Mega Denim Ltd. (Extension)

88/1, B.K Bari, Taltoli, Mirjapur, Gazipur sadar, Gazipur.
(24.121020, 90.378650)
10 September 2023

RSC RMG SUSTAINABILITY COUNCIL

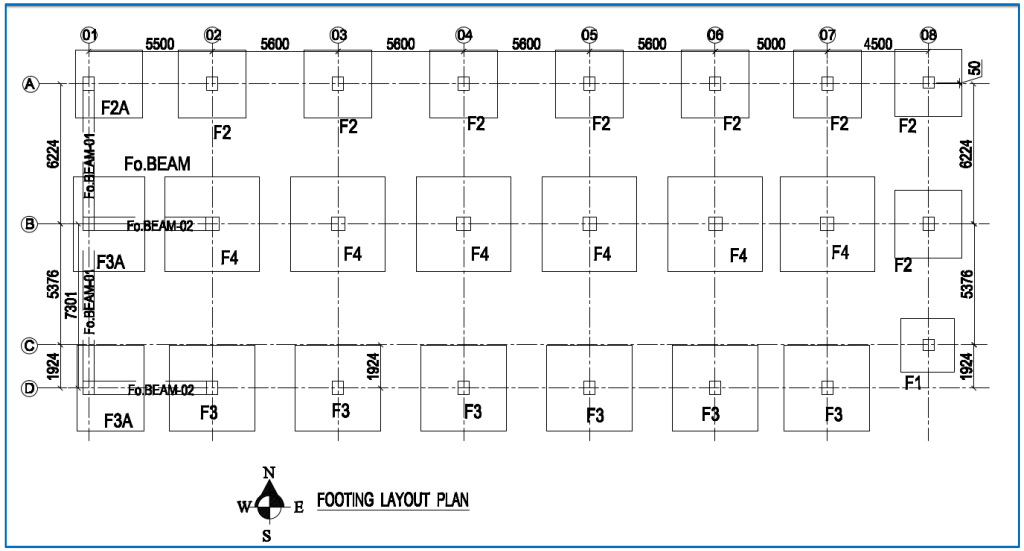
Building information:

1. Building-2: Six storied (G+5) reinforced concrete building.
2. Building-3 (Hydrant Building): Three storied (B+G+2) reinforced concrete building with a basement.

Observations

Foundation stress exceeds normal design limit

Observation: Building 2



FOOTING SCHEDULE

ID	SIZE L x B	DIMENSIONS Df	D1	D2	D	A	REINFORCEMENT ASB Bottom re-bar	ASB Top re-bar
F1	2400x2400	2100	475	100	575	400	T16mmØ@125c/c	T16mmØ@125c/c
F2	3000x3000	2100	550	125	675	500	T20mm@150c/c	T16mm@150c/c
F2A	3000x3000	2100	550	125	675	500	T20mm@150c/c	T16mm@150c/c
F3	3800x3800	2100	600	150	750	550	T20mm@125c/c	T16mm@150c/c
F4	4200x4200	2100	625	150	775	650	T20mm@100c/c	T16mm@125c/c
F3A	3800x3300	2100	600	150	750	550	T20mm@125c/c	T16mm@125c/c

L.D= Long Direction, S.D= Short Direction, B.D= Both Direction
NOT:Df IS DEPEND SOILE CONDITION
Bearing Capacity 1.30 tsf (FS 2.5)

Table No. 5A. Bearing Capacities of Shallow Foundation from field and Laboratory Tests (Values in tsf, F.S. = 2.50):

Bore Hole	Depth in ft	Field SPT	Cohesion Kg/cm²	Bearing capacity (tsf) For Raft Foundation	For circular or Square footin
BH - 1	5	6	0.38	0.88	1.19
	10	8	0.50	1.11	1.46
	15	12	0.75	1.61	2.05
	20	8	0.50	1.11	1.46
BH – 2	5	5	0.31	0.76	1.03
	10	9	0.56	1.23	1.61
	15	13	0.81	1.74	2.26
	20	8	0.50	1.11	1.46
BH - 3	5	7	0.44	0.99	1.31
	10	10	0.62	1.36	1.74
	15	12	0.75	1.61	2.05
	20	8	0.50	1.11	1.46
BH – 4	5	6	0.38	0.88	1.19
	10	8	0.50	1.11	1.46
	15	12	0.75	1.61	2.05
	20	8	0.50	1.11	1.46

Note:
SPT Correction depends on overburden pressure, Water table. F.S. = 2.50 As Bangladesh National Building Code (BNBC).

Table No. 6. Bearing Capacities of the Shallow foundation from Unconfined Compression Tests (Values in tsf, F.S. = 2.50):

Bore Hole no.	Depth Ft	Unconfined Compression Strength,psi	Allowable bearing capacityh, tsf Square Footing	Raft Foundation
BH No.-1	8.00	19.46	1.58	1.27
BH No.-3	8.00	25.30	2.06	1.65

Bearing capacity of soil

Cursory calculation indicates that bearing of internal footings exceeds the normal design limit considering ultimate Bearing Capacity of soil 3.25 tsf for 6 kPa live load on 1st floor & 3 kPa on typical floors. The building engineer to review design, loads and foundation stresses.

Observation: Building 2

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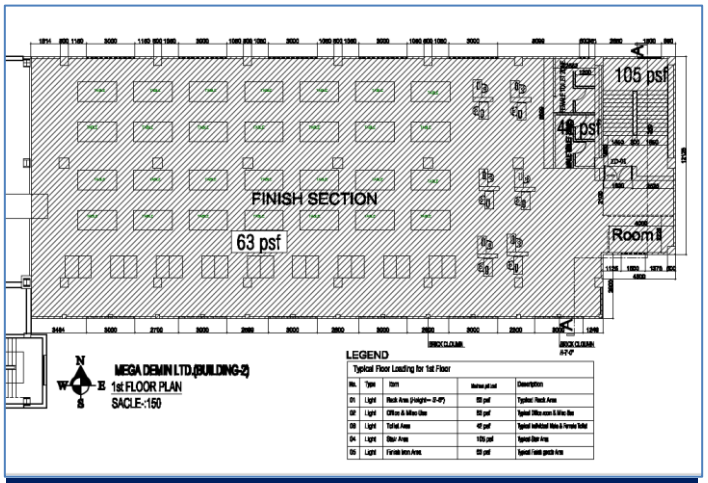
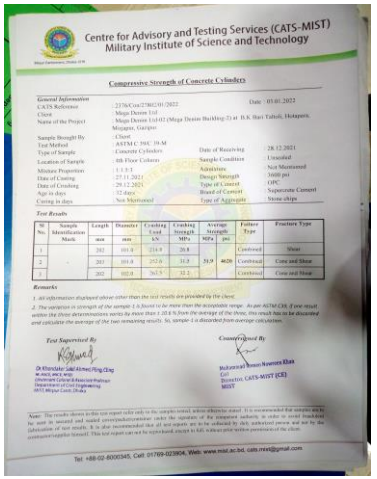
Load plan & material test not comply with BNBC requirements

Observation: Building 2

Storage on first floor



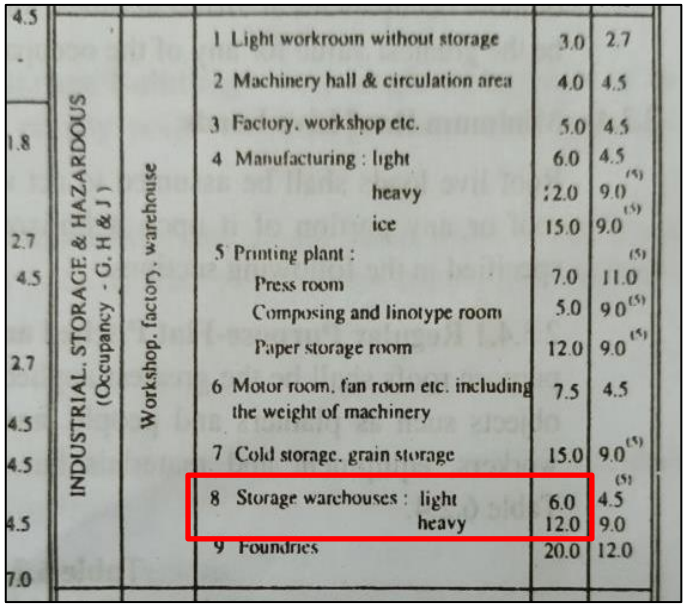
Load plan: 3 kPa live load for 1st floor



Test report

Currently, the first floor of the building is being used for finished cartoon store. As per BNBC, the minimum floor live load for light storage is 6 kN/m2 (125 psf). But the storage area of the building is designed for 3 kN/m2 live loads. Moreover, the factory has provided only 2 sets of concrete cylinder test report from column & slab, which doesn't comply the frequency of testing requirement of BNBC (section- 5.12.2).

Building engineer is required to revise the floor live load plan following BNBC storage live load requirement and revise the design documents based on in-situ material strength. Verify the in-situ material strength by taking 100 mm core from lower tier columns of the building.



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

Live load chart of BNBC

Observation: Building 2

Racks and plastic water tanks not anchored or braced

Observation: Building 2 & 3

Plastic water tank & storage racks not anchored or braced

Non-structural element including plastic water tank & storage racks not anchored or braced to resist lateral (earthquake) forces. The factory is required to anchor/brace all non-structural elements adequately to resist earthquake forces.

Observation: Building 2 & 3

Inadequate protection in the handrail of the roof parapet

Observation: Building 2

The partial hand railing of the parapet was found inadequate to protect falling hazards. Building engineer is required to provide more steel members at the handrail to avoid possible falling hazard.

Observation: Building 2

Column susceptible to vehicle impact

Observation: Building 2

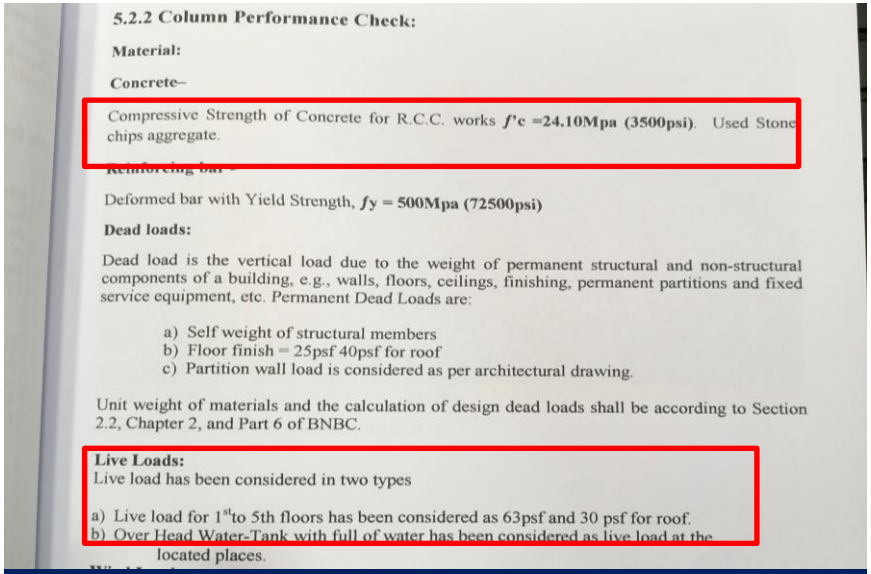
Column East-side stair

Column East-side stair is susceptive to vehicle impact. The factory is required to provide separate barrier around the column to avoid possible vehicle impact.

Observation: Building 2

Load plan & material test not comply with BNBC requirements

Observation: Building 3



5.2.2 Column Performance Check:

Material:

Concrete–

Compressive Strength of Concrete for R.C.C. works $f'c$ =24.10Mpa (3500psi). Used Stone chips aggregate.

Deformed bar with 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 40psf for roof
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 to 5th floors has been considered as 63psf and 30 psf for roof.
b) Over Head Water-Tank with full of water has been considered as live load at the located places.

Provided design report

Accessories Store on suspended floor

As per BNBC, the minimum floor live load for light storage is 6 kN/m2 (125 psf). But the storage area of the building is designed for 3 kN/m2 live loads.

Building engineer is required to revise the floor live load plan following BNBC storage live load requirement and revise the design documents based on in-situ material strength.

Verify the in-situ material strength by taking 100 mm core from lower tier columns of the building.

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
1.8			3 Factory, workshop etc.	5.0	4.5
			4 Manufacturing : light	6.0	4.5
			heavy	12.0	9.0 (5)
			ice	15.0	9.0 (5)
2.7			5 Printing plant :		(5)
4.5			Press room	7.0	11.0
			Composing and linotype room	5.0	9.0 (5)
			Paper storage room	12.0	9.0 (5)
2.7			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	(5) 4.5
			heavy	12.0	9.0
4.5			9 Foundries	20.0	12.0
7.0					

Live load chart of BNBC

Observation: Building 3

Lack or parapet wall on the existing roof

Observation: Building 3

No parapet wall was found to protect falling hazards on the existing roof. Building engineer is required to provided adequate the parapet wall to avoid possible falling hazard.

Observation: Building 3

Problems Observed

Building 2:

Item 01: Foundation stress exceeds normal design limit.
Item 02: Load plan & material test not comply with BNBC requirements.
Item 03: Racks and plastic water tanks not anchored or braced.
Item 04: Inadequate protection in the handrail of the roof parapet.
Item 05: Column susceptible to vehicle impact.

Building 3:

Item 06: Load plan & material test not comply with BNBC requirements.
Item 07: Lack or parapet wall on the existing roof.

Priority Actions

Item No.	Observation	Recommended Action Plan	Recommended Timeline
01	Foundation stress exceeds normal design limits. (Building 2)	The building engineer to review design, loads, and foundation stresses.	6-weeks
02	Foundation stress exceeds normal design limits. (Building 2)	Produce and actively manage a loading plan for all floor plates within the factory, considering floor, column and foundation capacity.	6-weeks
03	Foundation stress exceeds normal design limits. (Building 2)	Complete implementation of any remedial works.	6-months
04	Foundation stress exceeds normal design limits. (Building 2)	Continue to implement loading plan.	6-months
05	Load plan & material test not comply with BNBC requirements. (Building 2)	The building engineer is required to revise the storage live load limit and related design documents based on BNBC requirement.	6-weeks
06	Load plan & material test not comply with BNBC requirements. (Building 2)	Verify the insitu material strength by taking 100 mm core from lower tier columns.	6-weeks
07	Load plan & material test not comply with BNBC requirements. (Building 2)	Implement the recommendations of design report.	6-months

Item No.	Observation	Recommended Action Plan	Recommended Timeline
08	Load plan & material test not comply with BNBC requirements. (Building 2)	Implement floor load plan.	6-months
09	Racks and plastic water tanks not anchored or braced. (Building 2 & 3)	Building is required to adequately anchor/brace all non-structural elements to resist earthquake forces to comply with the BNBC.	6-months
10	Inadequate protection in the handrail of the roof parapet. (Building 2)	Building engineer is required to provide more steel members at the handrail to avoid possible falling hazard.	6-weeks
11	Column susceptible to vehicle impact. (Building 2)	The factory is required to provide separate barrier around the column to avoid possible vehicle impact.	6-months
12	Load plan & material test not comply with BNBC requirements. (Building 3)	The building engineer is required to revise the storage live load limit and related design documents based on BNBC requirement.	6-weeks
13	Load plan & material test not comply with BNBC requirements. (Building 3)	Verify the insitu material strength by taking 100 mm core from lower tier columns.	6-weeks
14	Load plan & material test not comply with BNBC requirements. (Building 3)	Implement the recommendations of design report.	6-months

Item No.	Observation	Recommended Action Plan	Recommended Timeline
15	Load plan & material test not comply with BNBC requirements. (Building 3)	Implement floor load plan.	6-months
16	Lack or parapet wall on the existing roof. (Building 3)	Implement the remedial works where necessary.	6-weeks