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DYNAMIC RESPONSE OF GEOTEXTILE WRAP-FACED LIME TREATED REINFORCED CLAYEY SOIL WALLS

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ABSTRACT

This paper describes model studies conducted on geotextile wrap-faced reinforced soil walls mounted on a shake table. Untreated and lime treated clay was used as backfill soils. The base motion parameters, surcharge pressure and number of reinforcing layers are varied in different model tests. It is inferred from these tests result that the response of the wrap-faced soil-retaining wall is extensively affected by the base acceleration levels, number of reinforcement and magnitude of surcharge pressure on the crest. The effects of these different parameters on acceleration response at different elevations of the retaining wall, settlement at crest and face deformations are presented in this paper. Numerical modeling has been done by computer program PLAXIS.

KEYWORDS: Geosynthetics, Retaining Wall, Shake Table Tests, Dynamic Analysis, Numerical Models, Lime

NOMENCLATURE

LVDTs: linear variable displacement transducers
Sv: vertical spacing between reinforcement
U1: displacement sensor one
U2: displacement sensor two
U3: displacement sensor three
Vp: primary wave velocity of soil
Vs: shear wave velocity of soil
WRSW: wrap faced reinforced soil retaining wall

INTRODUCTION

Reinforcement of soil to increase the stability of slopes and decreasing its deformations has now been a workable solution for geotechnical engineers to construct walls even in less space Mittal [1]. But, limited studies are available on the seismic response of reinforced soil slopes, (Perez [2], Perez and Holtz [3], Lo Grasso et al. [4], Nova-Roessig and Sitar [5] and Huang et al. [6]). GRS (Geosynthetic Reinforced soil) structures have also been examined with respect to enhancing the seismic stability of bridge abutments supporting bridge decks. Aoki et al. [7] carried out shaking table tests with 1 g acceleration on conventional and GRS bridge abutment models using cement treated backfill.

Krishna and Latha [8] investigated the seismic response of geotextile wrap-faced reinforced soil wall by conducting shaking table tests on model walls. They concluded that the seismic response of the retaining walls is extensively affected by the variations in base motion parameters, reinforcement configuration and surcharge pressure. Each model wall was subjected to 20 cycles of sinusoidal shaking. Saito et al. [9] carried out series of shaking table tests with cement treated sandy backfill soils in combination with geosynthetic reinforcement. The current AASHTO [10] technique in the USA limits pseudo-static methods to peak horizontal ground accelerations < 0.3 g.

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