

**ECONOMIC DESIGN OF REINFORCED CONCRETE
STAIRCASES FOR TWO-STOREYED HOUSES**

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ABSTRACT

In the past, two-storeyed houses were predominantly used by affluent people to display their social status with spacious and numerous activity spaces, expensive finishes, and lavish fittings. Due to scarcity of land and the ready acceptance of small plots of land of even 5 perches in extent for construction of houses, a new class of economical two-storeyed houses has emerged to cater for the housing needs of middle class people. This trend has created a high demand for cost savings in two-storeyed houses. In such houses the staircase is a very important and indispensable item where drive towards cost savings during planning, designing and construction stages can result in economy both significant and worthy of the extra effort. Although highly respected internationally used standards are available for staircase planning and design, these standards often contradict each other due to varying practices prevalent in those countries. Thus this is a need in Sri Lanka for guidance on staircase planning and design for local usage, and a research study on staircases was considered opportune. This study addresses the above issues on staircases for economic range of staircases in two-storeyed houses.

The investigation consisted of a literature survey, a design study, a cost study, and a qualitative study. The literature survey was directed to formulate guidelines on planning of staircases for economic two-storeyed houses. The design study focussed on production of economic designs going beyond traditional structural design process, using structured optimization by minimization of cost on four types of staircases (single flight, ninety degree turn double flight, hundred and eighty degree turn double flight and triple flight) suitable for economic two-storeyed houses. The cost study provided cost information for structural optimization of the design solutions, as well as comparing costs of the four dissimilar staircase types considered which are not amenable for direct comparisons, after making appropriate assumptions. The qualitative study dealt with 14 other criteria relevant for selection of a staircase type, apart from economy and safety provided by a design study.

The literature survey resulted in the formulation of guidelines for planning and design of staircases with special emphasis on local usage and on economic two-storeyed houses. The design study provided economic simplified designs for the four staircase types considered, while the cost study focused on highlighting information where a user can select a cost effective staircase, from among the four staircase types considered, with reasonable accuracy. Finally, the qualitative study gave guidance to the user on inclusion of often important criteria relevant to staircases, in addition to safety and economy, for selection of a staircase type for a particular house plan in a rational manner.

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