

1. General

1.1 Section Includes

- 1.1.1 This Section specifies the requirements for soil stripping, stockpiling, excavation, backfilling and grading for site development.

1.2 Related Sections

- 1.2.1 Section 01 33 00 – Submittal Procedures.
- 1.2.2 Section 31 11 00 – Clearing and Grubbing.
- 1.2.3 Section 31 23 33 – Excavating, Trenching and Backfilling.
- 1.2.4 Section 31 23 16 – Rock Removal.
- 1.2.5 Section 01 74 11 – Cleaning.
- 1.2.6 Section 32 11 16 – Granular Sub-Base.

1.3 References

- 1.3.1 ASTM D698-00a, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³) (600 kN-m/m³).
- 1.3.2 ASTM C 117-95, Standard Test Method for Material Finer Than 0.075 mm Sieve in Mineral Aggregates by Washing.
- 1.3.3 ASTM C 136-96A, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.

1.4 Submittals

- 1.4.1 Provide submittals in accordance with Section 01 33 00 – Submittal Procedures.
- 1.4.2 Quality Assurance: Submit testing and inspection reports on a daily basis.

1.5 Quality Assurance/Regulatory Requirements

- 1.5.1 Comply with Explosives Act of Canada, where applicable.
- 1.5.2 If required, perform blasting in accordance with Federal, Provincial and Municipal regulations, more stringent conditions to apply. Repair any damage incurred during blasting operations as directed by the Departmental Representative.

1.6 Waste Management and Disposal

- 1.6.1 Separate waste materials for reuse.

1.7 Testing and Inspections

- 1.7.1 Testing of materials and compaction of backfill and fill shall be carried out by testing laboratory designated or approved by the Departmental Representative.

- 1.7.2 Submit to designated testing agency, 2-23 kg samples of each type of backfill for fill material proposed for use, at least 2 weeks prior to the start of backfilling or filling work proceeding.
- 1.7.3 Do not begin backfilling or filling operations until material approval has been received from the Departmental Representative.
- 1.7.4 Not later than 48 hours before backfilling and filling with approved material, notify the Departmental Representative so that compaction tests can be carried out by designated testing agency.
- 1.7.5 Sieve Analysis: Proposed fill materials test to confirm suitability for intended use and conformity with specifications.
- 1.7.6 Conduct tests on compacted fill to ASTM D698-78 for Standard Proctor Density.

1.8 Existing Conditions

- 1.8.1 Before commencing work, conduct, with Departmental Representative, a condition survey of existing structures, trees, service poles, wires, survey bench marks and other items that may be affected by the Work.
- 1.8.2 Before commencing work establish the location of all buried services on and adjacent to the site.
- 1.8.3 Arrange with the owner for relocation of buried services, if required, that interfere with the execution of the Work.

1.9 Protection

- 1.9.1 Protect excavations from freezing.
- 1.9.2 Keep excavations clean, free of standing water, and loose soil.
- 1.9.3 Where soil is subject to significant volume change due to change in moisture content, cover and protect to Departmental Representative's approval.
- 1.9.4 Protect natural and man-made features required to remain undisturbed. Unless otherwise indicated or located in an area to be occupied by new construction, protect existing trees from damage.
- 1.9.5 Protect buried services that are required to remain undisturbed.

2. Products

2.1 Materials

- 2.1.1 Backfill Material: Properties to the following requirements:

- ♦ Site Selected Common Backfill:

Material used for site selected backfill not to contain organic matter, frozen lumps, weeds, sods, logs, roots, stumps or any objectionable material and have

not more than 8% passing the 0.075 mm sieve nor particles larger than 300 mm throughout the work or 200 mm within 300 mm of sub-grade.

◆ Absorption Bed Stone:

Material shall be a washed gravel or crushed stone with particle sizes ranging from 12 mm to 38 mm.

2.1.2 Unsuitable Material Excavation:

- Material unsuitable for embankment, embankment foundation or material surplus to requirements.

2.1.3 Embankment Materials:

- Embankment materials require prior approval by the Departmental Representative.
- Material used for embankment not to contain organic matter, frozen lumps, weeds, sods, logs, roots, stumps or any objectionable material and have not more than 8% passing the 0.075 mm sieve nor particles larger than 300 mm throughout the work or 200 mm within 300 mm of sub-grade.

2.1.4 Common material to be obtained from sources indicated or approved by the Departmental Representative.

2.1.5 The Departmental Representative may, at his sole discretion, accept the use of in situ materials having a higher than 8% silt content provided that the conditions will allow the material to be installed in a manner that will not compromise the structural integrity of the roadway.

3. Execution

3.1 Temporary Erosion and Sedimentation Control

- 3.1.1 Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties.
- 3.1.2 Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.
- 3.1.3 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

3.2 Preparation

- 3.2.1 Remove obstructions from surfaces to be excavated within limits indicated.

3.3 Clearing and Grubbing

- 3.3.1 Clearing and Grubbing in accordance with Section 31 11 00 – Clearing and Grubbing.

3.3.2 Remove trees, stumps, logs, brush, shrubs, bushes, vines, undergrowth, rotten wood, dead plant material, exposed boulders and debris within areas designated on drawings.

3.3.3 Dispose of cleared and grubbed material off site daily to disposal areas acceptable to authority having jurisdiction.

3.4 Stripping of Topsoil

3.4.1 Do not handle topsoil while in wet or frozen condition or in any manner in which soil structure is adversely affected as determined by the Departmental Representative.

3.4.2 Commence topsoil stripping of areas as indicated or as directed by Departmental Representative after area has been cleared of brush, weeds and grasses and removed from site.

3.4.3 Strip topsoil to depths as indicated or as directed by the Departmental Representative.

3.4.4 Avoid mixing topsoil with subsoil.

3.4.5 Stockpile in locations as indicated or as directed by Departmental Representative.

3.4.6 Dispose of unused topsoil, if required, to location as directed by the Departmental Representative.

3.4.7 Protect stockpiles from contamination and compaction.

3.4.8 Cover topsoil that has been piled for long term storage.

3.5 Excavation

3.5.1 Excavate as required to carry out work. Notify Departmental Representative when excavations are complete. If bearings are unsatisfactory, additional excavation will be authorized in writing and paid for as additional work.

3.5.2 Excavate areas designated on drawings to design lines, grades and cross sections. The excavation tolerance in OM shall be ± 30 mm and in rock it shall be ± 150 mm.

3.5.3 Remove materials which are unsuitable to the lines and grades as designated by the Departmental Representative and dispose of as directed.

3.5.4 Suitable material not used immediately in the work shall be stockpiled in locations designated by the Departmental Representative at no additional cost to the Owner for subsequent use in the work.

3.5.5 Maintain crowns and cross slopes to provide good surface drainage.

3.5.6 Excavate to elevations and dimensions indicated or required for construction of the work plus space required to erect formwork.

3.5.7 Make excavation to clean lines to minimize quantity of fill material required.

3.5.8 Earth bottoms of excavation to be dry undisturbed soil, level, free from loose or organic material.

- 3.5.9 Excavation must not interfere with normal 45 degree splay of bearing from bottom of any footing.
- 3.5.10 When complete, have Departmental Representative inspect excavations to verify soil bearing capacity, depths and dimensions.
- Correct unauthorized excavation at no extra cost.
- 3.5.11 Excavate trenches to line and grades shown to a minimum of 150 mm below pipe inverts. Provide recesses for bell and spigot pipe to ensure bearing will occur along the barrel of the pipe.
- 3.5.12 Cut trenches a minimum of 300 mm wider than nominal pipe diameter. Trim and shape trench bottom and leave free of irregularities, lumps, or projections.

3.6 Backfilling

- 3.6.1 Inspection: Do not commence backfilling until fill material and spaces to be filled have been inspected and approved by Departmental Representative.
- 3.6.2 Areas to be backfilled to be free from, debris, snow, ice, water and frozen ground.
- 3.6.3 Prior to placing fill, compact existing sub-grade to obtain the same compaction as specified for the fill material. Remove any soft material and fill with approved material until specified compaction can be obtained.
- 3.6.4 Where temporary unbalanced earth pressures are liable to develop on walls or other structures, erect bracing or shoring to counteract unbalance and leave in place until removal is approved by the Departmental Representative.
- 3.6.5 Lateral support: Maintain even levels of backfill around structures as work progresses, to equalize earth pressures.
- 3.6.6 Place and compact fill materials in continuous horizontal layers not exceeding 300 mm loose depth. Use methods to prevent disturbing or damaging buried services. Make good any damage.
- 3.6.7 Maintain optimum moisture content to enable compaction to attain the specified density.
- 3.6.8 Placing:
- Place backfill, fill and base-course material in 200 mm to 300 mm lifts. The newly added material shall be placed on the existing lift and pushed forward over the advancing face of the lift to ensure that voids from the previous application are filled with smaller materials and fines. An alternative method of placing alternating lifts of rock backfill materials and sand and gravel glacial till may be utilized provided that each lift is thoroughly compacted to the required density prior to application of the succeeding lift of material.
 - Add water as required to achieve specified density.

3.6.9 Compaction: Compact each layer of material to following densities for material to ASTM D698:

- Backfill shall be placed in lifts not exceeding 300 mm, all surface particles exceeding 100 mm shall be removed from the fill material prior to completing the compaction process. The material shall be compacted by use of a 10 tonne vibratory type roller utilizing a minimum of 8 passes in each direction along each footprint or path. Any surface voids of each layer shall be filled with small rock fragments or finer material and thoroughly compacted by a minimum of two passes in each direction of the 10 tonne vibratory type roller to achieve the required Standard Proctor Maximum Dry Density of 100%.

3.6.10 In trenches:

- In accordance with Section 31 23 33 – Excavating, Trenching and Backfilling.

3.6.11 Blasted rock material, not capable of fine grading, is not acceptable; imported material must be placed on this type of material.

3.7 Shortage and Surplus

3.7.1 Supply necessary fill to meet backfilling and grading requirements and with minimum and maximum rough grade variance.

3.7.2 Dispose of waste material not required for backfill, grading or landscaping, at an approved disposal site.

3.8 Cleaning

3.8.1 Cleaning in accordance with Section 01 74 11.

3.8.2 Upon completion of the work, the Contractor shall remove debris, trim surfaces and leave the work site in a clean and graded condition.

4. Measurement and Basis for Payment

4.1 Measurement for Payment

4.1.1 Mass Rock Excavation:

- Cross sections for any excavation area shall be completed after clearing and prior to the start of grubbing. Cross sections shall then be taken after grubbing.
- Rock excavation shall be measured in cubic meters calculated from cross sections taken before and compared to the theoretical limits.
- When depth indicated on the drawings or directed by the Departmental Representative is less than 300 mm below original rock surface, the depth excavated for measurement purposes will be taken as 300 mm.
- Only boulders or rock fragments larger than 1 m³ will be measured for payment as rock excavation. The volume of excavated boulders and rock fragments in excess

of 1 m³ will be determined by measuring three (3) mutually perpendicular dimensions.

- Boulders (any size) protruding and above the original ground surface are to be included in grubbing and not measured in mass rock excavation.

4.1.2 Mass Common Excavation:

- Cross sections for any excavation area shall be completed after clearing and prior to the start of grubbing.
- Common excavation shall be measured in cubic meters calculated from cross sections taken in areas of excavation. For this purpose the first 300 mm thickness shall be paid as per the grubbing unit price in the Schedule of Quantities and Prices.
- Topsoil and waste material will be measured for payment as common excavation in its original location. The payment shall include the stockpiling of the topsoil material for later use on the site and the disposal of waste material at an approved disposal site.

4.1.3 No measurement or payment will be made for:

- Unnecessary excavation beyond the lines established.
- Overblasting or rock beyond theoretical limits.
- Backfilling of overblasted areas, with concrete or rockfill as directed by the Departmental Representative.
- Stockpiling of topsoil or protection of stockpiles.

4.1.4 Payment for excavation shall include the placement of excavated material at another location on site or the disposal of waste material at an approved disposal site.

4.1.5 Rock excavation includes the cost to excavate and place at an alternate site. Excavation is based on insitu volumes, and processing and backfill quantities are based on in place compacted volumes.

4.1.6 Mass Imported Common Backfill including compaction shall be measured in cubic meters in place to specified pay lines. Cross sections shall be completed before and after placement of Imported Common Backfill to determine the quantities used. No payment will be made for material used in excess of the specified pay lines as shown on the drawings unless otherwise directed by the Departmental Representative.

4.1.7 Excavation, trenching and backfilling for all service utilities will be measured in accordance with Standard Specification 31 23 33 - Excavating, Trenching and Backfilling, Measurement for Payment unless otherwise specified.

4.1.8 When benching is required to key new slopes to existing slopes, no measurement or payment shall be made with respect to quantities excavated during this operation.

- 4.1.9 Clearing and Grubbing will be measured in accordance with 31 11 00 - Clearing and Grubbing.
- 4.1.10 Absorption bed stone shall be measured in cubic metres in place to specified pay lines. Cross sections shall be completed before and after placement of absorption bed stone to determine quantities used. No payment will be made for material used in excess of the specified pay lines as shown on the drawings unless otherwise directed by Departmental Representative.
- 4.1.11 The placement and spreading of on site and/or imported topsoil will be paid by the square meter to the depth specified in the Contract Drawings and Specifications.
- 4.1.12 The contractor is to plan his work such that there is no requirement for double handling of material. No additional payment will be made for double handling of materials.
- 4.1.13 No payment will be made for overhaul on excavated or imported materials used into construction works or placed in disposal areas within the limits of the project boundaries.

4.2 Basis for Payment

- 4.2.1 All costs associated with work in this Section shall be deemed to be included in the appropriate unit and lump sum prices quoted in the Schedule of Quantities and Prices. Payment for excavation and borrow material will include placing and compacting in embankments elsewhere on the project, as well as legal disposal of all waste material.