

# Zaheen Knitwears Limited

(Shed - 3, 4, 5, 10, 11, 12, 13) &  
(Building - Security, ETP and Fire Pump)

Keodala, Madanpur, Bandar, Narayangonj

(23.688200, 90.549445)

19 September 2022



# Buildings Information

1. Shed- 3 (Garments Shed): (G+1)
2. Shed -4 ( Knitting, Fabric store): (G+1)
3. Shed -5 (Garments and dyeing Shed): (G+1)
4. Shed -10 (Chemical Godown Shed): (single storied)
5. Shed -11 (Garments Shed): (G+2)
6. Shed -12 (Wastage Shed): (single storied)
7. Shed -13 (Worker Dinning Shed): (single storied)
8. Shed -14 (Knitting Gray Fabric Godown): (single storied)
9. Building- 3 (Fire control Room) Building- 6 (Fire pump) (single storied)
10. Building -4 (Security Office) (single storied)
11. Building- 5 (ETP) (G+3)
12. Building- 6 (Fire pump) (single storied)

# Observations

# Lack of lateral stability

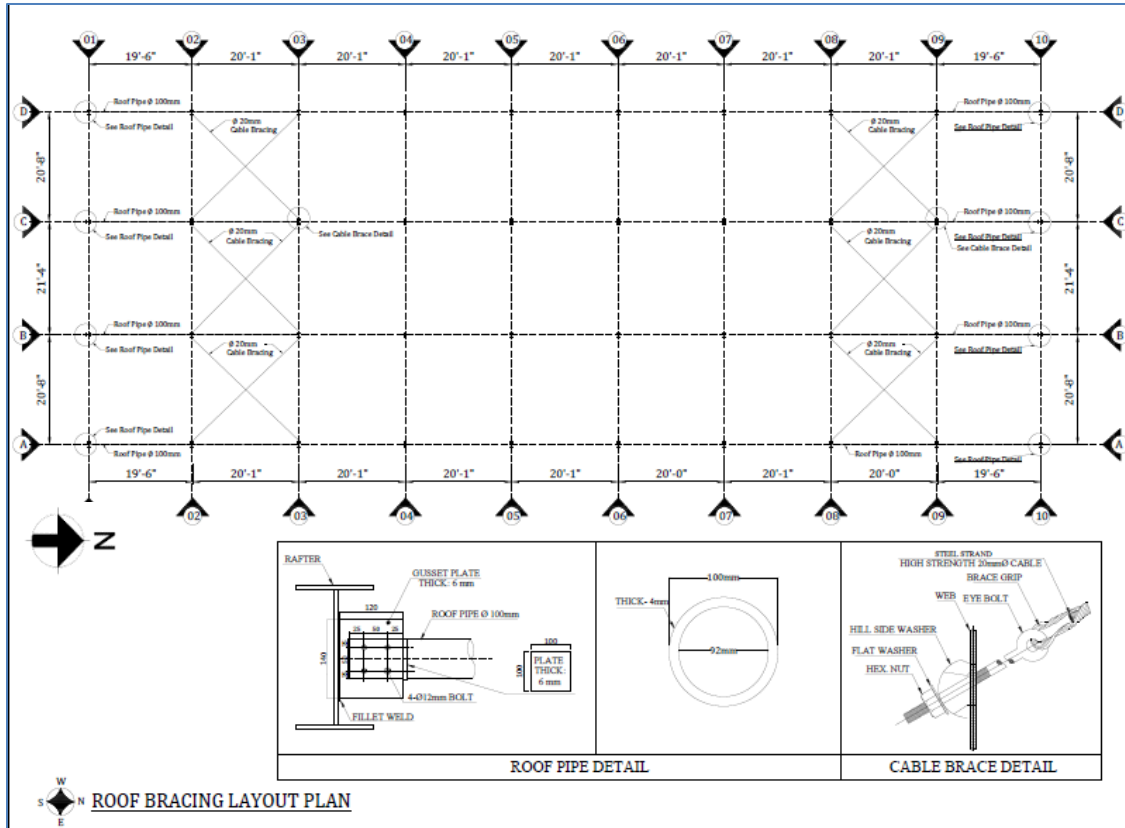


Load transfer media is not provided at first floor along long direction.



Load transfer media is missing at first floor along long direction

Lateral stability system of the shed has been checked by the building engineer. Retrofitting work is proposed. The factory has not implemented the retrofitting works yet.

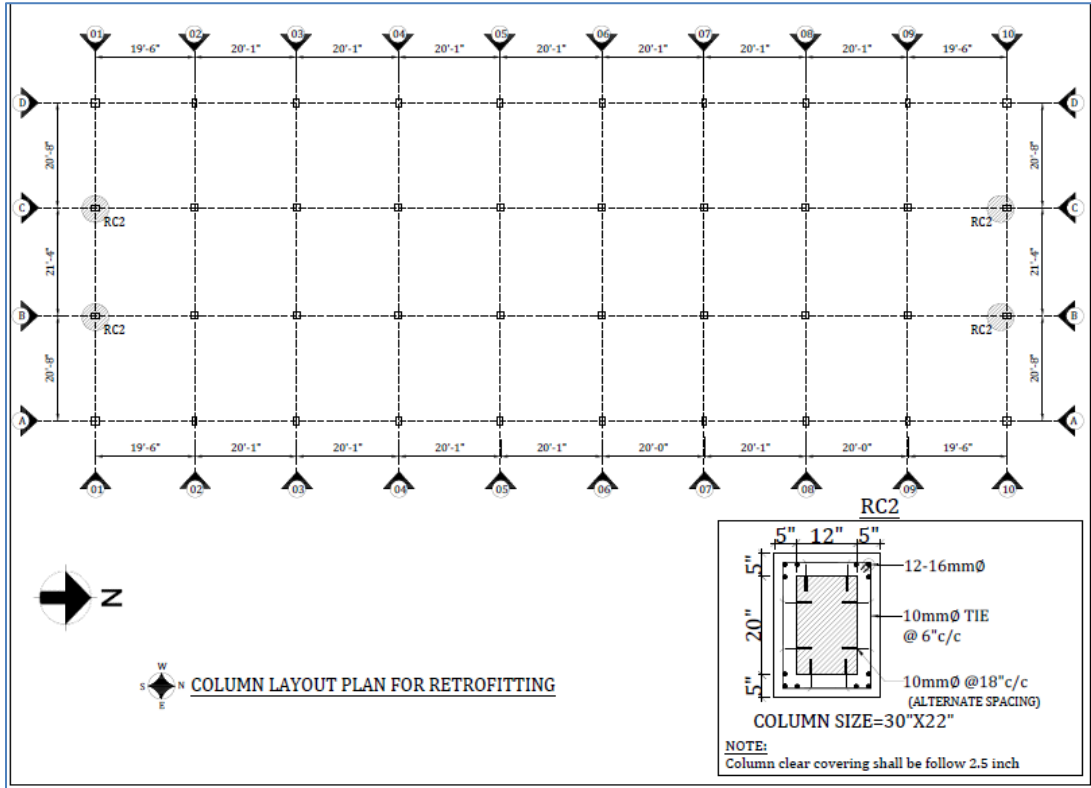


Strut pipe and cable bracing are proposed in retrofitting drawing.



Retrofitting work is not implemented

**Observation: Shed -3 (Garments Shed)**



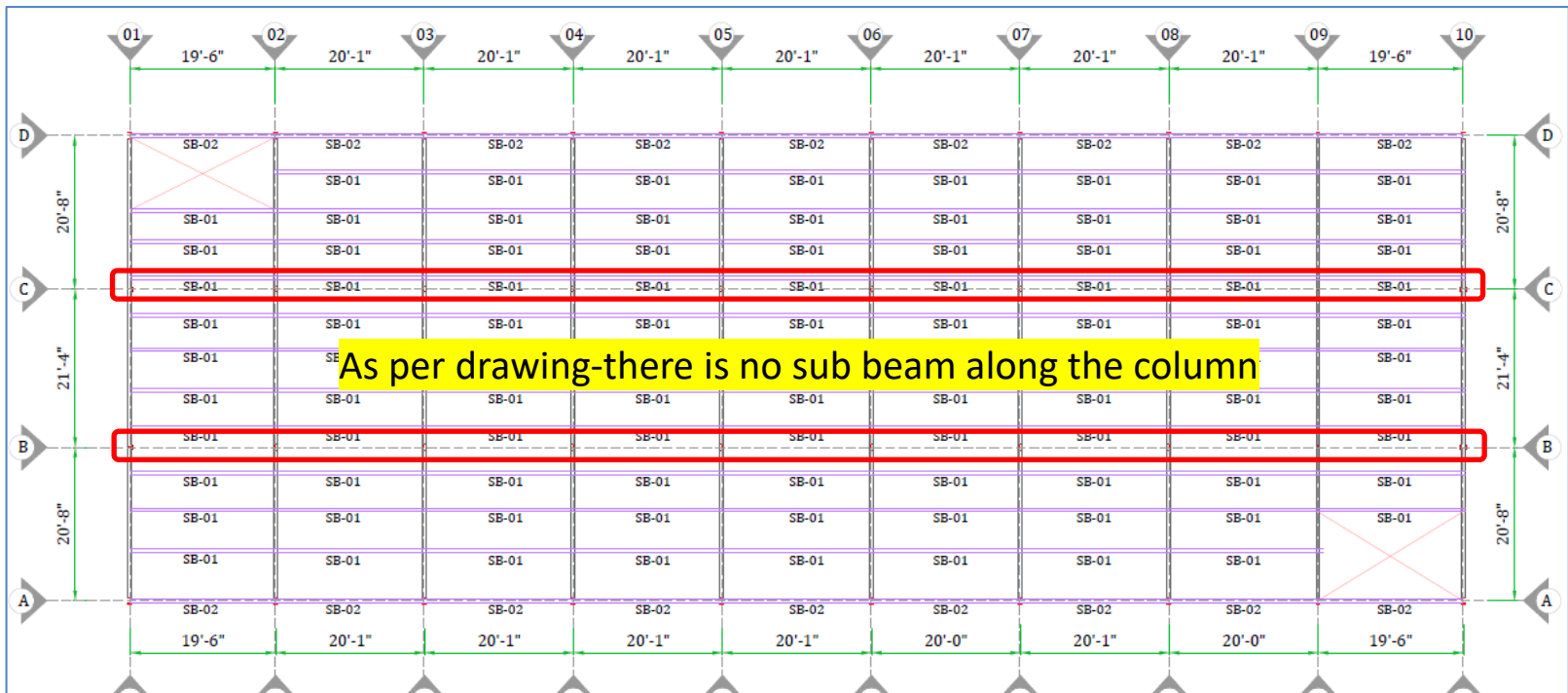
Retrofitting is proposed for RC pedestal column



Retrofitting work is not implemented

**Observation: Shed -3 (Garments Shed)**

# Discrepancy in as-built drawing

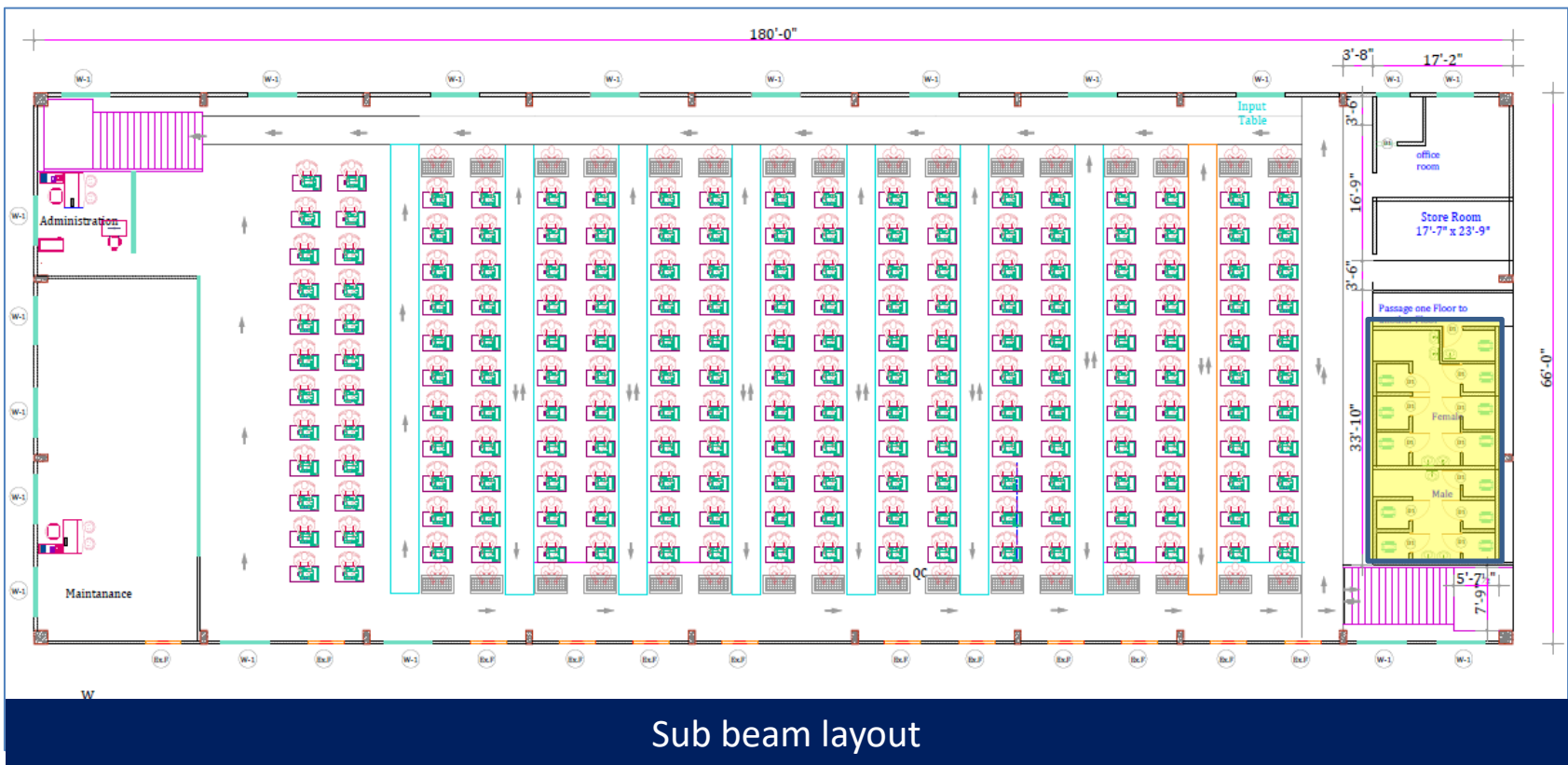


Sub beam layout

As per as built drawing sub-beams are not connected with the column. But on-site condition (marked grid) sub-beams are connected with columns. Building engineer is required to survey the whole structure and produce accurate as-built drawings.



Sub beam & column connection



Toilet build up at 1<sup>st</sup> floor are not shown in architectural drawing. Building engineer is required to survey the whole structure and produce accurate as-built drawing.



Toilet Build up (230 mm)

# Corrosion on steel members

11 **Observation: Shed -3 (Garments Shed)**



Corrosion on steel members

Corrosion was observed on steel members at several locations. Building engineer is required to provide rust proof paint on all steel members to protect from corrosion.



Corrosion on steel members

**Lateral stability to be checked**

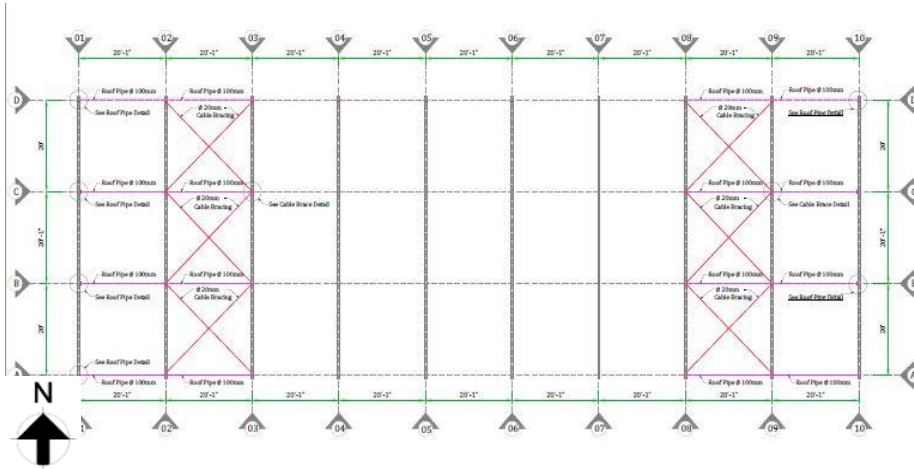


Load transfer media is missing at most of the location along long direction

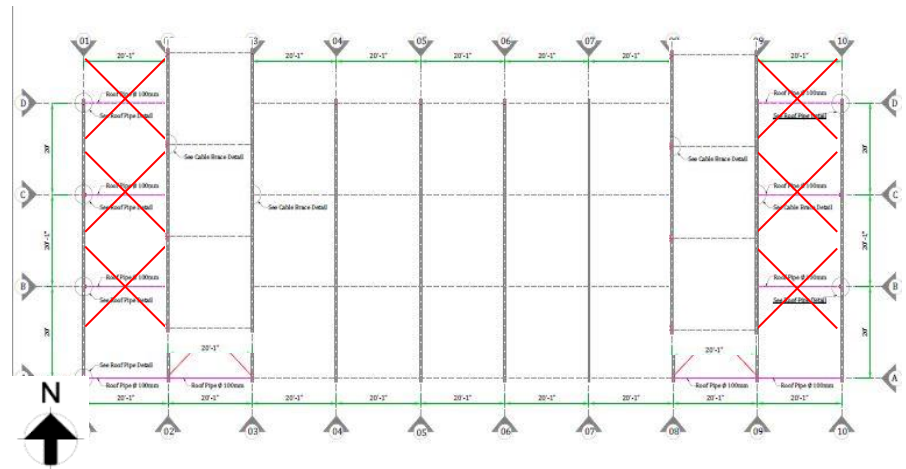


Load transfer media is provided at some locations along long direction

Roof and wall bracing are provided. Load transfer media is provided at some locations but load transfer media is missing at most of the location along long direction. Therefore, lateral stability system of the shed is apparently incomplete. Building engineer is required to check the lateral stability of the structure.



Bracing location shown in layout



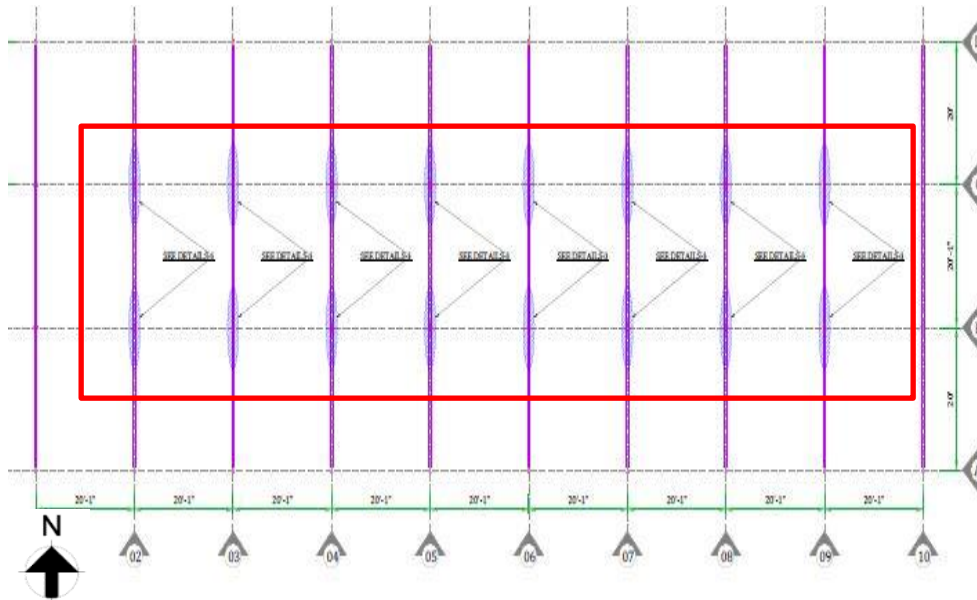
Bracing location found on site

Roof and wall bracing are found at different location of bracing layout plan shown in drawing. Building engineer is required to update the as-built drawing and check the lateral stability of the structure.



Bracing location shifted

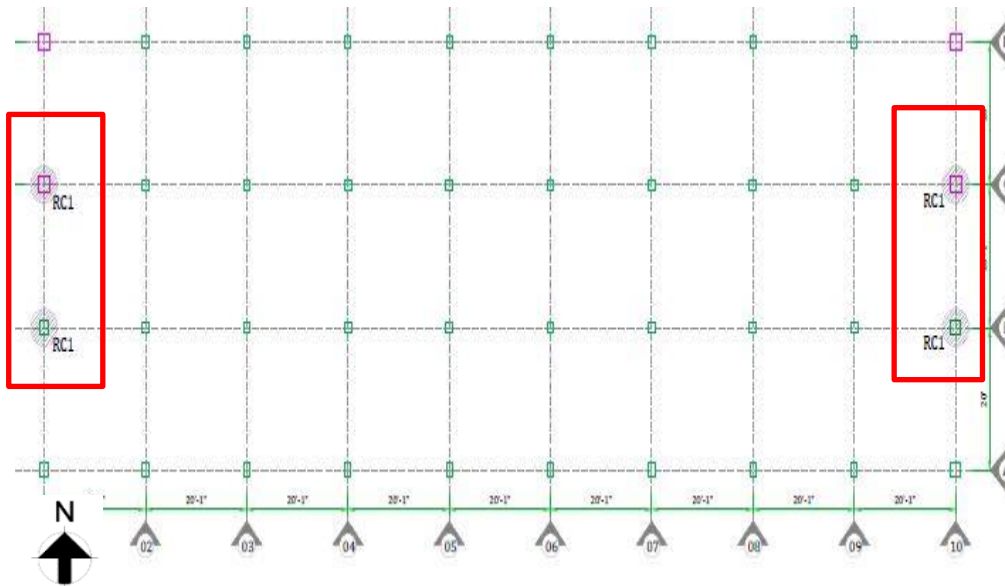
Lateral stability system and member adequacy of the shed has been checked by the building engineer. Retrofitting work is proposed. The factory has not implemented the retrofitting works yet.



Retrofitting (additional plate installation) is proposed for steel beam



Retrofitting work is not implemented



Retrofitting is proposed for RC pedestal column



Retrofitting work is not implemented

# Corrosion on steel members



Corrosion on steel members



Corrosion on steel members

Corrosion was observed on steel members at several locations. Building engineer is required to provide rust proof paint on all steel members to protect from corrosion.

# Incomplete lateral stability system



No load transfer media is provided along long direction

Roof and wall bracing are provided but load transfer media is not provided along long direction for this shed. Therefore, lateral stability system of the shed is apparently incomplete. Factory engineer is required to check the lateral stability of the structure.

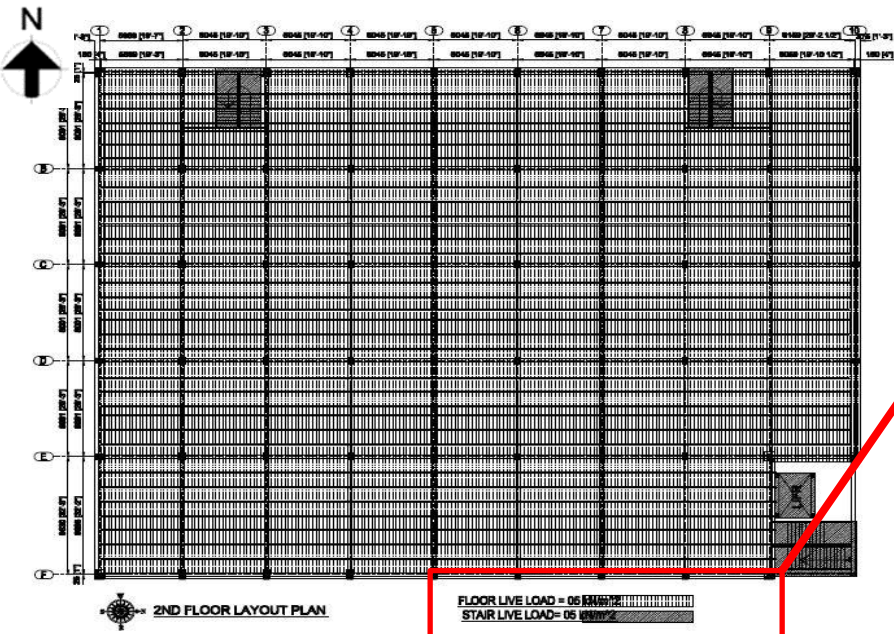
# Irregularities in load path



Column not placed along ridge

Internal columns are not placed along the ridge and placed at one side which indicates the irregularities in the load transfer system. A building engineer is required to check the load path and suggest any remediation work if required.

**Prepared load plan not followed BNBC**



**FLOOR LIVE LOAD = 05 kN/m<sup>2</sup>**  
**STAIR LIVE LOAD = 05 kN/m<sup>2</sup>**

Live load considered as 5 KPa for typical floor

Live load on typical floor is considered as 5 kPa in prepared load plan. As per BNBC- Part 6, live load for light storage areas is required to be considered minimum 6 kPa. However, the building engineer is required to revise the load plan as per BNBC requirement and check the design accordingly.

Live load plan- 1<sup>st</sup> floor



Storage on 1<sup>st</sup> floor

INDUSTRIAL, STORAGE & HAZARDOUS (Occupancy - G, H & J)				
Workshop, factory, warehouse	1	Light workroom without storage	3.0	2.7
	2	Machinery hall & circulation area	4.0	4.5
	3	Factory, workshop etc.	5.0	4.5
	4	Manufacturing : light	6.0	4.5
		heavy	12.0	9.0 <sup>(5)</sup>
		ice	15.0	9.0 <sup>(5)</sup>
	5	Printing plant :		
		Press room	7.0	11.0
		Composing and linotype room	5.0	9.0 <sup>(5)</sup>
	Paper storage room	12.0	9.0 <sup>(5)</sup>	
6	Motor room, fan room etc. including the weight of machinery	7.5	4.5	
7	Cold storage, grain storage	15.0	9.0 <sup>(5)</sup>	
8	Storage warehouses : light	6.0	4.5	
	heavy	12.0	9.0	
9	Foundries	20.0	12.0	

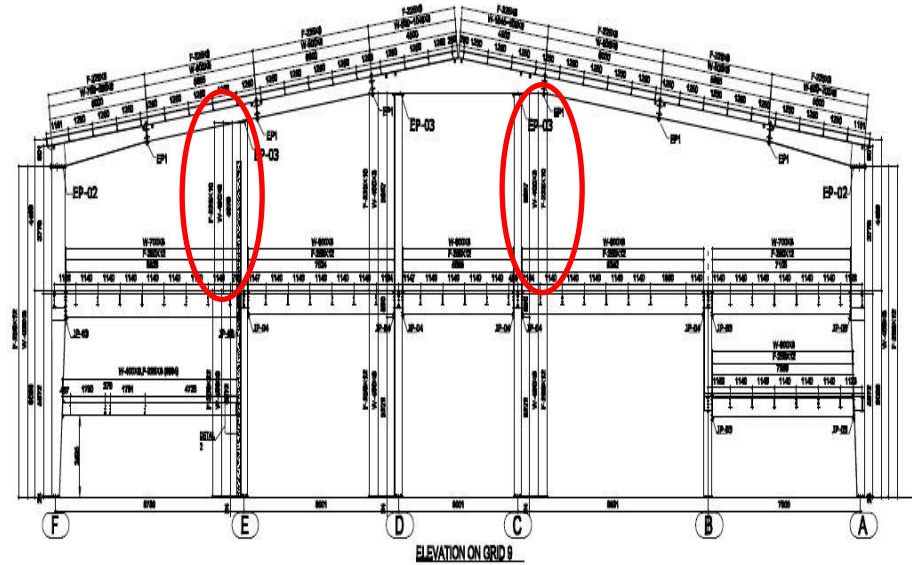
Live load table (BNBC part-6)

# Observations: Shed -5 (Garments and dyeing Shed)

# Discrepancy in as-built drawing



One internal column found at every grid along ridge at first floor

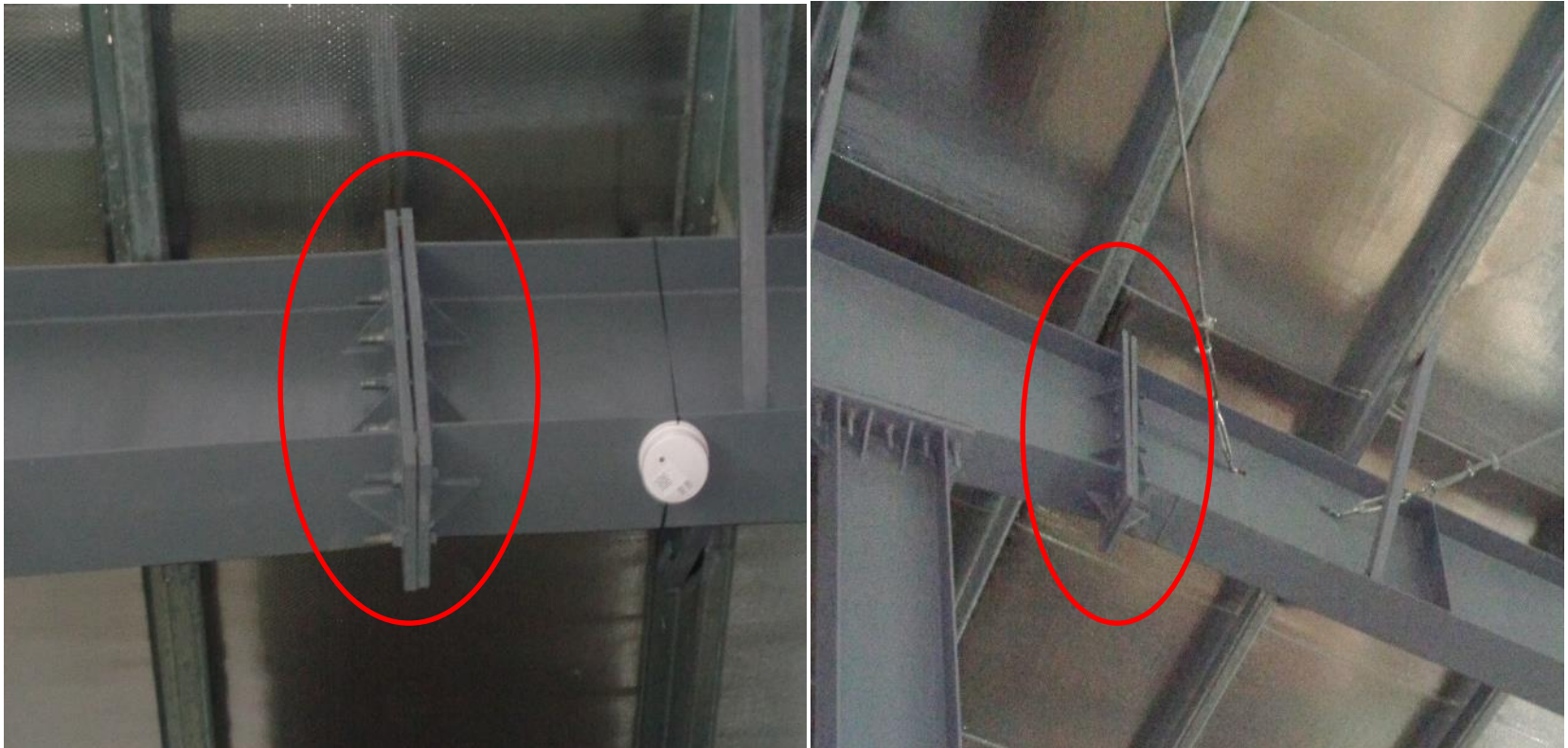


Marked column shown in drawing but not found on site from grid 2 to grid 9

One internal column found at every grid along ridge at first floor. Marked column shown in drawing but not found on site from grid 2 to grid 9. Building engineer is required to survey the whole structure and produce accurate as-built drawing.

# Gap in connection at several location

**Observation: Shed -5 (Garments and dyeing Shed)**



Gap was observed in connection

Gap was observed in connection of steel members. Building engineer is required to repair the connections with suitable method suggested by building engineer.

# Crack on brick wall



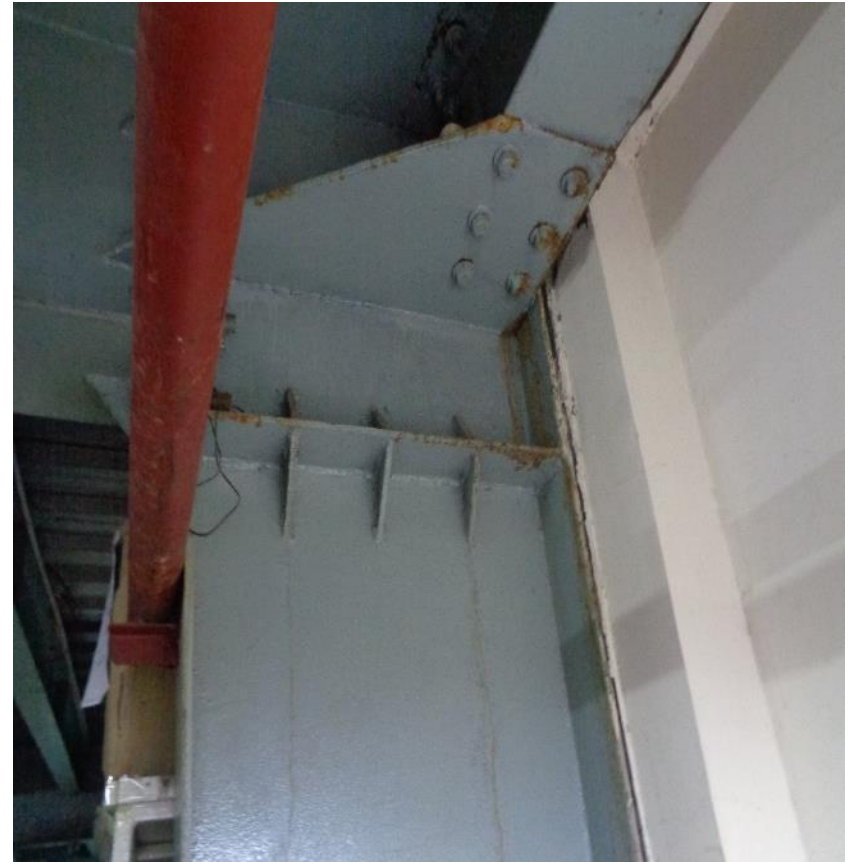
Crack observed on brick wall at several locations

Crack observed on brick wall at several locations. Building engineer is required to instigate the reason of the crack and repair with a suitable method.

# Corrosion on steel members



Corrosion on steel members



Corrosion on steel members

Corrosion was observed on steel members at several locations. Factory is required to provide rust proof paint on all steel members to protect from corrosion.

# Lack of lateral stability

Load transfer media (Bracing, Compression Strut) is not provided. Therefore, lateral stability system of the shed is apparently incomplete. Also, apparently the members are inadequate to resist vertical and lateral loading. Building engineer is required to check the lateral stability of the structure.



Load transfer media is missing at along long direction

# Design strength consideration for steel members

**Observation: Shed -11 (Garments Shed)**

**BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY (BUET)**  
**DEPARTMENT OF CIVIL ENGINEERING**  
 Mobile: 01819 557 964; PABX: 966 5650-80 Ext. 7226; www.buet.ac.bd/ce/

**STRENGTH OF MATERIALS LABORATORY**

**BRTC**  
Bureau of Research, Testing & Consultancy

**TESTING REPORT**  
 BRTC No.: 1102-47967/CE/21-22; Dt. 30/11/2021  
 Ref.: Letter: Dt. 30/11/2021  
 Date of Test: 7/12/2021  
 Contractor: -

**SENT BY:** জাহান নাট-ওয়ার লিমিটেড, কেওড়াল মদনপুর বন্দর নাগরঞ্জ।  
**PROJECT:** জাহান নাট-ওয়ার লিমিটেড কোম্পানী প্রকল্পের কনস্ট্রাকশনের স্টিল স্ট্রেট কাজ।

Sl. No.	Nominal Plate Thickness	Sample Identification	Test Coupon Thickness	Test Coupon Width	Area Under Test	Yield or Proof Load	Yield or Proof Strength *	Average Yield or Proof Strength	Ultimate Load	Ultimate Strength *	Average Ultimate Strength	Elongation (%)	Average Elongation (%)	Bend Test
	mm		mm	mm	sq. mm	kN	MPa	MPa	kN	MPa	MPa	(Gauge length = 203.2 mm)	(G. length = 203.2 mm)	
1	8	-	8.00	38.5	308	133	430	430	169	550	550	19	-	-
2	8	-	8.00	38.3	306	135	440	(62400 psi)	174	570	(79800 psi)	21	20	-
3	8	-	8.15	38.0	310	132	430	(6180 kg/sq. cm)	169	550	(5610 kg/sq. cm)	21	-	-
1	6	-	6.05	38.1	231	96	420	-	129	560	510	21	-	-
2	6	-	6.00	37.9	227	76	330	-	108	480	(74000 psi)	26	-	-
3	6	-	6.10	38.0	232	81	350	-	116	500	(6200 kg/sq. cm)	22	-	-
1	5	-	6.10	39.6	242	79	330	320	112	460	460	25	-	-
2	5	-	6.10	39.4	240	75	310	(46400 psi)	111	460	(66700 psi)	26	25	-
3	5	-	6.10	39.1	239	78	330	(3200 kg/sq. cm)	111	470	(6890 kg/sq. cm)	24	-	-


Conversion factors: 1.0 kg/cm<sup>2</sup> = 14.219 psi (689.5 N/m<sup>2</sup>) = 0.06807 MPa (N/mm<sup>2</sup>)  
 Samples were received in unsealed condition

320

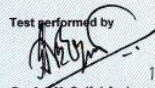
(46400 psi)


(3200 kg/sq. cm)

Engineering



62  
mdJeEhF27

Test performed by  
  
 13 DEC 2021  
 Dr. An. M. Saiful Amin  
 Professor, Department of Civil Engineering  
 BUET, Dhaka-1000, Bangladesh



If it is found that the samples tested in our laboratory do not have any representative character of the samples required to be tested, it is recommended that the client/contractor/owner/authority should be notified immediately. In order to avoid fraudulent fabrication of test results, it is recommended that all test reports be collected by duly authorized person/authority.

BUET/CE.03.14.05.25

No.	Materials	Specifications	Minimum Strength
1.	Built-Up Members	ASTM A 572M Grade 345 Type 1	$F_y = 34.5 \text{ kN/cm}^2$
		Or EN 10025 S355JR	
<b>Hot-Rolled Members</b>			
2.	Beams & Columns	EN 10025 S355JR	$F_y = 34.5 \text{ kN/cm}^2$
		Or ASTM A 572M Grade 345 Type 1	
	Tubes	JIS G 3466 STKR 490	$F_y = 34.5 \text{ kN/cm}^2$
		Or EN 10210 -1 S355J2H	
Channels	EN 10025 S355JR	$F_y = 34.5 \text{ kN/cm}^2$	
	Pipes	ASTM A 53M Type E or S Grade A	$F_y = 34.5 \text{ kN/cm}^2$
<b>Cold Formed Secondary Members</b>			
3.	Galvanized Steel	ASTM A 653M SS Grade 340 Class 1, Z275	$F_y = 34.5 \text{ kN/cm}^2$
<b>Sheeting &amp; Liner Panels</b>			
4.	ZincAlume Steel	ASTM A 792M Grade 345B, AZM 150	$F_y = 34.5 \text{ kN/cm}^2$
<b>X-Bracing Members</b>			
5.	Cables	ASTM A 475 Extra High Strength	Breaking Load =
	Rods	ASTM A 615M Grade 300	$F_u = 50.0 \text{ kN/cm}^2$
		Or ASTM A 36M	$F_u = 40.0 \text{ kN/cm}^2$
Angles	ASTM A 572M Grade 345 Type 1	$F_u = 35.5 \text{ kN/cm}^2$	
6.	Anchor Bolts	ASTM A 36M	$F_y = 25.0 \text{ kN/cm}^2$
		Hot Dip Galvanized to ASTM A 153M Class C	$F_u = 40.0 \text{ kN/cm}^2$

Strength of steel is mentioned as 320 MPa from MS plate test report

Design strength for steel is considered as 345 MPa

Design strength for steel is considered as 345 MPa but in test report strength of steel is mentioned as 320 MPa. Building engineer is required to revise the analysis with FEM model and update the Design report accordingly.

# **Faulty connection at several location**

**Observation: Shed -11 (Garments Shed)**



Gap was observed in connection



Warping in connection

Gap and warping were observed in connection of steel members. Factory is required to repair the connections with suitable method suggested by building engineer.

# Falling Hazard at stair area



Railing was missing at several location at staircase

Building engineer is required to provide railing at all locations of staircase to prevent possible falling hazard.

# Apparently inadequate connection

Apparently Inadequate structural member, poor connection details were found. Building engineer is required to check the adequacy of the steel members & connection for uplift and lateral forces otherwise replace with engineered structure.



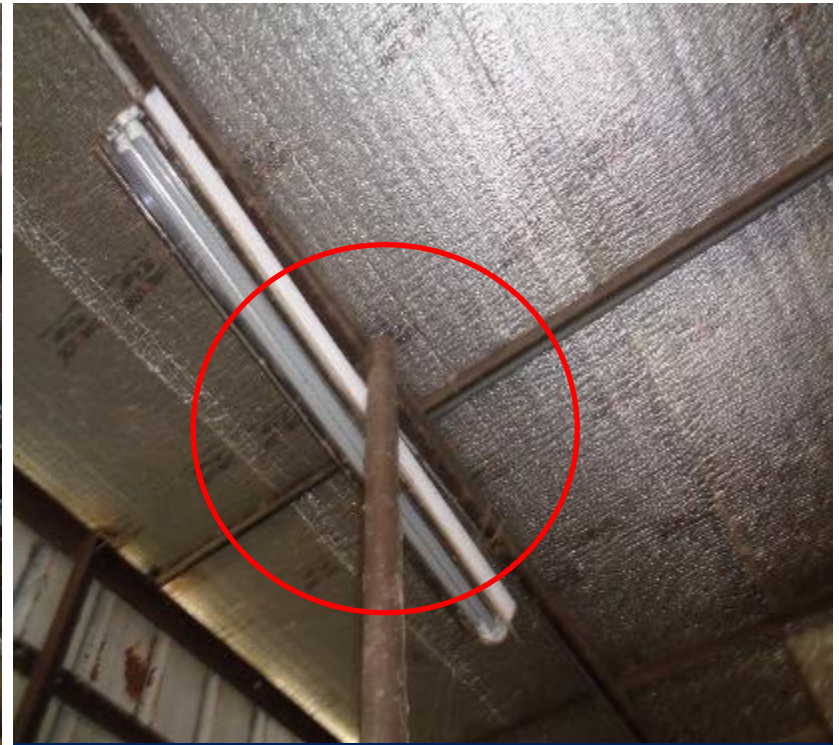
Apparently inadequate connection

# Apparently non engineered shed

**Observations: Shed -13 (Worker dining Shed)**



No obvious stability system



Poor connection

Shed -13 (Worker dining Shed) was appeared to be non engineered due to lack of apparent load path, poor connection and apparently inadequate member size. Building engineer is required to check the connection adequacy for uplift forces as part of EA otherwise replace with well designed structure.

# Apparently inadequate connection

Apparently Inadequate structural member, poor connection details were found. Building engineer is required to check the adequacy of the steel members & connection for uplift and lateral forces otherwise replace with engineered structure.



Apparently inadequate connection

# Lack of as-built drawings

As-built structural drawing and architectural drawings were not available for ETP building. Building engineer is required to survey the whole structure and produce accurate as-built drawing.



Roof shed of ETP Building



ETP Building

# Lack of foundation details



ETP Building

Geotechnical investigation report was not available for this structure. On the other hand, foundation details were unavailable.



ETP

Foundation drawing was not available for ETP Building. Building engineer is required to investigate foundation details and check the foundation capacity accordingly.

# Exposed rebar at column



Exposed reinforcement was found at column which is susceptible to corrosion that may be the cause of deterioration for concrete. Building engineer is required to take necessary measures to prevent the corrosion in exposed rebar.

# Problems Observed

## **Shed -3 (Garments Shed):**

- 01: Lack of lateral stability.
- 02: Discrepancy in as-built drawing.
- 03: Corrosion on steel members.

## **Shed -4 (Knitting, Fabric Store):**

- 04: Lateral stability to be checked.
- 05: Corrosion on steel members.

## **Shed -5 (Garments and Dyeing Shed):**

- 06: Incomplete lateral stability system.
- 07: Irregularities in load path.
- 08: Prepared load plan not followed BNBC.
- 09: Discrepancy in as-built drawing.
- 10: Gap in connection at several location.
- 11: Crack on brick wall.
- 12: Corrosion on steel members.

## **Shed -10 (Chemical Godown Shed):**

- 13: Lack of lateral stability.

## **Shed -11 (Garments Shed):**

- 14: Design strength consideration for steel members.
- 15: Faulty connection at several location.
- 16: Falling Hazard at stair area.

## **Shed -12 (Wastage Shed):**

- 17: Apparently inadequate connection.

## **Shed -13 (Worker Dining Shed):**

- 18: Apparently non engineered shed.

## **Shed -14 (Knitting Gray Fabric Godown):**

- 19: Apparently inadequate connection.

## **Building -5 (E.T.P):**

- 20: Lack of as-built drawings.
- 21: Lack of foundation details.

## **Building -6 (Fire Pump):**

- 22: Exposed rebar at column.

# Priority Action

Item No.	Observation	Recommended Action Plan	Recommended Timeline
01	Lack of lateral stability (Shed -3 (Garments Shed) )	Building engineer is required to check the lateral stability of the structure.	6-weeks
02	Lack of lateral stability (Shed -3 (Garments Shed) )	Carryout remedial works if required.	6-months
03	Discrepancy in as-built drawing (Shed -3 (Garments Shed))	Building engineer is required to survey the whole structure and produce accurate as-built drawing.	6-weeks
04	Corrosion on steel members (Shed -3 (Garments Shed))	Building engineer is required to provide rust proof paint on all steel members to protect from corrosion.	6-weeks
05	Lateral stability to be checked (Shed -4 (Knitting, Fabric store))	Building engineer is required to check the lateral stability of the structure.	6-weeks

Item No.	Observation	Recommended Action Plan	Recommended Timeline
06	Lateral stability to be checked (Shed -4 (Knitting, Fabric store))	Building engineer is required to update the as-built drawing.	6-weeks
07	Lateral stability to be checked (Shed -4 (Knitting, Fabric store))	Implement remediation work if required.	6-months
08	Corrosion on steel members (Shed -4 (Knitting, Fabric store))	Building engineer is required to provide rust proof paint on all steel members to protect from corrosion.	6-weeks
09	Incomplete lateral stability system (Shed -5 (Garments and dyeing Shed))	Building engineer is required to check the lateral stability of the structure.	6-weeks
10	Incomplete lateral stability system (Shed -5 (Garments and dyeing Shed))	Implement remediation work if required.	6-months

Item No.	Observation	Recommended Action Plan	Recommended Timeline
11	Irregularities in load path (Shed -5 (Garments and dyeing Shed))	Building engineer is required to check the load path of the shed.	6-weeks
12	Irregularities in load path (Shed -5 (Garments and dyeing Shed))	Implement remediation work if required.	6-months
13	Prepared load plan not followed BNBC (Shed -5 (Garments and dyeing Shed))	Building engineer is required to revise the load plan as per BNBC requirement and check the design accordingly.	6-weeks
14	Prepared load plan not followed BNBC (Shed -5 (Garments and dyeing Shed))	Implement remediation work if required.	6-months
15	Discrepancy in as-built drawing (Shed -5 (Garments and dyeing Shed))	Building engineer is required to survey the whole structure and produce accurate as-built drawing.	6-weeks

Item No.	Observation	Recommended Action Plan	Recommended Timeline
16	Gap in connection at several location (Shed -5 (Garments and dyeing Shed))	Building engineer is required to repair the connections with suitable method suggested by building engineer.	6-weeks
17	Crack on brick wall (Shed -5 (Garments and dyeing Shed))	Building engineer is required to instigate the reason of the crack and repair with a suitable method.	6-weeks
18	Corrosion on steel members (Shed -5 (Garments and dyeing Shed))	Building engineer is required to provide rust proof paint on all steel members to protect from corrosion.	6-weeks
19	Lack of lateral stability (Shed -10 (Chemical Godown Shed))	Building engineer is required to check the lateral stability of the structure.	6-weeks
20	Lack of lateral stability (Shed -10 (Chemical Godown Shed))	Implement remediation work if required.	6-months

Item No.	Observation	Recommended Action Plan	Recommended Timeline
21	Design strength consideration for steel members (Shed -11 (Garments Shed))	Building engineer is required review the design considering the accurate material strength.	6-weeks
22	Design strength consideration for steel members (Shed -11 (Garments Shed))	Implement remediation work if required.	6-months
23	Faulty connection at several location (Shed -11 (Garments Shed))	Building engineer is required to repair the connections with suitable method.	6-weeks
24	Falling Hazard at stair area (Shed -11 (Garments Shed))	Building engineer is required to provide railing at all locations of staircase to prevent possible falling hazard.	6-weeks
25	Apparently inadequate connection (Shed -12 (Wastage Shed))	Building engineer is required to check the adequacy of the structural members against the gravity & lateral forces or replace with the engineered one.	6-weeks

Item No.	Observation	Recommended Action Plan	Recommended Timeline
26	Apparently inadequate connection (Shed -12 (Wastage Shed))	Building engineer is required to check the connection adequacy for uplift forces.	6-weeks
27	Apparently inadequate connection (Shed -12 (Wastage Shed))	Carry out necessary remedial works where necessary.	6-months
28	Apparently non engineered shed (Shed -13 (Worker dining Shed))	Building engineer is required to check the connection adequacy for uplift forces as part of EA otherwise replace with well designed structure.	6-weeks
29	Apparently non engineered shed (Shed -13 (Worker dining Shed))	Implement remediation work where required.	6-months
30	Apparently inadequate connection (Shed -14 (Knitting gray fabric godown))	Building engineer is required to check the connection adequacy for uplift forces as part of EA otherwise replace with well designed structure.	6-weeks

Item No.	Observation	Recommended Action Plan	Recommended Timeline
31	Apparently inadequate connection (Shed -14 (Knitting gray fabric godown))	Implement remediation work where required.	6-months
32	Discrepancy in as-built drawing (Building -5 (E.T.P))	Building engineer is required to survey the whole structure and produce accurate as-built drawing.	6-weeks
33	Lack of foundation details (Building -5 (E.T.P))	Factory engineer is required to investigate the foundation details and check the foundation capacity accordingly.	6-weeks
34	Lack of foundation details (Building -5 (E.T.P))	Produce and actively manage a loading plan for all floor plates within the factory, considering floor, column and foundation capacity.	6-weeks
35	Lack of foundation details (Building -5 (E.T.P))	Carry out remedial works as per DEA recommendations.	6-months

Item No.	Observation	Recommended Action Plan	Recommended Timeline
36	Lack of foundation details (Building -5 (E.T.P))	Continue to implement loading plan.	6-months
37	Exposed rebar at column (Building -6 (Fire pump))	All exposed reinforcement is to be protected from corrosion which may cause degradation of the concrete.	6-weeks