Magic Works Ltd

8/54 Jhalpaza, 10 Hobirbari Mymensingh, Bhaluka, Mymensingh, 2240
(24.342420, 90.419369)
29 January 2023

RSC RMG SUSTAINABILITY COUNCIL

Building Information

1. Building-1 (Factory Building) is a three storied (G+2) prefabricated steel building with a partial basement.
2. Building-2 (Office Building) is a three storied (G+2) prefabricated steel building.
3. Building-3 (Security & Fire Control Room) is a single storied (G) reinforced concrete (RC) building.
4. Building-4 (Boiler-1) This structure is a single storied (G) masonry structure.
5. Building-5 (Boiler-2) is a single storied (G) reinforced concrete (RC) building.
6. Building-6 (Generator & Substation Room) is a single storied (G) prefabricated steel shed.
7. Building-7 (Pump Room) is a single storied shed with a basement(B+G).
8. Building-8 (Workshop Shed) is a single storied shed(B).

Observations

Inconsistencies in design report

Observation: Building-1 (Factory Building)

Table 4.1-1: Bearing Capacity Check for Isolated Footings considering 63 psf Live Load

Joint Label	Foundation Type	Provided Foundation Size	Bearing Capacity	FoS (From Soil Test Report)	Ultimate Load Bearing Capacity	Reaction (DL + LL)	Available FoS (For Existing Foundation)	Remarks (Minimum FoS=2.0)
		sft	ksf		kip	kip		
41	F2	91.6	1.76	3	483.65	145.2	3.33	OK
42	F2	91.6	1.76	3	483.65	154.4	3.13	OK
43	F2	91.6	1.76	3	483.65	150.4	3.22	OK
44	F2	91.6	1.76	3	483.65	145.3	3.33	OK
45	F2	91.6	1.76	3	483.65	146.1	3.31	OK
61	F1	100.0	1.76	3	528.00	219.3	2.41	OK
62	F1	100.0	1.76	3	528.00	217.0	2.43	OK
63	F1	100.0	1.76	3	528.00	217.7	2.42	OK
64	F1	100.0	1.76	3	528.00	210.4	2.51	OK
114	F3	104.1	1.76	3	549.46	219.4	2.50	OK
51	F2	91.6	1.76	3	483.65	144.6	3.34	OK
65	F1	100.0	1.76	3	528.00	215.4	2.45	OK
66	F1	100.0	1.76	3	528.00	215.1	2.46	OK
67	F1	100.0	1.76	3	528.00	214.9	2.46	OK
68	F1	100.0	1.76	3	528.00	215.6	2.45	OK
69	F1	100.0	1.76	3	528.00	208.3	2.53	OK
116	F3	104.1	1.76	3	549.46	216.9	2.53	OK
53	F2	91.6	1.76	3	483.65	148.9	3.25	OK
70	F1	100.0	1.76	3	528.00	216.7	2.44	OK
71	F1	100.0	1.76	3	528.00	215.3	2.45	OK
72	F1	100.0	1.76	3	528.00	215.3	2.45	OK
73	F1	100.0	1.76	3	528.00	215.9	2.45	OK
74	F1	100.0	1.76	3	528.00	208.7	2.53	OK
118	F3	104.1	1.76	3	549.46	217.5	2.53	OK
52	F2	91.6	1.76	3	483.65	148.9	3.25	OK
75	F1	100.0	1.76	3	528.00	216.6	2.44	OK
76	F1	100.0	1.76	3	528.00	215.2	2.45	OK
77	F1	100.0	1.76	3	528.00	215.2	2.45	OK
78	F1	100.0	1.76	3	528.00	215.9	2.45	OK
79	F1	100.0	1.76	3	528.00	208.6	2.53	OK
120	F3	104.1	1.76	3	549.46	217.4	2.53	OK
55	F2	91.6	1.76	3	483.65	149.4	3.24	OK
80	F1	100.0	1.76	3	528.00	216.4	2.44	OK
81	F1	100.0	1.76	3	528.00	215.3	2.45	OK
82	F1	100.0	1.76	3	528.00	215.2	2.45	OK

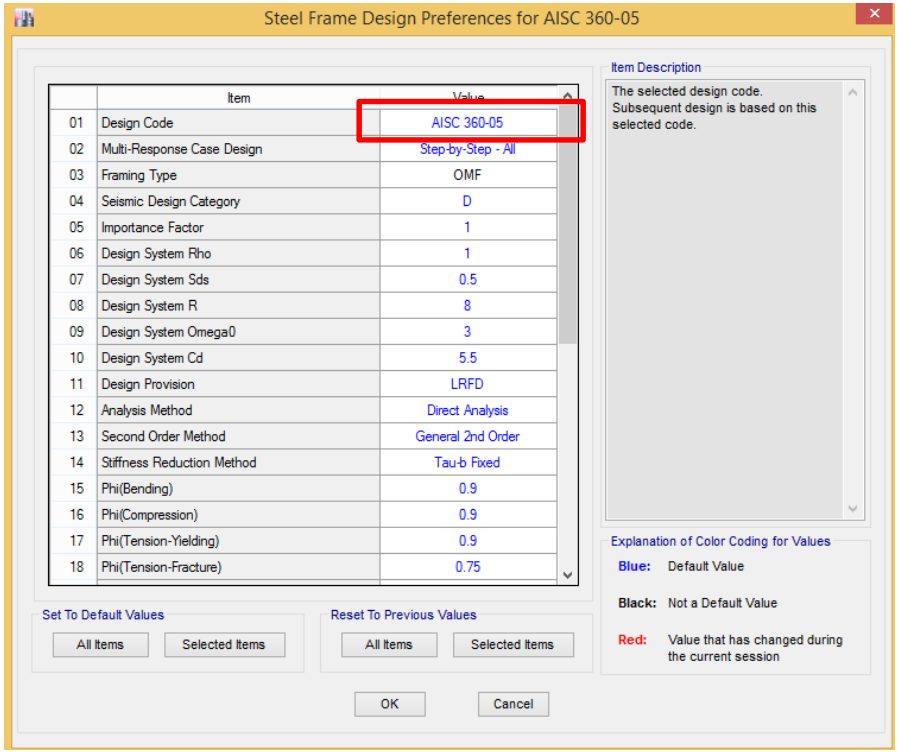
Building engineer has considered FoS 2 in foundation adequacy check however as per BNBC the FoS of footing is 2.5 and few foundation have FoS below 2.5. Building engineer is required to review the design of foundation as per BNBC requirements.

Observation: Building-1 (Factory Building)

3.5 METHOD OF ANALYSIS

Depending on the type of project, there are several well-established methods among which the Finite Element Method (FEM) is perhaps the most sophisticated and all-encompassing one. For analysis and design checking of the building, powerful finite element based structural design software package ETABS 15.2.0 has been employed for analysis. Some aspects of the analysis process are discussed in the following paragraphs.

Full three-dimensional modelling of the structure has been developed using frame and plate/shell elements. At the base level, the columns connected with the isolated foundation are assumed to be hinged and the Columns connected with Mat are assumed as fixed.



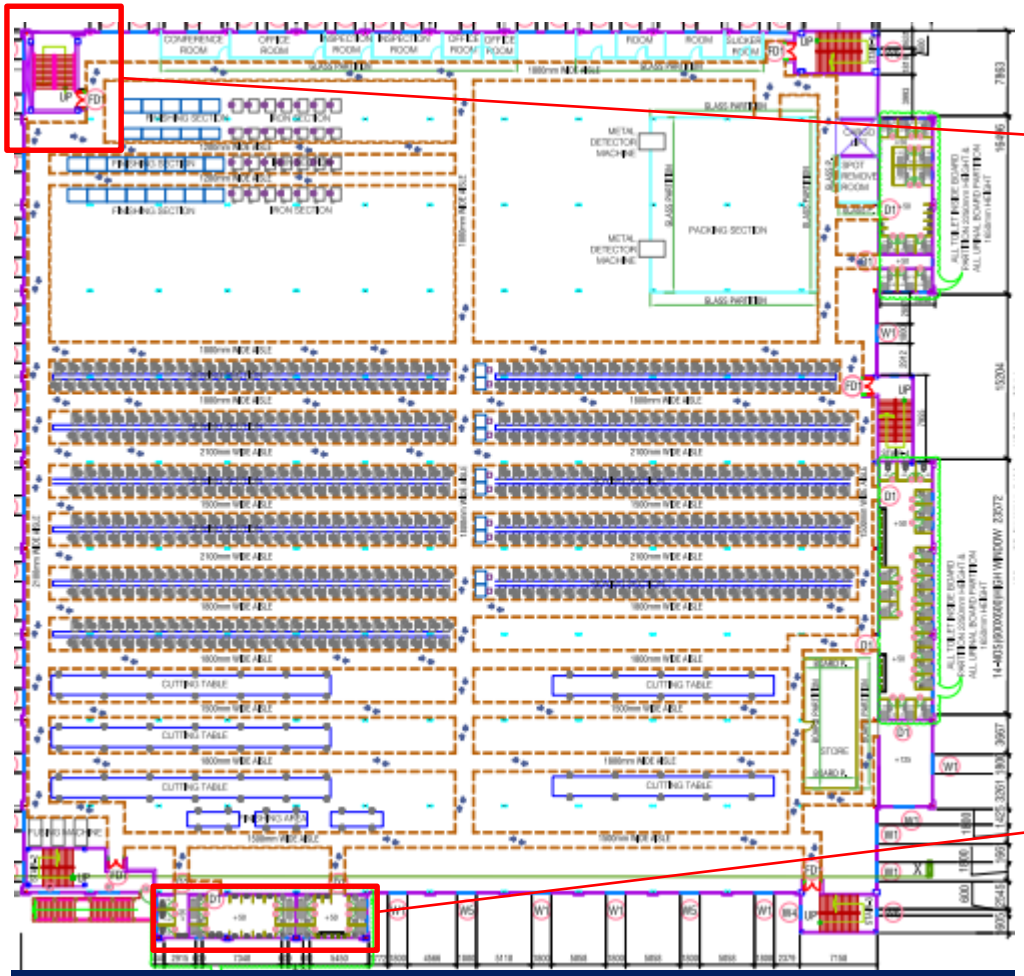
Building engineer has reviewed the design of the steel member as per AISC 360-05 method but the building under the code of BNBC-2006 shall require to evaluate as per AISC-LRFD 93 method

Observation: Building-1 (Factory Building)

RSC RMG SUSTAINABILITY COUNCIL

Discrepancy in as built drawing

Observation: Building-1 (Factory Building)



Architectural layout plan

Stair was found demolished.

200 mm build up found at toilet

Observation: Building-1 (Factory Building)

RSC RMG SUSTAINABILITY COUNCIL

Lack of construction safety practices in demolition works and falling hazard

Observation: Building-1 (Factory Building)

Unstable bamboo support on the demolition works which may slip away anytime.

Corroded and deflected steel member support instead of lintel

Lack of demolition safety practice observed in the factory. Building engineer is required to follow the BNBC Part-7 chapter-4 for safe demolition works.

Observation: Building-1 (Factory Building)

RSC RMG SUSTAINABILITY COUNCIL

Water ponding and vegetation on the roof

Observation: Building-1 (Factory Building)

Water ponding and vegetation observed on the roof.

Building engineer is required to develop water drainage system and apply water proofing layer on the roof with adequate slope.

Observation: Building-1 (Factory Building)

Crack in the RC beam-column joint of stair case and steel-RC member connection

Observation: Building-1 (Factory Building)

Crack on RC column and steel beam joint

Crack on RC beam-column joint

Crack on RC column and steel beam joint

Crack in the connection of RC beam-column joint of stair case and steel-RC member connection were observed. Building engineer is required to investigate the extent of the crack and suggest proper remedial actions.

Observation: Building-1 (Factory Building)

Vibration of roof slab

Observation: Building-1 (Factory Building)

Total slab area is approximately 7000 sqm. There is no construction/movement joint in the slab. During inspection we Vibration of roof slab . Building engineer is required to investigate the reason of the vibration and suggest proper remedial actions accordingly.

Observation: Building-1 (Factory Building)

Crack on the roof surface

Observation: Building-1 (Factory Building)

Total slab area is approximately 7000 sqm. There is no construction/movement joint in the slab. Crack appeared on the roof surface. Building engineer is required to investigate the reason of the crack and suggest proper remedial action accordingly.

Observation: Building-1 (Factory Building)

Significant gap in beam-column joints

Observation: Building-1 (Factory Building)

Significant gap was found in beam-column joint. Building engineer is required to identify all the connection gaps and fill the gaps with a suitable method.

Observation: Building-1 (Factory Building)

Severe corrosion in steel members

Observation: Building-1 (Factory Building)

Severe corrosion on steel members

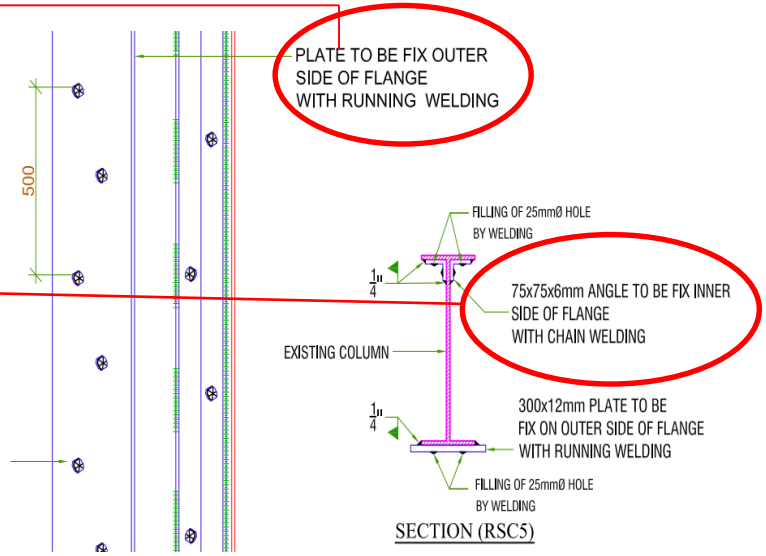
Severe corrosion was observed in steel members. Building engineer is required to remove the corrosion and provide rust proof paint on all steel members.

Observation: Building-1 (Factory Building)

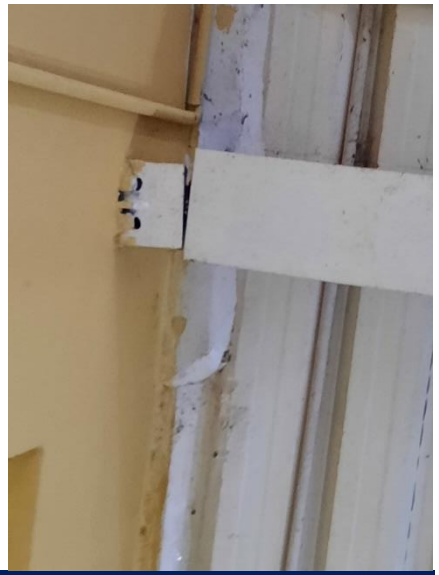
Faulty retrofitting works

Observation: Building-1 (Factory Building)

Tack welding found instead of continuous welding at steel column and beam retrofitting



Details of column and beam retrofitting



Faulty retrofitting works (disconnected flange).

Addition of plate/angle sections were proposed as retrofitting elements with the existing steel beams and columns. But during inspection additional plate & angle sections were found welded by tack welding where continuous welding was recommended in the retrofitting drawing. Also, the bottom flange of the retrofitted beams were disconnected. However, the building engineer is required to check the current retrofitting conditions, update the connection details, revise the EA report and submit the EA documents to RSC for detail review.

Observation: Building-1 (Factory Building)

Lack of lateral stability

Observations: Building-2 (Office Building)

Moment resisting frame is only provided along short direction at 1st and 2nd floor

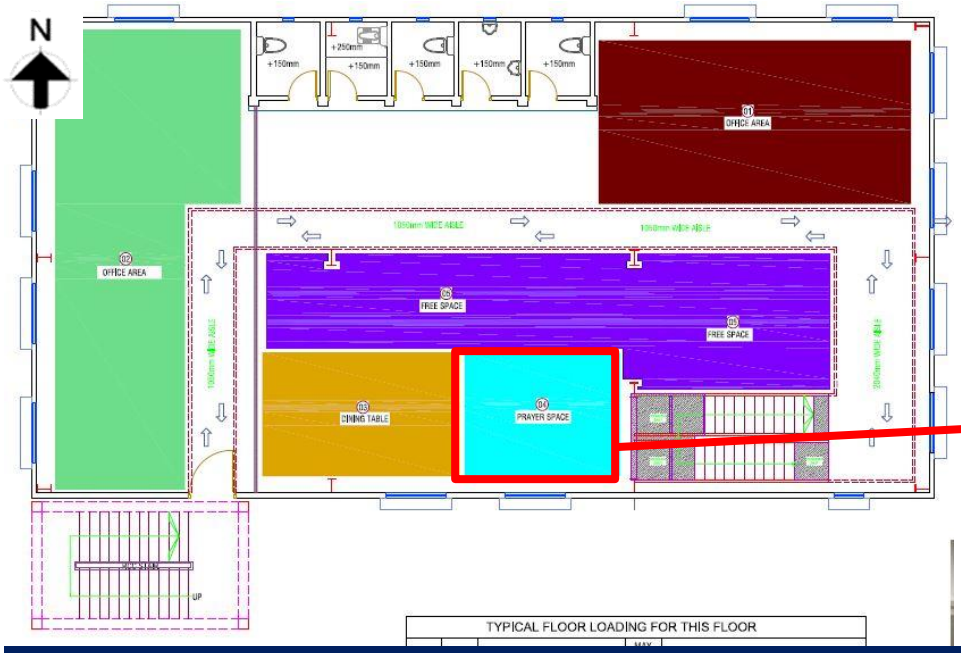
No wall bracing is provided along long direction at 1st and 2nd floor

Moment resisting frame is only provided along short direction and no wall bracing is provided along long direction at 1st and 2nd floor therefore lateral stability along long direction is questionable. Building engineer is required to check the lateral stability of the structure.

Observations: Building-2 (Office Building)

Load plan doesn’t comply with BNBC

Observations: Building-2 (Office Building)



Live load plan- 1st l floor

TYPICAL FLOOR LOADING FOR THIS FLOOR				
NO.	TYPE	ITEM	MAX, LOAD IN PSF	DESCRIPTION
01	LIGHT	OFFICE AREA	63	TYPICAL FURNITURE
02	LIGHT	DORMITORY AREA	63	TYPICAL FURNITURE
03	LIGHT	DINING AREA	63	TYPICAL DINING TABLE
04	LIGHT	PRAYER SPACE	63	
05	LIGHT	FREE SPACE	63	
06	LIGHT	STAIR CASE	84	
07	LIGHT	TOILET & AISLE AREA	63	

Live load considered as 3 kPa for Prayer

Prayer area on 1st floor

Library, auditorium, cinema, lecture hall, restaurant, bar, mosque, church (E1 – E4)	
1 Assembly room:	
with fixed seat	3.0
without fixed seat	5.0
2 Stages and projection room	5.0
3 Library :	
Reading room –	
without book storage	2.5
with book storage	4.0
	(3)
Stack room for book	6.5

Live load table (BNBC part-6)

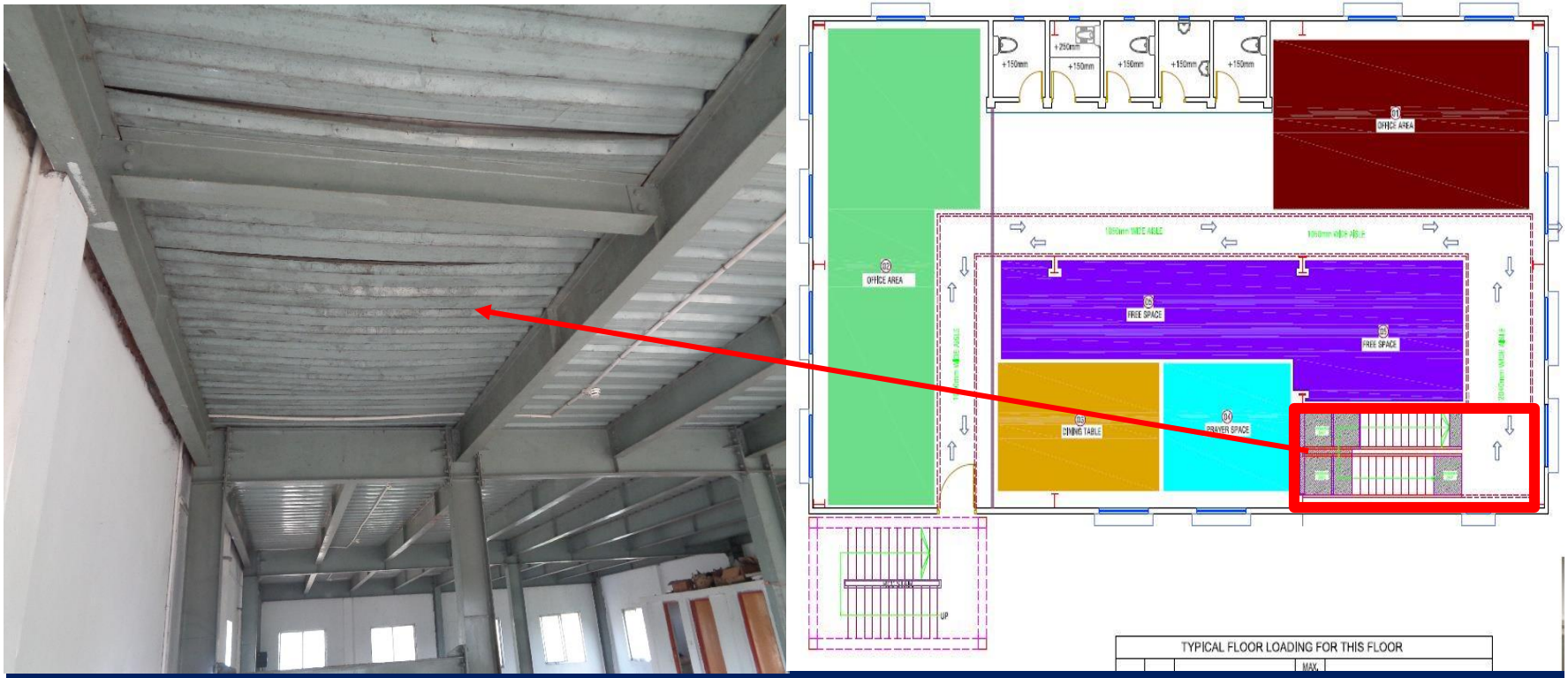
Live load for prayer on 1st floor is considered as 3 kPa in prepared load plan. As per BNBC- Part 6, live load for assembly (without fixed seat) is required to be considered minimum 5 kPa. However, the building engineer is required to update the load plan as per BNBC requirement, revise the design report and submit to RSC for review.

Observations:Building-2 (Office Building)

RSC RMG SUSTAINABILITY COUNCIL

Deflection in steel deck slab

Observations: Building-2 (Office Building)



Deflection in steel deck slab (roof)

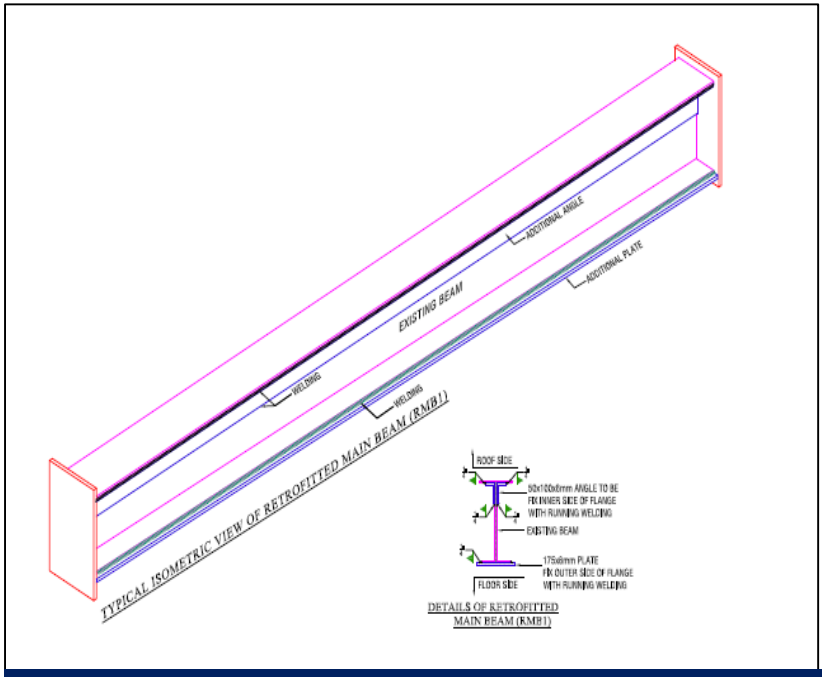
Deflection was found in steel deck slab (roof) at highlighted location. Building engineer is required to check the slab adequacy and propose remediation plan. Submit the remediation scheme to RSC for review.

Observations: Building-2 (Office Building)

Required remediation work is not completed

Observations: Building-2 (Office Building)

Additional plate not installed in steel beam



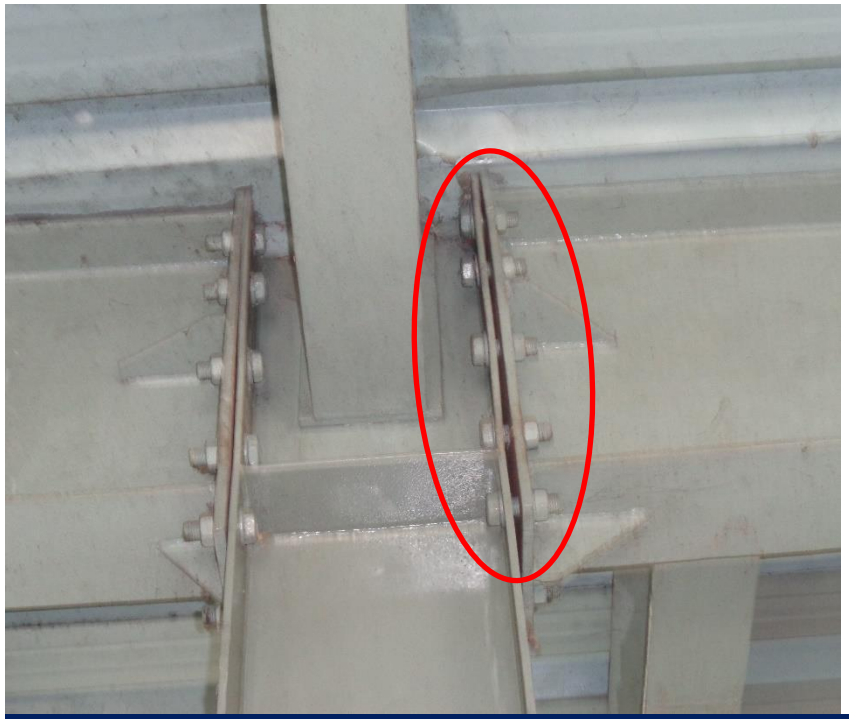
Additional plate is proposed for steel beam

Additional plate is proposed for steel beam (at roof) but not installed. However, the factory is required to submit retrofitting design along with Engineering Assessment (EA) to the RSC for review. Complete all remediation work once the EA is accepted from RSC.

Observations: Building-2 (Office Building)

Significant gap in beam-column joint at several locations

Observation: Building-2 (Office Building)



Significant gap in beam-column joint.

Significant gap was found in beam-column joint. Building engineer is required to identify all the connection gaps and fill the gaps with a suitable method.

Observation: Building-2 (Office Building)

Severe corrosion in steel members

Observation: Building-2 (Office Building)

Severe corrosion in steel members

Severe corrosion was observed in steel members. Factory is required to remove the corrosion and provide rust proof paint on all steel members to protect from further corrosion.

Observation: Building-2 (Office Building)

Dampness on brick wall

Observations: Building-2 (Office Building)

Dampness was found on periphery brick wall and stair zone

Dampness was found on periphery brick wall and stair zone. Factory is required to repair all damp areas as per suggestion of building engineer.

Observations: Building-2 (Office Building)

Incomplete lateral stability system

Observations: Building-6 (Generator & Substation Room)

Roof bracing is provided at some locations

No compression member provided

Roof bracing is provided at some locations but no compression member is provided from frame to frame to transmit the lateral load. Therefore, lateral stability system in the structure is apparently incomplete. Building engineer is required to carry out Engineering Assessment (EA) to check the lateral stability of the structure and submit the EA documents to RSC for review.

Observations: Building-6 (Generator & Substation Room)

Apparently inadequate connection

Observations:
Building-7 (Pump Room) & Building-8 (Workshop Shed)

No joint plate observed in truss to column joint

Purlin inserted to brick wall

Connection of truss to column was appeared to be inadequate due to poor connection (absence of baseplate, purlin inserted to brick wall). Building engineer is required to check the connection adequacy for uplift forces.

Observations:
Building-7 (Pump Room), Building-8 (Workshop Shed)

Problems Observed

Building-1 (Factory Building)

Item 01: Inconsistencies in design report.
Item 02: Discrepancy in as built drawing.
Item 03: Lack of construction safety practices in demolition works and falling hazard.
Item 04: Water ponding and vegetation on the roof.
Item 05: Crack in the connection of RC beam-column joint of staircase and steel-RC member connection.
Item 06: Vibration of roof slab.
Item 07: Crack on the roof surface.
Item 08: Significant gap in connection at several location.
Item 09: Severe corrosion on steel members.
Item 10: Faulty strengthen works.

Building-2 (Office Building)

Item 11: Lack of lateral stability.
Item 12: Load plan doesn't comply with BNBC.
Item 13: Deflection observed in steel deck slab.
Item 14: Required remediation work is not completed.
Item 15: Significant gap in connection at several location.
Item 16: Severe corrosion on steel members.
Item 17: Dampness on brick wall.

Building-6 (Generator & Substation Room)

Item 18: Incomplete lateral stability system.

Building-7 (Pump Room), Building-8 (Workshop Shed)

Item 19: Apparently inadequate connection.

Item No.	Observation	Recommended Action Plan	Recommended Timeline
01	Inconsistencies in design report (Building-1: Factory Building).	Building engineer is require to evaluate the design of steel members as per BNBC-2006 (equivalent to AISC-LRFD 93 method)	6-weeks
02	Inconsistencies in design report (Building-1: Factory Building).	Building engineer is required to prepare the design report considering 1.9.1 BNBC.	6-weeks
03	Inconsistencies in design report (Building-1: Factory Building).	Implement remediation work if required.	6-months
04	Discrepancy in as built drawing (Building-1: Factory Building)	Building engineer is require to update the as-built drawing as per as-built condition.	6-weeks
05	Lack of construction safety practices in demolition works and falling hazard (Building-1: Factory Building)	Building engineer is required to follow the BNBC Part-7 Chapter-3 for safe demolition works.	6-weeks

Item No.	Observation	Recommended Action Plan	Recommended Timeline
06	Water ponding and vegetation on the roof (Building-1: Factory Building)	Building engineer is required to develop water drainage system and apply water proofing layer on the roof with adequate slope.	6-weeks
07	Crack in the connection of RC beam-column joint of staircase and steel-RC member connection (Building-1: Factory Building)	Building engineer is required to investigate the extent of the crack and suggest proper remedial actions.	6-weeks
08	Crack in the connection of RC beam-column joint of staircase and steel-RC member connection (Building-1: Factory Building)	Implement suitable repair works.	6-months
09	Vibration of roof slab (Building-1: Factory Building)	Building engineer is required to investigate the reason of the vibration and suggest proper remedial action accordingly.	6-weeks
10	Crack on the roof surface (Building-1: Factory Building)	Building engineer is required to investigate the reason of the crack and suggest proper remedial action.	6-weeks

Item No.	Observation	Recommended Action Plan	Recommended Timeline
11	Significant gap in beam-column joint at several locations (Building-1: Factory Building)	Building engineer is required to identify all the connection gaps and fill the gaps with a suitable method.	6-weeks
12	Severe corrosion on steel members (Building-1: Factory Building)	Building engineer is required to remove the corrosion and provide rust proof paint on all steel members to protect from corrosion.	6-weeks
13	Faulty retrofitting works (Building-1: Factory Building)	The building engineer is required to check the current retrofitting conditions, update the connection details, revise the EA report and submit the EA documents to RSC for detail review.	6-weeks
14	Faulty retrofitting works (Building-1: Factory Building)	Complete all remediation as per accepted EA.	6-months
15	Lack of lateral stability (Building-2: Office Building)	Building engineer is required to check the lateral stability of the structure.	6-weeks

Item No.	Observation	Recommended Action Plan	Recommended Timeline
16	Lack of lateral stability (Building-2: Office Building)	Implement remediation work if required.	6-months
17	Load plan doesn't comply with BNBC (Building-2: Office Building)	Building engineer is required to revise the load plan as per BNBC requirement and check the design accordingly.	6-weeks
18	Load plan doesn't comply with BNBC (Building-2: Office Building)	Implement remediation work if required.	6-months
19	Deflection in steel deck slab (Building-2: Office Building)	Building engineer is required to check the slab adequacy, prepare remediation scheme and submit the design documents to the RSC for review.	6-months
20	Deflection in steel deck slab (Building-2: Office Building)	Carry out remediation works where required.	6-months

Item No.	Observation	Recommended Action Plan	Recommended Timeline
21	Required remediation work is not completed (Building-2: Office Building)	Building engineer is required to check the slab adequacy, prepare remediation scheme and submit the design documents to the RSC for review.	6-weeks
22	Required remediation work is not completed (Building-2: Office Building)	Complete all remediation work once the EA is accepted from RSC.	6-months
23	Significant gap in beam-column joint at several locations (Building-2: Office Building)	Building engineer is required to identify all the connection gap and fill the gaps with a suitable method.	6-weeks
24	Severe corrosion in steel members (Building-2: Office Building)	Factory is required to provide rust proof paint on all steel members to protect from corrosion.	6-weeks

Item No.	Observation	Recommended Action Plan	Recommended Timeline
25	Dampness on brick wall (Building-2: Office Building)	Factory is required to repair all damp areas as per suggestion of building engineer.	6-weeks
26	Incomplete lateral stability system (Building-6 :Generator & Substation Room)	Building engineer is required to carry out Engineering Assessment (EA) to check the lateral stability of the structure and submit the EA documents to RSC for review.	6-weeks
27	Incomplete lateral stability system (Building-6 :Generator & Substation Room)	Implement remediation work where required.	6-months
28	Apparently inadequate connection (Building-7:Pump Room, Building-8: Workshop Shed)	Building engineer is required to check the connection adequacy for uplift forces.	6-weeks

Item No.	Observation	Recommended Action Plan	Recommended Timeline
29	Apparently inadequate connection (Building-7:Pump Room, Building-8: Workshop Shed)	Implement remediation work where required.	6-months