

“Structural Audit and Rehabilitation of Building”

Lakshadeep Bhagwanrao Gade¹, Prof. A. B. Vawhale²

¹Student M-Tech Structures, Dept. Of Civil Engg., Shreeyash College of Engg. & Tec, Aurangabad 431010, India

²Assistant Professor, Dept. Of Civil Engg., Shreeyash College of Engg. & Tec, Aurangabad 431010, India

Abstract – In civil engineering field is directly impact to civil society to provide a basic infrastructure in all sectors of human beings. The recent time various problems occurred in the building like damages and collapse at age of above 30yr and to this problem are avoided they need to structural audit. Audit is a health monitoring of whole building. Structural audit give idea about current condition of building and necessary measures taken so that the life of building can be increased. And they can also suggest some rehabilitation and retrofitting techniques. Like beam strengthening, column strengthening & slab jacketing. The structural audit should be carried out following standard norms methods of NDT test and code provisions.

Key Words: Structural audit, NDT method, Structural evaluation program, Core extraction test.

1. INTRODUCTION

The structural audit is a monitoring of overall health of building to ensure that risk free and safe. The purpose of audit is correctly find out the parts and sections of a building that may need immediate repair and rehabilitation or replacement. Structural audit are performed by registered consultant who have the required expertise in construction field and empaneled with the government authorities. A structural audit is government mandated. For buildings that are between 15 to 30 years old, the statutory requirement is to conduct a structural audit once in 5 years. For buildings over 30 years, a structural audit must be conducted once every 3 years. The extreme damage is mainly depend upon quality of work at the time of construction. It important to finding current situation of the building and to know the remaining life and rehabilitation are need there need of redeveloped building. By performing the structural audit there was the human life and also economically can be saved. This articles deals with different units of structural audit including NDT visual inspection and core sampling. The main issue that occurs in the structural audit is that the society are not aware about audit and its importance. Repair and rehabilitation is the fastest growing factor of the civil engineering filed. The defects of the building are takes place due to wearing action climate condition like tsunami, earthquake condition flood cyclones defects in construction and others parameters are responsible. The selection and evaluate of repair materials like strengthening and protective coating is receiving more attention on civil engineers in the recent past.

1.1 Rehabilitation of Building

Rehabilitation of building are involves the changing and upgrading of structure like foundation change. Rehabilitation and retrofitting aims to strengthen a structure to satisfy the requirement of the current codes for seismic design. Thus, the rehabilitation of buildings can be understood as the set of operations which aim to increase the level of quality of building systems, so as to achieve compliance with functional requirement standards which are stricter than those planned. In ordinary rehabilitation include removing wall plastering. In the rehabilitation new advance techniques are used various materials like chemicals epoxy injection and others.

1.2 Structural Audit of Building

Structural Audit is examination of building to check the life of building to carry out the various NDT test. We can check the serviceability of the structure is judged based on standard values. It is an activity where actual data related to civil structures is observed measured, registered and conclusions are drawn. Audit is conducted by all types of technical staff such as auditor and contractors with almost identical objectives to check that the existing structures behave as intended. It important to know the current status of building to know the remaining life or the repairs are needed there is need of development of the structure. The Audit helps to understand critical areas to repair and enhance life cycle of building by suggesting preventive and corrective measures like repairs and retrofitting.

1.3 Retrofitting Techniques

- 1 Strengthening (column and beam)
- 2 Replacement of foundation
- 3 Routing and sealing
- 4 Pre-stressing steel
- 5 Surface treatments & grouting

2. OBJECT OF PROJECT

This article are include the principal of Nondestructive test method are considered in some detail with a view to establishing a definite role for them in the Structural Evaluation Program. And also to recognized and identifying

the defects and deterioration. To find the status of structure and predict future possibilities and also identifying the defects of building to the repair and free from any difficulties. The key role is to the setting of agreed standards and suggestive measures both for the execution of each surveying method in the field and understand the actual data obtained as an integral part of the investigation project.

3. METHODOLOGY

3.1 Understand the basic concept of audit

First to understanding the actual concept of the audit and its methods and deal with accordingly.

3.2 Define the problem on broad

After analyzing the problems in structure it is important to define broadly and widely to understand issue.

3.3 Discussion with professionals

Before doing actual audit it is important rather necessary to discuss major problems and possible scenarios related to structure

3.4 Preliminary survey and supporting topic of project

Thorough preliminary survey supporting the topic of project was done which made it very clear about the topic and what methods we can use.

3.5 Study of plan of building

After deciding the topic study structural plan of the building. If the structural plan is not available, the same can be prepared by any Engineer.

3.6 Visual inspection

By professional structural engineers can understand the basic problems or defects of structure by visual inspection only on the basis of actual field knowledge and past experiences. So the visual inspection plays a key role during structural audit. Major cracks and seepage in beams, columns and slab can be detected by visual inspection and by using some audit tools and instruments.

3.7 Identification of critical areas

To identify the critical area of the structure like seepage of water and cracks of column and beam.

3.8 NDT tests

To perform NDT tests depending upon defects in structure.

3.9 Results

After performing NDT tests obtain the results.

3.10 Suggestion based on result

After obtaining the results, we will analyze and final report of the project work will be prepared and suggest the actual solution.



Fig cracks and damages



Fig Retrofitting of column



Fig Seepage through slab

RESULTS & DISCUSSION

Repair/Rehabilitation of G+1 building at Beed, India

Structural Audit Report:

Name of the Building: Godavari Niwas

Description: House

Address: Beed. 431122

MH, INDIA.

Type of Structure - RCC Building of G+1 floors

Type of Structure – RCC

No of wings & stories - 2

Description of Building

Year of construction-Jun 1992

Age- 30 years

Effects of monsoon – Yes

Ultrasonic Pulse Velocity Test

Table Reading of column, Beam, Slab

SR. NO	MEMBER	DISTANCE (mm)	TIME (Sec)	VELOCITY (Km/Sec)	METHOD
1	Column	400	62.7	4.78	Direct
2	Column	230	46.4	4.34	Direct
3	Column	250	52.2	3.521	Indirect
4	Beam	300	131.4	3.283	Indirect
5	Slab	150	211.8	3.267	Indirect

RECOMMENDATIONS

According to standard practice audit should done once in 5 years for building life is below 30 years and once in 3 years where as building life exceeds 30 years.

It can be said that some structural members of the buildings are suffering from Class 2 Damage

It is felt that there pair work should start at earliest to avoid further deterioration of the structure

The repair work should include strengthening of beams, plastering, waterproofing, etc. Leakages were observed in pipes at various locations on top floor

To avoid this problem all vegetation should be removed at the earliest. Quality of RCC was found poor as the result of ultrasonic pulse velocity test & rebound hammer test performed at various locations.

CONCLUSIONS

Audit and non-destructive tests are plays an major role in actual dealing with problems

The cracks are repaired to epoxy injection by routing method.

Building is suffering from class 3 damage. (Class 3 damage stands for observation like structural cracks, seepage etc.) Needs to resolve by retrofitting techniques.

According Health Rating Index, the building should be safe for living after some routine repairs.

At the time of performing NDT tests, it is observed that various columns, beams and slabs whose quality and strength is not well as it seem from outside by visual inspection.

After doing carbonation test structure is found that it not be affected as much as by the corrosion as it's seems by visually

According to building bylaws and rules structure should audit in some intervals continuously and doing proper retrofitting to make sure structure should be safe for living.

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