

LIBERTY KNITWEAR LTD. (Extension)

Ramarbag, Fatullah, Narayanganj.

(23.6436764N, 90.488697E)

19 December 2023



1. Building Information

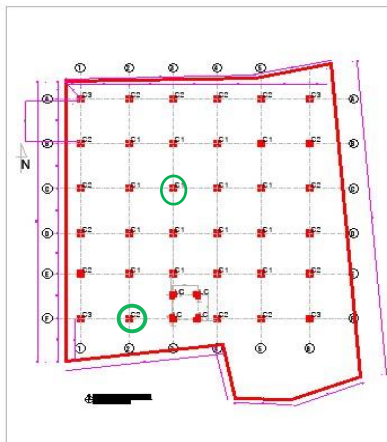
ETP Building: This is an eight storied (G+7) RC building.

Canteen Building: The structure is a 4 storied (G+3) reinforced concrete (RC) building.

Guard Room: This is a single storied brick structure.

2. Observations

Observation-1: Stress in column exceeds normal design limit (ETP Building).



Description: The cursory calculation indicates that column stress exceeds the normal design limit considering a typical floor live load of 6kPa/4 kpa for storage, roof live load of 1.5 kPa, and concrete strength of 16.3 MPa. The building engineer is required to review the design, loads, and column stresses for the marked columns based on in-situ material strength.

Observation-2: Storage live load limit does not comply with BNBC requirement (ETP Building).



Prepared load plan for 6th floors. Floor loading considered 4kPa (84 psf) for storage areas.

Storage area

Description: As per BNBC, 6 kPa is required to consider as floor loading for the light storage facilities. During inspection, load plan was found posted considering (84 psf) 4kPa at typical floor storage area. Also, 4 kPa live load considered in design report. However, update the storage live load limit as per BNBC requirement, revise the structural analysis & design accordingly.

Observation-3: Lack of test report (ETP Building).

Regarding the earthquake resistant structural design, it is essential that the specific design code is followed. For the analysis and design checking of the building, Equivalent Static Force Method of BNBC (2006) is followed. The main considerations for calculation of earthquake load are given below. Seismic zone factor-0.15 R=8 (intermediate moment resisting frame) Site coefficient sc-1.5 3. Material Strength: 3.1 Concrete strength: Concrete strength -4000 psi. As Per General Notes & factory document.	4.2. Steel strength: 72000 psi is considered in analysis of steel reinforcement for all buildings. 4. Structural Design Concept & Criteria The structural element of the complex has been designed considering the following criteria. Codes & Standard ✓ Accord and NTPA guidelines ✓ Bangladesh national Building Code 2006 ✓ American Concrete Institute (ACI 318-99) ✓ American Society for Testing Materials (ASTM) 5. Load Combination Load combination was taken from BNBC.2006 For RCC structure- 1. 1.4 D 2. 1.4 D + 1.7 L 3. 0.9 D + (1.3 W or 1.1 E) 4. 0.75 [1.4 D + 1.7 L] 5. 0.75 [1.4 D + 1.7 (W or 1.1 E)] 6. 0.75 [1.4 D + 1.7 L + 1.7 W] 7. 0.75 [1.4 D + 1.7 L + 1.7 (W or 1.1 E)]
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Description: In EA report concrete strength has been considered 27.58 MPa (4000 psi) and rebar tensile strength considered 500W (72000 psi). Only one set of cylinder test reports for column and 4 sets of cylinder test report for slab is available. The building engineer is required to verify in-situ material strength (by taking a minimum of 4 cores from lower tier columns, rebar from existing beam/column) and incorporate concrete and rebar strength in FEM model and report.

Observation-4: Storage rack without anchorage (ETP Building).



Storage rack without anchorage

Description: Racks on different floors are not adequately anchored or braced to resist lateral (earthquake) forces. The building engineer is required to adequately anchor and brace all non-structural elements to resist earthquake forces to comply with the BNBC.

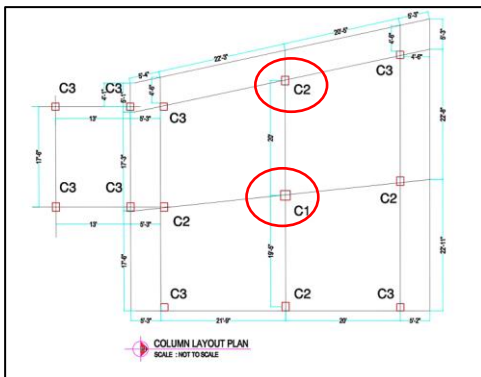
Observation-5: Lack of as built drawings (Guard room).



Absence of as built drawings

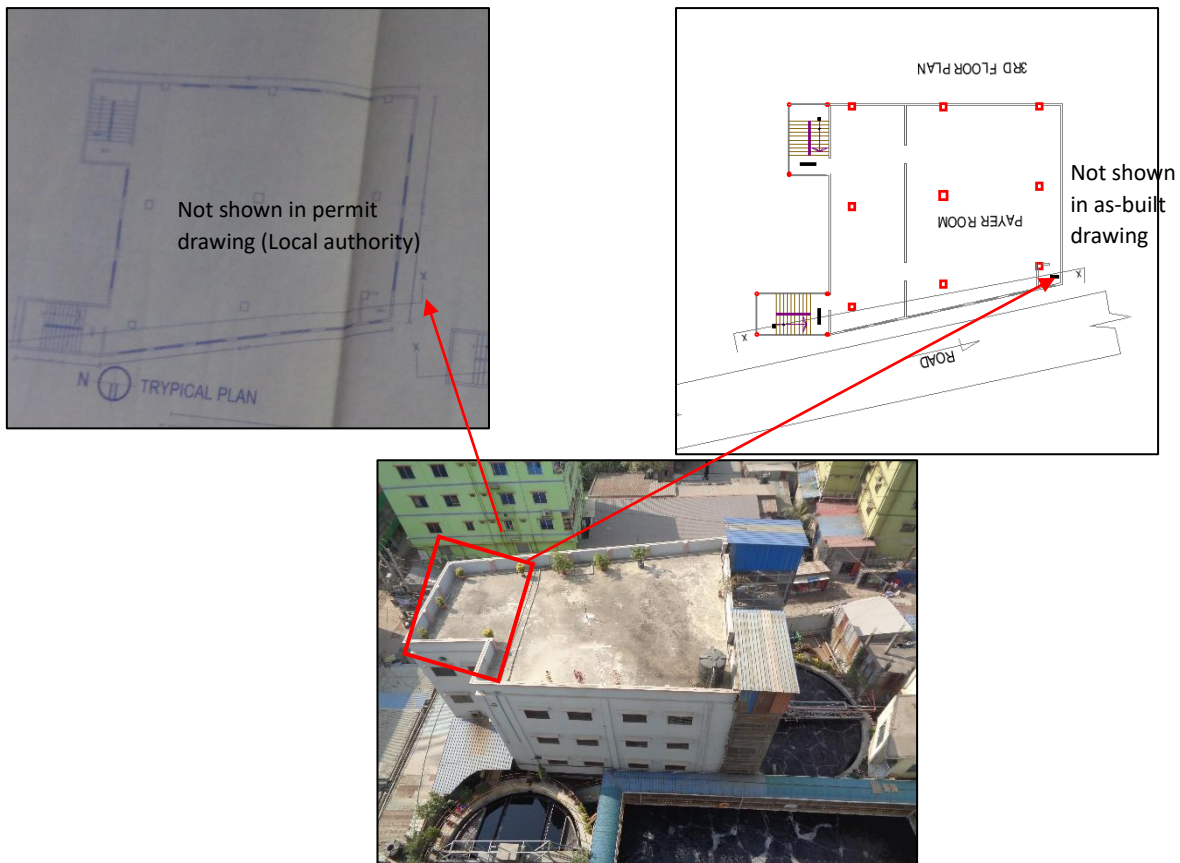
Description: Building engineer is required to prepare a set of as built drawings in compliance with BNBC.

Observation-6: Crack in ground floor columns (Canteen Building).

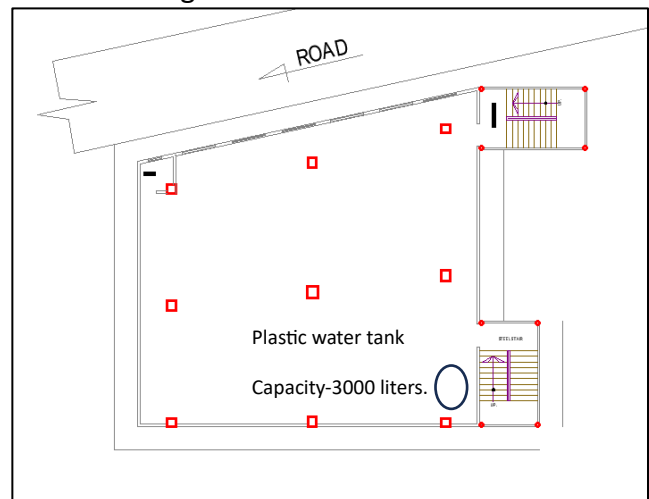


Description: Crack was found in marked columns on the ground floor. The factory must immediately engage a consultant to investigate the cracked column. Any safety measures, if required as suggested by the consultant, must be taken immediately to ensure safety. The investigation report along with the repair methodology must be submitted to RSC by December 24, 2023, and the remediation work must be completed within 7 days of receiving acceptance from RSC. Also, carry out a Detailed Engineering Assessment (DEA) of structure based on in-situ material strength. Take concrete cylinder core from ground floor column to determine the in-situ concrete strength.

Observation-7: Discrepancy in permit drawing and as-built drawing (Canteen Building).



Description: Marked portion at south side is not shown in permit drawing (Local authority) and as-built drawing. The factory is required to collect revised permit drawings from the local authority. Also, the building engineer is required to update as-built drawing.



Description: A plastic water tank (capacity 3000 liter) found on roof slab which was not shown in as-built drawing. The building engineer is required to update as-built drawing.

Observation-8: Dampness on brick wall at ground floor (Canteen Building).



Description: Dampness was found on brick wall on the ground floor. The building engineer is required to identify all damp areas and repair them with a suitable method.

Observation-9: Lack of lateral stability of steel stair (Canteen Building).



Stair at east side



Stair at west side

Description: No bracing system was found on any of the steel stairs. The building engineer is required to check the lateral stability of steel stairs as part of EA.

Observation-10: Severe corrosion on steel members at steel stairs (Canteen Building).



Description: Severe corrosion was found on steel members at both steel stairs. The building engineer is required to remove the corrosion from the steel members and apply rust proof paint.

3. Action Plan

Observation	Action Plan	Timeline
ETP Building		
Stress in column exceeds normal design limit (ETP Building)	Building Engineer to review design, loads and column stresses in the area identified above.	within 6 weeks
Stress in column exceeds normal design limit (ETP Building)	Verify in-situ concrete stresses by 100mm dia. cores from a minimum 4 no's from lower tier columns.	within 6 weeks
Stress in column exceeds normal design limit (ETP Building)	Produce and actively manage a floor live load plan for all floors of the building based on floor, column & foundation capacity.	within 6 weeks
Stress in column exceeds normal design limit (ETP Building)	Carry out remedial works where required.	within 6 months
Stress in column exceeds normal design limit (ETP Building)	Continue to implement allowable floor load plan.	within 6 months
Storage live load limit does not comply with BNBC requirement. (ETP Building)	Revise storage live load limit as per BNBC requirement, update floor load plan and incorporate the changes in the structural analysis and design report.	within 6 weeks
Storage live load limit does not comply with BNBC requirement. (ETP Building)	Building engineer is required to incorporate concrete and rebar strength in FEM model and report based on in-situ material strength.	within 6 months
Lack of test report. (ETP Building)	Building engineer is required to verify in-situ rebar strength and update the analysis model.	within 6 weeks
Storage rack without anchorage (ETP Building).	Building Engineer is required to adequately anchor and brace all non-structural elements to resist earthquake forces.	within 6 weeks
Guard room		
Lack of as built drawings (Guard room).	Building engineer is required to prepare a set of as built drawings.	within 6 weeks

Observation	Action Plan	Timeline
Canteen Building		
Crack in ground floor columns (Canteen Building).	The factory must immediately engage a consultant to investigate the cracked column. Any safety measures, if required as suggested by the consultant, must be taken immediately to ensure safety.	Immediate
Crack in ground floor columns (Canteen Building).	The investigation report along with the repair methodology must be submitted to RSC.	December 24, 2023.
Crack in ground floor columns (Canteen Building).	The remediation work for the cracked columns must be completed as per investigation report.	within 6 weeks
Crack in ground floor columns (Canteen Building).	Carryout a Details Engineering Assessment (DEA) of the structure.	within 6 weeks
Crack in ground floor columns (Canteen Building).	Take concrete cylinder core from ground floor column to determine the in-situ concrete strength.	within 6 weeks
Crack in ground floor columns (Canteen Building).	Carry out suggested remedial works for the building from DEA.	within 6 months
Discrepancy in permit drawing and as-built drawing (Canteen Building).	The factory is required to collect revised permit drawings from the local authority.	within 6 months
Discrepancy in permit drawing and as-built drawing (Canteen Building).	The building engineer is required to survey the full structure update as-built drawings.	within 6 weeks
Dampness on brick wall at ground floor (Canteen Building).	The building engineer is required to identify all damp areas and repair them with a suitable method.	within 6 weeks
Lack of lateral stability of steel stair (Canteen Building).	The building engineer is required to check the lateral stability of steel stairs as part of EA.	within 6 weeks
Lack of lateral stability of steel stair (Canteen Building).	Carry out suggested remedial works if required.	within 6 months
Severe corrosion on steel members at steel stairs (Canteen Building).	The building engineer is required to remove the corrosion from the steel members and apply rust proof paint.	within 6 weeks