

**OPTIMUM RETROFITTING METHODS FOR
LOW RISE MASONRY STRUCTURES IN SRI LANKA**

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Degree of Master of Science

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Sri Lanka

May 2020

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Thesis submitted in partial fulfilment of the requirements for the Degree of Master of
Science in Civil Engineering

Department of Civil Engineering

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Sri Lanka

May 2020

Declaration of the Candidate & Supervisors

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ABSTRACT

Floods can be considered as one of the natural hazards which cause destructive effects on the existence of mankind. Most of the mortalities have taken place due to damages in masonry walls of unreinforced masonry structures. These walls have failed due to its insufficient capacity to resist lateral forces exerted by floods. A field survey that was carried out in houses damaged due to flood revealed that, the outermost walls can play a major role in reducing flood induced damage, if they are strengthened to resist lateral forces applied by floods. Retrofitting of masonry walls has been recognized as a possible solution to strengthen the masonry structures against the aforementioned forces. Many researches have done in the past to strengthen the masonry walls by using different retrofitting types. Most of them are limited only to in plane behavior of walls with retrofitting.

The study has focused on the out of plane loading exerted by flooding. The failure mechanism due to floods was identified as the flexure parallel to bed joint of the masonry based on the field study conducted in the flood affected areas of Sri Lanka. The experimental program was mainly focused on flexure parallel to bed joint. Fired Clay Bricks (FCB) and Cement Blocks (CB) were used as the walling material for panels, whereas geogrid and wire mesh were used as the retrofitting materials for the research. The FCB panels retrofitted with geogrid and rendering under saturated conditions have shown an increase of 9.2 times the flexural strength of the reference wall panel without any retrofitting which is subjected to saturated condition and 6.78 times for the wire mesh. For CB, it was 5.8 times and 4.5 times respectively. The results have indicated that the masonry houses can be retrofitted and deployed to protect the people from floods.

Keywords— Brick, Cement block, Flexural strength, Flooding, Masonry, Retrofitting

ACKNOWLEDGEMENTS

The funding provided by the Royal Society (Global Challenge Research Fund) for the project “Safer communities with hydro-meteorological disaster resilient houses”.

Under the Research Project, I had the opportunity of gaining a very valuable experience of how to apply the theoretical knowledge gathered throughout the four years as an undergraduate to produce important findings for the well-being and development of the community.

There are number of persons whom I must pay my sincere gratitude for their help towards the successful completion of this research project and report.

First and foremost, I would like to express my heartfelt gratitude to my research supervisors Prof (Mrs.) C. Jayasinghe Senior Professor in the Department of Civil Engineering, University of Moratuwa, Prof. M. T. R. Jayasinghe, Senior Professor in the Department of Civil Engineering, University of Moratuwa and Prof. P. Walker, Professor in the Department of Architecture and Civil Engineering, University of Bath who granted me the invaluable opportunity to carry out this research. This research project would have never been succeeded without your assistance and guidance in every step throughout the project.

I would like to deeply appreciate Dr. Shawn Platt, Research Associate, Department of Architecture and Civil Engineering, University of Bath who provided the support, guidance and advices in many occasions and providing worthy ideas and solutions for the problems which arose in the project.

I gratefully thank to Dr. Dan Maskell, Department of Architecture and Civil Engineering, University of Bath who encouraged us to complete this project successfully.

I am thankful to Dr. H.G.H. Damruwan and Dr. J.C.P.H. Gamage for evaluating and giving me valuable instructions regarding the research findings I have in this research study.

I would like to show my profound gratitude to Ms. K.P.I.E. Ariyaratne and Mr. H.A.D.G.S. Jayathilake who gave me a tremendous support to conduct the research throughout the year.

Finally, I pay my appreciation to Mr. N.L. Dissanayake, Mr. H.T.R.M. Thanthirige, Mr. M.L. Perera, Mr. P.P.R. Peris, Mr. L.H.K. Chandana and all other non-academic staff of Department of Civil Engineering, University of Moratuwa who helped me in experimental work.

Thank you,

R.M.G.B. Ranasinghe

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20.06.2020.

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