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A REVIEW ON ANALYSIS AND DESIGN OF COUNTER FORT RETAINING WALL FOR DIFFERENT TYPES OF SOIL.

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Abstract – *This research paper is about analysis and design of counterfort retaining wall. There are many types of retaining walls but selected the counterfort retaining wall. We chose the counterfort retaining wall because it is more reliable and strong type of retaining wall. In this type of retaining wall the counterforts are provided at suitable intervals i.e. H/2, H/3 and 2H/3 resp. Generally the 2H/3 distance corresponding to height is most widely used for counterforts. Counterfort retaining wall with counterforts or pressure relief shelf are very strong as compared to conventional cantilever retaining wall.*

Key Words: Pressure Relief Shelves ,Counterfort retaining wall, Counterforts, Counterfort and cantilever retaining etc.

1. INTRODUCTION

A retaining wall is a structure that holds back soil or other materials while maintaining the ground surface at various elevations that are higher than the soil's angle of repose. These walls also support the soil laterally so that it can maintain various levels on both sides. Retaining walls can be built from a variety of materials, including concrete blocks, treated lumber, treated concrete, and rocks or boulders.

A cantilever wall with counter forts is known as a counterfort retaining wall. The base slab and counterfort are connected. It is a cantilever retaining wall that is reinforced with monolithic counter forts made of the base and rear wall slabs. The distance between counter forts is roughly equal to or slightly greater than half of their height. Treated wood, poured concrete, stone, brick, concrete block systems, and other materials are frequently used to construct retaining walls. The counter-fort wall is 8–12 metres high.

Retaining walls are made to hold back soil or engineered fill at an angle that is steeper than the material's angle of repose, or the steepest angle the material can support naturally without giving way. They must be able to endure the horizontal, or lateral, ground pressure put on them by the material being retained in order to accomplish this.

The vertical tension put on the ground behind a wall, which depends on the density and height of the backfill, determines the lateral earth pressure. Therefore, the base of the wall experiences the largest lateral earth pressure since the vertical tension is larger the deeper the backfill.

2. OBJECTIVES

- A comparative study of counter fort retaining wall for different type of soils.
- The main objective of this study is to effectiveness in term of analysis and design of counter fort retaining wall.
- Critical stability analysis.

3. PROBLEM STATEMENT

- We are going to do Analysis and Design of counter fort earth retaining wall with pressure relief shelf by manual and software approach.
- The overall study shows that when it comes to a retaining wall design, the points in counter fort are extremely important.
- Checking for Critical stability for different types of soils using excel.
- Suitability of Counterfort Retaining Wall for different types of soils.

4. LITERATURE REVIEW

1.Optimization and Prognostication of Counter fort Earth Retaining Wall with Traffic Load Using Artificial Neural Network (2013)Author: Kavan, M.R, Prakash, P, Keerthi Gowda. B.S.

This study explains how or when to obtain the ideal tension reinforcement area (Ast) and concrete area (Ac). It is an extremely time-consuming process that also necessitates knowledge of the Counter fort Retaining Wall's behaviour under traffic load. In this study, Artificial

Neutral Network (ANN) is used as a tool to predict the optimal Ac and Ast in order to reduce all of the aforementioned issues. According to the findings, artificial neural networks are seen to be taught for various design scenarios. The optimization technique accepts the restrictions set forth by IS 456 and applicable Codes. A neural network is a system of linked neurons that takes its inspiration from research on the biological nervous system.

2. The stability analysis study of the variation in vertical slope of traditional retaining walls. Author. M. Sholeh, I. Hermanto, and U. C. Sari1 (2019)

In this research, we investigated how to create an appropriate retaining wall design that may be employed on a vertical slope. The findings indicate that the value of the safety factor will rise with the size of the retaining wall. When compared to retaining walls with thin shapes, those with sloping walls on the front of the retaining wall have a higher safety factor. The driving force will be increased by cliffs or steep slopes. Rivers, springs, sea water, and wind erosion all contribute to the formation of the steep slopes.

3. Critical Study of Counterfort Retaining Wall Author. G. Madhavi and M.M. MahajanM.Tech Student, Department of Applied Mechanics, VNIT, Nagpur, India Department of Applied Mechanics, VNIT, Nagpur, India. (June 2016)

The retaining wall at Counterfort must be critically examined from a variety of angles. Understanding how earth retaining structures behave is one of the oldest geotechnical engineering issues. From the facts above, it can be inferred that cohesive soil around a wall causes the wall's cross section to rise when compared to non cohesive soil.

4. Inder Kumar (5 May 2017) discovered that the analysis for the behaviour and best design of the gravity wall and counter fort retaining wall in concrete dam. Concrete and steel volume and amount are used to evaluate cost analysis against each wall design. The alternative with the lowest cost estimate is picked as the optimal design solution after a comparative analysis.

5. Sustainable Design of Counterfort Retaining Walls Using Black Hole Algorithm Author: José V. Martn, José Garca, and Victor Yepes (1 April 2020)

This study investigates a discrete black hole algorithm-based parametric optimization of a buttressed earth-retaining wall. The analysis was created taking into account two goal functions: one that optimises the structure's cost and the other that reduces CO2 emissions. We compared the outcomes of both optimizations after varying the wall height in the various studies. Working toward the reduction of emissions while preserving the economic aim results in results that are stabilised.

5. METHODOLOGY

Step 1: Collection of soil sample of different types.

Step 2: Finding basic properties of soil.

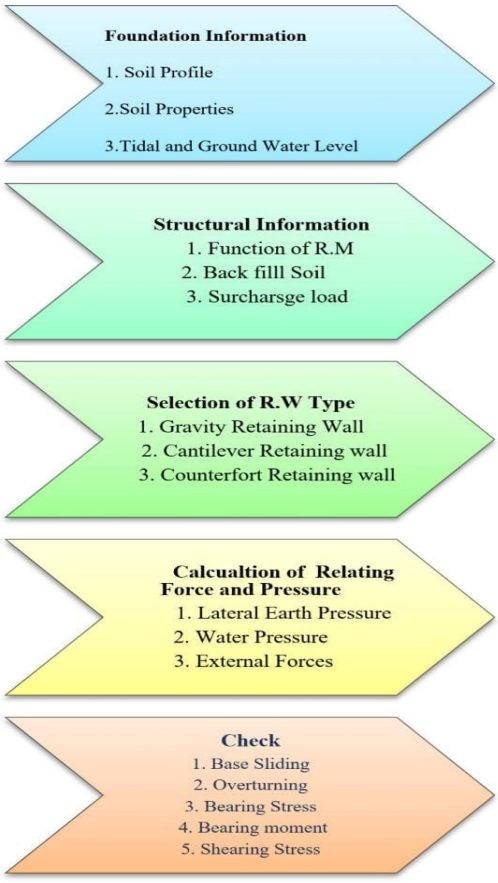
Step 3: Tests to be performed on Soil: Water absorption, Specific Gravity, Maximum dry density and Optimum moistures etc.

Step 4: Determining the lateral earth pressure. i.e. Passive and active earth pressure.

Step 5: Suitability and selection of suitable retaining wall for corresponding soil type.

Step 6: And comparing counterfort and cantilever retaining wall on the basis of cohesion and angle of repose.

Step 7: Analysis and Design of counter fort retaining wall with pressure relief shelves.



METHODOLOGY

6. CONCLUSION

The main objective of this project is to effectiveness in term of analysis and design of counter fort retaining wall. In this study we compared the counterfort retaining wall provided with pressure relief shelves with cantilever retaining wall on the basis of properties of soil i.e. Cohesion and angle of repose of soil. The positions of pressure relief shelves provided are H/3 , 2H/3, and H/2 respectively. The moment developed in the counterfort is relatively less than the conventional cantilever retaining wall. Because of reduction in moments, the overall stability of counterfort retaining wall is increased against the overturning and sliding.

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