

1.0 GENERAL

1.1 Scope

- 1.1.1 The work shall consist of the shaping, watering drying, or mixing and compacting existing subgrade or fill material to obtain the grades, lines and cross-sections as shown on the Plans or as designated by the Engineer.

1.2 Related Sections

- 1.2.1 Section 02110 - Excavation
- 1.2.2 Section 02120 – Embankments
- 1.2.3 Section 02150 – Lime Modified Subgrade
- 1.2.4 Section 02155 - Geotextiles
- 1.2.5 Section 02210 – Subdrainage Sand
- 1.2.6 Section 02220 - Subbase

2.0 PRODUCTS

None in this Section

3.0 EXECUTION

3.1 Excavation and Shaping of Subgrade for Urban Cross Sections.

- 3.2.1 The intent of this specification to provide a subgrade which, as close as possible, matches the natural moisture and density conditions found in the area, and that the subgrade be true to line and grade prior to placement of sub-drainage sand.

3.1.1 The Contractor shall not excavate to final subgrade level unless perforated drainage pipe and sub-drainage sand are to be placed on the subgrade within 24 hours. Otherwise the subgrade shall be left a minimum of 100 mm high of final grade until the placement of sub-drainage sand can follow.

3.1.2 Shaping tolerances for the completed subgrade surface shall be ± 20 mm vertically and 100 mm horizontally. The average level of the finished grade shall neither be consistently high or low from the designed grade.

3.2 Placement of Sub-drainage Sand (or Subbase) for Urban Cross Sections

- 3.2.2 The placement of sub-drainage sand will be carried out in a manner such that hauling and placing operations do not deform the subgrade or over compact the surface along defined routes, resulting in non-uniform density. In general the hauling operation should be carried out in such a manner that traffic on the subgrade is limited to unloaded vehicles.

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- 3.2.3 Ideally the placement would involve a dump and doze operation from a working pad of sub-drainage sand and sub-base, with no equipment travelling across the prepared subgrade. The contractor shall place the sub-base in a manner such that rutting of the in place sub-drainage sand does not occur.
 - 3.2.4 The Contractor will be required to reinstate the subgrade to proper line and grade should the hauling or placing operations deform or rut the subgrade.
 - 3.2.5 If the Contractor's operations results in a continual problem of deformation of the subgrade the Engineer may direct that either, full subgrade preparation and compaction be undertaken, or that the placement be undertaken in a manner that will not deform or over compact the subgrade.
- 3.3 Subgrade Preparation for Rural Cross Sections
- 3.3.1 For new urban cross sections where drainage sand is to follow, the following is not typically performed. Unless otherwise specified, the following shall apply to all new rural cross sections where excavation and embankment is constructed.
 - 3.3.2 Where directed by the Engineer, unsuitable material shall be removed to the extent determined by the Engineer and replaced with suitable material in accordance with Section 2120 for Embankments.
 - 3.3.3 If specified by the Engineer, lime modified subgrade may be used to provide additional support in accordance with Section 2150 for Lime Modified Subgrade. The use of lime will not be permitted in urban areas or adjacent to urban areas.
 - 3.3.4 In embankment areas, the subgrade shall be compacted to a depth of at least 150 mm, to a minimum of 98% of the Standard Proctor Dry Density at +/- 3% of the optimum moisture content.
 - 3.3.5 In areas of cut, the subgrade shall be sub-cut to a depth of 600 mm and re-compacted to a minimum of 98% of the Standard Proctor Dry Density at +/- 3% of the optimum moisture content.
 - 3.3.6 The completed, compacted, subgrade surface shall not vary more than 20 mm from the design grades and 100 mm horizontally.
 - 3.3.7 If specified, place geotextile on the prepared subgrade surface as indicated on the drawings and in Section 02155 for Geotextiles

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.