

PART 1 - GENERAL

<u>1.1 Description of Work</u>	.1	The work includes: .1 Trenches for all underground lines, including drainage works, culverts, culvert extensions, etc. .2 Other demolition, removal, excavations as required.
<u>1.2 Related Sections</u>	.1	Rough Grading - Section 31 23 13
	.2	Roadway Embankments - Section 31 24 13
	.3	Pipe Culverts - Section 33 42 13
<u>1.3 References</u>	.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 D698-12e1. Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (600 kN-m/m3).
<u>1.4 Definitions</u>	.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.
<u>1.5 Protection of Existing Features</u>	.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. Carry out test digs as required to locate services, etc.

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| <u>1.6 Shoring and Bracing</u> | <p>.1 Comply with Section 01 35 29 Health and Safety Requirements and applicable local regulations.</p> <p>.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.</p> <p>.3 Engage services of qualified Professional Engineer registered in the Province of Prince Edward Island to inspect and approve shoring equipment required for work.</p> |
| <br><u>1.7 Samples</u>         | <p>.1 When requested submit samples in accordance with Section 01 33 00 - Submissions / Shop Drawings.</p> <p>.2 At least 4 weeks prior to commencing work, inform Department Representative of proposed source of bedding, backfill or cover materials and provide access for sampling.</p>   |

PART 2 - PRODUCTS

Not Applicable

PART 3 - EXECUTION

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| <u>3.1 Site Preparation</u> | <p>.1 Remove obstructions, ice and snow, from surfaces to be excavated within limits indicated.</p>  |
| <br><u>3.2 Stockpiling</u>  | <p>.1 Stockpile fill materials in areas designated by Department Representative. Stockpile granular materials in manner to prevent segregation.</p> <p>.2 Protect fill materials from contamination.</p> |

3.3 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 Department 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 Department 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 Department Representative.

3.4 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.

3.5 Excavation

- .1 Carry out excavations and removals. Excavate to lines, grades, elevations and dimensions as indicated.
- .2 Remove rubble and other obstructions encountered during excavation.
- .3 For trench excavation, unless otherwise authorized by Department Representative in

3.5 Excavation  
(Cont'd)

- .3 (Cont'd)  
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.
- .4 Dispose of surplus and unsuitable excavated  
material in approved location off site in  
accordance with PEI Department of Environment  
regulations.
- .5 Do not obstruct flow of surface drainage.
- .6 Earth bottoms of excavations to be solid  
undisturbed soil, level, free from loose, soft  
or organic matter.
- .7 Notify Department Representative when soil at  
bottom of excavation appears unsuitable and  
proceed as directed by Department  
Representative.
- .8 Obtain Department Representatives approval of  
completed excavation.
- .9 Remove unsuitable material from trench bottom  
to extent and depth as directed by Department  
Representative.
- .10 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 95% Maximum Dry Density.
- .11 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.
- .12 Obtain excavation permit prior to starting any  
on-site excavations.

3.6 Fill Types  
and Compaction

- .1 Use fill of types as indicated or specified  
below. Compaction densities are percentages of  
maximum densities obtained from ASTM D698-12e1.

3.6 Fill Types  
and Compaction  
(Cont'd)

- .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 95% 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 95% 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 95% of Maximum Dry Density.
- .4 Notify Department Representative four hours prior to backfilling of trenches.

3.7 Backfilling

- .1 Do not proceed with backfilling operations until Department Representative has inspected and approved installation.
- .2 Areas to be backfilled to 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 24 hours after placing of concrete.
- .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.

3.7 Backfilling  
(Cont'd)

- .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.

3.8 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 Testing of materials and compaction will be carried out by testing laboratory designated by Department Representative. Frequency of tests will be determined by Department Representative.
- .3 Department Representative will pay costs for initial inspection and testing. Refer to Section 01 45 00 - Testing Laboratory Services.
- .4 Where tests or inspections by designated testing laboratory reveal work not in accordance with contract requirements, Contractor shall pay costs for additional tests or inspections as Department Representative may require to verify acceptability of corrected work.

3.9 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.

## PART 1 - GENERAL

1.1 Description of Work .1 To complete rough and fine grading of the site:

1.2 Related Work .1 Environmental Protection - Section 01 35 44  
.2 Excavation and Backfilling - Section 31 23 10  
.3 Roadway Embankments - Section 31 24 13  
.4 Topsoil Placement and Grading -  
Section 32 91 21  
.5 Hydraulic Seeding - Section 32 92 22  
.6 Pipe Culverts - Section 33 42 13

1.3 Site Conditions .1 Establish location of all services before  
commencing work.

1.4 Scheduling .1 Schedule all construction with Department  
Representative.

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

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## PART 2 - PRODUCTS

- 2.1 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 shall 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 from contamination.

## PART 3 - EXECUTION

- 3.1 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.
- 3.2 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.



- 3.2 Grading                      .4    All areas within the limits of the contract  
    (Cont'd)
- 3.3 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. Costs for geotechnical  
engineer shall be paid by the contractor and all  
test reports including witnessing of proof  
rolling shall be submitted to the Engineer.
- 3.4 Surplus Material .1    Remove surplus material from site.
- .2    Remove material unsuitable for fill or grading  
from site as directed by Departmental  
Representative.

PART 1 - GENERAL

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|-----------------------------------|--------|---|
| <u>1.1 Definitions</u>            | .1     | Topsoil: material capable of supporting good vegetative growth and suitable for use in top dressing, landscaping and seeding.                               |
|                                   | .2     | Waste material: material unsuitable for use in embankment or surplus to requirements.   |
|                                   | .3     | Borrow material: material obtained from areas off site required for construction of embankments or for other portions of work.                              |
|                                   | .4     | Embankment: material derived from usable excavation and placed above original ground or stripped surface up to subgrade elevation.                          |
|                                   | .5     | Pavement structure: combination of layers of unbound or stabilized granular sub-base, base, and asphalt or concrete surfacing.                              |
|                                   | .6     | Subgrade elevation: elevation immediately below pavement structure.   |
| <br><u>1.2 Related Sections</u>   | <br>.1 | <br>Reshaping Subgrade: Section 31 26 13  |
|                                   | .2     | Pipe Culverts: Section 33 42 13   |
| <br><u>1.3 Traffic Provisions</u> | <br>.1 | <br>Provide and maintain roadways, walkways and detours, for vehicular and pedestrian traffic and access to fire hydrants, alarms and emergency telephones. |

PART 2 - PRODUCTS

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| <u>2.1 Materials</u> | .1 | Embankment materials to approval of Department Representative.   |
|                      | .2 | Material used for embankment not to contain organic matter, frozen lumps, weeds, sod, roots, logs, stumps, boulders larger than 150 mm or any other unsuitable material. |
|                      | .3 | Borrow material: Obtain from sources off site and to Department Representative's acceptance.   |

2.1 Materials  
(Cont'd)

PART 3 - EXECUTION

- .4 Rip Rap: to PEI Transportation, Infrastructure  
and Energy specification size R5.

3.1 Compaction  
Equipment

- .1 Compaction equipment must be capable of  
obtaining required densities in materials on  
project.

3.2 Water  
Distributors

- .1 Apply water with equipment capable of  
uniform distribution.

3.3 Embankments

- .1 Remove topsoil and rootmat.
- .2 Where indicated, mill or pulverize existing  
pavement to depth indicated.
- .3 Do not place material which is frozen nor place  
material on frozen surfaces.
- .4 Maintain a crowned surface during construction  
to ensure ready runoff of surface water. Do not  
place material in free standing water.
- .5 With material containing less than 25% by  
volume of stone or rock fragments larger than  
100 mm:  
.1 Place and compact to full width in uniform  
layers not exceeding 200 mm loose thickness.  
Department Representative may authorize thicker  
lifts if specified compaction can be achieved.  
.2 Compact to a density of not less than 95%  
corrected maximum dry density in accordance with  
ASTM D698.  
.3 Bring moisture content of soil to level  
required to achieve specified compaction. Add  
water or aerate as required.

3.4 Excavations

- .1 Remove topsoil and rootmat.
- .2 Excavate fill or bedrock to subgrade level.
- .3 Following milling or pulverizing, excavate road  
and shoulder width to specified subgrade  
elevation.

3.5 Subgrade  
Compaction

- .1 After grading has been completed, scarify and mix subgrade surface to required depth of subgrade compaction.
- .2 Remove unsuitable materials found during work. Replace with material approved by Department Representative
- .3 Bring moisture content of soil to level required to achieve specified compaction. Add water or aerate as required.

3.6 Finishing  
and Tolerances

- .1 Shape and compact surfaces to within 30 mm of design elevations but not uniformly high or low.
- .2 Do scarifying, grading, compacting or other methods of work as necessary to provide thoroughly compacted roadbed shaped to grades and cross sections as indicated or as directed by Department Representative.
- .3 Finish edges and slopes of common material to neat condition, true to line and grade.
  - .1 Remove isolated boulders exposed in cut slopes and fill resulting cavities.
  - .2 Hand finish slopes that cannot be finished satisfactorily by machine.

3.7 Maintenance

- .1 Maintain finished surfaces in condition conforming to this section until acceptance.

PART 1 - GENERAL

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| <u>1.1 Description</u>      | .1 | This Section specifies requirements for recompacting and reshaping of existing subgrade, to lines, grades and typical cross-sections indicated or as established by Department Representative. |
| <u>1.2 Related Sections</u> | .1 | Roadway Embankments - Section 31 24 13.  |
| <u>1.3 References</u>       | .1 | ASTM D 698, Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort 600 kN- m/m <sup>3</sup> .   |
| <u>1.4 Definitions</u>      | .1 | Reshaping subgrade: scarifying, pulverizing, blading, reshaping and recompacting existing subgrade surface.  |

PART 2 - PRODUCTS

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| <u>2.1 Not Applicable</u> | .1 | Not Applicable |
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PART 3 - EXECUTION

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| <u>3.1 Pulverizing and Reshaping</u> | .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 Department 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 Department Representative.  |
|                                      | .4 | Re-use excess material in areas of material deficiency as directed by Department Representative.   |

- 3.2 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.
- 3.3 Site Tolerances .1 Reshaped compacted surface to be within plus or minus 10 mm of elevation as indicated.
- 3.4 Protection .1 Maintain reshaped surface in condition conforming to this section until succeeding material is applied or until Department Representative acceptance.