

# **REPORT ON VISUAL INSPECTION OF CHANDERKUNJU ARMY TOWER AT SILVER SAND ISLAND, COCHIN**

**Project**

**CHANDERKUNJU ARMY TOWER**



**SEPTEMBER 2020**

**M.A. COLLEGE OF ENGINEERING  
KOTHAMANGALAM**



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15 September, 2020

To

Col. Chandra Mohanan Unnithan  
Silver Sand Island  
Vytilla, Kochi.

**Subject: Report on Site visit to Chander Kunj Army Towers at Silver Sand Island,  
Vytilla, Kochi**

Dear Col. Chandra Mohanan Unnithan,

As requested by you, Er. Naveen Krishnan (Research Scholar, IIT Madras) and I visited the Chander Kunj Army Towers in Silver Sand Island, Vytilla, Kochi on September 3, 2020 (Thursday). Guided by Capt. Paul and Col. Sibi, we had a walk-through visual inspection of the various parts of the tower buildings. The observations made are as follows:

**Visual observations**

Figures 1 to 13 provide representative photographs showing the condition of the various elements of the building. Some of these and other observations made during the visual observations are listed below.

1. Reinforced concrete columns, beams, sunshades, slabs and walls have significant cracks. Most of the cracks are due to the corrosion of embedded steel.
2. Vertical cracks on the columns were observed in many places, which seem severe and need critical IMMEDIATE attention for arresting corrosion, providing adequate reinforcement, and ensuring safety of the structure and inhabitants.
3. Re-occurrence of cracks in the already patch-repaired portions were observed.
4. The cracks are repaired by just placing filler materials even without opening the cracked portion and performing necessary treatments or precautions (in many cases).
5. It was informed that there was severe water leakage from the retaining wall at the basement level. During the visit, repair works of these retaining wall were in progress.

The leakage seems to be mainly through the construction joints. There were 15-20 cm wide regions with damaged plastering. The waterproofing compound and plastering materials were being re-applied. For the drainage of the water during the repair works, weep holes (small drainpipes) were being installed. The local water proofing is done on the exposed surface of the retaining wall of the basement, which seems insufficient to solve the problem permanently.

6. Water is leaking from the water tanks.
7. The photos taken before the repair of the damaged portions shows that, in many places the reinforcement are corroded severely/completely. It seems only the local repair with mortar is done without addressing the root cause and replacing the severely corroded rebars or adding new rebars.
8. Some of the cladding granite in the lift portion are delaminated from the wall. This is a severe falling hazard.
9. While walking through the building, foul smells were felt. Hence the details of the drainage and plumbing are also need to be checked.



Figure 1. Repairing of the leaking portions in the basement



Figure 2. Improper cutting of the beams for fire pipes



Figure 3. Dampness in the walls and water tank walls



Figure 4. Cracks on the beams due to corrosion



Figure 5. Improper repair of cracks in columns with filler material

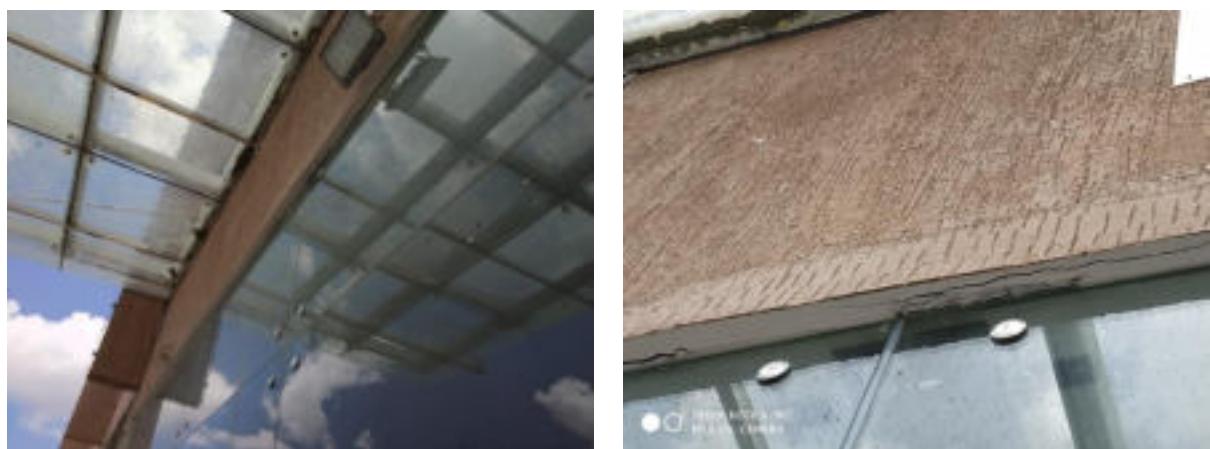


Figure 6. Reoccurrence of cracks in the already repaired beams



Figure 7. Rapaired beams on the balcony of almost every floor and many shades



Figure 8. Cracks in structural elements



Figure 9. Occurance of cracks in the visinity of already repaired portion

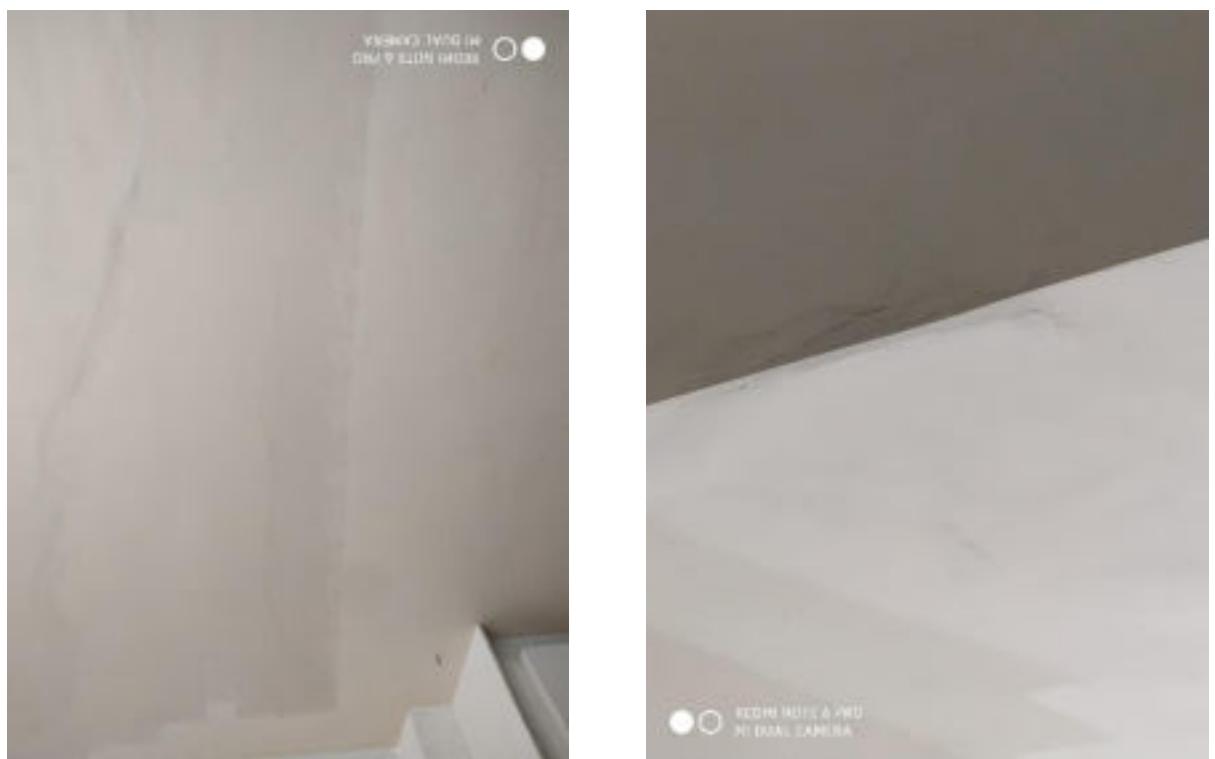


Figure 10. Reoccurrence of cracks in the repaired portions



Figure 11. Cracks in columns due to corrosion of reinforcement



Figure 12. Cracks in shade



Figure 13. Water is getting stagnated in the floor

## Recommendations

Following information is required to identify the root cause and suggest feasible and durable repair/strengthening procedures.

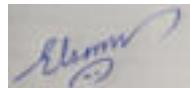
1. Chloride concentration and profile in the concrete used in the East and West side of the buildings
2. Carbonation depth in concrete cover on West and East side of the buildings
3. Half-cell potential of steel on the regions adjacent to the severely corroding regions on various structural elements
4. Compressive strength of concrete (if concrete coring is not allowed, use an impact hammer to obtain the possible compressive strength; then, if needed, more realistic estimations can be made by testing cored concrete cylinders)
5. Uniformity of cover depth of reinforcement in beams and columns
6. Original test reports on soil at site
7. Original test reports on water used
8. Original test reports on steel reinforcement used
9. Specifications and original test reports on the concrete used
10. Specifications and original test reports on the plastering material used
11. Detailed structural drawings of the structures.
12. MEP drawings of the Buildings.

## Conclusions

In short, the corrosion and corrosion-induced structural distress in the structure are in severe stage considering that the building was constructed just about 5 years ago. Moreover, in many places the cracks are re-appearing in the same region or occurring in the nearby portion (halo effect) immediately after the patch-repair. This shows the present procedure of crack-filling, patch-repair etc. is not sufficient to address the root cause and give a long life for the structure. As the structure is exposed to coastal atmosphere, immediate steps should be taken to preserve the structure in its present condition to avoid a disaster.

Please feel free to contact me if you need further guidance/consulting.

Regards,



Dr. Elson John