2nd International Conference on Emerging Trends in Science, Engineering & Technology
Mahratta Chamber of Commerce, Industries and Agriculture, Pune (India)
29th - 30th September 2018 www.conferenceworld.in ISBN :978-93-87793-46-0

APPLICATION OF U-BOOT AND SISAL FIBRE IN DEVELOPMENT OF LOW COST SANITATION FACILITY ENCLOSURES

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ABSTRACT

Sanitation facilities in India even to date remain sparce and costly and hence un-available to the major Indian population. The project work will include the design development and testing of permutations of the above said methods and thereby proving their effectiveness in terms of cost saving, time saving and durability. In order to reduce the cost and increase strength and durability of the enclosures sisal fibre will be introduced in the casting of the enclosure in conjunction to application to u-boots. Project work will include the design, development and testing of concrete blocks without application of u-boots and with application of u-boots in two layout configurations. Then the optimized layout will be used with application of sisal fibre to determine its strength and weight. Finally a prototype of Sanitation enclosure with overhead tank will be developed and tested for permeability and seepage.

Keywords: U-boot Technology, Sisal Fibre reinforced concrete, cost saving, mechanical properties

1. INTRODUCTION

Lean construction (LC) is a method of production aimed at reducing costs, materials, time and effort. Essentially, the methodology is to minimize the bad and maximize the good. Using the principles of lean-construction, the desired outcome would be to maximize the value and output of a project while minimizing wasteful aspects and time delay. This outcome is produced when standard construction approaches are merged with a clear and concise understanding of project materials and information and two sets of management archetypes, planning and control. This can only be done by strategic planning and action by a management group and with the help and aid of all workers.

It should be understood that lean construction is a philosophy with principles and ideologies, but it is not a concrete plan of action with set tools and methods. The basic principles include: creating a predictable atmosphere based on planning and data, reducing the overflow of waste from careful planning and increasing the communication flows between the customer and the project at hand.

2. LITERATURE AND REVIEW

2.1 "STRUCTURAL BEHAVIOUR OF REINFORCED CONCRET EELEMENTS IMPROVED BY LAYERS OF ULTRA HIGH PERFORMANCE REINFORCED CONCRETE" by John Wuest

6th International PhD Symposium in Civil Engineering Zurich, August 23-26, 2006

The purpose of this paper is to know the experimental investigation which was comprised of six UHPFRC-concrete composite elements. The investigated composite elements combine a reinforced concrete central core with two UHPFRC layers with the objective to increase the load carrying capacity and to improve durability.

The goal of this study was to investigate the UHPFRC layer restrained shrinkage under a high degree of restraint and to test the elements in bending up to failure.

The main conclusions are that the UHPFRC layers provide an increased stiffness under service conditions and the composite elements structural behaviour was not influenced by varying the change in interface roughness

2.2 "The Comparative Study of Lightweight Slab Solutions in Terms of Construction Cost" by 1) Renata Bašková, 2) Mária Kozlovská, 3) Alena Tažiková and 4) Zuzana Struková

These construction systems were examined: U – Boot, Quad– Deck, a beam-based monolithic slab and a slab made of prestressed panels. The mentioned lightweight slab systems were compared on the basis of a case study of construction project. The construction cost is determined on the basis of special budget. Moreover, based on two-criteria optimisation analysis, an optimal variant of the lightweight slab structure is selected.

The study results related to comparison of construction cost of innovative lightweight slab systems of traditional lightweight slabs as the beam which are much useful in construction practice.

It can be concluded that the modern voided slab systems are suitable mainly for specific cases of construction projects where construction cost is not decisive or traditional solution may not be used.

2.3 "Strength and durability evaluation of sisal fibre reinforced concrete" by K. V. Sabarish

International Journal of Civil Engineering and Technology (IJCIET) Volume 8, Issue 9, September 2017.

The purpose of paper is to know the Ordinary Portland cement (OPC) of grade 53 conforming to IS 12269-1987, good quality river sand as fine aggregate and crushed granite stone as coarse aggregate with maximum size of 20mm conforming to IS 383-1970 and portable water were used. The well-known natural fibre named sisal fibre

with maximum available length of 300mm was cut into smaller lengths of 10mm with aspect ratio of 100 and this was used throughout the experiment.

Conclusion -The addition of natural sisal fibre composites improved the workability about 29% without polymer. The increase of compressive strength, split tensile strength and flexural strength is about 13%, 15.5% and 12% for sisal fibre concrete. As overall, the strength and durability parameters are found to have positive impact on sisal fibre composites in the presence of natural rubber latex polymers.

2.4 "Structural Audit of Buildings" by A.B. Mahadik1 and M.H. Jaiswal

International Journal of Civil Engineering Research.

ISSN 2278-3652 Volume 5, Number 4 (2014), pp. 411-416

The purpose of this paper is to know the need of structural audit which is for maintenance and repairs of existing structures whose life has exceeded the age of 30 years to avoid any mishaps and save valuable human life. The concrete is widely used as construction material being inexpensive, easy for construction, applications and because of it high strength-cost ratio.

The main purpose of the audit is:

- Have minimal risk factor of life
- Know the life of the bridge
- Repair the cracks developed
- To increase the strength of the bridge

This paper deals to create awareness amongst the civil engineers, residents and owners of building towards the health examination of existing concrete buildings called as Structural Audit.

3. PROBLEM STATEMENT

Significant research remains to complete the translation to construction of lean thinking in several areas of construction. Sanitation facilities in India even to date remain sparce and costly and hence un-available to the major Indian population. Hence developmentof low cost and durable sanitation facility enclosures, which is an important application of the lean construction.

4. CONCLUSION

Using above materials and having less waste can greatly reduce all around costs. Although the philosophy of lean construction is focused on overall reduction, not just for profit, utilizing this methodology has shown to increase the bottom line. Construction time can greatly be reduced by increased planning and strategic vision.

Decreased stress for workers and management due to fewer workers. Increased job satisfaction resulting in more performance commitment. Finally a prototype of scaled model of Sanitation enclosure with overhead tank will be developed and tested.

5. ACKNOWLEDGEMENT

First of all we are thankful to Indira College of Engineering for their financial and logistical support and providing necessary guidance concerning projects implementation.

We are also grateful Prof Sujta Deo for provision of expertise, and technical support in the implementation. Without their superior knowledge and experience, the project would like in quality of outcomes, and thus their support has been essential.

We thank our colleague's form who provided great insight and expertise that greatly assisted the research, although they may not agree with all of the interpretation of this paper.

Nevertheless, we express our gratitude toward our families and colleagues for their kind co-operation and encouragement which helps us in completion of this project

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