MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE

(A Govt. Aided UGC Autonomous & NAAC Accredited Institute Affiliated to RGPV, Bhopal)

A MINOR-PROJECT REPORT

ON

"Condition Assessments of Buildings"

Submitted to

Dr. Abhilash Shukla

HOD Dr. M.K. Trivedi

Submitted by

1. Shivam kumar Namdev
2. Kavita Yadav
3. Akhilendra Rai
4. Amit kanade
5. Shivam Tiwari

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Department of Civil Engineering

Madhav Institute of Technology & Science

May 2022

CERTIFICATE

Madhav Institute of Technology & Science
Gwalior

This is to certify that the project entitled "**Condition Assessments of Buildings"** presented by the students of group-12 in complete satisfaction of the necessity of the recompense of Bachelor of Technology degree in Civil Engineering at Madhav Institute of Technology & Science, Gwalior is a genuine work completed by the students under my watch and direction.

To the best of my insight, the matter epitomized in the theory has not been submitted to any other college/Institute for the recompense of any Degree or Diploma

Under the Guidance of-**Dr. Abhilash Shukla**
Department of Civil Engineering

12/05/2022
Dr. M.K. Trivedi
Head of Department
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Date: 10/05/2022

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Last however not the slightest we want to thank the writers of different examination articles and books that we alluded throughout this undertaking.

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This is to certify that we are students of B.Tech. in Civil Engineering have checked my complete Minor Project-II entitled **"Condition assessments of buildings"** for similarity/plagiarism using the "Turnitin software" available in the institute.

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ABOUT

It is the method to evaluate the present situation of a structure like, residential buildings, commercial buildings, or many other types of buildings. In other words we can say that a

"**Health check of your buildings**"

Source:Construction Workers with Safety first sign Pro Vector

PROBLEM STATEMENT (addressing in everyone mind)

1. Does your building remain safe even after so many years of occupancy without any major maintenance?
2. Are there any hidden threats in your building?
3. What could you do? If there any defects in your building?
4. How serious and urgent are those defects?

"These all today we are concerns in our project called condition assessments of building"

Factors causing building distress

The lack of maintenance causes the building resulting in corrosion and cracking due to degradation/aging of the material and structural components.

Structure are damaged in various grades of damage when they experience over load conditions such as seismic earthquake or disaster storms for which they are not designed.

The building foundation is not properly designed.

It was not designed according to the standard codes of practices.

For example: IRC SP 40 2019 (guidelines of concrete bridges)

Due to lack of all these we have to face such situation

a) Corrosion in the RC slab

b) Failure in column-beam joint

c) Crack in masonry walls

d) Corrosion in RC column

All pictures in taken from www.google.com

Condition assessments are conducted in two levels

1. **Preliminary investigation (site visit)**
2. **Detailed investigation**

Preliminary investigation

To collect the information and details about the given (site) building design, construction, utilization, and maintenance in the past.

To provide building occupants with information about the nature of the building's layout and the range of services and to ensure availability to protect access to work.

Note down the distress based on onseen condition of building

Detailed investigation

To know all objects of distress or lack of design and their locations supported by sketches and drawings and to make a proper report.

To determine the condition of soil and also the foundation (observation)

Structural engineer specialists in various structural components and system can classify the type and severity of damage and decide on further course of action.

To know more about the problems in our building, we do some tests in the already constructed building. In-situ let's see what are the tests?

Concrete test

Pull – out method

It measure the force required to pull a steel rod of extreme hard concrete into which it has been casted at the time of concrete casting.

Use of special steel road whose have enlarge end.

Procedure

It gives direct tensile strength value by tensile fracture.

The insert may be caste into concrete under reamed groove from a drilled hole.

Diameter not exceed 60% diameter of head

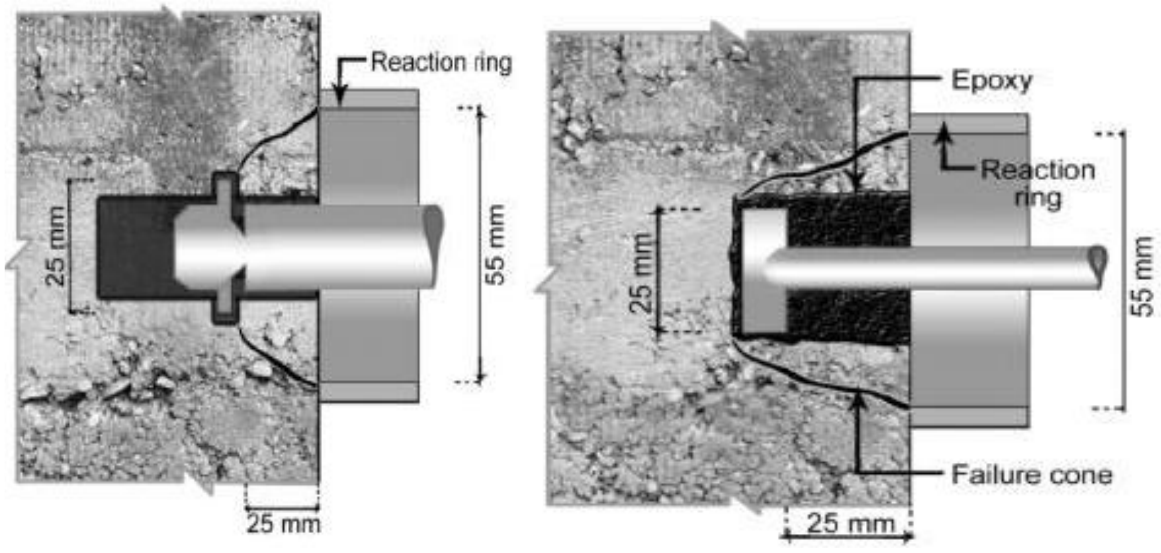

Figure: 1 pull-out

Pull- off method

It is used to measure the direct tensile strength of a concrete.

A metallic disk is placed on the surface of concrete then with the help of core cutter cut the area around the metallic disk with the help of hand mechanism hold the cut area and pull off.

It measure the force required to pull off the specimen from the surface.

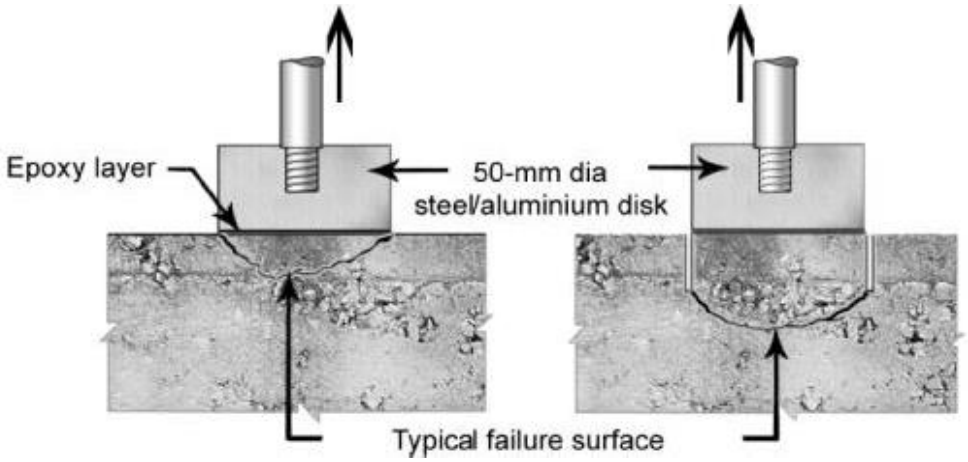

Figure: 2 pull-off

Rebound hammer test

In this test equipments used is rebound hammer

It is used to measure the surface hardness and gives idea about soundness and quality of cover concrete.

If rebound no. Low it indicates weak surface concrete may be affected by corrosion.

Procedure

It is tested against the anvil made of steel having a brinell hardness of about 5000N/mm^2

The rebound hammer held at right angle to the surface of concrete for taking readings.

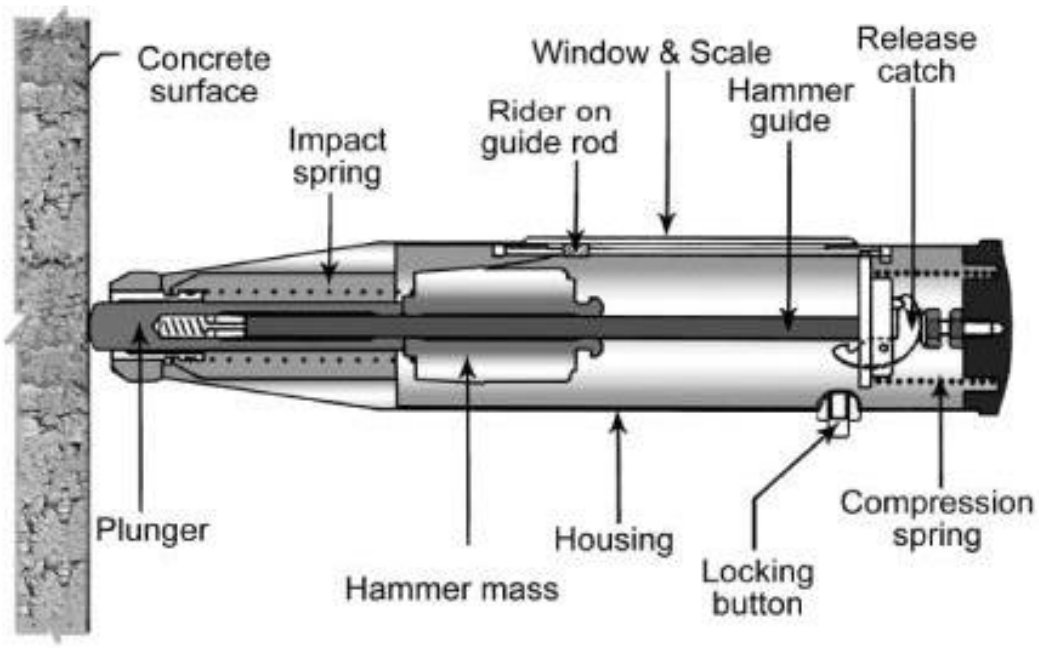

Figure: 3 rebound hammer

Quality interpreted by values –

Average rebound no.	Quality of concrete
>40	Very good
30 to 40	Good layers
20 to 30	Fair
<20	Poor concrete
0	Eliminated

(UPV) Ultrasonic pulse velocity test

In this method with the help of velocity of ultrasonic pulse by concrete we determine the dynamic modulus of elasticity of concrete.

By this method we determine the quality of concrete.

In this method the equipments used UPV testing equipments

Figure 04 ultrasonic pulse velocity

Procedure

This equipment has provision for generating ultrasonic pulse, transmitting it to concrete. Receiving pulse and measuring the pulse travel time.

The strength of concrete is determined by pulse velocity value.

UPV value	Concrete quality
V>4.0	Very good
V3.5-4.0	Good
V3.0-3.5	Poor
<2.5	Very poor

Penetration resistance

In this method the strength of concrete is estimated from the depth of penetration of a metal rod driven into concrete by a standard charge of powders

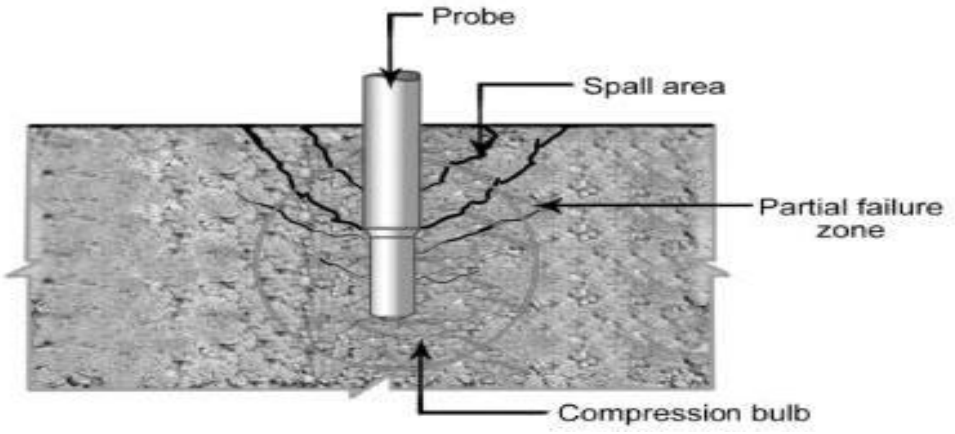

Figure 05 penetration resistance

Procedure

Probe of hardened alloy steel with a blunt conical nose which can be fired into the concrete in such a way that is remain fully embedded.

The tail end is threaded to facilitate firing measurement and withdrawal.

Probe should be of uniform length to within 0.5%.

Corrosion based on PH value and chloride content.

Test result from chemical analysis	Corrosion
High PH>11.5 & low chloride content	No corrosion
High PH& high chloride > 0.4-0.6% of weight of cement	Corrosion
Low PH value & high chloride	High corrosion prone

Corrosion of reinforcement in RC structure

Corrosion of steel reinforcement are caused by heavy moisture and aggressive environment condition by the pores of concrete cover.

Factors that influence corrosion are

Cover thickness

Quality of concrete in cover region

Environment condition

PH value & chloride level in concrete

Presence of cracks

Sample of steel reinforcement for determining the strength and other properties

Sample of steel reinforcement may be taken from the structure member to determine their strength, physical & chemical properties.

Conclusions and recommendations

Safety assessment is the basis for designing and recruiting building recruiting building reinforcements to meet performance and safety standards as per the standard building codes.

Field observation and test results to properly assess the situation, as well as analyze and evaluate safety

“It is also very important to make people aware about that locality conditions and also fulfil safety and measures.”

References

Detailed information about some tests for condition assessment can be obtained from the following references.

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