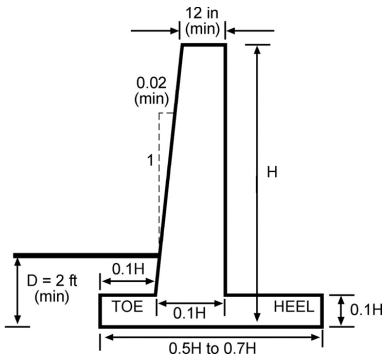
CE 462/562 Geotechnical Design II
Project 2: Rigid Retaining Walls

Assigned: February 13 - 2024
Due: March 3 – 2024

Develop a spreadsheet (or similar) to perform the geotechnical external stability checks (sliding, overturning, and bearing capacity) for a CIP rigid cantilever retaining structure. The user must input the retaining wall dimensions based on the figure below.

MINIMUM ASSIGNMENT (70/100).

- User input of wall geometry.
- User input of a single set of soil properties required for the stability checks.
- Use of Rankine earth pressure theory.
- Horizontal backfill behind the wall.
- No pore water pressure acting on the wall.
- Plot the lateral earth pressure diagram.
- Provide stability checks and factors of safety for sliding, overturning, and bearing capacity (Terzaghi's method).



ADDITIONAL POINTS (UP TO 30 ADDITIONAL POINTS AVAILABLE)

In addition to the minimum assignment, you can earn up to 30 more points. To earn additional points, you must pick at least one of the settlement calculations **(you can incorporate both for 30 points)**:

- Determine the immediate settlement using Schmertmann's Method (single soil, user input of parameters, divide the soil into four layers). **10 POINTS**

OR

- Incorporate a clay layer beneath the retaining wall to compute the consolidation settlement due to the construction of the CIP rigid wall (with user inputs of stratigraphy and soil properties). **20 POINTS**

Add additional features to increase your grade up to 100/100 **(each worth 5 Points)**:

- Perform a calculation indicating if the use of Rankine analysis is appropriate.
- Incorporate a user input stress acting on the horizontal backfill.
- Incorporate a sloping backfill.
- Incorporate a foundation soil and backfill soil with different properties.
- Incorporate Coulomb and Rankine analyses and thoroughly discuss the differences between the two analyses in your final report.
- Incorporate General and Terzaghi bearing capacity analyses and thoroughly discuss the differences between the two analyses in your final report.
- Incorporate a shear key.
- Automatically plot the wall geometry, active lateral pressure distribution, passive lateral pressure distribution, and q_{min} and q_{max} on the same plot.
- Use conditional formatting of cells to indicate when external stability checks are sufficient (Green) and insufficient (Red).

TECHNICAL MEMO

You must also produce a technical memo which:

- Provides an overview of your computing environment.
- Details the additional features (if applicable) you incorporated into your computing environment.
- Describes how you incorporated the additional features into your computing environment.