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| **Annexure MRTS100.1 (March 2023)** |
| **High Strength Geosynthetic Reinforcement in Road Embankment** |
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| **Specific Contract Requirements** |
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| **Contract Number**  |  |
|  |
| Note: | Clause references within brackets in this Annexure refer to Clauses in the parent Technical Specification MRTS100 unless otherwise noted. |

**Design Strength Requirement of Geosynthetic Reinforcement**

**Applications:**

# **Basal reinforcement beneath embankments (with or without vertical drains) (Clause 6.1.3, 6.3 & 6.4)**

Table 1 – Design Strength Requirement in Transverse Direction to Embankment

|  |  |  |  |
| --- | --- | --- | --- |
| Location | Design Strength Requirement¹ (kN/m)(Short‑term²) | Short Term1 duration²(years) | Maximum allowance strain³ (%) |
| **ULS** | **SLS** |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
| Notes:¹ Design strength requirement of the geosynthetic in transverse direction to embankment (that is, in the direction across the width of the embankment). The design strength shall be multiplied by the reduction factors (for creep-strain (SLS) / Creep-rupture (ULS), weathering effects, installation damage, environmental effects, and extrapolation) in accordance with BS8006-1to get the characteristic initial strength for the selection of geosynthetic reinforcement for the Work.² Short-term refers to the time duration from the commencement of construction to the end of foundation consolidation nominated by the Designer for this application.³ The strain in the basal reinforcement under SLS condition shall be nominated by the Designer. However, the nominated value of strain shall not exceed 5% for embankments constructed over soft cohesive soils and 3% for embankments constructed over soft sensitive soils (according to BS8006, Clause 8.3.2.11) within the short-term duration. |

# **Piles embankments with basal reinforcement (Clause 6.1.3, 6.3 & 6.4)**

Table 2 – Design Strength Requirements in Longitudinal and Transverse Direction to Embankment

|  |  |  |
| --- | --- | --- |
| Location | Design Strength Requirement¹ (kN/m) | Maximum allowable creep strain⁵ (%) |
| Longitudinal Direction² | Transverse Direction² |
| ULS³ | SLS⁴ | ULS³ | SLS⁴ |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
| Notes:¹ Design strength requirement of the geosynthetic in longitudinal and transverse directions to embankment. The design strength shall be multiplied by the reduction factors (for creep-strain (SLS) / Creep-rupture (ULS), weathering effects, installation damage, environmental effects, and extrapolation) in accordance with BS8006-1 to get the characteristic initial strength for the selection of geosynthetic reinforcement for the Work.² Longitudinal direction is referred to the direction along the embankment whereas transverse direction is the direction across the embankment.³ Design strength requirement for initial ULS condition where the initial tensile strain in the reinforcement is limited to 3% or 6%, depending on the height of the embankment (BS8006, Clause 8.3.3.14).⁴ Design strength requirement for SLS condition to limit long-term creep strain to within the specified maximum value. The total long-term strain shall be limited to the initial strain (3% or 6%, depending on the height of the embankment) plus the long-term creep strain (refer Note 5 below). Long-term refers to the design life of the embankment structure (that is, 100 years).⁵ Maximum allowable creep strain over the design life of the embankment structure, which is limited to 2% (BS8006, Clause 8.3.3.14). |

# **Reinforced embankments slopes (batter slope <70º)  (Clause 6.1.3, 6.3 & 6.4)**

Table 3 – Design Strength Requirements in the direction perpendicular to the face of slope

|  |  |  |  |
| --- | --- | --- | --- |
| Location | Design Strength Requirement¹ (kN/m) | Maximum allowable creep strain³ (%) | Design life of reinforced slope⁴ (year) |
| ULS² | SLS² |
|  |  |  |  |  |
|  |  |  |  |  |
| Notes:¹ Design strength of the geosynthetic in the direction perpendicular to the face of slope. The design strength shall be multiplied by the reduction factors (for creep-strain (SLS) / Creep-rupture (ULS), weathering effects, installation damage, environmental effects, and extrapolation) in accordance with BS8006-1 to get the characteristic initial strength for the selection of geosynthetic reinforcement for the Work.² Design strength requirements for ULS and SLS conditions at the end of design life of the reinforced slope.³ The post-construction creep strain should be limited to 3%.⁴ The design length of the reinforced slope shall be specified by the Designer. |

# Other applications**(Clause 6.1.3, 6.3 & 6.4)**

For applications other than the above stated three applications, the Designer is expected to nominate the design strength and allowable strain requirements.