

Prabhukutir, one of the prestigious apartment buildings on Altamount Road in South Central Mumbai, had developed some structural defects or inadequacies in the form of peeling of marble cladding on interior walls and also had signs of leakages, wet patches and efflorescence. The defects were more pronounced in the entrance foyer, rear and front garage and the terraces over the garages.

M/s Larsen & Toubro were concerned, as they were occupants of the building. The associate M/s ECC Construction Group went into the details of the problem and provided an effective repair proposal using materials of the **CICO's** so that the repair undertaken was compatible, methodical and as well as affordable.

General visual inspection consisting of chipping off of some columns in the entrance foyer revealed that corrosion of the reinforcement specially those used, as stirrups were the main cause of distress. In comparison, the vertical main reinforcements were generally much less distressed as the cover for the main reinforcements were at least 8 - 10mm more than those of the stirrups.

Avoiding the general practice of concrete repairs with guniting after removing the existing plaster, the proposal provided a more compatible solution where cement-to-cement approach of repair was put up. The guniting/shotcreting procedure does not generally remove the root cause of distress but the new layers of gunite along the welded steel wire mesh adds on to the dead weight of the structure and the guniting solution provides a relief for some period of time as the root cause of distress i.e. corroded steel remain in the structure. Contrary to the popular belief, shot creating / guniting does not provide a waterproofing barrier, and subsequently the corrosion continues probably at a slower rate in the gunited structure.

The cause for leakages and wet patches on some walls in the garage area were attributed to vegetative growth which prevented proper drainage of water and in particular due to the growth of some trees whose roots aggravated the problem.

For repair having cement-to-cement approach, the basic material chosen was TAPECRETE P-151 the versatile polymer modified latex.

Repair methodology is an important aspect of any structural repair work. A specification outlining the details forms the basis of the repair. In view of the distress which was attributed to corrosion of steel reinforcement, the repair was divided into several activities which are briefly described below:

1. **Surface Preparation** - in the area where corrosion of reinforcement had external signs, the area was prepared by removing the loose concrete upto 20 - 25mm below the depth of steel. In case of main vertical steel, concrete was removed for about 150mm more to expose unaffected reinforcement to the depth of 150mm. All the exposed concrete reinforced were suitably cleaned in order to free them from rust. The exposed concrete surface was repeatedly washed with water spray.
2. **Addition of new reinforcement** - in case of reduction of reinforcement area to the extent of 20% new reinforcement was provided which was welded to the 150mm portion of the unaffected but presently exposed reinforcement. In the case of stirrups in columns, new stirrups were provided after removing the old rusted ones.
3. **Anti-corrosive Treatment to Reinforcement** - anti-corrosive treatment was provided for both the existing and new reinforcements. The treatment consisted of applying 0.8 to 1.0mm thick MARINE COATING all rounds the reinforcement. For both the cases, the Marine Coating was applied after

placing the new reinforcement in position and after welding was completed. For the existing reinforcement, coating was provided in site and the gap of 20 - 25mm behind/below the steel, allowed a proper space for applying the coating.

4. **Bonding Coat** - A bond coat in the form of PMC slurry consisting of 1 kg of cement admixture with 0.52 kg of TAPECRETE P-151 was applied to the prepared surface, which was wet, but in surface dray condition. The slurry mix was prepared in batches of about 1.5kg so that the slurry mix was used within 30 min. of mixing. Polymer concrete/mortar was applied over the bonding coat, which was allowed to dry for about 30 - 40 minutes.
5. **Polymer Mortar for Inner layers** - as concrete had been removed even upto 40 - 50 mm in some areas the filling of the inner portion was done by cement, sand and TAPECRETE P-151 in the following proportion 1:4:0.12 layers of 20 - 25mm thickness. Water was used to obtain the desired consistency. Polymer concrete having 12% of TAPECRETE P-151 of the weight of cement was used in some locations so as to have an effective bond. The polymer concrete was of flowable consistency.
6. **Carbonation Resistant Coating** - In order to prevent ingress of moisture and carbon Dioxide, a polymer modified cementitious (PMC) plaster was applied over the entire surface, the applied thickness varied from 8 to 15mm. The PMC plaster consisted of the following:

Tapecrete P-151	-	1 Kg
Cement	-	2 Kg
Fine Silica Sand	-	2 Kg
Coarse Sand	-	3 Kg

No extra water was added to obtain the plaster. In case where the desired workability was not achieved, the coarse sand was nominally reduced.

Due to the overall guidance of Larsen & Toubro's ECC Construction Group and Management Committee and resident members of Prabhukutir Group Housing Society, the repair works could be carried out according to a predetermined scheduled and to the satisfaction of all concerned.

We at **CICO** takes this opportunity to express appreciation to those concerned in using materials manufactured by the **CICO** Group and to Matte and Associate for a proper application and execution of time bound repair works.