

## **PART 1 – GENERAL**

### **1.1 RELATED SECTIONS**

- .1 Section 02 61 00.01 Contaminated Soil Managements

### **1.1 REFERENCES**

- .1 American Society for Testing and Materials International (ASTM)
  - .1 ASTM C 117-13, Standard Test Method for Material Finer than 0.075 mm (No.200) Sieve in Mineral Aggregates by Washing.
  - .2 ASTM C 136-06, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
  - .3 ASTM D 422-63(2007), Standard Test Method for Particle-Size Analysis of Soils.
  - .4 ASTM D 698-12, 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 1557-12, 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 4318-10, Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.
  - .7 Appendix B - As-Built Survey Requirements.
- .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 Canadian Standards Association (CSA International)
  - .1 CAN/CSA-A3000-08, Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).
    - .1 CSA-A3001-03 Consolidation, Cementitious Materials for Use in Concrete.
  - .2 CSA-A23.1-09/A23.2-09, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.

### **1.2 DEFINITIONS**

- .1 Topsoil:
    - .1 Material capable of supporting good vegetative growth and suitable for use in top dressing, landscaping and seeding.
    - .2 Material reasonably free from subsoil, clay lumps, brush, objectionable weeds, and other litter, and free from cobbles, stumps, roots, and other objectionable material larger than 25 millimeters 1 inch in any dimension.
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- .2 Borrow material: material obtained from locations outside area to be graded, and required for construction of fill areas or for other portions of Work.
- .3 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 4318-05, and gradation within limits specified when tested to ASTM D 422-63(2002) and ASTM C 136-06: Sieve sizes to CAN/CGSB-8.2-M88.
    - .2 Table:

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

### **1.3 SUBMITTALS**

- .1 Make submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Samples:
  - .1 Inform Departmental Representative at least 4 weeks prior to beginning Work, of proposed source of fill materials and provide access for sampling.

### **1.4 QUALITY ASSURANCE**

- .1 Where Engineer is employee of Contractor, submit proof that Work by Engineer is included in Contractor's insurance coverage.
  - .2 Submit design and supporting data at least 2 weeks prior to beginning Work.
  - .3 Design and supporting data submitted to bear stamp and signature of qualified professional engineer registered or licensed in Province of Newfoundland and Labrador, Canada.
  - .4 Keep design and supporting data on site.
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- .5 Engage services of qualified professional Engineer who is registered or licensed in Province of Newfoundland and Labrador, Canada in which Work is to be carried out to design and inspect shoring, bracing and underpinning required for Work.

## **1.5 WASTE MANAGEMENT AND DISPOSAL**

- .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
- .2 Divert excess materials from landfill to local recycling facility for reuse as directed by Departmental Representative.

## **1.6 EXISTING CONDITIONS**

- .1 No soil report has been completed for this site. Contractor to provide minimum bearing capacity of 200 kPa under footings and transformer pad.
- .2 Buried services:
  - .1 Notify Departmental Representative of any requirement to relocate buried services that interfere with execution of work: pay costs of relocating services.
  - .2 Remove obsolete buried services within 2 m of foundations: cap cut-offs.
  - .3 Size, depth and location of existing utilities and structures as indicated are for guidance only. Completeness and accuracy are not guaranteed.
  - .4 Confirm locations of buried utilities by careful test excavations.
  - .5 Maintain and protect from damage, water, sewer, gas, electric, telephone and other utilities and structures encountered.
  - .6 Record location of maintained, re-routed and abandoned underground lines.
  - .7 Confirm locations of recent excavations adjacent to area of excavation.
- .3 Existing buildings and surface features:
  - .1 Conduct, with Departmental Representative, condition survey of existing buildings, trees and other plants, lawns, fencing, service poles, wires, 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 Departmental Representative.

## **PART 2 - PRODUCTS**

### **2.1 MATERIALS**

- .1 Backfill: Granular A and Granular B in accordance with Item 323.02 of City of

St. John's Department of Engineering Specifications Book (latest edition).

- .2 Bedding and Surround Material: Granular "B" Material in accordance with Item 323.02 of City of St. John's Department of Engineering Specifications Book (latest edition).
- .3 Select Structural Backfill Material: from excavations of other sources, approved by the Departmental Representative for use intended, unfrozen and free from rocks larger than 80 mm, cinders, ashes, sods, refuse or other deleterious materials.
- .43 Geotextiles: to Section 31 32 19.01.

## **2.2 BEDDING AND SURROUND MATERIAL**

- .1 Granular material to following requirements:
  - .1 Crushed or screened stone, gravel or sand consisting of hard durable particles free from clay lumps, cementation, organic material, frozen material and other deleterious materials.
  - .2 Gradations to be within limits specified when tested to ASTM C136-84a and ASTM C117-84. Sieve sizes to CAN/CGSB-8.1-87.

Sieve Designation	% Passing	
	Stone/Gravel	Gravel/Sand
200mm	-	-
75mm	-	-
50mm	-	-
38.1mm	-	-
25mm	100	-
19mm	-	-
12.5	65-90	100
9.5	-	-
4.75	35-55	50-100
2.00mm	-	30-90
0.425mm	10-25	10-50
0.180mm	-	-
0.075mm	0-8	0-10

### **PART 3 - EXECUTION**

#### **3.1 SITE PREPARATION**

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

#### **3.2 STOCKPILING**

- .1 Stockpile fill materials in areas designated by Departmental Representative.
  - .1 Stockpile granular materials in manner to prevent segregation.
- .2 Protect fill materials from contamination.

#### **3.3 DEWATERING AND HEAVE PREVENTION**

- .1 Keep excavations free of water while Work is in progress.
- .2 Provide for Departmental Representative's review details of proposed dewatering or heave prevention methods, including dikes, well points, and sheet pile cut-offs.
- .3 Avoid excavation below groundwater table if quick condition or heave is likely to occur.
  - .1 Prevent piping or bottom heave of excavations by groundwater lowering, sheet pile cut-offs, or other means.
- .4 Protect open excavations against flooding and damage due to surface run-off.
- .5 Dispose of water in accordance with Section 01 35 43 - Environmental Procedures to approved runoff areas and in 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.
  - .2 Any pumped groundwater may be contaminated and must be addressed accordingly.

#### **3.4 EXCAVATION**

- .1 Excavate to lines, grades, elevations and dimensions as indicated.
  - .2 Remove obstructions encountered during excavation.
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- .3 Excavation must not interfere with bearing capacity of adjacent foundations.
- .4 Do not disturb soil within branch spread of trees or shrubs that are to remain.
  - .1 If excavating through roots, excavate by hand and cut roots with sharp axe or saw.
- .5 Keep excavated and stockpiled materials safe distance away from edge of trench as directed by Departmental Representative.
- .6 Restrict vehicle operations directly adjacent to open trenches.
- .7 Dispose of surplus and unsuitable excavated material.
- .8 Do not obstruct flow of surface drainage or natural watercourses.
- .9 Earth bottoms of excavations to be undisturbed soil, level, free from loose, soft or organic matter.
- .10 Notify Departmental Representative when bottom of excavation is reached.
- .11 Obtain Departmental Representative approval of completed excavation.
- .12 Remove unsuitable material from trench bottom including those that extend below required elevations to extent and depth as directed by Departmental Representative.
- .13 Correct unauthorized over-excavation as follows: :
  - .1 Fill under bearing surfaces and footings with Type I Material fill compacted to a minimum of 100% of maximum dry density, to ASTM D 698.
  - .2 Fill under other areas with Type I Material fill compacted to a minimum of 95% of maximum dry density, to ASTM D 698.
- .14 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 200 kPa.
  - .2 Clean out rock seams and fill with concrete mortar or grout to approval of Department Representative.

### **3.5 FILL TYPES AND COMPACTION**

- .1 Use types of fill as indicated or specified below. Compaction densities are percentages of maximum densities in accordance with ASTM D 698-07.
  - .1 Exterior side of perimeter walls and electrical trenching: use Type II Material fill to subgrade level. Compact to 100% of corrected maximum

- dry density.
- .2 Within building area: use Type I Material to underside of base course for floor slabs. Compact to 100 % of corrected maximum dry density.

### **3.6 BACKFILLING**

- .1 Do not proceed with backfilling operations until completion of following:
  - .1 Departmental Representative has inspected and approved installations.
  - .2 As-built survey requirements have been fulfilled.
- .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 150 mm compacted thickness up to grades indicated. Compact each layer before placing succeeding layer.
- .5 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.
  - .3 Place layers simultaneously on both sides of installed Work to equalize loading.
  - .4 Where temporary unbalanced earth pressures are liable to develop on walls or other structures:
    - .1 Permit concrete to cure for minimum 14 days or until it has sufficient strength to withstand earth and compaction pressure and approval obtained from Departmental Representative.

### **3.7 RESTORATION**

- .1 Upon completion of Work, remove waste materials and debris in accordance to Section 01 74 21 - Construction/Demolition Waste Management and Disposal, trim slopes, and correct defects as directed by Departmental Representative.
  - .2 Replace topsoil as indicated by Departmental Representative.
  - .3 Reinstate pavements and sidewalks disturbed by excavation to thickness, structure and elevation which existed before excavation.
  - .4 Clean and reinstate areas affected by Work as directed by Departmental Representative.
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- .5 Protect newly graded areas from traffic and erosion and maintain free of trash or debris.