

# Structural Audit of Old Buildings Comparison with Standard Codes

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**Abstract:** As we know that each and every building has life cycle. So it very important to find out the strength of each and every part building like column, beams, slab. In the construction of any structure concrete and steel performs vital role. It generally depends upon what type of concrete, steel used. IS 456:2000 is used for steel. There are several test are performed that is destructive test and non destructive as well. Concrete is used is also depend upon climatic condition as well.

In India generally destructive test are used such as rebound hammer, ultrasonic pulse velocity test, carbonation test. In structural audit we try to find out the life of structure comparing with the standard codes. Because our Indian standard code has solution of structural health of building. In India we are seen that many buildings are suddenly collapse this is due to we don't find out structural health of building. So this necessary to audit of structure after 15 years.

**Keywords :** Structural Audit, Non Destructive Testing, Grouting, Strengthening.

## I. INTRODUCTION

In earlier days we use high quality of steel and concrete that is we use reinforced concrete. For workability we use slump test, vee bee test, standard proctor test. But to find out high workability. we use slump test . Its value should be greater than 150mm for high standard concrete. Its value generally depends upon the type of concrete. We use air entraining agents for increase the workability.

Concrete is comprehensive in nature. There are different grade of concrete which is used on the basis of structural demand. If in construction of high story building we use high grade concrete like it may be above M30. With including plasticizers, air entraining agents.

So this for how to improve the quality of concrete. But after several years due climatic conditions like wind pressure, high temperature, seismic activities there is loss of strength. So we have to perform structural audit. It may be carry out by municipal office or BnC office of every district.

Age of the Building	Structural Audit (Compulsory)
15 to 30 years	Once in 5 years
Above 30 years	Once in 3 years

TABLE 1: Audit Recommendation

## II. METHODOLOGY

Generally for auditing we use non destructive test.

### A) Ultrasonic Pulse Velocity Test:

Generally UPV consist of two nodes. Through these nodes ultrasonic waves got transmitted. And how it time taken on that basis we can calculate its strength of concrete.

Pulse Velocity = (path length)/(Travel time)

Pulse Velocity (In M/Sec)	Concrete Quality
Below 3000	Doubtful
3000-3500	Medium
3500-4000	Good
Above 45000	Very Good

TABLE 2 : Pulse Velocity

### B) Carbonation Test:



Fig 1: Carbonation Test

Substantial Carbonation is tried with the clear utilization of a compound marker; the most normally utilized pointer is an answer of phenolphthalein in liquor and water. Phenolphthalein arrangement applied to new emphatically basic substantial will become pink.

Concrete is fundamentally basic in nature having pH more than 12.6. It is because of its alkalinity that the front of cement shield support from consumption. The erosion prompts the extension in volume of concrete over steel bar. This extension in volume make in concrete.

**Trial of Carbonation:**

Description	Ultrasonic Pulse Velocity Test in m/sec		
	Maximum.	Minimum.	Average.
<b>Basement</b>			
Column	3550	2500	3025
Beam	3300	2450	2875
<b>First Floor</b>			
Column	33001	2400	2850
<b>Second Floor</b>			
Column	3200	2800	3000

TABLE 2: Trial of Carbonation

By breaking a piece a substantial from the principle region and splashing the fundamental surface right away. By penetrating opening into the substantial either at a given profundity or in little additions.

The opening should be flushed out with de-ionized water following the penetrating to keep away from tainting, this is then followed straight with the shower pf phenolphthalein. There ought to be a reasonable imprint showing the contrast among pink and normal substantial shading.

The level of carbonation would then be able to be estimated in millimeters.

**After Effect of The Test:**

The phenolphthalein marker arrangement is applied to a new surface of cement.

In the event that the pointer becomes purple, the pH is above 8.6. Where the arrangement stays dull, the pH of the substantial is beneath 8.6, proposing carbonation. A completely carbonated glue has a pH pf above 8.4

**C) Rebound Hammer Test:**

This is simple tool, which is used to indicate the comprehensive strength of concrete.

**Objectives:**

To determine the comprehensive strength of concrete.  
To check the quality of concrete based on standard specifications.

**Procedure:**

The rebound hammer is held perpendicular to the surface of concrete and gradually pushed until the hammer impact. Take minimum 6 readings should be taken.

**Interpretation of Result:**

Average Rebound Number	Quality of Concrete
>40	Very good Hard layer
30 to 40	Good Layer
20 to 30	Fair
<20	Poor concrete
0	Very poor

TABLE 3: Rebound Hammer Test

**III. OBSERVATIONS:**

As per IS 13311:1992. Here we perform ultrasonic pulse velocity test on building having age above 25 years old. We got different values comparing this value with the table which is given by IS CODE. here we find that different velocities like 3025m/s,2850m/s,3000m/s. We perform this test on first story building.

According to getting values we can say that some column of building in medium condition the strength and some column condition is doubtful. So we can say that building is not in proper strength condition. Now for improve the quality of building we can suggest that there should be use reinforced jacked, where likege in concrete use water proofing like bitumen, Dr fixet.

**IV. CONCLUSION:**

For structure more seasoned than 15 years underlying review ought to be completed once in 3 years. It is seen that primary driver of harm of the underlying individuals is because of consumption and maturing. Erosion in underlying individuals is seen because of sogginess and spillage from the slabs, cracks in dividers etc.

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