2.8 IMPROVED SUBGRADE

2.8.1 Description

This work shall consist of furnishing, placing and compacting improved subgrade material on a prepared and accepted subgrade in accordance with these Specifications, and to the lines, levels, grades, dimensions and cross sections shown on the Drawings, or as required by the Engineer.

2.8.2 Materials

Material shall be a natural or artificial mixture of sand or other mineral aggregate, free from vegetable matter, soft particles and excess clay.

a) Grading. The grading shall conform to one of the grading envelopes A to C in Table 2.8-1.

Table 2.8-1

<table>
<thead>
<tr>
<th>Nominal fineness modulus</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.8</td>
<td>1.5</td>
<td>-</td>
<td>1.0 - 1.5</td>
<td>0.8 - 1.0</td>
<td>0.5 - 0.8</td>
</tr>
</tbody>
</table>

Gradings outside the above limits may in certain circumstances be approved by the Engineer. Such permission shall be in writing.

b) Plasticity. The portion passing the 0.425 mm sieve shall, if it is plastic, have a liquid limit not greater than 30% and a plasticity index not greater than 9% (STP 3.2).

c) CBR. The material shall have a soaked CBR value not less than 8% when compacted to 95% of maximum dry density as determined by STP 4.5 (Vibrating Hammer compaction).

d) The material shall be free draining.
2.8.3 Construction Methods

2.8.3.1 Preparation of Subgrade

The subgrade shall be shaped and compacted in conformity with the provisions of Section 2.7 and completed along with all subgrade drainage ahead of the placing of the improved subgrade material. Notwithstanding any earlier approval of subgrade, any damage to or deterioration of subgrade shall be made good before the improved subgrade is laid.

Preparation of the subgrade shall be carried out, unless otherwise agreed by the Engineer, immediately prior to laying the improved subgrade.

2.8.3.2 Spreading

Improved subgrade shall be spread in layers, with uncompacted thickness up to 200 mm, subject to the approval of the Engineer, and the layers shall be as nearly equal in thickness as possible.

Where the material for shoulders is the same as that used for the improved subgrade course, the material shall be placed for the full width of the roadbed and the shoulders simultaneously.

Where the shoulders are not of the same material as the improved subgrade course, then the improved subgrade shall be spread to give the required compacted depth and the edge detail shown on the Drawings.

When the improved subgrade course is spread contiguous to concrete kerbs or gutters, extreme care shall be exercised not to damage the kerbs or gutters. Any damage of kerbs or gutters resulting from carelessness or negligent construction methods by the Contractor shall warrant the removal and replacement of said kerbs or gutters at the Contractor’s sole expense.

2.8.3.3 Sprinkling, Rolling and Compacting

Each layer shall be compacted to at least 95% of the maximum dry density as determined by STP 4.5 (Vibrating Hammer). 3 No. in situ density tests in accordance with STP 6.2 shall be taken from each 1,000 square metres of compacted improved subgrade, or as directed by the Engineer. If the achieved density is less than the minimum required, the Contractor shall carry out further compaction.

When commencing work on the improved subgrade the Contractor shall carry out a field compaction trial to determine the optimum moisture content and the required number of passes of his particular compaction equipment to comply with the Specification. This method will be approved by the Engineer and shall be used for all subsequent compaction of improved subgrade material. Such agreement will not however relieve the Contractor of his responsibility and in the event that test results later show that the specified compaction is not being achieved all improved subgrade work shall cease and not be resumed until a fresh trial has been undertaken and a revised compaction method approved by the Engineer.

In order to ensure uniform bearing capacity at the finished improved subgrade level, CBR tests shall be carried out as directed by the Engineer. The CBR shall be such that the laboratory value obtained in accordance with STP 5.1, at the specified compaction and after 4 days soaking, shall exceed 8%. In areas where these requirements are not met, correction shall be made by such measures as the Engineer deems necessary.
Immediately after each layer has been spread and shaped satisfactorily, each layer shall be thoroughly compacted with suitable and adequate compaction equipment approved by the Engineer. Rolling operations shall begin from the outer edge of roadbed toward the centre, gradually in a longitudinal direction; except on super-elevated curves, where rolling shall begin at the low side and progress towards the high side.

Improved subgrade material which does not contain sufficient moisture to be compacted in accordance with the requirements of this Section shall be watered by methods approved by the Engineer at the Contractor’s own expense. Improved subgrade material containing excess moisture shall be dried prior to or during compaction by methods approved by the Engineer, at the expense of the Contractor.

The finished improved subgrade shall follow the required grades and cross sections and at any point shall not vary more than 20 mm above or below the specified level. The thickness of the finished improved subgrade shall be:

- not thinner than 20 mm less than the required thickness at any point
- overall not less than the required thickness when five thickness measurements are averaged in any 100 metres of road.

Improved subgrade which does not conform to the above requirements shall be reworked, watered and thoroughly re-compacted to conform.

2.8.4 Measurement

Improved subgrade as described in this section shall be measured by the cubic metres of material compacted in place and accepted. Measurement shall be based on the average width and thickness of the improved subgrade shown on the Drawings and actual length measured horizontally along the centreline of the surface of the road.

2.8.5 Payment

This work measured as provided above shall be paid for at the Contract unit rate per cubic metre for improved subgrade. The payment shall be full compensation for furnishing all materials, hauling, placing, compacting, sprinkling, finishing and shaping, and for all labour, equipment, tools and other incidentals necessary to complete the work specified.

Pay item shall be:

2/8/1 Improved Subgrade Cubic Metre