# 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 31 23 10 Excavating and Backfilling

.3 Section 31 23 13 Rough Grading

## 1.3 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.

## 1.4 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.

**1.5 ACCESS TO SITE**

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

**1.6 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 For select mature trees in excess of 200mm dia.: Concrete jersey barricades – 1800mm long and 1000mm height.

.2 For other trees and shrubs:

.1 Fencing: Standard plastic snow fencing, 1200mm height, or equivalent.

.2 Posts: Rolled steel Tee-section fence posts.

**3 EXECUTION**

**3.1 PROTECTION OF VEGETATION TO REMAIN**

.1 Before commencing Work, ensure in examination of the site that all possible factors required for tree preservation are investigated.

.2 Do not sell or burn materials on site.

.3 Do not damage root systems within the dripline of existing trees, plants, and shrubs which are to remain, by piling of surplus soil or debris over them, or by cutting when clearing.

.4 Protect existing plant material which is to remain, and is located close to construction areas, to approval of Departmental Representative by:

.1 Selective placement of precast concrete jersey barricades and/or

.2 Encircling snow fence barricades erected on posts in a substantial manner a minimum of 3000mm from trunk of tree to approval of Departmental Representative.

.5 Keep heavy equipment away from trees to remain. Take any necessary steps to prevent excessive soil compaction around existing plant material to remain. Cordon off areas near mature trees to remain and alert equipment operators to minimize compaction damage.

.6 Immediately repair damage to trees, structures, buried and above-ground services, bench marks, and survey monuments should it occur as a result of Work of this Section. Completely cover wounds of over 25mm in diameter suffered by trees and shrubs with wound paint.

.7 Apply approved tree paint to cuts or scars suffered by vegetation designated to remain.

.8 Cut damaged roots of trees to remain cleanly with sharp tools retaining as much root as possible.

.9 Do not leave roots of trees and shrubs to remain reposed to air. Cover with minimum 150mm topsoil and water thoroughly.

**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 The work includes:
  .1 Trenches for all underground lines, including drainage works, culverts, culvert extensions, etc.
  .2 Other demolition, removal, excavations, backfilling, compacting, shoring, dewatering and disposal of unsuitable and contaminated materials.

## 1.02 RELATED SECTIONS

.1 Rough Grading - Section 31 23 13

.2 Storm Utility Drainage Piping - Section 33 41 00

## 1.03 REFERENCES

.1 ASTM C117-13, Test Method for Material Finer Than 0.075 mm (No. 200) Sieve in Mineral Aggregates by Washing.

.2 ASTM C136-14, Method for Sieve Analysis of Fine and Coarse Aggregates.

.3 ASTM D698-12e2, Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (600 kN-m/m3).

## 1.04 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.

**1.05 PROTECTION OF EXISTING FEATURES**

.1 Existing buried utilities and structures:

.2 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.

**1.06 SHORING AND BRACING**

.1 Comply with Section 01 35 29 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.

**1.07 SAMPLES**

.1 When requested submit samples in accordance with Section 01 33 00 - Submittals

.2 At least 4 weeks prior to commencing work, inform Departmental Representative of proposed source of bedding, backfill or cover materials and provide access for sampling.

**2 PRODUCTS**

.1 Clear stone: crushed and screened, hard, durable stone, free from clay and organic matter, and graded as follows:
  .1 25mm Clear Stone (“Drainage Course Gravel”, “25mm Clear Stone Back Fill”, “Clear Stone”, and “free draining backfill layer” are used interchangeably):

| Sieve Designation | % Passing |
|---|---|
| 25mm | 100 |
| 19mm | 15-85 |
| 12.5mm | 0-53 |
| 9.5mm | 0-30 |
| 4.75mm | 0-4 |
| 1.18mm | 0-2 |

.2 100mm Clear Stone:

| Sieve Designation | % Passing |
|---|---|
| 100mm | 100 |
| 50mm | 25-60 |
| 25mm | 0-5 |

## 3 EXECUTION

### 3.01 SITE PREPARATION

.1 Remove obstructions, ice and snow, from surfaces to be excavated within limits indicated.

### 3.02 STOCKPILING

.1 Stockpile fill materials in areas designated by Department Representative. Stockpile granular materials in manner to prevent segregation.

.2 Protect fill materials from contamination.

### 3.03 SHORING AND BRACING

.1 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.

.2 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.

.3 When sheeting is required to remain in place, cut off tops at elevations as directed by Departmental Representative.

.4 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.

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

**3.04 DEWATERING**

.1 Conduct dewatering operations in accordance with Section 01 35 44 - Environmental Protection.

.2 Keep excavations free of water while work is in progress.

.3 Protect open excavations against flooding and damage due to surface run off.

.4 Dispose of water in a manner not detrimental to public and private property, or any portion of work completed or under construction.

**3.05 EXCAVATION**

.1 Allow access for continuous sampling of excavation area by the Departmental Representative. Excavated material deemed as contaminated material by the Departmental Representative is to be disposed of at an approved contaminated waste disposal facility

.2 Carry out excavations and removals. Excavate to lines, grades, elevations and dimensions as indicated.

.3 Remove rubble and other obstructions encountered during excavation.

.4 For trench excavation, unless otherwise authorized by Department Representative in writing, do not excavate more than 30 m of trench in advance of installation operations and do not leave open more than 10 m at end of days operation.

.5 Dispose of surplus and unsuitable excavated material in approved location off site in accordance with PEI

Department of Environment regulations.

.6 Do not obstruct flow of surface drainage.

.7 Earth bottoms of excavations to be solid undisturbed soil, level, free from loose, soft or organic matter.

.8 Notify Department Representative when soil at bottom of excavation appears unsuitable and proceed as directed by Departmental Representative.

.9 Obtain Department Representatives approval of completed excavation.

.10 Remove unsuitable and contaminated material to extent and depth as directed by Departmental Representative.

.11 Remove unsuitable material and material that is deem contaminated by the Departmental Representative immediately from the site. Do not stockpile.

.12 Where required due to unauthorized over excavation, correct as follows:
.1 Fill under bearing surfaces and footings with approved structure fill compacted to 100% Standard Proctor Dry Density.
.2 Fill under other areas compacted to a minimum of 100% Maximum Dry Density.

.13 Hand trim, make firm and remove loose material and debris from excavations. Where material at bottom of excavation is disturbed, compact foundation soil to density matching undisturbed soil.

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

**3.06 FILL TYPES AND COMPACTION**

.1 Use fill of types as indicated or specified below. Compaction densities are percentages of maximum densities obtained from ASTM D698.

.2 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.

.3 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.

.4 Notify Departmental Representative four hours prior to backfilling of trenches.

**3.07 BACKFILLING**

.1 Do not proceed with backfilling operations until Department 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: use selected backfill compacted 90 % of maximum dry density.

.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.

**3.08 INSPECTION AND TESTING**

.1 The Contractor shall submit gradation curves for proposed materials to demonstrate compliance with specifications. Pay all costs for gradation curves.

.2 Refer to Section 01 45 00 - Testing and Quality Control.

**3.09 RESTORATION**

.1 Upon completion of work, remove surplus materials and debris, trim slopes, and correct defects noted by Department Representative.

.2 Clean and reinstate areas affected by work as directed by Department Representative.

**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 10

.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 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 µm 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 µm sieve.

.2 Obtain Department Representative's approval of excavated or graded material used as fill for grading work. Protect approved material form 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 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, Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort 600 kN- m/m3.

## 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 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 Department 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 D 4491-2016, Standard Test Methods for Water Permeability of Geotextiles by Permittivity.
- .2 ASTM D 4595-2011, Standard Test Method for Tensile Properties of Geotextiles by the Wide-Width Strip Method.
- .3 ASTM D 4716-2014, Standard Test Method for Determining the (In-Plane) Flow Rate Per Unit Width and Hydraulic Transmissivity of a Geosynthetic Using a Constant Head.
- .4 ASTM D 4751-2016, Standard Test Method for Determining Apparent Opening Size of a Geotextile.

.2 Canadian General Standards Board (CGSB)
- .1 CAN/CGSB-4.2 No. 11.2-2004, Textile Test Methods - Bursting Strength - Ball Burst Test (Extension of September 1989).
- .2 CAN/CGSB-148.1, Methods of Testing Geotextiles and Complete Geomembranes.
  - .1 No.2-M85, Methods of Testing Geosynthetics - Mass per Unit Area.
  - .2 No.3-M85, Methods of Testing Geosynthetics - Thickness of Geotextiles.
  - .3 No.6.1-93, Methods of Testing Geotextiles and Geomembranes - Bursting Strength of Geotextiles Under No Compressive Load.
  - .4 No.7.3-92, Methods of Testing Geotextiles and Geomembranes - Grab Tensile Test for Geotextiles.
  - .5 No. 10-94, Methods of Testing Geosynthetics - Geotextiles - Filtration Opening Size.

**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 D 4632.
.1 Tensile strength: minimum 401 N, wet condition.
.2 Elongation at break: 50%.

.3 Hydraulic properties:
.1 Permittivity: to ASTM D 4491, 2 Secâ¹.
.2 Water flow to ASTM D4491, 6095 1/min/mý.

## 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 not permitted directly on geotextile.

**END OF SECTION**