GEOSYNTHETICS AND REINFORCED SOIL STRUCTURES

DESIGN OF EMBANKMENTS

1. On what basis do you decide about designing a steep construction as a slope or as a retaining wall?

2. What are the different problems that may be encountered while constructing embankments on extremely soft clay soils?
   What are the different options that could be considered for construction of road embankments on extremely soft clay soils?

3. A reinforced soil embankment is shown below. Calculate the factor of safety of the slope for the failure mechanism shown in the figure. The weight of the soil mass in the failure wedge is 1500 kN/m. The allowable tensile strength of the reinforcement layer is 150 kN/m. The soil in the embankment is a pure clay with undrained cohesive strength of 65 kPa. What should be the minimum length of the reinforcement layer such that the full tensile strength of the reinforcement is mobilized at failure? Assume the interaction parameter in pullout to be 0.8. The angle at the slip circle centre is 70°. Assume unit weight of soil of 20 kN/m³.

4. It is required to construct a steep slope of 70° of height 7m using granular soil having properties of c=0, φ=35° and γ=20 kN/m³. Uniform surcharge pressure is 35 kPa.
   a. Estimate the total tensile capacity of reinforcement using planar wedge method to achieve a factor of safety of 1.50.
   b. Estimate the same using two-part wedge method (you may use the design charts in the power points). (r_u=0)
   c. Estimate the approximate length of reinforcement in the above two designs. Topmost layer may be assumed at 0.3 m depth.

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The diagram shows a reinforced soil embankment with dimensions and a circular slip surface. The embankment height is 8 m, width at the base is 4.3 m, and the radius of the slip surface is 12.5 m.