

1 GENERAL

- 1.1 The work of this section includes the provision of all design, labour, materials, equipment and services required for site earthwork as required for a complete project. The work includes, but is not necessarily limited to, the items referenced herein:
- 1.1.1 Site Grading.
 - 1.1.2 Excavation, trenching, backfill and compaction for site contour modification.
- 1.2 Refer to Section G2010: Roadways, Section G2020: Parking Lots, and Section G2030: Pedestrian Paving for backfill and compaction requirements for paved areas.
- 1.3 Reference Standards:
- 1.3.1 *[OPSS 206 Grading, December 1993]* for general grading requirements.
 - 1.3.2 *[OPSS 514 Trenching, Backfilling and Compacting]* for general trenching and backfill requirements.
 - 1.3.3 *[Regional Municipality of Ottawa-Carleton Standards and Specifications]* for watermain construction.
- 1.4 Regulations:
- 1.4.1 Shore and brace excavations, protect slopes and banks and perform all work in accordance with The Occupational Health and Safety Act, provincial and municipal regulations whichever is more stringent.
 - 1.4.2 Comply with Explosives Act of Canada R.S.,c.E-15, s.1. Perform blasting in accordance with provincial and municipal regulations. No blasting will be permitted within 3m of any building and where damage would result or as directed by Owner.
 - 1.4.3 Comply with MTO testing procedures for:
 - 1.4.3.1 OPSS 101 – Aggregates.
 - 1.4.3.2 OPSS 1003 - Aggregates – Hot Mix Asphalt.
 - 1.4.3.3 OPSS 1101 - Asphalt Cement.
 - 1.4.4 Retaining structures to be inspected during construction and certified that they have been constructed in accordance with the design of the Professional Engineer for the project.
- 1.5 Quality control:
- 1.5.1 Testing of fill materials and compaction of backfill and fill is to be carried out by approved testing laboratory engaged by the *[Design Builder]*.

- 1.5.2 Do not commence with work until fill materials have been tested and approved.
 - 1.5.3 Follow testing procedures identified in Builder's Quality Control Plan (BQCP), Designer's Quality Assurance Plan (DQAP), and paragraph Section 01390: Quality Management System.
 - 1.5.4 Engage services of qualified Professional Engineer licensed to practice in the Province of Ontario to carry out design and review of shoring, bracing, and permanent retaining structures necessitated by the Work. Submit temporary shoring, bracing, and retaining wall structure shop drawings bearing the seal of the Professional Engineer.
- 1.6 Environmental Requirements:
- 1.6.1 Remove of surplus or non-reusable excavated material offsite and dispose in designated landfill site.
 - 1.6.2 The Owner will engage qualified Environmental Engineer to test for presence of contaminated soil in area of work. Testing to be in accordance with provincial requirements.
 - 1.6.3 Carry out environmental protection, removal, and disposal procedures of contaminated waste and soil in strict accordance with provincial requirements.
- 1.7 Protection:
- 1.7.1 Adhere strictly to the requirements of Section 01561: Environmental Protection.
 - 1.7.2 Take precaution to protect all adjacent structures, paving, services, trees, and planting from damage, movement, or settlement during work. Make good damage caused.
 - 1.7.3 Protect excavations from freezing, clean, free of standing, water, and loose soil.
 - 1.7.4 Dewater excavations so concrete or services may be placed in dry.
 - 1.7.5 Maintain access roads to prevent accumulation of mud on roads.
- 1.8 Existing Utilities:
- 1.8.1 Verify, establish location, and protect all existing utilities during the course of the work. Coordinate with and obtain approval from utilities authorities for rerouting of any existing services entering the excavation area. Maintain services to all other buildings and properties operational. Record location of all rerouted services.

2 DESIGN

2.1 Grading and Drainage:

- 2.1.1 Engage qualified Professional Engineer, registered in the Province of Ontario, to design site grading, drainage, retaining structures, embankments, and roadbeds. Design grading to meet site development requirements and requirements of Section G20 - Site Improvements.
- 2.1.2 Coordinate grading and drainage design with the Stormwater Management Plan prepared for the project site. Comply with criteria established in the Master Servicing Report.
- 2.1.3 Design grading to provide adequate surface drainage. Do not drain onto adjacent property or structures.
- 2.1.4 Provide a supplementary drainage system where adequate surface drainage is not possible by grading alone.
- 2.1.5 Slope grade away from building structures.

2.2 Soil Stabilization, Slope Protection and Erosion Control:

- 2.2.1 Use planting and sod in landscape design to stabilize soil, protect slopes and control erosion. Incorporate surface laid geomat to permit vegetation to take root on slopes where erosion will be too great for simple mulching techniques.
- 2.2.2 Design slope of sodded swales and inclines to a maximum gradient of 1 in 3.
- 2.2.3 Where steeper slopes are necessary, incorporate retaining walls, engineered fill, soil reinforcement (geogrid) and hydraulic filters (geotextiles) in earthwork design as necessary to stabilize soil, protect slope and control erosion of final site contours.
- 2.2.4 Where retaining walls are required by the Work, use modular concrete unit segmental retaining wall systems, reinforced concrete. Timber retaining systems are not permitted.
- 2.2.5 Provide adequate drainage for retaining structures and slope retention systems to reduce hydrostatic head pressure.
- 2.2.6 Provide detailed drawings to illustrate proposed methods of soil and slope stabilization bearing seal of Professional Engineer licensed to practice in the Province of Ontario.

3 MATERIAL

3.1 Acceptable material:

- 3.1.1 Fill Material: Type 2 fill – earth borrow to [OPSS 212] and as per recommendations contained in geotechnical investigation report.

- 3.1.2 Excavated material: non-organic excavated or graded material free of contaminants may be used as fill when approved by qualified Professional Engineer licensed to practice in the Province of Ontario.
- 3.1.3 Geotextiles synthetic filter fabric: woven synthetic polypropylene or polyester fibre fabric
- 3.1.4 Geogrid soil reinforcement: open grid polymer polypropylene: to [ASTM D41011] or high density polyethylene: to [ASTM D 1248] with inhibitors added to resist deterioration by ultra-violet and heat exposure.
- 3.1.5 Geocomposite sheet drain: high impact polystyrene core with UV stabilizers.
- 3.1.6 Geomat: non-woven randomly oriented polyvinylchloride (PVC) monofilaments thermally welded together into a three dimensional, porous web with UV stabilizers.

4 EXECUTION

4.1 Preparation:

- 4.1.1 Locate extent of building, paved surfaces and other elements to be constructed under this contract.
- 4.1.2 From base line and bench mark set out as part of work in Section 01005: General Instructions, set out all pertinent lines, grades and levels required for proper and accurate setting out of this Work. Maintain accuracy of line and grade stakes during construction.
- 4.1.3 Identify and protect items designated to remain.
- 4.1.4 Disconnect, cap, and re-route utilities entering buildings to be demolished or relocated. Coordinate with Owner to minimize disruption to site when work on active or energized utilities traversing premises or designated to remain is required.
- 4.1.5 Before commencing work, conduct, with Owner, condition survey of existing structures, trees and other plants, lawns, fencing, service poles, wires and paving, survey bench marks and monuments which may be affected by work.

4.2 Stripping of Topsoil:

- 4.2.1 Do not strip soil while in wet or frozen condition.
- 4.2.2 Commence topsoil stripping of designated areas after work specified in Section G1010: Site Clearing has been completed.

- 4.2.3 Avoid mixing topsoil with sub-soil. Stockpile in locations directed by Owner.
- 4.2.4 Dispose of unused topsoil as directed by Owner.
- 4.3 Site Grading:
 - 4.3.1 Rough grade to levels, profiles, and contours allowing for required surface treatment and sub bases.
 - 4.3.2 Slope rough grade away from building 1:50 minimum
 - 4.3.3 Prior to placing fill over existing ground, scarify surface to depth of 150 mm to promote bonding of the two materials.
- 4.4 Excavation and Trenching:
 - 4.4.1 Excavate to lines, grades, elevations required by work.
 - 4.4.2 Excavate trenches to provide uniform continuous bearing and support for 150 mm thickness of pipe bedding material on solid and undisturbed ground. Trench widths below point 150 mm above pipe not to exceed diameter of pipe plus 600 mm.
 - 4.4.3 Unless otherwise required, excavate trenches to depth sufficient to provide a minimum cover of 1500 mm over pipe laid.
 - 4.4.4 Excavate for slabs and paving to subgrade levels. In addition, remove all topsoil, organic matter, debris and other loose and harmful matter encountered at subgrade level.
 - 4.4.5 Dispose of surplus and unsuitable excavated material off site.
- 4.5 Backfilling and Compaction:
 - 4.5.1 Remove snow, ice, construction debris, organic soil and standing water from spaces to be filled.
 - 4.5.2 Use fill of type and compaction densities for material to [ASTM D698] as follows:
 - 4.5.2.1 To underside of base courses – native excavated material compacted to 95% maximum dry density.
 - 4.5.2.2 Landscaped Areas - Native excavated material compacted to 90% maximum dry density.
 - 4.5.3 Place backfill and fill material in maximum 150 mm lifts.
 - 4.5.4 Place geocomposite sheet drains, geogrid, and geotextiles as required by design during backfilling and compaction process.

- 4.5.5 Remove surplus material and material unsuitable for fill, grading or landscaping off site and dispose in designated landfill site.
- 4.6 Soil Stabilization, Slope Protection, and Erosion Control:
 - 4.6.1 Construct retaining structures in accordance with design prepared by Professional Engineer.
 - 4.6.2 Where required by design provide geocomposite sheet drain, geotextiles and geogrid soil reinforcement. Install material and provide overlay cover to design requirements and manufacturer's instructions.
 - 4.6.3 Roll out, lap, anchor and stake geomat in accordance with manufacturer's recommendations.
- 4.7 Restoration:
 - 4.7.1 Upon completion of work, remove waste materials and debris, trim slopes, and correct defects as directed by Owner.
 - 4.7.2 Place topsoil taken from stockpile or other sources, in landscaped areas.

End of Section