1.0 GENERAL

1.1 Scope

The work shall consist of constructing embankments or miscellaneous backfills with excavated materials to the grades and cross-sections shown on the Plans or as designated by the Engineer.

1.2 Related Sections

1.2.1 Section 02110 – Excavation

1.2.2 Section 02130 – Subgrade Preparation

2.0 PRODUCTS

2.1 In-situ material may be used for compacted fill where approved by the Engineer. Large roots, stumps, boulders larger than 100 mm in maximum dimension, clumps of frozen ice, snow or earth, debris, and other deleterious materials that would prevent compaction shall not be permitted.

2.2 Coarse gravel is clean angular material required for stabilization for subgrade areas due to over excavation of unsuitable trench bottom conditions.

2.3 Topsoil is humus, peat or other material containing organics, which make up the top layer of the soil.

3.0 EXECUTION

3.1 Construction

3.1.1 Embankments shall be constructed with side slopes as shown on the plans or specified by the Engineer.

3.1.2 When directed or as indicated on the plans, scarify to 150 mm depth or bench existing slopes in side hill or sloping sections to ensure a proper bond between new materials and existing surfaces. Obtain prior approval of method to be used.

3.1.3 The material shall be placed in compacted layers of uniform 150 mm thickness. The layers shall be carried up full width from the bottom of the fill to avoid the widening of the edges after final grade has been reached. Each layer shall be spread and bladed evenly by means of a blade grader or other approved equipment so that rollers used for compaction will bear evenly at all times.

3.1.4 The compaction equipment may be of any type, provided it is capable of compacting each lift of the material to the specified density. The Engineer reserves the right to request any particular piece of equipment be removed

from the work if it is not capable of compacting the material to the required density in a reasonable time. Hauling equipment over fill will not be accepted in lieu of compaction equipment.

3.1.5 Subgrade areas, encountered in the construction of the embankment which are not sufficiently stable to properly support the embankment and any additional loading or traffic requirements, shall be scarified and re-compacted or removed as required by the Engineer. Where directed by the Engineer unsuitable material shall be removed and replaced with approved material at a cost to the contractor.

3.1.6 All subgrade and embankment fill materials shall be compacted in layers not exceeding 150 mm.

3.1.7 Each lift layer shall be compacted to a minimum of ninety-eight percent (98%) of the maximum standard proctor dry density as determined by ASTM D698 latest edition.

3.1.8 Each lift shall be brought to within the limits of plus or minus three percent (± 3%) of optimum moisture content. Water shall be added and thoroughly mixed if required for proper compaction. If the soil contains excess moisture, it shall be aerated until the moisture content has been reduced to within the limits stated above.

3.1.9 Measurement of the field density and moisture content shall be in accordance with ASTM D6938 latest edition for determination of Density and Moisture content of soil in place by Nuclear Methods.

3.1.10 Field density and moisture content tests will be made by the Engineer to ensure that the material is being compacted to the moisture content and density specified.

3.1.11 All soft, spongy or yielding spots and all organic or other deleterious material shall be entirely removed and the area re-compacted with approved material. Proof roll the subgrade with available construction equipment or optional vehicle as approved by the Engineer. Proof rolling shall be done to the satisfaction of the Engineer.

3.1.12 Where final trimming of surface is required – blade grader shall be used to grade the surface to within plus or minus 25 mm (± 25 mm)

3.1.13 Where topsoil is specified elsewhere, it shall be placed and spread by means of a blade grader or approved equipment to a depth shown on the plans or as directed by the Engineer.

4.0 Materials Testing Requirements for Quality Control

4.1 Determination of Standard Proctor Density of each material shall be completed in accordance with ASTM D698- Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort and ASTM D2216 - Standard Test Method for Laboratory Determination of Water (moisture) Content of Soil and Rock by Mass.

4.2 Field density will be tested using one or more of the following methods as deemed appropriate by the testing agency:

.1 ASTM D6938-Standard Test Methods for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods.

.2 ASTM D2167 Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method.

.3 ASTM D1556 Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method.

4.3 Perform a minimum of one test per 1000 m2 per 150mm compacted lift, and at least daily during Compaction. Testing locations to be selected by the testing agency under the direction of the Engineer.