Echotex Ltd. (Extension 2)

Chandra Pollibiddut, Kaliakoir, Gazipur-1751, Bangladesh

(24.037416, 90.258649)

11 March 2024

RSC RMG SUSTAINABILITY COUNCIL

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1. Building Information

Main Production Building 2: Nine storied with a basement (B+G+8) reinforced concrete (RC) building.

Office Building: Partially eight storied (G+7) reinforced concrete (RC) building.

Old Utility Building: Seven-storied (G+6) reinforced concrete (RC) building.

Medical & Childcare Shed: Single-storied RC building with steel roof truss shed.

Wastage Shed: Single storied steel roof truss shed.

Dining Shed: Single-storied steel shed.

Kitchen Shed: Single-storied steel shed.

RMS Room: Single storied masonry structure (steel deck slab supported by brick wall).

ETP Building: Two storied RC building with lightweight steel roof.

LPG Station Shed: Single storied RC building with lightweight steel roof shed.

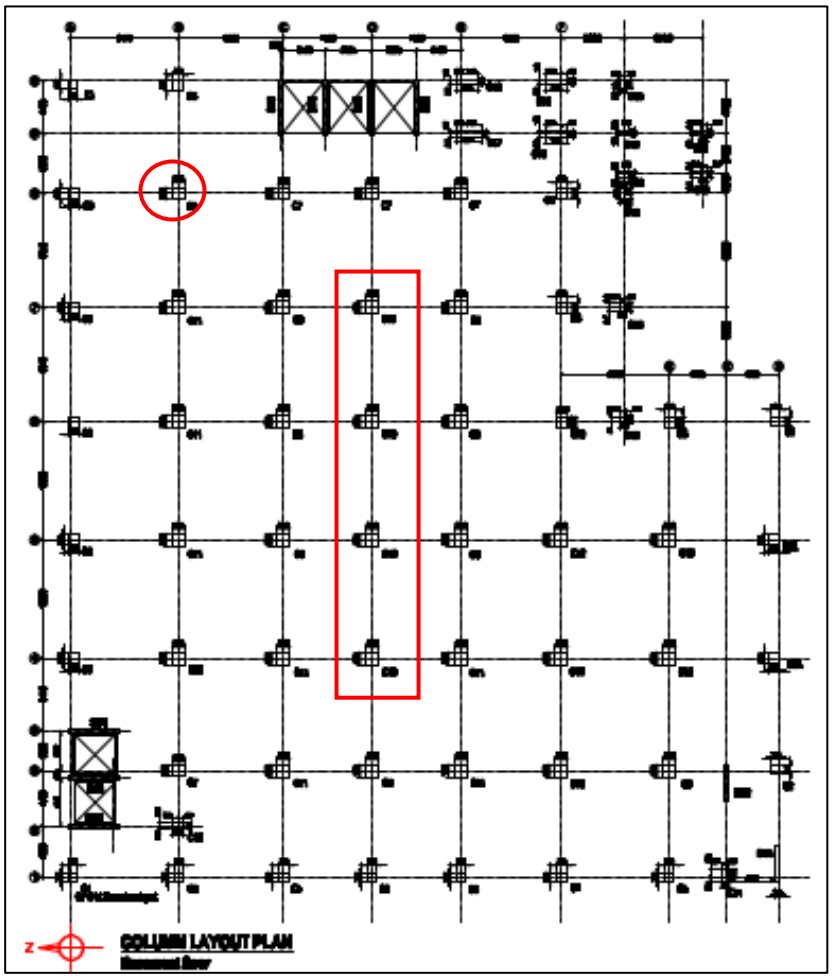
Connecting Bridge 1 (Between Factory Building & Multipurpose Building): Self-supported steel structure.

Connecting Bridge 2 (Between Multipurpose Building & Dyeing Building): Self-supported steel structure.

Connecting Bridge 3 (Between Multipurpose Building-2 & Dyeing Building): Self-supported RC structure.

2. Observations:

Observation 1: Cursory calculation indicates the columns are marginally overstressed (Multi-Purpose Building- 2).



Overstressed columns

Description: The cursory calculation indicates that marked columns are stressed above the normal design limit considering floor live load 4kPa for the typical floors and 6kPa for storage floors. We have considered minimum concrete strength (16.3 MPa) based on aggregate type and rebar strength 415 MPa.

The building engineer is required to review the design, load, and column stresses based on-situ material strength and produce an EA report as per BNBC 2020.

Observation 2: Exposed rebar of columns at the roof (Multi-Purpose Building- 2)

Exposed Rebar

Description: Exposed rebar was found on the roof. Factory is required to apply rust-proof paint on exposed rebar.

Observation 3: Non-structural element found unbraced or non-anchored (Multi-Purpose Building-2)

Steel Storage Rack – Not Anchored

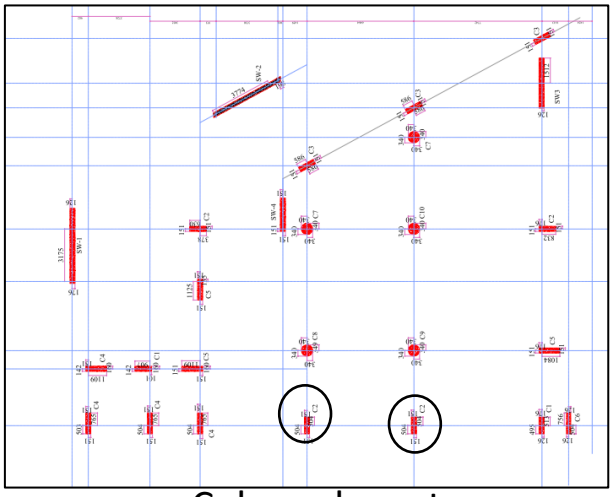
Plastic Water Tank – Not Braced

Description: Steel storage rack on several floor and plastic water tanks at roof were found non-anchored/unbraced. Factory is required to anchor or brace all non-structural elements (rack, plastic water tank etc.).

Observation-4: Column susceptible to vehicle impact (Multi-Purpose Building- 2).

Description: Column at ground floor loading/unloading area was found susceptible to vehicle impact. Building engineer is required to provide barriers around the column to prevent vehicle impact.

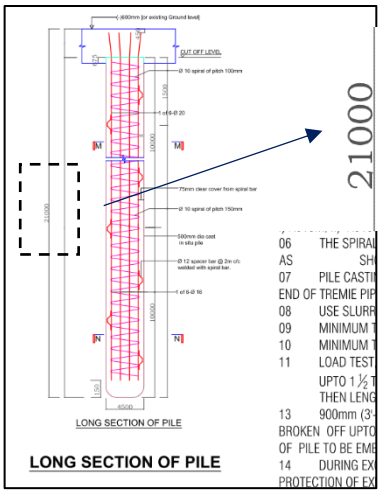
Observation-5: Column appears to be slender (Office Building).

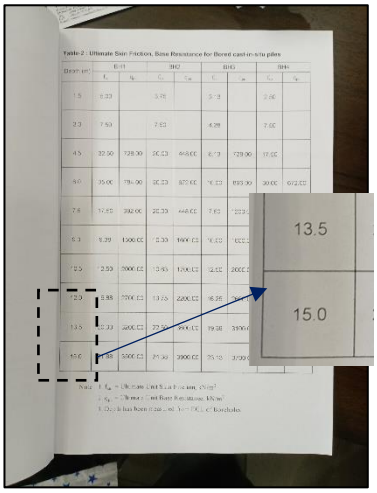


Column layout

Description: Cursory calculation shows that slenderness in highlighted columns exceeds the normal design limit due to long unsupported lengths. The building engineer is required to carry out an adequacy check of the highlighted columns considering the slenderness effect.

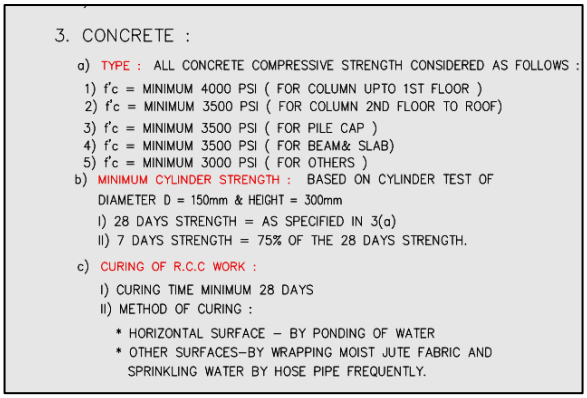
Observation-6: Lack of geotechnical data (Office Building).





Description: As per the provided drawing, the length of the pile is 21 m, but pile capacity is provided up to 15 m only in the soil test report. A geotechnical engineer is required to investigate this issue and prepare a new soil test report up to 21 m in length.

Observation-7: Inadequate number of concrete cylinder test reports (Office Building).



3. CONCRETE :

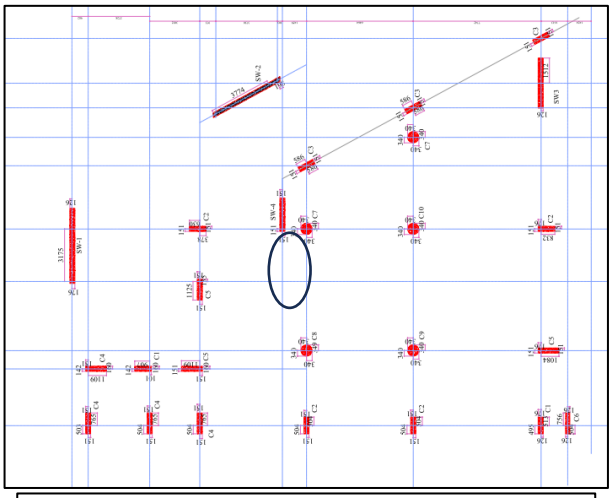
a) TYPE : ALL CONCRETE COMPRESSIVE STRENGTH CONSIDERED AS FOLLOWS :
1) f'c = MINIMUM 4000 PSI (FOR COLUMN UPTO 1ST FLOOR)
2) f'c = MINIMUM 3500 PSI (FOR COLUMN 2ND FLOOR TO ROOF)
3) f'c = MINIMUM 3500 PSI (FOR PILE CAP)
4) f'c = MINIMUM 3500 PSI (FOR BEAM& SLAB)
5) f'c = MINIMUM 3000 PSI (FOR OTHERS)

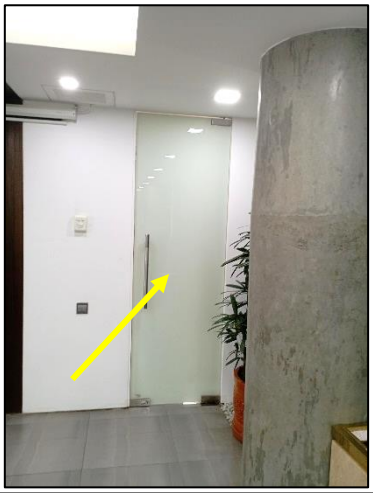
b) MINIMUM CYLINDER STRENGTH : BASED ON CYLINDER TEST OF DIAMETER D = 150mm & HEIGHT = 300mm
I) 28 DAYS STRENGTH = AS SPECIFIED IN 3(a)
II) 7 DAYS STRENGTH = 75% OF THE 28 DAYS STRENGTH.

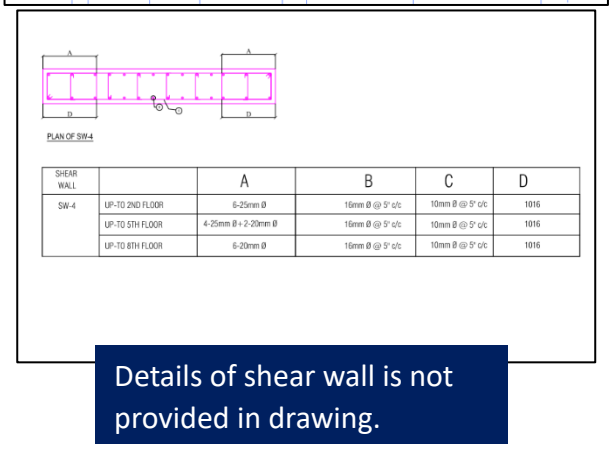
c) CURING OF R.C.C WORK :
I) CURING TIME MINIMUM 28 DAYS
II) METHOD OF CURING :
* HORIZONTAL SURFACE – BY PONDING OF WATER
* OTHER SURFACES–BY WRAPPING MOIST JUTE FABRIC AND SPRINKLING WATER BY HOSE PIPE FREQUENTLY.

Description: The design strength of concrete is considered as 27.58 MPa (4000 Psi) and 24.13 (3500 Psi) but the adequate number of concrete cylinder test reports was not available onsite as per frequency of testing (BNBC). The building engineer is required to take an adequate number of concrete cores to confirm the design strength.

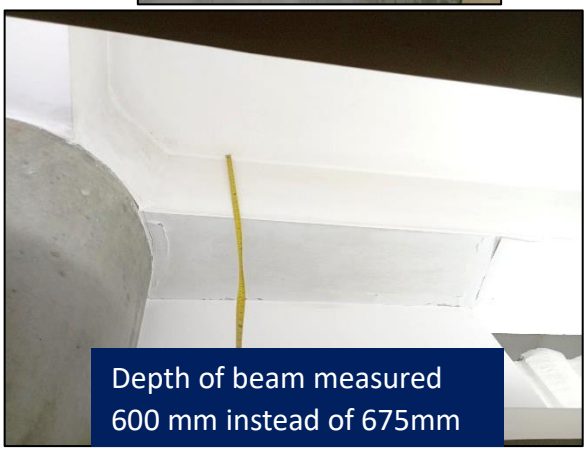
Observation-8: Discrepancy and missing information in as-built drawing (Office Building).



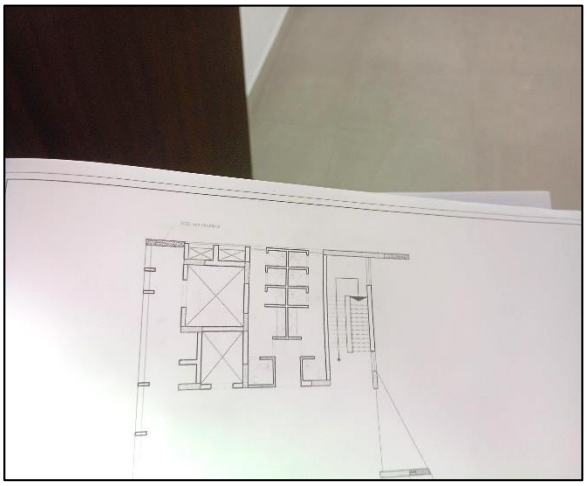


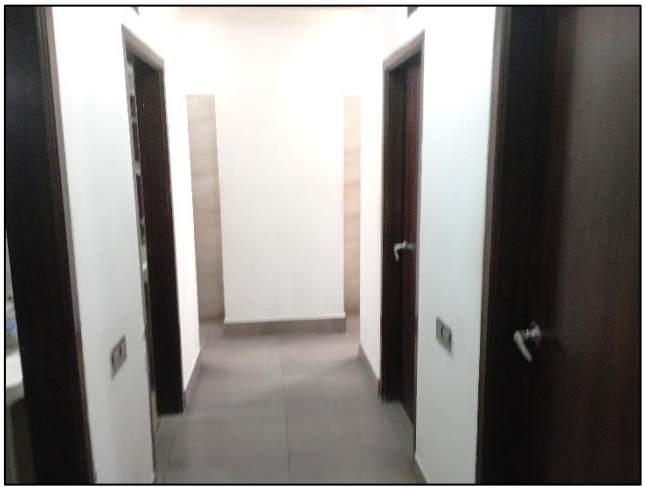


Details of shear wall is not provided in drawing.



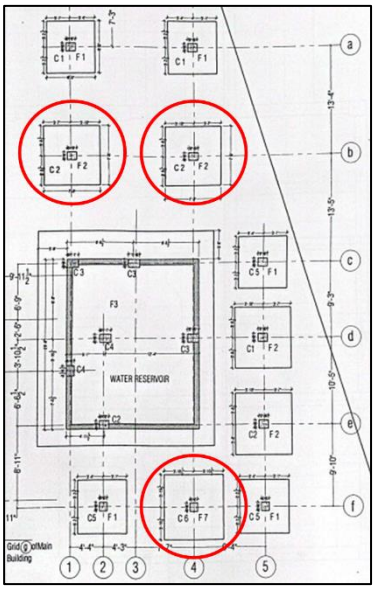
Depth of beam measured 600 mm instead of 675mm





Description: Shear wall at marked location was not found at top floor. No details of shear wall is provided in structural drawing. The depth of beam was measured 600 mm instead of 675mm. Toilet arrangement was not found as per as-built drawing. The building engineer is required to update the as-built drawing.

Observation 9: Cursory calculation indicates the columns and foundations are marginally overstressed (Old Utility Building)



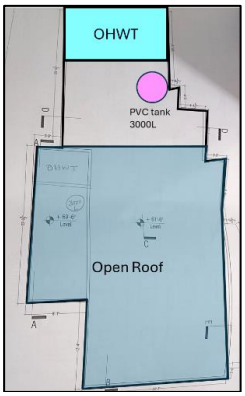
Overstressed columns and footings

Old Utility Building

Description: The cursory calculation indicates that marked columns and foundations are stressed above the normal design limit considering floor live load 2kPa for the typical floors. We have considered minimum concrete strength (14.1 MPa) based on aggregate type and rebar strength 275 MPa.

The foundations are marginally overstressed for punching shear and not checked for bearing as no soil investigation report was available. The building engineer is required to review the design, load, and column-foundation stresses based on-situ material strength at the marked locations.

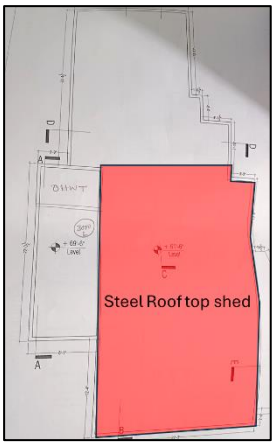
Observation 10: Inconsistencies in the as-built drawing (Old Utility Building)



Roof plan

Overhead water tank at roof

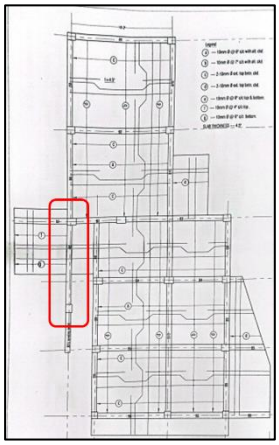
PVC water tank at the roof



Roof plan

Steel roof top shed

Steel stair



Typical floor and slab layout

Discontinuous rooftop beam

Floor Build up and false slab

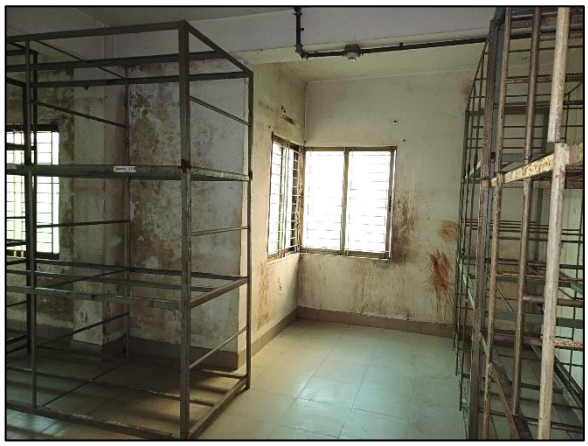
Description: During the inspection, the mismatch was found in the as-built drawings of the Old Utility building. On the roof, an overhead water tank and a PVC water tank (3000L) were found not mentioned in the drawing. The structural drawing of OHWT was found missing. Floor build-up and false slab are not mentioned in the drawing. The rooftop of the marked portion is a steel shed. No structural details were found for the steel portion. There is a steel stair with the building. No drawing was available for the stairs. There is a discontinuous beam at the rooftop. No rooftop beam layout/ structural details were provided. The building engineer is required to survey the structure, prepare accurate as-built drawings, and submit to the RSC.

Observation 11: Apparently non-engineered steel stairs (Old Utility Building)




Description: During the inspection, apparently non-engineered steel stair was found. The members are apparently inadequate, lack of lateral stability and improper steel connections were observed. The foundation of the structure is also not clear. The building engineer is required to check the lateral stability of the structure, prepare an Engineering Assessment (EA) and submit it to the RSC for review.

Observation 12: Dampness found in the masonry walls (Old Utility Building)

Description: During the inspection, dampness was found in the masonry walls. The building engineer is required to repair the walls in a suitable method.

Observation 13: Lack of design documents (Medical & Childcare Shed)

Medical & Childcare Shed

Description: As per BNBC, every building or structure designed shall have its design documents prepared following the provision of Section 1.9.1. The design document shall include a design report, a set of as-built drawings and load plans which shall be prepared in compliance with section 1.9.1.1 and section 1.9.1.2, part-6 of BNBC.

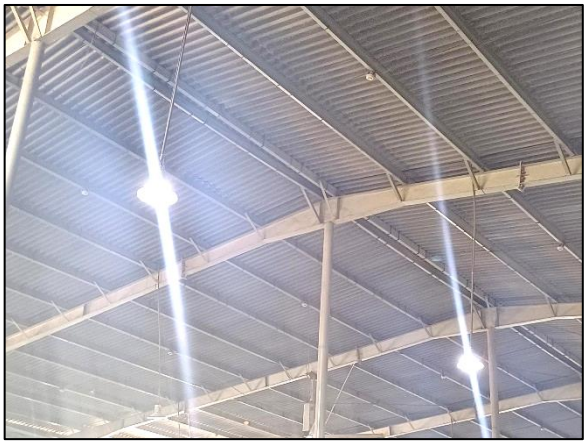
Observation-14: Lack of lateral stability (Wastage Shed).

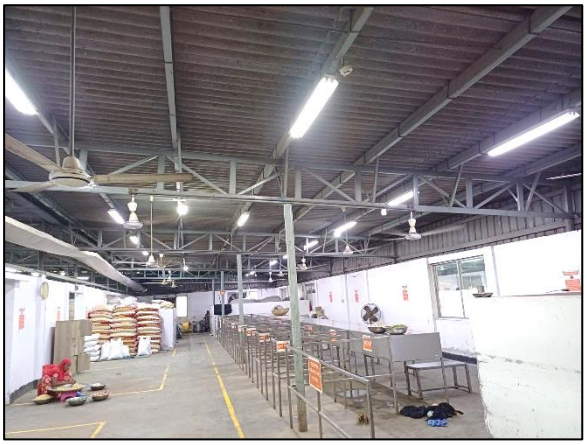
Description: No load transfer media/vertical bracing is provided for the structure. The building engineer is required to check the lateral stability of the structure and propose a remediation plan.

Observation-15: Lack of as-built drawing (Wastage Shed, RMS Room)

Description: As-built drawing was not available for these structures. The building engineer is required to produce as-built drawings for the structures.

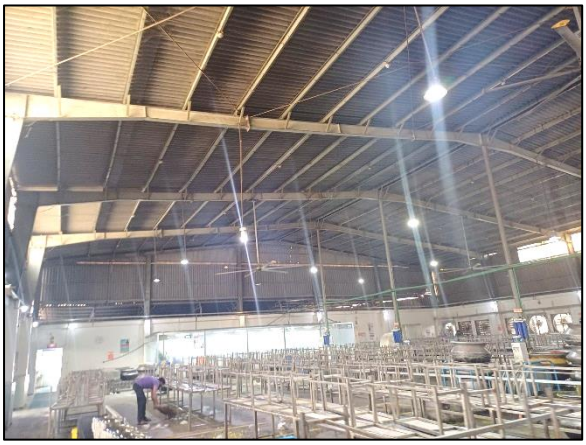
Observation 16: Lack of lateral stability (Dining Shed)

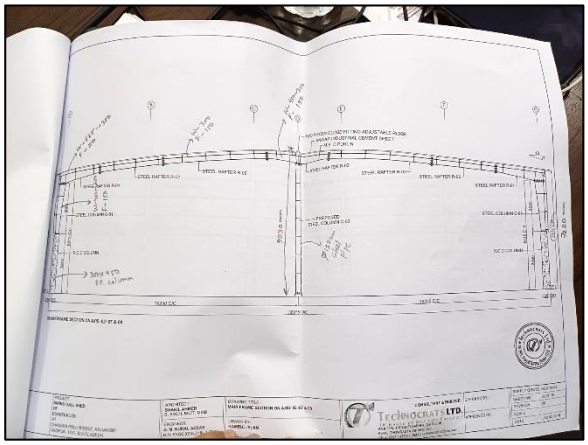


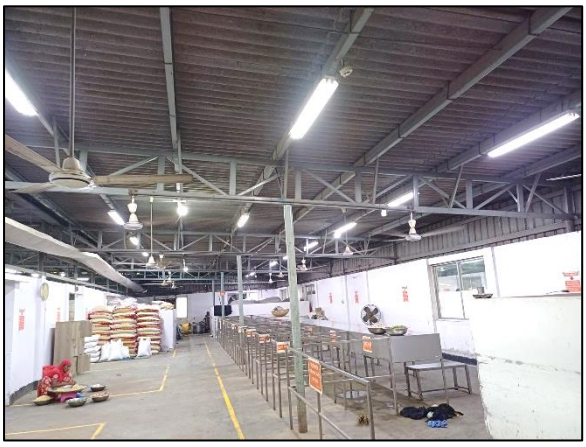


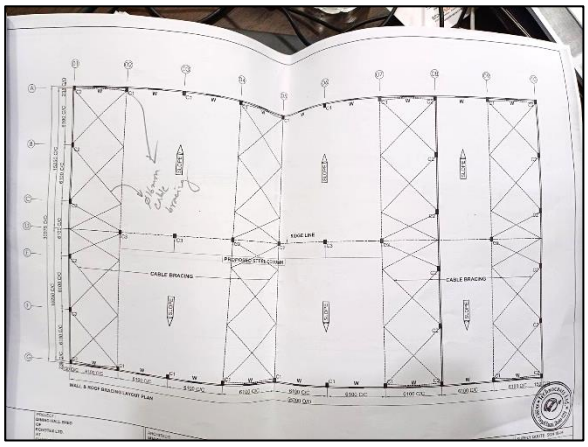
Description: During the inspection, a lack of lateral stability was found in the Dining Shed. Lateral load transfer media are absent (Compression Strut) along the transverse direction of the rafters. There is no compression strut, vertical and horizontal bracing transverse to the truss members of the shed. The building engineer is required to carry out an Engineering Assessment (EA) to check the lateral stability of the structure and suggest proper remedial actions accordingly. Submit the EA documents to RSC for review.

Observation 17: Lack of information in the as-built drawing. (Dining Shed)







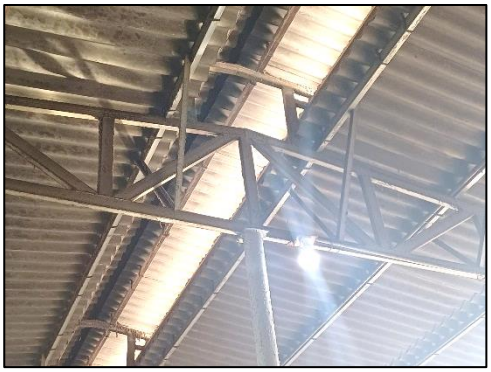


Description: Lack of information was found in the as-built drawings of the Dining Shed. The size of the steel column, rafter, vertical and side wall bracings, RC column and tie beams were found missing in the drawings. Structural details of truss members and supporting steel columns in the dining, prayer and washing sections were not found. There is also the absence of connection details. The building engineer is required to survey the structure, prepare accurate as-built drawings, and submit to the RSC.

Observation 18: Corrosion found in the steel sections (Dining Shed)

Description: During the inspection, corrosion was found in the steel section of the Dining Shed. The building engineer is required to remove the rust and apply rust-proof paint.

Observation 19: Lack of lateral stability (Kitchen Shed)

Description: During the inspection, a lack of lateral stability was found in the Kitchen Shed. Lateral load transfer media are absent (Compression Strut, Vertical and Horizontal Bracing) along the transverse direction of the truss. There is an improper steel connection, and the foundation system is also not clear. The building engineer is required to carryout an Engineering Assessment (EA) to check the lateral stability of the structure and suggest proper remedial actions accordingly. Submit the EA documents to RSC for review.

Observation 20: Corrosion found in the steel sections (Kitchen Shed)


Description: During the inspection, corrosion was found in the steel section of the Kitchen Shed. The building engineer is required to remove the rust and apply rust-proof paint.

Observation 21: Lack of design documents (ETP Building)

Description: No design document for the ETP Building was available. The building engineer is required to survey the whole structure and produce a set of as-built drawings along with DEA report.

Observation 22: Lack of design documents (Connecting Bridge 1, 2 & 3)

Connecting Bridge 1 Connecting Bridge 2 Connecting Bridge 3

Description: As per BNBC, every building or structure designed shall have its design documents prepared following the provision of Section 1.9.1. The design document shall include a design report, a set of as-built drawings and load plans which shall be prepared in compliance with section 1.9.1.1 and section 1.9.1.2, part-6 of BNBC.

3. Action Plan:

Observation	Action Plan	Timeline
Cursory calculation indicates the columns are marginally overstressed (Multi-Purpose Building- 2)	Verify in situ concrete strength (100mm dia. cores from 4 columns) from the lower tier of the building.	within 6 weeks
	The building engineer is required to review the design, load, and column stresses based on-situ material strength and produce an EA report as per BNBC 2020.	within 6 weeks
	Produce and actively manage a loading plan for all floor plates within the factory considering floor capacity and column capacity.	within 6 weeks
	Carry out remedial work where required.	within 6 months
Exposed rebar of columns at the roof (Multi-Purpose Building-2)	Building engineer is required to apply rust-proof paint on exposed rebar.	within 6 weeks
Non-structural elements found unbraced or non-anchored (Multi-Purpose Building- 2)	Building engineer is required to anchor or brace all non-structural elements (rack, plastic water tank etc.).	within 6 weeks
Column susceptible to vehicle impact (Multi-Purpose Building- 2)	Building engineer is required to provide barriers around the column to prevent vehicle impact.	within 6 weeks
Column appears to be slender (Office Building).	The building engineer is required to carry out an adequacy check of the highlighted columns considering the slenderness effect.	within 6 weeks
	Implement remediation work if required.	within 6 months
Lack of geotechnical data (Office Building).	A geotechnical engineer is required to investigate this issue and prepare a new soil test report up to 21 m in length.	within 6 weeks
Inadequate number of concrete cylinder test report (Office Building).	The building engineer is required to take a minimum 4 number of concrete cores from columns to justify the design strength.	within 6 weeks
Discrepancy and missing information in as-built drawing (Office Building).	The building engineer is required to update the as-built drawing.	within 6 weeks

Observation	Action Plan	Timeline
Cursory calculation indicates the columns and foundations are marginally overstressed (Old Utility Building)	The building engineer is required to take minimum 4 number of concrete cores from columns and foundations each to verify in-situ strength of concrete.	within 6 weeks
	The building engineer is required to review the design, load, and column-foundation stresses based on-situ material strength. Submit the Detailed Engineering Assessment (DEA) report to the RSC for further review.	within 6 weeks
	Produce and actively manage load management plans.	within 6 months
	Carry out remedial work where required.	within 6 months
Inconsistencies in the as-built drawing (Old Utility Building)	The building engineer is required to survey the structure, prepare accurate as-built drawings, and submit to the RSC.	within 6 weeks
Apparently non-engineered steel stairs (Old Utility Building)	The building engineer is required to check the lateral stability of the structure, prepare an Engineering Assessment (EA) and submit it to the RSC for review.	within 6 weeks
	Carry out remedial work where required.	within 6 months
Dampness found in the masonry walls (Old Utility Building)	The building engineer is required to repair the walls in a suitable method.	within 6 weeks
Lack of design documents (Medical & Childcare Shed)	The building engineer is required to prepare a set of design documents in compliance with section 1.9.1, part-6 of BNBC.	within 6 weeks
	Carry out remedial work where required.	within 6 months
Lack of lateral stability (Wastage Shed).	The building engineer is required to check the lateral stability of the structure and propose a remediation plan.	within 6 weeks
	Carry out remedial work if required.	within 6 months
Lack of as-built drawing (Wastage Shed, RMS Room)	The building engineer is required to produce as-built drawings for the structures.	within 6 weeks

Observation	Action Plan	Timeline
Lack of lateral stability (Dining Shed)	The building engineer is required carry out an Engineering Assessment (EA) to check the lateral stability of the structure and suggest proper remedial actions accordingly. Submit the EA documents to RSC for review.	within 6 weeks
	Carry out remedial work where required.	within 6 months
Lack of information in the as-built drawing. (Dining Shed)	The building engineer is required to survey the structure, prepare accurate as-built drawings, and submit to the RSC.	within 6 weeks
Corrosion found in the steel sections (Dining Shed)	The building engineer is required to remove the rust and apply rust-proof paint.	within 6 weeks
Lack of lateral stability (Kitchen Shed)	The building engineer is required to carryout an Engineering Assessment (EA) to check the lateral stability of the structure and suggest proper remedial actions accordingly. Submit the EA documents to RSC for review.	within 6 weeks
	Carry out remedial work where required.	within 6 months
Corrosion found in the steel sections (Kitchen Shed)	The building engineer is required to remove the rust and apply rust proof paint.	within 6 weeks
Lack of design documents (ETP Building)	The building engineer is required to prepare a set of design documents in compliance with section 1.9.1, part-6 of BNBC.	within 6 weeks
	Carry out remedial work where required.	within 6 months
Lack of design documents (Connecting Bridge 1, 2 & 3)	The building engineer is required to prepare a set of design documents in compliance with section 1.9.1, part-6 of BNBC.	within 6 weeks
	Carry out remedial work where required.	within 6 months