

PART 1 - GENERAL

- 1.1 WORK INCLUDED .1 This section specifies requirements for all earthwork operations. Work includes supply of products and excavating, bedding, backfilling, compacting, shoring, dewatering, and disposal of unsuitable and surplus materials.
- 1.2 RELATED SECTIONS .1 Asphalt Paving: Section 32 12 16.
.2 Topsoiling and Finish Grading: Section 32 91 19.
.3 Seeding and Sodding: Section 32 92 00.
.4 Reinstatement: Section 32 98 00.
- 1.3 REFERENCE STANDARDS .1 ASTM D698-2012, Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³ (600 kN-m/m³)).
.2 ASTM D4253-00(R2006), Test Methods for Maximum Index Density and Unit Weight of Soils Using a Vibratory Table.
.3 ASTM D4254-00e1(R2006), Test Method for Minimum Index Density and Unit Weight of Soils and Calculation of Relative Density.
.4 CAN/CSA A23.1/A23.2-14, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard for Concrete.
.5 Nova Scotia Transportation and Infrastructure Renewal Standard Specification, Highway Construction and Maintenance.
- 1.4 DEFINITIONS .1 Rock: material which requires drilling, blasting, 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.
.1 Volume limits:
.1 Trench excavation: 0.5 m³
.2 Mass excavation: 1.0 m³

- 1.4 DEFINITIONS (Cont'd)
- .2 Topsoil: soil capable of supporting good vegetative growth and suitable for use in top dressing and landscaping.
 - .3 Common: excavated soil which is not rock, unsuitable, or topsoil.
 - .4 Unsuitable material: all material which is not suitable for use in work and must be disposed of.
 - .5 Surplus material: excavated material not required for re-use.
 - .6 Subgrade: the surface of mass excavation and embankment finished to lines and elevations indicated.

- 1.5 SUBMITTALS
- .1 Submit samples, sieve analysis and mix design in accordance with Section 01 33 00 for granular materials specified herein.

PART 2 - PRODUCTS

- 2.1 MATERIALS
- .1 Selected backfill: common which is free from: stumps, trees, roots, sod, organics; rocks, boulders and masonry larger than 200mm in any dimension; and other deleterious materials.
 - .2 Borrow: well-graded material from Contractor's own off-site sources meeting the specification for Selected Backfill.
 - .3 Sand bedding for conduit: hard, granular, sharp material, well-graded from coarse to fine, free of impurities, chemicals or organic matter, and graded as follows:

<u>Sieve Designation</u>	<u>Percent Passing</u>
5 mm	100
0.16 mm	0 - 5
 - .4 Gravels: crushed and screened pit gravel or crushed and screened rock. Material shall consist of hard and durable stone particles. Gradation shall be dense, well graded and as follows:
 - .1 Type 1:

2.1 MATERIALS
(Cont'd)

- .4 Gravels:(Cont'd)
.1 Type 1:(Cont'd)

<u>Sieve Size μm</u>	<u>Percent Passing</u>
20 000	100
14 000	50 - 85
5 000	20 - 50
160	5 - 12
80*	3 - 8

- .2 Type 2:

<u>Sieve Size μm</u>	<u>Percent Passing</u>
80 000	100
56 000	70 - 100
28 000	50 - 80
14 000	35 - 65
5 000	20 - 50
160	3 - 10
80*	0 - 7

* For gravel sources not classified as quarries,
the allowable percentage passing the 80 μ m sieve
shall be 3 to 5%.

- .5 Lumber: construction grade stamped by Maritime
Lumber Bureau or approved equal.

PART 3 - EXECUTION

3.1 EXCAVATION

- .1 Excavate all types of materials to lines and
elevations indicated and as necessary for
construction.
- .2 Notify the Departmental Representative if in doubt
as to definition of material.
- .3 When rock is encountered, notify Departmental
Representative for measurement.
- .4 Select method of excavation, support, and dewatering
unless otherwise indicated or directed. Protect
property and structures from damage.
- .5 Cut paved surfaces in straight lines.
- .6 Extend excavations sufficient distance from footings
and walls to allow placing and removal of forms and
for placing backfill materials indicated.

3.1 EXCAVATION
(Cont'd)

- .7 Do not excavate more than 30 metres of trench in advance of laying conduit, unless otherwise directed by Departmental Representative.
- .8 Prepare trench bottom so conduit can be laid to required line and grade. Remove any boulders or rock within theoretical trench payment area as shown on the Project Drawings.
- .9 Handle materials 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.
- .10 Take care to protect granular material from the elements.
- .11 Do not stockpile materials alongside of excavations in such manner that stockpiling will cause side failure or bottom uplift.
- .12 Replace over excavation of trench bottom with selected site material, granular material, or unshrinkable fill as directed.
- .13 Notify the Departmental Representative whenever unsuitable materials are encountered and remove to depth and extent directed.
 - .1 If such Work is due to nature of soil, Engineer and Contractor will jointly measure work for payment.
 - .2 If such Work is due to any act or fault of Contractor remedial work is responsibility of Contractor.
- .14 Dispose of unsuitable or surplus materials off site unless otherwise indicated by the Project Documents.

3.2 TOPSOIL
EXCAVATION

- .1 Strip topsoil to limits and depth indicated or directed by the Departmental Representative
- .2 Stockpile in designated areas or dispose as directed. Minimize loss and wastage.

3.3 UNSUITABLE
EXCAVATION

- .1 When unsuitable material is encountered notify the Departmental Representative for measurement and assist in investigation to determine depth and type of material. Isolate area to minimize entry of water into excavation.

3.3 UNSUITABLE EXCAVATION (Cont'd)	.2	Excavate unsuitable material to extent directed. Handle unsuitable material without impacting suitable material on site.
	.3	Dispose of material unsuitable for reuse off site.
3.4 SUPPORT OF EXCAVATION	.1	Install and be responsible for shoring, and underpinning as required.
	.2	When support of excavation is required, engage services of a Professional Engineer, registered or licensed in the Province of Nova Scotia, to design shoring and inspect its installation.
	.3	Provide record copy of drawings signed and sealed by Professional Engineer responsible for their preparation.
3.5 DEWATERING	.1	Keep bottom of excavation free of water by draining or pumping.
	.2	Dewater excavation in a manner which will not endanger stability of the work.
	.3	Dispose of water from excavation in a manner that is not injurious to property, public health or any operation of the work.
	.4	Take precautions to prevent uplift of pipe or structures.
	.5	Do not drain water from excavation into sewer unless permitted by regulatory authorities having jurisdiction.
3.6 BEDDING AND BACKFILLING	.1	Remove all timber, snow, ice, frozen material, and debris from excavation before backfilling. Do not backfill until work has been inspected by the Departmental Representative.
	.2	Backfill with materials indicated.
	.3	Place and compact foundation layer of bedding to depth indicated, shaped to provide uniform support to pipe and structures.
	.4	After installation of conduit, place and compact bedding material in 150mm layers to horizontal centreline of pipe.

3.6 BEDDING AND
BACKFILLING
(Cont'd)

- .5 Place and compact remaining bedding material to depth indicated above the top of conduit before further compaction.
- .6 Complete backfilling by placing and compacting material indicated in 300mm layers. Bring backfill up evenly around structures.
- .7 Compact all materials to 95% Standard Proctor Density with the following exceptions:
 - .1 Top 300mm below subgrade to 98% Standard Proctor Density.
 - .2 Gravel under paved surface to 100% Standard Proctor Density.
- .8 Density Tests: Standard Proctor in accordance with Method B, ASTM D 698. Relative Density in accordance with ASTM D 4253 and D4254.
- .9 Control moisture content of backfill materials so that specified compaction may be obtained.
- .10 In areas of pedestrian and vehicular traffic, maintain surfaces level with existing surface until reinstatement.

3.7 ROAD GRAVELS

- .1 Prior to placing gravels, grade surface to within 40mm of elevations and cross sections indicated but not uniformly high or low. Compact top 300mm to 98% Standard Proctor Density.
- .2 Place gravels in uniform layers not exceeding 200mm to thickness indicated. Grade intermediate gravel courses to within 30mm of elevations and cross-sections indicated, but not uniformly high or low. Compact to 100% Standard Proctor Density.