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Studies on bamboo reinforced earth retaining structures

Different forms of internally stabilized systems based on the reinforced earth principles had been developed in various parts of the world. For developing countries further advantages could be gained by incorporating locally available material. Model studies were carried out in this research to study the behaviour of Bamboo reinforced earth retaining structures and to develop a rational design method.

Model earth retaining structures were constructed using Bamboo reinforcements and Aluminium facing in a Perspex box, kept inside a self contained loading frame in the laboratory. The box was fabricated with slotted angle sections and Perspex sheets were used in three sides to observe the failure patterns. No Perspex sheet was used in the side of the wall facing.

Models were done with both sandy materials and lateritic fill materials. A sandy soil that was made moist by adding 10% of water was used. Lateritic fill material was compacted at its optimum moisture content with a compaction effort equivalent to that in the Proctor Test. Models constructed inside the Perspex box was loaded vertically by jacking against the self contained loading setup. Vertical load was applied in stages and the outward movement of the wall facing was measured. Careful observations were done through sides of the Perspex box to identify the development of cracks and failure patterns.

Two types of loading; A load applied within the reinforced zone and a load applied behind the reinforced zone were used. The first case represent a situation where the load is applied mainly on the on top of the reinforced wall. The latter case represent a case of a wall done at the foot of a slope to provide stability. Models could be loaded to very high loading intersities when loaded on top of the reinforcements and they failed at much lower loads when loaded behind the reinforced zone. However, the failure loads were much higher than that correspond with a conventional gravity wall of similar weight.

Pullout resistance of bamboo meshes was also determined experimentally. Based on these information obtained a design method was developed for Bamboo reinforced earth retaining structures. In order to study the long term stability of these structures, Bamboo reinforcements treated with copper sulphate, potassium dichromate and coar tar were buried in an embankment along with untreated Bamboo reinforced earth retaining structures could be good alternative to the more expensive forms.