction Drawings, including frost protection, bedding, cover and associated works.

- 1.15. Supply, place, compact and grade the 600 mm thick clayey cover soil over the re-graded top of waste or soil fill. Clayey soil will either be sourced from local borrow pits or excess soil facilities. Imported soil shall meet the geotechnical and chemical criteria outlined in these Technical Specifications.
- 1.16. Place and grade 150 mm thick topsoil, obtained from on-Site temporary stockpiles, over the clayey cover soil and within the perimeter ditches.
- 1.17. Supply, place and compact Granular B, Type II sub grade for new access road.
- 1.18. Supply, place and compact Granular A sub grade for new access road.
- 1.19. Remove and dispose of the existing gate located at the north entrance along Limerick Road and replace it with fence panels.
- 1.20. Install a new access gate and access road at the existing south Site entrance along Limerick Road.
- 1.21. Supply and place Seed Mix #1, nurse crop, mulch and fertilizer over the topsoil located within the inferred landfill limits.
- 1.22. Supply and place Seed Mix #2, nurse crop, mulch and fertilizer over the topsoil located within the perimeter ditches.
- 1.23. Conduct a post-construction topographic survey within the property limits and submit all post-construction records.
- 1.24. Demobilize from Site.
2. Provisional items (to be implemented only if needed and with written approval by Owner or Engineer).
 - 2.1. Supply and place erosion control blanket over the seeded topsoil in accordance with OPSS.MUNI 804.
 - 2.2. Supply and place a winter maintenance crop of Winter Wheat Grain over the topsoil at the rate of 60 kilogram per hectare (km/ha) after the date of winter dormancy period as outlined in Table 3 of OPSS.MUNI 804.
 - 2.3. Engage a drilling subcontractor licensed in the Province of Ontario to install an extension to groundwater monitoring wells MW-102, MW-105 and MW-106.
 - 2.4. Supply, place and compact clayey soil cover as make-up fill to match top of waste lines and grades, as required.
 - 2.5. Supply, place and grade topsoil from an approved off-Site source for use as additional 150 mm thick (minimum) vegetation sustaining layer.
 - 2.6. Remove and dispose of the existing Site fence to the east of the proposed West Ditch 1 & 2, and north of South Ditch 1 and East Ditch 2 as shown on the Construction Drawings.
 - 2.7. Supply and install new 1.8 m chain-link fence to the east of the proposed West Ditch 1 & 2, and north of South Ditch 1 and East Ditch 2 as shown on the Construction Drawings.

1.1.2 DEFINITIONS

The following definitions will apply to provide further clarifications to the associated definitions provided in CCDC4 – 2023 Edition.

1. "Owner" in these Technical Specifications means The Municipality of Southwest Middlesex.
2. "Consultant", "Owner's Representative", "Engineer", and "Contract Administrator" in these Technical Specifications shall mean WSP Canada Inc.
3. "Contractor" shall mean an Owner-selected successful Bidder who has completed and executed the Contract Documents for this project.

4. Contract Documents: Defined in Article A-3 of the CCDC 4 – 2023 Edition as provided in the document titled “Limerick Landfill Closure, Final Cover and Stormwater Drainage Works, Tender Documents”, dated September 27, 2024.
5. Construction Drawings: Provided in Appendix A of this document.
6. Contract or Bid Price: Monetary sum identified on the Summary of Tender Price Form and Supplement to Tender Price Form as provided in the document titled “Limerick Landfill Closure, Final Cover and Stormwater Drainage Works, Tender Documents”, dated September 27, 2024
7. Technical Specifications: Contents of this document.
8. The Technical Specifications herein are referenced to the Ontario Provincial Standards for Construction and Material Specifications as well as the Ontario Provincial Standard Drawings, provided in Appendix B of this document.

1.1.3 SCHEDULING / SEQUENCING

1. The Owner requires the Works, as shown on the Contract Drawings, to be completed as per the Schedule in the Contract Documents. The Contractor shall commence work within four weeks, or another date agreed to by the Owner upon award of the Contract and shall proceed without interruption until all of the Works are complete.

1.2 GENERAL REQUIREMENTS

1.2.1 NOTICE OF PROJECT AND PERMITS

1. Before commencement of the Works, and after Award of Contract, the Contractor shall provide a completed Notice of Project to the Ministry of Labour, Training and Skills Development, that meet the standards set out in section 6(1) of the Regulation for Construction Projects, O. Reg 213/91.
2. Before commencement of the Works, and after Award of Contract, the contractor shall contact authorities having jurisdiction within the Municipality of Southwest Middlesex to coordinate, consult, and obtain and pay for the permits associated with these Works.

1.2.2 WORK DAYS AND HOURS

1. The Contractor shall prepare the Tender Price and Construction Schedule based on the following maximum working hours: 7:00 am to 7:00 pm Monday to Friday (inclusive). Work outside of these hours and days, including Statutory Holidays, is prohibited unless prior approval is obtained from the Owner or Engineer.

1.2.3 LAYOUT AND GRADE CONTROL

1. The control points available for use by the Contractor in constructing the Works are shown on the Construction Drawings.
2. The Contractor shall provide all necessary labour and equipment to establish the proposed grades. The Contractor shall assume full responsibility for dimensions and elevations measured from the lines, grades and elevations so established.

3. The Contractor shall provide, erect, and maintain for the duration of the work, such masts, batter boards, straight edges, templates, grid co-ordinate markers, and other devices as may be necessary to facilitate inspecting the Work.

1.2.4 BENCHMARKS AND SURVEY MONUMENTS

1. Control points are shown on the Construction Drawings for the Contractor's use.
2. The Contractor shall verify the location/elevation of the referenced monument(s).
3. Coordinates provided are in Universal Transverse Mercator (UTM) North American Datum (NAD) 83 (Original) and are referred to the central meridian 81W West Longitude, Zone 17 and the vertical datum is Canadian Geodetic Vertical Datum (GVD) 28 (geodetic).

1.2.5 SHOP DRAWINGS

1. Furnish to the Engineer all Contractor's, Subcontractor's, and manufacturer's drawings which shall be deemed to include shop drawings, catalogue cuts, brochures, illustrations, material lists and performance data which may be required by the specifications, requested by the Engineer or otherwise necessary for the proper execution of the Work. Submit all drawings to the Engineer in the manner hereinafter described, in sufficient time to prevent delays in delivering of materials or in progress or completion of the Work.
2. All Subcontractor and manufacturer drawings shall first be sent directly to the Contractor who shall keep a record of the drawing numbers and dates of receipt.
3. The Contractor shall check thoroughly all such drawings for measurements, sizes of members, materials and all other details, to assure himself that they conform to the intent of the drawings and specifications and shall promptly return to the Subcontractors and/or manufacturers for correction, such of the drawings as are found inaccurate or otherwise in error. After the Contractor has checked and approved such drawings, he shall place thereon the date of such approval and the legible signature of the checker and shall then submit them to the Engineer for review. The Engineer reserves the right to refuse to check or review any drawings of the Subcontractor or manufacturer that are not submitted in compliance with the foregoing requirements.
4. The Contractor shall submit in PDF format or five (5) copies of the drawings, brochures, etc. in addition to the number that the Contractor wishes returned for his own and his supplier's or Subcontractors use. One set of such drawings shall be in reproducible form.
5. For all equipment, shop drawings shall be complete in all respects and shall show clear compliance with the specifications. Where applicable, performance figures of equipment; finishes and reference to other relevant drawings must be noted on shop drawings. Details or auxiliary items being supplied with the particular equipment must be submitted. Piecemeal submissions will not be considered. Wiring and elementary control diagrams shall be submitted for electrical equipment. Descriptive brochures where applicable shall be included for information. Any notations made on the shop drawings by the Contractor, shall be made in red ink.
6. The Engineer will review the drawings submitted by the Contractor within a reasonable time and will return them with the noted comments which may be "no comment", "Amend and Submit", or "Rejected See Remarks". Drawings marked "Rejected See Remarks" shall be either corrected and resubmitted or shall be superseded by other submitted drawings. Each drawing returned "Rejected See Remarks" shall be subject to a \$500 penalty.
7. The Contractor should allow at least five (5) days' time for checking shop drawings by the Engineer.
8. Drawings resubmitted for further checking will be checked for correctness of previous notations only and the Contractor, by such resubmission shall be held to have represented that such drawings contain no other alterations, additions or deletions, unless the Contractor (in writing) directs the Engineer's specific attention to same. Should the Contractor question or dissent from such notations, instructions, or directions made by the Engineer, they shall direct the Engineer's attention to the same for clarification before resubmitting the

drawings. Corrections or changes indicated on such drawings shall not be considered as an order to perform extra work.

9. By checking and reviewing the Contractor, Subcontractor or manufacturer's drawings, the Engineer does not assume responsibility for errors or omissions. Such errors or omissions must be made good by the Contractor, irrespective of the receipt, checking or review of the drawings by the Engineer, and even though the work is done in accordance with such drawings.
10. Work shall not be carried out before the Engineer's review of the shop, working or setting drawings relating to such work as has been carried out. If work is carried out prior to Engineer's approval, the work will be dismantled and rebuilt as required at the sole expense of the Contractor. Costs for the Owner's Engineer to assess the deficiency, direct remedial work order, as well as conduct oversight of the remedial activities will be at the expense of the Contractor.

1.2.6 EXISTING UTILITIES

1. The Contractor shall contact all utility companies for utility locations and shall be responsible for protection of various utilities as required to perform the Work.
2. No responsibility will be assumed by the Engineer for the correctness or completeness of the Construction Drawings with respect to existing utilities or other structures, either underground, on the surface, or above ground.
3. Contractors are responsible to make their own independent assessment of the subsurface conditions by whatever means possible, at no additional cost to Owner. Contractor shall not make any claim for additional compensation as a result of variances in the subsurface conditions.

1.2.7 TEMPORARY POWER SUPPLY

1. Provide and pay for temporary power during construction for temporary lighting and operating tools/equipment, as needed.
2. Provide and maintain temporary lighting throughout project, as needed.
3. Consult with the Owner to determine if existing electrical service to Site may be used during the Works.

1.2.8 POTABLE WATER SUPPLY

1. The Contractor shall be responsible to ensure that an adequate potable water supply is available for the Work.
2. Potable water shall be used in all cases where water is required (e.g., for dust control, clayey cover soil application, etc.). The Contractor is responsible for supply of all equipment required for watering, including pumps, hoses, spray nozzles etc.
3. Contractor shall be responsible for the purchase, loading and hauling of water to the Site.

1.2.9 QUALITY ASSURANCE

1. The Work shall be inspected by the Engineer and the Owner to ensure that all Works are completed in accordance with the Construction Drawings and Technical Specifications.
2. All works shall be inspected and tested as described in the Technical Specifications, before they are covered. All works shall be inspected for alignment, elevation, grade and workmanship.
3. The Contractor shall provide samples of materials for testing as required by the Technical Specifications or as ordered by the Engineer/CQA Consultant/Owner. The Contractor shall assist the Engineer/CQA Consultant in

performing any tests deemed necessary to ascertain the acceptability of the work. No additional payment, in excess of the accepted Contract price, shall be made for the Contractor's assistance in this regard.

4. In the event of unsatisfactory materials testing results, the Contractor shall bear the cost of additional sampling, delivery and testing charges necessary to ascertain that the material meets the Technical specifications.
5. In the event that more than one interpretation may be made of any test result, the Engineer shall choose the result(s) that shall be accepted as correct and representative.
6. Whenever necessary, as determined by the Engineer, work shall be suspended for such reasonable time as may be necessary to permit the Engineer/CQA Consultant to inspect any portion of the work, and the Contractor shall not be allowed any extra compensation for this suspension of work.
7. Ensure Work complies with requirements of the Owner and the Engineer.
8. Engineer and Owner representatives will be present during construction. They have the power to order work stopped if, in their opinion, it is not being performed in accordance with the Technical Specifications.

1.2.10 LIABILITY INSURANCE

1. The Contractor shall include the Engineer, and regulatory bodies identified in Section 1.2.18 as additional insured in the same manner and to the same extent as the Owner.

1.2.11 INCLEMENT WEATHER

1. The Contractor shall adequately protect the Work and all related materials from damage or disturbance at times of inclement weather, to the satisfaction of the Engineer and Owner.
2. Weather restrictions may apply during certain aspects of the construction process.

1.2.12 CONTRACTOR'S SITE TRAILER AND PORTABLE TOILETS

1. The Contractor's Site trailer and portable toilets shall be located at a location approved by the Owner or Engineer.

1.2.13 LIMIT OF OPERATIONS AND STORAGE AREAS

1. All of the Contractor's construction operations and storage of materials shall be confined within the Site's property limits, unless otherwise directed by the Owner or Engineer. The Contractor's operations and storage areas shall be located at locations approved by the Owner or Engineer.

1.2.14 PROTECTION OF GROUNDWATER MONITORS

1. The Contractor shall not damage any existing groundwater, leachate or landfill gas monitoring wells located at the landfill Site. The Contractor shall arrange the work in a manner that always allows access by others to the existing groundwater monitors. Any damaged monitors, as determined by the Engineer, shall be repaired or replaced by the Contractor to the satisfaction of the Engineer at no additional cost. Note that a groundwater monitor can cost up to \$10,000.

1.2.15 SITE ACCESS AND USE

1. Access for all of the Contractor's work shall be via the existing main Site entrance, unless otherwise approved by the Owner or Engineer.

2. The Contractor shall not obstruct access to the landfill at any time during the course of the Works.
 3. The Contractor shall take care when mobilizing heavy machinery, equipment and materials over existing Site roads. The Contractor shall maintain existing roads in good working condition as acceptable to the Engineer and Owner.
 4. The Contractor shall be responsible for any and all damage caused to existing roads by the Contractor or his subcontractors or suppliers. The Contractor shall repair all damaged areas to the original conditions at the Contractor's own expense as soon as it is practicable. If the Contractor does not repair the road within an acceptable amount of time to the satisfaction of the Owner, the Owner reserves the right to carry out repair work deemed necessary by the Owner and charge the cost to the Contractor.
 5. Contractor shall construct and operate a temporary mud mat in accordance with the Construction Drawings at the Site entrance to facilitate the cleaning of vehicle tires and minimize the tracking of Site soils onto the adjacent Limerick Road. Contractor shall dismantle and properly dispose of the mud mat materials upon completion of the Works.
-

1.2.16 DISPOSAL OF WASTE MATERIAL

1. During construction and on completion of the Works, the Contractor shall remove waste and rubbish generated during the execution of the Work and leave the Work area clean and ready for use to the satisfaction of the Owner.
 2. In case of dispute, the Owner reserves the right to remove the waste and rubbish and charge the cost to the Contractor.
 3. Equipment and materials which are not necessary for the execution of the Works shall not be permitted on Site. On completion of the Work, all temporary works, materials not required, and equipment shall be removed off-Site by the Contractor.
-

1.2.17 MEETINGS AND ROUTINE SUBMISSIONS

1. Following Award of Contract and the instruction to commence the Works, the Engineer will convene a preconstruction meeting with the Owner and the Contractor. The preconstruction meeting will, as a minimum, include discussion of the following:
 - 1.1. The appointment and notification of official representatives of participants in the Work.
 - 1.2. Site-specific Health and Safety plans and requirements.
 - 1.3. Requirements for temporary facilities, Site signs, offices, storage sheds, utilities, Site access and use.
 - 1.4. Site access and security.
 - 1.5. Work schedule, including the delivery schedule of required products and materials.
 - 1.6. Schedule for submission of shop drawings, samples and similar documents.
 - 1.7. Schedule for Construction Progress meetings.
 - 1.8. A review of administrative procedures, including change notices, change orders, Site instructions, record drawings and progress claims.
 - 1.9. The appointment of inspection and testing agencies or firms.
 - 1.10. Scheduling and location of work as it relates to any other Contractor(s) working at the Site.
 - 1.11. Other items as they arise at the meeting.
2. Construction Progress meetings will be held on-Site, bi-weekly (once every two weeks or at another frequency approved by the Owner) during the course of the Works. The official representatives of the Owner, Engineer

and Contractor shall participate. The purpose of these meetings is to discuss the progress of the Work and related matters including:

- 2.1. Review and acceptance of previous meeting minutes.
 - 2.2. Health and Safety issues.
 - 2.3. Work completed since last meeting and work scheduled to be completed before the next meeting.
 - 2.4. Any problem that may impede Work progress and the construction schedule and corrective measures required.
 - 2.5. Contractor's nuisance control programs.
 - 2.6. Revisions to the construction schedule and products, if any.
 - 2.7. Progress payment, as appropriate.
 - 2.8. Other items as they arise at the meeting.
3. The Contractor shall provide the Engineer and the Owner with the following information in writing on a bi-weekly basis:
 - 3.1. Updated construction schedule, describing all major work tasks, the degree of completion of each task, and the projected date of completion.
 - 3.2. An activity summary, including:
 - 3.2.1. The work carried out during the previous two weeks and the locations of the work performed.
 - 3.2.2. A list of all materials/products delivered to the Site complete with delivery dates.
 - 3.2.3. A list of all major equipment on-Site including dates of equipment mobilization/demobilization; and
 - 3.2.4. A summary of any work carried out that is beyond the original scope of the contract.
4. The Contractor shall provide all written information in a format acceptable to the Owner.

1.2.18 REGULATORY INSPECTIONS

1. The Contractor is advised that the design and construction of the Works is regulated by the Ministry of the Environment, Conservation and Parks (MECP), as per the conditions of the Site's Amended Environmental Compliance Approval No. A041902, dated June 8, 2020. Inspectors from the MECP and other authorities may visit the Site at any time during construction. The Owner's acceptance to the Works may be withheld until the MECP or other authorities concerned have issued their approval.

1.2.19 FINAL ACCEPTANCE OF WORK

1. The Contractor shall notify the Owner when, in the opinion of the Contractor, the Works have been satisfactorily completed, upon which the Owner shall then cause the final inspection of the Works. When the whole of the Works is found by the Owner and Engineer to be completed in accordance with the Construction Drawings and Technical Specifications, the Owner, subject to any extended warranties on material and workmanship, may give notice of acceptance in writing to the Contractor and the Owner shall henceforth assume the maintenance of the accepted Work.

1.2.20 EQUIPMENT FUELING, MAINTENANCE AND STORAGE

1. Construction equipment shall be stored, refueled and maintained in a location acceptable to the Owner or Engineer. All refueling shall be conducted by appropriately trained personnel using proper personal protective equipment and procedures. No fuel storage is permitted on Site.

2. The Contractor shall ensure that a spill kit containing all materials required for the clean-up of spillage (e.g., absorbents, etc.) is readily accessible on Site at all times, to the satisfaction of the Owner or Engineer.
 3. Construction equipment shall be kept in good repair such that leakage of fuels or lubricants does not occur.
 4. Any leakage of fuels, lubricants, or other liquids from construction equipment must be cleaned up immediately to the satisfaction of the Owner or Engineer. Any part of the work that has become affected by any liquid leakages or spillages, as determined by the Owner or Engineer, shall be reconstructed and/or replaced to the satisfaction of the Owner or Engineer and at the expense of the Contractor. The cost of disposing of any materials off-Site, as a result of leakage or spillage, shall be paid by the Contractor.
-

1.2.21 SOIL STOCKPILE MANAGEMENT

1. The Contractor is responsible for the ongoing management of the soil stockpiles generated during the Work as well as existing stockpiles that are disturbed by the Contractor. This shall include the routine regrading and sealing of the stockpile surface to minimize infiltration into the stockpiles, erosion and sloughing, to the satisfaction of the Owner or Engineer.
-

1.2.22 SITE RESTORATION

1. All areas disturbed during the execution of this Contract shall be restored as specified in a tender item or to a condition at least as good as that which existed prior to the commencement of the Works.
 2. No extra payment will be allowed for restoration under this Contract, and the prices bid for each item shall include full compensation for the required restoration.
-

1.2.23 "AS-CONSTRUCTED" RECORDS

1. The Contractor shall provide to the Engineer all necessary survey records for the completed Works to confirm as-constructed material quantities and to allow preparation of as-constructed drawings.
 - 1.1. As-constructed records of a non-spatial nature shall be provided in the form of shop drawings in AutoCAD or PDF format.
 - 1.2. As-constructed records of a spatial nature shall meet the following requirements:
 - 1.2.1. Separate survey records shall be provided for each layer, stage or feature of the constructed Work.
 - 1.2.2. Survey data shall be based on the Survey control monuments at the Site as shown on the Construction Drawings.
 - 1.2.3. Units of measurement shall be metres.
 - 1.2.4. Sufficient survey points shall be captured to ensure a minimum level of detail and accuracy equivalent to the Construction Drawings.
 - 1.2.5. Survey points shall include five attributes: point number, easting, northing, elevation and description. Point descriptions shall be used to categorize various related features and shall be consistent throughout the duration of the Work. A document listing all point description codes shall be provided with each survey record.
 - 1.3. Each survey record shall include the following three files:
 - 1.3.1. Adjusted survey point file in ascii-text csv format.
 - 1.3.2. CADD drawing in AutoCAD DWG format.
 - 1.3.3. CADD drawing in Adobe Acrobat PDF format.

- 1.4. File names shall clearly identify the layer or feature of the as-constructed Work, the date of field survey and the revision (in the case of interim survey records).
 - 1.5. The AutoCAD drawings shall meet the following requirements:
 - 1.5.1. CADD objects shall be organized by separate layers with layer names that are consistent throughout the duration of the Work.
 - 1.6. Layer descriptions shall be used to identify or explain any layer codes.
 - 1.7. Survey data points shall be represented by a block object containing the point number and description as attributes.
 - 1.8. Survey data points representing linear features shall be joined with a continuous 3D polyline object.
 - 1.9. Survey data points representing a surface feature shall include: a TIN with 3D face objects, contour polyline objects and a bounding continuous 3D polyline object.
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1.2.24 ON-SITE CONSTRUCTION DOCUMENTS

1. The Contractor shall have on Site at all times and be familiar with the following documents:
 - 1.1. Required Ministry of Labour forms.
 - 1.2. Material Safety Data Sheets.
 - 1.3. Construction Drawings and Technical Specifications.
 - 1.4. Shop drawings.
 - 1.5. Test Results.
 - 1.6. Health and Safety Plan.
 - 1.7. Ontario Health and Safety Act and Regulations.
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1.2.25 CHANGE ORDERS

1. The Contractor shall complete and promptly return all Change Order price requests issued by the Contract Administrator quoting unit and/or lump sum prices as requested.
 2. Include appropriate supporting documentation to verify prices.
 3. The Contractor shall not proceed with work affected by the Change Order price request until authorized to do so by Change Order.
 4. The Contractor shall not proceed with Work described in the Contract Administrator's Change Order request unless a formal, signed Change Order has been issued and signed by the Owner.
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1.3 MEASUREMENT AND PAYMENT

1. The combined cost of all items identified in the Summary of Tender Price Form and Supplement to Tender Price Form shall, in all cases, fully cover the cost of all machinery, tools, labour, apparatus, plant, other means of construction, materials, and any expenses required for the execution of the Works completed as per the Construction Drawings and Technical Specifications.
2. Unit prices included and submitted as part of the tender are to be based on units of measurement specified in the bidding documents and are to include labour, materials equipment, preparation of shop drawings, delivery, handling, placing, installing, disposal of surplus material, overhead and profit, and any other direct and indirect expenditures of such work as specified in the Contract Documents.

3. Unit prices for specified units of measurement are to apply to all Works that can be measured in the said units regardless of the variations in productivity and job conditions, or the time when instruction to perform such work is issued.
4. Provisional Items may or may not be completed at the discretion of the Owner.
5. Unless otherwise specified, all work shall be completed to the lines, elevations, grades, and alignments shown in the Construction Drawings. Overbuild beyond the limits shown shall not be paid for by the Owner.
6. Prices for lump sum items submitted as part of the tender are to include labour, materials, equipment, preparation of shop drawings, delivery, handling, placing, installing, disposal of surplus material, overhead and profit, and any other direct or indirect expenditures of such work as specified in the Contract Documents.
7. Payment under General Items shall be by lump sum basis, as such no measurements are required. These General Items include items specified in this Technical Specification, including:
 - 7.1. Mobilization and demobilization.
 - 7.2. Layout and grade control.
 - 7.3. Locating, maintaining and restoring survey monument(s),
 - 7.4. Location and protection of utilities.
 - 7.5. Provision of uncontaminated water supply.
 - 7.6. Quality control testing.
 - 7.7. Liability insurance for Engineer.
 - 7.8. Protection of Work from damage due to the effects of weather (including protection from strong winds, rain and snow).
 - 7.9. Scheduling and co-ordination of work to avoid interference with other operations at the facility.
 - 7.10. Contractor's Site Office.
 - 7.11. Observance and delineation of limits of working area.
 - 7.12. Access road maintenance.
 - 7.13. Off-Site disposal of unwanted construction material.
 - 7.14. Attendance at meetings and preparation of required schedules.
 - 7.15. Scheduling and co-ordination of work around MECP inspections, if applicable.
 - 7.16. Site housekeeping.
 - 7.17. Traffic control.
 - 7.18. Protection of environmental features.
 - 7.19. Dust control.
 - 7.20. Noise control.
 - 7.21. Litter and noise control.
 - 7.22. Cleanup and management of spills.
 - 7.23. Dewatering (as needed).
 - 7.24. Preparation and observance of Worker Health and Safety Plan.
 - 7.25. Management of material stockpiles.
 - 7.26. Stormwater management.

7.27. Provision of survey data for preparation of as-constructed drawings.

END OF SECTION

2 HEALTH, SAFETY AND ENVIRONMENTAL MANAGEMENT

2.1 GENERAL HEALTH AND SAFETY

1. The Contractor shall be held responsible by the Owner for all damage caused by themselves, their employees, or any sub agents, including damage to subsurface or surface utilities, properties, pavement, sidewalks, curbs, buildings, or structures adjacent to or in the general area of the work, through any cause relating to the work carried out under this contract. Additionally, the Contractor will be required to make good all such damage at their own expense to the satisfaction of the Owner.
2. The Contractor shall be fully responsible for ALL accidents arising by reason of execution or non-execution, or non-repairs of the said works, or by reason of any failure to comply with the requirements of this clause and shall fully indemnify the Owner and Engineer in respect thereof.
3. Contractor is responsible for daily Site safety inspections and must take corrective action immediately should unsafe conditions or circumstances be found. Contractor shall maintain a log of daily Site inspections and make it available to the Owner/Engineer upon request.
4. Contractor must provide Site safety training to all new employees on the date of hire and keep written records of such. This Site safety training and the record will be available to the Owner/Engineer if requested.
5. Any accidents must be reported to the Owner/Engineer immediately by the Contractor and a representative of the Owner/Engineer and the Contractor will investigate for corrective action purposes.
6. Owner reserves the right to conduct a Site and equipment safety inspection anytime during the construction Contract to ensure safety compliance by the Contractor, including safety training, reporting and proper safety signage on the Site.
7. Contractor will supply to the Owner or Engineer, if requested and prior to Contract Award, a Workplace Safety & Insurance Board (WSIB) CAD-7 report indicating frequency of accidents and rating.
8. All Site safety records are to be made available to the Owner/Engineer on request.
9. The Contractor's Site supervisors, foremen and health and safety representative shall organize and attend bi-weekly progress meetings with the Owner/Engineer.
10. Refer to Subsection GC 9.4 Construction Safety in CCDC 4 (2023).

2.1.1 REGULATIONS

1. The Contractor shall conduct the work at all times, with the safety of employees on the job and the safety of the Owner/Engineer, the Owner's/Engineer's employees or representatives, and the public in mind.
2. All work shall be done in accordance with recognized safe working practices and all Government requirements applying to the work.
3. The Contractor shall comply with all conditions and regulations of the Occupational Health and Safety Act (OHSA), R.S.O. 1990, and the regulations enacted there under for construction projects and amendments thereto; any other Federal or Provincial Statute or Local By Law concerning safety, including but not

limited to Ontario Building Code, the regulations of the Ontario Ministry of Labour, Ontario Hydro Safety Requirements, and Workplace Safety and Insurance Board. Requirements shall be strictly enforced.

4. In the event of conflict between and provisions of the above authorities the most stringent provisions will apply.

2.1.2 *SITE-SPECIFIC HEALTH & SAFETY PLAN*

1. Within seven (7) business days after the Notice to Proceed and prior to mobilization to Site, Contractor shall submit a Site-specific Health and Safety Plan to Owner/Engineer. As a minimum, the plan shall address aspects of worker protection and measures designed to prevent migration of hazardous or contaminated material to the environment, including but not limited to, the provision and guidelines contained herein, and the following specific topics:
 - a. Worker training.
 - b. Personal hygiene, personnel and equipment decontamination procedures.
 - c. Personal protective equipment (PPE) types to be used.
 - d. Air monitoring.
 - e. Emergency first aid training, personnel, equipment and supply.
 - f. On-Site and Off-Site contingency and emergency response plans.
 - g. List of emergency contacts.
2. Engineer will review Contractor's Site-specific Health and Safety Plan and provide comments to Contractor within seven (7) business days after receipt of the plan. Contractor shall revise the plan as appropriate and resubmit the plan to the Engineer within three (3) business days after receipt of the comments from the Engineer.
3. Health and safety guidelines herein are intended to provide for a safe and minimal risk working environment for on-Site personnel.
4. Should the Contractor seek relief from, substitution for any portion or provision of the minimum health and safety guidelines specified herein, or the reviewed Site-specific Health and Safety Plan, such relief or substitution shall be requested to the Engineer in writing, and if accepted by the Engineer, will be authorized in writing.
5. Contractor shall be responsible for the safety of persons and property on-Site and the environment to the extent that they may be affected by the conduct of the Works. Comply with and enforce compliance by the Contractor's employees and the employees of Subcontractors, agents and invitees, with safety requirements of the Contract Documents, applicable federal, provincial and local statues, regulations and ordinances, and with the Contractor's Site-specific health and safety plan.
6. The Contractor acknowledges that safety and environment protection obligations are of paramount importance regarding all of the work performed under Contract Documents.
7. Comply with Ontario Regulation (O.Reg.) 860 Workplace Hazardous Materials Information System (WHMIS), as amended by O.Reg. 36/93.
8. Work Stoppage: Contractor shall give precedence to the safety and health of the public and on-Site personnel and the protection of the environment over cost and schedule considerations for all project work. The Health & Safety Officer shall be responsible for decisions regarding when work will be stopped or started for health or safety consideration and shall have the authority to stop or start the work for health or safety considerations.

9. The Contractor shall assign the responsibility and obligation to the Health and Safety Officer to stop or start the work when, in the Health and Safety Officer's discretion, it is necessary or advisable for reasons of health or safety. The Owner/Engineer shall have the right to stop work for health and safety considerations.
 10. Should any unforeseen or Site-peculiar safety-related factor, hazard or condition become evident during the performance of the Works at Site, bring such to the attention of the Owner or Engineer verbally and in writing as quickly as possible, for resolution. In the interim, take prudent action to establish and maintain safe working conditions and to safeguard the Contractor's employees and employees of Subcontractors, agents and invitees, the public, Owner, Engineer and the environment.
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2.1.3 WORKER TRAINING

1. Provide and require that personnel assigned to or entering the Site, complete site-specific training or refresher sessions. Site-specific training and refresher sessions shall ensure that personnel are capable of and familiar with the use of safety, health, respiratory, and protective equipment and with the safety and security procedures required for site. The training session shall be completed by the Contractor's Health and Safety Officer.
 2. As a minimum, include the following items in training program:
 - a. Names and personnel responsible for site health and safety.
 - b. Site-specific potential hazards.
 - c. Use of personal protective equipment (PPE), including proper donning and doffing procedures.
 - d. Work practices by which the employee can minimize risks from these potential hazards.
 - e. Safe use of engineering controls and on-site equipment.
 - f. Discussion and recognition of symptoms associated with exposure to hazards.
 - g. Site control methods.
 - h. On-site and off-site Contingency and Emergency Response Plans.
 - i. Decontamination procedures.
 - j. Site-specific standard operating procedures.
 - k. Scope of the intended work of the Contract.
 - l. Implement a hazard communication ("Right-to-Know") program in accordance with R.S.O. 1990, c.0-1, Regulation 860, as amended by O.Reg. 36/93 (WHMIS).
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2.1.4 DECONTAMINATION

1. Ensure that on-Site personnel observe and adhere to the personal hygiene-related provisions of this Section.
2. Issue a written notice of violation to on-Site personnel found to be disregarding the personal hygiene-related provisions of the Site-specific Health and Safety Plan or the Technical Specifications including but not limited to the requirements concerning PPE, respiratory protection, personnel hygiene, personnel decontamination and equipment decontamination procedures. The notice may be issued by the Engineer, the Health and Safety Officer, or any supervisory personnel of Contractor. Give a copy of the notice to the offending worker, to his immediate supervisor, to Contractor's Superintendent, and to Engineer. Upon issuance of a second written notice of such violation, terminate the worker from employment at site.
3. Failure of Contractor's supervisory personnel to implement this warning/ termination provision shall be deemed a material breach of the Contract.

4. Dispose of used PPE in landfill in accordance with the Contractor's Waste Management Plan.
5. Do not permit used disposable PPE to be reused, and when removed, properly dispose.
6. Prohibit smoking, chewing nicotine products, eating, and drinking, except in a designated lunch or break area.
7. Require removal of soiled disposable outerwear prior to entering the lunch area, and prior to cleansing hands.
8. Require on-site personnel to cleanse their hands and other exposed areas thoroughly before entering the smoking or lunch areas.

2.1.5 PERSONAL PROTECTIVE EQUIPMENT

1. The Contractor shall also comply with, as a minimum, the Health and Safety requirements of the Owner and Engineer. Personal Protection Equipment (PPE) shall include the use of Canadian Standards Association (CSA) approved equipment.
2. At a minimum, the Contractor shall furnish employees with Level D PPE as follows:
 - a. Hard hats.
 - b. Safety glasses with side shields or goggles.
 - c. Long pants and long-sleeve shirt.
 - d. Safety boots.
 - e. High visibility safety vest.
 - f. Any personal protective equipment necessary for specialized tasks (for example, welding goggles, respirators, etc.)
3. If required, the Contractor shall provide an increase level of PPE as follows:
 - a. Level C
 - i. Full-face or half-face air purifying respirators (NIOSH approved) with appropriate cartridges for organic vapours and particulates. Respirators shall be available at all times and donned when required as indicated by air monitoring.
 - ii. Chemical-resistant disposable coveralls (Tyvek).
 - iii. Latex and/or cotton inner gloves.
 - iv. Nitrile outer gloves.
 - v. Work boots with steel toe and shank.
 - vi. Chemical-resistant over boots or booties, butyl rubber or neoprene.
 - vii. Hard hat.
 - viii. Safety glasses with side shields and/ or chemical- resistant goggles.
 - b. Modified Level C
 - i. Chemical-resistant disposable coveralls (Tyvek).
 - ii. Latex and/ or cotton inner gloves.
 - iii. Nitrile outer gloves.
 - iv. Work boots with steel toe and shank.

- v. Chemical-resistant over boots or booties, butyl rubber or neoprene.
 - vi. Hard hat.
 - vii. Safety glasses with side shields and/ or chemical- resistant goggles.
-

2.1.6 AIR MONITORING

1. During the progress of work activities, monitor air quality in and around excavations. Conduct monitoring on a regular periodic basis, and additionally as required by special or work-related conditions. Report any departures from general background to Engineer, who will, in conjunction with the Health and Safety Officer, determine when operations should be shut down and restarted.
2. Provide the required instruments for air monitoring including, as a minimum, an oxygen level meter, a H2S meter, and a combustible gas meter (LEL meter). Additionally, personal sampling pumps may be required if Site conditions warrant. Provide sufficient number of each instrument to monitor the active work location and to provide back up equipment in cases of equipment malfunctions.
3. Operate air-monitoring equipment with personnel trained in the use of the specific equipment provided and under the control of the Health and Safety officer. Monitoring equipment used shall be intrinsically safe.
4. Action Levels:
 - a. Combustible Gases:
 - i. Action levels are based on the reading from a combustible gas meter. The readings are generally given as a percentage of the lower explosion limit (percent LEL) and are collected in the general work area. An atmospheric oxygen level of less than 19.5 percent may affect the reading from a combustible gas meter and give lower than actual levels. Test oxygen content first.
 - ii. Instrument Reading Action To Be Taken:
 1. 1-10% LEL Continue working and monitor atmosphere for combustible gases. Inform personnel working in the area whenever reading is greater than 5% LEL.
 2. 11-20% Continue working with caution. Inform personnel working in area of readings. Be prepared to cease operations.
 3. 20% LEL Cease operation and move to a safe place. Re-evaluate work plan. Engineering controls, such as forced ventilation and use of non-sparking tools are to be implemented if operations are to continue. **DO NOT CONTINUE WORKING UNTIL CONDITIONS ARE CONSISTENTLY BELOW 20% LEL.**
 - b. Oxygen:
 - i. A direct reading oxygen meter is used to determine the percent of oxygen in the atmosphere.
 - ii. Instrument Reading Action to be Taken:
 1. <19.5% or >23.5% Cease operations and move to safe area. Re-evaluate work plan. Engineering controls, such as forced ventilation, are to be implemented if operations continue. **DO NOT CONTINUE WORKING UNTIL OXYGEN LEVELS ARE BETWEEN 19.5 AND 23.5%.** When oxygen levels are outside this range, combustible gas meter readings are not reliable. Supplied air or self-contained breathing apparatus (SCBA) respiratory protection may be necessary.
 - c. Hydrogen Sulphide (H2S)

- i. Always proceed with caution when H2S odour is noticeable. Remember that after working for a short time in an area with a small amount of hydrogen sulphide, a person can no longer detect the smell of this gas. At 4 ppm, H2S may cause eye irritation. Always report H2S odour to a Health and Safety Officer as a precaution.
 - ii. Whenever readings approach 10 ppm on a direct reading H2S meter, cease work immediately, move to a safe area and contact the HSO. H2S has a Threshold Limit Value (TLV) level of 10 ppm.
- 5. Air Monitoring Reporting
 - a. Report the results of air monitoring programs to Engineer daily on specific forms and include the following information as applicable:
 - i. Location/date.
 - ii. Work process/operation name.
 - iii. Temperature, wind speed, and wind direction.
 - iv. Field notes including the following:
 - 1. Description of operation and complaints/symptoms.
 - 2. Chemicals/materials/equipment in use.
 - 3. Engineering/administration controls in effect.
 - 4. Personal protective equipment in use.
 - 5. Sampling observations/comments.
 - 6. In addition, record daily air monitoring activities in a hard cover logbook; maintain logbook on site at all times.

2.1.7 FIRST AID

- 1. The Contractor shall be fully responsible for the actions of their sub-contractors and ensure that all activities of their sub-contractor are in full compliance with OHSA regulations and the Health and Safety requirements of the Owner and Engineer.
- 2. The Contractor's Site-Specific Health and Safety Plan and Emergency Management Plan shall include a list of First Aid trained personnel, including the name of organization certifying the training, the date of certification and the date of training expiration.
- 3. The Contractor shall provide and maintain the necessary first aid items and equipment as called for under the First Aid Regulations of the Workplace Safety & Insurance Act.

2.1.8 EMERGENCY CONTACTS

- 1. Contractor to provide contact information (telephone number, email address) for the supervisor, Health and Safety officer and any other employees as required by the Owner or Engineer.

2.2 ENVIRONMENTAL MANAGEMENT

2.2.1 HOUSEKEEPING

1. The Contractor shall keep the Working Area free from accumulation of waste material and rubbish generated during the execution of the Works, to the satisfaction of the Owner or Engineer.

2.2.2 TRAFFIC CONTROL

1. Flagging for traffic control on this Contract shall be in conformance with the procedure outlined in the handbook entitled "Construction Traffic Controllers Handbook" issued by the Construction Safety Association of Ontario. Copies of this pamphlet may be obtained from the Association.
2. Each flag person shall, while controlling traffic, wear the following:
 - a. An approved fluorescent blaze orange or fluorescent red safety vest.
 - b. An approved fluorescent blaze orange or fluorescent red armband on each arm.
 - c. An approved fluorescent blaze orange or fluorescent red hat.
3. Comply with all requirements for Temporary Conditions as outlined in Book 7 of the Ministry of Transportation Ontario Traffic Manual and all conditions as outlined in Section GC 3.1 "Control of the Work" of the General Conditions of Contract.
4. The Contractor's earthmoving equipment shall not use the existing regional road network (paved or gravel surfaced). The Contractor shall prepare and use temporary haul roads for earth/waste moving operations as required to complete all work specified. Where the Contractor's operation requires crossing the existing roads (paved or gravel surfaced), the Contractor shall be responsible for traffic control as per this Section. The Contractor shall make repairs to any permanent road section damaged by their operations.

2.2.3 PROTECTION OF ENVIRONMENTAL FEATURES

1. The Contractor is hereby made aware of the sensitive nature of the stream crossings and drainage swales and the requirement that every attempt be made to avoid damage at these locations.
2. All exposed soil within 30 metres of each watercourse or swale must be protected from erosion and sedimentation by grading the contours smooth and by the installation of an erosion control silt fence fastened securely to the ground surface per OPSD 219.110. Further, an erosion control silt fence must also be installed at any location where the grade is sloping such that surface drainage could carry sediment into the watercourse at any time.
3. Existing trees located on or near the watercourse banks should be left intact.
4. Vehicles and machinery are not permitted to enter or cross through the watercourses.
5. Machinery on Site must be in a clean, washed condition and maintained free of fluid leaks.
6. Areas of soil affected by fluid leaks from machinery will be cleaned up to the acceptance by the Owner. Costs for Owner's Engineer oversight for the clean up will be at the expense of the Contractor.
7. Wash, refuel and service machinery and store fuel and other materials for the machinery away from the water or drainage swales to prevent any deleterious substance from entering the water.
8. Contaminated wash water shall be contained and managed by the Contractor.

2.2.4 DUST CONTROL

1. The Contractor shall, at the discretion of the Owner or Engineer, undertake dust control measures to prevent dust nuisances from any phase of the construction operation.
2. Permitted dust control measures may include the application of water. No chemicals may be used for dust control.
3. Undertake dust control on Limerick Road at no additional cost to the Owner. On paved roads a road sweeper will be required to remove any debris buildup. Contractor to supply and operate road sweeper at no additional cost.
4. Increase frequency of dust control on Site roads when necessary or as directed by the Owner or Engineer at no additional cost.

2.2.5 NOISE CONTROL

1. The Contractor shall adhere to all applicable noise by-laws.
2. All vehicles used by the Contractor shall be equipped with mufflers or other noise suppression devices which shall be kept in good working order at all times.
3. At the discretion of the Owner, the Contractor shall place noise attenuation devices (barriers) around pumps, compressors and other stationary sources of noise.

2.2.6 LITTER AND ODOUR CONTROL

1. The Contractor shall be responsible for litter/odour control within the work area requiring waste excavation. This requirement includes the following conditions:
2. Daily cover consisting of at least 150 mm of cover soil shall be applied over all areas of exposed waste by the end of each working day.
3. The Contractor shall be prepared to implement other odour control measures, such as odour masking sprays even when all active waste faces are properly covered. This may be needed, particularly on hot and humid summer days with no or little wind. Submit shop drawings for aerosol to be utilized and equipment for its application.
4. The Contractor shall suspend waste excavation on windy days to minimize blown litter. Waste excavation shall be suspended if wind gusts exceed 40 km/hr unless the wind has no effect on construction activities and operation is approved to proceed by the Owner/Engineer.
5. Provide labourers who will be responsible for the daily collection of litter escaping from the Contractor's work area.
6. The Contractor will be fined \$500 per incident if a request by the Owner/Engineer to correct litter/odour issues is not addressed within one (1) hour of receiving the request. More than one (1) fine a day may be applied in any given day for not implementing actions to address litter or odour nuisances. If non-compliance continues, any fines or orders received from the Ministry of the Environment, Conservation and Parks (MECP) and associated legal and/or engineering fees to address the fine and/or order that are directed to the Owner will be paid by the Contractor.

2.2.7 SITE CHARACTERIZATION

1. Work at Site will involve contact with municipal solid waste and associated contaminants, including but not limited to, leachate, landfill gas, landfill gas condensate and asbestos.

2. All work involving handling of waste requires the implementation of various safety procedures and measures to be outlined in the Site-specific Health and Safety Plan. Contractor is reminded that while the majority of waste is anticipated to be municipal solid waste, waste materials present at the Site may also contain hazardous substances such as sharps, dangerous and toxic materials, sludge, pathological waste, etc. Contractor shall proceed with caution and in accordance with procedures outlined in the Site-specific Health and Safety Plan.
 3. The Contractor shall treat any water in contact with as leachate and will avoid contact as much as possible. Encounters with leachate are not anticipated due to the limited excavation within the waste limits, however if leachate is encountered the Contractor shall notify the Owner/Engineer immediately and provide assistance with leachate management, as needed.
 4. Landfill gas may be present during waste excavation. Landfill gases may be present in the soil adjacent to the landfill during excavation activities.
 5. Landfill gas results from the decomposition of refuse and is primarily composed of 40 to 65 percent methane, 30 to 50 percent carbon dioxide, less than 2 percent nitrogen, less than 1 percent oxygen and trace gases including mercaptans, hydrocarbons, solvents, water vapour and hydrogen sulphide.
 6. Methane is explosive in concentrations between 5 and 15 percent by volume in air. Methane, carbon dioxide and nitrogen are simple asphyxiates.
 7. Trace gases in landfill may be toxic and odourous. Odourous gases may cause nausea in some persons. Toxic gases may also be present at concentrations above or below the levels deemed safe for human exposure. There is always a potential for levels to be sufficient to cause permanent and irreversible damage and even death.
 8. Contractor is notified that asbestos may be encountered during waste excavation. Contractor shall proceed carefully with this work and implement appropriate health and safety measures (waste watering, etc.) in accordance with the approved Site-specific Health and Safety Plan.
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2.2.8 DEWATERING

1. The Contractor is responsible for supplying all labour, equipment and materials required to dewater the works satisfactorily, if needed. Any damage caused by its dewatering system shall be the sole responsibility of the Contractor plus any costs incurred by the Owner.
2. The Contractor shall provide all measures necessary to prevent silt-laden water from discharging to natural or manufactured watercourses or storm sewers. This may include sedimentation basins, straw bale filters, silt fences and other measures deemed necessary by the MECP, the Conservation Authority or the Engineer to prevent contamination of natural watercourses by construction water.
3. If silt control measures are not implemented immediately upon request, a fine of \$1,000 per day will be applied to the Contractor until the requested work is implemented.
4. No additional payment will be made for the implementation of all required silt control works.
5. Dewatering operations may require pumping in excess of 50,000 L/day. If this is the case, the Contractor shall apply to the MECP Environmental Activity and Sector Registry (EASR) for construction site dewatering. All dewatering activities shall be conducted in accordance with O.Reg. 63/16. The Contractor shall keep complete dewatering records consisting of date, time, location, pumping rates and volumes of water removed. Pumping rates shall be recorded with flow totalizers or another device, as approved by the Engineer. The maximum water taking shall not exceed 400,000 L/day. Dewatering records shall be passed to the Owner/Engineer on a daily basis.
6. No additional payment will be made for the cost of this work, and it shall be deemed included in the price bid for the items that make this work necessary, and shall be full compensation for all labour, equipment and materials required to carry out the work described above.

2.2.9 SPILLS REPORTING

1. In the event of a spill or other emission of a pollutant into the natural environment, notify:
 - a. The Ministry of Environment, Conservation and Parks Spills Action Centre (Tel: 1-800-268-6060).
 - b. The municipality within the boundaries of which the spill occurred (Municipality of Southwest Middlesex).
 - c. The person having control of the pollutant, if known.
 - d. The Owner and Engineer.

2.3 MEASUREMENT AND PAYMENT

Refer to Section 1.3 regarding measurement and payment of items related to Environmental Management.

END OF SECTION

3 SITE PREPARATION

3.1 GENERAL INTENT

3.1.1 DESCRIPTION

1. This Section covers all aspects of Site preparation prior to the commencement of the major earth moving activities associated with these works. Specifically, this specification covers the following:
 - 1.1. Submit for review and execute a Site-Specific Health and Safety Plan, Erosion and Sediment Control Plan, Environmental Management Plan, Waste Management/Disposal Plan, Traffic Control Plan, and pre-constructions submittals for final cover – clayey soil and topsoil.
 - 1.2. Mobilize construction trailers, equipment and facilities to the Site.
 - 1.3. Conduct a pre- and post-construction topographic survey within the property limits.
 - 1.4. Supply and install protective fencing around on-Site groundwater monitoring wells.
 - 1.5. Supply and install erosion controls and environmental protection measures as per Section 2.2.3.
 - 1.6. Supply and install a temporary mud mat at the existing south Site entrance.
 - 1.7. Clear and grub vegetation within the construction areas located within inferred limit of waste and extents of the proposed perimeter ditches.
 - 1.8. Chip the cleared and grubbed vegetation and either:
 - 1.8.1. Dispose of at an approved off-Site facility; or
 - 1.8.2. Use on-Site as landscaping/restoration amendment.

3.1.2 REFERENCES

1. Latest version of Ontario Provincial Standard Specifications (OPSS):
 - 1.1. OPSS.MUNI 201 Clearing and Grubbing
 - 1.2. OPSS.MUNI 805 Construction Specification for Temporary Erosion and Sediment Control Measures.
 - 1.3. OPSD 219.110 Light-Duty Silt Fence Barrier.

3.2 PRODUCTS

1. Submit for review and execute a Site-Specific Health and Safety Plan, Erosion and Sediment Control Plan, Environmental Management Plan, Waste Management/Disposal Plan, Traffic Control Plan, and pre-constructions submittals for final cover – clayey soil and topsoil.
 - 1.1. Not applicable.
2. Mobilize construction trailers, equipment and facilities to the Site.
 - 2.1. Not applicable.
3. Pre-construction topographic survey within the property limits.

- 3.1. Not applicable.
 4. Protective fencing around on-Site groundwater monitoring wells.
 - 4.1. Protective fencing shall comply with OPSD 219.110.
 5. Erosion and sediment controls.
 - 5.1. Erosion and Sediment Control Plan materials shall confirm to OPSS.MUNI 805.
 6. Temporary mud mat at the existing south Site entrance.
 - 6.1. See details provided in Construction Drawings.
 7. Clearing and Grubbing
 - 7.1. Not applicable.
-

3.3 EXECUTION

1. Submit for review and execute a Site-Specific Health and Safety Plan, Erosion and Sediment Control Plan, Environmental Management Plan, Waste Management/Disposal Plan, Traffic Control Plan, and pre-constructions submittals for final cover – clayey soil and topsoil.
 - 1.1. See Sections 2.1.2 to 2.1.8 for the requirements of the Site-Specific Health and Safety Plan.
 - 1.2. See Sections 6 and 7 for pre-construction submittals for final cover – clayey soil and topsoil.
 - 1.3. Erosion and Sediment Control Plan materials shall confirm to OPSS.MUNI 805.
 - 1.4. See Section 2.2 for the requirements for Environmental Management.
 - 1.5. See Section 2.2.2 for the requirements for the Traffic Control Plan.
 - 1.6. Contractor shall submit to the Owner/Engineer a written Erosion and Sediment Control Plan for review at least seven (7) business days prior to mobilization.
 - 1.7. The Erosion and Sediment Control Plan shall be detailed to coincide with the Contractor’s proposed construction activities. The Owner/Engineer reserve the right to review and request modifications to the Erosion and Sediment Control Plan, as required.
 - 1.8. The Erosion and Sediment Control Plan shall address the stabilization of all construction activities to prevent soil erosion and sediment transport from leaving the property limits or entering any adjacent swales, ditches or water bodies.
2. Mobilize construction trailers, equipment and facilities to the Site.
 - 2.1. Mobilize equipment, supplies, and incidentals to the Site. Placement of the Contractor’s office trailers and staging/storage areas, shall be approved by the Owner/Engineer prior to placement.
 - 2.2. Obtain Engineer’s approval prior to changing locations of temporary construction facilities. Do not use other areas without Engineer’s prior approval.
 - 2.3. Provide electrical service, toilet, first aid equipment, wash facilities and any other facilities as required by the Ontario Health and Safety Act and the Site-specific Health and Safety Plan. Provide an adequate storage area for all materials and a parking area for all workers.
 - 2.4. Use existing site access roads to the designated work areas during mobilization. Complete improvements to roads as necessary for the performance of the works.
 - 2.5. Provide additional land and access thereto not shown or described that may be required by Contractor for temporary construction facilities or storage of materials with no liability to Owner or Engineer.

- 2.6. Relocate construction equipment or other materials or equipment as required for the performance of the works.
3. Pre-construction topographic survey within the property limits.
 - 3.1. Engage a licensed surveyor to conduct a pre-construction topographic survey of the Site to within the property limits and to the extent of construction areas outside of the property limits, as required.
 - 3.2. This survey will be used to determine quantities for payment. The preconstruction survey is to be submitted to the Owner and Engineer in CAD (.dwg) version 2020 with .csv files within two (2) weeks of Contract award.
 - 3.3. Layers such as, waste limits, tops of slopes, toes of slopes, ditch and road edges and centerlines, fence lines, gates, culverts and other items to be clearly labelled on the drawing files and within the .csv files.
 - 3.4. Benchmarks and control points are shown on the Construction drawings for the Contractor's use.
 - 3.5. Verify the location coordinates and elevation of the benchmarks and control points.
 - 3.6. Survey shall be conducted in UTM NAD83, Zone 17 and the vertical elevation shall be provided in GVD28.
 - 3.7. Make submittals to Engineer for review to avoid delay. Do not proceed with Work affected by submittals until review is complete and work approved by Engineer in writing.
 - 3.8. Contractor's responsibility for errors and omissions, providing specified products for construction in accordance with the Contract, is not relieved by Owner's or Engineer's review of submittals.
 - 3.9. Throughout the project, routine surveying/layouts will be required to ensure the works are constructed according to design. Costs for surveying/layout are to be included in the price for the corresponding tender item.
 - 3.10. No additional payment will be made for construction surveys or layouts.
4. Protective fencing around on-Site groundwater monitoring wells.
 - 4.1. Monitoring wells are installed around the Site as shown on the Construction Drawings. The Contractor shall preserve and protect these locations. The Contractor is directly responsible for cost of restoring any monitoring well or other facility damaged by their operations.
 - 4.2. Where necessary to adequately protect monitoring wells, surround the wells with light duty erosion control fencing as directed by the Owner or Engineer.
5. Erosion and sediment controls.
 - 5.1. Verify on-Site surface water drainage patterns with Engineer to determine proper locating of soil erosion and sediment control features.
 - 5.2. Verify that surfaces and Site conditions are ready to receive work.
 - 5.3. Sufficient quantities of erosion and sedimentation control measures describes as per OPSS. MUNI 805 shall be included in this item.
 - 5.4. Erosion and sediment control measures shall be implemented prior to and maintained during the construction phase. Inspect all erosion and sediment control measures weekly and after rainfall events of 5 mm or more.
 - 5.5. Remove sediment buildup when it reached a depth of 300 mm or half the height of the erosion and sediment control measure, whichever is lesser. All damaged erosion and sediment controls should be repaired and/or replaced within 48 hours of inspection.
6. Temporary mud mat at the existing south Site entrance.
 - 6.1. Install a temporary mud mat at the south Site entrance gate meeting the layout provided in the Construction Drawings.

- 6.2. Inspect the condition of the mud mat on a weekly basis, and after rainfall events of 5 mm or more.
 - 6.3. Remove the mud mat and dispose of the materials at a licenced disposal facility upon the completion of the construction works.
 - 6.4. Restore the affected area to pre-construction condition or better.
7. Clearing and Grubbing
- 7.1. The Contractor shall clear and grub all trees, stumps, bushes, debris, etc., necessary to construct the works as shown in the Construction Drawings or determined by the Engineer and Owner.
 - 7.2. Clearing and Grubbing shall be in accordance with OPSS.MUNI 201, unless amended or extended herein or directed otherwise by the Engineer and Owner.
 - 7.3. The Contractor shall close cut any trees/shrubs as required to allow construction of the works, including limbing and stacking for collection, chipping on-Site and hauling and placement in the on-Site Materials Storage Area/Grinding Operations. Brush less than 100 mm in diameter shall be chopped. Brush equal to and greater than 100 mm in diameter (including stumps) may be chipped.
 - 7.4. Do not disturb vegetation except as required for the execution of the work.
 - 7.5. Every effort must be made to leave and protect mature trees which will not be directly affected by the works.
 - 7.6. Contractor shall chip the cleared and grubbed vegetation and either:
 - 7.6.1. Dispose of at an approved off-Site facility; or
 - 7.6.2. Use on-Site as landscaping/restoration amendment.
-

3.4 MEASUREMENT AND PAYMENT

1. Measurement and payment for the Site preparation activities shall be according to the contract units and prices included in the Form of Tender Breakdown. Monthly payment will be made based on a percentage of the completed work.

END OF SECTION

4 TOPSOIL STRIPPING AND STOCKPILING

4.1 GENERAL INTENT

4.1.1 DESCRIPTION

2. Strip and temporarily stockpile topsoil within the construction areas, including within the inferred limit of waste and within the proposed perimeter drainage ditches.
 3. Temporarily stockpiled topsoil shall be used for subsequent construction of the final cover.
-

4.1.2 REFERENCES

2. Latest version of Ontario Provincial Standard Specifications (OPSS):
 - 3.1. OPSS.MUNI 180 General Specification for the Management of Excess Materials.
 - 3.2. OPSS.MUNI 206 Construction Specification for Grading.
 - 3.3. OPSS.MUNI 802 Construction Specification for Topsoil.
 - 3.4. OPSS.MUNI 805 Construction Specification for Temporary Erosion and Sediment Control Measures.
-

4.2 PRODUCTS

1. Not Applicable
-

4.3 EXECUTION

1. Strip topsoil and all organic materials from within the inferred limit of waste and within the proposed perimeter drainage ditches.
2. Do not disturb vegetation except as required for the execution of the work.
3. Topsoil stripped shall be clear of any waste material and to the approval of the Engineer.
4. Temporarily stockpile topsoil for re-use in separate stockpiles within the limits of the work area or as directed by the Engineer.
5. Construct topsoil stockpiles to a shape and height that minimizes erosion.
6. Inspection of the topsoil stripping and stockpiling activities will be carried out by the Engineer to assess the adequacy of the works.

4.4 MEASUREMENT AND PAYMENT

1. Measurement for payment of the topsoil stripping and stockpiling activities shall be made in cubic metres as outlined in the Form of Tender Breakdown. Measurement of volume will be made by surveying topsoil stripping areas before and after completion of topsoil stripping to calculate pay volume or another method approved by the Engineer and Owner.
2. Payment for the topsoil stripping and stockpiling activities shall be made at the unit price bid in the Form of Tender Breakdown and shall include all costs to strip, transport and place topsoil in a temporary stockpile(s) within the work area or as directed by the Engineer.

END OF SECTION

5 EXCAVATION, BACKFILLING AND GRADING

5.1 GENERAL INTENT

5.1.1 DESCRIPTION

1. This Section addresses the excavation, placement, grading and compaction of soil fill materials and waste as shown on the Construction Drawings including, but are not necessarily limited to:
 - 1.1. Regrade the landfill within the inferred waste limit to the top of waste lines and grades shown on the Construction Drawings (includes regrading existing waste, gravel and soil stockpiles).
 - 1.2. Realign and regrade existing West Ditch 1 & 2, South Ditch 1 and East Ditch 2 & 3 to the lines and grades shown on the Construction Drawings.
 - 1.3. Construct and grade new East Ditch 1 to the lines and grades shown on the Construction Drawings.
-

5.1.2 REFERENCES

1. Latest version of Ontario Provincial Standard Specifications (OPSS):
 - 1.1. OPSS.MUNI 180 General Specification for the Management of Excess Soils.
 - 1.2. OPSS.MUNI 206 Construction Specification for Grading.
 - 1.3. OPSS.MUNI 401 Construction Specification for Trenching, Backfill and Compaction.
 - 1.4. OPSS.MUNI 491 Construction Specification for Preservation, Protection and Reconstruction of Existing Facilities.
 - 1.5. OPSS.MUNI 506 Construction Specification for Dust Suppressants.
 - 1.6. OPSS.MUNI 805 Construction Specification for Temporary Erosion and Sediment Control Measures.
 2. Latest version of American Society for Testing and Materials International (ASTM):
 - 2.1. ASTM D422, Standard Test Method for Particle-Size Analysis of Soils.
 - 2.2. ASTM D698-12ae2, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³) (600 kN-m/m³).
 - 2.3. ASTM D1140, Standard Test Methods for Amount of Material in Soils Finer Than the No. 200 (75- μ m) Sieve.
 - 2.4. ASTM D4318, Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.
 - 2.5. ASTM D6938, Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).
-

5.2 PRODUCTS

1. Fill Material

- 1.1. Fill materials shall be primarily sourced from existing on-Site stockpiles or from soil excavated during construction activities. Fill materials shall be used for regrading to the top of waste contours as per the Construction Drawings.
 - 1.2. If encountered, cobbles and boulders greater than 150 mm diameter shall be removed from the fill prior to placement and compaction.
 - 1.3. The fill material shall in all cases be free of organic matter (i.e., roots, leaves, wood, etc.), concrete, metals and construction debris.
2. Unsuitable Imported Fill Materials (does not apply to fill materials sourced from existing on-Site stockpiles)
 - 2.1. Weak, chemically unstable, and compressible materials.
 - 2.2. Frost susceptible materials.
-

5.3 EXECUTION

1. General
 - 1.1. Verify existing survey benchmarks shown on the Construction Drawings.
 - 1.2. Maintain and protect from damage existing infrastructure including utilities. In the event of disturbance of or damage to any infrastructure, immediately notify Engineer. Repair or replace damaged infrastructure.
 - 1.3. Protect existing surface water drainage features which may be affected while work is in progress in accordance with OPSS.MUNI 491.
2. Construction
 - 2.1. Submit a list of equipment and proposed methods for excavation, placement and compaction of the fill for review by the Consultant prior to commencement of Work. If equipment and/or methods prove unsatisfactory, immediately implement changes required to ensure proper completion of the Work.
 - 2.2. The Contractor shall suspend excavations and/or placement and compaction of fill whenever weather conditions are unsatisfactory for these operations at the discretion of the Engineer.
3. Excavation
 - 3.1. No excavation shall be undertaken prior to the approval of the Engineer. Deviation from the alignment and grade shown shall only be at the Engineer's approval.
 - 3.2. Excavation sequence shall be to the satisfaction of the Engineer.
 - 3.3. Excavate the work areas to the limits and grades specified in the Construction Drawings. Excavation spoils, including excess material, shall be incorporated into engineering fill or landfill cover, as required and approved by the Engineer.
 - 3.4. The Contractor shall adjust the excavation methods, as required, to maintain a stable and dry excavation. Requirements of the Occupational Health and Safety Act pertaining to excavations shall be observed at all times.
 - 3.5. Protect open excavations against damage due to surface runoff and run-on. Take necessary precautions to prevent ponding of surface water and erosion of excavated or disturbed surfaces.
 - 3.6. After occurrence of heavy rains, do not operate equipment on approved excavations until the material has dried sufficiently to prevent occurrence of excessive rutting.
 - 3.7. Where excavations have been softened or eroded, remove soft and yielding material or otherwise objectionable or damaged areas and replace with fill as specified by the Engineer, at no additional cost to Owner.
 - 3.8. Remove debris and other obstructions encountered.

- 3.9. Notify Engineer of unexpected subsurface conditions and discontinue affected work in area until notified to resume work.
 - 3.10. Remove loose material and debris from excavations. Where natural or fill material at the bottom of the excavation is disturbed, re-compact disturbed soil to a density of at least equal to the undisturbed soil.
4. Filling and Compaction
 - 4.1. Subgrade shall be inspected by Engineer prior to placement of any engineered fill. The subject area shall be free of topsoil, organic matter, debris and standing water prior to placement of fill.
 - 4.2. At all times the Contractor shall prevent the entry of surface water and sediment into the area being filled.
 - 4.3. Unless otherwise specified, place fill in loose lifts with thickness not exceeding 300 mm. The maximum particle size of engineered fill shall be 150 mm.
 - 4.4. Unless otherwise specified, compact each lift using a sheepsfoot or pad foot roller with a minimum weight of 10 tonnes and capable of vibration. Use of vibration during compaction shall be at the discretion of the Engineer.
 - 4.5. Unless otherwise specified, compact each lift to a minimum of 95% Standard Proctor Maximum Dry Density (SPMDD) with a moisture content within 2% to 9% of optimum moisture content.
 - 4.6. Fine grade and smoothen the finished surface of the fill to match the design grades shown on the Construction Drawings. Final surface of engineered fill shall be rolled using a smooth drum roller with a minimum weight of 10 tonnes and capable of vibration. The allowable tolerance on the engineered fill final surface relative to the design grades shown on the Construction Drawings shall be ± 50 mm.
 5. Quality Control
 - 5.1. The Contractor's quality control measures shall, as a minimum, include the following:
 - 5.1.1. Visual monitoring of excavation stability.
 - 5.1.2. Maintaining sufficient survey control to ensure that excavations and fill placement are advanced to the correct alignment and grades as shown on the Construction Drawings.
 - 5.1.3. Informing the Engineer immediately of any conditions that may potentially result in a required deviation of the alignment and depth.
 - 5.1.4. Maintaining the excavations sufficiently dewatered and stable.
 - 5.1.5. Controlling lift thickness, compaction density and moisture content as required.
 6. Quality Assurance
 - 6.1. Inspection of the excavation and filling operations shall be carried out by the Engineer. The inspection shall be carried out on a daily basis during excavation and backfilling operations and will focus on the following:
 - 6.1.1. The stability of the excavation.
 - 6.1.2. The adequacy of the dewatering operation.
 - 6.1.3. The control of entry of sediments and fine-grained materials into the excavation and filling area.
 - 6.1.4. Absence of non-suitable materials in fill placement material.
 - 6.1.5. Loose and compacted lift thicknesses.
 - 6.1.6. Soil conditioning.
 - 6.1.7. In-situ nuclear gauge testing for compaction density and moisture content during fill placement (minimum 1 test per 500 square meters per lift).
 - 6.1.8. Compliance of the finished lines and grades with the Construction Drawings.

5.4 MEASUREMENT AND PAYMENT

1. Measurement for payment will be based upon cubic metres of excavation advanced, or cubic metres of material placed, as measured by topographic survey prior to and following the work. Excavation or fill beyond the lines and grades shown shall not be paid for. The finished volume of excavation and volume of fill shall be provided by the Contractor and will be checked by the Engineer. In order to measure the actual amount of subsoil cut, the Contractor will survey the areas to be cut after topsoil stripping and again after completion of excavation to calculate “pay volumes”. Should the Contractor disagree in any way with the before excavation elevations, the Contractor shall notify the Engineer, in writing, listing all points of disagreements, prior to the commencement of any work. Excavation (cut) beyond the lines and grades shown on the Construction Drawings shall not be paid for.
2. The unit price for Excavation and Grading shall be full compensation for excavation, haulage, stockpiling (if required), placement and rough and fine grading as specified on the Construction Drawings.
3. The unit price for Backfill and Grading shall be full compensation for placement, spreading of fill, conditioning, compaction, and rough and fine grading as specified on the Construction Drawings.

END OF SECTION

6 FINAL COVER – CLAYEY SOIL LAYER

6.1 GENERAL INTENT

6.1.1 DESCRIPTION

1. This Section provides the requirements for the supply, placement, compaction and grading of a minimum 600 mm thick final cover clayey soil layer to be placed over the re-graded top of waste and fill material.
-

6.1.2 REFERENCES

1. Latest version of the following Province of Ontario, Soil Quality documents:
 - 1.1. Ontario Regulation 153/04, as amended.
 - 1.2. Regulation 347, as amended by Regulation 558/00
 - 1.3. Rules for Soil Management and Excess Soil Quality Standards
 - 1.4. Soil, Groundwater and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act.
2. Latest version of the American Society for Testing and Materials (ASTM) Standards:
 - ASTM D 422, Method for Particle-Size Analysis of Soils.
 - ASTM D 698, Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (600 kN-m/m³ (12,400 ft-lbf/ft³)).
 - ASTM D 1140, Test Method for Amount of Material in Soils Finer than the No. 200 (75- μ m) Sieve.
 - ASTM D 2216, Method for Laboratory Determination of Water (Moisture) Content of Soil, Rock, and Soil-Aggregate Mixtures
 - ASTM D 2487, Test Method for Classification of Soils for Engineering Purposes.
 - ASTM D 2488, Practice for Description and Identification of Soils (Visual-Manual Procedure).
 - ASTM D 2922, Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
 - ASTM D 3017, Test Method for Water Content Of Soil And Rock In Place By Nuclear Methods (Shallow Depth).
 - ASTM D 4220, Practices for Preserving and Transporting Soil Samples.
 - ASTM D 4318, Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.
 - ASTM D 4718, Practice for Correction of Unit Weight and Water Content for Soils Containing Oversize Particles.
 - ASTM D 5080, Test Method for Rapid Determination of Percent Compaction.

6.2 PRODUCTS

- 1.1. The clay material for final cover construction shall be imported from an off-Site location proposed by the Contractor. Locations may include virgin sources as well as excess soil facilities.
- 1.2. The clayey soil shall be inorganic clay, free of debris, of generally medium plasticity, with the results falling above the “A” Line on the Casagrande Plasticity Chart. The Clay Size Content (<0.002mm) should be minimum 20%.
- 1.3. Imported final cover – clayey soil pre-construction analytical results as per Section 6.3.1, below.

6.3 EXECUTION

1. Soil Quality Testing
 - 1.1. Submit initial grain size, Proctor density, soil quality and TCLP test results to the Engineer for review at least seven (7) business days prior to importing material on-Site.
 - 1.2. Soils imported from virgin sources shall be tested to confirm that it meets the Table 3: Full Depth Generic Site Condition Standards for soil quality, industrial/commercial/community property use for medium and fine textures soils as outlined in the MECP’s “Soil, Groundwater and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act”, as amended.
 - 1.3. Soils imported from excess soils facilities shall be tested to confirm that it meets the Table 3.1: Full Depth Excess Soil Quality Standards in a Non-Potable Groundwater Condition, as outlined in the MECP’s “Rules for Soil Management and Excess Soil Quality Standards”, as amended.
 - 1.4. In either case, the imported soils will be sampled and analyzed at the frequency indicated in Table 2: Minimum Stockpile Sampling Frequency as outlined in Schedule E of Ontario Regulation 153/04, as amended.
 - 1.5. Soils imported from excess soils facilities shall be tested for Toxicity Characteristic Leaching Procedure (TCLP) parameters to confirm that it meets the Schedule 4 Leachate Quality Criteria as outlined in Regulation 347, as amended by Regulation 558/00. The minimum sample frequency for this test shall be three (3) samples, plus 10% of the required number of soil samples detailed in Table 2: Minimum Stockpile Sampling Frequency as outlined in Schedule E of Ontario Regulation 153/04, as amended.
 - 1.6. Collect samples of final cover soil for analysis of clay size, Atterberg Limit and Standard Proctor Density, in-situ water content and in-situ density analysis at the frequencies outlined in Tables 1 and 2.

2. TABLE 1			
3. Minimum Construction Quality Assurance Testing Frequencies for Compacted Clay Layer Material*			
Test	Method	Minimum Frequency of Testing	Testing Criteria
Standard Proctor Maximum Dry Density	ASTM D698	1 per 1,000 m ³	Range = 1.36 to 1.84 g/cm Target = 1.4 g/cm
Atterberg Limits	ASTM D4318	1 per 1,000 m ³	Plastic Limit – 18-25%

2. TABLE 1

3. Minimum Construction Quality Assurance Testing Frequencies for Compacted Clay Layer Material*

Test	Method	Minimum Frequency of Testing	Testing Criteria
			Liquid Limit = 40-50%
Clay Size Content (i.e., percent finer than 0.002 mm)	ASTM D1140	1 per 1,000 m ³	Min. 20%

Note * Samples to be collected and tested by the Engineer from the temporary stockpiles of imported clay soil. Material tested must be representative of the material used for constructing the compacted clay layer.

TABLE 2

**Minimum Construction Quality Assurance Testing Frequencies
after Compaction of Compacted Clay Layer Material**

Test	Method	Minimum Frequency of Testing	Testing Criteria
<i>In situ</i> Water Content Test per Lift	ASTM D3017 (Nuclear Method)	1 per 1,000 m ²	2% to 9% Wet of Optimum
<i>In situ</i> Density Test per Lift	ASTM D2922 (Nuclear Method)	1 per 1,000 m ²	≥ 95%

4. Construction

- 4.1. Construct the compacted clay layer over the entire base and interior side slopes, as shown on the Construction Drawings, including the anchor trench/tie-in details.
- 4.2. Compacted clay layer shall have a final compacted minimum thickness of 600 mm measured perpendicular to the subgrade surface. The allowable tolerance on the thickness of the compacted clay layer is +50 mm.
- 4.3. Compact the clay material at a water content within the range of 2% to 9% wet of the Standard Proctor Optimum Water Content. If the water content testing indicates that the water content needs to be adjusted to meet the above range in compaction water content, then the adjustment (either wetting or drying) shall be carried out by the Contractor after placement of each loose lift and the lift tilled/disked to promote moisture uniformity through the full thickness of the lift.
- 4.4. Construct the compacted clay layer in four lifts of approximately 150 mm compacted thickness. Compact each lift using a 12 tonne (min. weight) pad foot compactor to achieve an in-situ density of greater than or equal to 95% of the Standard Proctor Maximum Dry Density (SPMDD). Each lift to receive a minimum of 6 one-way passes of the compactor to ensure kneading/bonding of the material.
- 4.5. Prior to placing a new lift, the surface of the existing (underlying) lift must be scarified and the moisture content adjusted (as required) to within the range specified in Section 6.3.2.2.3 above. Sealing of the surface of each exposed lift shall be carried out at the end of each workday using a smooth drum roller to preserve the moisture content of the lift.

- 4.6. Permit the Engineer to perform in situ density tests and to collect samples of the compacted clay layer at the in-situ density test locations.
 - 4.7. Shape the final surface of the compacted clay layer to the specified lines and grades and seal by at least one pass of a smooth drum roller.
 - 4.8. Topsoil shall be placed over completed areas of the compacted clay layer as soon as practicable.
 5. Construction Equipment
 - 5.1. The equipment used for construction of the compacted clay layer shall include a track mounted bulldozer, a tiller, a 12 tonne (min. weight) self-propelled pad foot compactor and a smooth drum roller.
 - 5.2. Prior to the start of the compacted clay layer construction, the Contractor shall provide to the Engineer a list of equipment to be used for compacted clay layer construction. The Engineer's approval of the equipment is required prior to the start of the compacted clay layer construction.
 6. Construction Quality Assurance (CQA)
 - 6.1. Monitoring of the compacted clay layer construction will be carried out by the Engineer. The Engineer's work will include the following:
 - 6.1.1. Measurement of water content, clay size content.
 - 6.1.2. Atterberg Limits and Standard Proctor Maximum Dry Density/Optimum Water Content on representative samples of the compacted clay layer material.
 - 6.1.3. Observation of the lift thickness as placed loose and after compaction.
 - 6.1.4. Observation of the action of the compaction and hauling equipment on the construction surface.
 - 6.1.5. Monitoring of the number of passes of the compactor used to compact each lift.
 - 6.1.6. Measurement of the in-situ density and water content of the clay material after compaction.
 - 6.2. The proposed minimum testing frequencies for CQA testing of the compacted clay layer are presented in Tables 1 and 2. Actual test frequencies may vary. CQA testing, or lack thereof, does not relieve the Contractor of his responsibility to complete the work in accordance with these Specifications.
 - 6.3. Sampling/testing locations will be selected by the CQA Consultant.
 - 6.4. Acceptance of the Contractor's work with respect to compacted clay layer construction will be based on the following criteria:
 - 6.4.1. Clay layer compacted to greater than or equal to 95% of the Standard Proctor Maximum Dry Density within the specified range of water content (i.e., 2% to 9% wet of the optimum water content).
 - 6.4.2. Finished compacted clay layer thickness of 600 mm (minimum) with tolerance of plus 50 mm, measured perpendicular to the subgrade surface.
 - 6.5. Repairs and Retesting:
 - 6.5.1. Correct deficiencies to the satisfaction of the Engineer.
 - 6.5.2. All re-tests by the Engineer must verify that the defect has been corrected before any additional work is performed by the Contractor in the area of the deficiency.
 7. Minimum Construction Quality Assurance Test Criteria for Clayey Soil:
-

6.4 MEASUREMENT AND PAYMENT

1. Measurement for payment of compacted clay layer will be based upon cubic metres of compacted clayey soil layer constructed to the lines and grades shown on the Construction Drawings, as measured by topographic

survey prior to and following placement. The volumes of the compacted clay layer for payment shall be provided by the Contractor and will be checked/approved by the Engineer.

2. Payment for the compacted clay layer shall be made at the unit price bid in the Form of Tender Breakdown and shall include all costs to supply, place, compact and grade the material, including pre-construction testing and moisture adjustment as required.

END OF SECTION

7 FINAL COVER - TOPSOIL LAYER

7.1 GENERAL INTENT

7.1.1 DESCRIPTION

1. This section provides the requirements for both the reuse of the stripped and temporarily stockpiled topsoil, as well as potential use of imported topsoil for the construction of a minimum 150 mm thick cover over the clayey soil layer (if required).
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7.1.2 RELATED WORK

1. Section 8 – Seeding.
-

7.1.3 REFERENCES

1. OPSS.MUNI 802 Construction Specification for Topsoil.
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7.2 PRODUCTS

1. OPSS 802 shall apply and govern except as amended or extended herein.
 2. Topsoil should be sourced from the topsoil stripping stockpile(s) completed under this Contract or from existing on-Site topsoil stockpiles.
 3. If required, additional topsoil may be imported from approved local sources.
 4. The Contractor shall place topsoil on the areas specified below:
 - 4.1. On-top of clayey soil final cover top plateau and side slopes.
 - 4.2. Perimeter ditches constructed or regraded by the Contractor.
 5. The topsoil shall be free of tree roots and stones.
 6. The topsoil shall be free of concrete, glass, metal and construction debris.
 7. The topsoil shall have a moisture content appropriate for placement, spreading and grading using a bulldozer.
 8. Imported topsoil – pre-construction analytical results as per Section 7.3.1, below.
-

7.3 EXECUTION

1. Imported topsoil quality testing.
 - 1.1. Imported topsoil must be of suitable quality to support subsequent seeding and establishment of vigorous vegetative growth. Must not contain toxic elements or growth inhibiting materials.

- 1.2. Grain size: The topsoil shall not contain material greater than 25 mm in size, such as stones and clods. Soil texture based on The Canadian System of Soil Classification, to consist of 20 to 70% sand, and minimum 7% clay.
 - 1.3. Organic Content: Have an organic content between 7 and 11% by weight, according to ASTM D2974.
 - 1.4. Have a pH from 6.0 to 8.0 according to ASTM D4972.
 - 1.5. Nitrogen (N): 20 to 40 micrograms of available N per gram of topsoil.
 - 1.6. Phosphorus (P): 40 to 50 micrograms of phosphate per gram of topsoil.
 - 1.7. Potassium (K): 75 to 110 micrograms of potassium per gram of topsoil.
 - 1.8. Calcium, magnesium, sulphur and micro-nutrients present in balanced ratios to support germination and/or establishment of intended vegetation.
 - 1.9. Contractor shall submit one (1) initial sample of topsoil for analysis of grain size, organic content, pH, N:P:K and micro-nutrient content. Contractor shall submit test results to the Engineer for review at least seven (7) business days prior to importing material on-Site.
2. Construction
 - 2.1. Submit a list of equipment and proposed methods for placement of the topsoil material for review by the Engineer prior to commencement of Work. If equipment and/or methods prove unsatisfactory, immediately implement changes required to ensure proper completion of the Work.
 - 2.2. Contractor shall submit one (1) sample of topsoil for grain size, organic content, pH, N:P:K and micro-nutrient analysis for every 1,000 m³ of topsoil imported to the Site during construction. Contractor shall submit test results to the Engineer during construction.
 - 2.3. Place topsoil in one uniform lift of 150 mm thickness.
 - 2.4. The finished thickness of the topsoil layer shall be 150 mm ± 25 mm.
 - 2.5. Fine grade topsoil subgrade to eliminate rough spots and depressions and to ensure positive drainage. Finished surface to be smooth, uniform and firm.
 - 2.6. Spread topsoil with adequate moisture during dry weather over approved, dry, unfrozen subgrade, as indicated.
 - 2.7. Remove stones, roots, grass, weeds, construction materials, debris and foreign non-organic objects from topsoil.
 - 2.8. Fine grade topsoil top surface.
3. Quality Assurance
 - 3.1. The Engineer will inspect the placement of the topsoil, with particular attention given to the action of the spreading and hauling equipment on the construction surface and to the finished thickness of the topsoil layer.
-

7.4 MEASUREMENT AND PAYMENT

- 2.1. Measurement for payment of the topsoil layer will be based upon square meters of finished topsoil layer that is placed in accordance with the Construction Drawings, as computed from as-built survey data collected by the Contractor and checked/approved by the Engineer.
- 2.2. Payment for the topsoil layer shall be made at the unit price bid in the Form of Tender Breakdown and shall include all costs to supply, place and grade material, including pre-construction testing requirements as required.

END OF SECTION

8 SEEDING

8.1 GENERAL INTENT

8.1.1 DESCRIPTION

1. This Section provides the requirement for the supply and placement of specified seed mix, nurse crop, water and fertilizer over the finished surface of the topsoil layer for the final cover plateau, exterior slopes, constructed ditches and swales. This section also includes the requirements for the supply and placement of provisional items consisting of winter maintenance crop (winter wheat) and erosion control blanket cover.
-

8.1.2 RELATED WORK

1. Section 7 – Final Cover – Topsoil Layer.
-

8.1.3 REFERENCES

1. Credit Valley Conservation Seed Mixes, Version 1.1, August 2014
 2. OPSS.MUNI 804 Construction Specification for Seed and Cover
-

8.2 PRODUCTS

1. Seed Mixes
 - 1.1. Seed Mix #1 shall consist of Standard Roadside Mix as outlined in Table 1 Permanent Seed Mixes and Seed Certificate Analysis Values of OPSS.MUNI 804, to be confirmed or amended by the Owner or Engineer:
 - 1.1.1. Creeping Red Fescue: 50%
 - 1.1.2. Kentucky Bluegrass: 10%
 - 1.1.3. Perennial Ryegrass: 35%
 - 1.1.4. White Clover: 5%
 - 1.2. Seed Mix #2 shall consist of Credit Valley Conservation Seed Mix – CVC 7 Upland Native Meadow Mix
 - 1.2.1. Black Eyed Susan: 10%
 - 1.2.2. Blue Wood (Heart Leaved Aster): 1%
 - 1.2.3. Canada Anemone: 1%
 - 1.2.4. Canada Goldenrod: 2%
 - 1.2.5. Common Milkweed: 2%
 - 1.2.6. Evening Primrose: 25%
 - 1.2.7. Grass Leaved Goldenrod: 1%
 - 1.2.8. Meadow/Open Field Sedge: 15%

- 1.2.9. New England Aster: 1%
 - 1.2.10. Riverbank Wild Rye: 40%
 - 1.2.11. Virgins Bower: 1%
 - 1.2.12. Wild Bergamot: 1%:
 - 1.3. Nurse crop consisting of Fall Rye Grain at a rate of 60 kg/10,000 m²
 - 1.4. The seed shall be supplied in packages individually labelled and indicating the name of the supplier and date bagged.
 - 1.5. The source and type of seed mix must be approved by the Engineer prior to application.
 - 1.6. The Seed Analysis Certificate shall stipulate the seed supplier's lot designation numbers. Test results from the Seed Analysis Certificate shall specify germination and purity for each seed species of the mix as well as the seed mix composition expressed as a percentage of each seed species by mass for each seed mix specified in the Contract Documents.
 2. Water
 - 2.1. Water applied during seeding shall be free of impurities that could inhibit germination and growth.
 - 2.2. The source of the water shall be approved by the Engineer prior to use.
 3. Fertilizer
 - 3.1. To Canada "Fertilizer Act" and "Fertilizers Regulations."
 4. Provisional Items to be applied at the direction of the Engineer:
 - 4.1. Winter maintenance crop consisting of Winter Wheat at a rate of 60 kg/10,000 m².
 - 4.2. Erosion Control Blanket and Staples: Confirm to OPSS.MUNI 804.05.04.05 and OPSS.MUNI 804.05.05.
-

8.3 EXECUTION

1. Location
 - 1.1. Apply Seed Mix #1, mulch and fertilizer over the finished topsoil layer located within the inferred landfill limits (including top plateau and side slopes).
 - 1.2. Apply Seed Mix #2, mulch and fertilizer over the finished topsoil layer located within the perimeter ditches.
2. Workmanship
 - 2.1. Do not perform work under adverse field conditions such as frozen soil, excessively wet or dry soil covered with snow, ice or standing water, or after November 15 unless approved by Engineer.
 - 2.2. Remove and dispose of weeds, debris, stones 2" (50 mm) in diameter and larger, soil contaminated by oil, gasoline and other deleterious materials.
3. Seed Bed Preparation
 - 3.1. Verify that grades are correct. If discrepancies occur, notify Engineer and do not commence work until instructed by Engineer.
 - 3.2. Fine grade surface free of humps and hollows to smooth, even grade.
 - 3.3. Cultivate fine grade approved by Engineer to 1" (25 mm) depth immediately prior to seeding.
4. Seed and Cover Placement

- 4.1. As per OPSS.MUNI 804.
- 4.2. Seed the finished surface of the topsoil layer. Sow Seed Mix #1 at a rate of 130 kg/10,000 m². Sow Seed Mix #2 at a rate of 50 kg/10,000 m².
- 4.3. Apply a nurse crop consisting of Fall Rye Grain at a rate of 60 kg/10,000 m² before or during the winter dormancy period.
- 4.4. Apply fertilizer per OPSS.MUNI 804 (i.e., 8-32-16 (N:P:K) at a rate of 350 kg/10,000 m² for both seed mixes.
- 4.5. Provisional Item to be applied at the direction of the Engineer:
 - 4.5.1. During the winter dormant period for Southwestern Ontario (November 15 to April 15), apply a winter maintenance crop consisting of Winter Wheat at a rate of 60 kg/10,000 m².
 - 4.5.2. During the winter dormant period for Southwestern Ontario (November 15 to April 15), apply erosion control blanket over the seeded topsoil surface.
5. Maintenance During the Establishment Period
 - 5.1. Perform the following operations from time of seed application until acceptance by Engineer:
 - 5.2. Water seeded area to maintain optimum soil moisture level for germination and continued growth. Control watering to prevent washouts.
 - 5.3. Repair and reseed dead or bare spots to allow establishment of seed prior to acceptance.
6. Acceptance
 - 6.1. Germination Rate: Minimum acceptable germination rate shall be 70%.

To determine the germination rate for each seed species, the number of seeds per unit of weight is factored by the minimum germination rate of 70% in accordance with the Canada Seeds Act.

The Contractor and the Owner may agree to use a simplified analysis, where instead of counting each seedling of each individual seeded perennial species of the mix, only the total number of seedlings of the mix are counted. If the parties cannot agree to the simplified analysis, the default method is a seedling count of each seeded perennial species.
 - 6.2. Seeded areas will be accepted by Engineer provided that:
 - 6.2.1. Areas are uniformly established and are free of rutted, eroded, bare or dead spots and free of weeds.
 - 6.2.2. Areas seeded in fall will be accepted in following spring, one month after start of growing season provided acceptance conditions are fulfilled.
7. Placing Erosion Control Blankets (Provisional Item to be applied at the direction of the Engineer).
 - 7.1. The Contractor shall supply all labour, equipment and material necessary to install the erosion control blanket to cover the seeded topsoil layer or other areas directed by the Engineer.
 - 7.2. Minimum roll width/length to be equal to the Manufacturer's standard roll size.
 - 7.3. The anchors for the erosion control blanket shall be 150 mm long biodegradable staples.
 - 7.4. Installation of erosion control blankets shall be as soon as possible following seeding to minimize erosion of the topsoil layer.
 - 7.5. Place material by unrolling onto the surface in a manner consistent with the Manufacturer's instructions. Any snow or debris accumulated on the surface must be removed prior to placement of the erosion control blanket.
 - 7.6. Contractor shall ensure that the blanket is installed with direct contact to the ground surface, creating a uniform, cohesive mat that does not allow for any tenting to occur.

- 7.7. Deploy erosion control blanket with 150 mm overlaps (shingled) between adjacent and abutting panels. Anchor down the panel with minimum 150 mm long biodegradable staples in accordance with Manufacturer's recommendation.
 - 7.8. The staple placement pattern shall be in accordance with Manufacturer's staple pattern guide.
 - 7.9. Erosion control blanket may be retained in place with sandbags during placement and during periods of high wind.
 - 7.10. Place panels to minimize any folds or wrinkles especially along overlaps prior to overlapping and anchoring.
 - 7.11. Do not permit passage of any vehicle directly on the erosion control blanket until such time that the grass vegetation is fully developed.
 - 7.12. Remove and replace damaged or deteriorated erosion control blanket as directed by the Engineer. Remove deleterious materials from erosion control blanket.
8. Product Protection
 - 8.1. Use all means necessary to protect all prior work and materials.
 - 8.2. In the event of damage, immediately make all repairs and replacements as per Manufacturer's recommendation to the approval of Engineer, at no additional cost to the Owner.
-

8.4 MEASUREMENT AND PAYMENT

1. Measurement for payment of seeding, including the provisional winter maintenance crop (if required), will be based upon the total surface area (square metres) that is acceptably seeded in accordance with this specification, as computed from measurements made by the Contractor and checked/approved by the Engineer.
2. Payment shall be made at the unit price bid in the Form of Tender Breakdown. The unit price shall be full compensation for the supply and placement of seed mix, including all labour, materials and equipment required for the placement of the seed as described in this specification. The cost to prepare the Site and maintain grass growth through the maintenance period is to be incorporated into the unit cost for the item.
3. Measurement for payment of the provisional erosion control blanket (if required) will be based upon finished surface area of the erosion control blanket in square metres as measured by the Contractor and checked/approved by the Engineer.
4. The unit price shall be full compensation for the supply and installation of the provisional erosion control blanket (if required), including all labour, materials, equipment and associated facilities required for the proper installation of the erosion control blanket.
5. Allowance for overlap at joints, and for securing with biodegradable staples are to be included in the Contractor's unit price per square metre of the provisional erosion control blanket (if required) and will not be paid separately.

END OF SECTION

9 CORRUGATED STEEL PIPE (CSP) CULVERT

9.1 GENERAL INTENT

9.1.1 DESCRIPTION

1. This Section covers the supply and installation of a 300 mm diameter corrugated steel pipe (CSP) culvert, complete with a 100 mm diameter orifice plate as shown on the Construction Drawings, including frost protection, bedding, cover and associated works.
-

9.1.2 RELATED WORK

1. Section 10 – Rip-Rap and Geotextile.
-

9.1.3 REFERENCES

1. OPSS.MUNI 401, Construction Specification for Trenching, Backfilling, and Compacting.
 2. OPSS.MUNI 421, Construction Specification for Pipe Culvert Installation in Open Cut.
 3. OPSS. MUNI 1801, Corrugated Steel Pipe Products.
 4. OPSD 219.210 Temporary Rock Flow Check Dam V-Ditch (Modified), Detail 5/10 on the Construction Drawings.
-

9.2 PRODUCTS

1. Materials
 - 1.1. The length, nominal diameter and specification of the proposed CSP culvert are as shown in the Construction Drawings and supplemented by the information below:
 - 1.1.1. Square end finish
 - 1.1.2. CSP and orifice plate shall be 16-gauge, galvanized, aluminized Type 2 steel.
 - 1.2. CSP culvert connections (if required) shall be as per manufacturer's recommendations.
 - 1.3. CSP culvert shall be placed within rip-rap bedding/cover and affixed with a 100 mm diameter welded steel orifice place on the inlet (upstream) end.
-

9.3 EXECUTION

1. Installation
 - 1.1. Rip-rap bedding/cover and backfill as per OPSS.MUNI 401 except as noted herein.

- 1.2. The Contractor shall allow the Engineer to inspect the CSP segments when they arrive on Site to check that the pipes are of correct size, type and supplied with proper couplings.
 - 1.3. Unload pipes on level ground and avoid damage to pipes, and the spigots and bells.
 - 1.4. Lifting devices such as slings, chains or cables should be place around the pipe so that pipe is always lifted horizontally. Lift forks or other methods may be used if recommended by the manufacturer.
 - 1.5. Line and grade of the pipe shall be checked and any discrepancies from design should be corrected.
 - 1.6. The excavation for the pipe shall be kept stable and free of water. The Contractor shall adhere to all Occupational Health and Safety Act requirements for open trenches.
 - 1.7. The subgrade shall be inspected, and any soft spots shall be rectified to form a stable and uniform foundation. Subgrade shall be compacted to a minimum 95% Standard Proctor Maximum Dry Density (SPMDD).
 - 1.8. Match corrugations or indentations of coupler with pipe sections before tightening. Tap couplers firmly as they are being tightened, to take up slack and ensure snug fit.
 - 1.9. Ensure bottom of pipe is in contact with shaped and compacted subgrade throughout its length.
 - 1.10. Shape subgrade to fit lower segment of pipe exterior so that width of at least 50 percent of pipe diameter is in close contact with bedding and to camber as indicated or as directed by Engineer, free from sags or high points.
 - 1.11. No heavy equipment shall be used above the crown of the CSP culvert.
-

9.4 MEASUREMENT AND PAYMENT

1. Measurement for payment will be a lump sum.
2. Payment shall be made at the price in the Form of Tender and shall be full compensation for all equipment, labour and material required to complete the work in every respect, consistent with the Technical Specifications and as shown on the Construction Drawings.

END OF SECTION

10 RIP-RAP AND GEOTEXTILE

10.1 GENERAL INTENT

10.1.1 DESCRIPTION

1. This Section covers the supply and placement of rip-rap aprons, check dam and geotextile liner for the ditching areas shown on the Construction Drawings.
-

10.1.2 RELATED WORK

1. Section 9 – Corrugated Steel Pipe (CSP) Culvert
-

10.1.3 REFERENCES

1. Latest version of Ontario Provincial Standard Specifications (OPSS):
OPSS.MUNI 1004 Material Specification for Aggregates - Miscellaneous.
OPSS.MUNI 1860 Material Specifications for Geotextiles.
2. Latest version of Geosynthetic Institute Standard Specifications (GSI):
GRI-GT12(a) Test Methods and Properties for Nonwoven Geotextiles used as Protection (or Cushioning) Materials
3. Latest version of American Society for Testing and Materials International (ASTM):
ASTM D4354, Standard Practice for Sampling Geosynthetics for Testing.
ASTM D4491, Standard Test Method for Water Permeability of Geotextiles by the Permittivity Method.
ASTM D4533, Standard Test Method for Trapezoid Tearing Strength of Geotextiles.
ASTM D4632, Standard Test Method for Breaking Load and Elongation of Geotextiles (Grab Method).
ASTM D4751, Standard Test Method for Determining Apparent Opening Size of a Geotextile.
ASTM D4791, Standard Test Method for Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate.
ASTM D4833, Standard Test Method for Index Puncture Resistance of Geotextiles, Geomembranes, and Related Products.
ASTM D4873, Guide for Identification, Storage and Handling of Geotextiles.
ASTM D5261, Standard Test Method for Measuring Mass Per Unit Area of Geotextiles.
ASTM D6241, Standard Test Method for Static Puncture Strength of Geotextiles and Geotextile Related Products Using a 50-mm Probe.
ASTM D7238, Test Method for Effect of Exposure of Unreinforced Polyolefin Geomembrane Using Fluorescent UV Condensation Apparatus.

10.2 PRODUCTS

1. Materials

- 1.1. The rip-rap material shall consist of hard, dense, durable fieldstone or quarry stone, free from clay seams, cracks or other structural defects.
- 1.2. Rip-rap shall meet the requirements for R-10 rip-rap as listed in Table 7 Physical Property Requirements for Gabion Stone, Rip-rap and Rock Protection and Table 8 Gradation Requirements for Gabion Stone, Rip-Rp and Rock Protection in OPSS.MUNI 1004, except as extended or amended herein.
- 1.3. The geotextile separator beneath the rip-rap shall be a non-woven, Class II geotextile with minimum mass per unit area of 340 grams per square meter (g/m²), or 10 ounce per square yard (oz/yd²) meeting the properties shown in Table 1(b) of GRI-GT12(a).

TABLE 1				
Required Properties of Geotextile Separator				
Property	Qualifier	Units	Required Value	Test Method
Structure	-	-	Needle Punched Non-woven, Class II	-
Polymer Composition	Minimum	%	95% by wt. Polypropylene	-
Mass Per Unit Area	MARV	g/m ²	340	ASTM D5261
Grab Tensile Strength	MARV	kN	1.02	ASTM D4632
Grab Tensile Elongation	MARV	%	≥50	ASTM D4632
Tear Strength	MARV	kN	0.42	ASTM D4533
CBR Puncture Strength	MARV	kN	3.11	ASTM D6241
Permittivity	MARV	s ⁻¹	0.05	ASTM D4491
UV Resistance ¹	Minimum	%	≥70	ASTM D7238

Notes:

- 1. Geotextile to be ultra-violet stabilized. Evaluation to be on 50 mm strip tensile specimens after 500 hours exposure.
- 2. MARV – Minimum Average Roll Value (average of test results of any roll in a lot sampled by the manufacturer for quality testing shall meet or exceed the Minimum Average Roll Value).
- 3. Manufacturer’s Quality Assurance (MQA) sampling shall be in accordance with ASTM D4354.

10.3 EXECUTION

1. Construction
 - 1.1. Grade, compact and proof roll subgrade to minimum 95% Standard Proctor Maximum Dry Density (SPMDD).
 - 1.2. Place the geotextile on the subgrade before placement of the rip-rap material.
 - 1.3. Place rip-rap material on geotextile in a manner which avoids puncturing of the geotextile.
 - 1.4. Do not drive vehicles directly on the geotextile.
 - 1.5. Place rip-rap in accordance with the lines and dimensions indicated on the Construction Drawings.
 - 1.6. Key in the geotextile in firm and compacted soil.
 - 1.7. Finish the rip-rap apron surface even, free of large openings and neat in appearance.

10.4 MEASUREMENT AND PAYMENT

1. Measurement of rip-rap apron for payment shall be based upon finished placed mass in tonnes, as computed from weigh scale data collected by the Contractor and checked/approved by the Engineer.
2. The finished surface area of geotextile underlay for the rip-rap apron shall be measured on placed surface area determined by the Contractor from survey measurements and checked/approved by the Engineer.
3. Payment for the supply and placement of the rip-rap aprons shall be according to the unit price as described in the Form of Tender Breakdown.
4. Payment at the unit price in the Form of Tender Breakdown shall be compensation in full for all the work required to construct the works, including supply and installation of geotextile.

END OF SECTION

11 ACCESS ROAD - GRANULAR B, TYPE II SUB-BASE AND GRANULAR A BASE

11.1 GENERAL INTENT

11.1.1 DESCRIPTION

1. This Section describes the requirements for the supply and placement of granular subbase (Granular B, Type II) material to a thickness of 300 mm above the subgrade of the access road, and base (Granular A) material to a thickness of 150 mm above the subbase as shown on the Construction Drawings.
-

11.1.2 REFERENCES

1. Latest version of Ontario Provincial Standard Specifications (OPSS):
OPSS.MUNI 1010 Material Specification for Aggregates – Base, Subbase, Select Subgrade, and Backfill Material.
 2. Latest version of American Society for Testing and Materials International (ASTM):

ASTM D 698, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³) (600 kN-m/m³).

ASTM C136, Method for Sieve Analysis of Fine and Coarse Aggregates.

ASTM C117, Test Method for Material Finer Than 0.075 mm Sieve in Mineral Aggregates by Washing.

ASTM C131, Test Method for Resistance to Degradation of Small Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.

ASTM D422, Method for Particle-Size Analysis of Soils.
-

11.2 PRODUCTS

1. Granular subbase aggregate shall Granular B Type II as outlined in OPSS.MUNI 1010.
2. Granular base aggregate shall be Granular A as outlined in OPSS.MUNI 1010
3. Granular subbase shall be produced from a quarry and /or crushed limestone consisting of hard, durable, angular particles from natural materials free of organics (i.e., roots, leaves, wood, etc.), concrete, metals, glass, construction debris and clay lumps.

4. The aggregate for Granular Subbase shall meet the physical properties for Granular B, Type II listed in Table 1 Physical Property Requirements – Percent Passing in OPSS.MUNI 1010. The Granular Subbase material shall meet the gradation requirements for Granular B, Type II listed in Table 2 Gradation Requirements – Percent Passing in OPSS.MUNI 1010.
 5. The aggregate for Granular Subbase shall meet the physical properties for Granular A listed in Table 1 Physical Property Requirements – Percent Passing in OPSS.MUNI 1010.
 6. The Granular Base material shall meet the gradation requirements for Granular A listed in Table 2 Gradation Requirements – Percent Passing in OPSS.MUNI 1010.
 7. The source and quality of the granular materials must be approved by the Engineer prior to delivery of the material to the Site.
 8. The supplier must provide results of grain size distribution and physical property testing on samples representative of the material that will be delivered to the Site for review by the Engineer.
-

11.3 EXECUTION

1. The Contractor shall suspend placement and compaction of Granular Subbase and Base material whenever weather conditions are unsatisfactory for these operations at the discretion of the Engineer.
 2. The surface of the underlying subgrade shall be inspected, proof rolled and approved by the Engineer prior to placement of the Granular Subbase. The subject area shall be free of organic matter, debris and standing water prior to placement of Granular Subbase.
 3. Place using methods which do not lead to segregation or degradation of aggregate. Remove and replace that portion of layer in which material becomes segregated during spreading.
 4. Place material to full width in uniform layers not exceeding 150 mm compacted thickness. Engineer may authorize thicker lifts (layers) if specified compaction can be achieved.
 5. Compact each lift using a smooth drum roller. The Granular B, Type II subbase shall be compacted to a minimum of 100% of the Standard Proctor Maximum Dry Density (SPMDD). The Granular A base shall be compacted to a minimum of 100% of the SPMDD.
 6. Apply water as necessary during compaction to obtain specified density. If material is excessively moist, aerate by scarifying with suitable equipment until moisture content is corrected.
 7. The thickness of the finished Granular Subbase layer shall be 300 mm (\pm 25 mm), but not uniformly high or low.
 8. The thickness of the finished Granular Base layer shall be 150 mm (\pm 10 mm), but not uniformly high or low.
-

11.4 MEASUREMENT AND PAYMENT

1. The tendered unit price for the granular materials shall be full compensation for the supply, spreading, conditioning, compaction, and rough and fine grading as specified on the Construction Drawings.
2. Measurement for payment of the granular material will be based upon in metric tonne of finished, compacted surface that is constructed in accordance with the Construction Drawings, as computed from weigh scale data collected by the Contractor and checked/approved by the Engineer. Placement beyond the lines and grades shown shall not be paid for.

END OF SECTION

12 CHAIN LINK FENCE AND GATES

12.1 GENERAL INTENT

12.1.1 DESCRIPTION

1. This Section describes the requirements for the supply and installation of new chain link fence and gate to relocate/repair the existing Site fencing as shown on the Construction Drawings.
-

12.1.2 REFERENCE STANDARDS

1. Latest version of Ontario Provincial Standard Specifications (OPSS):
OPSS.MUNI 772 Construction Specification for Chain-Link Fence.
OPSS. MUNI 1541 Material Specification for Chain-Link Fence Components.
 2. Latest version of Ontario Provincial Standard Drawings (OPSD):
OPSD 972.102 Fence, Chain-Link Component – Gate
OPSD 972.130 Fence, Chain-Link Installation – Roadway
OPSD 972.132 Fence, Chain-Link Details and Table
-

12.2 PRODUCTS

1. Material
 - 1.1. OPSS.MUNI 1541 shall apply and govern except as amended or extended herein.
 - 1.2. Chain link fence shall be 1.8 m high and supplied in accordance with OPSD 972.130 (Top Rail option) and OPSD 972.132.
 - 1.3. Chain link gate shall be 4.5 m wide, single swing and supplied in accordance with OPSD 972.102.
-

12.3 EXECUTION

1. Construction
 - 1.1. OPSS.MUNI 772 shall apply and govern except as amended or extended herein.
 - 1.2. Chain link fence shall be installed in accordance with OPSD 972.130 (Top Rail option) and OPSD 972.132.
 - 1.3. 4.5 m wide vehicle single swing gate shall be installed in accordance with OPSD 972.102.

12.4 MEASUREMENT AND PAYMENT

1. Chain Link Fence: Measurement for payment will be in linear metres of new chain link fence installed to relocate/repair the existing Site fencing.
2. 4.5 m Wide Vehicle Single Swing Gate: Measurement for payment will be by direct counting of each single swing gate installed.
3. Payment shall be made at the unit price in the Form of Tender Breakdown and shall be full compensation for all equipment, labour and material required to complete the work in every respect, consistent with the Technical Specifications and as shown on the Construction Drawings.

END OF SECTION

ATTACHMENT

A CONSTRUCTION
DRAWINGS



ATTACHMENT

B REFERENCE DOCUMENTS

Credit Valley Conservation Seed Mixes, Version 1.1, August 2014

Geosynthetic Institute GRI-GT12(a) Test Methods and Properties for Nonwoven Geotextiles Used as Protection (or Cushioning) Materials

OPSD 219.110 Light-Duty Silt Fence Barrier

OPSD 219.210 Temporary Rock Flow Check Dam V-Ditch (Modified)

OPSD 810.020 Rip-Rap Ditch Inlet

OPSD 972.102 Fence, Chain-Link Component – Gate

OPSD 972.130 Fence, Chain-Link Installation – Roadway

OPSD 972.132 Fence, Chain-Link Details and Table

OPSS.MUNI 180 General Specification for the Management of Excess Materials

OPSS.MUNI 201 Construction Specification for Clearing, Close Cut Clearing, Grubbing and Removal of Surface and Piled Boulders

OPSS.MUNI 206 Construction Specification for Grading

OPSS.MUNI 401 Construction Specification for Trenching, Backfilling, and Compacting

OPSS.MUNI 421 Construction Specification for Pipe Culvert Installation in Open Cut

OPSS.MUNI 491 Construction Specification for Preservation, Protection, and Reconstruction of Existing Facilities

OPSS.MUNI 506 Construction Specification for Dust Suppressants

OPSS.MUNI 772 Construction Specification for Chain-Link Fence

OPSS.MUNI 802 Construction Specification for Topsoil

OPSS.MUNI 804 Construction Specification for Seed and Cover

OPSS.MUNI 805 Construction Specification for Temporary Erosion and Sediment Control Measures

OPSS.MUNI 1004 Material Specification for Aggregates – Miscellaneous

OPSS.MUNI 1010 Material Specification for Aggregates – Base, Subbase, Select Subgrade, and Backfill Material

OPSS.MUNI 1541 Material Specification for Chain-Link Fence Components

OPSS.MUNI 1801 Corrugated Steel Products

OPSS.MUNI 1860 Material Specification for Geotextiles