

PART 1 GENERAL

1.1 WORK INCLUDED

- .1 This Section specifies requirements for furnishing all materials, labour, tools and equipment and performing all operations necessary to excavate all types of material encountered, placing of suitable excavated material as backfill, disposal of unsuitable and surplus material on-site at designated disposal area, and furnishing and placing structural fill, and imported backfill material as specified below, all as shown on the Drawings and as specified herein.
- .2 The Work generally includes, but is not necessarily limited to, the following items:
 - .1 Trench excavation and backfilling for service pipes and appurtenances.
 - .2 Structure excavation and backfilling for foundations, manholes, catch basins and structures.
 - .3 Supply and placing pipe bedding material where required.
 - .4 Compaction of bedding and backfill.
 - .5 Control of water by dewatering.
 - .6 Removal and disposal of surplus and/or unsuitable material.
 - .7 Sheet piling, shoring and bracing to support trench walls, sides of excavations or utilities.
 - .8 Reinstatement of existing asphalt surfaces.

1.2 REFERENCE STANDARDS

- .1 CAN/ULC S701-2011, Thermal Insulation, Polystyrene, Boards and Pipe Covering.
- .2 ASTM D698-07a, Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³ (600 kN-m/m³)).
- .3 New Brunswick Department of Transportation and Infrastructure (NBDTI formerly NBDOT) Standard Specifications, latest edition.

1.3 DEFINITIONS

- .1 Unsuitable Material: all organic or other excavated material, which is not suitable for use in Work.
- .2 Subgrade: the surface of mass excavation and embankment finished to lines and elevations indicated.

1.4 PROTECTION OF EXISTING FEATURES

- .1 Existing buried utilities:
 - .1 Size and location of existing utilities as indicated are for guidance only. Depth to be confirmed by contractor prior to starting excavation. Completeness and accuracy are not guaranteed.
 - .2 Prior to commencing excavation Work, notify Departmental Representative and establish location and state of use of buried utilities. Clearly mark such locations to prevent disturbance during

work.

.3 Confirm locations of buried utilities by careful test excavations.

.4 Maintain and protect from damage, water, sewer, gas, electric, telephone and other utilities encountered. It is the Contractor's responsibility to have these utilities field located.

.5 Where utility lines or structures exist in area of excavation, obtain direction of Departmental Representative before removing or re-routing. Advise Departmental Representative of existing lines in area of excavation that require removal or relocation and cost for such work.

.6 Record location of maintained, re-routed and abandoned underground lines.

.2 Existing surface features:

.1 Conduct, with Departmental Representative condition survey of trees and other plants, lawns, service poles, wires, pavement, survey bench marks and monuments which may be affected by work.

1.5 SHORING, BRACING AND UNDERPINNING

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

.2 Engage services of qualified professional engineer who is registered or licensed in province of New Brunswick, in which work is to be carried out to design and inspect shoring, bracing and underpinning required for work.

.3 Submit design and supporting data at least two (2) weeks prior to commencing Work.

1.6 SUPPORT OF EXCAVATION

.1 Geotechnical Investigation has been carried out at the Site.

.2 Information from Geotechnical Report No. 5684.09-R01 dated May 30, 2017 prepared by GEMTEC is available for viewing upon request to the Departmental Representative.

.3 Any interpretations shall be at the Tenderer's own risk and the Departmental Representative shall not be held responsible for the content or interpretation of this document.

.4 Known underground and surface utility lines and buried objects are indicated on the Drawings. Locations are approximate from record drawings.

1.7 SUPPORT OF EXCAVATION

.1 Suitably slope or properly shore sides of excavations according to site conditions, all in accordance with the New Brunswick Occupational Health and Safety Act.

.2 The choice of any method of support shall be the responsibility of the

Contractor. However, drawings and calculations for the method of support selected, designed by a qualified professional engineer licensed to practice in New Brunswick in accordance with the Provincial safety requirements, are to be submitted to the Departmental Representative for review before its use.

- .3 If it is desirable that any support, other than that which may be shown on the Drawings, be left in the excavations, then the Departmental Representative will issue instructions accordingly.
- .4 Take every precaution against slips or falls, but if any should occur, at once make good the same. If any such slip or fall affects or may affect the stability of the permanent work, execute such remedial work as necessary, including filling up of any space left by the slip or fall with approved granular material. Submit proposed remedial work to Departmental Representative for review.

PART 2 PRODUCTS

2.1 MATERIALS

- .1 Selected Backfill material: material approved 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 or boulders larger than 150mm. 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.
- .2 Structural Fill: Departmental Representative approved, should consist of an approved clean, well-graded, granular material meeting the requirements of the latest version of the NBDTI Standard Specifications for Highway Construction. Structural fill required for the foundation and concrete slab-on-grade areas should consist of 75 mm minus crushed rock meeting NBDTI subbase specification. A Geotechnical Engineer should approve the structural fill material before being placed on the Site.
- .3 Clear stone: crushed and screened, hard, durable stone, free from clay and organic matter, and graded as follows:
 - .1 Clear Stone, 25mm:

<u>Sieve Designation</u>	<u>% Passing</u>
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:

<u>Sieve Designation</u>	<u>% Passing</u>
100mm	100
50mm	25-60
25mm	0-5

- .4 Surge Rock: 150mm maximum crushed quarry-run material free from shale, clay, friable materials, roots and vegetable matter.
- .5 Gravels: as specified in Section 32 11 19.
- .6 Granular bedding material, Base, Type 1 Gravel, Class A Gravel, Type 1 Base: Aggregate Base as specified in Section 32 11 19.
- .7 Subbase, Type 2 Gravel, Class B Gravel, Type 2 Subbase: Aggregate Subbase as specified in Section 32 11 19.
- .8 Rigid insulation: to CAN/ULC S701, Type 4, expanded polystyrene, minimum compressive strength 60 psi, thickness as indicated.

PART 3 EXECUTION

3.1 SITE PREPARATION

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

3.2 SHORING AND BRACING

- .1 Construct temporary works to depths, heights and locations as approved by Departmental Representative
- .2 During backfill operation:
 - .1 Unless otherwise as indicated or as directed by Departmental Representative, remove sheeting and shoring from excavations.
 - .2 Do not remove bracing until backfilling has reached respective levels of such bracing.
 - .3 Upon completion of substructure construction:
 - .1 Remove shoring and bracing.
 - .2 Remove excess materials from site as directed by Departmental Representative.

3.3 EXCAVATION - GENERAL

- .1 Excavate in all kinds of materials including rock encountered on Site and make own computations of amounts and nature of excavation required.
- .2 Select method of excavation, support and dewatering suitable for the works. Submit proposed method to Departmental Representative for review.
- .3 Protect property or structures above or below ground in accordance with the Contract.

- .4 Bear foundations or underside of all structures including pipe surrounds on the material as shown on the Drawings and neatly finish all bearing surfaces to the required levels and grades.
- .5 If the excavated surface is unsuitable, the Departmental Representative will determine what work is required. If such work is due solely to the nature of the ground, then Departmental Representative will measure the work, but if such work is due to any act or default of the Contractor in carrying out of the Works, resulting in disturbance of natural ground conditions, then the Contractor shall execute such work at no additional cost to the Contract.
- .6 Pile excavated material a safe distance away from sides of trench so it will not endanger personnel and the work, reduce sight distances, and obstruct roadways.
- .7 Leave existing utility controls unobstructed and accessible at all times.
- .8 Do not obstruct drainage ditches and natural watercourses.
- .9 Departmental Representative reserves the right to require surplus material to be placed for embanking, general grading or other improvement or use on site, for the general benefit of Departmental Representative.
- .10 Control grading so that the surface of the ground will be properly sloped to prevent water from running into excavated areas. Promptly remove any water, which accumulates in excavations.
- .11 Place excavated soil to be re- used as backfill in stockpiles properly graded and protected from all sources of moisture and freezing.
- .12 Reduce steepness of slopes wherever possible, and expose smallest practical area of land for shortest possible time.
- .13 Dispose of surplus materials off site at approved disposal site.
- .14 Correct unauthorized over-excavation as follows:
 - .1 Fill under bearing surfaces and footings with concrete specified for footings fill concrete, aggregate base compacted to not less than 100 % of maximum dry density as directed by Departmental Representative.
 - .2 Fill under other areas with aggregate subbase compacted to not less than 95% maximum dry density as directed by Departmental Representative.

3.5 DRAINING, PUMPING AND THAWING

- .1 Keep excavations and trenches free of water. Control excavations to prevent surface water running into excavated areas.
- .2 Do work in connection with dewatering and supply and maintain on the worksite pumps in a number and capacity sufficient to keep bottom of

excavations dry and free from water so placing of pipe, manholes, and concrete will be done in the dry. Operate equipment for as long as necessary.

- .3 Dispose of water removed from excavations in a manner that will prevent injuries to public health or private property or to any operation of the work completed or under construction. Do not pump water containing silt or other material in suspension into streams or drainage courses or water bodies.
- .4 Ensure that sub-drains, sump holes, wells or the like required for dewatering shall not endanger the stability of the Works. On completion of the work completely backfill and consolidate excavations.
- .5 Excavate, remove or thaw out frozen ground as necessary.

3.6 TRENCH EXCAVATION

- .1 Trenches for piping and related excavations shall be of sufficient width and depth at all points to allow pipes to be laid, joints to be formed, and appurtenant structures to be built in a workmanlike manner, and when needed, to allow for sheeting and shoring, pumping, draining, and for removing and replacing all materials unsuitable for foundations.
- .2 Excavate trenches so pipe can be laid to the alignment and depth required. Excavation length to be not more than pipe length that can be laid and backfilled in one day. Brace and drain trench so workers may work safely and efficiently.
- .3 Remove organic material and soft deposits to a depth where medium dense to dense materials are encountered as designated by the Departmental Representative.
- .4 Do not stockpile excavated materials alongside trench if the bearing soil will cause trench side failure or bottom uplift and affect pipe alignment.

3.7 UNSUITABLE MATERIAL EXCAVATION

- .1 Notify Departmental Representative when materials unsuitable for use in the work are encountered and remove to depth and extent as directed by Departmental Representative.
- .2 Dispose of unsuitable material off site at an approved disposal site.

3.8 GRANULAR BEDDING

- .1 Place granular bedding material in uniform layers not exceeding 150mm compacted thickness to depth as indicated.
- .2 Shape bed true to grade to provide continuous uniform bearing surface for pipe. Do not use blocks when bedding pipe.

- .3 Shape transverse depressions in bedding as required to suit joints.
- .4 Carry bedding material across actual trench width. Mounding bedding shall not be permitted.
- .5 Compact each layer full width of bed to at least 95% of corrected maximum dry density.
- .6 After pipe installation, place and compact bedding to haunch line of pipe. Place and compact bedding material from haunch line of pipe to top of pipe in maximum 150mm layers. Place remaining bedding material to 300mm above top of pipe before further compaction.
- .7 Compact granular bedding to ASTM D4254, 98% relative density for Aggregate Base Gravel.

3.9 BACKFILLING - GENERAL

- .1 Do not proceed with backfilling operations until Departmental Representative has inspected and approved installations.
- .2 Proof roll exposed subgrade under floor slab base course in presence of the Departmental Representative. Use suitable heavy roller and compact to minimum 95% Maximum Dry Density. Over-excavate loose, excessively wet or soft areas, and areas containing organic matter, and backfill with suitable fill capable of being compacted to required density. Thoroughly compact all areas to be backfilled by mechanical tamping or rolling. Compaction shall be minimum 95% maximum dry density.
- .3 Remove timber and debris from excavation before backfilling is commenced. Do not cover up or put out of view any work until it has been examined and approved by the Departmental Representative. If any work is covered without approval of the Departmental Representative it must, if requested, be uncovered for examination.
- .4 After pipelines, and structures have been built, backfill trenches and other excavated areas with materials as specified. Compaction densities are percentages of maximum densities obtained from ASTM D698.
 - .1 Exterior side of perimeter walls: use aggregate subbase fill to subgrade level within 1.0 m of building and select backfill material fill in other areas unless specified otherwise. Compact to 98 % of maximum dry density.
 - .2 Within building area under concrete slabs on grade: use uniform 150 mm thick course of aggregate base to underside of floor slabs. Use aggregate subbase if fill is required below base course. Compact to 100 % maximum dry density.
 - .3 150mm below footings place aggregate base. Compact to 100% maximum dry density.
 - .4 Under landscaped areas: use Selected Backfill Material compacted 90 % of maximum dry density.
- .4 Place backfill in 200mm layers and compact

- .5 Do not backfill around or over cast-in-place concrete within 24 hours after placing.
- .6 Place layers simultaneously on both sides of installed Work to equalize loading. Difference not to exceed 600 mm
- .7 Where temporary unbalanced earth pressures are liable to develop on walls or other structures, permit concrete to cure minimum 14 days or until it has sufficient strength to withstand earth and compaction pressure.

3.10 BACKFILLING TRENCHES

- .1 Backfill trench from top of pipe bedding using common site materials.
- .2 Place backfill in 300mm layers and compact to 98% maximum dry density.
- .3 During backfilling, keep trenches free of water at all times and controlled so as to prevent surface water running into excavated areas. Remove silty materials, which become wetted and subsequently liquid or extremely plastic.
- .4 Leave surface of backfill initially high and repair settlement of trench backfilling.

3.11 INSULATION

- .1 Place rigid insulation in trench where indicated on drawings. Do not disturb or break boards during backfilling.

3.12 REINSTATEMENT

- .1 Upon completion of work, remove surplus materials and debris, trim slopes, and correct defects as directed by Departmental Representative.
- .2 Reinstate disturbed areas to conditions, elevation and thickness equal to or better than that which existed before excavation.
- .3 Clean and reinstate areas affected by work as directed by Departmental Representative.

END OF SECTION