

LITERATURE REVIEW ON STRUCTURAL AUDIT OF VARIOUS STRUCTURES

Yash Agarwal¹, Prem Upadhyay², Rohan Majgankar³,

Shubham Gaikwad⁴, Vijay Wairagade⁵

¹⁻⁴Student, Indira College of Engineering & Management, Pune, India

⁵Professor, Civil Dept., Indira College of Engineering & Management, Pune, India

ABSTRACT

In the recent times, there has been incidents related to various collapse of bridges, buildings. This paper deals with the various factors related with the structural audit of the structures. It has been observed that the structural audit of various mega structures is carried out by the civil engineers. But the audit contains various factors which are not similar for every structure. There are some variations in the auditing process and redevelopment of the superstructure.

1. INTRODUCTION

An audit is a systematic and independent examination of various things such as books, documents of an organization, etc. Structural audit is nothing but the checking of the health of the existing structure. This checking is done in accordance to the performance of any structure just like a doctor checks the patient for any injury or health issue. It is important to know the current status of the structure, to know the remaining life or if any repairs are needed or there is a need of redevelopment of the structure. By carrying the structural audit human life as well as a lot of economy can be saved.

2. LITERATURE AND REVIEW

2.1 “STRUCTURAL AUDIT OF BRIDGES” by Ms. P. S. Jadhav, Ms. R.S.Chavan, Mr. G. K. MohiteR. D. Gosavi, Prof. P.S.Shinde (September 2017)-

The purpose of this paper is to create awareness among the civil engineers about the health examination of the bridges. It is very necessary to do regular examination of old bridges. Thus, this paper gives some knowledge on the tests of strength and the major factors affecting the life span of the bridge.

The life span of the bridges is too long. This means there is a great chance of reduction in the strength, increase in challenges like deterioration, natural hazards, etc. there may also be no. of accidents taking place over the bridge. the structural audit ensures that the structure is safe and has no risk.it is conducted by a professional and licensed engineer.

The main purpose of the audit is:

- Have minimal risk factor of life
- Know the life of the bridge
- Repair the cracks developed
- To increase the strength of the bridge

The methodology includes visual observation, destructive testing, non-destructive testing and the climatic changes. In the visual observation general information such as address of bridge, its history, no. of spans,etc. is find out. The structural system of bridge is also known. Additional information such as change of loading, difference in the bridge deck can also be known. Destructive testing of various components is carried by cutting a section through a component and examining the exposed surface. But this is not a great measure as it makes the components useless for its intended use. For this, from past recent years, the Non-Destructive Testing (NDT) is carried. It consists of the rebound hammer test, ultra-sonic pulse velocity test, impact echo test, and many more. The temperature also has a major effect on the bridge. For this purpose, expansion and contraction were allowed by the use of bearings and joints. But nowadays, integral abutment bridges are commonly used which has eliminated the use of expansion joints.

This paper concludes that it is utmost important to carry out structural audit of bridge after certain period of timeso that the performance of the bridge is maintained.

2.2 “STRUCTURAL AUDIT OF OLD STRUCTURES” by Swapnil U Biraris, Aishwarya G Gujrathi, Abhishek D Pakhare, Anjali N Satbhai, Pournima K Vispute (January 2017)-

The above paper gives the information regarding the importance of structural audit and steps involved in conducting it that should be strictly carried out for an old structure. The structures whose life span has been more than 25 years an overall health and performance check-up of structure should be conducted.

It emphasizes on different repairs and retro fitting measure to be used for buildings after structural audit. It also mentions that as humans are mainly accommodated in such structures so it is of prime importance to conduct the audit so that it can help to save life, property and reduces risk factor. We under stood the purpose behind conducting audit where firstly to save human life and property, to understand condition of building, finding critical areas and repair them immediately. We also were able to know comply with municipal requirements as well as suggestive various preventive measures. By conducting the audit, we were able to examine or predict expected future life.

2.3 “STRUCTURAL AUDIT OF RCC BUILDING” by Sanket Sanjay Suryawanshi, Vaibhav Vishnu Vishe, Deepak PremchandSah, Reetika Sharan (2018)-

The paper states the faulty mechanism in the structure and different measures to overcome them. It states that the structure can be residential, commercial or historical monument. The ancient structures had huge impact on life because of its long-life span. But nowadays the structures become less efficient and lose their strength before the design period. So, to prevent any further damage, regular check-ups and health examination of the building is carried.

For co-operative housing society, buildings older than 15 years must have a structural audit carried out every 5 years to know the remaining life of the building. The model bylaw no-77 also states that structural audit is necessary. It states that if a building is 15-30 years old, then audit is carried out every 5 years and if the building has completed 30 years or above that, then audit is taken place after every 3 years.

The main purpose of structural audit of RCC building is to check the damages in the structure and to create reverse strength in the weak elements. The structural audit is carried by visual inspection and the NDT testing. In a case study, the general information of the building was known. The visual inspection was done as per flat and externally. Defects were seen in columns, beams, slabs and were recorded on sheet. Under NDT testing, they performed the rebound hammer test, UPV test and carbonation test to check the strength of beams, columns, external walls, internal walls, etc.

From the tests they concluded that the building was suffering from class 3 damage, repairs were required, vegetation should be removed.

2.4 “STRUCTURAL AUDIT” by B.H Chafekar, O.S Kadam, K.B Kale, S.R Mohite, P.A Shinde, V.P Koyle (2013)-

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.

The purpose of structural audit is

1. Determine the real-time status condition of the building
2. To calculate the remaining life
3. To protect human life
4. To comply the standard codes

The audit is performed by different methods or tests recommended by a professional structural consultant. Firstly, the assessment of structure is done by visual interpretations. During this method, a form is prepared giving rating to various damages as per their importance. In this, the last structural audit is also taken into consideration.

Another way of conducting the visual inspection is by conducting the non-destructive tests on various components such as beams, columns, etc. and comparing the result with standard values. At the same time also take the photographs of the damages seen.

In a case study, it was seen that the HRI of the structure was 6.2068, i.e. fair. This means that the structure is fair.

The paper concludes that for any load bearing structure, the structural audit is necessary as it is good to know the remedial measures to any defects seen in the building. Also, the government is making compulsory to conduct the audits for old structures or structures above 30 years old.

3. CONCLUSION

The paper concludes that for any structure, structural audit is necessary after a certain period of time. There are by-laws provided for the time period after which the auditing of any structure is compulsory. The auditing is commonly carried in two ways, i.e. visual inspection and NDT testing. There is a third way, i.e. Destructive testing, but that makes the component of the structure useless. For this reason, it is rarely used. This way the structural audit of various structures is carried.

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