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STRUCTURAL AUDITING OF OLD BUILDING

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***Abstract*— Generally structural audit is check up of performance of a building. It is used to investigate risks to a building. Structural audit is the technical survey of a building to evaluate strength so as to improve safety & efficiency. Structural audit is generally refer for older residential building, commercial building, industrial building & bridges, roads, etc.**
It is the process which suggests proper repair measure for a building so that structure will become safer and stable in its service life. It is the visual survey. The periodical structural auditing and diagnosis of older building find out present serviceability and structural feasibility of structure.

***Keywords*— Structural Audit, Visual inspection, NDT, Repair**

I. INTRODUCTION

In our country there are so many buildings which have reduced there strength and stability. If we use such deteriorated structure, it may be dangerous for the occupants as well the surrounding tenement.

Deterioration of building depends upon various factor such as corrosion of steel, weathering effects on structure, dampness, expansion and contraction of concrete due to temperature variation, etc. During the life span of structure building reduce its strength because of material deterioration.

Structural audit is a analysis of building in which diagnosis of cracks and damages carried out. In structural audit visual survey is carried out or NDT is carried out if it is necessary and then all the observations and recommendations are listed out in structural audit report.

II. NEED OF STRUCTURAL AUDIT

According to Bye-Law no.77 for co-operative Housing societies, when age of building up to 15-30 years structural audit is necessary. If the age of structure is more than 30 years structural audit should be carried out once in 3 years rather than it should be carried out once in 5 years. If any building found in bad condition, its structural audit is carried out after monsoon since the seepage problem will be more clear at that time.

Structural audit is generally carried out to check the current status of building to ensure that is structure in working condition or not so we can avoid any injury and loss of life.

III. OBJECTIVES

1. To identify the type of structural faults.
2. To know signs of material deterioration.
3. To compute critical areas of structural.
4. Diagnosis of deprivation.
5. Finding current strength of building.
6. To enhance life of structure by giving appropriate remedial measures.

IV. LITERATURE REVIEW

Swapnil U Biraris, Aishwarya G Gujrathi, Abhishek D Pakhare, Anjali N Satbhai, Pournima K Vispute conclude that Structural audit isprocess of analysis of building and this process recommend a appropriate repair and retrofitting measures needed for the buildings to perform better in its service life. structural audit is an significant tool for knowing the real health status of the existing buildings.

Patil S.R., Prof. Sayyed G.A. studied that structural audit is a introductory technical survey of a building to assess its common health as a civil engineering structure. It is usually stared as the first step for recuperate. In this Project a Root Cause of a defective mechanism of structure and a disincentive measures to outflank a failure of this structures.

A. B. Mahadik, M.H. Jaiswal conclude that there are many buildings during 30+ period and earlier have allay strength in due course of time because of structural defect, material decay, unexpected over loadings or physical damage. If, further

use of such decayed structure is continued it may endanger the lives of occupants and surrounding tenement. There is demand of aright actions and measures for all such building structures to improve its performance and restore the desired duties of structures which may leads to increase its functional life.

K. R. Sonawane, Dr. A. W. Dhawale conclude that most of the building constructed in last 23 to 30 years is in severe structural distress and require to repair, hence these building needs a periodical survey from structural point of view to asses from structural health. This paper deals with methods of estimating the audit of old structures whose life has crossed the age of 30 years. Such an investigation can be carried out using the following methods: a) Visual examination b) Non Destructive Testing c) Partial Destructive Testing.

V. METHODOLOGY

Structural audit carried out by using different methods –

Generally structure audit performed by using following methodology.

1. Structural audit done by visual inspection

In visual inspection cracks on wall, there length and width, condition of columns, beams, flooring tiles, toilets, doors and windows, external and internal plastering, condition of foundation are inspected visually.

Following points are consider during visual inspection

- Is any settlement in foundation.
- Any small or large crack in any component of building.
- Exposed steel reinforcement / corrosion in reinforcement.
- Any deflection in balconies.
- Dampness in wall.
- Seepage.
- Leakage from roof slab.
- Leakage from Toilet blocks.
- Condition of chhajjas, fins, canopies etc.
- Condition of roof corrugated sheets.
- Condition of door / window and its frame.
- Status of stairs / lift.
- Damaged in external and internal plastering causing exposure of brickwork.
- Paint – type of paint, when last painted.
- Condition of electric fitting from meter room to all flats.
- Availability of building plans
- Is all plans and drawing are available
- Is occupation certificate available.

2. Structural audit by Tapping observations:

Some times tapping observations are carried out by subjecting the beams or columns inside the flat to tapping them by hammer. And some times depth of crack is also check by using chisel.

3. Structural audit by Non-Destructive testing:

Non-Destructive test is carried out on different components of building. It is carried out on special requirement. It gives standard result and present condition of structure.

VI. VISUAL INSPECTION

Present study about structural audit is done on the basis of visual inspection method. This is the initial steps to carry out the structural audit. By visual inspection only visual damages or defects in component of building should be observed. In visual inspection of building cracks, spells, crazing, seepage are thoroughly inspected. Observations are carried out in tabular format and by giving grades to each component according to its current condition. At the same time photographs are taken as shown in figure1 to figure4.

Fig.1
Exposed steel reinforcement in beam

Fig.2
Dampness in wall

Fig.3
Crack in beam

Fig.4
Exposed brickwork

General format of structural audit report

- Name of Building
- Name of owner
- Address
- Contact No
- Year of Construction
- Name of structural Engineer for Audits

General observations

Sr. No	Description	Remark
1.	Type of building	
2.	Type of structure	
3.	Age of building	
4.	No. of stories	
5.	Structural plan	
6.	Building plan approval date	
7.	Occupation certificate date	
8.	Last repair date	

Structural observations

Sr. No.	Description	component	Grade
1.	Cracks	Beam	
		Column	
		Slab	
		Plaster	
		Wall	
2.	Settlement	Foundation	
		Joint at plinth	
		Column	
		Wall	
3.	Leakage and Dampness	External wall	
		Toilet	
		Terrace	
		Slab	
		Water tank	
		Drainage line/pumping line	
4.	Deflection	Beam	
		Slab	
		balcony	
5.	Condition of staircase, balcony ,flooring and ducts		

Note: RCC framed structures are rated by grades as follow:

- Very Bad (VB)
- Bad (B)
- Fair (F)
- Good (G)
- Very Good (VG)

VII. RESULT

The remarks of structural audit should be given in a form of grades according to present status of building.

VIII. CONCLUSION

Structural audit is very important and highly responsible activity which relates with human's lives. Periodic structural audit is necessary to check up serviceability of structure. It suggest repair measures on the problems which are occurs in building based on some investigations and in-depth studies of problems in building. The proper execution of auditing increases life of structure and make it safer for its further use

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