



## INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

### DEPARTMENT OF CIVIL ENGINEERING

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**Dr. Rajib Chowdhury**  
Associate Professor  
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No. CED-6293/22-23/2

Date: 29.06.2023

To

The Chief Executive Officer,  
Unitech Group of Companies  
8<sup>th</sup> Floor, Tower-B, Signature Towers,  
Gurugram

**Subject: Proof-checking and Structural Health Safety Audit of “Concourse”, 3B+G+15-Storeyed Commercial Tower A & B of Unitech Project at Sector 71, Gurugram**

Kindly refer to your letter bearing No. \_Ky/Unitech/2022/45\_ dated 17th June 2022\_ whereby IIT, Roorkee was engaged for the assignment of undertaking Proof-checking of Structural Drawings and Structural Health Safety Audit of 3B+G+15-commercial Tower A&B of Unitech Project at Sector 71, Gurugram.

2. Having completed the assignment, we are pleased to submit our report as follows:
  - 2.1 The proof-checking of Structural Designs has been done and the same is generally found to be in order. Separate Certificate is being issued in this behalf.
  - 2.2 The Structural Health Safety Audit has been carried out as per NBC and relevant IS Codes applicable at the time of first approval of plans, both based on visual inspections and scientific tests.

### 3. **Executive summary of the Report:**

The structures of Tower A&B, are found to be safe and liveable, subject to rectification of construction related deficiencies wherever observed and mentioned in the detailed report. No propping of structures is required. No slab-recasting is required.

#### 3.1 **Observations/ Findings from Visual Inspection:**

As the structures/ incomplete buildings are standing in situ for a few years, the same have been exposed to the adverse effects of weathering, deterioration and normal wear & tear. We have observed the following:

- (i) Plaster found damaged, with cracks observed in internal and external plaster, and of poor quality at certain places as mentioned in the detailed report, which needs repairs/ replacement;
- (ii) Column and beam steel exposed at certain places and the rusted parts would need retrofitting;
- (iii) Deflection/ sagging of slab/ beam at a few places as mentioned in the detailed report;

- (iv) Staircase damaged at some floors need to retrofitting;
- (v) External phase show falling of concrete at a few places – need recasting/ retro-fitting

### 3.2 Tests carried out on structures:

We have conducted/ got the following tests carried out:

- (i) Ultrasonic pulse velocity Test
- (ii) Rebound hammer Test
- (iii) Half Cell Potential Test
- (iv) Carbonation Depth Test
- (v) Tomography
- (vi) Chemical Analysis

### 3.3 Overall Observations and Remedial measures:

- (i) The standing structures are found to be safe and liveable. The distress and damages observed at places are repairable. No propping of structures is required;
- (ii) No slab recasting is required; however, damaged slab/beam/ external faced require repair/ recasting at a few places as pointed out in the detailed report;
- (iii) Need retrofitting of damaged members with appropriate solution, wherever observed as per detailed report;
- (iv) Need to repair the plaster after removing the existing poor-quality plaster at places as per detailed report;
- (v) Jacketing/ strengthening of deficient members required at some places as per the detailed report;
- (vi) RCC cover needs replacement in exposed members at a few places – refer to detailed report;
- (vii) Chemical Test Carbonation & Sulphate results found satisfactory;
- (viii) The half-cell Potential Test found satisfactory;
- (ix) The retro-fitting proposals based on the report be prepared and executed at site.

### 3.4 Strengthening of short falling member shall be done by:

- (i) Concrete Jacketing;
- (ii) Carbon fibre wrapping;
- (iii) Injection grouting;
- (iv) Repaired by polymer modified mortar;
- (v) Strengthening by steel girder;