

PART 1 - GENERAL

1.1 DESCRIPTION
OF WORK

- .1 This Section specifies requirements for furnishing all materials, labour, tools and equipment and performing all operations necessary to strip and remove over burden from areas designated, complete excavation of all types of material encountered, placing of excavated material as backfill in trenches and embankments, disposal of unsuitable or frozen material, disposal of surplus material, furnishing and placing backfill material as specified below, all as shown on the Drawings and as specified.
- .2 The work generally includes, but is not necessarily limited to, the following items:
 - .1 Preparing ground for excavation.
 - .2 Trench excavation and backfilling.
 - .3 Structure excavation and backfilling.
 - .4 Control of water by dewatering.
 - .5 Providing borrow material when required.
 - .6 Removal and disposal of frozen or unsuitable material.
 - .7 Removing surplus material.
 - .8 Sheet piling, shoring, trench box and bracing to support trench walls, sides of excavations, existing structures or utilities.
 - .9 Stripping, and replacing topsoil and granular surfaces.

1.2 RELATED
SECTIONS

- .1 Section 03 30 00 - Cast in Place Concrete.
- .2 Section 26 05 34 - Conduits, Conduit Fastening and Conduit Fittings.
- .3 Section 32 98 00 - Reinstatement
- .4 Section 33 31 00 - Sanitary Sewer
- .5 Section 33 34 00 - Force mains
- .6 Section 33 39 00 - Manholes, Catch Basins and Structures

1.3 REFERENCES

- .1 ASTM C117. Test Method for Material Finer Than 0.075 mm (No. 200) Sieve in Mineral Aggregates by Washing.
- .2 ASTM C136. Method for Sieve Analysis of Fine and Coarse Aggregates.

<u>1.3 REFERENCES</u> (Cont'd)	.3	ASTM D698. Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (600 kN-m/m ³).
<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.
<u>1.6 SHORING AND BRACING</u>	.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.
<u>1.7 SAMPLES</u>	.1	When requested submit samples in accordance with Section 01 33 00 - Submittal Procedures.
	.2	At least 2 weeks prior to commencing work, inform Departmental Representative of proposed source of bedding, backfill or cover materials and provide access for sampling.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Common Borrow: where material additional to that obtained from excavation on site is required to complete trench backfilling the Contractor will provide this material from his own sources. Material shall be as per DOTIE requirements Division 206.
- .2 Select Backfill Material: approved material from site excavation or borrow pits. Such material shall be free from stumps, trees, roots, sod, muck or other deleterious material, and shall not contain rock, boulders or masonry larger than 150 mm diameter. The material shall be free from frost, and shall not be placed on frozen ground or in water. It must have a moisture content that will allow compaction to the specified densities.

- .3 Clear stone: Hard durable stone, crushed and screened, free from clay and organic matter and graded as follows:

<u>Sieve Designation, mm</u>	<u>Percent Passing</u>
28	100
20	90-100
10	0-40
5	0-10

- .4 Select Borrow: shall be as per PEI DOTIE requirements Division 206.
- .5 Filter fabric: non woven geotextile terrafix 270R or equivalent.
- .6 Rip-Rap: Class 1 as per PEI DOTIE Specification 213 for R-25 random Rip-Rap.
- .7 Unshrinkable Fill: Unshrinkable fill shall meet the requirements of ASTM C869. The 28-day compressive strength, measured in accordance with CAN/CSA-A23.2 shall range between 0.40 - 0.80 MPA. Water/cement ratio shall be 0.45 and mix shall have a measured density of between 35-40 lbs/ft³. Acceptable product: Rheocell 30 as manufactured by Master Builders Technologies.
- .8 Class A granular: As per PEI DOTIE Requirements Division 207.

- | <u>Sieve Designation, mm</u> | <u>Percent Passing</u> |
|------------------------------|------------------------|
| 200 | 100 |
| 150 | 90-100 |
| 112 | 20-35 |
| 80 | 0-20 |
| 20 | 0-10 |

<p>3.1 TEMPORARY EROSION AND SEDIMENTATION CONTROL</p> <hr/>	<p>.1 Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways in accordance with PEI DOTIE and Department of Communities, Land and Environment.</p> <p>.2 Inspect, repair and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established</p> <p>.3 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.</p>
<p>3.2 SITE PREPARATION</p> <hr/>	<p>.1 Remove obstructions from surfaces to be excavated within limits indicated.</p>
<p>3.3 STOCKPILING</p> <hr/>	<p>.1 Stockpile fill materials in areas designated by Departmental Representative. Stockpile granular materials in manner to prevent segregation.</p> <p>.2 Protect fill materials from contamination.</p>
<p>3.4 STRIPPING OF TOPSOIL</p>	<p>.1 Strip all surficial vegetation, rootmat and topsoil. Do not mix topsoil.</p>

3.5 PREPARATION/
PROTECTION

- .1 Keep excavations clean, free of standing water and loose soil.
- .2 Protect natural and man-made features required to remain undisturbed. Unless otherwise indicated or located in an area to be occupied by new construction, protect existing trees from damage.
- .3 Protect buried services that are required to remain undisturbed.

3.6 SHORING AND
BRACING

- .1 Construct temporary works to depths, heights and locations as indicated or directed by the Professional Departmental Representative 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.

3.7 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.

3.8 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 Departmental Representative in writing, do not excavate more than 30 m of trench in advance of installation operations.
- .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 Departmental Representative when soil at bottom of excavation appears unsuitable and proceed as directed by Departmental Representative.
- .8 Obtain Departmental Representative's approval of completed excavation.
- .9 Remove unsuitable material from trench bottom to extent and depth as directed by Departmental 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 not less than undisturbed soil.
- .12 Obtain excavation permit prior to starting any on-site excavations.

3.9 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 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 Departmental Representative four hours prior to backfilling of trenches.

3.10 BACKFILLING

- .1 Do not proceed with backfilling operations until Departmental 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

3.10 BACKFILLING
(Cont'd)

- .7 (Cont'd)
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 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 Have an independent testing laboratory carry out testing of materials and compaction.
- .3 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 Departmental Representative may require to verify acceptability of corrected work.

3.12 RESTORATION

- .1 Upon completion of work, remove surplus materials and debris, trim slopes, and correct defects noted by Departmental Representative.
- .2 Clean and reinstate areas affected by work as directed by Departmental Representative.