UTILIZATION OF BUILDING DEBRIS AS AGGREGATES IN STONE COLUMN CONSTRUCTION IN SRI LANKA

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Thesis submitted to University of Moratuwa in partial fulfillment of the requirements for the Degree of Master of Engineering in Foundation Engineering and Earth Retaining Systems

by

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February 2017

DECLARATION

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ABSTRACT

Due to rapid development and population growth, construction industry has emerged with few recent problems. The major problem faced by the construction industry is the scarcity of construction material and disposal of construction waste because of high disposal cost and inadequate land fill area.

Due to the remnants of 30 year civil war happened in Sri Lanka, huge amount of building debris are to be disposed during new infrastructure constructions. To curtail the amount of building debris, the possibility of using them (concrete, brick and plaster) for civil engineering applications can provide an attractive way to reduce the wastes to be disposed of and it may also provide fiscal benefits. In this study, the scope for using building debris as the traditional rock aggregate for stone columns was investigated.

Experiments were conducted using building debris(concrete, brick and plaster)and stone aggregate passing through a 14 mm and retained on a 10mm British standard (BS) sieves. Where experimental studies were carried out to determine the engineering properties (Durability, Shear strength & Compressive strength) of the recycled construction material and compared with conventional road construction material (aggregates).

AIV, ACV and LAAV tests and slake durability index test were carried on selected building debris to find out the suitability to be used in stone columns construction.And uniaxial compressive strength testwas carried out to find the resistance to impact and crushing under loads. Improvement in shear strength was tested using vane shear in radially as well as with depth in several laboratory models with a centred stone column made up of different building debris.

It was observed that the model done using concrete wastes exhibited a similar capacity of traditional rock aggregates of same size. Other materials did exhibit the same behavior though their results from slake durability tests were relatively low.

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NOTATIONS

LL	-	Liquid Limit
PL	-	Plastic Limit
PI	-	Plastic Index
MDD	-	Maximum Dry Density
OMC	-	Optimum Moisture Content
SSCM	-	Standard Specification of Construction & Maintenance of Roads & Bridges
BS	-	British Standards
ASTM	-	American Standards for Testing and Materials
AASHTO	-	American Association of State Highways and Technical Official
GOSL	-	Government of Sri Lanka
RDA	-	Road Development Authority
ICTAD	-	Institute of Construction Training and Development

AIV -Aggregate Impact Value

ACV -Aggregate Crushing Value

LAAV- Los Angele Abrasive Value

APPENDICES