1.0 GENERAL

1.1 Related Work Specified Elsewhere

.1	Perforated Subdrains Pipes	Section 02636
.2	Geosynthetics for Roadways	Section 02706
.3	Granular Base Course	Section 02721
.4	Adjustment of Appurtenances	Section 02840

1.2 Site Conditions

.1 Subsurface investigation is the responsibility of the Contractor.

.2 Underground and surface utility lines and buried objects are known to exist on the job site. The Contractor shall contact applicable utility companies for more precise information prior to commencement of work.

1.3 Protection

.1 Prevent damage to fencing, trees, landscaping, natural features, bench marks, existing buildings, existing pavement, surface or underground utility lines which are to remain. Make good any damage.

1.4 Scope

.1 Items of work covered by this Specification are those pertaining to excavation, filling, hauling, compaction and other associated work required to construct the subgrade to the required cross sections and grades.

1.5 Definitions

.1 Roadway common excavation is defined as the excavation of all material including rock and shall include over-burden, hard pan, quicksand, frozen earth and boulders.

.2 Topsoil is defined as organic material and is to be removed and placed on the designated topsoil disposal stockpile.

1.6 Measurement and Payment

.1 Common excavation will be paid for at the unit bid price per cubic metre which shall be full payment for excavation of all material except rock. Payment for common excavation shall be considered full payment for excavation, hauling, stockpiling topsoil, excavation of unsuitable subgrade, watering and dewatering, embankment placement, and compaction to specified density, disposal of excess material to waste, regravelling of adjacent structures disturbed by construction, disposal of all boulders not

allowed as backfill, maintaining the subgrade to specification until completion of the work and all other work required for which separate payment is not indicated in the bid form. The quantity shall be the volume measured in its original place determined by cross-sections taken before and after excavation and computed by the Average End Area Method. Excavation beyond the limits established by the Engineer or required on the drawings will not be paid for. Payment will be made on the basis of excavated volumes and no extra payment will be made for earth placed in fills or embankment.

.2 Subgrade preparation will be measured for payment by the square metre of the finished subgrade, completed to the dimensions indicated on the typical road cross-section details and to a depth of 150 mm. Payment shall be full compensation for shaping, scarifying, mixing, windrowing, watering, aerating/drying and compaction to 98% Standard Proctor Density.

.3 Imported granular material when ordered by the Engineer, will be measured in cubic metres of material in place after compaction. Payment shall be full compensation for supply, hauling, watering, aerating/drying, placing and compacting the material to 98% Standard Proctor Density.

.4 Refer to section 02706 for Geosynthetics for Roadways.

.5 Refer to section 02636 for Perorated Subdrain Pipes.

2.0 PRODUCTS

2.1 Imported Granular Fill (Pit-Run)

.1 Material for the imported granular material shall consist of sound, hard, durable, uniformly graded crushed gravel and shall not contain organic or soft materials, materials that break up when alternately frozen and thawed or wetted and dried, or other deleterious materials.

.2 Imported granular fill shall be placed in 150 mm lifts. Each lift shall be compacted to 98% of Standard Proctor Density, using mechanical compaction equipment.

2.2 Road Geotextile Filter Fabric

.1 Refer to section 02706 Geosynthetics for Roadways.

2.3 Weeping Tile

.1 Refer to section 02636 Perforated Subdrain Pipes.

3.0 EXECUTION

3.1 Unstable Subgrade

.1 Where the subgrade is unstable, or where it contains materials such as ashes, cinders, refuse, vegetable or organic material, the Contractor shall excavate such material to the width, depth and length designated by the Engineer and dispose of the material as required. The subgrade shall then be made by backfilling with approved native material or imported granular material as required by the Engineer. Material shall be placed in successive layers not exceeding 150 mm in depth and compacted to a minimum of 98% Standard Proctor Density.

3.2 Subgrade Preparation

.1 The subgrade shall be scarified and compacted to a minimum of 98% Standard Proctor Density at optimum moisture content, over the full width of the cross-section. The material shall be worked to ensure as much uniformity as possible in material.

.2 All topsoil encountered during this operation shall be removed and replaced with suitable clay material excavated elsewhere on the project. The subgrade moisture content shall be maintained to the required specifications until completion of the project.

Light blading of the subgrade will be required during the compaction process to assure that any distortion of the roadway is corrected.

Soft spots or areas of subgrade failure due to unsuitable material which appear during the rolling shall be excavated as required by the Engineer and backfilled with suitable native material or imported granular fill when directed by the Engineer. Backfill material shall be compacted into place. It shall be the Contractor's responsibility to co-ordinate the overall excavation and subgrade preparation, so that suitable native material can be placed in the subcut areas directly from cuts elsewhere on the project. Payment for removal of unsuitable material will be made as common excavation. Payment for replacement and compaction of native material used to replace unstable subgrade will be paid for at the Unit Price tendered for common excavation.

.3 Water shall be added or the material shall be aerated to bring the moisture content to optimum value. The supply of water shall be the responsibility of the Contractor.

.4 Upon completion of subgrade preparation, the Contractor shall protect it against all damage.

3.3 Geotextile Installation

.1 Refer to section 02706 Geosynthetics for Roadways.

3.4 Weeping Tile Installation

.1 Refer to section 02636 Perforated Subdrain Pipes.

3.5 Compaction

.1 The top 150 mm of the subgrade shall be scarified and compacted to a minimum of 98% Standard Proctor Density at optimum moisture content, over the full width of the roadway cross-section. The material shall be worked to ensure as much uniformity as possible in material.

.2 Field tests for density and moisture content shall be taken by the Engineer or his representative. The cost of this testing shall be as per Section 01450, Clause 1.1.1. Non-conformity with the specified density or moisture content shall constitute sufficient grounds for rejection of the work.

.3 Final compaction of the subgrade surface shall be done with pneumatic tire rollers. Rolling shall be continued until all loose soil is properly compacted true to design elevations but not uniformly high or low.

.4 Trench backfill encountered in the preparation of the subgrade which has not been compacted sufficiently, shall be excavated and recompacted. The cost of this item shall be included in the unit price tendered for subgrade preparation.

.5 The Contractor shall be responsible for any repair required to roadworks arising from the subsidence of trenches after the completion of the maintenance period of the underground services contractor(s).

.6 Inaccessible areas by large compaction equipment shall be compacted by mechanical hand tampers.

3.6 Testing Compaction

.1 Compaction results shall be based on a minimum of one density test per 500 square metres of road. Additional tests may be called for by the Engineer as deemed necessary.

.2 Field density tests shall conform to ASTM D1556, ASTM D2167, or ASTM D2922 for comparison with a maximum density determined according to ASTM D698 Method A.

3.7 Tolerances

.1 The finished surface of the subgrade shall conform to grades approved by the Engineer, and shall show no depression more than 15 mm under a straightedge 3.0 m long when placed parallel to the centreline. Subgrade higher than the approved grades shall be cut to the required grades.

.2 The tolerance for ditches, boulevards, etc., shall be $\pm$ 30 mm.

3.8 Inspection

.1 Before acceptance by the Engineer and prior to application of the subsequent layer of roadway materials, the subgrade surface shall be true to cross-section and grade, and shall conform to the density and bearing ratio requirements specified.

.2 The Contractor shall supply a truck loaded to 8,200 kilograms axle load (4.5 kilograms per millimeter of tread width) for subgrade axle test. This test will be undertaken when compaction of the subgrade has been completed, and shall be carried out under the direction and in the presence of the Engineer. It will be used as a supplement to density tests for determining performance of the Contract. No separate payment shall be made for this work.

.3 Any rutting or deflection points noted during the axle test shall be repaired by the Contractor and at the Contractor's expense. Following repairs, the axle test shall be repeated.

3.9 Protection of New and Existing Curb, Gutter and Sidewalks and Asphalt

.1 The Contractor shall protect the new and existing curb, gutter and sidewalks and asphalt from damage caused by his operations. Any damage by the Contractor's operations shall be replaced at his own expense.

END OF SECTION