**ASSESSMENT OF ADDITIONAL FLOOR OVER THE EXISTING PARTIALLY CONSTRUCTED BUILDING AT SRINGERI, CHIKKAMAGALURU DISTRICT KARNATAKA**

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ABSTRACT

To assess the primary sufficiency and achievability study for the development of number of floors on the current to some extent built building, nitty gritty actual perceptions were made to comprehend the current underlying framework, Layered estimation of the current RC individuals was checked at different levels. Non-disastrous/Semi-damaging tests were done to evaluate the strength/state of primary individuals. The outlining format at various levels and consequences of the non-damaging tests were utilized as in-put information for completing free hypothetical examination and configuration check of the current basic underlying individuals utilizing primary investigation programming "ETABS". In view of the perceptions, aftereffects of Non-disastrous tests, hypothetical confirmation/configuration check, fitting reclamation measures are suggested for the lacking underlying individuals.

Keywords—RC frame,load bearing wall,existing building

# INTRODUCTION

The current SBI building working at Sringeri Taluk, Chikkmagalur region is a mix of RC outlined and loadbearing wall structure (size-stone workmanship walls) containing part-cellar and segments are brought up in ground floor level up-to lintel level. It was accounted for that, the development work was quit during the year 2002 (20 years back) because of some regulatory issue.Now the concerned specialists are intending to proceed with the development work. Considering this, they wanted to survey the underlying sufficiency and practicality study to check the quantity of floors which can be developed on the current to some degree built building.Hence, a reference was made to Enstructura Experts (Pvt) Ltd., Bengaluru, by the concerned specialists to survey the primary sufficiency and to assess the possibility study for development of number of floors over the current building.In reaction to this, a definite assessment study was completed by us on thirteenth and fourteenth August, 2022. This report, in a word, sums up the result of the examination did.

**II. OBSERVATIONS MADE PHYSICALLY**

Building subtleties:

Following are the underlying subtleties gathered at site.

1. Building contains part-cellar and ground floor (Without rooftop)

2. In the profile of the normal ground level, descending incline (roughly 5 to 6 mt) was seen from front side to raise side of the structure. Thus part cellar floor was given.

3. Part of the storm cellar floor is proposed to be utilized areas of strength for as/depository.

4. Plinth pillar was not given in longer range/course at ground floor level.

5. Building is a mix of RC outlined and size stone workmanship load-bearing wall structure, where the fringe RC Segments are upheld on strip establishment (1.0m Width) and size stone work wall establishment was noticed all through the outskirts of the structure. Following are the perceptions made ensuing to point by point assessment of the structure:

1) No Indications of establishment settlement was seen in any piece of the structure.

2) Accumulation of trash, development of vegetation/weeds and stagnation of water was seen on RC piece at ground floor.

3) Growth of weeds in the mishap area and green growth/parasite development on RC individuals, size stone brick work walls was noticed.

4) Water spillage from cellar roof section was seen at not many areas.

5) Column expansion and flight of stairs dowel rebars are presented to climate for a significant stretch prompting erosion stains.

6) It was seen that a couple of section fortifications are consumed at floor level in ground floor.

7) Spalling of cover concrete/openness of rebars was seen in RC radiates in cellar floor roof level.

To assess the primary sufficiency of the structure, following examining tests were turned to:

1. Verification of layered estimations of every single underlying part.

2. Examination of establishment framework and confirmation of soil at establishing level.

3. Semi-Damaging test on RC sections to evaluate the compressive strength of in-situ concrete

4. Non-horrendous tests to evaluate the quality/strength of in-situ concrete in RC individuals.

5. Rebound Mallet test on RC individuals.

6. Ultrasonic Heartbeat Speed test on RC sections and shafts.

7. Cover-meter studies to plan the demeanor of support and cover substantial thickness in RC individuals.

8. Carbonation test on rc individuals.

9. Dimensional check of primary RC individuals.

10.Detailed actual perceptions were made to grasp the current underlying framework. Itemized layered estimation check of the current RC individuals was made at different levels and recorded for hypothetical confirmation.

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#### Fig-1 Actual layered estimation is underway

**Examination of establishment framework and check of soil at establishment level.**

To inspect the establishment framework and to check the dirt at establishing level, preliminary pits indiscriminately/available district were exhumed (two areas) nearby the section up to establishing level. 

#### Fig-2 Assessment of existing establishment and soil test assortment

From the aftereffects of soil examination test, it is uncovered that the dirt is Blackish/Yellowish Sandy

Sediment with mica and Safe bearing limit is 15 t/m2 at 3.0 m profundity from the storm cellar floor level.

1.Semi-direct test on RC sections to evaluate the compressive strength of in-situ concrete.

To survey the strength of cement, Semi-damaging test, for example, center test was turn. The center examples were extricated from recognized RC sections for research facility tests. The extricated center examples were exposed to compressive strength test after fundamental managing and covering according to the rules in IS: 516: Section 4: 2018.

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#### Fig-3 Center extraction in process



Fig-4 Extricated *center examples*

From the aftereffects of the Semi-direct test, it is gathered that the compressive strength of in-situ concrete in tried RC segments is viewed as in the scope of 21 N/sq.mm to 24 N/sq.mm.

#### **Non-Damaging tests to survey the quality/strength of in-situ concrete in RC individuals.**

#### Rebound Hammer test on RC members:

Rebound Hammer test was completed on the RC individuals at irregular to evaluate the surface hardness/quality and strength of in-situ concrete. The tests were directed utilizing Schmidt rebound hammer from M/s. Proceq, Switzerland according to the rules in Indian Standard IS: 516-(Section 5/Segment 4)- 2020. Position of sledge during testing was flat/vertical.



#### Fig-5 NDT test on rc individuals in the works.

1. From the aftereffects of the rebound hammer test, it is uncovered that the assessed strength of cement in the tried RC segments is viewed as in the scope of 23 to 28 N/sq.mm, where as in piece and in RC Wall it is in the scope of 18 to 20 N/sq.mm.
2. **Covermeter examinations to plan the demeanor of support in RC individuals.**

Covermeter test was done on RC individuals at arbitrary to evaluate the thickness of cover cement and dia of fringe rebars. The test was led utilizing Profometer-5+ from M/s. Proceq, Switzerland. The consequences of the test are



#### Fig-5 Cover meter observaation on RC Section

From the results of Cover meter test, it is revealed that the cover concrete provided to the rebars is as mentioned below at unaffected regions.

1. columns clear cover varies 30 to 45 mm
2. beams clear cover varies – 20 to 30 mm
3. Slabs clear cover varies – 20 to 25 mm

In unaffected areas, the cover concrete in RC members is satisfactory

#### Carbonation test for columns.

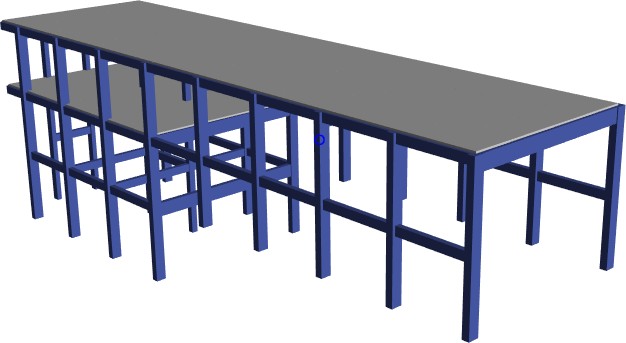
Carbonation test was carried out on rc column using phenolphthalein indicator in dilute methyl alcohol to assess the extent of carbonation in cover concrete as per the guidelines in Indian Standards IS:516-(Part-5/Section 3)-2021.



Fig-6 Carbonation test

According to the instructions in Indian Standards IS:516-(Part-5/Section 3)-2021, a carbonation test was performed on an RC column using phenolphthalein indicator in diluted methyl alcohol to determine the degree of carbonation in cover concrete.

**III. Theoretical Analysis And Design Verification**

The current building is subjected to independent analysis and design review as part of the theoretical verification process. Using the structural analysis programme ETABS, a three-dimensional analytical model was created based on the planned frame design and the dimensions data gathered on site. According to the instructions in the applicable Indian standards, the design loads are taken into account. According to the findings of the performed non-destructive tests, the material attributes are allocated.

#### Fig-7 - D view of the ETABS software-generated analytical model of the structure.

* **The material grades considered for analysis is as follows**

M20 grade concrete and Fe415 grade steel

#### Design standards for the theoretical verification

In accordance with the following "Indian Standard specifications or codes of practise," a design check was performed for all design loads.

**Loads**

All levels of the design loads were taken into account as commercial building loadings.

**Dead load**

|  |  |  |
| --- | --- | --- |
| Self-weight of existing rc members |  |  |
| Self-weight of the slab | **:** | = 3.75 kN/m2 |

#### Live load

|  |  |  |
| --- | --- | --- |
| Live load on ground floor | **:** | 4.0 kN/ m2 |
| Live load (Terrace) | **:** | 2.0 kN/ m2 |

**Load Combinations**

The following are the load combinations are considered for the analysis and design check. DL+LL

1.5 DL +LL

#### Results of the Theoretical Analysis and Design Check:

Analysis and design check of the existing building is carried out for gravity load combinations only seismic loads are not considered for design check.

The outcome of theoretical verification is outlined below.

#### RC Footing:

Based on the theoretical analysis and design check, the results are tabulated below. SBC considered is 150kN/sqm at 3.0 depth from basement floor. (Building considering part basement plus ground floor only.)

The size and cross-sectional area of the reinforcement provided in the existing columns are judged to be "Structurally Adequate" for the design loads according to the findings of the theoretical analysis and design check. Building with only the ground level and a portion of the basement.

**IV INFERENCES**

The following conclusions were reached based on the thorough observations and findings of the probing tests:

1. According to the site observations, there are no indications that the building's foundation system has settled in any area.
2. It may be deduced from the results of the non-destructive tests that the concrete quality and strength in RC members are sufficient.
3. The theoretical analysis and design check suggest that the existing footings' cross-sectional area is barely sufficient to support the design loads for the part-basement plus ground floor alone.Based on the theoretical analysis and design check, it is inferred that the cross- sectional area of reinforcement provided in columns, beams and slabs are adequate for design loads for part basement plus ground floor only.
4. Distress features like spalling of cover concrete, exposed rebars in RC members, dampness/damp patches, growth of fungus, algae on internal, external surface of walls, etc. are primarily caused by weathering action, age effect, ingress of rain water, abandoned building over a long period of time, etc. The building requires appropriate restoration measures to restore the affected area to normal.

**V Recommended Corrective Actions**

The following corrective actions are suggested based on the conclusions drawn.

e) Plan 1: Locally affected RC member regions are treated.

1. Existing loose or spalled concrete in RC members must be fully removed using moderate chipping techniques to reveal solid, durable concrete.
2. The exposed concrete surface must be ground to remove any loose debris, fungi, or algae.
3. To eliminate dust, the exposed surfaces of the concrete and reinforcing bars must be thoroughly cleaned using an air and water jet.
4. The exposed and well cleaned reinforcing bars must get two applications of anti-corrosive chemical, according the manufacturer's instructions.
5. A layer of weld mesh 50 x 50 x 3 mm shall be placed and fixed to concrete using shear connectors at as per sketch for staircase cutout cantilever beams at basement floor ceiling level.
6. At the height of the basement floor ceiling, a layer of weld mesh measuring 50 x 50 x 3 mm must be positioned and fastened to concrete using shear connections for the staircase cutout cantilever beams.
7. Over a layer of primer applied in accordance with the manufacturer's specifications, 20 mm thick (minimum) polymer modified mortar plaster should be given, finished level with the surrounding surface, and allowed to cure.
8. After installing packers with non-return valves in accordance with the manufacturer's instructions, existing honeycombed areas in RC beams must be grouted with neat cement slurry that has expansive agent added. (With a 3–4 kg/sq.cm pressure)
9. Following the removal of all fungus, ground floor columns must be plastered with polymer modified mortar over a layer of bonding agent.

**VI Conclusion**

A mix of RC framed and load-bearing wall structure (size-stone masonry walls), the current SBI building in Sringeri Taluk, Chikkmagalur district, has columns elevated to lintel height in the ground floor. According to reports, a managerial issue caused the building work to cease in the year 2002 (20 years ago).

According to the theoretical analysis and design review, the existing footings and columns are structurally suitable for a portion of a basement plus ground floor when only gravity loads are taken into account.Weathering activity is primarily responsible for the distress features that have been noticed, such as the spalling of cover concrete, the exposing of rebars in RC members, and the growth of fungus and algae on the interior and exterior surfaces of walls.

If the current distress characteristics are not addressed, they will have an impact on the members' long-term safety, durability, and serviceability. The same cannot thus be disregarded. To make the affected members durable and safe, it is crucial to implement the proposed corrective steps.

The disturbed members can be made safe and useful by successfully implementing the recommendations made by an expert agency under the supervision of an experienced technical staff.

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