

STRUCTURAL AUDIT ON WATER TANK BY USING REBOUND HAMMER AND ULTRASONIC PULSE VELOCITY METHOD

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Abstract: In case of construction the life cycle of a structure can be divided in four phases as architectural planning, structural planning, construction and maintenance. Every structure has its own service life and it should stand stable on its position. But because of less importance to the maintenance collapsed mechanism has increased day by day and structure getting collapsed before its service life is completed which leads to the loss of properties and life of human beings. Concrete is considered as a durable material but it is potentially to deterioration, unless certain precautions are taken. Life enhancement of distressed concrete structures depend upon number of factors such as design, detailing, materials, used in the original construction, quality control, environment as well as periodic inspection and regular maintenance. The assessment of concrete structures consists of not only evaluation of the present condition but also prediction of the cause of damage and residual life. Hence, it is essential to have accurate assessment of physical and chemical properties to enhance the existing life of the structure. A proper assessment of the structure is made, it may be economically feasible to repair the damage structure and prolong its life. Number of tests need to be carried out to assess the extent of distress and to estimate the quality and strength of concrete, before taking up any repair measures. These tests can be of non-destructive type (NDT). This report discusses a case study, the assessment of an old overhead reservoir by the NDT methods. A systematic approach for the test results based on NDT is presented for an economical repair procedure and measures. Necessary repair measures are suggested to increase the service life of the structure.



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INTRODUCTION

In India, from 1980 onwards the infrastructure industry witnessed stepping up of public investment and growth in infrastructure industry which results in construction of new multi-storey concrete apartments which are now in the age of thirty plus years. There are many buildings during this period and earlier have reduced strength in due course of time because of structural deficiency, material deterioration, unexpected over loadings or physical damage. If, further use of such deteriorated structure is continued it may endanger the lives of occupants and surrounding habitation. Structural audit is an examination of the overall health of a building to ensure that it is safe, risk-free and habitable. The purpose of a structural audit is to correctly identify parts or sections of a building that may be in need of immediate repair, renovation or replacement. Structural audits are performed by licensed consultants who have the required expertise in civil construction and are empaneled with the government authorities. As the structure gets older and older as time goes it need periodical maintains and checkup to prevent future damages. Health and performance of building depends on its quality of maintains also to prevent the structure from environmental effect one should monitor it time to take the professional opinion. Therefore, it is done to assess the general health of building. The general health

and performance of a building depends on its quality of maintenance as a building grows old, ageing, use and exposure to the environment can affect the health of the building significantly. Therefore, it is advisable to monitor it periodically by taking a professional opinion. Structural audit is a preliminary technical survey of building to assess its general health as a civil engineering structure. It is usually initiated as the first step for repair. This is similar to the periodic health checkup recommended for older people. A methodology for Structural Audit was first prepared by the Indian Society of Structural Engineers. “Structural audit is the inspection or examination of the building, to evaluate the strength so as to improve its appropriateness, safety, efficiency.

LITURATURE SURVEY

In [1] The paper covers the structural audit of the overall structures. According to the author(s), the frame is the heart of the building. It is designed by the structural engineer with the help of bye-laws provided for the structure. Various techniques are used to assess the old frames. The structure is a system of interconnected element to transfer the loads safely to the soil. It is similar to a ‘table’. The engineer will call the legs of table as columns, battens as beams and sheet ply as slab. When a no. of tables is connected horizontally and vertically, they we get a building structure. The structural audit is like checking a patient by a doctor. It is important to know the real status of the old buildings. Before analyzing the structure, we should know the components of structure with inter connected elements to carry the load safely to underground earth. The health examination of concrete building called as structural audi. [1]

In [2] It creates the awareness among all the Civil Engg., the architect's, and the owner of building towards the health inspection of the existing concrete structure. There are many buildings during the period of 15-30 years who have reduced their strengths due to time because of structural deficiency, physical damage or overloading. There is demand of appropriate actions and measure for all such building to improve its function and the performance of building which can increase the life of building. [2].

In [3] The paper offers a synthesis of the design study of an advanced seismic retrofit solution of a low-rise reinforced concrete building. The structural characteristics of the case study building make it Representative of a large stock of similar designed with earlier seismic approach..[3].

In [4] Many parts of country are suffered by earthquake also the lots of damage is occurred due to it.The reinforcement structure are mostly like to damage in It .Normally they are design for vertical load when such a masonry structure is subjected to lateral inertial loads during an earthquake, the walls develop.

OBJECTIVES

- To study and use NDTmethods.
- To identify the defect
- To find damaged area of the building
- To provide a cost-effective solution

Purpose of Structure audit

- To save human life and Property
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- To enhance life cycle of the building structure
- To find critical portion.

PHOTO GALLERY





RECOMMENDATIONS FOR REPAIRS

- Concrete shall be removed where it is in patches are form, at a time only a single column (i.e.C-1, C-2.....C-6).
- Surface shall be clean by water jetting of the columns and beams particularly column no.1,2,4,5,6 and beam no. 1,2,3,4,5,8 due to algae formation on it.
- In Column no.1,2,4,5 and Beam no. 1,2,3,5,6,8 has voids, it should be strengthened by means of grouting with cement paste or concrete paste.
- Intralok Bonding agent should be used to connect proper old and newly fresh concrete,
- The water pipes should be done with anticorrosive coating and the leakage problem should be resolved to avoid the micro problems.
- The internal portion of tank may be damaged due to chlorine present in water.
- It should be clean by water jetting.
- The voids present in tank should be clean by grouting or with proper cement paste.
- The staircase inside the tank should be repair as it is fully damage there is no way for access.
- The cracks on slab of tank shall be fill with cement paste.
- The bottom slab of tank should be done

- cracks in it to avoid leakages.
- The outer plaster of tank where concrete is peeled off it should be done with new plaster by removing old one.

The staircase needs to be replaced with new one for access, because the old staircase is fully broken

CONCLUSION

The detailed methodology in conducting the structural audit of ESR is presented.

- This assessment includes the visual observations and the NDT methods to take test on columns and beam.
- From above observations we conclude that even heavy reinforcement is used but due to less bonding and after some period of exposure the reinforcement corrodes and become harmful for the structure.
- So the strength and serviceability of the structure can be increase by taking necessary actions on time and preventing the leakage problems in structure.
- Based on results it was found that the supporting structures were distress mainly due to voids.
- Necessary repairs measures are suggested to improve the strength and performance of the structure in proper manner.
- Quality of concrete is poor in columns and some beams.
- Pumping Room is also having inadequate strength and having more voids.
- Stability of tank is much better than beams, columns and pumping room.
- AS the values of Ultrasonic Pulse Velocity are varying from 0.23- 4.29, so, the average is near to 2.5 so the integrity of structure is poor.
- The average characteristic compressive strength for beams and columns are ranging avg between 12-18mpa this indicates that the concrete strength is not adequate to carry the design load of the structure

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