

CONDITION SURVEY REPORT
A SIX – STOREYED BUILDING
BLOCK I, MAY FLOWER PARK
MALLAPUR, HYDERABAD

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M/S MODI PROPERTIES AND INVESTMENTS (P) LTD.
HYDERABAD

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SIX – STOREYED BUILDING
Block I, May Flower Park, Mallapur, Hyderabad**

INTRODUCTION

M/s Modi Properties & Investments Pvt. Ltd. requested for the assessment of one of the buildings of the Group Housing Scheme at Mallapur, Hyderabad. The structure developed cracks along the expansion joint in the building alarming the residents.

One of the residents filed a complaint with the Municipal Commissioner, East Zone about the wide crack / cut of some of the flats from the main block (from ground to fifth floor completely south to north). The complaint also mentioned that the sub-block was bent towards eastern side. Further, the complaint mentions that experts have opined that it was a construction and structural defect for imperfect workmanship and low quality material, and declared hazardous and dangerous to live in. However, the experts were not identified in the complaint.

The complaint adds that the hazard and danger are further multiplied by the installation of a high tower with its connected machinery over the roof, weighing in tens of tonnes.

The Deputy Commissioner, Kapra Circle GHMC responded by issuing a notice under sections 459 of the HMC Act, 1955 (vide Notice No. G2 / 884 / TPS – II / 2007 of 20. 9. 2007). The notice mentions that the said building was in dangerous and dilapidated condition / likely to collapse any moment causing danger to the inmates of the building / surrounding building and the public passing through the road / lane on the front / sides of the said building. The owners / occupiers of the said dilapidated structure were required to vacate / repair / remove the said dilapidated structures to prevent all cause of danger immediately. The owners / occupiers of the said dilapidated building were requested to vacate the building immediately, and repair / remove the dilapidated structures of the said premises, failing which they would be held responsible for any sort of danger / incident and any other problem created due to the said dilapidated structures.

THE STRUCTURE

The building is a part of the Group Housing Scheme, May Flower Park, Mallapur, Hyderabad with plan dimensions of about 17.23 X 50.29 m. The building being long in plan, an expansion joint was provided, separating the block into two segments of sizes 38.40 X 17.23 m and 11.89 X 17.23 m. The smaller segment lies on the east side of the block.

The building provides for 8 flats on each of the five upper floors each of 643.12 m² area, with the ground floor left open for parking. It has a staircase and a lift, and is symmetric about its north – south axis. Being a residential structure, the live load applicable is 2.0 kPa.

The structure was designed in December 2000, and completed a year later. The codes of practice then prevalent were adopted for design. The columns are grouped into C1, C2 and C3 types, and are in M20 grade concrete. The sizes of all the columns are 229 X 381 mm at the ground floor reducing to 229 X 305 mm from third floor level with reinforcement varying along the floors for structural requirements and economy.

The footings are taken to the depth of hard soil with an assumed safe bearing capacity of 300 kN / m². The sizes and reinforcement details vary depending up on the type of columns; the footings are of 1.83 X 1.83 m for C1 type columns, 1.75 X 1.75 m for C2 type columns, and 1.60 X 1.60 m for C3 type columns. Combined footings are provided for the columns along the corridors.

The slab panel dimensions vary depending upon the column spacings. The largest slab panel is of 3.70 X 4.31 m size while the corridors are provided with one way slab of 1.45 m spans. The thickness is generally 102 mm.

The beams are generally of over all size 152 X 406 mm; the reinforcement details vary depending up on the spans and location. The reinforcement bars are of 12 mm and 16 mm diameter.

Since the building is 50.38 m long in one direction, an expansion joint is provided to avoid cracking in the floor slabs along the shorter dimension. The expansion joint separates the two segments as mentioned above. The two segments are provided with mastic pad to avoid the joint being filled with dust and debris, and to seal against water leaking through the joint.

PREVIOUS INVESTIGATIONS

The structure was assessed for structural adequacy to install a communications tower of 15 m height on the terrace of the smaller segment. M/s Civil Aid Technoclinic (P) Limited investigated the structure in September, 2002, and found the structure suitable for installation of the tower. The report based on analytical studies and tests on the structural members such as beams and columns. Reinforced concrete members of the building were investigated using ultrasonic pulse velocity (UPV) system and profometer; the former indicates the quality of concrete, while the latter is useful in locating the reinforcement details.

The strength of concrete in the beams and columns tested was estimated as about 20 MPa, though the drawings specify concrete of M15 grade. The disposition of reinforcement in the columns and beams tested was found to be as per the drawings; the cover was also found to be adequate as per the code.

The analysis considered slab thickness as 114 mm against the specified thickness of 102 mm on the structural drawings, however, possibly based on in situ measurements. The results of theoretical analysis, and in situ tests for strength of concrete, besides reinforcement configuration in beams and columns, indicated the adequacy of the structure to support the additional loads imposed by the tower.

The report also mentions that no signs of foundation settlement, and distress features in any reinforced concrete members were found.

PRESENT INVESTIGATIONS

The investigations were intended to locate any visible signs of distress in the form of cracks, settlements, and spalling of concrete. Though several non-destructive tests are available to assess structural condition, they are generally taken up only when details are not available or distress is discernible. The investigations on the structure are summarised here.

STRUCTURAL DESIGNS AND DRAWINGS

Structural design reports were not readily available with the client. It is unlikely that the records of analysis, design and construction would be available six years after the completion of a housing project.

Nevertheless, the plans, structural layout and details of reinforcement were made available in the form of copies of drawings. All the details presented in this report are based on the drawings made available, and site inspection. The report of Civil Aid Technoclinic (P) Limited, Hyderabad was also helpful in assessing the structure.

The capacity of C3 type columns supporting the tower was found to be adequate to support an axial load of about 1.13 MN (factored) at the ground floor level, and about 0.74 MN at the sixth floor level. The capacity is adequate for the structural system of the building.

The loads imposed by the 15 m tall communication steel tower and the equipment are of the order of about 40 kN, about 3 percent of the column capacity at ground floor level or about 5 percent of the column capacity at the sixth floor level.

The mass of the 15 m high communication tower is not ten of tones, but barely 3 tonnes. Considering the extreme wind conditions, the loads on each leg of the tower work out to be about 30 kN in tension or about 40 kN in compression. The tower loads are transmitted to the columns through reinforced concrete beams with anchor bolts to prevent its overturning in high winds. The capacities of anchor bolts are adequate for the tower to sustain the loads as per the code requirements.

The load capacities of footings, columns, beams and slabs are adequate for the residential structure investigated. The structural analysis did not reveal any inadequacies as per the drawings available and standard codes of practice (IS 456 : 2000, IS 875 : 1987, Part 2, and IS : 2502).

The structure may be considered adequate as per the relevant standards.

VISUAL INSPECTION

Visual inspection of structures provides valuable information on the condition and possible distress to the structure. It includes locating cracks, spalls, rust marks and any other signs of distress. Structural and non-structural cracks are identified during the inspection. While any cracks are disturbing, the latter do not affect structural performance.

Signs of distress

An inspection of the structure did not reveal any structural cracks or rust marks except at the expansion joint. No signs of excessive deflections or structural deterioration were evident.

Expansion joint

The oblong profile of the structure in plan necessitates the installation of an expansion joint to avoid contraction cracks in the floor slabs.

The building is provided with an expansion joint in the north – south direction all along the width at a distance of 11.89 m from the eastern edge as indicated in the drawings. The joint separates two flats on each floor at the eastern end from the rest of the flats. It is filled with mastic pad as per the standard practice.

However, mastic pad is generally not installed correctly due to lack of trained personnel and poor workmanship. It appears that rain water seeped through the joint, possibly due to poor installation or deterioration of the pad with age. The joint on the roof was sealed with bitumen to cut off water seepage effectively.

The flooring at all the levels developed cracks that reflect the expansion joint underneath. These cracks at the joint appear to have alarmed the residents, who mistook them to be structural cracks and attributed the reasons to the tower installed on the terrace of the building.

These cracks are consequent to the expansion joint planned as per the structural requirements to prevent possible random cracks of the floors due to seasonal temperature changes. The variation of temperatures every day and seasonal variations cause the structure to expand or contract depending upon the temperatures. Expansion joint provided in structures of length more than 40 m, confines the temperature movements to these joints, and prevents the formation of random structural cracks in the floor slabs and beams.

Structural condition

The structure appears to satisfy the requirements of the relevant codes to sustain the loads applicable safely. The materials appear to satisfy the design requirements, and are of standard grade specified as per the previous investigations in 2002. The structure does not show any serious visible signs of distress in the form of structural cracks, deflections or vibrations.

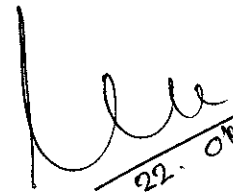
It cannot be said to be dilapidated and unsafe to serve as a residential structure. The structure does not pose any hazard to the occupants in particulars, and to the neighbours in general.

SUMMARY

The drawings, previous inspection reports and other details made available of the six storeyed residential structure were scrutinised, and the design requirements of the members assessed. The structure was also inspected for any visible signs of distress or deterioration. The following conclusions may be drawn based on the drawings available, analysis, design checks and inspection.

- The structure does not show any signs of distress or abnormality.
- It may be said that the structure is not in a dilapidated condition, and does not pose hazard or danger to the residents of the structure or neighbours.
- It is a habitable structure satisfying the general design and safety specifications as per the standard codes of practice.
- The presence of the tower and the shelter housing the communication systems does not jeopardize the safety of the building in any way. The expansion joint may require regular maintenance and replacement, if necessary.

All the documents pertaining to the structure are returned with the report to Mr. G. Kanaka Rao, General Manager, Modi Properties and Investments Pvt. Ltd., Hyderabad.


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