

Part 1 General

1.1 SCOPE OF WORK

- .1 Work under this Section includes, but is not limited to, all plant, materials and labour required to excavate, backfill, stockpile, and dispose of materials as indicated on the drawings, specified herein or as directed by the Departmental Representative.

1.2 REFERENCE STANDARDS

- .1 American Society for Testing and Materials (ASTM)
- .1 ASTM C 117-95, Standard Test Method for Material Finer than 0.075 mm (No. 200) Sieve in Mineral Aggregates by Washing.
 - .2 ASTM C 136-96a, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
 - .3 ASTM D 698-00a, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³) (600 kN-m/m³).
- .2 Canadian General Standards Board (CGSB)
- .1 CAN/CGSB-8.1-88, Sieves, Testing Woven Wire, Inch Series.
 - .2 Topographic survey, boundary and utilities provided by Eastern Land Surveys (1993) Ltd. (File No. 5864-152-10).
 - .3 Nova Scotia Department of Transportation Standard Specifications - Latest Revision.
 - .4 Nova Scotia Department of Transportation Acid Rock Protocol.
 - .5 Engineers Nova Scotia, Recommended Standards Water & Sewer Projects.

1.3 DEFINITIONS

- .1 Excavation classes: one class of excavation will be recognized; common excavation.
- .1 Common excavation: excavation of materials of whatever nature, which includes solid rock.
- .2 Unsuitable materials:
- .1 Weak and compressible materials under excavated areas.
 - .2 Frost susceptible materials under excavated areas.
 - .3 Frost susceptible materials:
 - .1 Fine grained soils with plasticity index less than 10 when tested to ASTM D 4318, and gradation within limits specified when tested to ASTM C 136. Sieve sizes to CAN/CGSB-8.1.

.2 Table:

Sieve Size, mm	% Passing
2.00	100
0.10	45 - 100
0.02	10 - 80
0.005	0 - 45

.3 Coarse grained soils containing more than 20% by mass passing 0.075 mm sieve.

.4 Any material deemed unsuitable by the Departmental Representative.

1.4 INSPECTION AND TESTING

.1 Compaction densities are percentages of Standard Proctor as determined by ASTM D-698-00a.

1.5 PROTECTION OF EXISTING FEATURES

.1 Protect existing features and services in accordance with applicable local regulations.

.2 Conduct, with Departmental Representative, condition survey of trees and other plants, lawns, fencing, service poles, wires, pavement, survey benchmarks and monuments which may be affected by Work.

.3 Take all necessary precautions to protect existing or newly constructed works, but if undermining should occur, it shall be corrected by breaking out and repairing the existing structure and/or replacing the disturbed foundation material with fill concrete, grout, sand, etc., as may be directed by the Departmental Representative. All of the protective and corrective work is to be at the expense of the Contractor.

.4 The above shall also apply to all electrical cables, poles, sewers, water mains, gas lines and other appurtenances already constructed in the area whether above ground or underground or which appear within the excavation. Should damage of any kind, including settlement or lateral movement of adjacent structures, utilities or surface features occur as a result of the work, such conditions and any resultant damage shall be immediately rectified at the Contractor's expense and to the satisfaction of the Departmental Representative.

Part 2 Products

2.1 MATERIALS

.1 Engineered Fill: Properties to the following requirements:

.1 Crushed quarried rock.

.2 Gradations to be within limits specified when tested to ASTM C-136 and ASTM C-117. Sieve sizes to CAN/CGSB-8.1.

.3 Maximum abrasion loss of 30% when tested to MTO LS 618.

.4 Maximum Freeze Thaw loss of 20% when tested to MTO LS 614.

.5 Plasticity Index to a maximum of three (3) when tested to D4318-05.

.6 Table:

Sieve Size, mm	% Passing
75	95 - 100
50	73 - 95
37.5	58 - 87
25	--
19	35 - 69
12.5	--
9.5	25 - 54
4.75	17 - 43
2.36	12 - 35
1.18	8 - 28
0.30	4 - 16
0.075	0 - 7

.2 Granular Base:

- .1 Crushed quarried rock composed of clean, hard, sound, durable, uncoated particles that do not contain friable, soluble or reactive minerals or other deleterious materials or conditions that would make the aggregate prone to decomposition or disintegration when exposed to the natural elements after placement in the Work.
- .2 Gradations to be within limits specified when tested to ASTM C-136 and ASTM C-117. Sieve sizes to CAN/CGSB-8.1.
- .3 Maximum abrasion loss of 30% when tested to MTO LS 618.
- .4 Maximum Freeze Thaw loss of 20% when tested to MTO LS 614.
- .5 Plasticity Index to a maximum of three (3) when tested to D4318-05.
- .6 Table:

Sieve Size, mm	% Passing
37.5	100
31.5	95 - 100
25	81 - 100
19	66 - 90
12.5	50 - 77
9.5	41 - 70
4.75	27 - 54
2.36	17 - 43
1.18	11 - 32
0.30	4 - 19
0.075	0 - 8

.3 Granular Subbase:

- .1 Crushed quarried rock shall be composed of clean, hard, sound, durable, uncoated particles that do not contain friable, soluble or reactive minerals or other deleterious materials or conditions that would make the aggregate prone to decomposition or disintegration when exposed to the natural elements after placement in the Work.
- .2 Gradations to be within limits specified when tested to ASTM C-136 and ASTM C-117. Sieve sizes to CAN/CGSB-8.1.

- .3 Maximum abrasion loss of 30% when tested to MTO LS 618.
- .4 Maximum Freeze Thaw loss of 20% when tested to MTO LS 614.
- .5 Plasticity Index to a maximum of three (3) when tested to D4318-05.
- .6 Table:

Sieve Size, mm	% Passing
90	100
75	95 - 100
63	85 - 100
50	73 - 95
37.5	58 - 87
19	35 - 69
9.5	25 - 54
4.75	17 - 43
2.36	12 - 35
1.18	8 - 28
0.3	4 - 16
0.075	0 - 9

.4 Bedding and Backfill:

- .1 Aggregate shall be composed of clean, hard, sound, durable, uncoated particles that do not contain friable, soluble or reactive minerals or other deleterious materials or conditions that would make the aggregate prone to decomposition or disintegration when exposed to the natural elements after placement in the Work.
- .2 Gradations to be within limits specified when tested to ASTM C-136 and ASTM C-117. Sieve sizes to CAN/CGSB-8.1.
- .3 Maximum abrasion loss of 30% when tested to MTO LS 619.
- .4 Maximum Freeze Thaw loss of 20% when tested to MTO LS 614.
- .5 Plasticity Index to a maximum of three (3) when tested to D4318-05.
- .6 Table:

Sieve Size, mm	% Passing
40	100
25	95 - 100
19	90 - 100
9.5	60 - 100
4.75	35 - 80
2.36	15 - 60
0.30	0 - 30
0.075	0 - 10

.5 Levelling Course:

- .1 Aggregate shall be composed of clean, hard, sound, durable, uncoated particles that do not contain friable, soluble or reactive minerals or other deleterious materials or conditions that would make the aggregate prone to decomposition or disintegration when exposed to the natural elements after placement in the Work.
- .2 Gradations to be within limits specified when tested to ASTM C-136 and ASTM C-117. Sieve sizes to CAN/CGSB-8.1.
- .3 Maximum abrasion loss of 30% when tested to MTO LS 619.

- .4 Maximum Freeze Thaw loss of 20% when tested to MTO LS 614.
- .5 Plasticity Index to a maximum of three (3) when tested to D4318-05.
- .6 Table:

Sieve Size, mm	% Passing
10	100
5	80 - 90
2.5	60 - 75
1.25	35 - 50
0.63	15 - 30
0.16	0 - 8
0.075	0 - 3

.6 20 mm Clear Stone:

- .1 Aggregate shall be composed of clean, hard, sound, durable, uncoated particles that do not contain friable, soluble or reactive minerals or other deleterious materials or conditions that would make the aggregate prone to decomposition or disintegration when exposed to the natural elements after placement in the Work.
- .2 Gradations to be within limits specified when tested to ASTM C-136 and ASTM C-117. Sieve sizes to CAN/CGSB-8.1.
- .3 Maximum abrasion loss of 30% when tested to MTO LS 618.
- .4 Maximum Freeze Thaw loss of 20% when tested to MTO LS 614.
- .5 Plasticity Index to a maximum of three (3) when tested to D4318-05.
- .6 Table:

Sieve Size, mm	% Passing
28	100
19	90 - 100
9.5	25 - 60
4.75	0 - 10
2.36	0 - 5
0.075	0 - 1

.7 Borrow:

- .1 All borrow material shall be supplied by the Contractor in accordance with NBDTI Item 121.

.8 6.3 mm minus Course:

- .1 Aggregate shall be composed of clean, hard, sound, durable, uncoated particles that do not contain friable, soluble or reactive minerals or other deleterious materials or conditions that would make the aggregate prone to decomposition or disintegration when exposed to the natural elements after placement in the Work.
- .2 Gradations to be within limits specified when tested to ASTM C-136 and ASTM C-117. Sieve sizes to CAN/CGSB-8.1.
- .3 Maximum abrasion loss of 30% when tested to MTO LS 619.
- .4 Maximum Freeze Thaw loss of 20% when tested to MTO LS 614.
- .5 Plasticity Index to a maximum of three (3) when tested to D4318-05.

.6 Table:

Sieve Size, mm	% Passing
6.3	100
0.075	8 – 14

.9 Cobble Stone

- .1 Aggregate shall be composed of clean, hard, sound, durable, uncoated particles that do not contain friable, soluble or reactive minerals or other deleterious materials or conditions that would make the aggregate prone to decomposition or disintegration when exposed to the natural elements after placement in the Work.
- .2 Gradations to be within limits specified when tested to ASTM C-136 and ASTM C-117. Sieve sizes to CAN/CGSB-8.1.
- .3 Stone Size shall vary from 25mm to 100mm in size, to be rounded and granitic in nature.

.10 Weed Mat.

Part 3 Execution

3.1 GENERAL

- .1 Excavate through existing granular materials, native materials and solid rock through the execution of this contract. Suitable excavated granular materials so meeting the appropriate gradations and physical requirements may be re-incorporated into the Work. Unsuitable excavated materials will comprise frozen, saturated, or deleterious materials whatever their origin and shall also include excavated bedrock. All unsuitable excavated materials shall become the property of the Contractor and shall be disposed of off site. All exposed subgrade surfaces shall be inspected by the Departmental Representative prior to the placement of fill or concrete. Existing or constructed engineered fill may be proof rolled at the discretion of the Departmental Representative. Groundwater may be encountered at or near the bedrock surface or in the vicinity of existing services. Appropriate de-watering measures will be required by the Contractor.
- .2 The Contractor shall advise the Departmental Representative two weeks in advance of his intended use of any materials to allow sufficient time for sampling and testing. The Contractor shall submit samples of granular materials to be used in the Works if so requested by the Departmental Representative. Approval of a sample does not mean acceptance of the whole source. Each load of material received at the job site shall be subject to all the requirements of that material.
- .3 The costs of any additional testing of backfill, as deemed necessary by the Departmental Representative to determine the acceptability or degree of compaction shall be paid by the Contractor.
- .4 Operations on earthwork shall be suspended at any time when satisfactory results cannot be obtained due to rain, freezing weather or other conditions of the field. At all times, the Contractor shall drag, blade or slope the fill to provide proper surface drainage.

- .5 Materials which shall be compacted shall be placed in layers no thicker than 300 mm, loose depth, and of the proper moisture content before compacting to facilitate obtaining the prescribed compaction shown on the drawings or specified herein.
- .6 Final grades shall be within 12 mm of the levels shown on the drawings. All areas shall be sloped to avoid puddles.
- .7 It shall be the responsibility of the Contractor to repair all damage and correct all deficiencies which may result from the settlement of backfill areas.

3.2 SITE PREPARATION

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

3.3 STOCKPILING AND DISPOSAL

- .1 Protect fill materials from contamination.
- .2 Excess material unsuitable for backfill shall become the property of the Contractor and be disposed of off site. It will be the Contractor's responsibility to acquire permission and all permits for the disposal site. A copy of all obtained permits is to be submitted to the Departmental Representative.
- .3 In case of a dispute, the Departmental Representative shall be the sole judge as to which material is unsuitable and shall be hauled away.

3.4 DEWATERING AND HEAVE PREVENTION

- .1 Keep excavations free of water while Work is in progress.
- .2 Protect open excavations against flooding and damage due to surface run-off.
- .3 All excavations and trenches shall be kept free from water. Dams, dykes or other work necessary for dewatering including duplicate pumps of sufficient capacity for the purpose, shall be placed at the Contractor's expense.
- .4 The discharge of water from any dewatering operation shall be in accordance with all applicable municipal, provincial, and federal regulations.

3.5 EXCAVATION

- .1 Excavate to lines, grades, elevations and dimensions as indicated.
- .2 Excavation shall include the removal of all water, ice, snow and material of any nature which interferes with construction work.
- .3 Where the bearing value of the sub-grade is determined by the Departmental Representative to be unsuitable, or where unknown interfering objects are encountered the Contractor shall sub-excavate to the depth directed by the Departmental Representative.

- .4 Excavation must not interfere with bearing capacity of adjacent foundations.
- .5 For trench excavation, unless otherwise authorized by the Departmental Representative in writing, do not excavate more than 30 metres of trench in advance of installation operations.
- .6 All earth banks created by excavating shall be sloped at sufficient angle to prevent sliding or caving in and if they are not adequately sloped, then shoring and/or trench boxes must be used.
- .7 Earth bottoms of excavations to be undisturbed soil or rock, level, free from loose, soft or organic matter.
- .8 Notify Departmental Representative when bottom of excavation is reached.
- .9 Obtain Departmental Representative's approval of completed excavation.
- .10 Remove unsuitable material from trench bottom to extent and depth as directed by the Departmental Representative.
- .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 at least equal to undisturbed soil.
- .12 Make all excavations in such a manner and to such a width as will give adequate clearance for structures connections thereto, for bracing and supporting, pumping, draining and for removing from the excavation any material which the Departmental Representative may deem unsuitable for foundations, including any material which may slough off the sides of the excavation.
- .13 Where excavation carried out by the Contractor exceeds the limits authorized by the Departmental Representative, the costs of such unauthorized excavation shall be borne by the Contractor as shall all necessary fill required to fill the void.

3.6 FILL TYPES AND COMPACTION

- .1 Exterior of perimeter walls: Use subbase material compacted to 95%.
- .2 Under slabs: Use materials as indicated on drawings or as specified by the Departmental Representative compacted to 95%.
- .3 Under roadways, walkways, curbs and gutters use subbase and base materials as specified in the drawings compacted to 95%.
- .4 Under landscaped areas compacted to 95%.

3.7 BEDDING AND SURROUND OF UNDERGROUND SERVICES

- .1 Place bedding and surround of underground services as indicated on the drawings or as directed by the Departmental Representative.
- .2 Place bedding and surround material in unfrozen and unsaturated condition.

3.8 BACKFILLING

- .1 Do not proceed with backfilling operations until Departmental Representative has inspected and approved installations.
- .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 Place backfill material in uniform layers not exceeding 300 mm loose depth and compacted up to grades indicated. Compact each layer before placing succeeding layer.
- .5 Backfilling around installations:
 - .1 Do not backfill around or over cast-in-place concrete within 24 hours after placing of concrete.

3.9 RESTORATION

- .1 Upon completion of work, remove waste material and debris, trim slopes, and correct defects as directed by Departmental Representative.
- .2 Replace topsoil as directed by Departmental Representative.
- .3 Clean and reinstate areas affected by Work as directed by Departmental Representative.

3.10 REPAIRS DURING WARRANTY PERIOD

- .1 During the specified guarantee period, make good, any damage to walks, roads, etc., due to settlement of backfilled areas. All such repairs shall be made at the Contractor's expense upon notification by the Departmental Representative.
- .2 Should the Contractor fail to carry out the necessary maintenance within 5 days after receiving written instruction from the Departmental Representative, the Departmental Representative will carry out the work and deduct the cost incurred from the money owing the Contractor.

END OF SECTION