

## 1 GENERAL

### 1.01 RELATED REQUIREMENTS

- .1 Section 32 11 23 - Aggregate Base Courses
- .2 Section 33 41 00 - Storm Utility Drainage Piping.

### 1.02 MEASUREMENT PROCEDURES

- .1 Excavated materials will be measured in cubic metres in their original location and will be incidental to unit price of storm pipe and catch basin installation.
  - .1 Common excavation quantities measured will be actual volume removed within following limits and will be incidental to unit price of storm pipe and catch basin installation:
    - .1 1.5m Width for trench excavation as indicated.
    - .2 Width for excavation for structures as indicated.
    - .3 Depth from ground elevation approved by DR.
    - .4 Common excavation will be incidental to unit price of storm pipe and catch basin installation.
  - .2 Rock quantities measured will be actual volume removed within following limits and will be incidental to unit price of storm pipe and catch basin installation:
    - .1 1.5m Width for trench excavation as indicated.
    - .2 Width for excavation for structures to be bounded by vertical planes up to 500 mm outside of and parallel to neat lines of footings as indicated.
    - .3 Depth from rock surface elevations immediately prior to excavation, to elevation as indicated.
    - .4 Where design elevation is less than 300 mm below original rock surface, depth will be considered to be 300 mm below original rock surface.
    - .5 Volume of individual rock fragments will be determined by measuring three maximum mutually perpendicular dimensions.
    - .6 Rock quantities will be incidental to unit price of storm pipe and catch basin installation.
- .2 Sheeting and bracing left in place on direction of DR will be measured in square metres of surface area of plane surface of sheeting. Sheeting and bracing will be incidental to unit price of storm pipe and catch basin installation.
- .3 Shoring, bracing, cofferdams, underpinning and de-watering of excavation will be incidental to unit price of storm pipe and catch basin installation.
- .4 Backfilling to authorized excavation limits will be incidental to unit price of storm pipe and catch basin installation.

### 1.03 REFERENCE STANDARDS

- .1 ASTM International (ASTM)
  - .1 ASTM C 117-04, Standard Test Method for Material Finer than 0.075 mm (No.200) Sieve in Mineral Aggregates by Washing.
  - .2 ASTM C 136-05, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
  - .3 ASTM D 422-63 2002, Standard Test Method for Particle-Size Analysis of Soils.
  - .4 ASTM D 698-00ae1, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft<sup>3</sup>) (600 kN-m/m<sup>3</sup>).
  - .5 ASTM D 1557-02e1, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft<sup>3</sup>) (2,700 kN-m/m<sup>3</sup>).
  - .6 ASTM D 4318-05, Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.
- .2 Canadian General Standards Board (CGSB)
  - .1 CAN/CGSB-8.1-88, Sieves, Testing, Woven Wire, Inch Series.
  - .2 CAN/CGSB-8.2-M88, Sieves, Testing, Woven Wire, Metric.
- .3 CSA Group (CSA)
  - .1 CAN/CSA-A3000-18, Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).
    - .1 CSA-A3001-03, Cementitious Materials for Use in Concrete.
  - .2 CSA-A23.1/A23.2-19, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.

### 1.04 DEFINITIONS

- .1 Excavation classes: two classes of excavation will be recognized; common excavation and rock excavation.
  - .1 Rock: solid material in excess of 1.00 m<sup>3</sup> and which cannot be removed by means of heavy duty mechanical excavating equipment. Frozen material not classified as rock.
  - .3 Common excavation: excavation of materials of whatever nature, which are not included under definitions of rock excavation.
- .2 Unclassified excavation: excavation of deposits of whatever character encountered in Work.
- .4 Waste material: excavated material unsuitable for use in Work or surplus to requirements.
- .5 Borrow material: material obtained from locations outside area to be graded, and required for construction of fill areas or for other portions of Work.
- .6 Unsuitable materials:
  - .1 Weak, chemically unstable, and compressible materials.
  - .2 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 D 422 and ASTM C 136: Sieve sizes to CAN/CGSB-8.2.

.2 Table:

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

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

### **1.05 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Make submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .4 Preconstruction Submittals:
  - .1 Submit construction equipment list for major equipment to be used in this section prior to start of Work.
  - .2 Submit records of underground utility locates, indicating: location plan of existing utilities as found in field, clearance record from utility authority and location plan of relocated and abandoned services, as required.
- .5 Samples:
  - .1 Submit samples in accordance with Section 01 33 00 - Submittal Procedures.
  - .2 Inform DR at least 4 weeks prior to beginning Work, of proposed source of fill materials and provide access for sampling.
  - .3 Submit 70 kg samples of type of fill specified including representative samples of excavated material.
  - .4 If requested to, Ship samples prepaid to DR, in tightly closed containers to prevent contamination and exposure to elements.

### **1.06 QUALITY ASSURANCE**

- .1 Engage services of qualified professional Engineer who is registered or licensed in Newfoundland, Canada in which Work is to be carried out to design and inspect cofferdams, shoring, bracing and underpinning required for Work.
- .2 Do not use soil material until written report of soil test results are reviewed and approved by DR.
- .3 Health and Safety Requirements:
  - .1 Do construction occupational health and safety in accordance with Section 01 35 29.06 - Health and Safety Requirements.

### **1.07 WASTE MANAGEMENT AND DISPOSAL.**

- .1 Divert excess aggregate materials from landfill to local facility for reuse as directed by DR.

### **1.08 EXISTING CONDITIONS**

- .1 Buried services:
  - .1 Before commencing work establish location of buried services on and adjacent to site.
  - .2 Arrange with appropriate authority for relocation of buried services

- that interfere with execution of work: pay costs of relocating services.
- .3 Remove obsolete buried services within 2 m of foundations: cap cut-offs.
  - .4 Size, depth and location of existing utilities and structures as indicated are for guidance only. Completeness and accuracy are not guaranteed.
  - .5 Prior to beginning excavation Work, notify applicable authorities having jurisdiction to establish location and state of use of buried utilities and structures. Authorities having jurisdiction to clearly mark such locations to prevent disturbance during Work.
  - .6 Confirm locations of buried utilities by careful test excavations.
  - .7 Maintain and protect from damage, water, sewer, gas, electric, telephone and other utilities and structures encountered.
  - .8 Where utility lines or structures exist in area of excavation, obtain direction of DR before removing. Costs for such Work to be paid by DR.
  - .9 Record location of maintained, re-routed and abandoned underground lines.
  - .10 Confirm locations of recent excavations adjacent to area of excavation.
- .2 Existing buildings and surface features:
- .1 Conduct, with DR, condition survey of existing buildings, trees and other plants, lawns, fencing, service poles, wires, rail tracks, pavement, survey bench marks and monuments which may be affected by Work.
  - .2 Protect existing buildings and surface features from damage while Work is in progress. In event of damage, immediately make repair as directed by DR.

## 2 PRODUCTS

### 2.01 MATERIALS

- .1 Backfill: Granular "A" as identified in Section 32 11 23 - Aggregate Base Courses.
- .2 Pipe Bedding: Granular "A" as identified in Section 32 11 23 - Aggregate Base Courses.

## 3 EXECUTION

### 3.01 TEMPORARY EROSION AND SEDIMENTATION CONTROL

- .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, according to requirements of authorities having jurisdiction.
- .2 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

### **3.02 SITE PREPARATION**

- .1 Remove obstructions, ice and snow, from surfaces to be excavated within limits indicated.
- .2 Cut pavement or sidewalk neatly along limits of proposed excavation in order that surface may break evenly and cleanly.

### **3.03 PREPARATION/ PROTECTION**

- .1 Protect existing features in accordance with Section 01 35 27 - Special Procedures Airports in Use and applicable local regulations.
- .2 Keep excavations clean, free of standing water, and loose soil.
- .3 Where soil is subject to significant volume change due to change in moisture content, cover and protect to DR approval.
- .4 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.
- .5 Protect buried services that are required to remain undisturbed.

### **3.04 STRIPPING OF TOPSOIL**

- .1 Not used.

### **3.05 STOCKPILING**

- .1 Stockpile fill materials in areas designated by DR.
  - .1 Stockpile granular materials in manner to prevent segregation.
- .2 Protect fill materials from contamination.
- .3 Implement sufficient erosion and sediment control measures to prevent sediment release off construction boundaries and into water bodies.

### **3.06 COFFERDAMS, SHORING, BRACING AND UNDERPINNING**

- .1 Maintain sides and slopes of excavations in safe condition by appropriate methods and in accordance with Section 01 35 29.06 - Health and Safety Requirements
  - .1 Where conditions are unstable, stabilization methods are to be proposed for review by DR.
- .2 Obtain permit from authority having jurisdiction for temporary diversion of water course.
- .3 Construct temporary Works to depths, heights and locations as indicated by DR.
- .4 During backfill operation:
  - .1 Unless otherwise indicated or directed by DR, remove sheeting and shoring from excavations.

- .2 Do not remove bracing until backfilling has reached respective levels of such bracing.
- .3 Pull sheeting in increments that will ensure compacted backfill is maintained at elevation at least 500 mm above toe of sheeting.
- .5 When sheeting is required to remain in place, cut off tops at elevations as indicated.
- .6 Upon completion of substructure construction:
  - .1 Remove cofferdams, shoring and bracing.
  - .2 Remove excess materials from site and restore watercourses as indicated by DR.

### 3.07 DEWATERING AND HEAVE PREVENTION

- .1 Keep excavations free of water while Work is in progress.
- .2 Provide for DR approval details of proposed dewatering or heave prevention methods, including dikes, well points, and sheet pile cut-offs.
- .3 Protect open excavations against flooding and damage due to surface run-off.
- .5 Dispose of water in accordance with Section 01 35 15 - Environmental Protection to approved runoff areas in a manner not detrimental to public and private property, or portion of Work completed or under construction.
  - .1 Provide and maintain temporary drainage ditches and other diversions outside of excavation limits.

### 3.08 EXCAVATION

- .1 Advise DR at least 7 days in advance of excavation operations for initial cross sections to be taken.
- .2 Excavate to lines, grades, elevations and dimensions as required for installation of storm piping and catch basin and as indicated by DR.
- .3 Excavation must not interfere with bearing capacity of adjacent foundations.
- .6 For trench excavation, unless otherwise authorized by DR in writing, do not excavate more than 15 m of trench in advance of installation operations and do not leave open more than 15 m at end of day's operation.
- .7 Keep excavated and stockpiled materials safe distance away from edge of trench as directed by DR.
- .8 Restrict vehicle operations directly adjacent to open trenches.
- .9 Dispose of surplus and unsuitable excavated material off site.
- .10 Do not obstruct flow of surface drainage or natural watercourses.
- .11 Earth bottoms of excavations to be undisturbed soil, level, free from loose, soft or organic matter or approved structural fill by DR.
- .12 Notify DR when bottom of excavation is reached.

- .13 Obtain DR approval of completed excavation.
- .14 Remove unsuitable material from trench bottom including those that extend below required elevations to extent and depth as directed by DR.
- .15 Correct unauthorized over-excavation as follows:
  - .1 Fill under other areas with Granular "A" compacted to not less than 95 % within trench backfill limits and 100% within asphalt subgrade extent of corrected proctor maximum dry density in accordance with ASTM D 698.
- .16 Hand trim, make firm and remove loose material and debris from excavations.
  - .1 Where material at bottom of excavation is disturbed, compact foundation soil to density at least equal to undisturbed soil.

### **3.09 FILL TYPES AND COMPACTION**

- .1 Use types of fill as indicated or specified below. Compaction densities are percentages of maximum densities obtained from ASTM D 698.
  - .1 Pipe bedding: use Granular "A" as specified. Compact to 95% of standard proctor maximum dry density.
  - .2 Pipe trench backfill: use Granular "A" as specified. Compact to 95% of standard proctor maximum dry density.
  - .3 Pipe trench over excavation: use Granular "A" as specified. Compact to 95% of standard proctor maximum dry density.

### **3.10 BEDDING AND SURROUND OF UNDERGROUND SERVICES**

- .1 Place and compact granular material for bedding and surround of underground services as specified in Section 33 41 00 - Storm Utility Drainage Piping.
- .2 Place bedding and surround material in unfrozen condition.

### **3.11 BACKFILLING**

- .1 Vibratory compaction equipment: 1000lb diesel plate tamper or 10-ton vibratory roller or other substitute as approved by DR.
- .2 Do not proceed with backfilling operations until completion of following:
  - .1 DR has inspected and approved installations.
  - .2 DR has inspected and approved of construction below finish grade.
  - .3 Inspection, testing, approval, and recording location of underground utilities.
  - .4 Removal of shoring and bracing; backfilling of voids with satisfactory soil material.
- .3 Areas to be backfilled to be free from debris, snow, ice, water and frozen ground.
- .4 Do not use backfill material which is frozen or contains ice, snow or debris.
- .5 Place backfill material in uniform layers not exceeding 150 mm compacted thickness up to grades indicated. Compact each layer before placing succeeding layer.

- .6 Backfilling around installations:
  - .1 Place bedding and surround material as specified elsewhere.
  - .2 Place layers simultaneously on both sides of installed Work to equalize loading. Difference not to exceed 0.6 m.
  - .3 Where temporary unbalanced earth pressures are liable to develop on walls or other structures:
    - .1 If approved by DR, erect bracing or shoring to counteract unbalance, and leave in place until removal is approved by DR.

### 3.12 RESTORATION

- .1 Reinstall pavements disturbed by excavation to thickness, structure and elevation which existed before excavation.
- .2 Clean and reinstall areas affected by work as directed by DR.

END OF SECTION