Part 1 General

1.1 SUMMARY

.1 Section Includes:

.1 Materials, applications, installation and verification for excavating, trenching and backfilling.

1.2 REFERENCES

.1 City of Winnipeg (CW)

.1 CW2030 – Excavation, Bedding and Backfill
.2 CW3110 – Sub-Grade, Sub-Base, and Base Course Construction
.3 CW3170 – Earthwork and Grading
.4 CW3230 – Full-Depth Patching of Existing Slabs and Joints

.2 American Society for Testing and Materials International (ASTM)

.1 ASTM C117, Standard Test Method for Material Finer Than 0.075 mm (No.200) Sieve in Mineral Aggregates by Washing.
.2 ASTM C136, 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, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort.
.5 ASTM D1557, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort.
.6 ASTM D4318, Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.

.3 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-8.1, Sieves, Testing, Woven Wire, Inch Series.
.2 CAN/CGSB-8.2, Sieves, Testing, Woven Wire, Metric.

.4 Canadian Standards Association (CSA International)

.1 CAN/CSA-A3000, Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).
.1 CSA-A3001, Cementitious Materials for Use in Concrete.
.2 CAN/CSA-A23.1/A23.2, Concrete Materials and Methods of Concrete Construction/Methods of Test for Concrete.

1.3 DEFINITIONS

.1 Rock: any solid material in excess of 1 m^3 and which cannot be removed by means of heavy duty mechanical excavating equipment with 0.95 to 1.15 m^3 bucket. Frozen material not classified as rock.

.2 Common excavation: excavation of materials of whatever nature, which are not included under definitions of rock excavation.

.3 Unclassified excavation: excavation of deposits of whatever character encountered in Work.

.4 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 mm in any dimension.

.5 Waste material: excavated material unsuitable for use in Work or surplus to requirements.

.6 Borrow material: material obtained from locations outside area to be graded, and required for construction of fill areas or for other portions of Work.

.7 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 D4318, and gradation within limits specified when tested to ASTM D422 and ASTM C136.

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

.8 Sub-grade – the natural in-situ material.

.9 Sub-base – where required, the layer of material provided between the sub-grade and the base course.

.10 Base course – the layer of material immediately underlying the pavement

1.4 SUBMITTALS

.1 Submit shoring design and excavation plans to the Contract Administrator for review at least two (2) weeks prior to commencement of the work. The design drawings shall be sealed by a Professional Engineer registered in the Province of Manitoba, Canada. Also include the design firm's Certificate of Authorization stamp on all documents. The shop drawings shall outline all intermediate steps that may be required to construct the shoring system.

Part 2 Products

2.1 MATERIALS

.1 Sub-Base Materials

.1 Sub-base material of the type(s) shown on the Drawings or indicated in the Specifications will be supplied in accordance with the following requirements:

.2 Suitable site sub-base material will be of a type approved by the Contract Administrator.

.3 Clay borrow sub-base material will be of a type approved by the Contract Administrator.

.4 Crushed sub-base material will be crushed aggregate, crushed limestone or crushed concrete pavement.

.5 Crushed sub-base material will be well-graded and conform to City of Winnipeg CW3110.

.2 Base Course Materials

.1 Base course material will be approved by the Contract Administrator.

.2 Base course material will consist of sound, hard, crushed rock or crushed gravel and will be free from organic or soft material that would disintegrate through decay or weathering.

.3 The base course material will be well graded and conform to City of Winnipeg CW3110.

.3 Imported Fill Material

.1 Imported fill material will consist of low to medium plastic clays or mixtures of sand and clay, uniform in texture.

.2 The fill material shall be free of wood, vegetation, concrete rubble or stones larger than 25 mm in diameter.

.4 Backfill Materials

.1 Backfill materials of the type(s) shown on the Drawings or indicated in the Specifications will be supplied in accordance with the following requirements:

.2 Suitable backfill material will be of a type approved by the Contract Administrator.

.3 Backfill material will be graded in accordance with City of Winnipeg CW2030.

Part 3 Execution

3.1 SITE PREPARATION

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

3.2 EXCAVATION

.1 Excavate in-situ material to the depth to accommodate the structure as shown on the Drawings or as directed by the Contract Administrator.

.2 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 Dispose of surplus suitable site material and unsuitable material such as frost heaving clays, silts, rocks and rubble.

.4 Backfill and compact over-excavated areas with material approved by the Contract Administrator.

3.3 PREPARATION OF SUB-GRADE AND PLACEMENT OF SUB-BASE

.1 Compact the sub-grade after the bottom of the excavation has been approved by the Contract Administrator.

.2 Compact areas of suitable sub-grade material, the full width of the excavation, to a minimum of 95% Standard Proctor Density.

.3 Place and compact suitable site sub-base material before placing any new sub-base material, as directed by the Contract Administrator.

.4 Place and compact sub-base materials in layers to a depth of 3 times the maximum aggregate size or as directed by the Contract Administrator. Compact to a minimum of 100% Standard Proctor Density, for the full width of the excavation, and each layer must be levelled and approved by the Contract Administrator before the succeeding layer may be placed.

.5 Recompact or replace any layer, which has been rejected as directed by the Contract Administrator.

.6 When excess water has been applied, either by sprinkling operations or by precipitation, to cause local or continuous pondage, soil compaction will not be permitted until sufficient soil drying has occurred, creating a condition lending itself favourably to compacting operations. Exercise necessary precautions to protect compacted areas against excess wetting from any natural or artificial sources of water application.

.7 Should excess moisture from continuous or heavy precipitation threaten to unduly delay the completion of the Contract. Apply in writing to the Contract Administrator requesting permission to use Lime or Portland Cement to dry out the clay sub-grade or sub-base material at specific location(s).

3.4 PLACEMENT OF IMPORTED FILL

.1 Place fill materials to satisfy the grading requirements of boulevard and ditches.

.2 Supply material in accordance with Section 2.5 of this specification.

.3 Compact to a minimum of 90% Standard Proctor Density.

3.5 GRADING

.1 Grading of areas to receive sod will be understood to mean the required excavation or backfilling to a depth up to 150 mm so that the areas medians, after compaction, are at a uniform depth of 100 mm below finished grade shown on the Drawings.

.2 Grade the areas to receive sod, unless otherwise shown on the Drawings or as directed by the Contractor Administrator.

.3 Supply backfill material in accordance with Section 2.1 of this specification.

.4 Compact backfill materials to a minimum of 95% Standard Proctor Density.

3.6 QUALITY OF SUB-GRADE, SUB-BASE, AND BASE COURSE LAYERS

.1 Determine the Standard Proctor Density for the sub-grade, sub-base and base course materials at the optimum moisture content in accordance with ASTM Standard D698. The field density of each sub-grade, sub-base and base course layers will be a percentage of the applicable Standard Proctor Density, in accordance with in Sections 3.3, 3.4 and 3.5 of this specification.

.2 Utilize quality control tests to determine the acceptability of the sub-grade, sub-base and base course layers, as placed and compacted before the succeeding layer may be applied.

.3 Verify the field density of the compacted layers 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).

.4 The frequency and number of tests will be as directed by the Contract Administrator.

.5 Fill promptly, holes made by the removal of samples from the layers with appropriate material and thoroughly compact so as to conform in every way with the adjoining material.

3.7 BACKFILLING

.1 Vibratory compaction equipment is required.

.2 Do not proceed with backfilling operations until completion of following:

.1 The Contract Administrator approved installations construction below finished grade.

.2 Inspection, testing, approval, and recording location of underground utilities.

.3 Removal of concrete formwork.

.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. Compact each layer before placing the succeeding layer.

.6 Backfilling around installations.

.1 Place bedding and surround material as specified elsewhere.

.2 Do not backfill around or over cast-in-place concrete within 48 hours after placing of concrete.

.3 Place layers simultaneously on both sides of installed Work to equalize loading. Difference not to exceed 150 mm.

.7 Install drainage system in backfill as directed by The Contract Administrator.

3.8 RESTORATION

.1 Prior to construction, inspect the grassed, pavement and gravel surfaces within and adjacent to the Site with the Contract Administrator to record the current condition. After construction and site cleanup is complete, re-inspect the condition with the Contract Administrator.

.2 Restoration of grassed areas removed or damaged as result of construction activities will be restored in accordance with CW 3510. Restoration of grassed areas will not be measured for payment and shall be included as part of the Work being done.

END OF SECTION