

# Amtranet Limited (New Buildings 2)

Kasba Tower, 160, West Rajashon, Savar, Dhaka

(23.846167N, 90.271673E)

14 December 2023

## Structural Inspection Report

Author: Md. Latifur Rahman Siddique and Md. Jahidul Islam

Reviewed By: Abu Zafar-Al-Mansur

Approved By: Mohammad Ahsan Ullah



# 1. Executive Summary

On 14<sup>th</sup> December 2023, Md. Latifur Rahman Siddique and Md. Jahidul Islam of the **RMG SUSTAINABILITY COUNCIL (RSC)** carried out a visual structural survey of Amtranet Limited (New Buildings 2) at the address and coordinates given on the cover page of this report.

We met with factory management A.K Azad Bhuiyan (Manager-Civil), Md. Tareq Hossain (Sr. Manager Admin, HR & compliance), Md. Kamrul Hasan Shawon (Assistant Manager Civil/Maintenance) and many more.

The factory premises comprises of fourteen structures named Building-1 (Factory Building), Generator & Sub-Station, Building-2, Boiler Room, Building-3, Building-4, Utility Building, Cooling Tower Building-4, Empty Chemical Drum Shed, Security Room, RMS Room, Cooling Tower Building-2, Wastage Shed, and ETP Shed.

The Building-3, Building-4, Utility Building, Cooling Tower Building-4, Empty Chemical Drum Shed, Security Room, RMS Room, Cooling Tower Building-2 and Wastage Shed have been covered under this inspection.

Among the rest of the structures, the Building-1 (Factory Building) and Generator & Sub-Station were covered previously by ACCORD under Amtranet Limited (ID-11271). And, Building-2 and Boiler Room were covered previously by RSC under Amtranet Limited (New Building) (ID-24267).

The factory owned all the structures. We were allowed access to all the areas of the mentioned structures below.

## **During the inspection we were provided with the following documents for review:**

- Three permit drawing approved by Savar Pouroshova (Local Authority) different dated.
  - On **19<sup>th</sup> April 2017** approval taken for Building-3, Building-4, Utility Building
  - For structural changes and adding new structures the factory had taken revised approval on **16<sup>th</sup> July 2023** for the Building-3, Building-4, Utility Building, Cooling Tower Building-4, Empty Chemical Drum Shed, Cooling Tower Building-2, and Wastage Shed.
  - On **25<sup>th</sup> February 2018** approval was taken for Security Room and RMS Room.
- An industrial machine layout drawing approved from the Department of Inspection for Factories and Establishments (DIFE) dated 31<sup>st</sup> July 2022.

## Building-3:

- A set of architectural and structural drawing prepared by ENGINEERING SOLUTION & IDEAS (ESI) dated January-2019.
- The load plan prepared by ADVANCED DESIGN CONCEPT dated December-2023.
- Two sets of cylinder test report from slab.
- A geotechnical investigation report (for full premises) prepared by SHAHIN SOIL ENGINEERING dated August 2016. The report was prepared based on 12 borehole data. The allowable bearing capacity range is recommended as 137 kPa to 240 kPa at 2.74m depth with FoS 3.0.

## Building-4:

- A set of structural drawing prepared by ENGINEERING SOLUTION & IDEAS (ESI) dated July-2020.
- A set of architectural drawing prepared by ENGINEERING SOLUTION & IDEAS (ESI) dated January-2019.
- The load plan prepared by ADVANCED DESIGN CONCEPT dated December-2023.
- A geotechnical investigation report (for full premises) prepared by SHAHIN SOIL ENGINEERING dated August 2016. The report was prepared based on 12 borehole data. The allowable bearing capacity range is recommended as 137 kPa to 240 kPa at 2.74m depth with FoS 3.0.

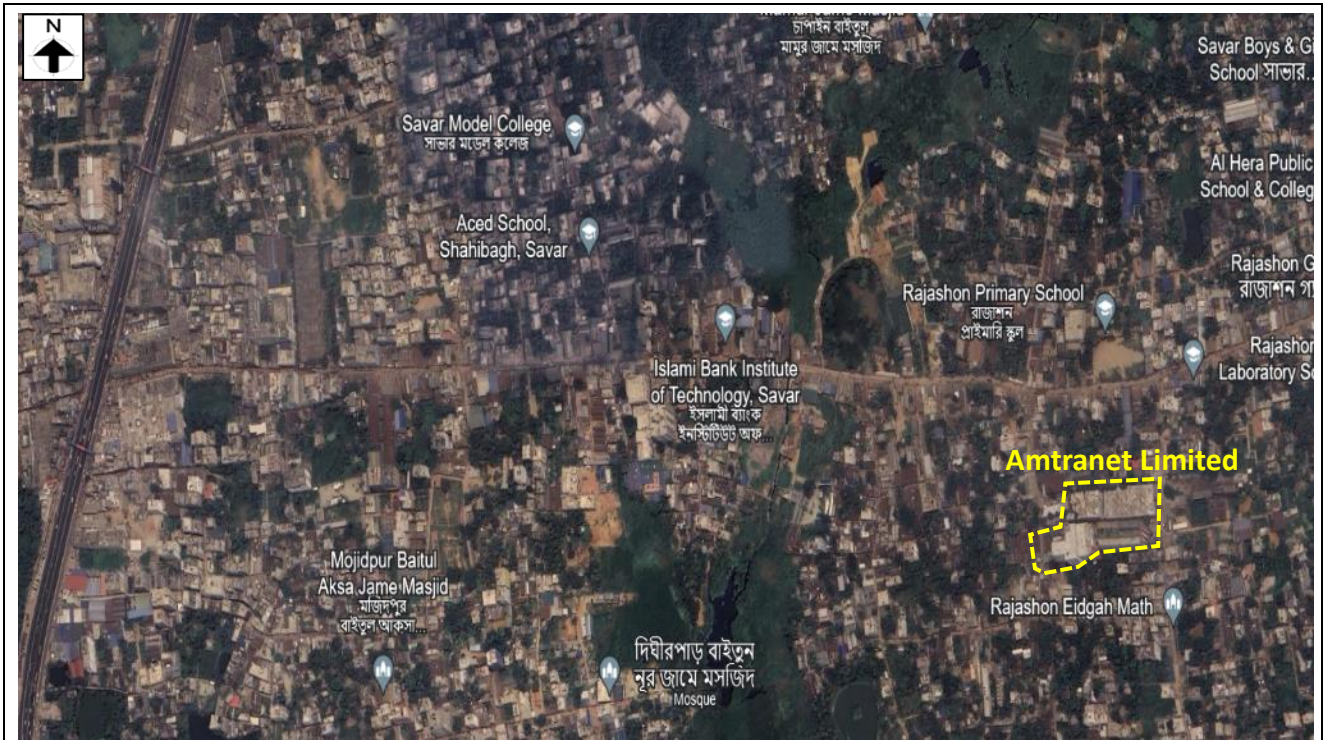
**We have checked the column capacity of the Building-3, Building-4, and Utility Building considering live load 3kPa for the typical production floor, 6kPa for the storage area and 1.5 kPa for the roof. We have considered minimum concrete strength based on aggregate type.**

Based on the visual inspection a list of non-exhaustive key concerns with associated action plan and timeframes are given at the end of this report. We see no reason to suspend operations in the facilities due to structural concerns (subject to the required immediate actions noted in this report). Please note that these actions should be completed as soon as practically possible and certainly within the time frame noted.

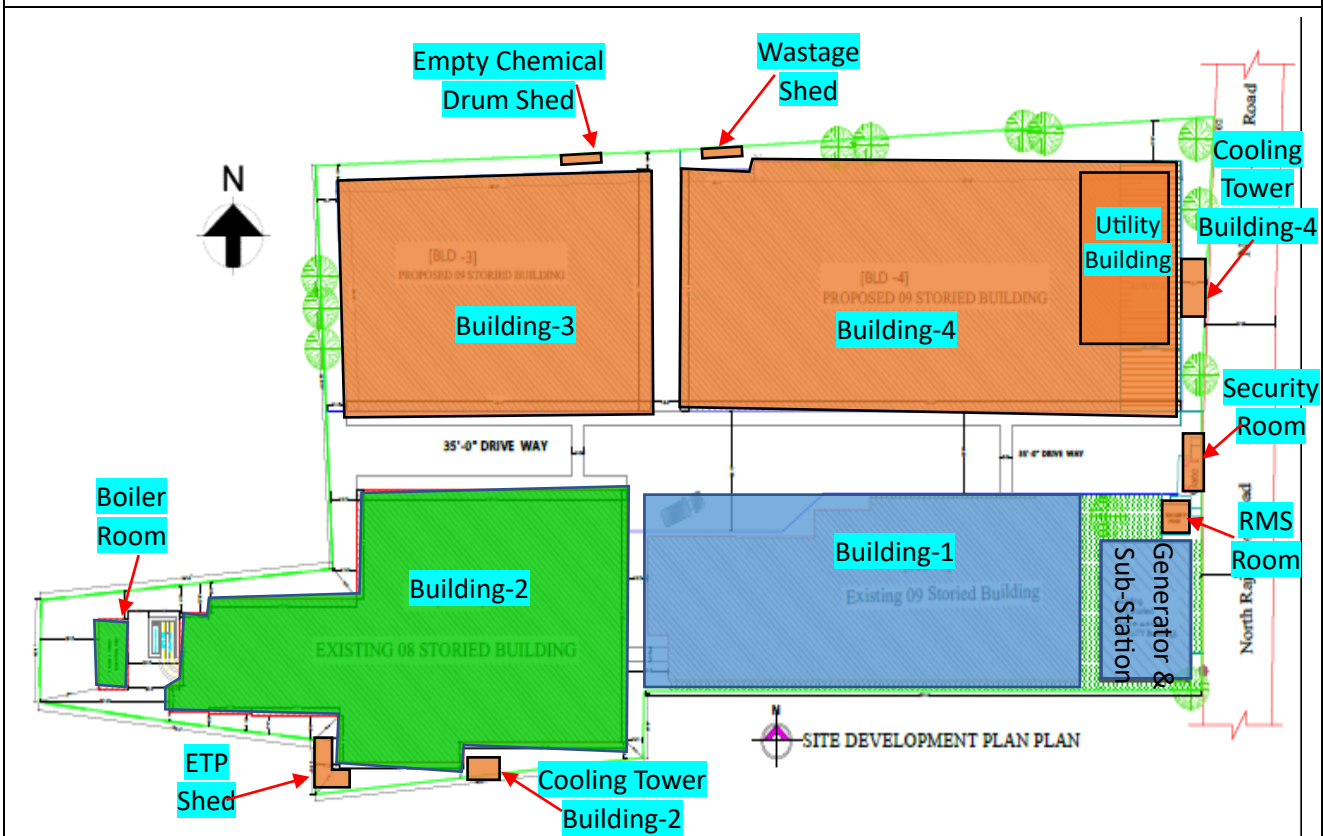
We have reviewed the property from an outline seismic perspective and would consider that the building, along with many others in the Dhaka region, to be at significant risk of damage in a major Seismic event.

Our Limitations and Assumptions are also noted at the end of this report.

## 2. Building Extents



Geographical location of the factory

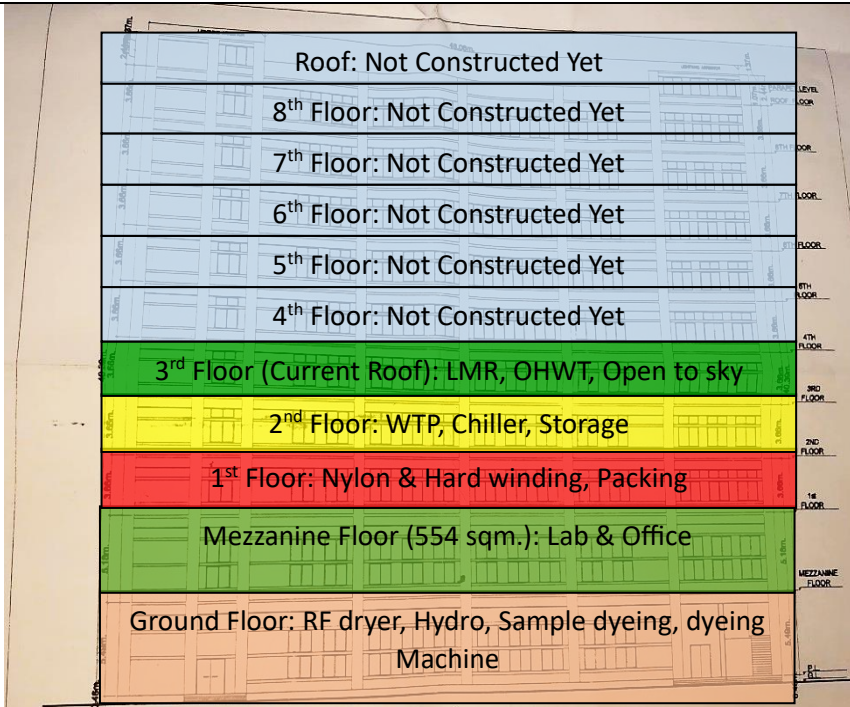


Master Layout plan of the factory premises

	Amtranet Limited (New Buildings 2) ID-24776; Covered under this inspection
	Amtranet Limited (New Building) ID-24267; Covered previously dated 22-November-2021
	Amtranet Limited ID-11271; Covered previously dated 29-April-2014

**Building-3:**

This structure is a proposed nine storey (G+M+8) and existing three storey (G+M+2) reinforced concrete (RC) building. The building was constructed from February 2019 to October 2021 and started operation in January 2023. Each floor area is approximately 1369 sqm.



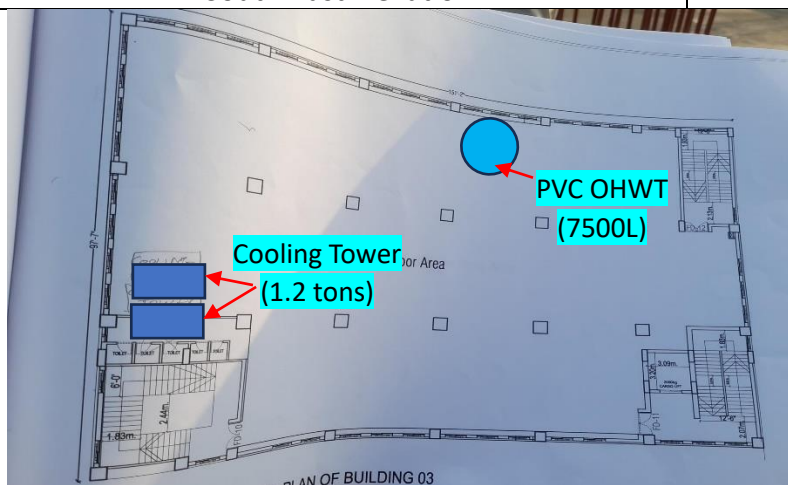
Typical Frame Section and Floor Usages



South-East Elevation



South-West Elevation

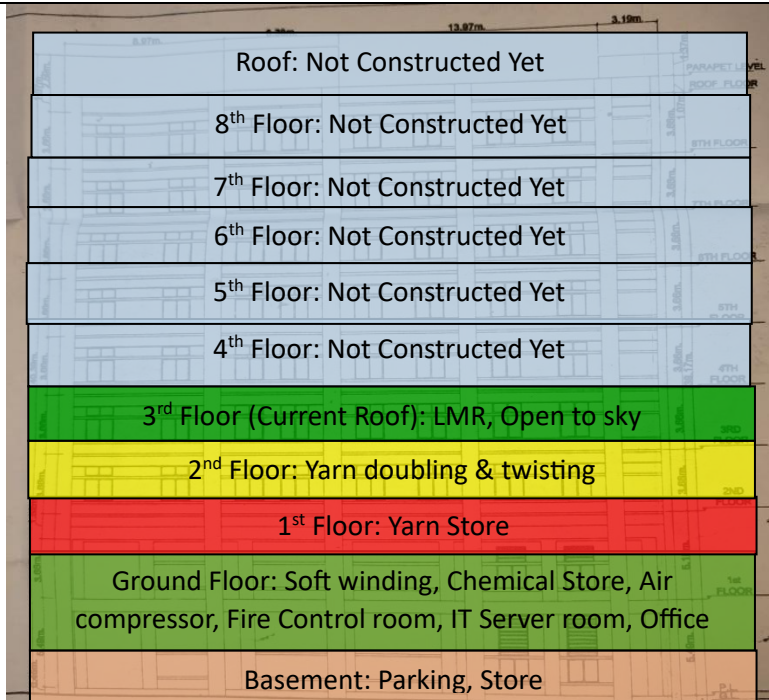


Roof Extent



**Building-4:**

This structure is a proposed nine storey (G+8) and existing three storey (B+G+2) reinforced concrete (RC) building. The building was constructed from February 2020 to December 2021 and started operation in January 2023. Each floor area is approximately 272 sqm.



Typical Frame Section and Floor Usages



South-West Elevation



North-West Elevation



Roof Extent

**Utility Building:**

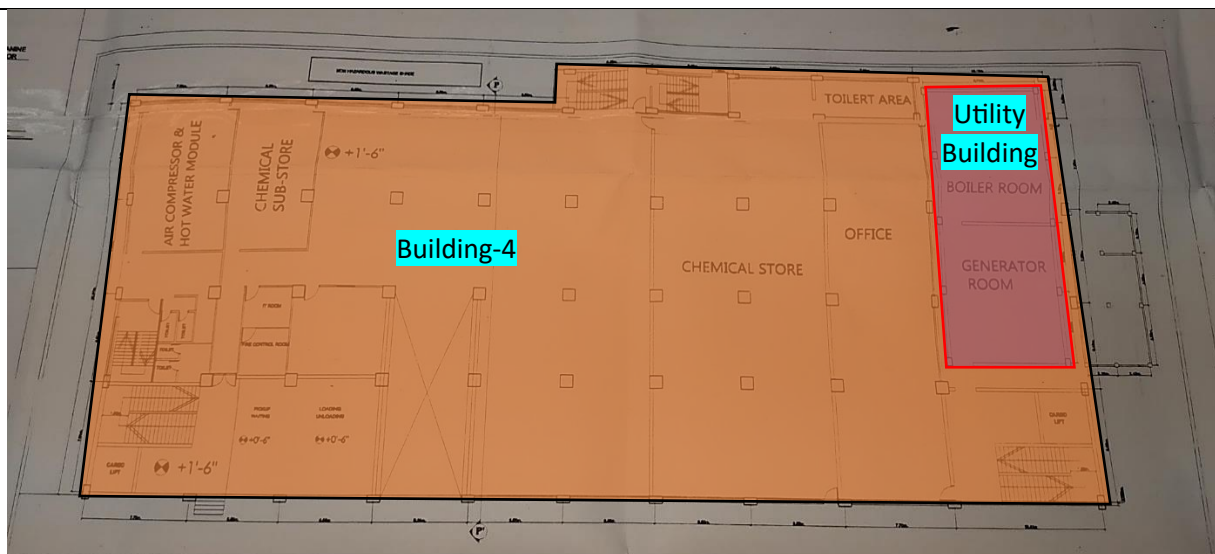
The structure is a two-storey RC structure. The utility building was found constructed inside the building-4 which is structurally separated. The construction of the structure started in February 2020 and was completed in December 2021. It has been occupied since January 2022. Each floor area is approximately 250 sqm.

Roof: Enclosed under Building-4
1 <sup>st</sup> Floor: Electrical Substation
Ground Floor: Gas Generator, Boiler

Floor Usages



North-East Elevation



Floor Layout

**Cooling Tower Building-4:**

This is a two-storey RC building. The construction of the building was started in January 2022 and completed in May 2022. The building has been occupied since June 2022. Each floor area is approximately 74 sqm.

Roof: Cooling Tower
1 <sup>st</sup> Floor: Air Supply
GF: Diesel Generator

Floor Usages



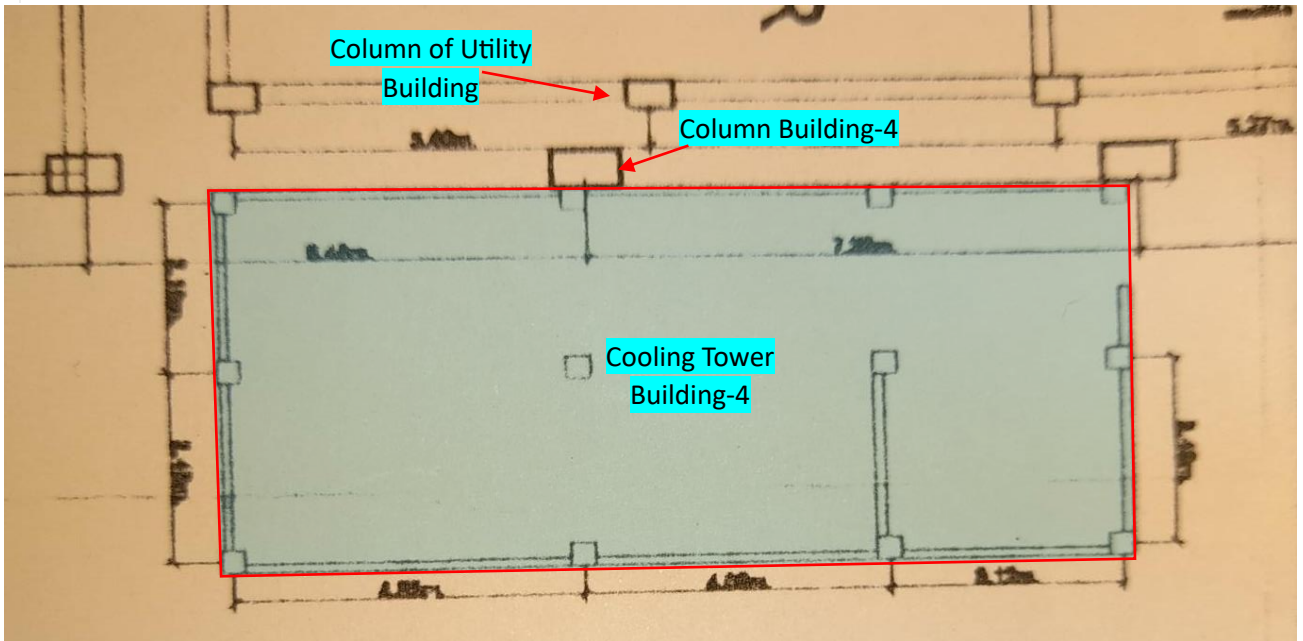
South Elevation



North-East Elevation



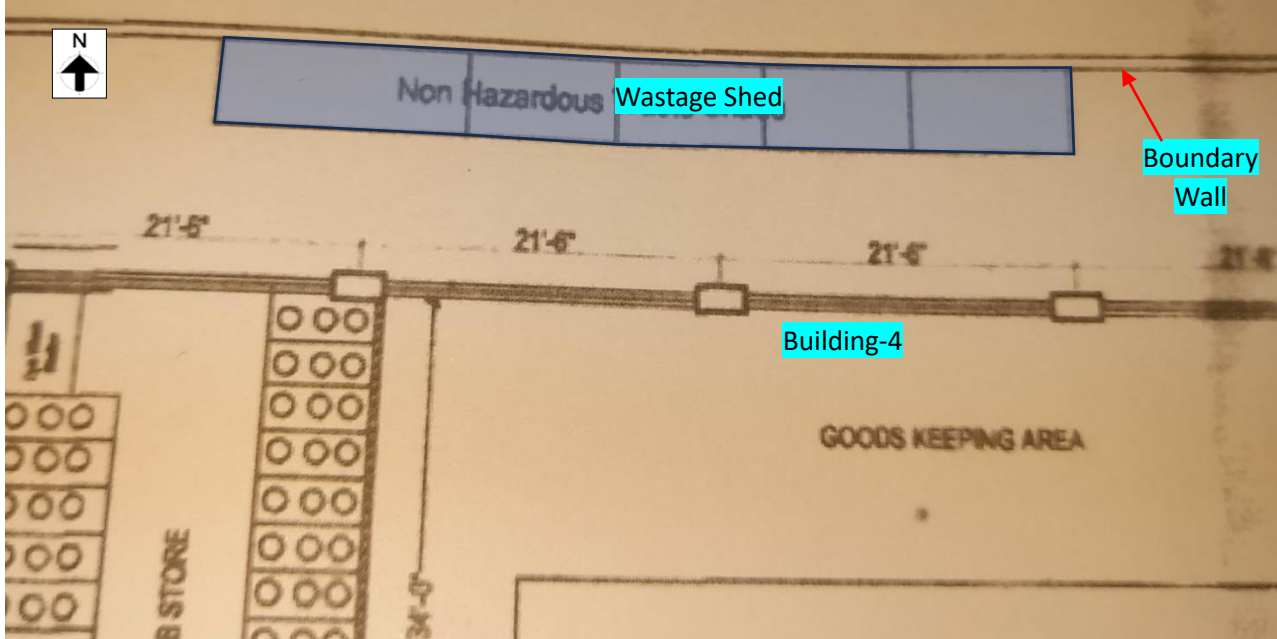
Inside View



Floor Layout

**Wastage Shed:**

This is a single storied steel shed. The structure is being used for garments jhut, empty cartoon and poly store. The construction of the structure was started in February 2023 and completed in March 2023. The shed has been occupied since April 2023. Floor area is approximately 16 sqm.



Floor Layout



South-West Elevation



Inside View



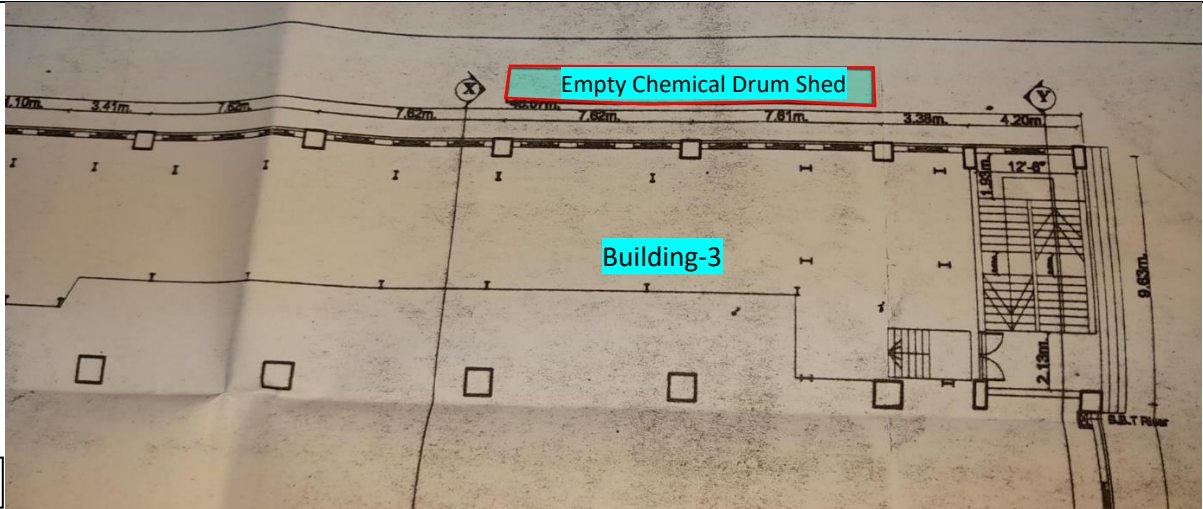
MS angle supported lightweight steel roof



Connections of angle 'L'

**Empty Chemical Drum Shed:**

This is a single storied steel shed. The structure is being used for garments empty chemical drum store. The construction of the structure was started in February 2023 and completed in March 2023. The shed has been occupied since April 2023. The floor area is approximately 29 sqm.



Floor Layout



South-East Elevation



Inside View



MS angle supported lightweight steel roof



Connections of angle 'L' and hollow pipe

**Security Room:**

It is a single storey gate RC structure. The construction of the structure was started in January 2012 and completed in December 2012. It has been occupied since January 2013. The floor area is approximately 15 sqm.



East Elevation



West Elevation

**RMS Room:**

It is a single storey masonry structure. The construction of the structure was started in January 2012 and completed in December 2012. It has been occupied since January 2013. The floor area is approximately 32 sqm.



West Elevation



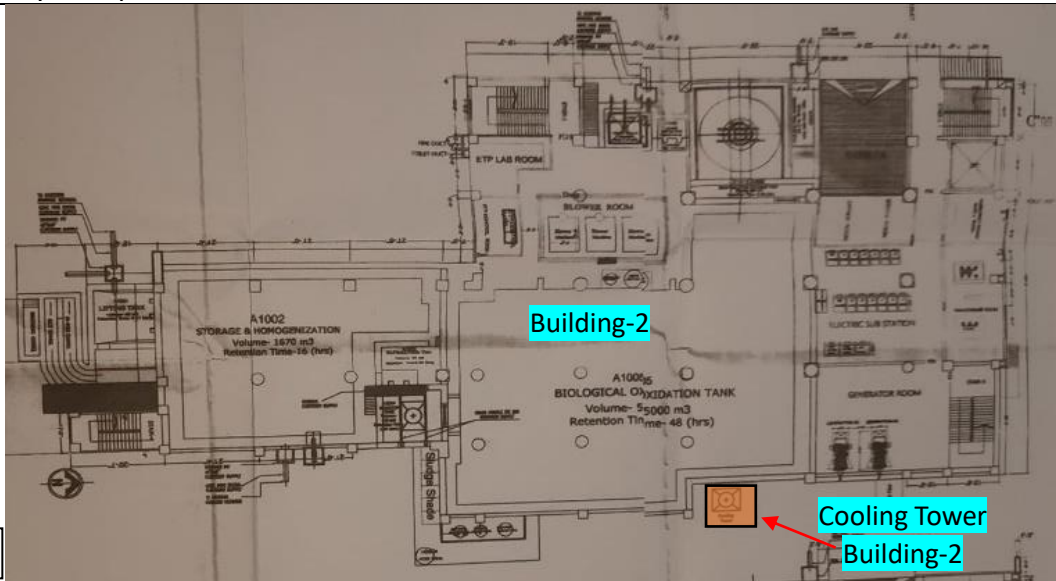
North-West Elevation



Inside View

**Cooling Tower Building-2:**

This is a single storey RC building. The construction of the building was started in January 2022 and completed in May 2022. The building has been occupied since June 2022. Each floor area is approximately 14 sqm.



Floor Layout



East Elevation



West View



Roof

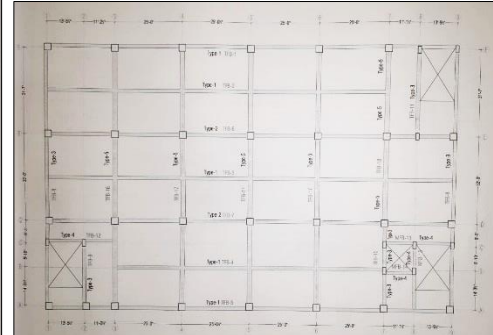
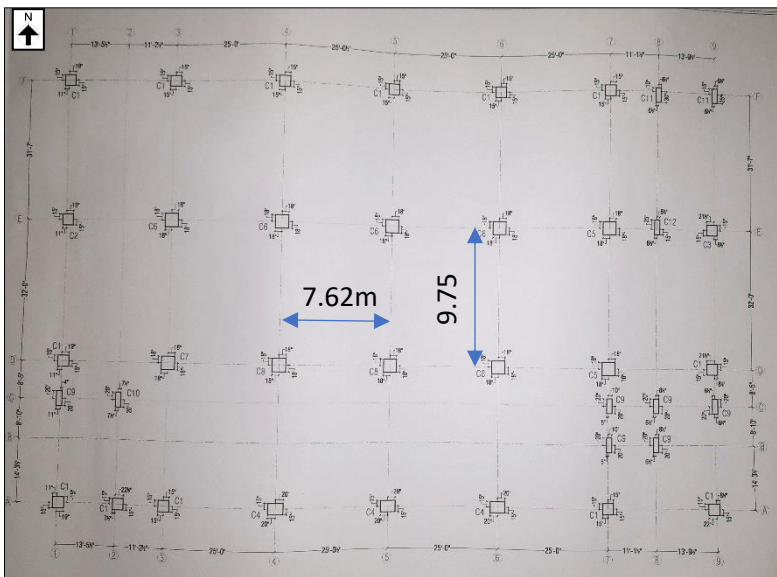


Inside View

Typical RC beam-column frame with two-way spanning Slab.  
 Typical Column size (mm): 300X300  
 Max Grid (m): 3.3 X 3.3  
 Floor to Ceiling Height: 6.7m

### 3. Structural System

**Building 3:** RC beam column frame structure with two-way spanning slab.



Column Layout and beam Layout plan

**Stability System:**

Moment resisting frame

**RC Column Sizes (mm):**

750X750;900X900;375X750;

**Beam Sizes (mm):**

N-S direction- 500 (b) x 600 (d/s)

S-E direction- 375 (b) x 450 (d/s)

**Slab thickness (mm):**

150 mm (excluding finishes)

**Material:**

Stone Chips Concrete

**Floor to Ceiling Height:**

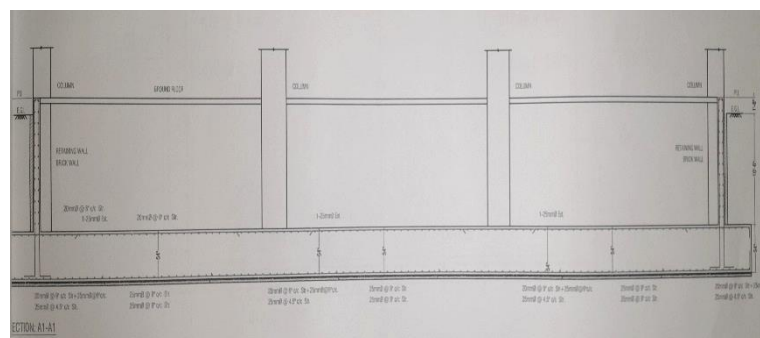
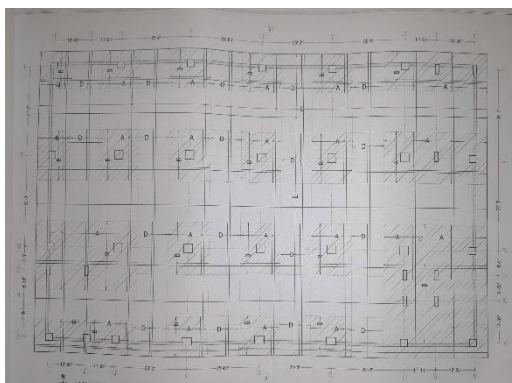
Typical Floor: 3.5 m.

**Foundation type:**

MAT foundation (as per drawing)

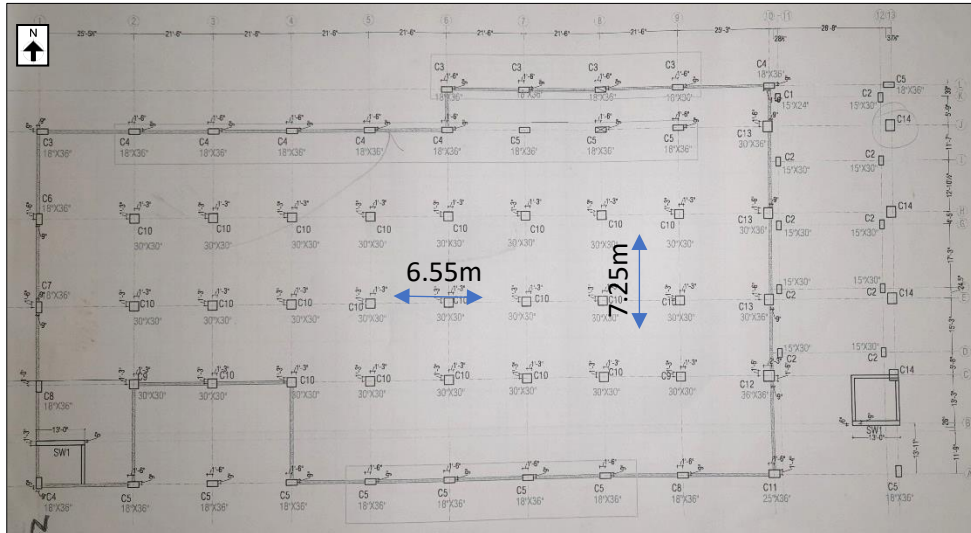


Typical beam-column frame



MAT foundation details

**Building 4:** RC beam column frame structure with shear wall and two-way spanning slab.



**Column Layout and beam Layout plan**

**Stability System:**

Moment resisting frame with shear wall.

**RC Column Sizes (mm):**

450X900;750X750;625X900;900X900; 750X900;

**Beam Sizes (mm):**

N-S direction- 375 (b) x 425 (d/s)

S-E direction- 375 (b) x 425 (d/s)

**Slab thickness (mm):**

175 mm (excluding finishes)

**Material:**

Stone Chips Concrete

**Floor to Ceiling Height:**

Typical Floor: 3.5 m.

**Foundation type:**

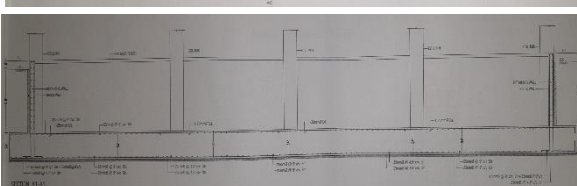
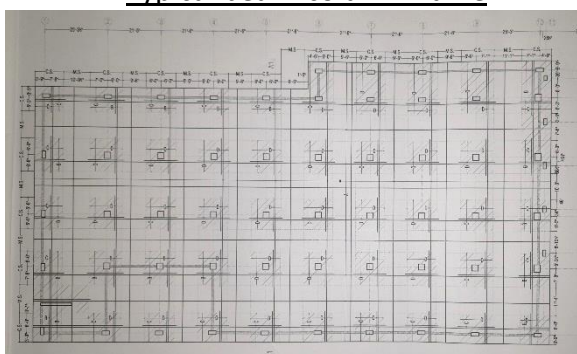
MAT foundation (as per drawing)



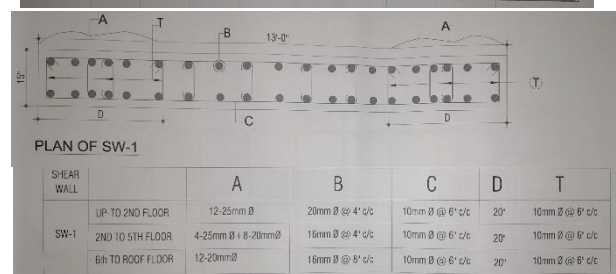
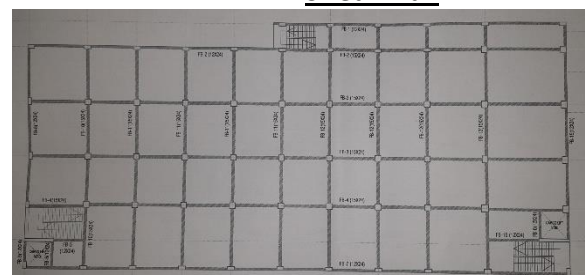
**Typical beam-column frame**



**Shear wall**

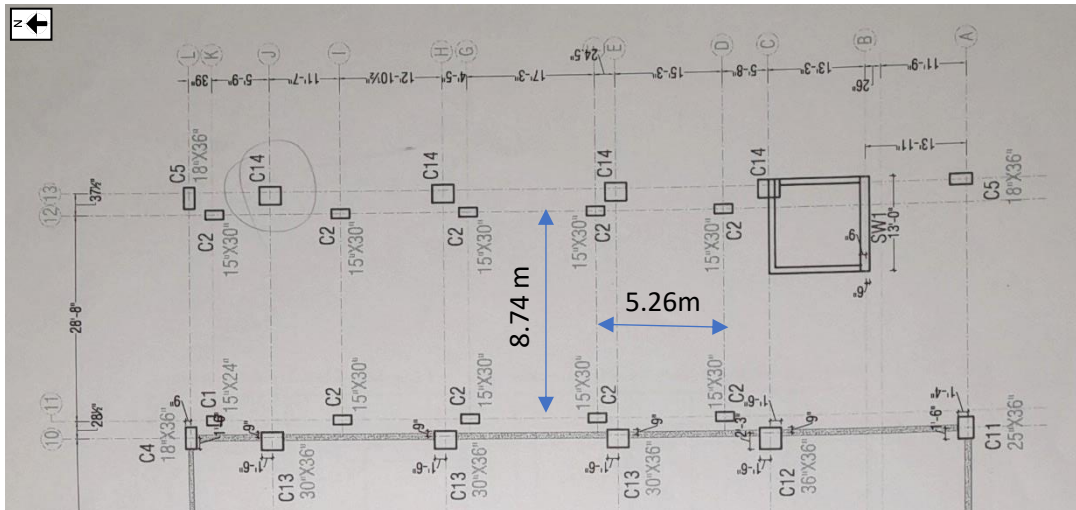


**MAT foundation details**



**Beam Lauout plan and shear wall details**

**Utility Building:** RC beam column frame structure with two-way spanning slab.



Column Layout and beam Layout plan

**Stability System:**

Moment resisting frame

**RC Column Sizes (mm):**

375X750;

**Beam Sizes (mm):**

Both direction- 300 (b) x 425 (d/s)

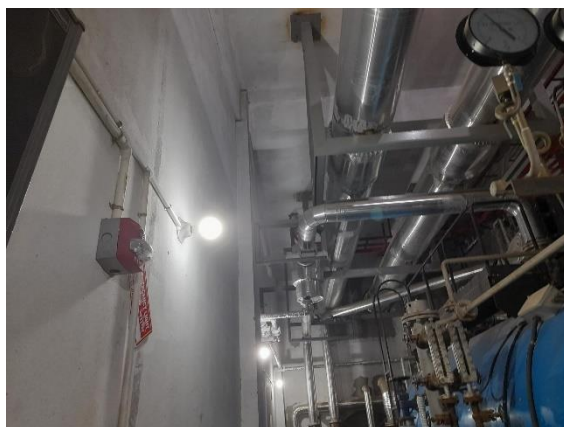
**Slab thickness (mm):**

175 mm (excluding finishes)

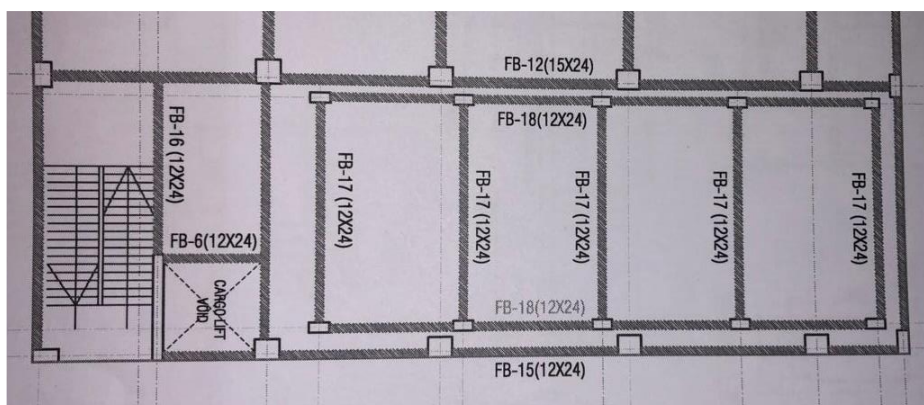
**Material:**

Stone Chips Concrete

Foundation: Unknown

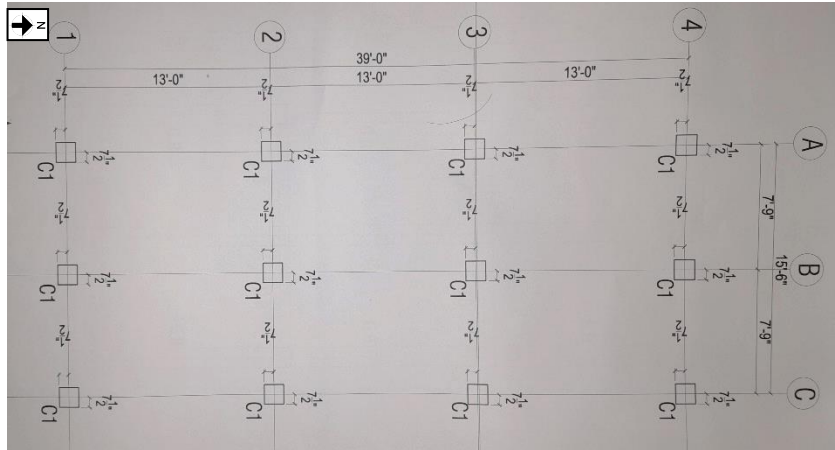


Typical beam-column frame



Beam Layout plan

**Cooling Tower Building-4:** RC beam column frame structure with two-way spanning slab.



**Column Layout**

**Stability System:**

Moment resisting frame.

**RC Column Sizes (mm):**

300X300

**Beam Sizes (mm):**

Both direction- 300 (b) x 325 (d/s)

**Slab thickness (mm):**

125 mm (excluding finishes)

**Material:**

Stone Chips Concrete

**Floor to Ceiling Height:**

Typical Floor: 3.6 m.

**Foundation type:**

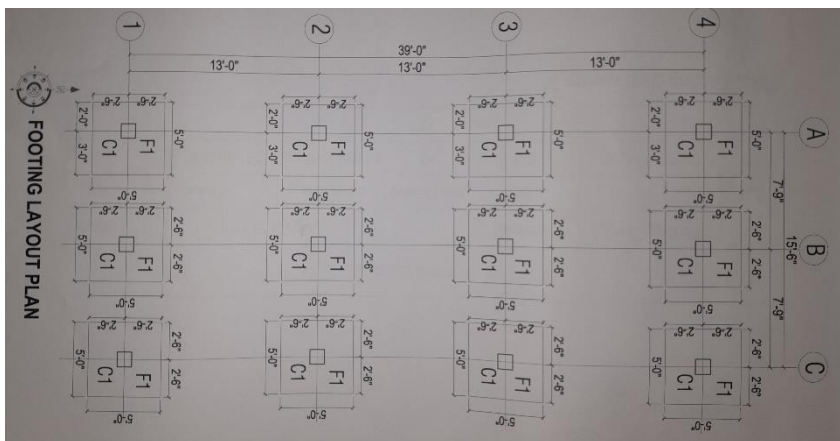
Unknown



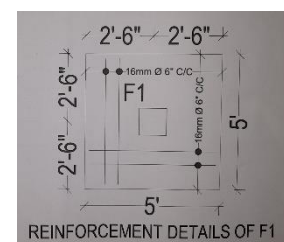
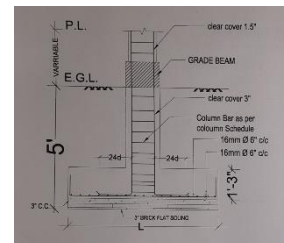
**Typical beam-column frame**



**Shear wall**



**Isolated footing foundation**

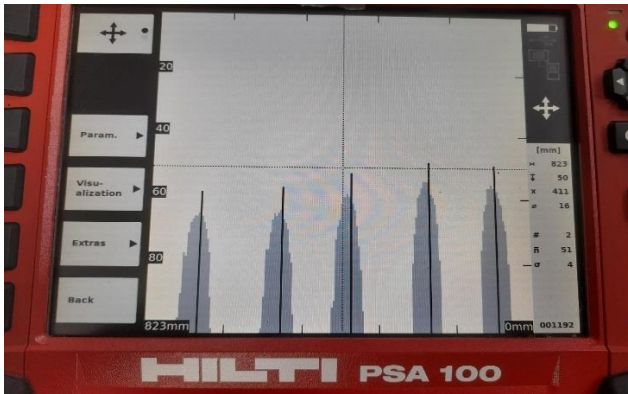
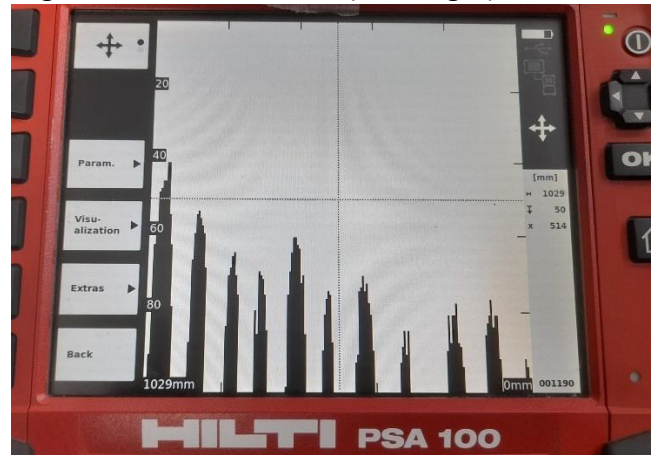


## 4. Observations

### Observation-1: Mismatch between provided drawing and on-site condition (Building-3)



Column C2 exposed rebar at roof

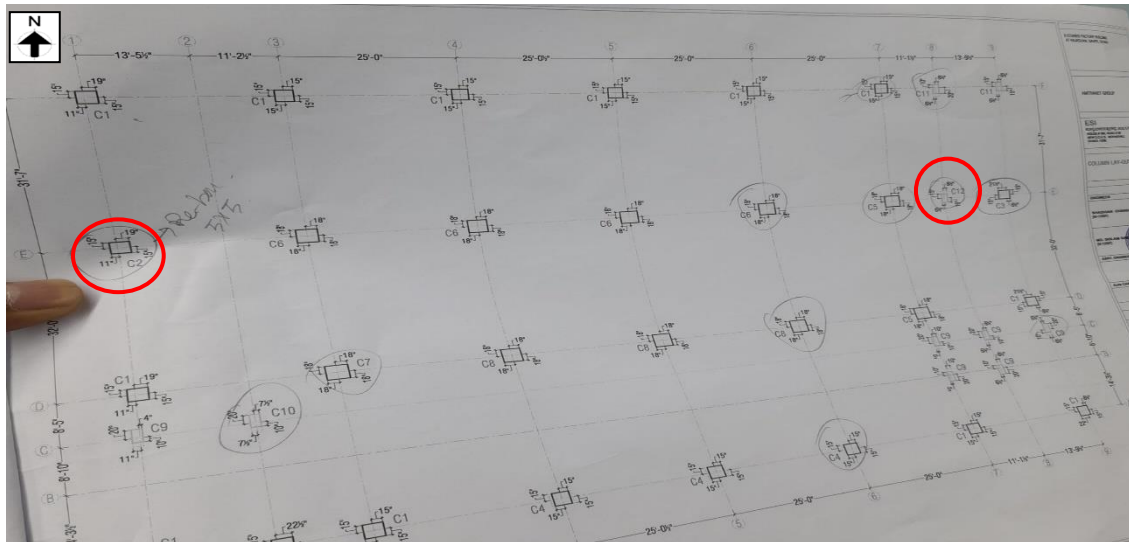


Column C2 re-bar profile scan at 1<sup>st</sup> floor

Column C2; less numbers of re-bar observed



Column C12; less numbers of re-bar observed



### Column Layout; Rebar profile mismatch at C2 (Grid-1-E) and C12 (Grid-8-E)

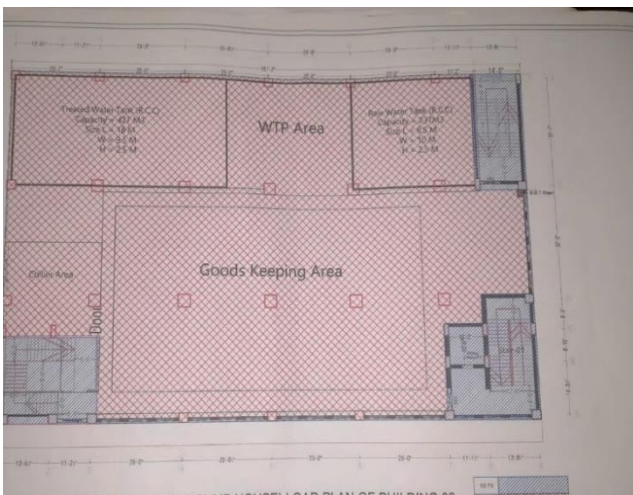
**Description:** During the inspection, column type C2 & C12 re-bar information mismatches observed with the provided drawing and on-site condition. The building engineer is required to survey the full structure and prepare accurate as-built drawings accordingly.

**Observation-2:** Lack of full sets of design documents. (Building-3)



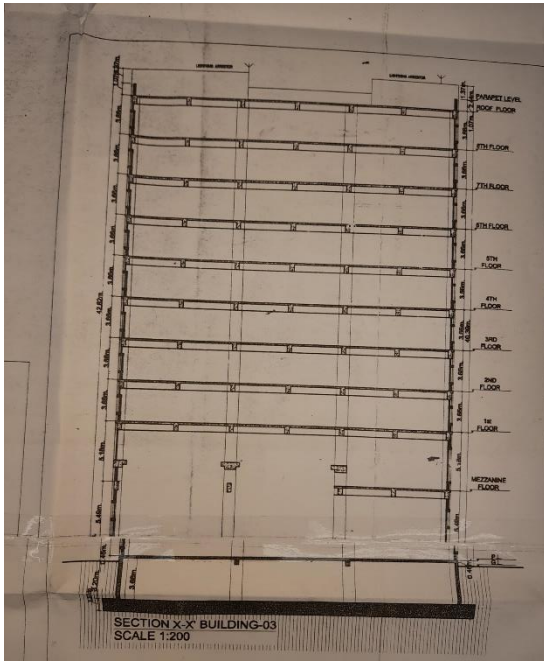
**Description:** During inspection, a full set of design documents was not available for building 3. A set of as-built drawings, load plan and only two sets of cylinder test report was available. The number of cylinder test reports does not comply with the requirement for the frequency of test as per BNBC. Also, the design report was not available for the for the structure. There is a self-supported steel mezzanine on the ground floor. No information has been provided for the steel mezzanine. As per BNBC, every building or structure designed shall have its design documents prepared in accordance with the provision of Section 1.9.1. The design document shall include a design report, and a set of structural drawings, which shall be prepared in compliance with section 1.9.1.1 and section 1.9.1.2 as per BNBC. Factory engineers is required prepare full set of the design documents including design report based on in-situ concrete strength in compliance with section 1.9.1 (part-6, BNBC).

**Observation-3:** Load plan does not comply with BNBC requirement. (Building-3)



**Description:** Factory has prepared a load plan. The live load has been considered 3 kPa for the storage area at 2<sup>nd</sup> floor instead of 6 kPa as per BNBC. Also, storage loading was found in some locations at 1<sup>st</sup> floor. Factory is required to revise the load plan for as per requirement of BNBC

#### Observation-4: Possibility of Vertical Extension. (Building-3)



**Description:** The building permission layout is for nine storied with mezzanine at ground floor approved from Savar Pouroshova (Local Authority) dated 19-April-2017. For the structural changes and adding new structures the factory had taken revised approval on 16th July 2023 for the Building-3. There are extended column rebar at roof. The building engineer is required to check the structure for lateral loading considering full proposed nine storied and submit to RSC for review and submit to RSC for further review.

#### Observation-5: Water seepage from RC water tank. (Building-3)



**Description:** During the inspection, water seepage was found from the RC water tank at 2<sup>nd</sup> floor. The water seepage may happen due to poor construction of the RC water tank. The building engineer is required to investigate the reason of the water seepage, extend of damage due to moisture and suggest proper remedial action to solve the issue.

**Observation-6:** Exposed re-bar at roof (Building-3)



**Description:** During inspection, the presence of corrosion was found in exposed reinforcement was found on roof columns. Building engineers is required to take necessary measures to prevent corrosion in exposed rebar.

**Observation-7:** Non-structural elements not anchored or braced. (Building-3)



**Description:** Water tanks resting on the rooftop is not adequately anchored or braced to resist lateral (earthquake) forces. Adequately anchor and brace all non-structural elements to resist earthquake forces.

**Observation-8:** Trolley impact on Column. (Building-3)



**Description:** RC Column was found damaged due to the impact with trolley. The engineer is required to investigate the damage and suggest a remedial action as well as provide suggestion to prevent such damages in future. Factory is required to follow the suggestion of the engineer for remedial actions.

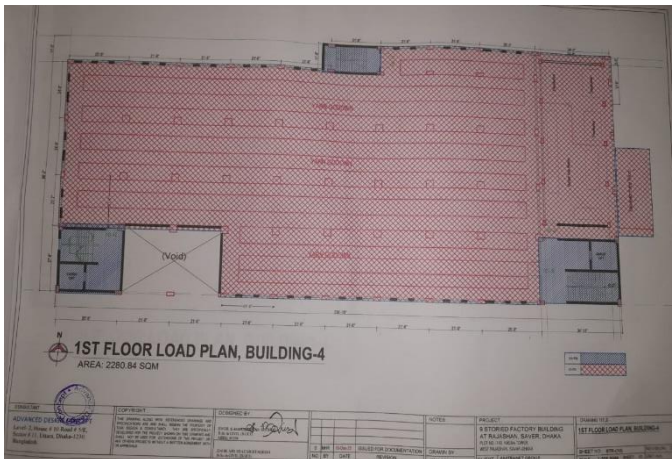
**Observation-9:** Lack of full sets of design documents. (Building-4)



**Description:** During inspection, a full set of design documents was not available for Building-4. A set of as-built drawings was available. Design report was not available for the for the structure. Also, lack of material test was observed.

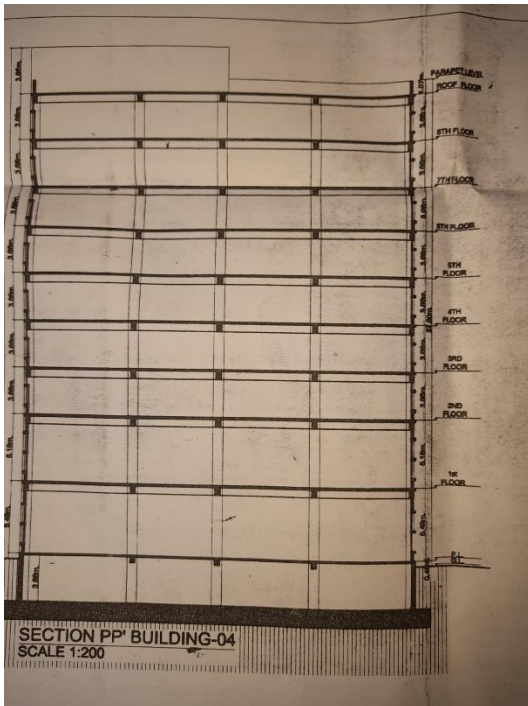
As per BNBC, every building or structure designed shall have its design documents prepared in accordance with the provision of Section 1.9.1. The design document shall include a design report, and a set of structural drawings, which shall be prepared in compliance with section 1.9.1.1 and section 1.9.1.2 as per BNBC. Factory engineers is required prepare full set of the design documents including design report based on in-situ concrete strength in compliance with section 1.9.1 (part-6, BNBC).

**Observation-10:** Load plan does not comply with BNBC requirement. (Building-4)



**Description:** Factory has prepared a load plan. The live load has been considered 3 kPa for the storage area on 1<sup>st</sup> floor instead of 6 kPa as per BNBC. Also, storage loading was found in some locations the 2<sup>nd</sup> floor. Factory is required to revise the load plan as per the requirement of BNBC.

**Observation-11:** Possibility of Vertical Extension. (Building-4)



**Description:** The building permission layout is for nine storied with basement (B+G+8) approved from Savar Pouroshova (Local Authority) dated 19-April-2017. For the structural changes and adding new structures the factory had taken revised approval on 16th July 2023 for the Building-4. There is extended column re-bar at roof.

So, there is a possibility of future vertical extension. The building engineer is required to check the structure for lateral loading considering full proposed nine storied and submit to RSC for review and submit to RSC for further review.

**Observation-12:** Exposed re-bar at roof (Building-4)



**Description:** During inspection, the presence of corrosion was found in exposed reinforcement was found on roof columns. Building engineers is required to take necessary measures to prevent corrosion in exposed rebar.

**Observation-13:** Non-structural elements not anchored or braced. (Building-4)



**Description:** Racks are not adequately anchored or braced to resist lateral (earthquake) forces. Adequately anchor and brace all non-structural elements to resist earthquake forces.

**Observation-14:** Column susceptible to vehicle impact. (Building-4)



**Description:** Columns are susceptible to vehicle impact. The factory engineer is required to take necessary measures to prevent the vehicle impact by providing the barrier around the columns.

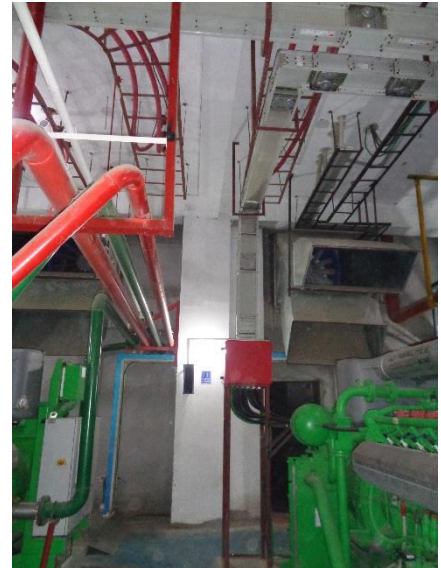
**Observation-15:** Lack of design documents. (Utility Building, Cooling Tower Building-4, Cooling Tower Building-2)



Cooling Tower Building-2



Cooling Tower Building-4



Utility Building

**Description:** During inspection, a full set of design documents was not available for the Utility Building and Cooling Tower Building-4. Only a set of structural drawings for the Cooling tower Building-4 and Utility building where all the required information has not been provided for the Utility Building. No documents were found for the Cooling tower Building-2. The building engineer is required to survey the structures and prepare accurate as-built drawing.

As per BNBC, every building or structure designed shall have its design documents prepared in accordance with the provision of Section 1.9.1. The design document shall include a design report, and a set of structural drawings, which shall be prepared in compliance with section 1.9.1.1 and section 1.9.1.2 as per BNBC. Building engineer is required prepare full set of the design documents including design report based on in-situ concrete strength in compliance with section 1.9.1 (part-6, BNBC).

**Observation-16:** Verify connection adequacy against wind load. (Empty Chemical Drum Shed, Security Room, RMS Room, and Wastage Shed)



Empty Chemical Drum Shed



Wastage Shed



RMS Room



Security Room

**Description:** During inspection, no documents were found for the Empty Chemical Drum Shed, Security Room, RMS Room, and Wastage Shed. Also, apparently non-engineered roof framing, connections and inadequate member sizes were observed.

The building engineer is required to survey the structures and prepare accurate as-built drawings. The Empty Chemical Drum Shed, RMS Room (steel part) and Wastage Shed is made of light weight steel roof. Building engineer is required to check the adequacy of connection against lateral loading.

## 5. Action Plan

Observation	Action Plan	Timeline
Mismatch between provided drawing and on-site condition (Building-3)	The building engineer is required to survey the full structure and prepare accurate as-built drawings accordingly.	within 6 weeks
Lack of full sets of design documents. (Building-3)	Building engineer is required to prepare a set of design documents in compliance with BNBC.	within 6 weeks
	Verify in-situ concrete strength by taking core from structural members.	within 6 weeks
	Complete implementation of remedial works if required.	within 6 months
Load plan does not comply with BNBC requirement. (Building-3)	Revise floor loading plan as per BNBC.	within 6 weeks
	Implement the floor load management plan.	within 6 months
Possibility of Vertical Extension. (Building-3)	The building engineer is required to check the structure for lateral loading considering full proposed nine storied and submit to RSC for review and submit to RSC for further review.	within 6 months
Water seepage from RC water tank. (Building-3)	Building engineer is required to investigate the reason of the water seepage, extend of damage due to moisture and suggest proper remedial action to solve the issue.	within 6 weeks
Exposed re-bar at roof (Building-3)	All exposed reinforcement is to be protected from corrosion which may cause degradation of the concrete.	within 6 weeks
Non-structural elements not anchored or braced. (Building-3)	Building engineer is required to adequately anchor and brace all non-structural elements to resist earthquake forces.	within 6 months
Trolley impact on Column. (Building-3)	The building engineer is required to repair the damaged portion of columns and provide protection to prevent the trolley impact.	within 6 weeks
Lack of full sets of design documents. (Building-4)	Building engineer is required to prepare a set of design documents in compliance with BNBC.	within 6 weeks
	Verify in-situ concrete strength by taking core from structural members.	within 6 weeks
	Complete implementation of remedial works if required.	within 6 months

Load plan does not comply with BNBC requirement. (Building-4)	Revise the floor loading plan as per BNBC.	within 6 weeks
	Implement the floor load management plan.	within 6 months
Possibility of Vertical Extension. (Building-4)	The building engineer is required to check the structure for lateral loading considering full proposed nine storied and submit to RSC for review and submit to RSC for further review.	within 6 months
Exposed re-bar at roof (Building-4)	All exposed reinforcement is to be protected from corrosion which may cause degradation of the concrete.	within 6 weeks
Non-structural elements not anchored or braced. (Building-4)	Building engineer is required to adequately anchor and brace all non-structural elements to resist earthquake forces.	within 6 weeks
Column susceptible to vehicle impact. (Building-4)	The factory engineer is required to take necessary measures to prevent the vehicle impact by providing barrier around the columns.	within 6 weeks
Lack of design documents. (Utility Building)	Building engineer is required to prepare a set of design documents including full set of as-built drawings in compliance with 1.9.1 BNBC.	within 6 weeks
	Verify in-situ material strength by further testing if required.	within 6 weeks
	Complete implementation of remedial works if required.	within 6 months
Lack of design documents. (Cooling Tower Building-4)	Building engineer is required to prepare a set of design documents including full set of as-built drawings in compliance with 1.9.1 BNBC.	within 6 weeks
	Verify in-situ material strength by further testing if required.	within 6 weeks
	Complete implementation of remedial works if required.	within 6 months

Lack of design documents. (Cooling Tower Building-2)	Building engineer is required to prepare a set of design documents including full set of as-built drawings in compliance with 1.9.1 BNBC.	within 6 weeks
	Complete implementation of remedial works if required.	within 6 months
Verify connection adequacy against wind load. (Empty Chemical Drum Shed, Security Room, RMS Room, and Wastage Shed)	The building engineer is required to survey the full structure and prepare accurate as-built drawings accordingly.	within 6 weeks
	Building engineer is required to check the adequacy of connection against lateral loading	within 6 weeks
	Complete implementation of remedial works if required.	within 6 months

## Survey Limitations and Assumptions

This report is for the private and confidential use of RSC for whom it was prepared together with their professional advisors as appropriate. It should not be reproduced in whole or in part or relied upon by third parties for any use without the express written permission of RSC.

This report can be used in discussion with the supplier or factory owner as a means to rectify or address any observations made. The report is not comprehensive and is limited to what could be observed during a visual inspection of the building.

This Report is not intended to be treated as a generalized inspection and does not cover the deterioration of structural members through dampness, fungal or insect attack, nor does it deal with problems and defects of a non-structural nature. Other non-structural aspects of the building such as fire safety have not been assessed in this survey.

Except as otherwise noted, drains and other services were not viewed or tested during our inspection and are therefore similarly excluded from this Report. We have not inspected any parts of the structure which are covered, unexposed or inaccessible and we are therefore unable to report that any such part of the property is free from defect.

External inspection of the façade walls has generally been carried out from ground level only by visual sighting. No opening up works were carried out (except as noted) and we rely on the Architects and Engineers drawings provided to us for our views on concealed parts of the structure and in particular foundations. Strengths of materials and components are untested and we recommend that the factory owners Building Engineer carries out in situ testing over and above those suggested to satisfy themselves with the material strengths and component details.

Recommendations, where given, are for the purpose of providing indicative advice only, are not exhaustive, relate solely to identifying key and obvious structural defects as identified in this presentation, and do not take the form of or constitute a specification for works. We take no responsibility for the works as constructed. This report does not interfere with the factory owners Building Engineers responsibility for the structural performance of this building, The Building Engineer remains fully responsible for the structural adequacy of the building.

This report does not comment in detail on the future seismic performance of the building and only highlights the fact that the building may experience significant damage or collapse in a seismic event along with many others in the Dhaka region.

The observations in this report are based on the Engineering Judgement of the lead surveyor/engineer at the time of the survey. We assume in making these observations that no covering up of faults defects, filling or plastering over cracking or significant repair work has been carried out by the building owner. Any future alteration or additional work by the building owner will void this report.