GMS Trims Ltd.

Sardaganj, Kashimpur, Gazipur-1346,Bangladesh
(23.96674, 90.29609)
25th October 2021

RSC RMG SUSTAINABILITY COUNCIL

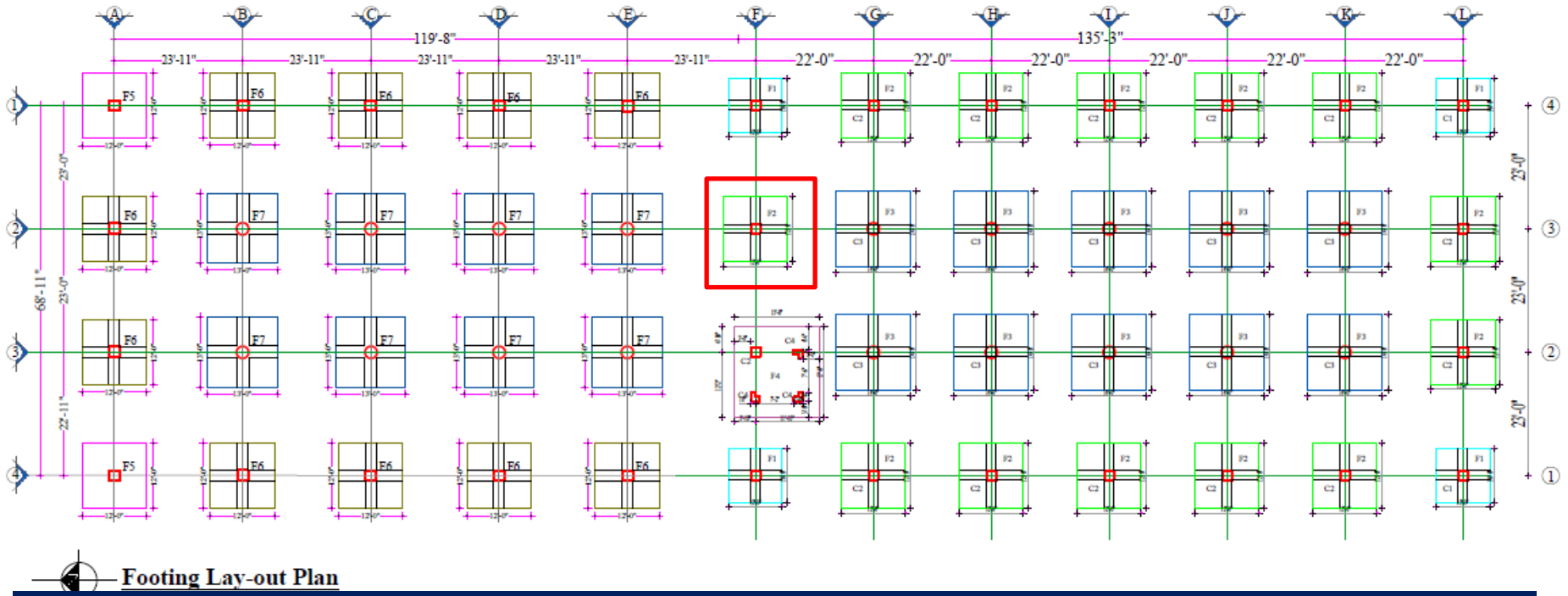
Buildings Information

1. Building-1 (GMS Trims Building) (G+6)
2. Building 2 (Poly Building) (G+5)
3. Shed-1 (Trims Worker Dinning and Office) (Single storied)
4. Shed-2 (Jacquard Elastic section and Bonded warehouse) (Single storied)
5. Shed-3 (Poly Dana Shed) (Single storied)
6. Shed-4 (Poly Recycle Shed) (Single storied)

Observations

Footings are stressed above normal design limit

Observations: Building 1



Footing layout plan

The cursory calculation indicates that footings are stressed above the normal design limit for both punching and bearing considering the soil bearing capacity recommended in the geotechnical investigation reports. Building engineer is required to review the foundation stresses of the area identified above.

This building constructed in 2 phases. 1st phase construction of this building started in January 2013 & completed in March 2015 and 2nd phase construction started January 2017 and completed in June 2019. Building engineer also required to verify in situ concrete strength of the lower tier structural member as all the core test performed from the six floor.

Observations Building 1

6.0 BEARING CAPACITY & SKIN FRICTION :

6.1 BEARING CAPACITY

The allowable bearing capacities in TSF of sub-soil for square footing for shallow foundation have been calculated with F.S.3 and is shown in Table -1 below :

TABLE -1
ALLOWABLE BEARING CAPACITIES IN TSF WITH F.S.3

Bore Hole No.	Depth in (ft)	SPT Value	Allowable bearing capacity Sq. Footing
BH-1	5	4	0.88
	10	8	1.76
	15	13	2.86
	20	15	3.30
BH-2	5	5	1.10
	10	9	1.98
	15	10	2.20
	20	14	3.08
BH-3	5	3	0.66
	10	9	1.98
	15	12	2.64
	20	14	3.08
BH-4	5	5	1.10
	10	7	1.54
	15	9	1.98
	20	12	2.64
BH-5	5	3	0.66
	10	8	1.76
	15	11	2.42
	20	15	3.30
BH-6	5	8	1.76
	10	9	1.98
	15	8	1.76
	20	16	3.52
BH-7	5	3	0.66
	10	9	1.98
	15	12	2.64
	20	13	2.86
BH-8	5	5	1.10
	10	5	1.10
	15	10	2.20
	20	14	3.08
BH-9	5	6	1.32
	10	8	1.76
	15	10	2.20
	20	13	2.86

Bearing capacity of soil recommended 1.1 ~1.98 tsf (FS 3) for shallow foundation. Depth of foundation 10’ (3.05 m) from EGL. Geotechnical Investigation report prepared by Delta Soil Engineers

Additional super imposed loading. 350 mm toilet buildup and 120 mm false slab

Observations Building 1

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Footing Bearing Capacity Table. WSD

Footing F1								
Story	Joint Label	Load Combo	FZ Kip	Q ksf	Area Req. Sft	Area Prov. Sft	Ratio%	Comp.
Base	22	COMB1	623.97	4.92	126.82	248	51.14	OK
Base	23	COMB1	561.54	4.92	114.13	248	46.02	OK
Base	36	COMB1	325.90	4.92	66.24	248	26.71	OK
Base	37	COMB1	569.26	4.92	115.70	248	46.65	OK

F2								
Story	Joint Label	Load Combo	FZ	Q ksf	Area Req. Sft	Area Prov. Sft	Ratio%	Comp.
Base	25	COMB1	818.89	4.92	166.44	315	52.84	OK
Base	38	COMB1	576.09	4.92	117.09	315	37.17	OK
Base	39	COMB1	488.20	4.92	99.23	315	31.50	OK
Base	40	COMB1	484.70	4.92	98.52	315	31.27	OK
Base	41	COMB1	485.12	4.92	98.60	315	31.30	OK
Base	42	COMB1	497.32	4.92	101.08	315	32.09	OK
Base	43	COMB1	741.31	4.92	150.67	315	47.83	OK
Base	44	COMB1	519.37	4.92	105.56	315	33.51	OK

Bearing capacity and the footing area considered at 15’ depth and after soil improvement but record of soil improvement not provided.

2.4.4 FOUNDATION COMPLIANCE STUDY

MATERIAL STUDY:

f'c =5322 psi (Reference from core test report)
fy =72000 psi (Reference from Rebar chalan copy)

Foundation level-10 ft.
Sylhet sand compaction-5ft
So, we consider the bearing capacity at 15 ft. level & load transfer angle through sand is 30°
So the effective area to transfer the load at 15 ft level is for,

F1-15.75'x15.75'
F2-17.75'x17.75'
F3-19.75'x19.75'
F4-22.75x21.42'
F5-16.75'x16.75'
F6-17.75'x17.75'
F7-18.75'x18.75'

The Foundation is an RCC Footing system, footing bearing capacity is taken from soil test report table no-1 for trims existing building, table no-1 for trims extension building.
15' bellow from EGL

Trims existing building
BH-1=2.32
BH-2=2.61
BH-3=2.46

Avg.=2.46 Tsf (F.S=3.0)

4.92 ksf for F.S=3.0.

Trims extension building
BH-1=2.86
BH-2=2.20
BH-3=2.64
BH-4=1.98
BH-5=2.42
BH-6=1.76
BH-7=2.64
BH-8=2.20
BH-9=2.20

Avg.=2.32 Tsf (F.S=3.0)

4.64 ksf for F.S=3.0.

FOOTING SCHEDULE:

TYPE	SIZE L X B	DEPTH T	BAR SCHEDULE
F1	10' - 0" X 10' - 0"	24"	20 mm @ 5" c./c. bothway
F2	12' - 0" X 12' - 0"	26"	20 mm @ 4.5" c./c. bothway
F3	14' - 0" X 14' - 0"	28"	20 mm @ 4" c./c. bothway
F4	15' - 8" X 17' - 0"	24"	20 mm @ 5" c./c. bothway

FOOTING SCHEDULE:

TYPE	SIZE	DEPTH			BAR SCHEDULE
	L X B	T1	T2	T	
F5	11'-0" X 11'-0"	15"	9"	24"	12 mm @ 5" c./c. top. 20 mm @ 5" c./c. bott.
F6	12'-0" X 12'-0"	14"	8"	22"	12 mm @ 5" c./c. top. 20 mm @ 5" c./c. bothway
F7	13'-0" X 1 3'-0"	15"	9"	24"	12 mm @ 5" c./c. top. 20 mm @ 5" c./c. bothway

Footing schedule as per drawing

Observations Building 1

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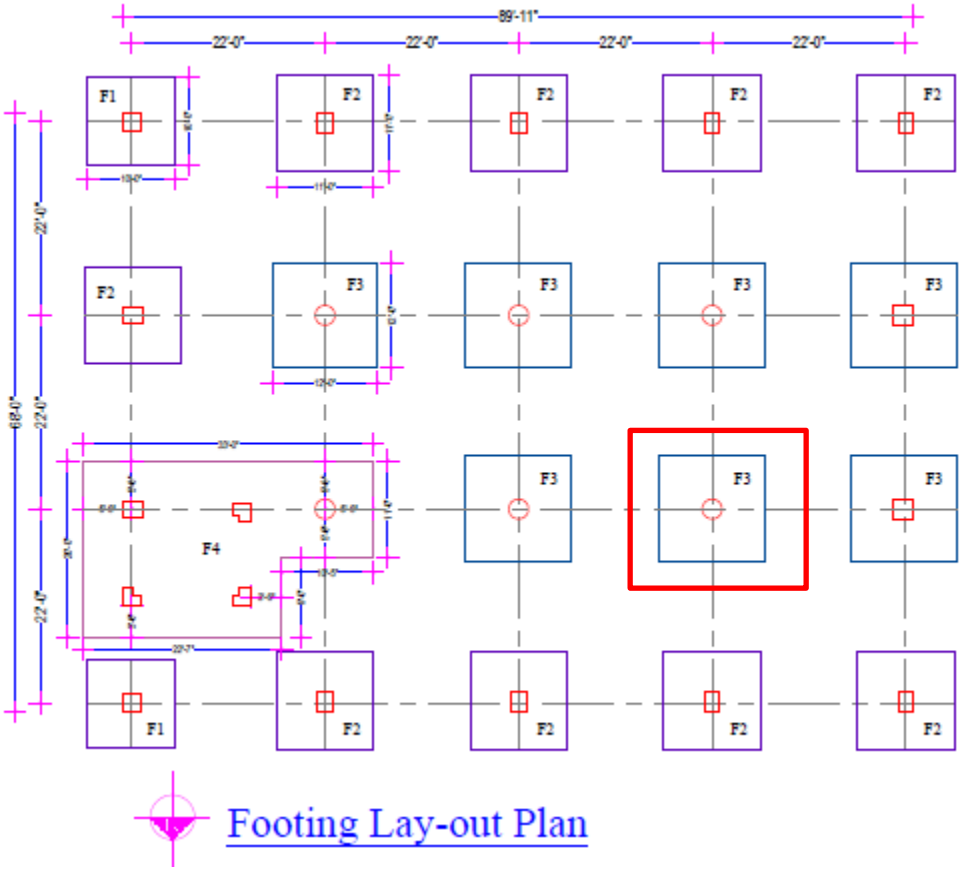
Footings are stressed above normal design limit considering full construction

Observations: Building 2



Footing layout plan

The cursory calculation indicates that footings are stressed above the normal design limit for punching shear force considering the equivalent concrete strength from the core test data. Building engineer is required to review the foundation stresses of the area identified above before commencing further construction works.

Observations Building 2

Footing Bearing Capacity Table. USD

Footing F1 Punching										
Story	Joint Label	Load Combo	FZ Kip	Column Size		T in	Punch Load	Punch Capacity	Ratio%	Comp.
Base	1	COMB2	540.609	27	27	22	472.41	1038.18	45.50	OK
Base	2	COMB2	560.321	27	27	22	492.13	1038.18	47.40	OK

Footing F2 Punching										
Story	Joint Label	Load Combo	FZ Kip	Column Size		T in	Punch Load	Punch Capacity	Ratio%	Comp.
BASE	3	COMB 2	830.515	30	24	20	768.03	905.65	84.80	OK
BASE	4	COMB 2	835.744	30	24	20	773.26	905.65	85.38	OK
BASE	5	COMB 2	828.737	30	24	20	766.25	905.65	84.61	OK
BASE	6	COMB 2	624.168	30	24	20	561.68	905.65	62.02	OK
BASE	7	COMB 2	796.61	30	24	20	734.12	905.65	81.06	OK
BASE	8	COMB 2	982.599	30	24	20	920.11	905.65	101.60	OK
BASE	9	COMB 2	861.735	30	24	20	799.25	905.65	88.25	OK
BASE	10	COMB 2	1160.491	30	24	20	1098.00	905.65	121.24	NC
BASE	11	COMB 2	896.951	30	24	20	834.46	905.65	92.14	OK

Footing F3 Punching										
Story	Joint Label	Load Combo	FZ Kip	Column Size		T in	Punch Load	Punch Capacity	Ratio%	Comp.
BASE	12	COMB 2	1146.812	30	30	22	1070.01	1102.20	97.08	OK
BASE	13	COMB 2	1164.016	30	30	22	1087.21	1102.20	98.64	OK
BASE	14	COMB 2	1160.332	30	30	22	1083.53	1102.20	98.31	OK
BASE	16	COMB 2	1177.664	30	30	22	1100.86	1102.20	99.88	OK
BASE	17	COMB 2	1424.841	30	30	22	1348.04	1102.20	122.30	NC
BASE	18	COMB 2	969.94	30	30	22	893.14	1102.20	81.03	OK
BASE	19	COMB 2	1252.845	30	30	22	1176.04	1102.20	106.70	~OK

As per design report some of the footings are overstressed due to punching shear.

Additional super imposed loading. 300 mm toilet buildup.

Observations: Building 2

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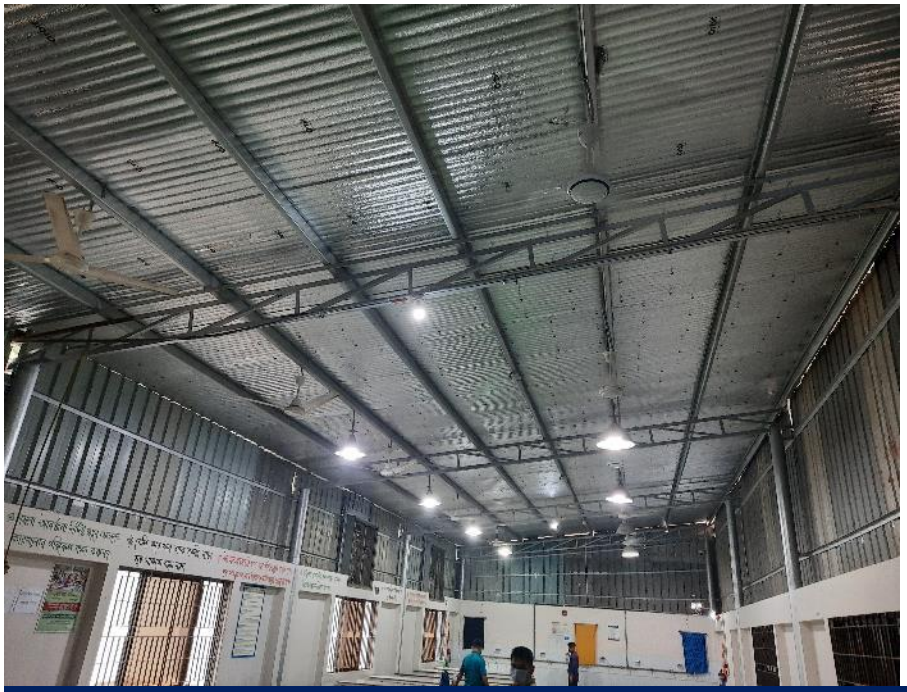
Apparently lack of lateral stability system

Observations: Shed 1, 2 & 4



Apparently lack of lateral load resisting system observed in shed 1. Truss action in the short direction no compression strut and bracing observed in the long direction. Building engineer is required to check the lateral stability of the shed.

Observations Shed 1

Apparently lack of lateral load resisting system observed in shed 2. Apparently inadequate member, no compression strut, bracing observed in the long direction & poor connection found. Building engineer is required to check the lateral stability of the shed.

Observations Shed 2

Apparently lack of lateral load resisting system observed in shed 1. Only frame action in short direction. No compression strut and bracing observed in the long direction. Building engineer is required to check the lateral stability of the shed.

Observations Shed 4

Problems Observed

Building 1

1: Footings are stressed above normal design limit.

Building 2

2: Footings are stressed above normal design limit considering full construction.

Shed 1, 2 & 4

3: Apparently lack of lateral stability system.

Priority Actions

Item No.	Observation	Recommended Action Plan	Recommended Timeline
01	Footings are stressed above normal design limit. (Building 1)	Building engineer is required to review the foundation stresses of the area identified above.	6-weeks
02	Footings are stressed above normal design limit. (Building 1)	Verify in-situ concrete strength by taking 100 mm diameter concrete core min 4 nos from the lower tier column.	6-weeks
03	Footings are stressed above normal design limit. (Building 1)	Building Engineer to prepare design report as per BNBC (part 6; Article 1.9.1) by reviewing design, loads, capacity of structural members & serviceability issues.	6-weeks
04	Footings are stressed above normal design limit. (Building 1)	Produce and actively manage a loading plan for all floor plates within the factory considering floor, column and foundation capacity.	6-weeks

Item No.	Observation	Recommended Action Plan	Recommended Timeline
05	Footings are stressed above normal design limit. (Building 1)	Carryout remedial works where required.	6-months
06	Footings are stressed above normal design limit. (Building 1)	Continue to implement loading plan.	6-months
07	Footings are stressed above normal design limit considering full construction. (Building 2)	Before commencing any further construction, building engineer is required to review the design of foundation.	Immediate - Now
08	Footings are stressed above normal design limit considering full construction. (Building 2)	Building engineer is required to review the foundation stresses of the area identified above.	6-weeks
09	Footings are stressed above normal design limit considering full construction. (Building 2)	Building Engineer to prepare design report as per BNBC (part 6; Article 1.9.1) by reviewing design, loads, capacity of structural members & serviceability issues.	6-weeks

Item No.	Observation	Recommended Action Plan	Recommended Timeline
10	Footings are stressed above normal design limit considering full construction. (Building 2)	Produce and actively manage a loading plan for all floor plates within the factory considering floor, column and foundation capacity.	6-weeks
11	Footings are stressed above normal design limit considering full construction. (Building 2)	Carryout remedial works where required.	6-months
12	Footings are stressed above normal design limit considering full construction. (Building 2)	Continue to implement loading plan.	6-months
13	Apparently lack of lateral stability system. (Shed 1)	Building engineer is required to check the lateral stability of the structure and suggest proper remedial actions accordingly.	6-weeks
14	Apparently lack of lateral stability system. (Shed 1).	Carryout remedial works where required	6-months

Item No.	Observation	Recommended Action Plan	Recommended Timeline
15	Apparently lack of lateral stability system. (Shed 2)	Building engineer is required to check the lateral stability of the structure and suggest proper remedial actions accordingly.	6-weeks
16	Apparently lack of lateral stability system. (Shed 2).	Carryout remedial works where required	6-months
17	Apparently lack of lateral stability system. (Shed 4)	Building engineer is required to check the lateral stability of the structure and suggest proper remedial actions accordingly.	6-weeks
18	Apparently lack of lateral stability system. (Shed 4).	Carryout remedial works where required	6-months