HEIGHT LIMITS FOR REINFORCED CONCRETE WALL-SLAB RESIDENTIAL BUILDINGS

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DECLARATION OF THE CANDIDATE AND THE SUPERVISOR

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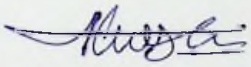

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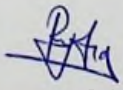

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ABSTRACT

It is common in urban areas for medium rise residential buildings to be constructed with a scarcity of land. With rapid urban growth in developing countries like Sri Lanka, it is crucial that low income families are provided with better living conditions. Construction of residential buildings with higher number of stories for low income families in Colombo has already started and further plans for constructing more buildings are likely. In order to eliminate the space taken by columns and beams in vertical and horizontal spaces in each floor and to reduce the time spent for partition wall construction, reinforced concrete wall-slab structures are arguably the best structural form for residential buildings.

In this research, the wall thickness requirements in several codes of practices were analyzed to select the minimum possible wall thickness with respect to durability and fire requirements as well as practical feasibility. Three building layouts were generated with approximately similar floor areas, wall densities and number of stories but with different aspect ratios and modeled using computer software. By using the maximum stress figures obtained from the analysis, calculations were made to predict the maximum number of stories achievable with selected wall thicknesses in each building. Further a seismic analysis was done for all three buildings to compare their behavior under an earthquake.

Comparing several codes of practices and considering practical feasibility, the minimum wall thickness for double layered reinforced concrete walls was obtained as 180mm and for single layered reinforced concrete walls as 130mm. The maximum stories achievable in buildings with aspect ratios of 2, 1.15 and 6.7 ranged from 16 to 8, 16 to 8 and 14 to 8 respectively, depending on its grid spacing (i.e. whether 3m or 6m) and wall thickness (i.e. whether 180mm or 130mm). Buildings having aspect ratios of 2 and 1.15 with 12 stories showed sufficient capacity under seismic action too.

Key words: Reinforced Concrete, Wall-slab structures, Wall Thickness, Aspect Ratio, Seismic Analysis

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