RESOURCE OPTIMIZATION WITH THE USE OF PRECAST SLAB SYSTEMS

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DECLARATION OF THE CANDIDATE AND SUPERVISOR

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K.G.Janaka Date: 02nd August 2019

The above candidate has carried out research for the Masters dissertation under my supervision

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ABSTRACT

Resource optimization is one of the key themes of sustainable development. With the fast growing construction industry over the past few decades, the consumption of natural resources has been on the rise. Rapid urbanization in Sri Lanka demands more and more multistoried buildings, resulting in a large quantity of resource utilization. The slab system which consumes lots of material and time is a key element of multi-storied structures. The slab system also creates the highest amount of construction waste to the environment. Therefore, the research covered in this paper has been focused on a novel slab system developed with optimized resource utilization.

The proposed slab system comprised of a pre-cast plank system designed as a hollow slab consisting of 60 mm thick precast concrete panel, lightweight filler material using compressed straw boards and an in-situ screed concrete layer on top. The precast paels of 5 m span and 1.2 m wide consist of two trusses and BRC mesh.

The proposed slab system optimizes material consumption in the form of false work, formwork. The reusable steel mold used as formwork eliminates the use of timber and plywood. Erecting and assembling the proposed pre-cast system will consume much less time compared to that of in-situ construction. Steel shutters will create a better surface finish so that the systems need less labour and material for the application of finishing coats. Pre-stressing of the slab can further optimize the system by reducing reinforcement requirement.

The propose slab system can promote cost effective construction with optimized use of materials and labour resulting in faster construction and higher quality of the end product compared to the conventional slab system. Reuse of waste products such as paddy straw as a filler material and also reusing steel molds will further enhance the life cycle cost in the form of environmental benefits.

Keywords: Precast concrete; Slab construction, Resource optimization, Sustainability

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LIST OF ABBREVIATIONS

Abbreviation	Description
ICC	International Construction Consortium
SBS	Suspended Beam Slab
NERD	National Engineering Research and Development
GDP	Gross Domestic Product
ADPT	Analytical Design Planning Technique
GI	Galvanized Iron
CECB	Central Engineering Consultancy Bureau
BRC	British Reinforcement Company
SKL	Skilled Labour
USKL	Unskilled Labour
NDT	Nephrology Dialysis and Transplant
SLS	Sri Lankan Standard
CS	Conventional Slab
PPS	Precast Plank Slab

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