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Static calculation of a 3.5m high Ecobag filled with liquid

This document presents the forces which are applied on the embankment of a 3.5m high Ecobag by the stored liquid.
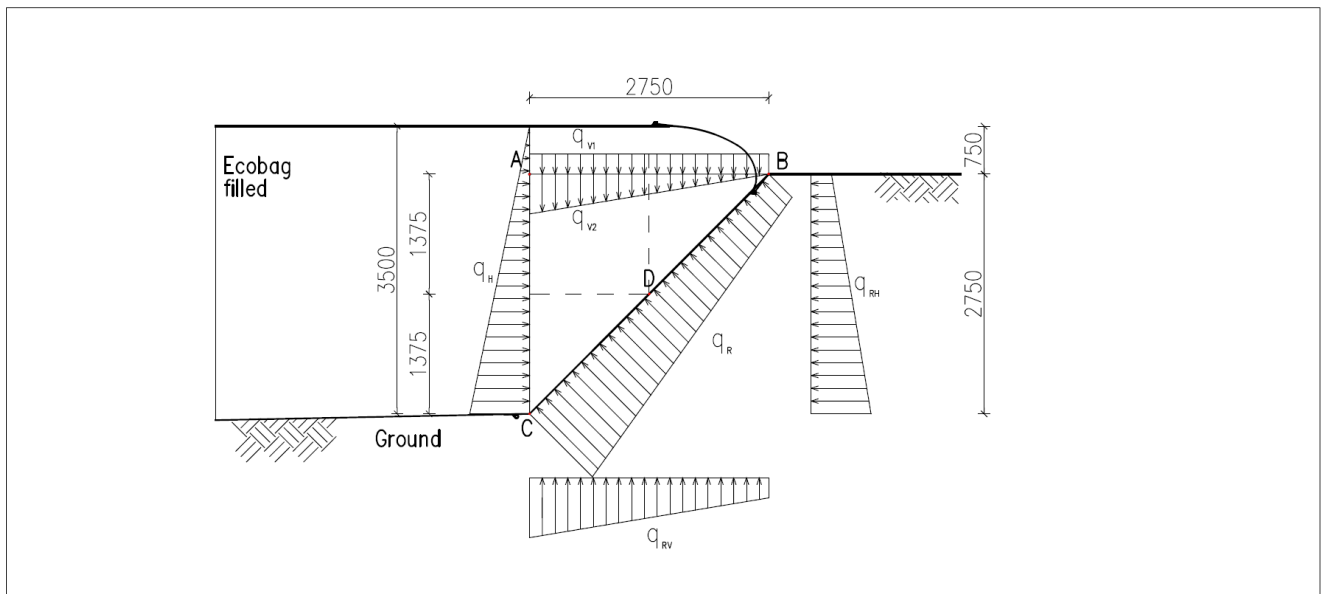
1. Data input material

   The liquid is assumed to be water:
   Volume weight liquid = 1000kg/m³ = 9.8 kN/m³

   1kN/m²=1kPa

2. Situation drawing – geometry

3. Load calculation:

$$q_{V1} = 9.8 \times 0.75 = 7.35 \; kN/m^2$$

$$q_{V2A} = 9.8 \times 2.75 = 26.95 \; kN/m^2$$

$$q_{V2B} = 0 \; kN/m^2$$

$$q_{V2D} = 9.8 \times \frac{2.75}{2} = 13,475 \; kN/m^2$$

$$q_{HA} = 9.8 \times 0.75 = 7.35 \; kN/m^2$$

$$q_{HC} = 9.8 \times 3.5 = 34.3 \; kN/m^2$$

$$q_{HD} = 9.8 \times 2.125 = 20.825 \; kN/m^2$$

4. Reactions calculation:

$$q_{RVA} = q_{V1} + q_{V2A} = 7.35 + 26.95 = 34.3 \ kN/m^2$$

$$q_{RVB} = q_{V1} = 7.35 \ kN/m^2$$

$$q_{RHB} = q_{HA} = 7.35 \ kN/m^2$$

$$q_{RHC} = q_{HC} = 34.3 \ kN/m^2$$

$$q_{RVD} = q_{V1} + q_{V2D} = 7.35 + 13.475 = 20.825 \ kN/m^2$$

$$q_{RHD} = q_{HD} = 20{,}825 = 20{,}825 \ kN/m^2$$

$$q_{RC} = \sqrt{q_{RHC}{}^2 + q_{RVA}{}^2} = \sqrt{34.3^2 + 34.3^2} = 48.5 \ kN/m^2$$

$$q_{RB} = \sqrt{q_{RVB}{}^2 + q_{RHB}{}^2} = \sqrt{7.35^2 + 7.35^2} = 10.4 \ kN/m^2$$

$$q_{RD} = \sqrt{q_{RVD}{}^2 + q_{RHD}{}^2} = \sqrt{20.825^2 + 20.825^2} = 29.5 \ kN/m^2$$