Daeyu Bangladesh LTD (Extension)

731, Bhannara Mouchak, Gazipur.
(24.035353, 90.300452)
02 May 2023

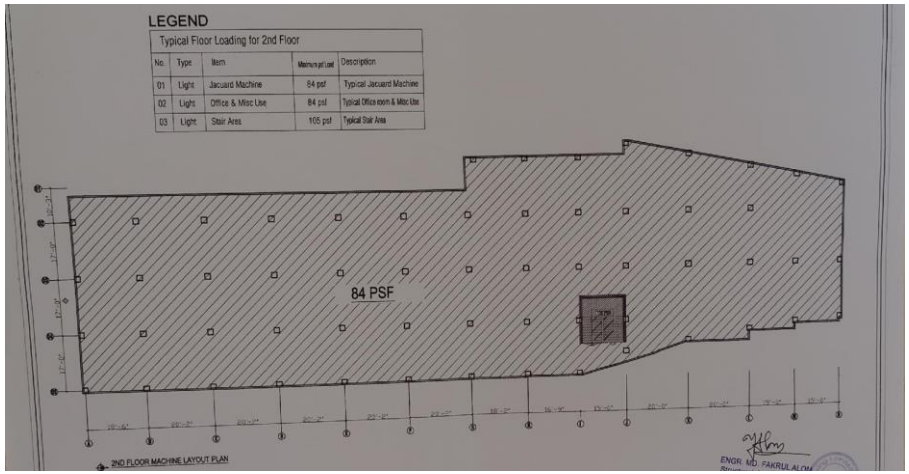
RSC RMG SUSTAINABILITY COUNCIL

Buildings Information

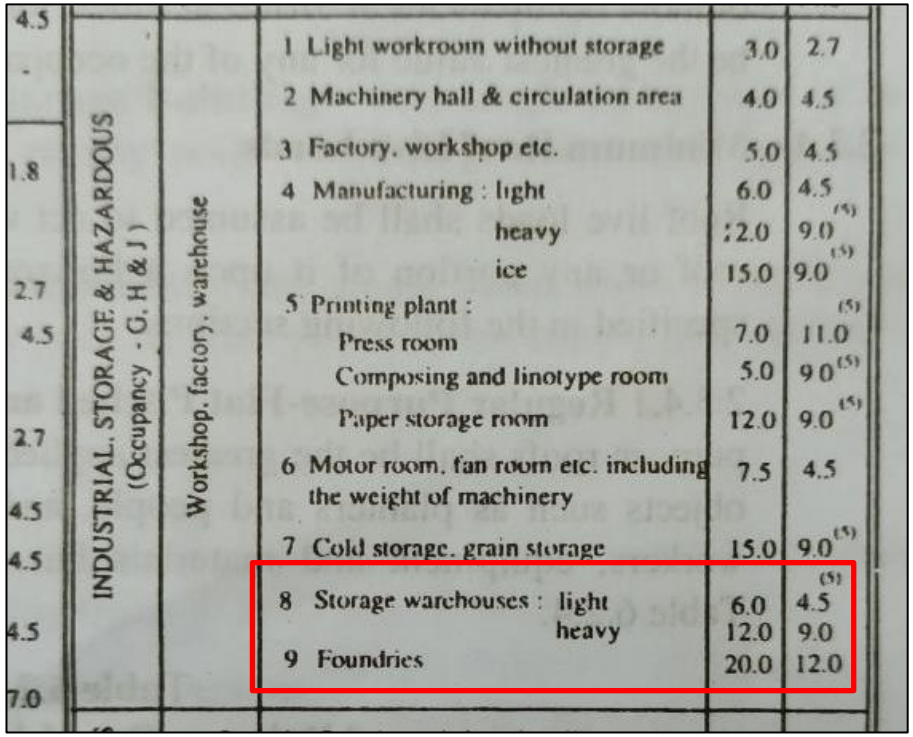
1. 4-Storied Production Building : (G+3)
2. 5-Storied Proposed Production Building) : (G+2)
3. Utility Building : (G)
4. Pump House : (G)
5. UPS & Compressor Room : (G)
6. ETP Shed : (G)
7. Wastages Shed: (G)

Observations

Load plan & design report not comply with BNBC requirements



Currently, the 2nd floor of the building is being allotted for fabric store. As per BNBC, the minimum floor live load for light storage is 6 kN/m2 (125 psf). But the storage (temporary store as per factory management) area of the building is designed for 4 kN/m2 live loads.
Building engineer is required to revise the storage live load limit and related design documents based on BNBC requirement.



4.5	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
1.8			4 Manufacturing : light	6.0 / 4.5
			heavy	12.0 / 9.0 (5)
2.7			ice	15.0 / 9.0 (5)
4.5			5 Printing plant :	(5)
			Press room	7.0 / 11.0
			Composing and linotype room	5.0 / 9.0 (5)
2.7			Paper storage room	12.0 / 9.0 (5)
4.5			6 Motor room, fan room etc. including the weight of machinery	7.5 / 4.5
4.5			7 Cold storage, grain storage	15.0 / 9.0 (5)
4.5			8 Storage warehouses : light	6.0 / 4.5 (5)
			heavy	12.0 / 9.0
7.0			9 Foundries	20.0 / 12.0

Storage on 2nd floor

Observation: Proposed 5-Storied Production building

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5.2.2 Column Performance Check:

Material:

Concrete–

Compressive Strength of Concrete for R.C.C. works *f'c* =**33.0Mpa (4770 psi)**.Used Stone chips aggregate.

Reinforcing bar -

Deformed bar with min[m] Yield Strength, *fy* = **500Mpa(72500psi).**

Dead loads:

Dead load is the vertical load due to the weight of permanent structural and non-structural components of a building, e.g., walls, floors, ceilings, finishing, permanent partitions and fixed service equipment, etc. Permanent Dead Loads are:

a) Self-weight of structural members
b) Floor finish = 25PSF on typical floor and roof respectively.
c) Partition wall load is considered as per architectural drawing.

Unit weight of materials and the calculation of design dead loads shall be according to Section 2.2, Chapter 2, and Part 6 of BNBC.

Live Loads
Live load has been considered in two types

a) Live load for 1st floor to 4th floors has been considered as 84psf and 30 psf for roof.

b) Over Head Water-Tank with full of water has been considered as live load at the located places.

Wind Load:

Previously it has been described details according to BNBC with wind speed 196mph.

Compressive strength and floor load on design report

In the design report concrete compressive strength for column fc' = 33.0 Mpa (4770 psi) has been considered. But no cylinder test report was found from ground floor column. Building engineer is required to confirm the concrete strength by taking core from lower tier of column and updated the design report accordingly.

Proposed 5-Storied Production building

Observation: Proposed 5-Storied Production building

Lack of construction safety measures

Observation: Proposed 5-Storied Production building

Necessary safety measures were not observed on the roof. No barrier was provided at roof to mitigate the falling hazard. Building engineer is required to take necessary measures to provide and install construction safety barrier.

Current roof

Observation: Proposed 5-Storied Production building

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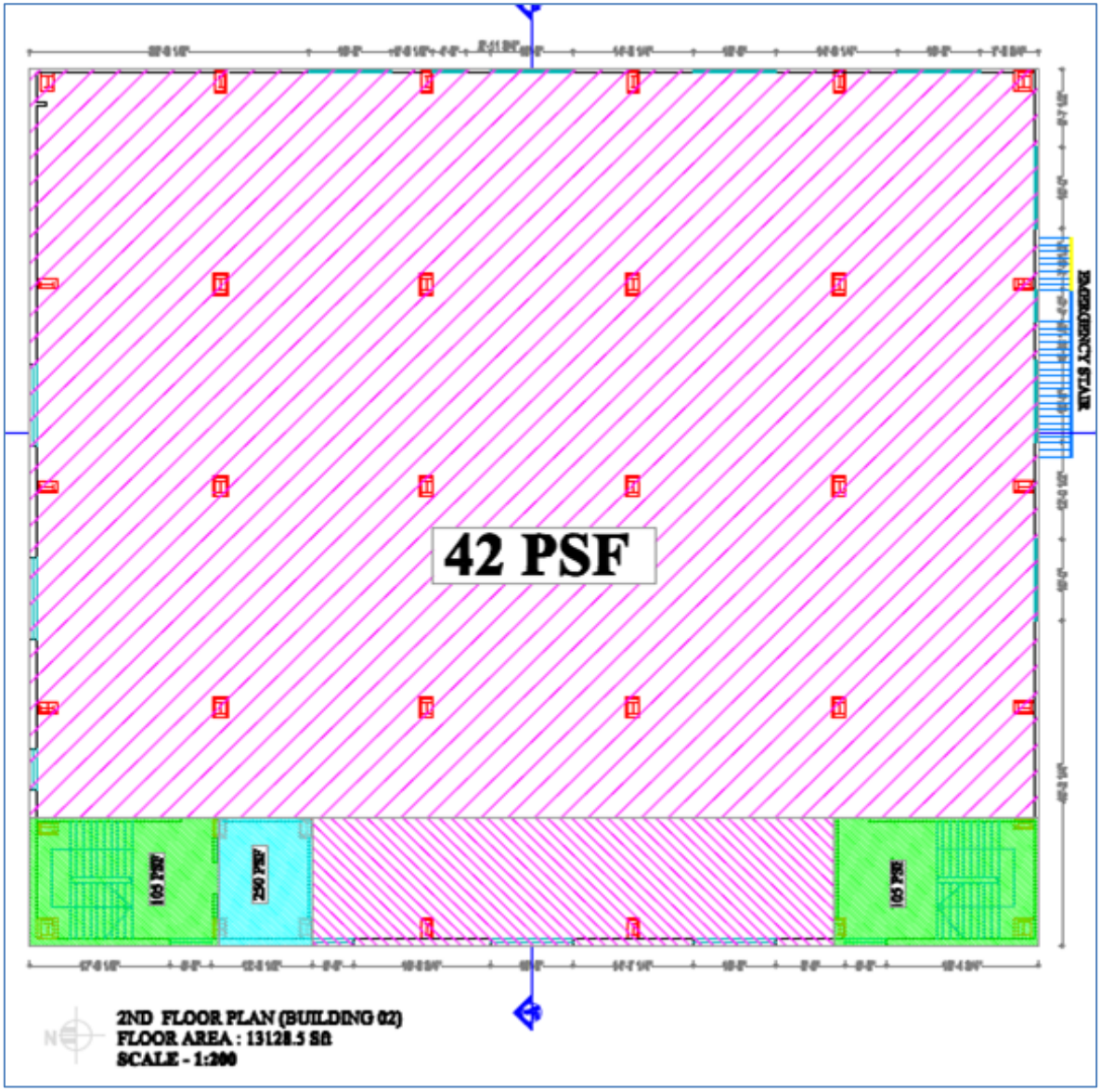
Overloading on the floor

Observation: 4-Storied Production building



Floor Load Plan

As per load plan and provided design report the building is design for 42 psf live load on typical floor. But during the inspection floor loading was found almost 84 psf in storage areas.

Building engineer is required to be revised the floor load plan considering floor slab, Column and footing capacity.

Floor loading

Observation: 4-Storied Production building

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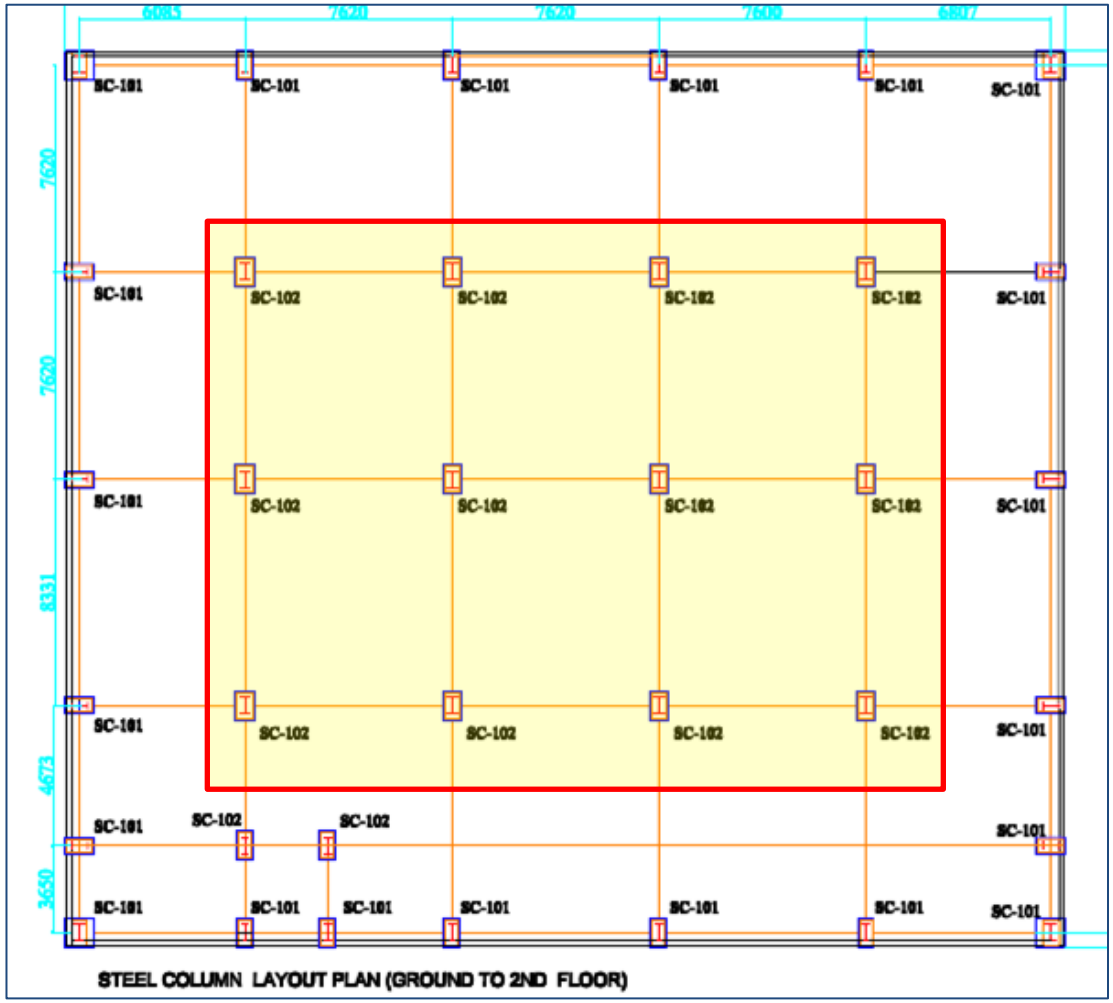
Mismatch in as built drawing

Observation: 4-Storied Production building

Column sizes are not match with the as built condition. Flange thickness of SC-102 type column was found 20 mm instead of 24 mm at GF level and 12 mm instead of 20 above 2nd floor level.



SC-101= Web-600(10), Flange-300(18)
SC-102= Web-600(16), Flange-400(24)

Steel Column Schedule From Ground Floor to 2nd Floor

SC-101= Web-600(8), Flange-300(16)
SC-102= Web-600(12), Flange-400(20)

Steel Column Schedule From 2nd Floor to Roof

Observation: 4-Storied Production building

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Design report required to be revised

Observation: 4-Storied Production building

In the design report concrete compressive strength for column fc' = 20.69 Mpa (3000 psi) has been considered. But no cylinder test report was found from pedestal column. Tensile strength of MS plate was considered 305 Mpa (44.2 Ksi) but no plate test report was found in the time of inspection. Building engineer is required to confirm the concrete strength and tensile strength of MS plate by taking core from short column and lab test of MS plate from existing sample, respectively.

5.1.6Material:
Steel and Concrete:
For Footing & Column samples:

$f_c' = 3000psi$

For Tensile Strength of Reinforcing Rebar

Yield Strength, $fy = 275Mpa$ (60000psi).

Strength of MS Plate, (1) f_s =305Mpa (44.20ksi),

Material strength in the design report

Steel beams of connection bridge are directly connected with main beam of production building. Which is not considered in the design report. Building engineer is required revised the design report considering actual size and strength of materials.

Connection Bridge

Connection with production building

Observation: 4-Storied Production building

Lack of drawings

Observation: Connection Bridge

No drawing documents were available for the connection bridge. Factory is required prepared full set of as-built drawings for the structure.

Connection Bridge

Support Condition

Observation: 4-Storied Production building

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Incomplete bracing system

Observation: 4-Storied Production building

Incomplete bracing system was found at stair zone of 4-Storied Production building. One leg was found missing in the diagonal cross bracing at stair zone.

Incomplete bracing at the stair zone

Incomplete bracing at the stair zone

Factory engineer is required to install the missing bracing where necessary.

Observation: 4-Storied Production building

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Absence of design documents

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, part-6 of BNBC. At the time of inspection, only as-built drawing and geotechnical report were available, but no design report & load plan were available which are required to be prepared in compliance with section 1.9.1.1 (part-6, BNBC).

No design report was available for Utility Building, UPS & Compressor Room

Observation : Utility Building, UPS & Compressor Room

Apparently inadequate connection

Observations: ETP Shed

Connection steel members to brick wall

Steel rafter are inserted to brick wall therefore connection of steel members to brick wall is appeared to be inadequate. Building engineer is required to check the connection adequacy for uplift forces of wind.

Observations: ETP Shed

Apparently non engineered shed

Observations: Westage Shed

Inside of wastage shed

The structure 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 carry out member adequacy & lateral stability check of the wastage shed.

Observations: Wastage Shed

Lack of as-built drawings

Observation: Ancillary Structures

Utility Building

Fire Pump Room, ETP Shed

UPS & Compressor Room

Wastage Shed

At the time of inspection, no drawing documents were available for the mentioned structures. Factory is required prepared full set of as-built drawings for all the structures.

Observation: Ancillary structures

Problems Observed

Proposed 5-Storied Production building:

Item 01: Load plan & design report not comply with BNBC requirements.

Item 02: Lack of construction safety measures.

04 Storied Production Building:

Item 03: Overloading on the floor.

Item 04: Mismatch in drawings.

Item 05: Design report required to be revised.

Item 06: Lack of drawings (Connection Bridge).

Item 07: Incomplete bracing system.

Utility Building, UPS & Compressor Room:

Item 08: Absence of design documents.

ETP Shed:

Item 09: Apparently inadequate connection.

Wastage Shed:

Item 10: Apparently non engineered shed.

Ancillary structures:

Item 11: Lack of as built drawings.

Priority Actions

Item No.	Observation	Recommended Action Plan	Recommended Timeline
01	Load plan & design report not comply with BNBC requirements. (Proposed 5-Storied Production building)	Building engineer is required to verify in-situ concrete strength by taking cores from lower tier columns.	6-weeks
02	Load plan & design report not comply with BNBC requirements. (Proposed 5-Storied Production building)	The building engineer is required to revise the storage live load and related design documents based on BNBC requirement.	6-weeks
03	Load plan & design report not comply with BNBC requirements. (Proposed 5-Storied Production building)	Revise and actively manage a set of floor loading plan following BNBC.	6-weeks
04	Load plan & design report not comply with BNBC requirements. (Proposed 5-Storied Production building)	Implement the recommendations of design report.	6-months
05	Load plan & design report not comply with BNBC requirements. (Proposed 5-Storied Production building)	Implement floor load plan.	6-months

Item No.	Observation	Recommended Action Plan	Recommended Timeline
06	Lack of construction safety measures. (Proposed 5-Storied Production building).	The factory engineer is required to take necessary measures to provide and install construction safety barrier as per BNBC Part 7.	6-weeks
07	Overloading on the floor. (4-storied Production Building).	Produce and actively manage a set of floor loading plan within the factory building considering foundation, column and floor capacity.	6-weeks
08	Overloading on the floor. (4-storied Production Building).	Implement floor load plan.	6-Months
09	Mismatch in drawings. (4-storied Production Building)	Building Engineer is to survey the whole structure and update as-built drawings representing accurate site condition.	6-weeks
10	Design report required to be revised. (4-storied Production Building).	Factory engineer is required revise the design report considering actual size and strength of concrete & steel materials.	6-weeks
11	Design report required to be revised. (4-storied Production Building).	Carry out remedial works (if any) after review by RSC.	6-Months

Item No.	Observation	Recommended Action Plan	Recommended Timeline
12	Lack of drawings. (Connection Bridge)	Building Engineer is to survey the whole structure and prepare as-built drawings representing accurate site condition.	6-weeks
13	Incomplete bracing system. (4-storied Production Building)	Install missing bracing where necessary.	6-weeks
14	Absence of design documents. (Utility Building, UPS & Compressor Room)	Factory engineer is required to prepare the design documents including a design report, and a set of structural drawings in compliance with section 1.9.1.1 and section 1.9.1.2, part-6 of BNBC and submit it to RSC for review.	6-weeks
15	Absence of design documents. (Utility Building, UPS & Compressor Room)	Carry out remedial works (if any) after review by RSC.	6-Months
16	Apparently inadequate connection. (ETP Shed)	Building engineer is required to check the connection of the steel shed for the uplift pressure of wind.	6-weeks
17	Apparently inadequate connection. (ETP Shed)	Implement remediation work where required.	6-Months

Item No.	Observation	Recommended Action Plan	Recommended Timeline
18	Apparently non-engineered Shed. (Wastage Shed)	Factory engineer is required to carry out member adequacy & lateral stability check of the wastage shed.	6-weeks
19	Apparently non-engineered Shed. (Wastage Shed)	Implement remediation work where necessary or replace the wastage shed with a properly designed structure.	6-Months
20	Lack of as built drawings. (All ancillary structures)	Building Engineer is to survey the whole structure and prepare as-built drawings representing accurate site condition.	6-weeks