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Study of Reinforced Retaining Wall Over Predictable Considering Different Heights

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ABSTRACT
The use of geo-textiles in MSE walls started after the beneficial effect of reinforcement with geo-textiles was noticed in highway embankments over weak sub grades. The first geo-textile reinforced wall was constructed in France in 1971, and the first structure of this type in the United States was constructed in 1974. Since about 1980, the use of geo-textiles in reinforced soil has increased significantly. The first wall to use this technology in the United States was built in 1972 on California State Highway 39, north east of Los Angeles. In the last 25 years, more than 23,000 Reinforced Earth structures representing over 70 million m2 (750 million ft2) of wall facing have been completed in 37 countries. More than 8,000 walls have been built in the United States since 1972. The highest wall constructed in the United States was of height 30 meters (98 feet)

KEYWORDS: *highway, embankments, reinforced, facing, structures, constructed*

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INTRODUCTION
Retaining walls may be classified into two groups, externally stabilizes walls and internally stabilized walls. The examples of the externally stabilizes walls are gravity walls, reinforced concrete cantilever and reinforced concrete counterfort walls. These walls are essentially characterized by the concept that the lateral earth pressures due to self-weight of the retained fill and accompanied surcharge loads are carried by the structural wall. This necessitates a large volume of concrete and steel to be used in such walls. The construction sequence of these walls involves casting of base and stem followed by backfilling with specified material. This requires considerable amount of time as concrete has to be adequately cured and sufficient time spacing has to be allowed for concrete of previous lift to gain strength before the next lift is cast. The internally stabilized walls include metal strip walls; geotextile reinforced walls and anchored earth walls. These walls comprise of horizontally laid reinforcements which carry most or all of the lateral earth pressure via soil-reinforcement interaction or via passive resistance from the anchor block. If the reinforcements are spaced closely enough, the stiffness of the soil-reinforcement system may be so high that practically very insignificant lateral thrust will have to be carried by the wall facing elements. This reduces the volume of concrete and steel reinforcement in the wall significantly. An additional feature of the internally stabilized walls is their relatively fast speed of construction. This is firstly because of less volume of concrete and steel fabrication work, and secondly because the placing of wall panels, laying of reinforcements and compaction of reinforced fill are carried out simultaneously. A retaining wall is a structure that retains holds back any material usually earth and prevents it from sliding or eroding away. It is designed so as to resist the material pressure of the material that it is holding back.

Garg(1998) Garg in 1998 had studied and developed a new design philosophy for designing rigid walls with reinforced cohesion-less backfill. He had studied the design, construction and cost economics of 11m high and 19.50mlong random rubble stone masonry wall retaining reinforced earth. The cohesion-less earth available at the site of construction was reinforced by geo-grids that were not attached to the wall back face. The wall was built on a national highway in the lower Himalaya in September 1991.

Berg (2000) New methods and technologies of retention and steepened-slope construction continue to be developed, often by specialty contractors and suppliers, to solve problems in locations of restricted Right-of-Way (ROW) and at marginal sites with difficult subsurface conditions and other environmental constraints. Professionals charged with the responsibility of planning, designing, and implementing improvements and additions in such locations need to understand the application, limitations and costs associated with a host of measures and technologies available. This manual was prepared to assist design engineers, specification writers, estimators, construction inspectors and maintenance personnel with the selection, design and construction of Mechanically Stabilized Earth Walls (MSEW) and Reinforced Soil Slopes (RSS), and the monitoring of their long term performance. The design, construction and monitoring techniques for these structures have evolved over the last two decades as a result of efforts by researchers, material suppliers and government agencies to improve some single aspect of the technology or the materials used. This manual is the first single, comprehensive document to integrate all design, construction, materials, contracting and monitoring aspects required for successful project implementation.

Belal and George(2000) A typical geogrid reinforced soil retaining wall constructed with and without facing units was analyzed for seismic response. The walls are proportioned using the Pseudo-Static design method. A finite element method—ABAQUS-code—was employed using Drucker-Prager model to characterize sand and nonlinear elastic reinforcement material. This paper presents the wall responses to a typical seismic spectrum. Of particular interest in this study are: (1) the acceleration response, (2) the wall displacement, (3) the tensile stress in the reinforcement, and (4) the slippage at the soil-reinforcement interface. Probable failure modes were also sought in this study. Specifically, three possible failure mechanisms were investigated, namely, wall displacement, tensile stress in reinforcement, and slippage between soil and reinforcement. Having designed for peak acceleration of 0.25g in conjunction with a factor of safety of two, the walls withstood a base excitation of 0.5g ground motion.. While imposing surcharge loads of different magnitudes, however, those responses begin to accumulate over the duration of the simulated seismic event, indicating imminent failure in one mode or another. Slippage at the interface seems to the probable failure mode of the wall without facing whereas the wall with facing would fail by breakage of the reinforcement.

Srbulov (2001) has studied the results of measurements of axial strains in geogrids of two reinforced steep slopes and two retaining walls, which were uniformly interpreted. The stabilities of slopes and walls were analyzed using a method based on limit equilibrium. The method of analysis takes into account strains along boundaries of rigid wedges in addition to the forces considered by classical methods of limit equilibrium. However, the results obtained by the method remain only approximate due to necessity to introduce a number of simplifying assumptions.

Koernera and Soongb (2001) had studied the evolution and cost survey of retaining walls. It was observed that geosynthetic reinforced walls were the least expensive of all wall categories for all wall heights. Koernera studied the numeric example (geosynthetic reinforced walls for different heights) and proved that the modified Rankine method is the most conservative, the FHWA (Federal Highway Administration approach) method is intermediate, and the NCMA (National Concrete Masonry Association approach) method is the least conservative. It was further proved by him that the overwhelming causes for the poor performances of the Segmental retaining walls (SRWs) were (i) backfilling with improperly draining fine grained soil and (ii) contractors deficiencies which could have been avoided with proper quality control and inspection.

Chonkar (2001) Among several innovative construction techniques, new materials of constructions and new technologies adopted in the construction of flyovers in Mumbai by Maharashtra State Road Development Corporation (MSRDC), the reinforced earth technique has definitely proved the advantages of this technology over conventional reinforced concrete (RC) retaining walls both in terms of saving foundation cost, working space and time. The reinforced earth technology is in use in the west, especially in Great Britain and France, for the last 35 years

OBJECTIVE OF THE PRESENT STUDY

A. Design of Reinforced Earth wall and R.C.C Retaining Wall for different heights.
B. Calculating the Quantity of various components of the retaining wall and reinforced earth wall
C. Calculating the cost of Retaining wall and Reinforced Earth Wall at different heights.

FORMULATION & Methodology

The cantilever wall generally consists of a vertical stem, and a base slab, made up of two distinct regions, viz. a heel slab and a toe slab. All three components behave like one-way cantilever slabs: the 'stem' acts as a vertical cantilever under the lateral earth pressure; the 'heel slab' and the 'toe slab' acts as a horizontal cantilever under the action of the resulting soil pressure.

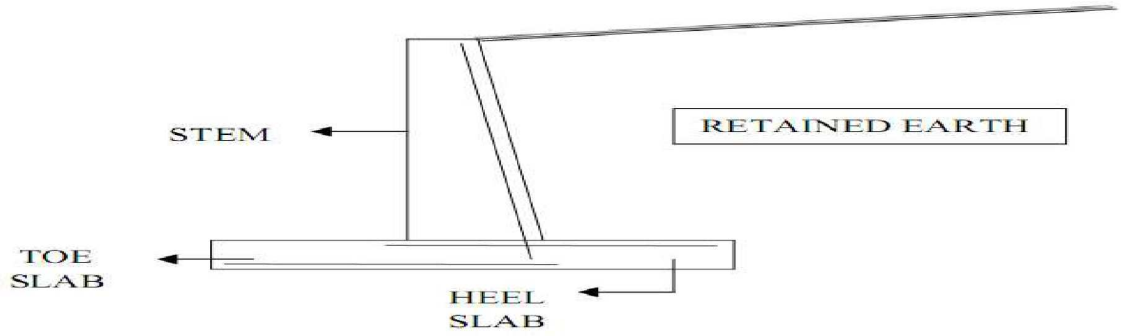

Figure 1 .Design of RC Cantilever Wall

Setting a Full-Height Panel:
- Remove the spacing tool.
- Center the full-height panel between the half-height panels to ensure equal vertical or angled joint spacing.
- Batter of the full-height panel is set with wedges.
- Clamp the full-height panel to the half-height panels on each side.

RESULTS AND DISCUSSION

Table 1. RETAINING WALL for 5m Height

Sl. No.	Description of works	Unit	Length	Width	Height	Qty	Total Quantity
A	Earth work in Excavation						
		cum	10.000	3.500	1.000	35.000	
				TOTAL Earth work		35.000	35.000
B	PCC M-15 Grade Concrete						
	M-15 G. Con.	cum	10.000	3.000	0.150	4.500	
				TOTAL M-15		4.500	4.500
C	RCC M-30 Grade Concrete						
i	M-30 .G. con Raft	cum	10.000	3.000	0.500	15.000	
v	M-30 WALL	cum	10.000	0.500	5.500	27.500	
				TOTAL M-30		42.5	42.5
D	TOTAL Quantity of Steel	MT					3.74

CONCLUSIONS

- Site-specific costs of a soil-reinforced structure are a function of many factors, that includes such as cut and fill of the ground, the height of the wall or slope and its type, in situation soil type, the backfill material available, look of the facing panel, temporary or permanent application. It has been found that R walls with precast concrete facings are usually less expensive than reinforced concrete retaining walls for greater heights.
- Procedures adopted for the design of different types of externally and internally stabilized walls have been given in Chapter no 3 in detail and by the help of example by considering the ground data the RCC retaining wall/ Counter fort Retaining wall/ RE walls have been analysed and designed for the various heights in the Chapter no 4 and 5 respectively.
- The walls are then calculated for the quantity and cost estimate for the 10 meter length of the walls has been done. It has been found that the internally stabilized walls (RE walls) are significantly more economical as compared to the externally stabilized wall i.e Retaining Wall for the given geometric and loading conditions considered in this study.
- In general, the use of RE walls results in savings in comparison with a conventional reinforced concrete retaining structure, especially when the

latter is supported on a deep foundation system (poor soil condition). A substantial savings is obtained by elimination of the deep foundations, which is usually possible because reinforced soil structures can accommodate relatively large total and differential settlements.

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