Assignment 5

The due date for submitting this assignment has passed.

As you are aware, you have not submitted this assignment.

A reinforced soil retaining wall is constructed of steel strips. The details of the system are as follows:

- Height of the wall = 6 m with horizontal backfill soil.
- Properties of backfill and reinforced soil are $E = 29,000$ kPa, $v = 0.45$, $y = 225$ kN/m$^3$.

The steel strips are driven into the soil and locked in. The end strength of the strip is 435 kN/m. The stress-strain relationship is 0.4% loss. Assume that the stress is distributed over the cross-section of the strip.

The steel strips are placed at horizontal spacing of 0.5 m. There are 100 m of reinforcement strip at the following depths: the surface (0.5 m), 1.0 m, 1.5 m, 2.0 m, 2.5 m, 3.0 m, 3.5 m, 4.0 m, 4.5 m, 5.0 m, 5.5 m, and 6.0 m.

Assume the width of the wall increases linearly from 0.5 m to 6.0 m. The total width is 1.0 m. A concrete abutment is supported on the wall with a bearing width of 0.3 m, placed 2.5 m from the top of the wall. The reinforcement in the footing is 2.50% (0.025) (slab) reinforcing bars spaced 40 mm apart.

A shrinkage calculation, assume that the shrinkage ends on the outer surface and reduce the shrinkage bridge abutment load. The reduced bridge abutment load is 350 kN (300 kN for the reinforced strip) and 450 kN for the reinforced strip.

Answer the following questions:

1. What is the cross-sectional area of the steel strip at the end of design? 1 point

2. What is the vertical pressure due to bridge abutment load at a depth of 1.75 m? 1 point

3. What is the vertical pressure due to bridge abutment load at a depth of 3.0 m? 1 point

4. What is the maximum length of the reinforced soil block to achieve a factor of safety of 1.5 against lateral sliding? 1 point

5. What is the maximum height of the reinforced soil block required to reduce the bearing pressure to 0.9 kPa? 1 point

6. What is the lateral earth pressure coefficient for internal stability calculations at a depth of 0.5 m from the surface per AS 3600-2009? 1 point

7. What is the total force in the reinforcement at the due to the horizontal load of 40 kN/m? 1 point

8. What is the total force developed in the reinforcement at the due to the horizontal load of 60 kN/m? 1 point

9. What is the total force applied for the reinforcement at depth of 0.5 m? 1 point

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