

## **PART 1 GENERAL**

### **1.1 Related Sections**

- .1 Soil Investigation Data – Eng-Tech Report 19-217-03 dated Aug 14, 2019.

### **1.2 REFERENCES**

- .1 American Society for Testing and Materials International (ASTM)
  - .1 ASTM C117-04, Standard Test Method for Material Finer than 0.075 mm (No.200) Sieve in Mineral Aggregates by Washing.
  - .2 ASTM C136-05, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
  - .3 ASTM D422-63, Standard Test Method for Particle-Size Analysis of Soils.
  - .4 ASTM D698-00ae1, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (600 kN-m/m ;).
  - .5 ASTM D1557-02e1, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (2,700 kN-m/m ;).
  - .6 ASTM D4318-05, 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 Canadian Green Building Council (CaGBC)
  - .1 LEED Canada-NC Version 1.0-[December 2004], LEED (Leadership in Energy and Environmental Design): Green Building Rating System For New Construction and Major Renovations.
- .4 Canadian Standards Association (CSA International)
  - .1 CAN/CSA-A3000-03, 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/A23.2-04, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.

### **1.3 SITE CONDITIONS**

- .1 For sub-surface investigation soil boring logs refer to Appendix. The complete soil report is available.

### **1.4 UTILITY LINES**

- .1 Before commencing work, establish location and extent of underground utility lines in areas of excavation. Notify Contract Administrator of findings.

- .2 Remove abandoned utility lines in the area of work. Cap or otherwise seal lines at cut-off points.
- .3 Record locations of maintained, re-routed and abandoned underground utility lines.
- .4 Repair and pay for damage to existing utility lines resulting from work.

## **1.5 PROTECTION**

- .1 Protect bottoms of excavations from softening. Should softening occur, remove softened soil and replace with compacted granular fill.
- .2 Construct banks in accordance with local by laws.
- .3 Provide adequate protection around benchmarks and geodetic monuments.
- .4 Provide protection to ensure no damage to existing facilities and equipment situated on site.
- .5 Use approved measures to minimize dust as result of work.
- .7 Do not stockpile excavated material at the work area or in the occupied garage areas.
- .8 Excavated material to not interfere with site operation or drainage.
- .8 Provide shoring as required to protect adjacent property and structures. All shoring design and drawings to be submitted under seal of an engineer registered in the province of Manitoba for review and approval.

## **1.6 COMPACTION DENSITIES**

- .1 Compaction densities are percentages of maximum densities obtainable from ASTM D698-70 and correct as noted.

## **1.7 UNSATISFACTORY SOIL CONDITIONS**

- .1 Any unsatisfactory or questionable soil conditions revealed during excavation shall be reported immediately to the Contract Administrator.
- .2 All foundation and sub-structural work shall cease until the condition has been examined and approval to proceed has been issued.

## **1.8 MATERIAL UNSUITABLE FOR BACKFILL**

- .1 The Contractor shall be responsible for all costs associated with the excavation and removal of all materials unsuitable for backfill as per the geotechnical report.

## **1.9 WATER**

- .1 Keep excavation free from water at all times. Provide drainage trenches and sumps as necessary and pump water well away from excavation. Do not discharge water onto garage floor or into occupied areas.

## **1.10 INSPECTION AND TESTING**

- .1 Testing of materials and compaction will be carried out by testing laboratory designated by Contract Administrator and as described in Division 0.

- .2 Sieve analysis: Proposed fill materials will be tested to confirm suitability for intended use and conformity with specifications.
- .3 Frequency of Tests:
  - .1 Excavated surfaces: When undisturbed excavated surface is being prepared, make a series of 3 test of surface for each 500 m<sup>2</sup> area.
  - .2 Fills under floor or other slabs on grade: Make 3 tests for every 2 lifts of compacted fill.

## **PART 2 MATERIALS**

### **2.1 GRANULAR MATERIALS:**

- .1 Type 1 Fill (Base Course): Clean, angular crusher run natural stone, free from shale clay, friable materials, roots and vegetable matter and graded within the following limits:
  - 1. City of Winnipeg CW3110: Base Course Materials.
  - 2. Crushed concrete may not be used.
- .2 Type 2 Fill (Sub-base): Crushed natural stone, free from shale clay, friable materials, roots and vegetable matter and graded within the following limits:
  - 1. City of Winnipeg CW3110: 50 mm MAX.
- .3 Type 3 Fill: Medium or highly plastic inorganic clay.

### **2.2 STOCKPILING**

- .1 If required stockpile fill materials in areas designated by the Contract Administrator. Stockpile granular materials in manner to prevent segregation. Protect stockpile fill materials from freezing or washing out.
- .2 Protect fill materials from contamination.

## **PART 3 EXECUTION**

### **3.1 EXCAVATING**

- .1 Excavate to elevations and dimensions indicated for installation, construction and inspection of work specified.
- .2 Excavate to well defined lines to minimize quantity of fill material required.
- .3 Earth bottoms of excavations to be dry undisturbed soil, level, free from loose or organic matter.
- .4 Excavation must not interfere with normal 45-degree splay of bearing from bottom of any footing.
- .5 Dispose of surplus and unsuitable excavated material off site.
- .6 Do not obstruct flow of surface drainage.
- .7 Notify Contract Administrator when soil at bottom of excavation appears unsuitable and proceed as directed by Contract Administrator.

- .8 Obtain Contract Administrator review of completed excavation.
- .9 Remove unsuitable material from trench bottom to extent and depth directed by Contract Administrator.
- .10 Correct unauthorized excavation at no extra cost as follows:
  - .1 Fill under bearing surfaces and footings with concrete specified.
  - .2 Fill for trenching with Type 2 fill compacted to minimum of 95% maximum dry density to ASTM D698-78.
  - .3 Fill under other areas with Type 2 fill compacted to 100% maximum dry density to ASTM 0698-78.
- .11 Cut trenches 300 mm wider than maximum pipe, conduit, cable, diameter. Trim and shape trench bottoms and leave free of irregularities, lumps or projections.
- .12 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.
- .13 Provide shoring to Provincial Safety Standards.

### **3.3 BACKFILLING**

- .1 Do not commence backfilling until areas of work to be backfilled have been reviewed by the Contract Administrator.
- .2 Areas to be backfilled shall be free from debris, snow, ice, water or frozen ground. Backfill and filling material shall not be frozen or contain ice, snow or debris.
- .3 Do not backfill around or over cast-in-place concrete within 3 days of placing concrete.
- .4 Backfill simultaneously each side of walls and other structures to equalize soil pressure.
- .5 Where temporary unbalanced earth pressures can develop on walls or other structures, erect bracing or shoring to counteract unbalance, and leave in place until removal is approved by the Contract Administrator.
- .6 Place and compact fill materials in continuous horizontal layers not exceeding 300 mm loose depth. Use methods to prevent disturbing or damaging buried services, insulation, waterproofing. Repair any damage.

### **3.4 FILL TYPES AND COMPACTION**

- .1 Dimensions specified in following paragraphs are minimum dimensions of fill after compaction.
- .2 Around the hoist foundations and under structural slabs:
  - 1. Once excavation has reached the design subgrade elevation, the subgrade should be inspected by the geotechnical engineer prior to placement of fill.
  - 2. Where inspection does not indicate the presence of localized soft conditions, the subgrade should be scarified, moisture conditioned and compacted to a minimum of 95% of SPMDD, following the recommendations in the geotechnical report.
  - 3. Sub-base material can be placed directly on the compacted sub-grade.
  - 4. The sub-base shall consist of Type 2 Fill in layers not more than 200mm in thickness and compacted to 95% of the maximum dry density (MDD) as determined by the Standard Proctor Compaction Test.

- .4 Under slabs on grade:
1. Once slab-on-grade has been removed and the excavation has reached the design subgrade elevation, the subgrade should be inspected by the geotechnical engineer prior to placement of fill.
  2. Where inspection does not indicate the presence of localized soft conditions, the subgrade should be scarified, moisture conditioned and compacted to a minimum of 95% of SPMDD, following the recommendations in the geotechnical report.
  3. Provide minimum 200 mm Type 1 Fill compacted to 100% MDD.
  4. Provide a 10 mil polyethylene vapour barrier under the slab.

**END OF SECTION**