

Masihata Sweaters Ltd. (Extension)

South Panishail, Kashimpur, BKSP, Gazipur.

(23.99335, 90.26211)

15 November 2023



1. Building Information

Building-2: Existing Single storied RC building with basement (B+G) and proposed for construction up to ten storied with basement (B+G+9).

Building-3 (Daycare Shed): A single storied steel shed.

Building-6 (ETP): A single storied steel shed.

Building-7 (Medical & Canteen Shed): A single-storied steel shed.

Building-8 (Fire Pump & Control room): A single-storied RC structure with an underground fire pump room and water reservoir.

Building-9 (Generator Building): This is a two storied RC building.

Building-10 (Utility Building): A three storied RC building.

Building-11 (Chemical Store): A single storied steel shed.

Building-12 (LPG Shed): A single storied steel shed.

Building-16 (Smoke zone & air compressor): A two storied (G+1) RC building with steel roof shed.

Building-18 (Boiler & Chiller Building): A two storied (G+1) RC building.

Gas Generator: A single-storied shed.

2. Observations

Observation-1: Inconsistencies in design report. (Building-2)

3.2.3. Seismic Load		
Earthquake load has been considered as per BNBC 2020 mentioned rules & regulations that have been considered in ETABS analysis.		
Time period, T, zone factor, Z & response modification co-efficient, R are needed for interpolating to achieve desired base shear as per BNBC 2020.		
Detail Calculation of Earthquake Load (Part A):		
EARTHQUAKE LOAD ANALYSIS		
Seismic zone coefficient Z =	0.2	Zone 2
Structure importance coef. I =	1.25	III
Soil Factor, S =	1.15	SC
Seismic Design Category	C	Table 6.2.18
Response modification coefficient R=	8	8

1. Special steel moment frames	8	3	5.5	NL	NL
2. Intermediate steel moment frames	4.5	3	4	NL	NL
3. Ordinary steel moment frames	3.5	3	3	NL	NL

Loading parameters in the design report

Seismic Design Category According to BNBC-2020

In Design Report, R=8 considered which is for special moment resisting frame in BNBC 2020, but no justification provided regarding special moment resisting frame.

Table 2.1: Minimum Design Live Loads	
Load	Use of Floor
3.0KN/sqm	For Light Workroom without storage
5.0KN/sqm	For Factory Building
4.8KN/sqm	For Stair
2.0KN/sqm	For Toilet
1.0KN/sqm	For Roof (Table 6.2.4)

Live Load considered in the design report

No.	Type	Item	Max. Load (KN/M ²)	Description
1	HS	Fire Stair	5	Typical Fire Stair
2	HS	Rework & Special Selection	5	Typical Rework & Special Selection
3	HS	Conference & Showroom	5	Typical Conference & Showroom
4	HS	Iron & QC Measurement Area	5	Typical Iron & QC Measurement Area
5	HS	Fire Stair	5	Typical Fire Stair
6	HS	Toilet Area	5	Typical Toilet Area

Live Load mentioned in load plan

For toilet zone, live load is considered 2KN/sqm in design report and FEM but 5KN/sqm mentioned in live load plan.

Design Concrete Strength as follows (Based on model analysis):		
o For Reinforced Concrete Section		
Item	Aggregate Type	Concrete Strength, f _c
Foundation, Column, Shear wall, Beam, Slab, Stair and others	Stone chips	3500 psi (24.14 MPa)
Design Steel (Rebar) Strength as follows (Based on model analysis):		
All reinforcements are 60 grade (415MPa) steel.		

Design strength considered in design report

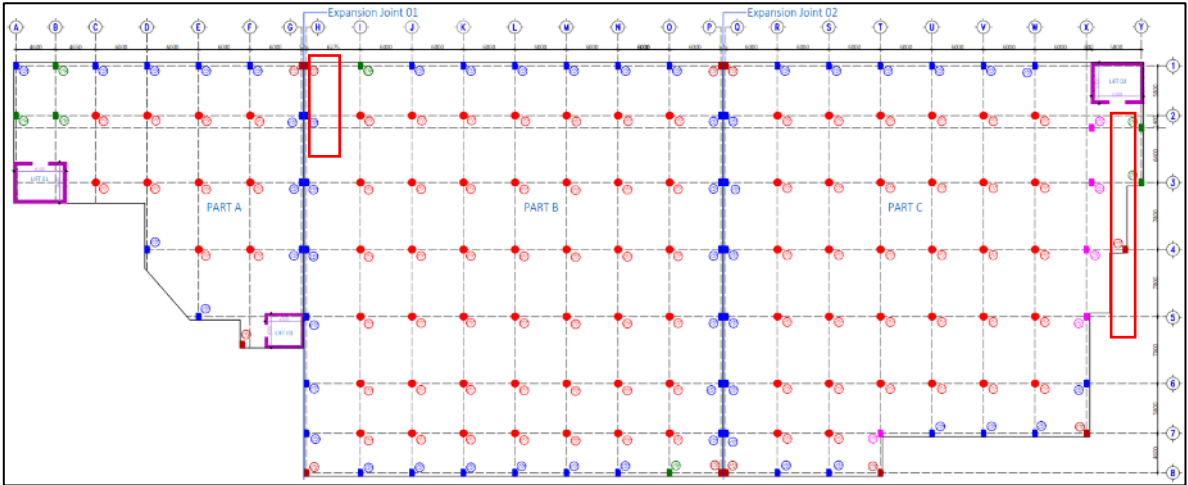
3. Materials Specification/ Statement/ Description/ Detailing/Instructions/ Designation:	
Concrete compressive strength considered as follows:	
1) f _c = Minimum 3000 psi for Slab on grade (1:2:4 with 3/4" downsize well graded Stone chips & Local sand).	
2) f _c = Minimum 4500 psi for Footing, Column, Lift Core & Shear Wall (1:1½:3 with 3/4" downsize well graded Stone chips & Sylhet sand).	
3) f _c = Minimum 3500 psi for beam, slab, stair and others (1:1½:3 with 3/4" downsize well graded Stone chips & Sylhet sand).	
Steel Brand: BNBC	
Yield strength of steel f _y = 496Mpa (72 grade)[Epoxy coated may be used in under ground]	

Design strength considered in structural drawing

In the design report, concrete strength considered 24.1 MPa for column & shear wall and 415MPa for rebar but in structural drawing, design strength mentioned 31.03 MPa concrete and 496 MPa for rebar.

Description: The building engineer is required to revise the report with proper justification regarding special moment resisting frame, revise loading condition as per BNBC-2020 and confirm the design strength of concrete from concrete cylinder test report.

Observation-2: Discrepancies in as built drawings. (Building-2)



Column Type	Total Column No.	Reinforcement	Ground Floor Level to Floor 01 Level	Floor 01 Level to Floor 02 Level	Floor 02 Level to Floor 05 Level	Floor 05 Level to Floor 16 Level and above
C1	84					
C2	52					
C3	11					
C4	17					
C5	15					

Column Schedule



C2 column-16 nos of rebar found instead of 18 nos rebar.



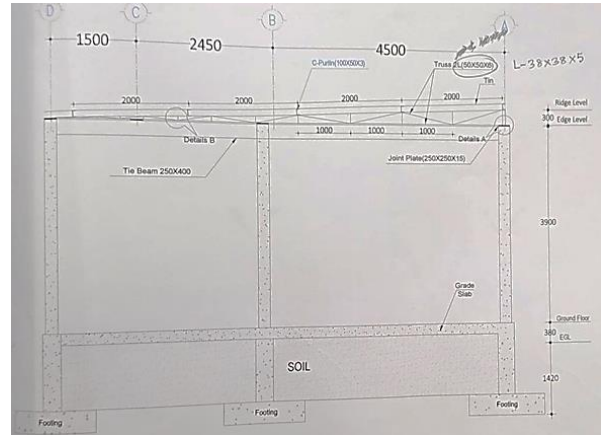
C5 column-18 nos of rebar found instead of 24 nos rebar.

Description: During inspection, mismatches were found between onsite condition and as-built drawing. Rebar numbers of C2, C5 and C6 column found different from column schedule. The building engineer is required to survey the full structure and produce accurate as-built drawings.

Observation-3: Mismatches in as-built drawings (Building-3)



Daycare building



Truss Section (L-38X38X5)

Description: During inspection, mismatches observed in as-built drawings. As per drawings, member size of steel truss was provided 2L-50X50X6, where member size was found L-38X38X5 on site. The building engineer is required to prepare accurate as built drawings and revise the design report.

Observation-4: Dampness on brick wall (Building-3).



Description: Dampness observed on brick wall. Building engineer is required to repair the dampness.

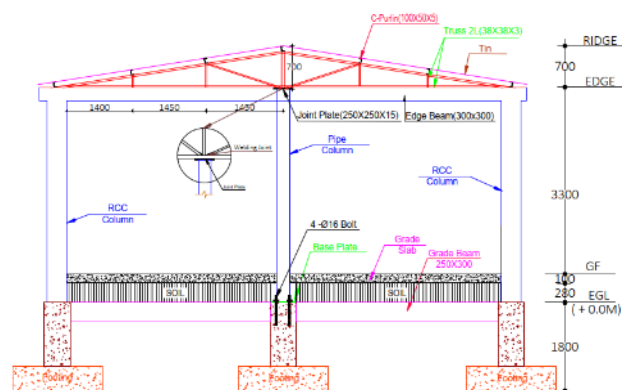
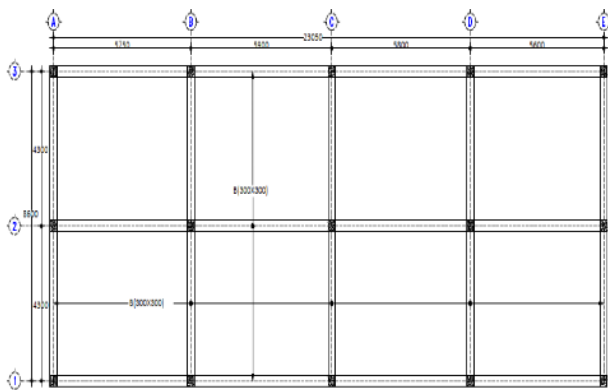
Observation-5: Lack of lateral stability (Building-6).



ETP steel shed

Description: During inspection, a built drawing was not available for the structure. Also, lateral load transfer media was not available. The existing truss may be inadequate against the lateral loading. The building engineer is required to prepare accurate as built drawings and perform the Engineering Assessment (EA) for the ETP shed.

Observation-6: Mismatches in as-built drawings (Building-7).



Edge Beam Layout and frame section



Description: During inspection, no edge beams were observed at the eave height level. In as-built drawings, edge beams are provided at eave height. The building engineer is required to prepare accurate as built drawings and revise the design report.

Observation-7: Loose and bent horizontal bracing (Building-7).



Description: Horizontal bracing (16mmØ bar) was found bent and loose. Factory is required to take remedial actions as per the suggestion of building engineer.

Observation-8: Verify the connection adequacy of the roof shed. (Building-8)



Steel Roof shed over the Fire pump room and control room

Description: Light weight steel roof shed was found over the Fire pump room and control room. The size of the steel members connections seems to be inadequate against the lateral loading.

Observation-9: Lack of design report. (Building-9)



Building-9 (Generator Building)

Description: 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 documents shall include as built drawings and a design report which shall be prepared in compliance with section 1.9.1, part-6 of BNBC.

During inspection, the design report was not available on site. The building engineer is required to prepare a design report based on in-situ material strength & software-based analysis and submit it to RSC for review.

Observation-10: Design documents needs to be revised (Building-10)



Utility Building



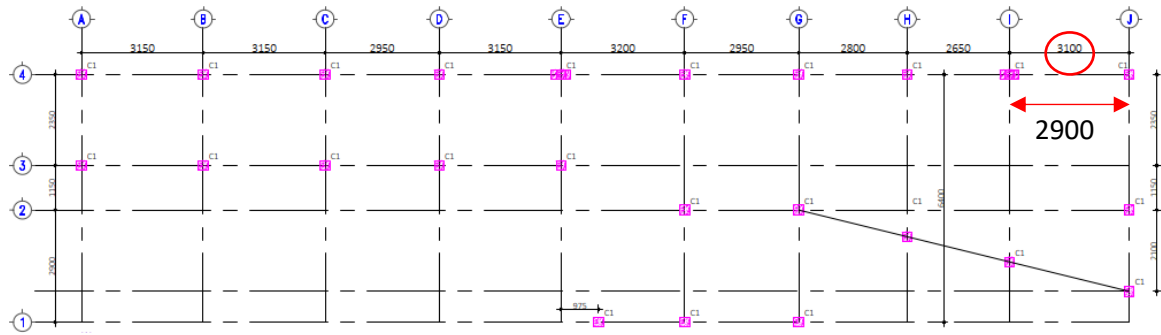
Beam aggregate-Brick chips

Observations: Stone chips aggregate has been used for the construction of the utility building but one of the beam was found made of brick chips. Building engineer is required to identify all the locations where brick chips has been used.

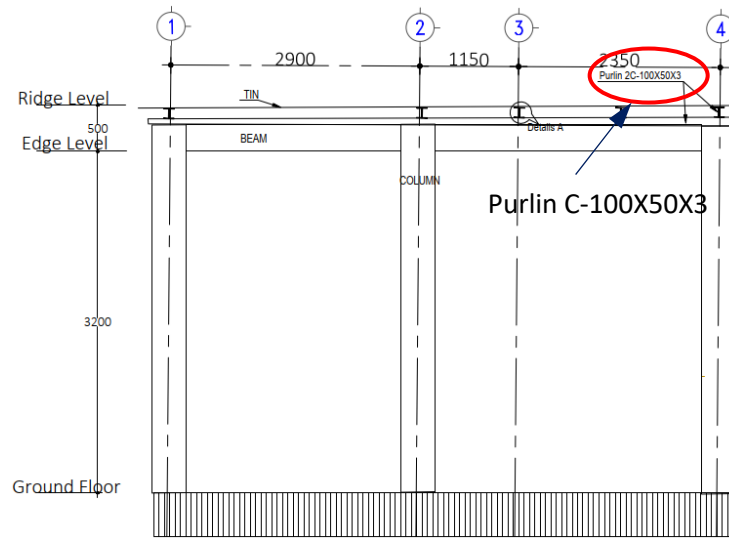
During inspection, total eight sets of the cylinder test of the report was available but only two sets (one set from Column and one set from footing) of the cylinder test report having average strength. The frequency of test for the cylinder test report does not comply with BNBC.

The provided design documents does not contains any FEA model. Building engineer is required to update the design documents based on in-situ strenth and submit to RSC.

Observation-11: Mismatches in as-built drawings (Building-11)

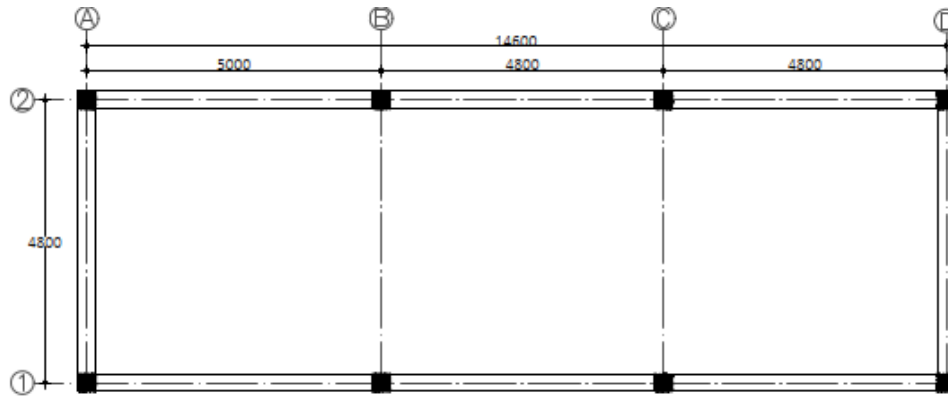


Grid distance mismatch



Observations: During inspection, discrepancy observed in as-built drawings. Grid distance mismatch was found at some locations. As per drawing, purlin size is 2C-100X50X3 but purlin size was found C-100X50X3 on-site. The building engineer is required to prepare accurate as built drawings and revise the design report.

Observation-12: Discrepancies in as built drawings (Building-12).



Edge beam layout (as per structural drawing)



Missing edge beams at on-site condition

Description: According to the on-site condition, there is no edge beam at eave height level. Building engineer is required to prepare accurate as built drawings and revise the design report.

Observation-13: Inconsistencies in design report. (Building-16)

Others Load & Considerations: As per BNBC 2020 this is mentioned in Table 2 & 3		
Table 2 Load & Miscellaneous		
Live load	4.8 KN/sqm 1 KN/sqm	For Air Compressor Floor For Roof
Location	Gazipur	
Wind load	As per Section 3.2.2 : BNBC 2020 Part-6 & ASCE 7-05	
Seismic load	As per Section 3.2.3 : BNBC 2020 Part-6 & ASCE 7-05	
Wind Speed	66.5 m/s as per BNBC	
Floor Finish	0.9 KN/sqm	
Partition Wall	6.63 KN/m : 125mm wall weight = $18.3 \times 0.125 \times 2.9 = 6.63 \text{ KN/m}$	
Structure type	IMF	Ref: Section 2.5.5: BNBC 2020
Depth of Foundation	1.8m	Ref.: As per Supplied Structural Drawing

Loading parameters in the design report

Description: In Design Report, intermediate moment resisting frame was considered without any justification. The building engineer is required to revise the report for actual framing system with proper justification as per BNBC-2020.

Observation-14: Apparently inadequate connection. (Building-16)



Description: Apparently inadequate structural connection details were found in steel roof shed. Building engineer is required to check the adequacy of the steel connection for uplift forces.

Observation-15: Adequacy of steel stairs needs to be checked. (Building-16)



Description: Inadequate structural connections were found in steel stair. Building engineer is required to check the structural adequacy of the steel stair.

Observation-16: Lack of design report. (Building-18)



Description: 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 documents shall include as built drawings and a design report which shall be prepared in compliance with section 1.9.1, part-6 of BNBC.

During inspection, the design report was not available on site. The building engineer is required to prepare a design report.

Observation-17: Verify the connection adequacy of the roof shed. (Diesel Generator)



Roof shed

Description: Light weight steel roof shed is supported by the RC column. During inspection, the as-built drawing was not available for the Diesel Generator. The roof shed is apparently non-engineered. Also, connection seems to be inadequate to carry the uplift force.

3. Action Plan

Serial	Observation	Action Plan	Timeline
1	Inconsistencies in design report. (Building-2)	The building engineer is required to revise the design report in compliance with BNBC.	within 6 weeks
2	Inconsistencies in design report. (Building-2)	Carry out suggested remedial works if required.	within 6 months
3	Discrepancies in as built drawings. (Building-2)	The building engineer is required to survey the full structure and produce accurate as-built drawings.	within 6 weeks
4	Mismatches in as-built drawings (Building-3)	The building engineer is required to prepare accurate as built drawings and revise the design report.	within 6 weeks
5	Mismatches in as-built drawings (Building-3)	Carry out suggested remedial works if required.	within 6 months
6	Dampness at brick wall (Building-3).	Building engineer is required to repair the dampness.	within 6 weeks
7	Lack of lateral stability (Building-6)	Survey the whole structure and prepare the as-built drawings.	within 6 weeks
8	Lack of lateral stability (Building-6)	Building engineer is required to verify the lateral stability of the ETP shed	within 6 weeks
9	Lack of lateral stability (Building-6)	Carry out suggested remedial works if required.	within 6 months
10	Mismatches in as-built drawings (Building-7).	The building engineer is required to prepare accurate as built drawings and revise the design report.	within 6 weeks
11	Mismatches in as-built drawings (Building-7).	Carry out suggested remedial works if required.	within 6 months
12	Loose and bent horizontal bracing (Building-7).	Factory is required to take remedial actions as per the suggestion of building engineer.	within 6 weeks
13	Verify the connection adequacy of the roof shed. (Building-8)	Building engineer is required to verify the adequacy of connection against uplift force.	within 6 weeks
14	Verify the connection adequacy of the roof shed. (Building-8)	Carry out suggested remedial works if required.	within 6 months
15	Lack of design report. (Building-9)	The building engineer is required to prepare a design report based on in-situ material	within 6 weeks

		strength & software-based analysis and submit it to RSC for review.	
16	Lack of design report. (Building-9)	Carry out remedial work if required.	within 6 months
17	Design documents needs to be revised (Building-10)	The building engineer is required to update design documents based on in-situ material strength & software-based analysis and submit it to RSC for review.	within 6 weeks
18	Design documents needs to be revised (Building-10)	Carry out remedial work if required.	within 6 months
19	Mismatches in as-built drawings (Building-11).	The building engineer is required to prepare accurate as built drawings and revise the design report.	within 6 weeks
20	Mismatches in as-built drawings (Building-11).	Carry out suggested remedial works if required.	within 6 months
21	Discrepancies in as built drawings (Building-12).	Building engineer is required to prepare accurate as built drawings and revise the design report based on in-situ material strength.	within 6 weeks
22	Discrepancies in as built drawings (Building-12).	Carry out remedial works if required.	within 6 months
23	Inconsistencies in design report. (Building-16)	The building engineer is required to revise the report for actual framing system with proper justification as per BNBC-2020.	within 6 weeks
24	Inconsistencies in design report. (Building-16)	Carry out remedial work if required.	within 6 months
25	Apparently inadequate connection. (Building-16)	Building engineer is required to check the adequacy of the steel connection for uplift forces.	within 6 weeks
26	Apparently inadequate connection. (Building-16)	Carry out remedial work if required.	within 6 months
27	Adequacy of steel stair need to be checked. (Building-16)	Building engineer is required to check the adequacy of the steel stair.	within 6 weeks
28	Adequacy of steel stair need to be checked. (Building-16)	Carry out remedial work if required.	within 6 months
29	Lack of design report. (Building-18)	The building engineer is required to prepare a design report based on in-situ material strength & software-based analysis and submit it to RSC for review.	within 6 weeks

30	Lack of design report. (Building-18)	Carry out suggested remedial works.	within 6 months
31	Verify the connection adequacy of the roof shed. (Diesel Generator)	Building engineer is required to verify the adequacy of connection against uplift force.	within 6 weeks
32	Verify the connection adequacy of the roof shed. (Diesel Generator)	Carry out suggested remedial works if required.	within 6 months