AIN SHAMS UNIVERSITY
FACULTY OF ENGINEERING
Structural Engineering

Evaluation of Protective layers on Masonry Structures against Impact

A Thesis submitted in partial fulfilment of the requirements of the degree of
Master of Science in Civil Engineering
(Structural Engineering)
by

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Date:04 September 2018

Statement

This thesis is submitted as a partial fulfilment of Master of Science in Civil Engineering Engineering, Faculty of Engineering, Ain shams University.
The author carried out the work included in this thesis, and no part of it has been submitted for a degree or a qualification at any other scientific entity.

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Thesis Summary

Hydraulic structures in Egypt are considered to be one of the oldest buildings throughout the world and its system is considered to be one of the most complex. The strength of these structures reduced due to deterioration in masonry elements for the hydraulic effect of the water. Impact load due to ship collision and debris on hydraulic structures is one of the most significantly decreasing factors that affect its durability of these structures. This necessitates the use of unusual techniques that would enhance the efficiency of operation and upgrade of such structures to current codes of practices.

One of these techniques is the use of different cementious mixes as a protective layer on masonry hydraulic structures, these mixes are tested and prepared in the lab with different admixtures as (Plasticizer, Adhesive, Fiber, Rubber, and Fly Ash) with different ratios for Fiber (3% & 4%), Rubber (30% & 40%) as sand replacement by volume. The standard compressive, and splitting strength tests were conducted to judge the effect of the added admixtures on concrete behavior. Moreover, impact testing program was applied to specific specimens, with dimensions 200 mm width and height, and 50 mm thickness. The number of blows to first crack load and ultimate was determined. The relationship between the mechanical properties and impact resilience is also presented. The results showed that as the percent of fiber increased, the resistance to impact increased. The variation in results was discussed. Fiber-4% of the sand volume exhibited the best impact resistance, estimated about five times over control mix, with ratio of 83% reduction of compressive strength.

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