

**Part 1 General**

**1.1 REFERENCES**

- .1 City of Winnipeg
  - .1 City of Winnipeg Standard Construction Specification CW 3170- Earthwork and Grading [December 2015] included in Appendix B.
  - .2 For this specific project the word Contract Administrator in the City of Winnipeg Construction Specifications shall refer to Departmental Representative.

**Part 2 Products**

**2.1 NOT USED**

- .1 Not Used.

**Part 3 Execution**

**3.1 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 Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.
- .3 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

**3.2 STRIPPING OF TOPSOIL**

- .1 Ensure that procedure are conducted in accordance with CW 3170- Earthwork and Grading
- .2 Excavate surface soil, organic growth, or other material designated by the Departmental representative as overburden, stockpile topsoil for re-use on site, and dispose of unsuitable material such as brush, grass, weeds and all other organic growth and any surface topsoil, unless otherwise specified herein or in the Specifications for the Work.
- .3 Remove topsoil before construction procedures commence to avoid compaction of topsoil.
- .4 Handle topsoil only when it is dry and warm.
- .5 Remove vegetation from targeted areas by non-chemical means and dispose of stripped vegetation by alternative disposal.
- .6 Remove brush from targeted area by non-chemical means and dispose of through alternative disposal.
- .7 Pile topsoil in berms in locations as directed by Departmental Representative.
  - .1 Stockpile height not to exceed 2.5 - 3 m.

- .8 Dispose of unused topsoil off-site.
- .9 Protect stockpiles from contamination and compaction.
- .10 Cover topsoil that has been piled for long term storage, with trefoil or grass to maintain agricultural potential of soil.

### **3.3 PREPARATION OF GRADE**

- .1 Verify that grades are correct and notify Departmental Representative if discrepancies occur do not begin work until instructed by .
  - .1 Grade area only when soil is dry to lessen soil compaction.
  - .2 Grade soil with scrapers establishing natural contours and eliminating uneven areas and low spots, ensuring positive drainage.

### **3.4 PLACING OF TOPSOIL**

- .1 Spread topsoil during dry conditions in uniform layers not exceeding 150mm, over unfrozen subgrade free of standing water.
- .2 Establish traffic patterns for equipment to prevent driving on topsoil after it has been spread to avoid compaction.
- .3 Cultivate soil following spreading procedures.

### **3.5 CLEANING**

- .1 Proceed in accordance with Section 01 74 11 - Cleaning.
- .2 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

**END OF SECTION**

**Part 1 General**

**1.1 REFERENCES**

- .1 City of Winnipeg
  - .1 City of Winnipeg Standard Construction Specification CW 3170- Earthwork and Grading [December 2015] in Appendix B.
  - .2 For this specific project the word Contract Administrator in the City of Winnipeg Construction Specifications shall refer to Departmental Representative.

**1.2 SUBMITTALS**

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.

**1.3 EXISTING CONDITIONS**

- .1 Known underground and surface utility lines and buried objects are as indicated on site plan.

**Part 2 Products**

**2.1 MATERIALS**

- .1 Fill material: refer to CW 3170 "Earthwork and Grading"
- .2 Fill material for embankment construction shall be obtained from site excavation, from borrow sites or shall be imported material, of a type approved by the Professional Designer.
- .3 Approved clay fill material shall consist of low to medium plastic clays or of mixtures of sand and clay, uniform in texture and suitable for compaction.

**2.2 MATERIAL TESTING**

- .1 All materials supplied under this Specification shall be subject to inspection and testing by the Testing Laboratory designated by the Departmental Representative.
- .2 The Professional Designer shall approve all materials at least ten (10) days before any construction is undertaken. If, in the opinion of the Professional Designer, such materials, in whole or in part, do not conform to the Specification detailed herein or are found to be defective in manufacture or have become damaged in transit, storage or handling operations, then such material shall be rejected by the Professional Designer and replaced by the Contractor at his own expense.

## **Part 3            Execution**

### **3.1                EXAMINATION**

- .1      Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for rough grading installation in accordance with manufacturer's written instructions.
  - .1          Visually inspect substrate.
  - .2          Inform Departmental Representative of unacceptable conditions immediately upon discovery.
  - .3          Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

### **3.2                STRIPPING OF TOPSOIL**

- .1      Do not handle topsoil while in wet or frozen condition or in any manner in which soil structure is adversely affected as determined by Departmental Representative.
- .2      Commence topsoil stripping of areas as directed by Departmental Representative after area has been cleared of brush, weeds, grasses and removed from site.
- .3      Stockpile in locations as directed by Departmental Representative. Stockpile height not to exceed 2 m.
- .4      Dispose of unused topsoil off site as directed by Departmental Representative.

### **3.3                GRADING**

- .1      Rough grade to levels, profiles, and contours allowing for surface treatment as indicated.
- .2      Slope rough grade away from building 1:50 minimum.
- .3      Grade ditches to depth as indicated on Drawing C02.
- .4      Prior to placing fill over existing ground, scarify surface to depth of 150 mm minimum before placing fill over existing ground. Maintain fill and existing surface at approximately same moisture content to facilitate bonding.
- .5      Compact as per clause 9.7 Compaction (CW 3170)
- .6      Do not disturb soil within branch spread of trees or shrubs to remain.

### **3.4                TESTING**

- .1      Inspection and testing of soil compaction will be carried out by certified testing laboratory. Costs of tests will be paid by Contractor.
- .2      The Standard Proctor Density for the sub-grade and embankment materials shall be determined at the optimum moisture content in accordance with ASTM Standard D698. The field density of each layer shall be a percentage of the Standard Proctor Density, as specified in clause 9.7 Compaction (CW 3170).
- .3      Quality control tests will be used to determine the acceptability of each layer, as placed and compacted by the Contractor, before the succeeding layer may be applied.
- .4      The field density of the compacted layers shall be verified by Field Density Tests in accordance with ASTM Standard D1556, Test for Density of Soil in Place by the Sand-Cone Method, or ASTM Standard D2922, Test of Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).

- .5 Holes made by the removal of samples from the layers shall be promptly filled by the Contractor with appropriate material and thoroughly compacted so as to conform in every way with the adjoining compacted material.

### **3.5 CLEANING**

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
  - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.
- .3 Waste Management: separate waste materials for reuse or recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
  - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

### **3.6 PROTECTION**

- .1 Protect existing trees, landscaping, natural features, bench marks, buildings, pavement, surface or underground utility lines which are to remain as directed by Departmental Representative. If damaged, restore to original or better condition unless directed otherwise.
- .2 Maintain access roads to prevent accumulation of construction related debris on roads.

**END OF SECTION**

## **Part 1 General**

### **1.1 REFERENCES**

- .1 City of Winnipeg
  - .1 City of Winnipeg Standard Construction Specification Section - CW2030 Excavation, Bedding and Backfill [December 2015] in Appendix B.
- .2 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 D422-632002, 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 (12,400 ft-lbf/ft<sup>3</sup>) (600 kN-m/m<sup>3</sup>).
  - .5 ASTM D1557-02e1, 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 D4318-05, Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.
- .3 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.
- .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.
- .5 U.S. Environmental Protection Agency (EPA)/Office of Water
  - .1 EPA 832R92005, Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices.

### **1.2 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.
  - .2 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.
- .3 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 in any dimension.
- .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 Recycled fill material: material, considered inert, obtained from alternate sources and engineered to meet requirements of fill areas.
- .7 Unsuitable materials:
  - .1 Weak, chemically unstable, and compressible materials.
  - .2 Frost susceptible materials:
- .8 Unshrinkable fill: very weak mixture of cement, concrete aggregates and water that resists settlement when placed in utility trenches, and capable of being readily excavated.

### **1.3 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Make submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Quality Control: in accordance with Section 01 45 00 - Quality Control:
  - .1 Submit condition survey of existing conditions as described in EXISTING CONDITIONS article of this Section.
  - .2 Submit for review by Departmental Representative proposed dewatering and heave prevention methods as described in PART 3 of this Section.
  - .3 Submit to Departmental Representative written notice at least 7 days prior to excavation work, to ensure cross sections are taken.
  - .4 Submit to Departmental Representative written notice when bottom of excavation is reached.
  - .5 Submit to Departmental Representative testing and inspection results as described in PART 3 of this Section.
- .3 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 and location plan of relocated and abandoned services, as required.
- .4 Samples:
  - .1 Submit samples in accordance with Section 01 33 00 - Submittal Procedures.

- .2 Inform Departmental Representative at least 4 weeks prior to beginning Work, of proposed source of fill materials and provide sieve analysis and compaction test results..

#### **1.4 QUALITY ASSURANCE**

- .1 Qualification Statement: submit proof of insurance coverage for professional liability.
- .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 the Province of Manitoba, Canada.
- .4 Keep design and supporting data on site.
- .5 Engage the services of qualified professional Engineer who is registered or licensed in the Province of Manitoba, Canada in which Work is to be carried out to design and inspect any shoring and bracing required for Work.
- .6 Do not use soil material until written report of soil test results are reviewed by Departmental Representative.
- .7 Health and Safety Requirements:
  - .1 Do construction occupational health and safety in accordance with Section 01 35 29 - Health and Safety Requirements.

#### **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 aggregate materials from landfill to local quarry for reuse as directed by Departmental Representative.

#### **1.6 EXISTING CONDITIONS**

- .1 Examine soil report attached as Appendix A.
- .2 Buried services:
  - .1 Before commencing work verify and 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 Departmental Representative establish location and state of use of buried utilities and structures. Contractor to clearly mark such locations to prevent disturbance during Work.
  - .6 Confirm locations of buried utilities by careful soil hydrovac methods.
  - .7 Maintain and protect from damage, water, sewer, gas, electric, telephone, data and other utilities and structures encountered.



- .8 Where utility lines or structures exist in area of excavation, obtain direction of Departmental Representative before removing or re-routing. Costs for such Work to be paid by Departmental Representative.
- .9 Record location of maintained, re-routed and abandoned underground lines.
- .10 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, 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 Departmental Representative
  - .3 Where required for excavation, cut roots or branches as directed by Departmental Representative.

## Part 2 Products

### 2.1 MATERIALS

- .1 Type 1 and Type 2 fill: properties to following requirements:
  - .1 Crushed, pit run or screened stone, gravel or sand.
  - .2 Gradations to be within limits specified when tested to ASTM C136 and ASTM C117. Sieve sizes to CAN/CGSB-8.1 and CAN/CGSB-8.2.
  - .3 Table:

Sieve Designation	% Passing	
	Type 1	Type 2
75 mm	-	[100]
50 mm	-	-
37.5 mm	-	-
25 mm	[100]	-
19 mm	[75-100]	-
12.5 mm	-	-
9.5 mm	[50-100]	-
4.75 mm	[30-70]	[22-85]
2.00 mm	[20-45]	-
0.425 mm	[10-25]	[5-30]
0.180 mm	-	-
0.075 mm	[3-8]	[0-10]

- .2 Type 3 fill: selected material from excavation or other sources, approved by Departmental Representative for use intended, unfrozen and free from rocks larger than 75 mm, cinders, ashes, sods, refuse or other deleterious materials.
- .3 Unshrinkable fill: proportioned and mixed to provide:
  - .1 Maximum compressive strength of 0.4 MPa at 28 days.
  - .2 Minimum strength of 0.07MPa at 24 h.

- .3 Concrete aggregates: to CSA-A23.1/A23.2.
- .4 Cement: Type GU.
- .5 Slump: 160 to 200 mm.
- .4 Shearmat: honeycomb type bio-degradable cardboard 150 mm thick, treated to provide sufficient structural support for poured concrete until concrete cured.
- .5 Geotextiles: to Section 31 00 00 Civil Works.

### **Part 3 Execution**

#### **3.1 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 Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.
- .3 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

#### **3.2 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.

#### **3.3 PREPARATION/PROTECTION**

- .1 Protect existing features in accordance with Section 01 56 00 - Temporary Barriers and Enclosures 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 Departmental Representative 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.

#### **3.4 STRIPPING OF TOPSOIL**

- .1 Begin topsoil stripping of areas as indicated on the drawings.
- .2 Strip topsoil to depths as directed by Departmental Representative].
  - .1 Do not mix topsoil with subsoil.
- .3 Stockpile in locations as directed by Departmental Representative].

- .1 Stockpile height not to exceed 2 m and should be protected from erosion.
- .4 Dispose of unused topsoil off site as directed by Departmental Representative.

### **3.5 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 Implement sufficient erosion and sediment control measures to prevent sediment release off construction boundaries and into water bodies.

### **3.6 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 - Health and Safety Requirements and the Health and Safety Act for the Province of Manitoba.
  - .1 Where conditions are unstable, Departmental Representative to verify and advise methods.
- .2 Construct temporary Works to depths, heights and locations as indicated.
- .3 During backfill operation:
  - .1 Unless otherwise indicated or 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 Pull sheeting in increments that will ensure compacted backfill is maintained at elevation at least 500 mm above toe of sheeting.
- .4 When sheeting is required to remain in place, cut off tops at elevations as indicated.
- .5 Upon completion of substructure construction:
  - .1 Remove cofferdams, shoring and bracing.
  - .2 Remove excess materials from site.

### **3.7 DEWATERING AND HEAVE PREVENTION**

- .1 Keep excavations free of water while Work is in progress.
- .2 Provide for Departmental Representative 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 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.

### 3.8 EXCAVATION

- .1 Advise Departmental Representative 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 indicated.
- .3 Remove concrete, masonry, paving, walks, demolished foundations and rubble and other obstructions encountered during excavation in accordance with Section 02 41 13 - Selective Site Demolition.
- .4 Excavation must not interfere with bearing capacity of adjacent foundations.
- .5 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.
- .6 For trench excavation, unless otherwise authorized by Departmental Representative in writing, do not excavate more than 30 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 Departmental Representative.
- .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.
- .12 Notify Departmental Representative when bottom of excavation is reached.
- .13 Obtain Departmental Representative 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 Departmental Representative.
- .15 Correct unauthorized over-excavation as follows:
  - .1 Fill under bearing surfaces and footings as directed by Departmental Representative.
  - .2 Fill under other areas with Type 2 fill compacted to not less than 95 % of corrected Standard Proctor maximum dry density.
- .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.
  - .2 Clean out rock seams and fill with concrete mortar or grout to approval of Departmental Representative.
- .17 Install geotextiles in accordance with Section 31 00 00 Civil Works.

### **3.9 FILL TYPES AND COMPACTION**

- .1 Use types of fill as indicated or specified below. Compaction densities are percentages of maximum densities obtained from ASTM D698 and ASTM D1557.
  - .1 Exterior side of perimeter walls: use Type 3 fill to subgrade level. Compact to 95% of corrected maximum dry density.
  - .2 Within building area: use Type 2 to underside of base course for floor slabs. Compact to 100 % of corrected maximum dry density.
  - .3 Under concrete slabs: provide minimum 150 mm compacted thickness base course of Type 1 fill. Compact base course to 100 %.
  - .4 Retaining walls: use Type 2 fill to subgrade level on high side for minimum 500 mm from wall and compact to 95 %. For remaining portion, use Type 3 fill compacted to 95 %.

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

- .1 Place and compact granular material for bedding and surround of underground services.
- .2 Place bedding and surround material in unfrozen condition.

### **3.11 BACKFILLING**

- .1 Do not proceed with backfilling operations until completion of following:
  - .1 Departmental Representative has inspected and approved installations.
  - .2 Departmental Representative has inspected and approved of construction below finish grade.
  - .3 Inspection, testing, approval, and recording location of underground utilities.
  - .4 Removal of concrete formwork.
  - .5 Removal of shoring and bracing; backfilling of voids with satisfactory soil material.
- .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.
- .6 Place unshrinkable fill in areas as indicated.
- .7 Consolidate and level unshrinkable fill with internal vibrators.
- .8 Install drainage and filter system in backfill as indicated.

**3.12 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 directed by Departmental Representative.
- .3 Reinstall lawns to elevation which existed before excavation.
- .4 Reinstall pavements and sidewalks disturbed by excavation to thickness, structure and elevation which existed before excavation.
- .5 Clean and reinstall areas affected by Work as directed by Departmental Representative.
- .6 Use temporary plating to support traffic loads over unshrinkable fill for initial 24 hours.
- .7 Protect newly graded areas from traffic and erosion and maintain free of trash or debris.

**END OF SECTION**

**Part 1            General**

**1.1                REFERENCES**

- .1    City of Winnipeg
  - .1    City of Winnipeg Standard Construction Specification Section - CW2030  
Excavation, Bedding and Backfill [December 2015] in Appendix B.
  - .2    For this specific project the word Contract Administrator in the City of Winnipeg  
Construction Specifications shall refer to Departmental Representative.

**1.2                DEFINITIONS**

- .1    Excavation classes:
  - .1    Common excavation: excavation of materials of whatever nature encountered  
during work.
- .2    Waste material: excavated material unsuitable for use in Work or surplus to requirements.
- .3    Borrow material: material obtained from locations outside area to be graded, and required  
for construction of fill areas or for other portions of Work.
- .4    Recycled fill material: material, considered inert, obtained from alternate sources and  
Departmental Representative to meet requirements of fill areas.
- .5    Unsuitable materials:
  - .1    Weak, chemically unstable, and compressible materials
- .6    Unshrinkable fill: very weak mixture of cement, concrete aggregates and water that  
resists settlement when placed in utility trenches, and capable of being readily excavated.

**1.3                SUBMITTALS**

- .1    Make submittals in accordance with Section 01 33 00 - Submittal Procedures
- .2    Quality Control: in accordance with Section 01 45 00 - Quality Control:
  - .1    Submit condition survey of existing conditions as described in EXISTING  
CONDITIONS article of this Section.
  - .2    Submit for review by Departmental Representative proposed dewatering methods  
as described in PART 3 of this Section.
  - .3    Submit to Departmental Representative written notice at least 7 days prior to  
excavation work, to ensure cross sections are taken.
  - .4    Submit to Departmental Representative written notice when bottom of  
excavation is reached.
  - .5    Submit to Departmental Representative testing results as described in PART 3 of  
this Section.
- .3    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.
- .4 Samples:
  - .1 Submit samples in accordance with Section 01 33 00 - Submittal Procedures.
  - .2 Inform Departmental Representative 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 Ship samples to designated materials testing facility as directed by Departmental Representative, in tightly closed containers to prevent contamination and exposure to elements.

#### **1.4 QUALITY ASSURANCE**

- .1 Qualification Statement: submit proof of insurance coverage for professional liability.
- .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 Manitoba, Canada.
- .4 Keep design and supporting data on site.
- .5 Do not use soil material until written report of soil test results are reviewed and approved by Professional Designer.

#### **1.5 EXISTING CONDITIONS**

- .1 Examine soil report available from Professional Designer.
- .2 Buried services:
  - .1 Before commencing work verify 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 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 or soil hydrovac methods.



- .7 Maintain and protect from damage, water, sewer, gas, electric, telephone and other utilities and structures encountered as indicated.
- .8 Where utility lines or structures exist in area of excavation, obtain direction of Departmental Representative.
- .9 Record location of maintained, re-routed and abandoned underground lines.
- .10 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 Fill material for embankment construction shall be obtained from site excavation, from borrow sites as specified in the specifications for the work or shall be imported material, of a type approved by the Professional Designer.
- .2 Imported clay material is to be low to medium plastic clays with liquid limit <50 or mixtures of clay and sand suitable for compaction and is to be free of silt, rock, concrete rubble and organic materials. Material is to be approved by the Professional Designer before placing in excavations. Refer to Section 312213 "Rough Grading".
- .3 Refer to Section 330516 "Manholes and Catch Basin Structures", Section 334100 "Storm Utility Drains" and Section 334213 "Pipe Culverts" for backfill and bedding material.
- .4 Geotextiles: to Section 31 32 21 - Geotextiles.

## **Part 3 Execution**

### **3.1 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 sediment and erosion control plan, specific to site, that complies with EPA 832/R-92-005 or requirements of authorities having jurisdiction, whichever is more stringent.
- .2 Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.

- .3 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

### **3.2 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 in accordance with Section 02 41 13 - Selective Site Demolition.

### **3.3 PREPARATION/PROTECTION**

- .1 Protect existing features in accordance with Section 01 56 00 - Temporary Barriers and Enclosures 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 Departmental Representative 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.

### **3.4 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 Implement sufficient erosion and sediment control measures to prevent sediment release off construction boundaries and into water bodies.

### **3.5 DEWATERING AND HEAVE PREVENTION**

- .1 Keep excavations free of water while Work is in progress.
- .2 Provide for Departmental Representative 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 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.
- .6 Provide flocculation tanks, settling basins, or other treatment facilities to remove suspended solids or other materials before discharging to storm sewers, watercourses or drainage areas.

### **3.6 EXCAVATION**

- .1 Advise Departmental Representative 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 directed by Departmental Representative.
- .3 Remove concrete, paving, demolished foundations and rubble and other obstructions encountered during excavation in accordance with Section 02 41 13 - Selective Site Demolition.
- .4 Excavation must not interfere with bearing capacity of adjacent foundations.
- .5 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.
- .6 For trench excavation, unless otherwise authorized by Departmental Representative in writing, do not excavate more than 30 m of trench in advance of installation operations and do not leave open more than 15m at end of day's operation.
- .7 Keep excavated and stockpiled materials safe distance away from edge of trench as directed by Departmental Representative.
- .8 Restrict vehicle operations directly adjacent to open trenches.
- .9 Dispose of surplus and unsuitable excavated material in approved location 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.
- .12 Notify Departmental Representative when bottom of excavation is reached.
- .13 Obtain Departmental Representative 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 Departmental Representative.
- .15 Correct unauthorized over-excavation as follows:
  - .1 Contractor shall replace over excavated areas with suitable site materials as directed by the Departmental Representative
- .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.
- .17 Install geotextiles in accordance with Section 31 32 19.01 - Geotextiles.

### **3.7 FILL TYPES AND COMPACTION**

- .1 Refer to Section 312213 "Rough Grading".

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

- .1 Place and compact granular material for bedding and surround of underground services as indicated in Section 33 41 00 - Storm Utility Drainage Piping, Section 334 213 Pipe Culvert, Section 330 516 Manholes and Catch Basin Structures.
- .2 Place bedding and surround material in unfrozen condition.

### **3.9 BACKFILLING**

- .1 Backfilling shall be in accordance with the of the Winnipeg Standard Construction Specifications Section CW2030 Excavation, Bedding and Backfill
- .2 Do not proceed with backfilling operations until completion of following:
  - .1 Departmental Representative has inspected and approved installations.
  - .2 Departmental Representative has inspected and approved of construction below finish grade.
  - .3 Inspection, testing, approval, and recording location of underground utilities.
- .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.
  - .3 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.
    - .2 If approved by Departmental Representative, erect bracing or shoring to counteract unbalance, and leave in place until removal is approved by Departmental Representative.
- .7 Place unshrinkable fill in areas as indicated.

- .8 Consolidate and level unshrinkable fill with internal vibrators.

### **3.10 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 Clean and reinstate areas affected by Work as directed by Departmental Representative.
- .3 Use temporary plating to support traffic loads over unshrinkable fill for initial 24 hours.
- .4 Protect newly graded areas from traffic and erosion and maintain free of trash or debris.

**END OF SECTION**

**Part 1        General**

**1.1            REFERENCES**

- .1    City of Winnipeg
  - .1    City of Winnipeg Standard Construction Specification CW 3130 - Supply and Installation of Geotextile Fabrics [December 2015] in Appendix B.
  - .2    For this specific project the word Contract Administrator in the City of Winnipeg Construction Specifications shall refer to Departmental Representative.

**1.2            ACTION AND INFORMATIONAL SUBMITTALS**

- .1    Submit in accordance with Section 01 33 00 - Submittal Procedures
- .2    Product Data:
  - .1    Submit manufacturer's instructions, printed product literature and data sheets for geotextiles and include product characteristics, performance criteria, physical size, finish and limitations.
- .3    Samples:
  - .1    Submit following samples 4 weeks prior to beginning Work.
    - .1    Minimum length of 2 m of roll width of geotextile
    - .2    Methods of joining
- .4    Test and Evaluation Reports:
  - .1    Submit copies of mill test data and certificate at least 4 weeks prior to start of Work.

**1.3            DELIVERY, STORAGE AND HANDLING**

- .1    Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements, with manufacturer's written instructions
- .2    Storage and Handling Requirements:
  - .1    Store materials in accordance with manufacturer's recommendations in clean, dry, well-ventilated area
  - .2    Store and protect geotextiles from direct sunlight and UV rays
  - .3    Replace defective or damaged materials with new

## **Part 2            Products**

### **2.1            MATERIAL**

- .1      Geotextile used for construction of access road to be Geotextile Fabric approved for use as a sub-grade separator and reinforcement shall be woven fabric in accordance with Section 2.6 of Specification CW 3130 Supply and Installation of Geotextile Fabrics.
- .2      Geotextile used for the rip-rip installation shall be non-woven fabric in accordance with Section 2.5 of Specification CW 3130 Supply and Installation of Geotextile Fabrics.

## **Part 3            Execution**

### **3.1            EXAMINATION**

- .1      Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for geotextile material installation in accordance with manufacturer's written instructions.
  - .1      Visually inspect substrate in presence of the Departmental Representative
  - .2      Inform the Departmental Representative of unacceptable conditions immediately upon discovery
  - .3      Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from the Departmental Representative

### **3.2            INSTALLATION**

- .1      Place geotextile material by unrolling onto graded surface in orientation, manner and locations indicated and retain in position with securing pins
- .2      Place geotextile material smooth and free of tension stress, folds, wrinkles and creases.
- .3      Place geotextile material on sloping surfaces in one continuous length from toe of slope to upper extent of geotextile.
- .4      Overlap each successive strip of geotextile 600 mm over previously laid strip.
- .5      Join successive strips of geotextile by sewing
- .6      Protect installed geotextile material from displacement, damage or deterioration before, during and after placement of material layers.
- .7      After installation, cover with overlying layer within 4 hours of placement
- .8      Replace damaged or deteriorated geotextile to approval of the Departmental Representative.
- .9      Place and compact soil layers in accordance with the relevant Specification Section

### **3.3 CLEANING**

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning
  - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 – Cleaning

### **3.4 PROTECTION**

- .1 Vehicular traffic not permitted directly on geotextile securing pins.

**END OF SECTION**



## **PART 1 GENERAL**

### **1.1 REFERENCES**

- .1 City of Winnipeg
  - .1 City of Winnipeg Standard Construction Specification CW3615 – RipRap [December 2015] IN Appendix B.
  - .2 For this specific project the word Contract Administrator in the City of Winnipeg Construction Specifications shall refer to Departmental Representative.

### **1.2 WASTE MANAGEMENT AND DISPOSAL**

- .1 Separate and recycle waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
- .2 Divert left over aggregate materials to local quarry/facility for reuse as approved by Departmental Representative.
- .3 Divert left over geotextiles to local plastic recycling facility as approved by Departmental Representative.

## **PART 2 PRODUCTS**

### **2.1 STONE**

- .1 Hard, dense, durable quarry stone, free from seams, cracks or other structural defects, to meet following size distribution for use intended:
  - .1 Random rip-rap:
  - .1 The stones shall range in size from 100 mm to 150 mm

### **2.2 GEOTEXTILE FILTER**

- .1 Geotextile: in accordance with Section 31 32 19.01 - Geotextiles.

## **PART 3 EXECUTION**

### **3.1 PLACING**

- .1 Where rip-rap is to be placed on slopes, excavate trench at toe of slope to dimensions as indicated on Drawing C02.
- .2 Fine grade area to be rip-rapped to uniform, even surface. Fill depressions with suitable material and compact to provide firm bed.
- .3 Place geotextile on prepared surface in accordance with Section 31 32 19 - Geotextiles and as indicated. Avoid puncturing geotextile. Vehicular traffic over geotextile not permitted.
- .4 Place rip-rap to thickness and details as indicated on Drawing C02.
- .5 Place stones in manner to secure surface and create a stable mass. Place larger stones at bottom of slopes.
- .6 Refer to clause 9.2 of CW 3615 for installation details.

**END OF SECTION**

**Part 1 General**

**1.1 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Sub-surface investigation report: when site conditions differ from those indicated, submit written notification to Consultant and await further instructions.

**1.2 DELIVERY, STORAGE AND HANDLING**

- .1 Deliver, store and handle materials in accordance with manufacturer's instructions.
- .2 Protect piles from damage due to excessive bending stresses, impact, abrasion or other causes during delivery, storage and handling.
- .3 Replace damaged piles as directed by Consultant.

**1.3 EXISTING CONDITIONS**

- .1 Refer to existing sub-surface investigation report titled "Geotechnical Survey and Utilities Capacity Study" prepared by Stantec Architecture Ltd. dated February 26, 2013 located in Appendix A.
- .2 All Work to be completed in accordance with the recommendations included in the Geotechnical Survey and Utilities Capacity Study.

**1.4 PRE-CONDITION SURVEY**

- .1 Contractor to engage the services of a Professional Engineer registered in the Province of Manitoba to complete a visual pre-condition survey of the existing Header House and Greenhouse building to record existing conditions including any visible damage and provide a detailed report for photographic records.
- .2 The condition survey shall be repeated upon completion of the pile installation to identify any damage that occurred during the piling operations. Contractor will be responsible for repairs to any damages which occurred as a result of the pile installation.

**1.5 PILE INSTALLATION VIBRATION MONITORING**

- .1 Contractor to engage the services of a Professional Engineer registered in the Province of Manitoba or a certified testing agency to complete pile installation vibration monitoring during the course of the pile installation.
- .2 Contractor to control use of vibration producing construction techniques or equipment so that the ground adjacent to existing structures, pipelines and utilities experience a resultant peak particle velocity (PPV) not exceeding 12 mm/s.

**Part 2 Products**

**2.1 MATERIALS**

- .1 Material requirements for piles are specified in Section 31 62 19 Timber Piles.

- .2 Supply or fabricate full length piles as indicated and provide equipment to handle full length piles without cutting and splicing.

## **2.2 EQUIPMENT**

- .1 Impact hammers: provide manufacturer's name, type, rated energy per blow at normal working rate, mass of striking parts of hammer, mass of driving cap and type and elastic properties of hammer and pile cushions.
- .2 Hammer:
  - .1 Hammers to be selected on basis of driveability analysis using wave equation theory, performed to show that piles can be driven to levels indicated.
  - .2 Driveability analysis to include, but not be limited to, following: hammer, cushion, and cap block details; static soil parameters; quake and damping factors, total soil resistance, blow count, pile stresses and energy throughput at representative penetrations.
  - .3 When required criteria can not be achieved with the proposed hammer, use larger hammer and take other measures as required.

## **Part 3 Execution**

### **3.1 PREPARATION**

- .1 Protection:
  - .1 Protect adjacent structures, services and work of other sections from hazards due to pile driving operations.
  - .2 Arrange sequencing of pile driving operations and methods to avoid damages to adjacent existing structures.
  - .3 When damages occur, remedy damaged items to restore to original or better condition at own expense.
- .2 Ensure that ground conditions at pile locations are adequate to support pile driving operation.
  - .1 Make provision for access and support of piling equipment during performance of Work.
- .3 Drive piles only when excavation has been completed.
- .4 Pre-bore of holes to a depth of 2.0 meters to facilitate pile alignment.

### **3.2 INSTALLATION**

- .1 Leads: construct pile driver leads to provide free movement of hammer.
  - .1 Hold leads in position at top and bottom, with guys, stiff braces, or other means to ensure support to pile while being driven.
  - .2 Length: provide sufficient length of leads to ensure that use of follower is unnecessary.
- .2 Followers:

- .1 Provide followers of such size, shape, length and mass to permit driving pile in desired location to required depth and resistance.
- .3 Timber Piles are designed based on factored shaft friction resistance. Factored load capacity of pile is as indicated on the drawings.
- .4 Installation of each pile will be subject to review of Consultant.
  - .1 Consultant will be sole judge of acceptability of each pile with respect to final driving resistance, depth of penetration or other criteria used to determine load capacity.
  - .2 Consultant to review final driving of all piles prior to removal of pile driving rig from site.

### **3.3 APPLICATION / DRIVING**

- .1 Use driving caps and cushions to protect piles.
  - .1 Piles with damaged heads as determined by Consultant will be rejected.
- .2 Hold piles securely and accurately in position while driving.
- .3 Deliver hammer blows along axis of pile.
- .4 Remove loose and displaced material from around piles after completion of driving, and leave clean, solid surfaces to receive foundation concrete.
- .5 Cut off piles neatly and squarely at elevations as indicated.
  - .1 Provide sufficient length above cut-off elevation so that part damaged during driving is cut off.
- .6 Remove cut-off lengths from site on completion of work.
- .7 Do not drive piles within 6 meters of concrete less than 7 days old.

### **3.4 OBSTRUCTIONS**

- .1 Where obstruction is encountered that causes sudden unexpected change in penetration resistance or deviation from specified tolerances, proceed as directed by Consultant.

### **3.5 REPAIR AND RESTORATION**

- .1 Remove rejected pile and replace with new, and if necessary, longer pile.
- .2 No extra compensation will be made for removing and replacing or other work made necessary through rejection of defective piles.

### **3.6 CLEANING**

- .1 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

**END OF SECTION**

**Part 1 General**

**1.1 REFERENCES**

- .1 All references to be the latest edition as of the date indicated on the specifications.
- .2 American Society for Testing and Materials International (ASTM)
  - .1 ASTM A123/A123M, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
- .3 Canadian Standards Association (CSA International)
  - .1 CAN/CSA-G164, Hot Dip Galvanizing of Irregularly Shaped Articles.
  - .2 CAN3-O56, Round Wood Piles (Metric version).
  - .3 CAN/CSA-O80 Series, Wood Preservation.

**1.2 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
  - .1 Submit manufacturer's printed product literature, specifications and datasheet.
  - .2 Submit data on round timber pile treatment including certification by treating plant stating type of preservative solution and pressure process used, net amount of preservative retained and compliance with applicable standards.
- .3 Shop Drawings: Submit shop drawings of pile types and connections (uplift).
- .4 Pile Driving Sequential Layout:
  - .1 Submit layout drawings showing the proposed sequence of driving the piles.
  - .2 On the sequential layout, show each pile identification, its driving sequence number, type, size, length of pile and top of pile elevation.
- .5 Pile Driving Record: Maintain a pile driving record during the pile driving and submit it to the Consultant upon completing of the piling. On the record, indicate for each pile drive, the information specified in Section 1.3.4. and the following: type and rating of driving equipment, overall blow count per foot, number of blows per inch penetration for the last 12 inches, pile tip elevation, top of pile elevations and any unusual conditions encountered during driving.
- .6 Spliced piles: when authorized, submit design details of splice complete with signature and stamp of qualified professional engineer registered or licensed in the Province of Manitoba, Canada.
- .7 Equipment: submit prior to pile installation for review by Consultant, list and details of equipment for use in installation of piles. The adequacy of the equipment and accessories shall remain the responsibility of the Contractor. Should the equipment used by the Contractor prove inadequate to drive the scheduled types of piles in the locations indicated, or should the use rate of accessories show damage to the piles, the Contractor shall replace, or use different types of equipment.
- .8 Quality assurance submittals:

- .1 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.

### **1.3 WASTE MANAGEMENT AND DISPOSAL**

- .1 Place materials defined as hazardous or toxic in designated containers.
- .2 Ensure emptied containers are sealed and stored safely.
- .3 Do not dispose of preservative treated wood through incineration.
- .4 Do not dispose of preservative treated wood with other materials destined for recycling or reuse.
- .5 Dispose of treated wood, end pieces, wood scraps and sawdust at sanitary landfill in accordance with local regulations.
- .6 Dispose of unused wood preservative material at official hazardous material collections site.
- .7 Do not dispose of unused preservative material into sewer system, into streams, lakes, onto ground or in other location where they will pose health or environmental hazard.

## **Part 2 Products**

### **2.1 MATERIALS**

- .1 Round wood piles: Douglas Fir to CAN3-O56, unused, clean peeled, uniformly tapered, one piece from butt to tip, with minimum butt size of 30 cm and tip diameter related to length as indicated in table A-1 of CAN3-O56.
  - .1 Order length of piles to achieve the design lengths indicated on the drawings.
- .2 Pile caps: Reinforced concrete caps as indicated on the drawings.
- .3 Piles one piece, splices not permitted.
- .4 Consultant will be sole judge of quality and dimension of piles.

### **2.2 EQUIPMENT**

- .1 Pile hammer: select and use pile hammer of sufficient weight and energy to suitably install specified pile without damage into soils as identified in the Geotechnical Survey and Utilities Capacity Study prepared by Stantec Architecture Ltd. dated February 26, 2013.

### **2.3 PRESERVATIVE TREATMENT**

- .1 Preservative Treatment: to CSA-O80 Series.

### **2.4 ACCESSORIES**

- .1 Hot dip galvanize bolts, nuts and washers and unless otherwise specified, staples, cable clamps, pipe sleeves, spikes and nails: to CAN/CSA-G164.
  - .1 Other hardware to be galvanized to ASTM A123/A123M.

**Part 3            Execution**

**3.1                MANUFACTURER'S INSTRUCTIONS**

- .1        Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheets.

**3.2                PROTECTION**

- .1        Avoid dropping, bruising or breaking of wood fibres.
- .2        Avoid breaking surfaces of treated piles.
- .3        Do not damage surfaces of treated piles below cutoff elevation.
- .4        Treat cuts, breaks or abrasions on surfaces of treated piles, bolt holes and field cuts in accordance with CSA-O80 Series.

**3.3                WOOD PRESERVATION**

- .1        Treat wood piles with wood preservative treatment in accordance with CAS-O80 Series.

**3.4                INSTALLATION**

- .1        Install piles in accordance with Section 31 61 13 - Pile Foundations, General Requirements.
- .2        Restrain lateral movement of piling, during driving at intervals not exceeding 6 m over length between ground surface and driving head.
- .3        Pile heave for piles within 5 pile diameters should be monitored and re-driven where pile heave occurs.
- .4        Treat exposed ends of cut off piles in accordance with CSA-O80 Series.
- .5        Protection: treat end cut-offs and bolt holes with preservative.
- .6        Replace any pile that is damaged during driving.

**3.5                APPLICATION / DRIVING**

- .1        Place cap and cushion block combination capable of protecting pile head between top of pile and ram to prevent impact damage to pile.
- .2        Replace block if it is damaged, split, highly compressed, charred or burned or has become spongy or deteriorated, with a new block.
- .3        Block helmet: uniformly transmit energy to pile and minimum loss of energy.
- .4        Drive friction piles to the required penetration as indicated on the drawings.

**3.6                PRE-BORING**

- .1        Pre-bore to a depth of 2 meters to enhance pile alignment and reduce vibrations.

### **3.7 TOLERANCES IN DRIVING**

- .1 Variation of not more than 6 mm per 300 mm of pile length from vertical for plumb piles permitted, but not more than 150mm overall.
- .2 Center of butts: within 50 mm of location indicated.
- .3 Manipulation of piles: not be permitted.
- .4 In addition to complying with stated tolerances, clear distance between pile heads and pile cap edges minimum of 125 mm.
- .5 Provide additional reinforcement and concrete to maintain required minimum clear distance with prior approval of Consultant.
- .6 Redesign of pile caps or additional work required due to improper location of piles is responsibility of Contractor as reviewed by Consultant.
- .7 Redrive heaved piles to required tip elevation.
- .8 Remove and replace damage piles, mislocated piles, driven out of alignment piles and provide additional piles, driven as directed.

### **3.8 CLEANING**

- .1 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

**END OF SECTION**