

**DEVELOPMENT OF A LARGE -SCALE SHEAR
APPARATUS FOR THE DETERMINATION
OF SHEAR STRENGTH PROPERTIES
OF MUNICIPAL SOLID WASTE**

Sanchitha Hema Sharendra Jayakody

168959P

Degree of Master of Engineering

Department of Civil Engineering

University of Moratuwa

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DECLARATION

I declare that this is my own work and this thesis does not incorporate without acknowledgement any material previously submitted for a Degree or Diploma in any other University or institute of higher learning and to the best of my knowledge and belief it does not contain any material previously published or written by another person except where the acknowledgement is made in the text.

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ABSTRACT

Landfill slope failure became one of the hot topics in Sri Lanka as the infamous Meethotamulla waste fill collapsed, claiming lives of people and infrastructure. Every year all around Sri Lanka, millions of tons of Municipal Solid Waste (MSW) are produced, and no one can predict the variation and heterogeneity of their composition. Although MSW is a difficult material to test, many comprehensive studies have been conducted to determine the likely ranges of waste properties and hence to take them in the design of landfills.

In this study, in-situ direct shear test was performed to assess and develop insights about the shear strength properties of MSW. A large-scale direct shear apparatus was fabricated to conduct in-situ test which has dimensions of 300 mm × 300 mm in plan view. The report contains the steps followed to manufacture the large-scale direct shear device. One of the main objectives was to test the MSW at differently aged locations in abandoned Meethotamulla waste fill site. The testing procedure is comprehensively described in the report. Further, density test, moisture content test and composition analysis were also conducted in this study.

As stated by many researchers a peak failure state was not observed during in any of the direct shear tests. There was no significant variation in the shear stress parameters of the differently aged samples. However, all the samples are more than 03 years old. The results obtained from the tests were analyzed and compared with the published data in literature. Recommendations were made regarding the further studies needed to develop a relationship between the differently aged MSW and their shear strength properties.

Keywords: Municipal solid waste (MSW), In-situ tests, Direct shear test, Shear strength properties

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