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A Review on Study of Rehabilitation and Repair Techniques of R.C.C. Building

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Abstract: Cement concrete reinforced with steel bars is an extremely popular construction material. One major flaw, namely its susceptibility to environmental attack, can severely reduce the strength and life of these structures. External reinforcement using steel plates have been used in earlier attempts to rehabilitate these structures. The most important problem that limited their wider application is corrosion. This project emphasize on Rehabilitation of R.C.C. structures. The purpose of this project is to highlight the various techniques of repair and rehabilitation methods to be undertaken for structures with defects and deficiencies that necessitate rehabilitation. Repair and Rehabilitation methods currently used are reviewed on the basis of present knowledge and the merits of a holistic system approach. This project focuses on visible symptoms of the problem rather than on invisible problems as well as the possible causes behind them. This project focuses on various techniques and repair materials used for the satisfactory performance of the repaired structure. This project presents an analysis of concrete illnesses, and problems leading to unsatisfactory performance of repaired concrete structure. This project describes the analysis the types of surface preparations that are commonly adopted in Indian conditions. This project highlights the problem of reinforcing steel corrosion in concrete structures and attempts to provide the remedial measures available in design to mitigate the effects of corrosion. In view of these limitations the various types of coatings are available and the precautions to be taken in the selection of coatings systems are also discussed. This also highlights the importance of epoxy resins and various methods of epoxy in the construction applications such as repairing of cracks, patching, grouting of concrete, structural adhesives and anti-corrosive linings etc. The conclusive part deals with cost comparison between present approximate estimated cost of new building & rehabilitated building.

I. INTRODUCTION

When we look around us, we will found that there are several similarities between human beings & reinforced cement concrete (R.C.C.) buildings. Just like human being grows old and need medication and care similarly R.C.C. building cannot be over loaded and neglected in maintenance.

Through random renovation and alternation to make an apartment look attractive and actually abuse the structure or its load carrying members by damaging them by the occupants of the building . This can be result in weakening the structure, worse still; perhaps even collapse.

It is imperative to caution occupants that several sound structures have been collapsed, due to careless and negligent interior works and modification. This has resulted in killing innocent people and destroying property worth millions of rupees. There are many health problems of R.C.C. building, which ultimately lead to repairs of buildings. There are large numbers of concrete structures around the world that have been damaged by extreme environmental conditions, overloading or simply as a result in aging. These structures are unsafe to use and need urgently repair for continued use.

II. LITERATURE REVIEW

A. *REHABILITATION OF R/C BUILDING JOINTS WITH FRP COMPOSITES* Author 1)Chris PPANTELIDES1, Chandra CLYDE 2)Lawrence D REAVELEY

Reinforced concrete buildings that were built in the 1960's do not meet current design criteria and behave in a non ductile manner. In this paper, beam column joints of such non ductile buildings are investigated. Half scale R/C corner joints were tested for the purpose of investigating their behaviour in a shear type of failure due to diagonal tension. In addition the as is specimens, an identical corner joints was retrofitted with FRP composites to determine the improvement in ductility and joint shear capacity that could be achieved. The proposed method of strengthening the beam column joints with FRP composites jacket is relatively new; existing techniques include R/C jackets, glued steel plates and X shaped pre stressed collars.

B. REPAIR AND RETROFITTING OF DETERIORATED REINFORCED CONCRETE STRUCTURE Author A.H. AL-Gadhib1, M.H. Baluch2 and M.K. Rahman3 1: Associative professor, Dept. of Civil Engineering, KFUPM, Dhahran 31261 2: Professor, Dept. of Civil Engineering, KFUPM, Dhahran 31261 3: Research Engineer, Research Institute, KFUPM, Dhahran 31261

Concrete is the material most widely used in the construction of reinforced concrete structure including hydraulic structures. There are many diversified applications of reinforced concrete for storage, conveyance and collection of potable water and sea water, irrigation and waste water conveyance and treatment. In the Arabian Gulf, the potential aggressive environment has resulted in corrosion of the reinforcement and subsequent cracking and spalling of concrete. This paper will address the issues related to repair and strengthening techniques of three reinforced concrete structures. The first case deals with the inspection, assessment and repair strategy of mosque in Dammam. Investigation of structural distress and cracking a newly constructed sea water conveyance structure and the suggested remedial measure for mitigating the problem are presented in the second study. Finally, strengthening and monitoring of a distressed reinforced concrete structure that support a cylindrical tank, using carbon fiber reinforced plates (CFRP) is addressed. System approach. This paper focuses on visible symptoms of the problems rather than visible and invisible problems as well as the possible causes behind them. This paper focuses about the repair material and techniques used in since the use of appropriate repair material and the techniques is essential for the satisfactory performance of the repaired structure. This paper present and analysis of concrete illnesses, curing treatments, and problems leading to unsatisfactory performance of repaired concrete structures. This paper describes the types of surface preparation that are commonly adopted in Indian conditions and their limitation. An attempt has been made in this paper discuss the properties and types of grouts, the application techniques the paper highlights the problems corrosion of reinforcing steel in concrete structures and attempt to provide the measure available in designed to mitigate the effect of corrosion. The various type of coating available and the precaution to be taken in the selection of coating system in view of these limitation are also discussed. This present a review on the use of silica fume to control damaging alkali –silica reaction in concrete, with popular emphasis on the development of a new standard practice. In particular, the latest information on important technical findings pertaining to hot deep galvanizing is discussed. This highlight the importance of epoxy resins and systems in the constructions, civil engineering applications such as repairing of cracks, patching and grouting of concrete, industrial flooring, structural adhesive, anticorrosive lining, etc. This also discusses how electrochemical repairs of reinforced concrete structures are proving to be highly effective in term of durability, life cycle costing and the ability to extend concrete protection beyond the boundaries of localized patch repairs the conclusive part deals with modern trend such as carbon fiber reinforced concrete plastic (CFRP), which offer a promising solution to the ever growing problems. The paper emphasize on rehabilitation of RCC structures. The purpose of the paper is to highlight the methods of repairs and rehabilitation to be undertaken for structures with defects and deficiencies that necessitate rehabilitation. Repair and rehabilitation methods currently used are reviewed on the basis of present knowledge and the merit of a holistic.

C. RECENT ADVANCES IN PAPER AND REHABILITATION OF R.C.C. STRUCTURE WITH NONMETALLIC FIBERS. Author 1. Abhijit Mukharji 2. Mangesh Joshi

Cement concrete reinforced with steel bars is an extremely popular construction materials. One major flaw, namely its susceptibility to environmental attack, can severely reduce the strength and life of these structure. External reinforcement using steel plates have been used in earlier attempts to rehabilitate these structures. The most important problem that limited their wider application is corrosion. Recent developments in the field of fiber reinforced composites (FRCs) have resulted in the development of highly efficient construction materials. The (FRCs) are unaffected by electromechanical deterioration and can resist corrosive effect of acids, alkalis, salts and similar aggregates under a wide range of temperature.

D. REHABILITATION AND THE BUILDING ENCLOSURE. Author M.C. Baker Division Of Building Research, National Research Council, Ottawa, Ontario

The building envelope provides the separation between inside and outside environments and controls flows of mass and energy. Rehabilitation of buildings usually involves new interior conditions that will normally impose a more severe service environment for the building envelope than existed in the original building. The walls and roofs have to be designed to maintain the separation of the two dissimilar environments without deterioration and this should take precedence over restoration considerations. The paper deals with the upgrading of walls and roofs to increase air tightness reduce rain penetration and conserve energy use. It discusses the effect of insulation on the envelope performance and the types of wall and roof modification that are possible. Exterior cladding and insulation on the exterior of walls, controlled buffer spaces for walls and exposed insulation in the protected membrane mode for roof is considered.

E. SQA (STRUCTURAL QUALITY ASSURANCE) FOR REPAIR AND REHABILITATION OF STRUCTURES. Author 1) Prof. R.G. Limaye President Aryan Engineers and Devendra Limaye Executive director of Aryan Engineers

Quality of education of repairs and rehabilitation is a cause of concern to the structural designer and owners. Being a heterogeneous combination of old and new material, affected further by bonding between old and new materials, standard NDT techniques are not directly applicable to assess the strength gain for the structural members. Using various NDT methods, this paper intends to highlight typical methods used to ensure execution of repairs and rehabilitation to deliver assured quality. In addition to the technical aspects, the paper analyzes the root causes of quality issues, methods to overcome the same, use of latest computing and mobile technology for mass adoption. Finally a techno-commercially feasible methodology is proposed in tandem with PMC and execution agency for early detection and prevention of causes thereby assuring quality.

III. SCOPE OF PROJECT

- 1) The present study only the static axial load is considered one can check the behavior for seismic, eccentric loading, lateral loading etc.
- 2) One can fix the required strength after jacketing and can change the grade of concrete and size of jacketing.
- 3) Present study shows the behavior of column after jacketing with same size but different grade of concrete one can check the behavior of other building element such as beam, slab, foundation etc

IV. CONCLUSIONS

Following conclusions are made from present study

- 1) For repair and strengthening of column R.C.C. jacketing are the suitable method
- 2) Study of different grades column jacketing is important to find out the behavior of column after jacketing.
- 3) It is also necessary to find out cost comparison between different grades. From the present study it is observed that as the grade of concrete jacketing increased the strength of the column and cost of material also increased

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