

DIVISION 31 - EARTHWORK

Section 31 10 00 Clearing and Grubbing

1 Management of Grubbings

- 1.1 Where on-site reuse is approved, ensure that the area is graded and landscaped to blend with other site features to the approval of the Province.
- 1.2 The off-site disposal of grubbings will be at the discretion of the DTIR Representative.

2 Management of Surplus Brush Slash or Non-Merchantable Timber

- 2.1 Ensure the Contractor follows the Nova Scotia Department of Transportation and Infrastructure Renewal Highways Specification Division 1 Section 5, Environmental Protection for the management of brush, slash, or other non-merchantable timber.
- 2.2 Mulch should be well aged shredded bark.

3 Chipping.

- 3.1 Chips are to be disposed of where they will not wash into a watercourse or block ditches, culverts or drains.
- 3.2 In accordance with best ecological practice, wood chips should be spread in wooded areas to create a neat, natural appearance, maximum depth of 100mm. If this is not feasible, wood chips should be removed from the site and disposed of in accordance with sustainability (LEED) requirements or other DTIR approved of method.
- 3.3 Dispose of unusable chip and slash at a licensed facility.

4 In all cases, disposal shall adhere to Federal, Provincial, and Municipal laws and regulations.

- 4.1 Disposal in a municipal landfill is acceptable, if permitted by the Municipality.

Section 31 20 00 Earth Moving

1 Where Landscaping, Roads, Streets and Parking are incorporated into the design, complete design such that:

- 1.1 The thickness of the foundation for paved areas is determined while taking into account the results of the geotechnical report recommendations, the properties of the foundation materials, the design vehicle type and frequency, and the pavement thickness.

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- 1.2 The grading of the aggregates is such that it shall allow sufficient draining of the foundation, towards the storm drains while protecting against infiltration by fine subgrade materials.
 - 1.3 Effective grading of the area provides positive drainage away from the entire structure, particularly adjacent to foundation walls.
 - 1.4 Retention and use of existing site features and topography are maximized.
 - 1.5 Unless noted otherwise, all of the aggregate layers are compacted to 95% standard proctor density. Where required subgrade materials will be compacted in accordance with recommendations of the Geotechnical Report.
 - 1.6 Under slabs on grade, trenches, and sidewalks:
 - 1.6.1 Backfill is to be composed of granular material with non-capillary characteristics and compacted to 95% standard proctor density
 - 1.6.2 The layer of granular material has a thickness not less than 200 mm.
 - 1.6.3 When clay soil is in the area being backfilled, a 150 mm layer of sand or fine gravel, or specially made fabric filters are to be provided before the layer of granular material is placed. If a Geotechnical Report is available for the site, the recommendations of the Geotechnical Report are to be followed.
 - 1.6.4 Granular material is to be used for backfilling of the inside of the walls and pilasters.
 - 1.7 Where a highwater table is expected under slabs-on-grade below ground level, install a drainage system to avoid hydrostatic pressure under the slabs. The drainage system shall consist of perforated pipes draining to a storm sewer system, ditch, or watercourse under approval from the Nova Scotia Department of Environment. Embed and surround drainage system in a bed of Clear Stone granular material as defined in Division 3, section 4 of the Nova Scotia Standard Specification for Highway Construction and maintenance, and geotextile fabric. This system shall drain by gravity.
 - 1.8 Remove topsoil from surfaces to be occupied by buildings, roads, walks and parking areas. Stockpile such soil for reuse in landscaping work.
 - 1.9 The depth of excavations for foundation walls and pilasters shall conform to the requirements of the governing codes and regulations. When subject to freezing and thawing cycles, foundations shall not be less than 1.22 m below finished grade unless the Geotechnical Report or Municipal Standards require greater than 1.22 m of cover.

2 Mineralized Rock Excavation.

- 2.1 When mineralized rock is encountered on the project, the “Sulphide Bearing Materials Disposal Regulations” made under Section 66 of the Environment Act are to be followed

3 Blasting

- 3.1 All blasting is to be carried out in accordance with the regulations made pursuant to the Occupational Health and Safety Act, Chapter 320 of the Revised Statutes of Nova Scotia.
- 3.2 The requirements as set out in the Occupational Health and Safety Act are deemed to be minimum requirements. Ensure the Contractor conducts his operations in a manner so as to comply with all other Act(s) or Regulations in effect at the time of the blasting.
- 3.3 Blasting in or near watercourses is to receive prior approval from the Department of Fisheries and Oceans. Such blasting is to be in accordance with the Guidelines for use of Explosives in Canadian Fisheries Waters” (DFO; 1998).
- 3.4 Blasting is to be done in a manner that the three components of ground vibration do not exceed 12.5 mm/sec (0.5 in./sec) and air concussion as measured by peak particle velocity shall not exceed 128 decibels (0.0003 lbs/sq. in.) as measured in the ground adjacent to the nearest structure where it is anticipated the values will be higher than at the nearest structure.

Section 31 21 00 Off-Gassing Mitigation

- 1 Where Phase 1 Environmental Site Assessment indicates a presence of Radon, TPH or other radioactive waste at contaminating levels, or as directed by the Department, provide for design and installation of a vapour extraction system. The system shall be designed as recommended by the Phase 1 Environmental Site Assessment or as directed by the Department and shall be designed by an Environmental Engineer.
 - 1.1 Where no evidence of TPH contamination is found provide vapour extraction system for potential TPH contamination under the boiler room only, of all buildings.
 - 1.2 Unless recommended by the Phase 1 Environmental Assessment, or directed by the Department, design a vapour extraction system for radon as a passive system with provision for future activation.

Section 31 22 00 Grading

1. The grading for paved areas shall be as indicated in Sections 32 10 00.

2. The grading of landscape areas shall be in accordance with the following:
 - 2.1. There shall be no standing water on the site except in areas designated to retain or infiltrate water.
 - 2.2. Minimum slope for landscaped areas (other than sports fields) shall be 2%.
 - 2.3. Minimum slope for ditches and swales shall be 1.5%.
 - 2.4. Maximum slope for turf areas shall be 1:4(rise: run). Slopes up to 1:2 (rise: run) are permitted provided maintenance is not required and safety issues are resolved, as approved by the Province.
 - 2.5. Sports fields shall be graded to meet the specific design requirements of each sport. Generally, the surface shall be sloped at minimum 1.5% to provide drainage.
 - 2.6. The surface of play areas around playground equipment shall be level, with drainage provided by subsurface means.
3. Topsoil and Finish Grading
 - 3.1. General:
 - 3.1.1. The Contractor shall provide all topsoil required to complete the work. This may include improved grubbing material stockpiled on-site, and topsoil imported from off site.
 - 3.1.2. Topsoil shall meet the requirements for its intended use and for the vegetation to be established according to the landscape plan.
 - 3.1.3. Source Quality Control
 - 3.1.3.1. Advise DTIR of source of topsoil to be utilized 7 days in advance of starting work.
 - 3.1.3.2. Contractor is responsible for soil analysis and amendments to soil as specified.
 - 3.1.4. Testing
 - 3.1.4.1. All topsoil or other planting medium to be used in any project shall be tested for soil texture by an approved laboratory designated by the Province of Nova Scotia. Soil sampling, testing and analysis to be in accordance with provincial standards. Contractor will arrange and pay for cost of tests. Contractor shall submit copies of Soils Texture Report to the Province for approval prior to delivery of soil to the site.

3.1.4.2. All topsoil or other planting medium to be used in any project shall be tested for fertility, organic matter sieve analysis, chemical analysis and pH value by an accredited Laboratory. Soil sampling, testing and analysis to be in accordance with provincial standards. Contractor will arrange and pay for cost of tests. Contractor shall submit copies of Soils Analysis Report to the Province for approval prior to delivery to the site and again prior to Acceptance.

3.2. Products

3.2.1. Topsoil or other planting medium to be used for any project to consist of material stripped from site (grubbings) and/or imported topsoil to be supplied by the Contractor with the following considerations:

3.2.1.1. Topsoil: mixture of mineral particulates, micro-organisms and organic matter which provides suitable medium for supporting intended plant growth.

3.2.1.2. Soil Amendments: Lime, fertilizer and/or compost amendments to be made according to the fertility and pH requirements specified in the Soil Analysis Report.

3.2.1.3. Topsoil to contain no toxic elements or growth inhibiting materials.

3.2.1.4. Topsoil to be free from debris and stones over 25 mm diameter and coarse vegetative material, 12 mm diameter and 50 mm length, occupying more than 2% of soil volume.

3.2.1.5. Topsoil consistence: friable when moist.

3.2.2. Planting Soil for Trees, Shrubs and Groundcover shall be as follows:

3.2.2.1. A mixture consisting of 7 - 8 parts topsoil, and 2 - 3 parts compost, manure, peat moss or decomposed ground bark.

3.2.2.2. Soil Amendments to improve fertility and/or texture Peat moss: Derived from partially decomposed species of sphagnum mosses; elastic and homogeneous, brown in colour; free of wood and deleterious material which could prohibit growth; shredded particle minimum size: 5 mm.

3.2.2.3. Sand: washed coarse silica sand, medium to coarse textured.

3.2.2.4. Limestone: ground agricultural limestone containing minimum calcium carbonate equivalent of 85%; gradation requirements: percentage passing by weight, 90% passing 1.0 mm sieve, 50% passing 0.125 mm sieve.

3.2.2.5. Fertilizer: complete, commercial, with 35% soluble nitrogen.

3.2.2.6. Manure: well-aged cattle manure, free of lumps and impurities.

3.2.2.7. Compost: shall meet provincial and CCME guidelines.

3.3. Execution

3.3.1. Preparation of Subgrade

3.3.1.1. Verify that grades are correct. If discrepancies occur, notify DTIR and do not commence work until instructed.

3.3.1.2. Grade soil, eliminating uneven areas and low spots to ensure positive drainage.

3.3.1.3. Remove debris, roots, branches, stones in excess of 25 mm diameter and other deleterious materials. Remove soil contaminated with calcium chloride, toxic materials and petroleum products. Remove debris which protrudes more than 50 mm above surface. Dispose of removed material at an approved site.

3.3.1.4. Coarse cultivate entire area which is to receive topsoil to depth of 100 mm. Cross cultivate those areas where equipment used for hauling and spreading have compacted soil.

3.3.2. Placing and Spreading of Topsoil/Planting Soil

3.3.2.1. Do not place topsoil until subgrade has been approved by DTIR.

3.3.2.2. Spread topsoil in uniform layers not exceeding 150 mm, over unfrozen sub-grade free of standing water.

3.3.2.3. Spread topsoil over areas to be seeded to a minimum depth of 150 mm after settlement and 80% compaction.

3.3.2.4. Place planting soil in shrub planting beds and pits to a minimum depth of 450 mm after settlement.

3.3.2.5. Manually spread topsoil/planting soil around trees, shrubs and landscape features.

3.3.3. Soil Amendments

3.3.3.1. Apply and thoroughly mix soil amendments and fertilizer into full depth of soil at rates recommended by Soils Analysis Report or qualified

Vegetation Consultant.

3.3.4. Finish Grading

- 3.3.4.1. Grade to eliminate rough spots and low areas and ensure positive drainage. Prepare loose friable bed by means of cultivation and subsequent raking.
- 3.3.4.2. Consolidate topsoil to leave surfaces smooth, uniform and firm against deep foot printing.

3.3.5. Acceptance

- 3.3.5.1. DTIR will inspect materials in place and determine acceptance of material, depth of topsoil and finish grading. Approval of topsoil material subject to soil testing and analysis.
- 3.3.5.2. Restoration of Stockpile Sites: Restore stockpile sites acceptable to DTIR
- 3.3.5.3. Surplus Material: Dispose of materials not required at approved site.

Section 31 30 00 Earthwork Methods

1 Tests and Inspections

- 1.1 Ensure that backfilling or filling operations do not begin until backfill material has been approved for use by DTIR.
- 1.2 A minimum of 48 hours prior to commencement of backfilling or filling, ensure that DTIR is notified such that compaction testing can be carried out by the designated testing agency.

2 Performance

- 2.1 Ensure all aspects of earthwork, including excavating, trenching and backfilling, are performed according to guidance in the Geotechnical Investigation report, and to the satisfaction of the Province. Ensure Geotechnical Engineer provides written confirmation of acceptance.

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