

## **1 GENERAL**

### **1.1 WORK INCLUDED**

- .1 To complete clearing and grubbing as shown, specified or required, to:
  - .1 Removal of growth and vegetation, including roots, within areas of existing vegetation as indicated on plans.
  - .2 Protection of existing trees to remain.

### **1.2 RELATED WORK**

- .1 Section 01 35 43 Environmental Procedures
- .2 Section 02 41 13 Selective Sitework Demolition
- .3 Section 31 23 11 Excavation, Trenching and Backfilling

### **1.3 WASTE MANAGEMENT AND DISPOSAL**

- .1 Separate and recycle waste materials in accordance with Section 01 74 21.
- .2 Place materials defined as hazardous or toxic waste in designated containers.
- .3 Seal emptied containers and store safely for disposal.
- .4 Use sealers, form release and stripping agents that are non-toxic, biodegradable and have zero or low VOC's.

### **1.4 LEED DOCUMENTATION**

- .1 Submit a LEED material submittal form as specified in Section 01 35 21 - LEED Requirements, to identify recycled and/or regional content of materials for inclusion by the Owner/Consultant in a submission for LEED certification.
- .2 Conform to the requirements outlined in Section 01 74 21 - Construction Waste Management.

## **1.5 DEFINITIONS**

- .1 Clearing: Cutting of trees and brush vegetative growth to not more than a specified height above ground and disposing of felled trees and surface debris. Underbrush clearing consists of removals from treed area of undergrowth. Deadwood and disposing of all fallen timbers and surface debris.
- .2 Grubbing: Excavation and disposal of stumps, roots, boulders, and rock fragments to not less than a specified depth below original ground surface.

## **1.6 PROTECTION**

- .1 Protect existing items designated to remain and materials designated for reuse. In event of damage, immediately replace such items or make repairs to approval of Departmental Representative at no additional cost.
- .2 Prevent damage to fencing, trees, landscaping, natural features, bench marks, existing buildings, existing pavement, utility lines, site appurtenances, etc. which are to remain. Make good any damage.
- .3 Do not damage root systems of existing trees, plants and shrubs which are to remain, by piling of surplus soil or debris over them, or by cutting when clearing.

## **1.7 ACCESS TO SITE**

- .1 Provide and maintain access into existing buildings, roadways and parking areas at all times during construction.

## **1.8 SAFETY**

- .1 Contractor to undertake any and all measures to ensure safety of the public from work of the Contract, including but not limited: supply and installation of barricades required and traffic control measures.

## **2 PRODUCTS**

### **2.1 BARRICADES FOR TREE PROTECTION**

- .1 See Section 02 41 13 Selective Sitework Demolition

## **3 EXECUTION**

### **3.1 GENERAL**

- .1 Do not sell or burn materials on site.
- .2 Refer to Section 02 41 13 Selective Sitework Demolition for protection of vegetation to remain.

### **3.2 CLEARING**

- .1 Stake out and/or tag limits of tree clearing for review and approval by Departmental Representative.
- .2 Clear trees, shrubs, uprooted stumps and surface debris not designated to remain.
- .3 Cut off unsound branches and cut down dangerous trees overhanging area cleared as directed by the Departmental Representative.

### **3.3 GRUBBING**

- .1 Grub out stumps and roots to not less than 450mm below original ground surface.
- .2 Do not disturb soil area within the dripline of any tree to remain without approval of Departmental Representative.

### **3.4 DAMAGED TREES REMOVALS**

- .1 Cut, clear and remove from the site all trees within 6000mm of the designated limit of clearing shown on Drawings that are partially or fully toppled, leaning or posing threat of collapse due to wind or other weather effect, weakening to root systems from cut line exposure or direct damage by construction activity and, any other trees in this zone that pose a toppling hazard in the opinion of the Departmental Representative until date of Substantial Completion of Contract.

### **3.5 REMOVAL AND DISPOSAL**

- .1 Remove from the site daily all materials and debris resulting from Work under this Section.
- .2 Do not burn or bury any debris on site.
- .3 Usable timber becomes property of Contractor.

### **3.6 FINISHED SURFACE**

- .1 Leave ground surface in a condition suitable for immediate grading operations and/or stripping of topsoil.

**END OF SECTION**

## **1 GENERAL**

### **1.01 DESCRIPTION OF WORK**

- .1 This Section specifies requirements to provide and maintain erosion and sedimentation control features where required, prior and during construction.

### **1.02 RELATED WORK**

- .1 Environmental Procedures - Section 01 35 43
- .2 Excavation and Backfilling - Section 31 23 11
- .3 Topsoil Placement and Grading - Section 32 91 21
- .4 Storm Utility Drainage Piping - Section 33 41 00

### **1.03 SITE CONDITIONS**

- .1 Establish location of all services before commencing work.

### **1.04 SCHEDULING**

- .1 Schedule all construction with Departmental Representative.

## **2 PRODUCTS**

### **2.01 MATERIALS**

- .1 Preassembled silt fence with industrial woven geotextile fabric with 20 - 30 micron effective opening size, pre-stapled to wood posts spaced as indicated.
- .2 Geotextile to be non-woven Type N1 PEI Department of Transportation and Infrastructure Renewal General Provisions and Contract Specifications

## **3 EXECUTION**

### **3.01 GENERAL**

- .1 Maintain site in a clean and safe manner in order to minimize erosion and sediment movement.

### **3.02 SEDIMENT CONTROL FENCE**

- .1 Install sediment control where indicate and as required.

- .2 Excavate 150mm x 150mm trench along length of fence as indicated. Lay fabric bottom in trench and backfill.

### **3.03 MAINTENANCE**

- .1 Maintain sedimentation control features throughout the construction period. Repair damage to original condition.
- .2 Remove accumulated sediment from behind sediment control fence when and as directed by the Departmental Representative.
- .3 Maintain vertical alignment of sediment control fence such that it is always plumb and straight.
- .4 Remove sedimentation control features when directed by the Departmental Representative. Take care to avoid causing turbidity and excessive re-suspension of particles when removing sediment control features.

### **3.04 STOCKPILED MATERIAL**

- .1 When stockpiling removed material such as topsoil or when stockpiles of granular material are being used in the Work, protect stockpiles from contamination, compaction and weather. Cover all stockpiles with tarpaulins.

### **3.05 CATCH BASIN PROTECTION**

- .1 Install on all storm sewers inlet protection as indicated:
  - .1 On and adjacent to the Site.
  - .2 At the first inlet downstream of the site on all roads adjacent to the site.
- .2 Cut or torn fabric shall be replaced.
- .3 Manufactured filter bags are an acceptable alternative to geotextile.

**END OF SECTION**

## **1 GENERAL**

### **1.01 WORK INCLUDED**

- .1 To complete general excavation, trenching, backfilling and site grading of the site as shown, specified, or required 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 for construction of asphalt paving, concrete curbs, unit paver and/or concrete sidewalks, 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 Storm sewer system and utilities.
    - .2 Sanitary utilities.
    - .3 Water line utilities.
    - .4 Electrical utilities
  - .5 Excavation, filling and site grading for building construction.
  - .6 Preparation of As-Built Survey.

### **1.02 RELATED WORK**

- .1 Section 01 35 43 - Environmental Procedures
- .2 Section 31 15 53 - Erosion Control
- .3 Section 32 12 16 - Asphalt Paving
- .4 Section 32 13 13 - Sitework Concrete
- .5 Section 32 14 13 - Precast Unit Pavers
- .6 Section 32 32 35 - Precast Concrete Unit Masonry Walls
- .7 Section 32 91 19.13 - Topsoil and Finish Grading
- .8 Section 33 11 17 - Water Main
- .9 Section 33 31 13 - Sanitary Sewers
- .10 Section 33 39 00 - Precast Manholes, Catch Basins and Structures

- .11 Section 33 40 00 - Storm Sewers and Culverts
- .12 Electrical Drawings and Specifications
- .13 Architectural & Structural Drawings and Specifications

### 1.03 REFERENCES

- .1 ASTM C136/C136M-14 Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates
- .2 ASTM C117-13, Test Method for Material Finer Than 0.075 mm (No. 200) Sieve in Mineral Aggregates by Washing.
- .3 ASTM C136-14, Method for Sieve Analysis of Fine and Coarse Aggregates.
- .4 ASTM D698-12e1, Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (600 kN-m/m<sup>3</sup>).
- .5 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>))
- .6 ASTM D3776/D3776M-09ae2(2013) Standard Test Methods for Mass Per Unit Area (Weight) of Fabric
- .7 ASTM D3786/D3786M-13 Standard Test Method for Bursting Strength of Textile Fabrics-Diaphragm Bursting Strength Tester Method
- .8 ASTM D4253-14 Standard Test Methods for Maximum Index Density and Unit Weight of Soils Using a Vibratory Table
- .9 ASTM D4254-14 Standard Test Methods for Minimum Index Density and Unit Weight of Soils and Calculation of Relative Density.
- .10 ASTM D4355/D4355M-14 Standard Test Method for Deterioration of Geotextiles by Exposure to Light, Moisture and Heat in a Xenon Arc Type Apparatus
- .11 ASTM D4632/D4632M-15 Standard Test Method for Grab Breaking Load and Elongation of Geotextiles
- .12 ASTM 4833/D4833M-07(2013)e1 Standard Test Method for Index Puncture Resistance of Geomembranes and Related Products
- .13 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.

#### 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 classes of excavation will be recognized;
  - .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 four (4) weeks 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 Comply with Section 01 35 29.06 - Health and Safety Requirements and applicable local regulations.
- .2 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.
- .3 Engage services of qualified Professional Engineer registered in the Province of Prince Edward Island to inspect and approve shoring equipment required for work.
- .4 Construct temporary works to depths, heights and locations as indicated or directed by the Professional engineer responsible for the design of the shoring or bracing.
- .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 When sheeting is required to remain in place, cut off tops at elevations as directed by the Departmental Representative.
- .7 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.

- .8 Water must not be directly pumped into a watercourse or water body.

## 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 and meeting criteria for use as determined by Departmental Representative.
- .4 Borrow: well graded material from Contractor's own sources meeting the specification for Selected Backfill.
- .5 Structural Fill: Structural Fill to be to the approval of the Geotechnical engineer.
  - .1 Type A Structural Fill:
    - .1 Approved inorganic well-graded soil with a maximum particle size of 200mm and maintained at a suitable moisture content to achieve the required compaction of 100% Standard Proctor Maximum Dry Density (ASTM D698).
    - .2 Type A Structural Fill is to be placed within the stress zone of site services and the new visitor centre building

### 2.02 GRANULARS

- .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 shall consist of hard and durable stone particles. Gradation to be dense and well graded and to PEI DOTIE - Latest Edition.

Sieve Size	Passing By Mass (%)			
	Granular Class A	Granular Class B	Granular Class C	Drainage Class D
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 sub grade 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 Engineer. 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.

### **3.04 EXCAVATION & EMBANKMENT**

- .1 Schedule excavation activities to minimize the exposure of load bearing Subgrade. Minimize construction traffic over load bearing Subgrade.
- .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 45° splay of bearing from bottom of any footing.
- .9 When constructing embankment with Common material place in uniform layers to full width of embankment. Compact to 95% Standard Proctor Density throughout full width and depth. Maximum rock size: 65% of compacted lift thickness.
- .10 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.
- .11 Do not excavate more than 30 metres of trench in advance of pipe laying, unless otherwise directed.
- .12 Do not obstruct flow of surface drainage
- .13 Dispose of surplus and unsuitable excavated material in approved location off site in accordance with PEI Department of Environment regulations.
- .14 Earth bottoms of excavations to be undisturbed soil, level, free from loose, soft or organic matter.
- .15 Prepare trench bottoms so pipe can be laid to required line and grade.
- .16 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.

Obtain Department Representatives approval of completed excavation.

Obtain excavation permit prior to starting any on-site excavations.

### **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 deem 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 or concrete as directed by Departmental Representative.

### **3.06 ROCK REMOVAL**

- .1 Blasting 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 shoring.
- .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.

### 3.09 PLACEMENT OF STRUCTURAL FILL

- .1 Confirm demolitions and removals are completed prior to placement of Structural Fill.
- .2 Geotechnical engineer to review Subgrade prior to placement of Structural Fill.
- .3 Place and compact Structural Fill with equipment and in lift thicknesses to ensure the specified levels of compaction throughout.
- .4 Use fill of types as indicated or specified below. Compaction densities are percentages of maximum densities obtained from ASTM D698.
- .5 Within trenches:
  - .1 For pipes, cables, ducts, fittings and appurtenances, install bedding as follows: Provide min. 150 mm bedding layer of bedding sand under pipes, cables, ducts, fittings and appurtenances. Compact to 100% of Maximum Dry Density. Side fill to top of utility or service manually with beddings and in uniform lifts not exceeding 150 mm. Hand tamp only.
- .6 Backfill: provide min. 300 mm protective backfill cover over bedding cover, hand-place. Compact to 100% of Maximum Dry Density. For remainder of trench backfill to underside of sub-base course or of surface restoration in lifts not to exceed 200 mm. Compact to 100% of Maximum Dry Density.
- .7 Notify the Departmental Representative four hours prior to backfilling of trenches.

### 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 specified elsewhere.
  - .2 Do not backfill around or over cast-in-place concrete within 72 hours after placing of concrete.
  - .3 Exterior side of perimeter walls: use selected backfill

- material fill in other areas unless specified otherwise.  
Compact to 98 % of maximum dry density.
- .4 Within building area under concrete slabs on grade: use minimum 200 mm thick base course of Premium Borrow, per section 31 23 13, with a uniform 150 mm thick top course of granular base to underside of floor slabs. Use Premium Borrow if fill is required below subbase course. Compact to 100 % maximum dry density.
  - .5 Subgrade fill in landscaped areas: per Section 31 26 10.
  - .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.

### **3.09 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 Provide facilities as required by municipal, provincial or federal regulations to remove suspended solids or other materials before discharging to watercourses or drainage areas.

### **3.10 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 shall be as noted on Drawings.

### **3.11 BACKFILLING**

- .1 Use fill of types as indicated.
- .2 Departmental Representative to inspect and approve prepared Subgrade prior to placing any fill material and/or formwork.
- .3 Do not proceed with backfilling operations until Departmental Representative has inspected and approved installations.
- .4 Areas to be backfilled to be free from debris, snow, ice, water and frozen ground.
- .5 Do not use backfill material which is frozen or contains ice, snow or debris.
- .6 After installation of pipe, place and compact bedding material in 150mm layers to horizontal centerline of pipe.
- .7 Place and compact remaining bedding material to depth indicated above the top of pipe before further compaction.
- .8 Complete backfilling of structures by placing and compacting material indicated in 300mm layers. Bring backfill up evenly around structures.
- .9 Generally, place backfill material in uniform layers not exceeding 150mm compacted thickness up to grades indicated. Compact each layer before placing succeeding layer.
- .10 Backfill around installations.
- .11 Control moisture content of backfill materials so that specified compaction may be obtained.
- .12 In areas of pedestrian and vehicular traffic, maintain surfaces level with existing surfaces until reinstatement.

### **3.12 COMPACTION**

- .1 Compact filled and disturbed areas to 95% Standard Proctor density, with the following exceptions:
  - .1 Type A Structural Fill: 100% Standard Proctor Maximum Dry

- Density
- .2 Granular materials in parking 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, Contractor to 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 Reinstate pavements, lawns or other site features damaged by Work of this section to elevation which existed before excavation.
- .3 Clean and reinstate areas affected by work as directed by Departmental Representative.

### **3.16 AS-BUILT TOPOGRAPHICAL 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 Manholes and catchbasins.
  - .2 Subsurface piping:

- .1 Storm sewer pipes.
  - .2 Sanitary sewer pipes.
  - .3 Water pipes, thrust blocks, elbows, joints, etc.
  - .4 Subsurface field drainage.
  - .3 Water valves and fire hydrants.
  - .4 Curbing and asphalt areas.
  - .5 Walkways.
- .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 OF WORK**

- .1 To complete rough and fine grading of the site:

### **1.02 RELATED WORK**

- .1 Environmental Procedures - Section 01 35 43
- .2 Excavation and Backfilling - Section 31 23 11
- .3 Topsoil Placement and Grading - Section 32 91 19.13
- .4 Storm Utility Drainage Piping - Section 33 41 00

### **1.03 SITE CONDITIONS**

- .1 Establish location of all services before commencing work.

### **1.04 SCHEDULING**

- .1 Schedule all construction with Department Representative.

### **1.05 PROTECTION**

- .1 Prevent damage to fencing, trees, landscaping, natural features, bench marks, existing buildings, existing pavement, surface or underground utility lines which are to remain. Make good any damage.

## **2 PRODUCTS**

### **2.01 MATERIALS**

- .1 Fill material:
  - .1 Selected backfill: common material from site excavation, free from stumps, trees, roots, sod, organics, rocks, boulders, and masonry larger than 150 mm in any dimension, and any other deleterious materials.
  - .2 Select Borrow: well-graded material from Contractor's own sources meeting the PEI DOTIE specification for select borrow free from lumps of clay and other deleterious material with a maximum particle size of 100 mm, and a maximum of 30% of the material passing the 4.75 mm sieve must pass the 75 m sieve.
  - .3 Premium Borrow: well-graded material from Contractor's own sources meeting the PEI DOTIE specification for select

borrow free from lumps of clay and other deleterious material with a maximum particle size of 100 mm, and a maximum of 20% of the material passing the 4.75 mm sieve shall pass the 75 m sieve.

- .2 Obtain Department Representative's approval of excavated or graded material used as fill for grading work. Protect approved material from contamination.

### **3 EXECUTION**

#### **3.01 REMOVAL OF TOPSOIL**

- .1 Do not handle wet or frozen topsoil.
- .2 Remove topsoil from areas to be excavated or regraded. Strip topsoil when dry enough to prevent contamination with sub grade material.

#### **3.02 GRADING**

- .1 Grade to levels, profiles, and contours allowing for surface treatment as indicated.
- .2 Grade as noted.
- .3 Prior to placing fill over existing ground, scarify surface to depth of 150 mm. Maintain fill and existing surface at approximately same moisture content to facilitate bonding.
- .4 All areas within the limits of the contract (i.e. paved areas, building, etc.) shall be proof-rolled with a 25t loaded truck. Take extreme care to not damage existing underground services. Make good any damage at no additional cost to the Contract.

#### **3.03 TESTING**

- .1 Have a geotechnical engineer carry out the Department of Transportation, Infrastructure and Energy's construction control testing requirements and ensure compliance with the general provisions and contract specifications for highway construction. Pay costs for geotechnical engineer and submit all test reports including witnessing of proof rolling to the Departmental Representative.

#### **3.04 SURPLUS MATERIAL**

- .1 Remove surplus material from site.
- .2 Remove material unsuitable for fill or grading from site as

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directed by Departmental Representative.

**END OF SECTION**

## **1 GENERAL**

### **1.01 DESCRIPTION**

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

### **1.02 RELATED SECTIONS**

- .1 Rough Grading- Section 31 23 13.

### **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**

## **1 GENERAL**

### **1.01 RELATED REQUIREMENTS**

- .1 Section 31 26 13 - Reshaping Subgrade.

### **1.02 MEASUREMENT AND PAYMENT**

- .1 Measure geotextiles in square metres of surface covered by material. No allowance will be made for seams and overlaps.

### **1.03 REFERENCES**

- .1 ASTM International
  - .1 ASTM D4491-2016, Standard Test Methods for Water Permeability of Geotextiles by Permittivity.
  - .2 ASTM D4632-15a, Standard Test Method for Grab Breaking Load and Elongation of Geotextiles.

### **1.04 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
  - .1 Submit manufacturer's instructions, printed product literature and data sheets for geotextiles and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Samples:
  - .1 Submit following samples four (4) weeks prior to beginning Work.
    - .1 Minimum length of 2 m of roll width of geotextile.
    - .2 Methods of joining.

### **1.05 DELIVERY, STORAGE AND HANDLING**

- .1 Deliver, store and handle materials in accordance with manufacturer's written instructions.
- .2 Storage and Handling Requirements:
  - .1 Store materials and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
  - .2 Store and protect geotextiles from direct sunlight and UV rays.
  - .3 Replace defective or damaged materials with new.

## **2 PRODUCTS**

### **2.01 MATERIAL**

- .1 Non-woven Geotextile: non-woven synthetic fiber fabric, supplied in rolls.
- .2 Physical properties:
  - .1 Tensile strength and elongation (in any principal direction): to ASTM D4632.
    - .1 Tensile strength: minimum 401 N, wet condition.
    - .2 Elongation at break: 50%.
  - .3 Hydraulic properties:
    - .1 Permittivity: to ASTM D4491.
    - .2 Water flow to ASTM D4491, 6095 l/min/m<sup>2</sup>.

## **3 EXECUTION**

### **3.01 EXAMINATION**

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for geotextile material installation in accordance with manufacturer's written instructions.
  - .1 Visually inspect substrate in presence of Departmental Representative.
  - .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
  - .3 Proceed with installation only after unacceptable conditions have been remedied.

### **3.02 INSTALLATION**

- .1 Place geotextile material by unrolling onto graded surface in orientation, manner and locations indicated and retain in position with approved anchors
- .2 Place geotextile material smooth and free of tension stress, folds, wrinkles and creases.
- .3 Place geotextile material on sloping surfaces in one continuous length from toe of slope to upper extent of geotextile.
- .4 Overlap each successive strip of geotextile 600 mm over previously laid strip.
- .5 Protect installed geotextile material from displacement, damage or deterioration before, during and after placement of material layers.

- .6 Replace damaged or deteriorated geotextile to approval of Departmental Representative.

### **3.03 PROTECTION**

- .1 Vehicular traffic is not permitted directly on geotextile.

**END OF SECTION**