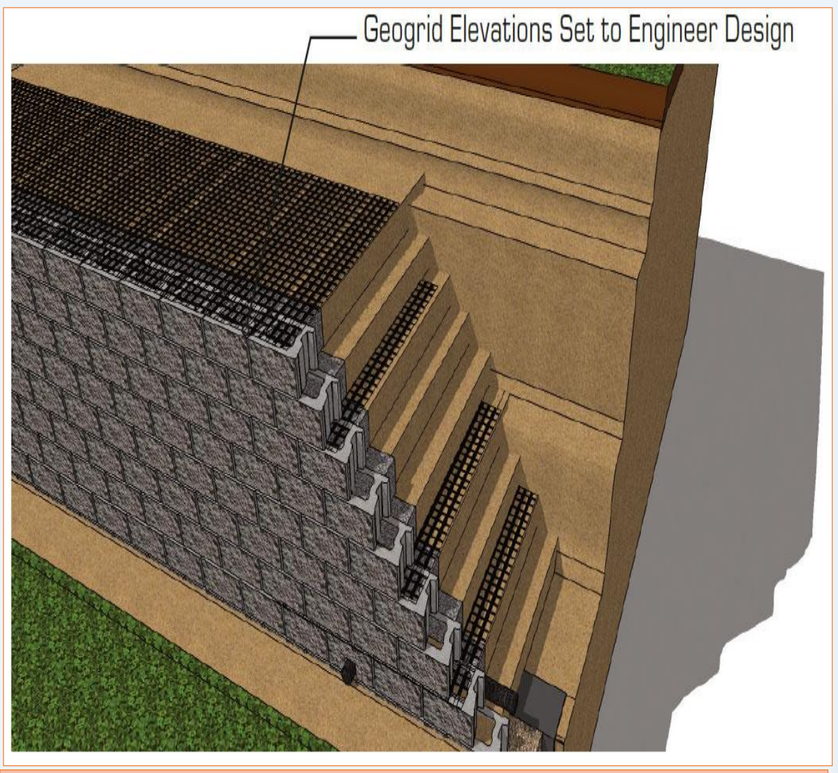
YEDİTEPE UNIVERSITY

GEOTECHNICAL DESIGN OF A GEOTEXTILE-REINFORCED RETAINING WALL WITH CLAYEY SAND BACKFILL

Muhammed Berk ERSOY Harun Kaan ÖZKAN Yaşar Mert DOĞANAY

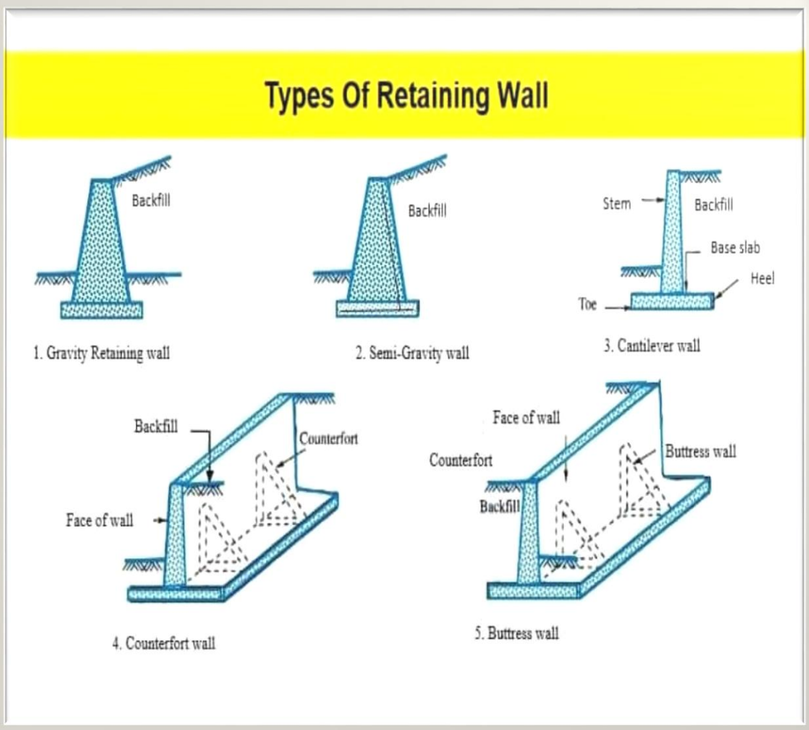
Introduction

Retaining walls are structures designed to hold back soil and prevent it from collapsing or shifting when there are differences in height between natural or filled ground. Extensive research has been conducted over the years, focusing on the safety and effectiveness of retaining walls, with foundational work by Coulomb and Rankine still influential in their design today. Their studies are frequently utilized for calculating active and passive soil pressures across various types of retaining walls.



There are constructions designed to maintain the vertical stability of the soil and the structures above, or to avert collapse, thus preventing the shifting of an excavation, a current area, and a filling zone.

- Maintaining the terrain at a sharper incline than its original gradient
- For constructing basement walls for buildings,
- To prevent coastal erosion or protect it from floods,
- To serve as edge supports in bridges,
- In extensive diggings,
- To utilize it when adjusting the incline on the roadway,
- On roads that require filling and splitting

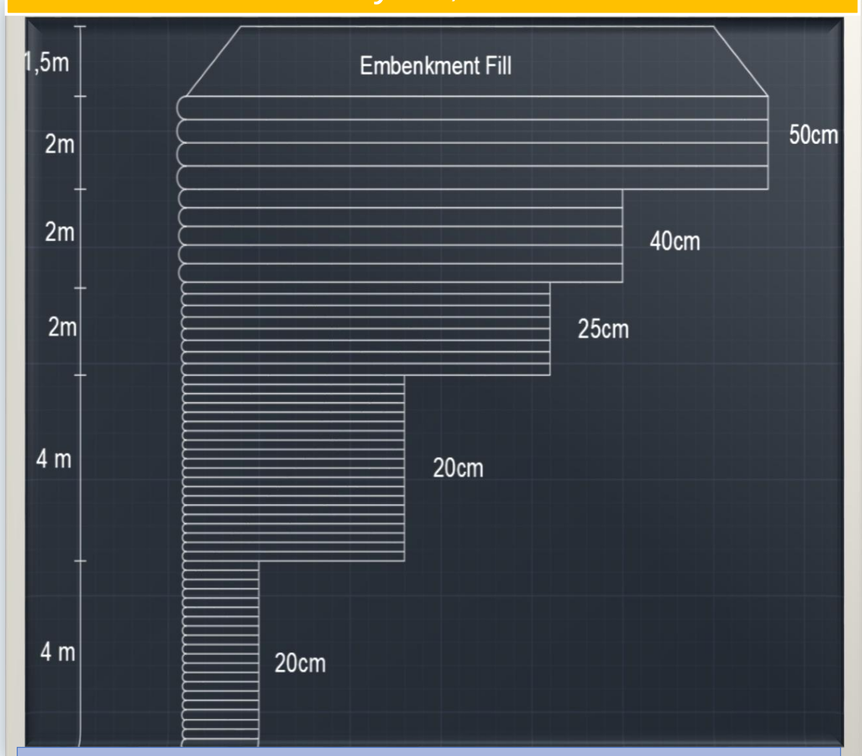


LATERAL EARTH PRESSURE THEORIES

Two values can be utilized for the retaining wall. One such factor is the active pressure created by the displacement of the retaining wall from the earth fill. The other is the passive force generated by the shifting of the retaining wall into the ground fill.

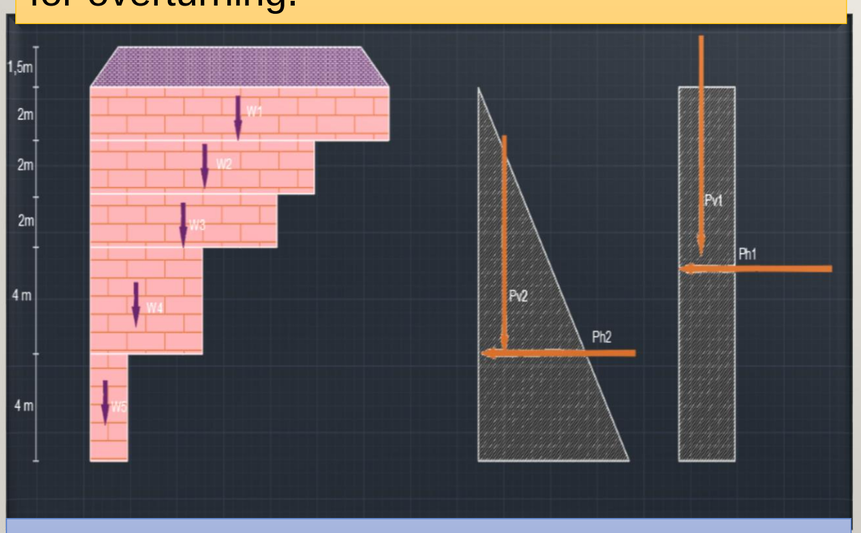
IN THIS PROJECT

As a result of our internal stability analysis, we were able to determine the precise lengths of the geotextile reinforcements,.This detailed evaluation provided a clear understanding of the reinforcement layout,.

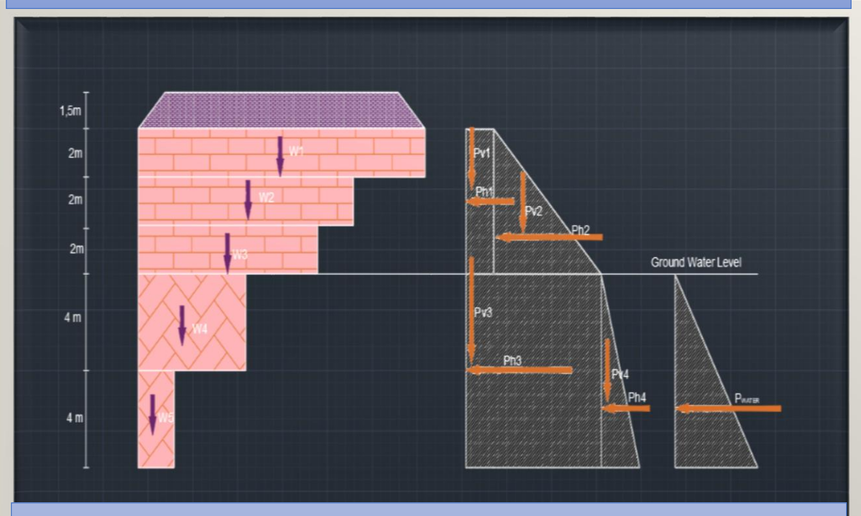


Geotextile Retaining Wall After Calculating the Sv Values and Geotextile Lengths

We checked for the sliding, overturning and bearing capacity calculations of the wall. During the controls, we calculated seperately for each geotextile layer with the same length for overturning.

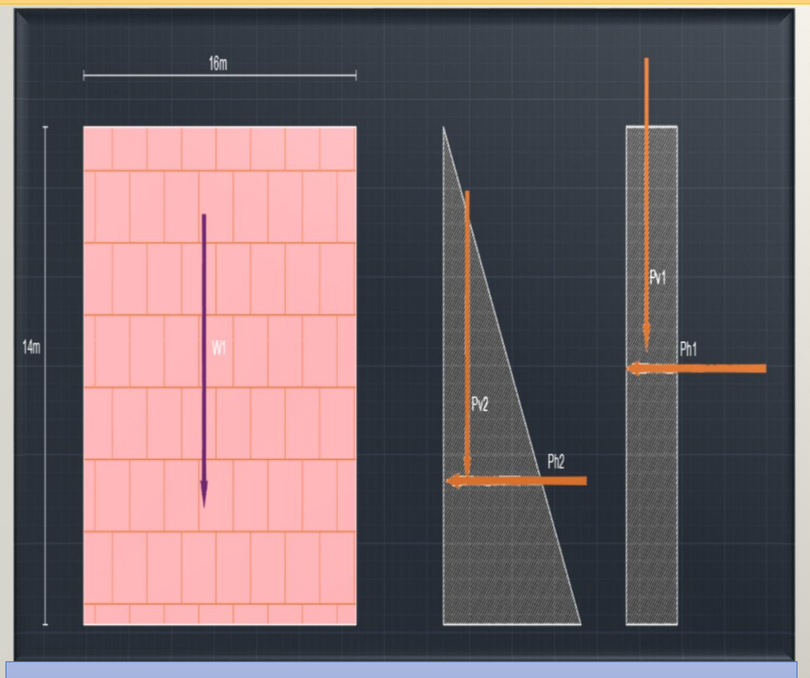


Overturning Analysis For the Non-water Condition

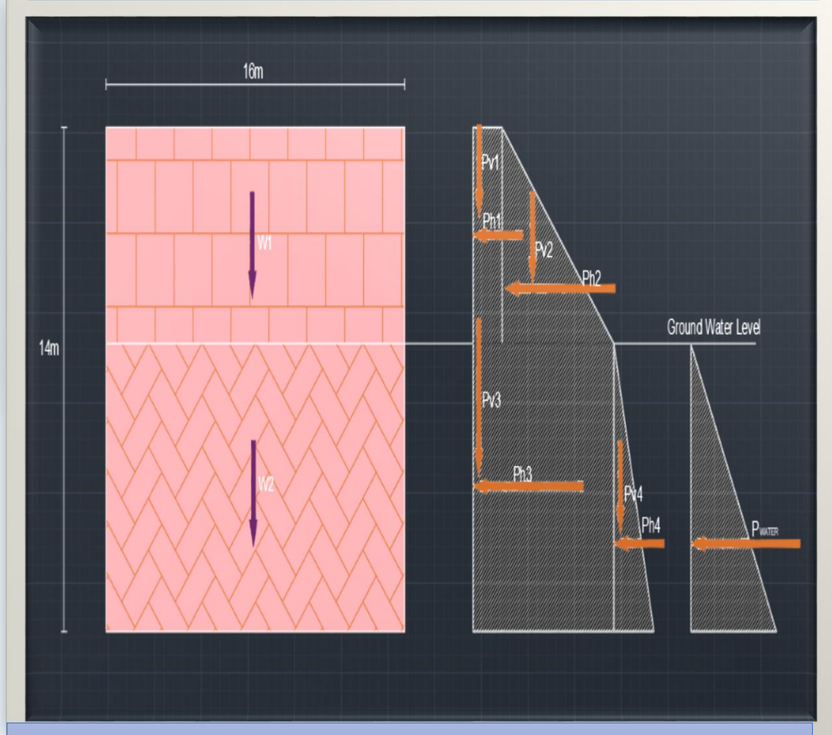


Overturning Analysis For the GWT Condition

The calculations for the sliding were conducted based on the area defined by the maximum length of the geotextile material. This approach ensures that the stability analysis accurately reflects the potential sliding surface influenced by the geotextile's extent.



Sliding Analysis For the Non-water Condition



Sliding Analysis For the GWT Condition

CONCLUSION

This report details the design of a 16 m high geotextile-reinforced retaining wall with a 30 kPa surcharge load. Internal stability calculations used Coulomb Theory to determine vertical stress, water pressure, and effective stress, followed by the required geotextile lengths to prevent rupture,The design is including with 57 geotextile lengths grouped into 5 categories. External stability analyses checked safety against overturning and sliding.Sliding was analyzed using the weakest foundation soil properties, while overturning moments were calculated relative to the toe. Lastly, bearing capacity was assessed using Terzaghi's method with foundation soil parameters.

YEDİTEPE ÜNİVERSİTESİ