DESIGN OF RETAINING WALL FOR A HIGHWAY BACKFILL

ENCE 454 – Design of Concrete Structures

SPRING 2004

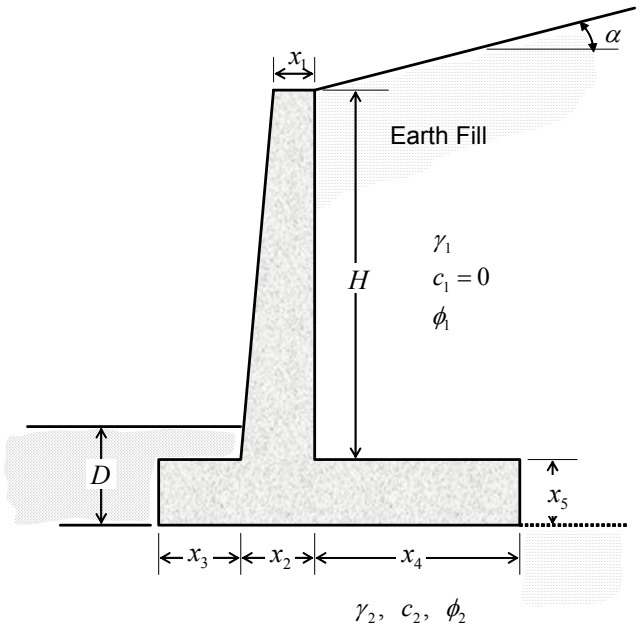
The design and analysis of reinforced concrete retaining wall for a highway backfill must adhere to the following general requirements:

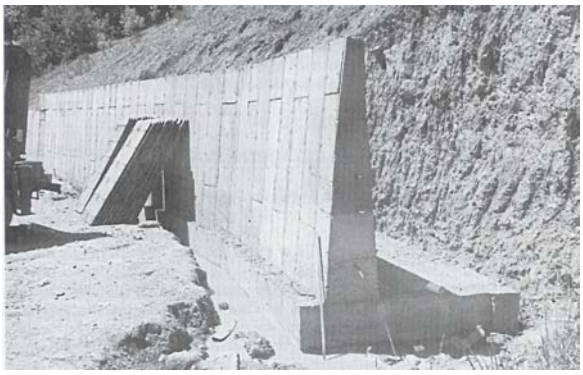
1. Each team (if applicable) will analyze a full-scale reinforced concrete, cantilever retaining wall for a highway backfill according to the ACI-318-02 Code.

2. The cantilever wall layout must adhere to the following set of dimensions (see figure):

$H = 26$ ft $\quad x_1 = 1⅓$ ft. $\quad x_2 = 2$ ft. $\quad x_3 = 5$ ft

$x_4 = 11.5$ ft $\quad x_5 = 3$ ft $\quad D = 7.75$ ft $\quad \alpha = 10^0$





3. Soil properties of the backfill and the foundation are specified as follows (see figure):

$\gamma_1 = 107$ lb/ft^3 $\quad \phi_1 = 32^0$ $\quad \gamma_2 = 112$ lb/ft^3

$\phi_1 = 32^0$ $\quad c_2 = 627$ lb/ft^2

4. Analysis and design details should include, but are not limited to, the following main items:
    a) Calculation of the factor of safety with respect to overturning, sliding, and bearing capacity.
    b) Required reinforcing steel per unit width for the stem, toe, and heel.
    c) Show the pattern of reinforcing steel bars in all regions of the wall on an accurate drawing of the wall cross-section.

5. Specify material type for all components. Material property data (i.e. elastic modulus, yield strength, ultimate strength, etc.) should be obtained from appropriate tables.

6. Create drawings of the entire wall as well as individual components, including assembly details. All drawings should be generated with a computer (preferred) or NEATLY by hand.

7. The final report* will be due on the last day of class – **Tuesday, May 11, 2004**.

***NOTE**: Detailed guidelines and contents of your final report will be provided in a separate handout.