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Importance of Structural Audit (A Review)

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Abstract - With the study of current process of Structural Audit Framework there is need to find the lacunas in the current process and modify the process for efficient implementation of Structural Audit. This research aims at finding out the lacunas if any in the current procedure and applying management principals to modify the structural auditing process and suggest some improvement measures to the governing body.Methodology adopted comprises of collecting experts reviews on current framework, study of existing structural Audit procedure in governing body and finding lacunas if any in current framework. Currently, Safety of old buildings is one of the critical issues in India. Though, there are many practices to conduct structural audit of such buildings, the issues of structural safety audit remains uncertain due to inconsistency of such practices. The study attempts to evaluate gaps in current such local practices of structural audit of residential buildings. Thereby, intends to offer insights to generate more precise framework of structural audit.

Keywords - Structure. Structural Audit, Impact

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INTRODUCTION

Structural audit is the general health and performance checkup of a building depending on its quality of maintenance. as the building grows old ageing and exposure to environment can affect the health of the building significantly. Therefore, it is necessary to monitor it periodically by taking a professional opinion. Structural Audit is a preliminary technical survey of a building to assess its general health. It is usually initiated as the first step for repair. Structural Audit is an overall health and performance checkup of a building like a doctor examines a patient. It ensures that the building and its premises are safe and have no risk. It analyses and suggests appropriate repairs and retrofitting measures required for the buildings to perform better in its service life. Structural audit is done by an experienced and licensed structural consultant

PAST RESEARCH AND MODELS

Jayakumar J. Shah (2008) says structural Audit is Inspection Report on the condition of the building. Generally visual inspection is required. Non Destructive Testing/Destructive Testing checkup is done in exceptional cases where deterioration is severe.

According to **Dhargalkar (2005)** the structural audit is the general health and performance of a building depends on its quality of maintenance. As the building grows old ageing and exposure to environment can affect the health of the building significantly. Therefore, it is necessary to monitor it periodically by taking a professional opinion.

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According to **A.B.Mahadik (2014),** Structural Audit is an overall health and performance checkup of a building like a doctor examines a patient. It ensures that the building and its premises are safe and have no risk. It analyses and suggests appropriate repairs and retrofitting measures required for the buildings to perform better in its service life. Structural audit is done by an experienced and licensed structural consultant.

I.H. Shah (2008) says Structural Audit is an important tool for knowing the real status of the old buildings. The Audit should highlight & investigate all the risk areas, critical areas and whether the building needs immediate attention. It should also cover the structural analysis of the existing frame and pinpoint the weak structural areas for static, wind & earthquake loads.

Meltem Vatan (2000) says Safety assessment based on qualitative and quantitative data is necessary before making any intervention decision. Mostly surveyors get the qualitative data from a visual inspection of structural damages, decays and deteriorations; research on archive material and literature. Obtaining the quantitative data requires rather complicated methods which necessitate specialists and are time and money consuming.

According to **B.H.Chafekar (2013),** the health examination of concrete building called as “Structural audit" or structural audit is an overall

health and performance checkup of building like a doctor examines a patient.

According to **Martti Lujanen (2010),** Structural Audit broadly consists of two types of surveys. The External Survey covers building faces, common areas (stilts, staircase, terrace, projections etc), surroundings and ancillary structures (pump room, compound wall, water tanks etc). The Internal Survey covers individually owned units such as apartments, shops etc. All units must be surveyed, except those, which are inaccessible. Members can also brief the Consultant about their specific observations/ experiences. The Managing Committee should provide the Consultant with information about the building repair history. Common instruments used are a light tapping hammer, damp detector, spirit level, magnifying glass etc. The Consultant must have adequate experience and good engineering judgment to correlate his observations to draft unambiguous and useful recommendations concerning the general health of the building. Further action by the CHS would depend on the recommendations of the Report.

Yuzo Akatsuka (1994) added further and stated that Failures sometimes occur even in projects that have been executed with thorough planning, surveys, and designs and that have kept focused on established project objectives. The causes of such failures vary widely from case to case. Also, a structure that is technically sound may fail to fulfill its intended social and economic functions because of subsequent changes in the social environment.

According to **Meltem Vatan (2008)** during his study on damage of Historical Buildings, the main cause of failure for old historic building is their long life, historic structures have experienced many actions occurred over long periods of time; endured long term deteriorating effects and earthquake loads. Since historic importance, cultural value and exposure of aggressive environmental loads there is no fixed criterion for evaluating safety of historic structures.

EVALUATION PROCESS

According to By **Yuzo Akatsuka (1994),** while the achievement of the goals identified it is required to establishment of suitable evaluation systems, no effective and pragmatic system of this type has yet been established for public-works projects in Japan (Yamamoto 1989).

According to **Meltem Vatan (2008)** Damage assessment of old Historical Buildings requires both qualitative and quantitative data based on visual observations and specific techniques such as in-situ tests, laboratory tests, numerical models etc. The first step is visual observation which leads to detailed analysis if it is necessary. A detailed inspection require specific techniques, takes more time, money and are applicable to the limited number of buildings

According to Structural Audit is commissioned by appointing a Consulting Structural Engineer registered with the Municipal Corporation of Greater Mumbai (MCGM or BMC). The Consultant carries out a visual survey of the building covering its faces, stilts, staircase, terrace, flats, shops and ancillary structures such as pump room, compound wall, etc. A light tapping hammer, damp detector, spirit level, magnetic compass and magnifying glass are used during survey. Repair history of the building and specific observations/ experiences of the members are also noted. Critical observations, probable causes of distress, remarks on structural health and recommendations for further action are given in the Structural Audit Report.

Building and Control Authority says There is a common misconception that a periodic structural inspection involves only a “visual” record of the observations during a brief tour of the building. Such misconception has to be corrected. The Building Control Act requires the visual inspection to be conducted by a structural engineer who must be a registered professional engineer in the civil or structural engineering discipline, rather than any other person. It is so because of the need for and importance of professional assessment and judgment in structural engineering during the visual inspection. Any other lesser assessment would provide little more than what a lay person could have observed from a casual inspection.

Daniel Chi-Wing Hoa (2008) explains an assessment scheme based on a hierarchy of building performance indicators concerning the quality of (a) architectural design (b) building services design (c) the surrounding environment (d) operations and maintenance and (e) management approaches was developed.

Raffaele Pucinotti (2015) stated that the assessment of existing buildings is an important issue that involves researchers and engineers in many countries. The assessment of in situ compressive strength of a reinforced concrete structure plays a key role in the evaluation of its safety. The study of an ‘ancient’ structure is interesting because it provides information about both the materials and technologies available at the time of its construction and the knowledge of the main physical properties of concrete and its state of conservation. An estimation of concrete strength in existing structures becomes necessary when evaluating their seismic capacity and designing seismic strengthening.

In major cities like Mumbai, the municipal corporations maintain a panel of civil/ structural engineers who are licensed as consultants to carry out structural design of new buildings. Such engineers can carry out Structural Audit. There is no separate panel prepared for Structural Audit. In less urban areas, engineers who are registered with local authorities may carry out Structural Audit. In other

areas where there is no system of registration, engineers who are members of the Institution of Engineers or Indian Society of Structural Engineers may carry out Structural Audit.

CONCLUDING REMARK

Structural Audit is an Overall health Checkup of a Building. Structural Audit should be carried out for every building having age above 30 yrs. General health Checkup of the building can be carried out with the help of Visual Inspection. If further necessary, Non Destructive Test should be carried out depending on the condition of the building. There is no Standard or Legal Procedure of Structural Audit. Structural Engineers have their own formats for report. There is no any serviceability index or Safety Index to assess the building; it completely depends on the experience of the Structural Engineer. The Ratio of old Buildings to Structural Engineers is very low and also the available structural Engineers are busy in new Projects it is very difficult to assess all the buildings. The society is not aware about the Structural Audit process and its Importance. Structural Audit is of no importance if the suggested repair and retrofitting measures are not carried.

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