

# Condition Assessment And NDT Of Building

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*Abstract-Concrete is considered as a durable material but it is still potentially vulnerable to deterioration, unless certain precautions are taken. Life enhancement of distressed concrete structures depend on number of factors such as design, detailing, materials used in the original construction, quality control, environment as well as periodic inspection and regular maintenance. The assessment of concrete structures consists of not only evaluation of the present condition but also prediction of the cause of deterioration and its residual life. Hence, it is essential to have accurate assessment of physical, chemical and electro-chemical properties to enhance the existing life of the structure. If the cause of deterioration is predicted and a proper assessment of the structure is made, it may be economically feasible to repair the distressed structure and prolong its life.as we know that we are facing the problems against the cracking, shrinkages, seepages, etc. to overcome this difficulty there are several techniques. NDT, which means Non Destructive Testing which helps to improve the structural damages after proper testing.*

destructive technique. The main objective of NDT is to determine the strength as well as to avoid the damages or the activity of structural components. The NDT gives the brief idea about the condition assessment of the building and performing the various techniques.

Condition assessment of building which gives the brief idea about the damages, shrinkages, etc. of building. Depending upon condition the suitable methods are conducted, not only one method is applicable to do but also the more over methods are adopted.

Ultra sonic pulse velocity (UPV) is more useful non destructive test, which are so familiar now-a-days and gives the correlation between RH number and UPV reading and to strength of concrete. Ultrasonic pulse velocity is also most commonly used method now a days so it very applicable to all user and hence to improve the strength of building is commonly used. Test procedure is well known described in IS: 13311 Part1 1992.

## I. INTRODUCTION

NDT is the test performing on the actual structure or object without damaging to get strength.NDT allows material to be examined without changing properties or destroying their usefulness.NDT gives quality assurance when it used properly. NDT can be easily investigated for New and old structure also. Thus, NDT methods are extremely valuable in condition assessment of building or structure such as bridges highways etc.

NDT is nothing but a non destructive testing which is generally been used for gaining the actual strength of building or a material or member of structure.non destructive testing is gradually using in construction to check the actual report of strength. Hence this method is used in actual structure to improve the strength and to recommend that the structure is capable to resist the further structure.

NDT truly received a great importance in terms of engineering value and is growing intention during recent years. Non destructive evaluation of concrete are well known and extensively used. It is very important to use the non

Also the Rebound hammer is useful to detect the changes in concrete such as cracks, shrinkages, and seepages. This test is moniterated to the elastic mass depends on the principal which on the hardness of surface of rebound. Test procedure is described in IS: 13311 Part2 1992.

## II. DESCRIPTION OF STRUCTURE

Building name : Vasant Mahal Building Santra Market Marwadi Cut Piece Chal Nagpur-440018

The building has 70 years long span which shows the various damages including seepages, spalling, reinforcement exposed, major and hair cracks.



### III. VISUAL OBSERVATION

1. The building around 70 years old
2. Reinforcement exposed and damaged
3. Concrete portion was fully vanished and only because of it, areas was totally restricted
4. Minor cracks or hair cracks noticed
5. Wall plaster was damaged
6. Spalling observed
7. Vegetation observed in balcony area
8. Balcony and chhajja portion was fully reinforcement exposed from bottom side

### IV. NON DESTRUCTIVE TEST

Keeping in view the visual observations, a comprehensive test programme was planned for condition assessment.

#### A. ULTRASONIC PULSE VELOCITY TEST

Ultrasonic Pulse Velocity test is conducted on critical column and beam locations in the building. The test is conducted as per the procedure mentioned in IS 13311: Part I. Before measuring the pulse velocity using the transducers, a thin layer of grease is applied to testing members so as to act as acoustic coupling between the transducers and the concrete surface.



From this test it is observed that the ultrasonic pulse velocity results with direct, indirect and semi direct method includes that readings are below 3.5 Km/sec, at maximum location. (Refer to IS 13311 ( Part I )1992). "Non destructive testing of concrete is medium and doubtful at maximum location. The readings are taken with indirect method as per IS 13311 (Part I) indirect reading gives less pulse velocity than direct method generally by 1Km/sec.

#### B. REBOUND HAMMER

Rebound Hammer test is conducted on the column faces using an N type Schmidt hammer test for concrete. The test covered critical column and beam locations in the building. The test is conducted as per the procedure mentioned in IS 13311: Part II. For each column, six readings are taken ensuring a minimum distance of 20mm between two successive points. Finally, average of these readings is taken as the representative rebound number for the concrete of that column. Average rebound number which is obtained is to be corrected by considering the carbonation effect. The interpretation of rebound hammer results is carried out based on the guide lines given in BS 6089: 1881 since IS 13311: Part II remains silent in this aspect.



as per rebound hammer test Ref. IS 13311 (part II) 1992 “Non Destructive testing of concrete –method of test, rebound hammer”. The maximum reading confirming M10 to M15 grade concrete.

## V. RECOMMENDATION FOR REPAIR

This building causes a major damages as mentioned above, hence to recover this building and to get strength as well as to increase the life span of building, mentioned some remedial measure as below.

1. All the cover concrete (up to a minimum thickness of 50mm) shall be chipped off exposing the sound concrete.
2. Surface shall be cleaned by sand blasting or water jetting
3. Wherever core concrete has voids and honeycombs, it should be strengthened by means of grouting with cement
4. All the reinforcement shall be cleaned thoroughly
5. An anticorrosive coating shall be applied on the surface of the reinforcements
6. Micro concrete shall be placed in stages of 1.5m. For better bonding between old and new concrete, shear connectors shall be provided
7. After demoulding and curing, the entire exposed surface of the structure shall be coated with a concrete surface coating which will resist the ingress of carbon dioxide and chloride from the atmosphere.

## VI. SUMMARY AND CONCLUDING REMARK

A detailed systematic methodology in conducting the condition assessment of building is presented. This includes visual observation and documentation, ultrasonic testing on structure such as slab, cantilever, etc for assessing the integrity of concrete, core sampling and testing for estimating the compressive strength and water absorption. Half-cell potential measurements were also carried out for assessing the presence of corrosion activity. The test results have been interpreted, and finally assessed the overall concrete quality and integrity. Based on the test results, it was found that the distressing of the supporting structure was mainly due to voids, honeycombing and carbonation of concrete. Necessary repair measures are suggested to improve the strength and performance of the structure in a qualitative manner.

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