

## **1 GENERAL**

### **1.01 WORK INCLUDED**

- .1 This section specifies the requirements associated with the completion of general excavation, trenching, backfilling and site grading of the site as shown, specified, or required including but not restricted to:
  - .1 Select demolition, removal, excavations, backfilling, compacting, shoring, dewatering and disposal of materials.
  - .2 Stripping and stockpiling of native topsoil material.
  - .3 Rough grading and preparation of subgrade and landscaped areas to indicated depths below finished grade elevations as indicated on Drawings or as specified.
  - .4 Excavation, trenching and backfilling of areas as indicated on Drawings and as specified, including:
    - .1 Water line utilities.
    - .2 Electrical utilities
  - .5 Excavation, filling and site grading for building construction.
  - .6 Preparation of As-Built Survey.

### **1.02 RELATED WORK**

- .1 Environmental Procedures: Section 01 35 43
- .2 Topsoil Placement and Grading: Section 32 91 19.13
- .3 Water Mains: Section 33 11 17
- .4 Structural Drawings and Specifications
- .5 Direct Buried Underground Cable Ducts: Section 33 65 76

### **1.03 REFERENCES**

- .1 ASTM D698-12e1, Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (600 kN-m/m<sup>3</sup>).
- .2 ASTM D1557-12 Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft<sup>3</sup> (2,700 kN-m/m<sup>3</sup>))
- .3 Prince Edward Island - Department of Transportation, Infrastructure and Energy - General Provisions and Contract Specifications for Highway Construction - Latest Edition.

#### 1.04 SITE CONDITIONS

- .1 Known underground and surface utility lines and buried objects are indicated on the drawings. Size, depth and location of existing utilities and structures as indicated are for guidance only. Completeness and accuracy are not guaranteed. Carry out test digs as required to locate services, etc.
- .2 Establish location of all existing services before commencing work. Notify Departmental Representative of any utility locations that differ from plans. Note depths of found utilities on as-built mark-up.

#### 1.05 DEFINITIONS

- .1 Excavation: excavation of materials of whatever nature including dense tills, hardpan, frozen materials, boulders, bedrock, debris and all other materials encountered on the site.
- .2 Selected Backfill: excavated on-site material suitable for grading work.
- .3 Unsuitable material: all material which is not suitable for use in work and must be disposed of off-site.
- .4 Contaminated material: soil with exceedances of Provincial and CCME (Canadian Council of Ministers of the Environment) Soil Quality Guidelines and requiring off-site disposal at a soil treatment facility licensed in the Province of Prince Edward Island.
- .5 Invasive Plant Species - Vegetative material not native to nor currently found within the project site and which aggressively spreads, is fast growing and/or is difficult to eradicate, such as Japanese knotweed; purple loosestrife; goutweed, Glossy Buckthorn, Scotch Pine, garlic mustard, etc.
- .6 Native Topsoil: Existing soil capable of supporting good vegetative growth. Native topsoil may not meet specification of topsoil required for sodding and planting activities.
- .7 Common: Excavated soil which is not rock, unsuitable, or topsoil.
- .8 Surplus Material: excavated material not required for re-use.
- .9 Subgrade: the surface of mass excavation and embankment finished to lines and elevations indicated.

- .10 Excavation classes: two (2) classes of excavation will be recognized; rock excavation and common excavation.
  - .1 Rock excavation: excavation of rock as defined in 1.05.10 exceeding minimum volume limits.
  - .2 Common excavation: excavation of materials of whatever nature including pavements, drainage structures, timber and masonry encountered during excavation or indicated on the drawings, which are not included under definitions of rock excavation. This also includes the excavation of Unsuitable Material.
- .11 Rock: material which requires drilling, ripping or breaking up with power-operated tools for its removal, and boulders and pieces of concrete exceeding volume limits below. Frozen material will not be classified as rock. Minimum volume limits:
  - .1 Mass excavation: 1.0 cubic metres.
  - .2 Trench excavation: 0.5 cubic metres.

#### **1.06 SAMPLES**

- .1 When requested submit samples in accordance with Section 01 33 00 - Submittal Procedures.
- .2 At least one (1) week prior to commencing work, inform Departmental Representative of proposed source of bedding, backfill and cover materials and provide access for sampling.
- .3 Submit sieve analysis of all granular materials.

#### **1.07 TOLERANCES**

- .1 Finish rough grading of site to 25mm +/- or as noted on Drawings.

#### **1.08 PROTECTION OF EXISTING STRUCTURES**

- .1 Existing buried utilities and structures:
  - .1 Size, depth and location of existing utilities and structures as indicated are for guidance only. Completeness and accuracy are not guaranteed.
  - .2 Prior to commencing excavation work, notify applicable owner or authorities having jurisdiction, establish location and state of use of buried utilities and structures. Owners or authorities having jurisdiction to clearly mark such locations to prevent disturbance during work.
  - .3 Confirm locations of buried utilities by careful test excavations.
  - .4 Maintain and protect from damage, water, sewer, gas, electric, telephone, and other utilities and structures encountered.

- .5 Where utility lines or structures exist in area of excavation, obtain direction of Departmental Representative before removing or re-routing.
- .6 Record location of maintained, re-routed and abandoned underground lines.
- .2 Existing surface features:
  - .1 Conduct, with Departmental Representative, a condition survey of existing service poles, wires, signs, pavement, trees, shrubs, fences, asphalt, concrete, survey benchmarks and monuments, etc. which may be affected by work.
  - .2 Protect existing surface features from damage while work is in progress. In event of damage, immediately make repair to approval of the Departmental Representative.

#### **1.09 SHORING, BRACING & UNDERPINNING**

- .1 Shoring, bracing, or underpinning is required to avoid undermining adjacent buildings and utility lines.
- .2 Comply with Section 01 35 29.06 - Health and Safety Requirements and applicable local regulations.
- .3 Provide shoring and bracing as required to prevent movement, failure or settlement, to safeguard and maintain integrity of structures, utilities, earth, benchmarks, services and adjacent grades.
- .4 Engage services of qualified professional engineer registered in the Province of Prince Edward Island to inspect and approve shoring equipment required for work.
- .5 Remove sheeting and/or shoring at the completion of the work.

## **2 PRODUCTS**

### **2.01 MATERIALS**

- .1 Backfill materials to be free from invasive plant species.
- .2 Fill material: Selected Backfill as specified herein. Obtain approval from Departmental Representative for excavated or graded material to be used as fill for grading work. Protect approved material from contamination.
- .3 Selected Backfill: Common which is free from stumps, trees, roots, sod, organics, rock, boulders, and masonry larger than 100mm in any dimension; and other deleterious materials.

- .4 Borrow: well graded material from Contractor's own sources meeting the specification for Selected Backfill.

## 2.02 GRANULAR MATERIALS

- .1 Sand: hard, granular, sharp material, well graded from course to fine, free of impurities, chemicals or organic matter, and grades as follows:

Sieve Designation	Cum. % Passing
5 mm	100
0.16 mm	0-5

- .2 Gravels: crushed and screened pit gravel or crushed and screened rock. Material to consist of hard and durable stone particles. Gradation to be dense and well graded and to PEI DOTIE - Latest Edition.

Passing By Mass (%)				
Sieve Size	Granular Class A (required)	Granular Class B (for info only)	Granular Class C (for info only)	Drainage Class D (for info only)
50.0mm	-	-	-	100
45.0mm	-	-	100	-
38.0mm	-	-	-	60-100
31.5mm	100	100	87-100	40-100
25.0mm	95-100	95-100	80-96	20-65
19.0mm	-	-	-	0-30
12.5mm	50-83	50-83	45-83	0-20
4.75mm	30-60	30-60	25-65	0-5
1.18mm	15-40	15-43	-	-
600um	10-32	10-35	-	-
300um	5-22	5-26	5-22	-
75um	3-9	3-9	3-10	-

## 2.03 MISCELLANEOUS

- .1 Pipe Bedding and backfill: Class A granular.

## 3 EXECUTION

### 3.01 GENERAL

- .1 Confirm erosion and sedimentation control measures and other environmental protection measures as specified in Section 01 35 43 are in place prior to beginning work of this Section.

- .2 Remove obstructions, ice and snow, from surfaces to be excavated within limits of contract.
- .3 Verify existing grade elevations prior to beginning work. Report any discrepancies to Departmental Representative.

### **3.02 GRADING - GENERAL**

- .1 Minimize construction traffic over load bearing Subgrade.
- .2 Rough grade to levels, profiles, and contours allowing for surface treatment as to the following depths:
  - .1 150mm maximum for areas to be sodded.
  - .2 As noted on Details for other construction
- .3 Geotechnical engineer to inspect and approve prepared compacted Subgrade prior to placement of fill material.
- .4 Prior to placing fill over existing ground, scarify surface to depth of 150mm. Maintain fill and existing surface at approximately same moisture content to facilitate bonding.
- .5 Do not disturb soil within branch spread of trees or shrubs to remain.

### **3.03 STRIPPING OF NATIVE TOPSOIL**

- .1 Remove native topsoil from areas to be excavated, paved or regraded. Strip when dry enough to prevent contamination with subgrade material. Strip to minimum 150mm depth. Do not handle wet or frozen topsoil.
- .2 Strip native topsoil after area has been cleared of brush, weeds, grasses or other vegetation.
- .3 Stockpile native topsoil on site in location to approval of the Departmental Representative. Stockpile height not to exceed 1830mm. Provide protection of stockpile from erosion.
- .4 Dispose of unused native topsoil off site.
- .5 Native top soil may not meet tolerance requirements of prepared topsoil for planting operations. Test material prior to reusing on site.

### **3.04 EXCAVATION & EMBANKMENT**

- .1 Schedule excavation activities to minimize the exposure of load bearing subgrade. Minimize construction traffic over load bearing subgrade.

- .1 Obtain Department Representatives approval of completed excavation.
- .2 Excavate all types of materials to lines, grades, elevations and dimensions as indicated and as necessary for construction.
- .3 Handle material in a manner that will not endanger the public, personnel, property or the work. Do not reduce sight distances or obstruct roadways or utilities. Do not obstruct flow of surface drainage or natural watercourses.
- .4 Notify the Departmental Representative if in doubt as to definition of material.
- .5 Select method of excavation, support, and dewatering unless otherwise indicated or directed. Protect property and structures from damage.
- .6 Remove concrete, masonry, paving, walks, demolished foundations and rubble and other obstructions encountered during excavation.
- .7 Extend excavations sufficient distance from footings and walls to allow placing and removal of forms and for placing backfill materials indicated.
- .8 Excavation must not interfere with normal bearing influence from bottom of any existing footing. Where this occurs, shoring, sheeting, or underpinning is required.
- .9 Minimize disturbance of soil within branch spread of trees or shrubs that are to remain. If excavating through roots, excavate by hand and cut roots with sharp axe or saw.
- .10 Do not excavate more than 30 metres of trench in advance of pipe laying, unless otherwise directed.
- .11 Do not obstruct flow of surface drainage
- .12 Dispose of surplus and unsuitable excavated material in approved location off site in accordance with PEI Department of Environment regulations.
- .13 Earth bottoms of excavations to be undisturbed soil, level, free from loose, soft or organic matter.
- .14 Prepare trench bottoms so pipe can be laid to required line and grade.
- .15 Correct unauthorized over-excavation as follows and to the approval of the geotechnical engineer:

- .1 Fill under bearing surfaces and footings with concrete specified for footings.
- .2 Fill under other areas with Class A fill compacted to not less than 95% of corrected maximum dry density.

### **3.05 EXCAVATION OF UNSUITABLE MATERIAL**

- .1 Notify Departmental Representative whenever Unsuitable Materials are encountered in the Subgrade and remove to depth and extent directed. Isolate area to minimize entry of water into excavation.
  - .1 If such work is due to nature of the soil, the Departmental Representative and Contractor will jointly measure work for payment.
  - .2 If such work is due to any fault of the Contractor, remedial work is responsibility of Contractor.
- .2 Remove unsuitable material and material that is deemed contaminated by the Departmental Representative immediately from the site. Do not stockpile.
- .3 Remove and dispose of Unsuitable Materials from trench bottom to extent and depth as required by these specifications and as directed by Departmental Representative. Replace over excavation of trench with selected site material, granular material (Class A) or concrete as directed by Departmental Representative.

### **3.06 ROCK REMOVAL**

- .1 Blasting is not permitted.
- .2 When rock is encountered which was not identified in the geotechnical reports nor could be anticipated from geotechnical reports, notify the Departmental Representative for measurement.
- .3 Break rock to a depth 300mm below Subgrade. Remove loose rock fragments from slopes.
- .4 Remove rock by wedging, drilling and/or mechanical hammer. Conduct rock removal with all possible care to avoid injury to persons and property.

### **3.07 STOCKPILE**

- .1 Stockpiling and protection of fill materials approved for use is the responsibility of the Contractor.
- .2 Do not stockpile materials alongside of excavations in such manner that stockpiling will cause side failure or bottom uplift.

- .3 Protect fill materials from contamination.

### **3.08 SUPPORT OF EXCAVATION**

- .1 Install and be responsible for supporting excavation as directed in 1.09.
- .2 When shoring is required, engage services of a Professional engineer, registered or licensed in the Province of Prince Edward Island, to design shoring and inspect installation.
- .3 Provide record copy of drawings signed and sealed by Professional engineer responsible for their preparation.
- .4 Construct temporary works to depths, heights and locations as directed by the Professional Engineer responsible for the design per 1.09.4.
- .5 During backfill operation:
  - .1 Unless otherwise indicated or as directed by Departmental Representative, remove sheeting and shoring from excavations.
  - .2 Do not remove bracing until backfilling has reached that specified by the Professional engineer responsible for the design of the shoring or bracing.
  - .3 Pull sheeting in increments that will ensure compacted backfill is maintained at an elevation at least 500 mm above toe of sheeting.
- .6 Upon completion of substructure construction:
  - .1 Remove shoring and bracing.
  - .2 Remove excess materials from site and restore conditions indicated or as directed by Departmental Representative.

### **3.09 BEDDING**

- .1 Place and compact foundation layer of bedding for piping to depth indicated, shaped to provide uniform support to pipe structures. Granular bedding for all underground structures to be as noted on Drawings.

### **3.10 BACKFILLING**

- .1 Do not proceed with backfilling operations until the Departmental Representative has inspected and approved installation.
- .2 Areas to be backfilled must be free from debris, snow, ice, water and frozen ground.

- .3 Do not use backfill material which is frozen or contains ice, snow or debris.
- .4 Backfilling around installations:
  - .1 Place bedding and surround material as indicated.
  - .2 Do not backfill around or over cast-in-place concrete within 72 hours after placing of concrete.
  - .3 Backfill walls with Granular Class A within 600mm of the wall. Compact to 98% of maximum dry density. Beyond 600mm select backfill from the site can be used.
  - .4 Within building area under concrete slabs on grade: use minimum 200 mm thick base course of Class A. Compact to 100 % maximum dry density.
  - .5 Subgrade fill in landscaped areas: per Section 32 91 19.13.
- .5 Place layers simultaneously on both sides of installed work to equalize loading. Difference not to exceed 225 mm.
- .6 Where earth pressures are liable to develop permit concrete to cure for minimum 28 days to withstand earth and compaction pressures. Do not install earth or backfill until concrete has cured completely.
- .7 Place protective material layer under, around and over minor installations until 600 mm of cover is provided. Dumping material directly on installations will not be permitted.
- .8 Place backfill materials of earth fill around structure in uniform layers not exceeding 200 mm compacted thickness up to finish grade. Compact each layer replacing succeeded layer.
- .9 Where new services cross under existing services, compact bedding for existing service pipe to 150 mm below bottom of pipe and provide a cast-in-place cradle for length of unsupported pipe.

### **3.11 DEWATERING**

- .1 Keep excavations free of water while work is in progress.
- .2 Dewater excavation in a manner which will not endanger stability of the work.
- .3 Protect open excavations against flooding and damage due to surface run-off.
- .4 Dispose of water in accordance with Section 01 35 43 - Environmental Procedures and in manner not detrimental to public and private property, or any portion of work completed or under construction.

- .5 Take precautions to prevent uplift of pipe or structures.
- .6 Water must not be pumped directly into a watercourse or water body.
- .7 Provide facilities as required by municipal, provincial or federal regulations to remove suspended solids or other materials before discharging towards watercourses or drainage areas.

### **3.12 COMPACTION**

- .1 Compact filled and disturbed areas to 95% Standard Proctor density, with the following exceptions:
  - .1 Class A Granular Fill: 100% Standard Proctor Maximum Dry Density
  - .2 Granular materials in road area to 98% Standard Proctor Maximum Dry Density.
  - .3 Backfilling around structures to 98% Standard Proctor Maximum Dry Density.
  - .4 Clear stone to 70% Relative Density.
- .2 Density tests: Standard Proctor in accordance with Method B, ASTM D 698. Modified Proctor Density in accordance with ASTM D1557. Relative Density in accordance with ASTM D4253 and D4254.

### **3.13 TESTING**

- .1 Undertake quality control testing of filled and disturbed areas to ensure compliance with these specifications. Bear cost of quality control testing at no additional cost to the Contract.
- .2 At its discretion, the Departmental Representative may undertake inspection and testing of soil compaction. Cost of this testing to be borne by the Departmental Representative.
- .3 If Owner's testing identifies non-compliance with these specifications, pay for any additional testing required by the Departmental Representative.

### **3.14 SURPLUS MATERIAL**

- .1 Remove Surplus Material from site.

### **3.15 RESTORATION**

- .1 Upon completion of work, remove waste materials and debris, trim slopes, and correct defects as directed by Departmental Representative.

- .2 Reinstall pavements, lawns or other site features damaged by Work of this section to elevation which existed before excavation.
- .3 Clean and reinstall areas affected by work as directed by Departmental Representative.

### **3.16 AS-BUILT SURVEY**

- .1 Undertake topographical survey of completed work with a minimum of 10m x 10m grid and significant changes in grades or material types.
- .2 Identify location and elevations of newly built work, including:
  - .1 Subsurface piping:
    - .1 Water pipes, thrust blocks, elbows, joints, etc.
    - .2 Subsurface field drainage.
  - .2 Water valves and fire hydrants.
- .3 Submit electronic data as an AutoCAD drawing and in tabular format as a requirement of Substantial Performance.

**END OF SECTION**

## **1 GENERAL**

### **1.01 DESCRIPTION**

- .1 This Section specifies requirements for re-compacting and reshaping of existing subgrade along proposed road, to lines, grades and typical cross-sections indicated or as established by the Departmental Representative.

### **1.02 RELATED SECTIONS**

- .1 Excavation, Trenching & Backfilling - Section 31 23 10.

### **1.03 REFERENCES**

- .1 ASTM D 698-12E1, Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort 600 kN-m/m<sup>3</sup>.

### **1.04 DEFINITIONS**

- .1 Reshaping subgrade: scarifying, pulverizing, blading, reshaping and re-compacting existing subgrade surface.

## **2 PRODUCTS**

### **2.01 NOT APPLICABLE**

- .1 Not Applicable

## **3 EXECUTION**

### **3.01 PULVERIZING AND RESHAPING**

- .1 Pulverize and break down scarified material to 75 mm maximum soil clod size, except that stones larger than this size may be left intact as directed by the Departmental Representative.
- .2 Blade and trim pulverized material to elevation and cross section dimensions as indicated.
- .3 Where deficiency of material exists, add and blend additional subgrade material as directed by Departmental Representative.
- .4 Re-use excess material in areas of material deficiency as directed by the Departmental Representative.

### **3.02 COMPACTING**

- .1 Compact to density not less than 100% corrected maximum dry density maximum dry density in accordance with ASTM D 698.
- .2 Shape and roll alternately to obtain smooth, even and uniformly compacted subgrade surface.
- .3 Apply water as necessary during compaction to obtain specified density.
- .4 If material is excessively moist, aerate by scarifying with suitable equipment until moisture content is corrected to value not greater than 2 % moisture above optimum value for compaction in accordance with ASTM D 698.

### **3.03 SITE TOLERANCES**

- .1 Shape and compact subgrade to within 25mm of design elevations but not uniformly high or low. Before placement of the granular base or replacement of the millings/pulverized material, 20 meter grid showing the design and as constructed elevations, demonstrating that the specified tolerance has been achieved and that the road/parking is not uniformly high or low.

### **3.04 PROTECTION**

- .1 Maintain reshaped surface in condition conforming to this section until succeeding material is applied or until Departmental Representative acceptance.

**END OF SECTION**