

NON-DESTRUCTIVE TESTING OF MIAMI APARTMENTS - MUMBAI

OVERVIEW

Miami Apartments residential building at Bhulabhai Desai Marg, Breach Candy, Cumballa Hill, Mumbai is a structural RCC framed structure. At present, the building comprises, Stilt, Thirteen floors and Terrace. It is reported that the building was constructed about 55-60 years ago and since then the building is in use.

This Non – destructive testing was carried out in response to the request made by Miami Apartments to DGC Engineering Pvt Ltd. to offer Condition Survey Report and Structural Analysis services for Miami Apartments.



Fig 1:- MIAMI apartments .

COURSE OF ACTION

1) Visual inspection: -

Visual inspection has done on various parts of building as per availability of access also, repair work was done on various beams and columns at ground floor & in rooms and most of structural members are cladded with wood in columns, beams & slabs in rooms which resulted in limitation on visual inspection.

Staircase was Repaired in year 2014-15. Leakages & Rusting of C.I pipes was

observed in building. Lot of cracks were observed in the columns and Beams. Bulging of tiles was observed on the floor. Reinforcement corrosion was observed on a large scale



Fig 2: - Major Cracks were detected on Column

2. Non – Destructive Testing

On the basis Visual Inspection, following Non Destructive Testing (NDT) decided to carried out:-

Purpose of NDT Test:-

- **To Determine the existing Compressive Strength of concrete.**
- **To Obtained the Quality of Concrete.**
- **To analysed the carbonation and oxidation of concrete and reinforcement.**
- **To check the reinforcement details of structural members.**

Based on that following tests carried out:-

1. Quality of Concrete – ULTRASONIC PULSE VELOCITY (UPV TEST).
2. Corrosion/ Oxidation in Existing Reinforcement – HALF CELL POTENTIAL (HCP TEST).
3. Carbonation in Concrete Surface – CARBONATION TEST.
4. Hardness of Concrete -- REBOUND HAMMER .
5. Compressive Strength of Concrete – Cut And Pull Out Test (CAPO) TESTING.
6. Reinforcement Analysed – REBAR MAPPING (As per drawing and site condition).
7. Chemical content in Concrete – Chemical Testing .
8. Depth & Type of foundation – Foundation Analysis .

3. TESTING PHOTOS



Fig 3:- Rebound Hammer

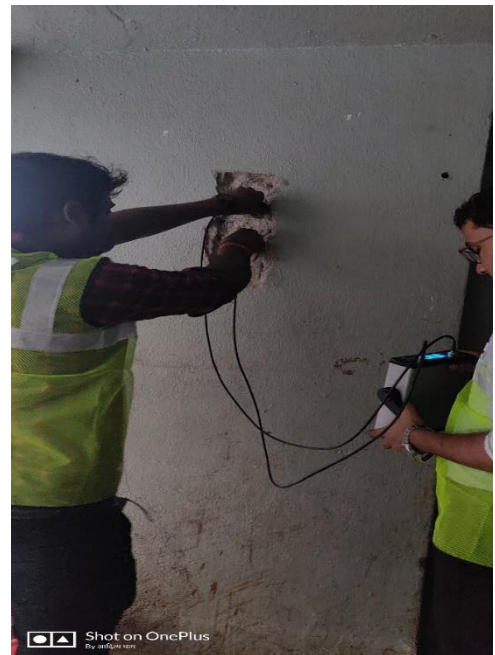


Fig4 :- Ultrasonic pulse velocity test.

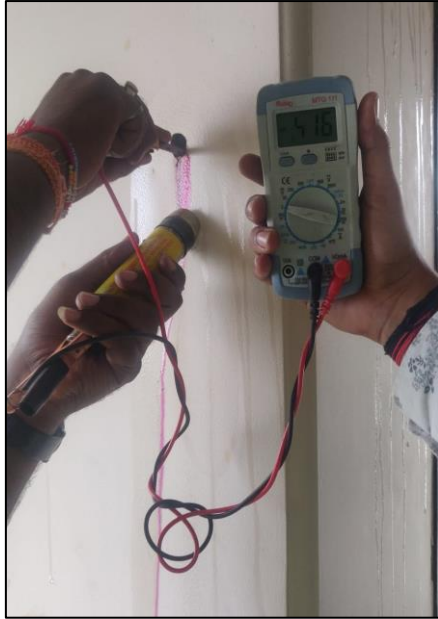


Fig 5 :- Half cell potential test.



Fig 6 :- Carbonation depth .



Fig 7 :- CAPO Test.

4) STAGES OF STRUCTURAL AUDIT .

- a) Visual Inspection was carried out of the building. External and internal damages were noted down.
- b) Non – Destructive tests of concrete was carried out using Rebound hammer, ultrasonic pulse velocity test, half-cell potential Test, Carbonation, CAPO Test, Chemical tests, Rebar Mapping were carried out stage by stage.
- c) The entire data was collected and analysed.
- d) Structural Analysis report was prepared and submitted to the client along with Scheme for Structural Strengthening.

5) CONCLUSION

Visual Inspection-

1. There are signs of distress and deterioration in structural member such as Beams, Columns and Slabs.
2. Cracks were found in flooring above 7th floor.
3. Building is more damaged between grid no A” to J” & 1” to 15”.
4. Slab reinforcement was break at 13th floor in bath area.
5. Seepages are found in walls at 13th floor.
6. Balconies extended in 2014, hence load on peripheral column is increased.
7. At 13th floor slab is sunken near column.

Non-Destructive Testing-

1. Carbonation depth in column is 35mm and clear cover is 50mm.
2. 63.53% overall UPV test readings are doubtful.
3. Probability of corrosion is obtained as 50% from half-cell potential test.
4. Carbonation depth is 20mm.
5. Rebound hammer test shows that average grade of concrete is M20.
6. Average cube compressive strength obtained from capo test is 22.4Mpa.

Structure Analysis-

1. Gravity load analysis shows satisfactory results.

2. Lateral load analysis shows strengthening requirements for structural members i.e columns, beams.