# EFFECT OF HYDROSTATIC PRESSURE ON GEOCOMPOSITE STABILISED SOIL RETAINING STRUCTURE

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# ABSTRACT

The use of cement bound waste material geocomposite as compressible backfill behind retaining wall can help to reduce lateral earth pressure behind wall and at the same time help to reduce the rapidly accumulated waste materials. However, their effectiveness is yet to be proven with little research conducted in Malaysia. This study therefore investigated the effectiveness of cement bound waste material geocomposite as compressible layer behind soil retaining structure using laboratory model wall test. Variables affecting the effectiveness of geocomposite were investigated with the main focus on effect of hydrostatic pressure, in addition to effects of waste material content and surcharge. Two locally available waste materials, namely rubber chip and tire chip were bound by Ordinary Portland Cement (OPC) to form the geocomposites. Local sand was used as conventional backfill in the laboratory model wall test. A steel rectangular model wall tank was designed and fabricated with internal dimension of 732 mm high, 700 mm long, and 450 mm width. Lateral earth pressure (at rest condition) and hydrostatic pressure behind top, middle and bottom of wall were monitored. A total of 14 model wall tests were conducted. All geocomposites tested in this study were cast at water-cement ratio of 0.5, cured for 7 days at room temperature and of 40 mm width. Repeatability testing on control specimen (sand and both geocmposites) reported acceptable repeatability of less than 15% differences between identical test pairs. Increasing waste material content in the geocomposite was found to reduce the lateral earth pressure behind wall, thus higher effectiveness for both geocomposites. At no water condition,

application of surcharge at high magnitude was found to increase the lateral earth pressure behind the wall. Application of low surcharge seems to have negligible impact on the effectiveness of the geocomposites. It is also observed that reloading the geocomposites (dry or wet condition) has negligible impact on their effectiveness. An increasing lateral earth pressure was observed with increasing water level for the geocomposites. Effectiveness of the geocomposite was reduced by the presence of hydrostatic pressure. It is concluded that both geocomposites are effective in reducing lateral earth pressure behind wall with percentage reduction ranged from 31.89 to 99.3%.