CE 462/562 Geotechnical Design 2
Project 3 – Cantilever Sheet Pile Walls

Assigned: March 7, 2024
Due: March 28, 2024

Minimum Project Requirements (70/100)

Choose **one** of the following textbook methods (no groundwater condition):

- Sheet piles in granular soils ($\phi' > 0 \; and \; c' = 0$).
- Sheet piles penetrating granular soils and embedded in clay soils.
- Sheet piles in clay soils ($\phi = 0 \; and \; s_u > 0$)

and develop a user-friendly spreadsheet (or similar) to compute the required embedment depth and maximum moment. The user must be able to input the required shear strength parameters of the soil. Your spreadsheet must inform the user if the sheet pile height is too tall for a cantilever sheet pile (greater than 6 m or 20 feet). You must also plot the lateral earth pressure diagram.

Here are some methods to solve for the roots of an equation in Excel:

- https://people.revoledu.com/kardi/tutorial/Excel/RootPolynomial.html
- https://www.exceldemy.com/learn-excel/solver/examples/solve-equation/

Perform a sensitivity analysis by systematically changing the shear strength parameters (you must use a reasonable range of values with a small step size to capture the shape of the curve). Plot the shear strength parameter versus embedment depth and the shear strength parameter versus the maximum moment.

In a properly formatted memo, show the two graphs and describe how changing the shear strength parameters changes the required embedment depth and maximum moment.

Additional Project Options (up to 100/100)

In addition to the minimum project requirements, you can add the following components to your spreadsheet:

- Include one of the following design methods (10 Points):
  - Factored strength method, Factored moment method, or Net passive pressure method
- Include the effects of groundwater flow (10 Points)
- Determine the required section modulus (based on a user input allowable stress of ASTM A-328, ASTM A-572, or ASTM A-690) (5 Points)
- Use “lookup” functions (or similar) with the required section modulus to specify the sheet pile PZ PZC designation (10 Points)
- Plot the displacement of the sheet pile with depth using the method presented in the NAVFAC manual (10 Points)

Your properly formatted memo must also include the additional features you have added to your spreadsheet.