

Russel Apparels & Ekram Sweater Ltd (New Building)

Kathali, Bhaluka-2240, Mymensingh , Bangladesh
(24.380511, 90.377977)
14th November 2021

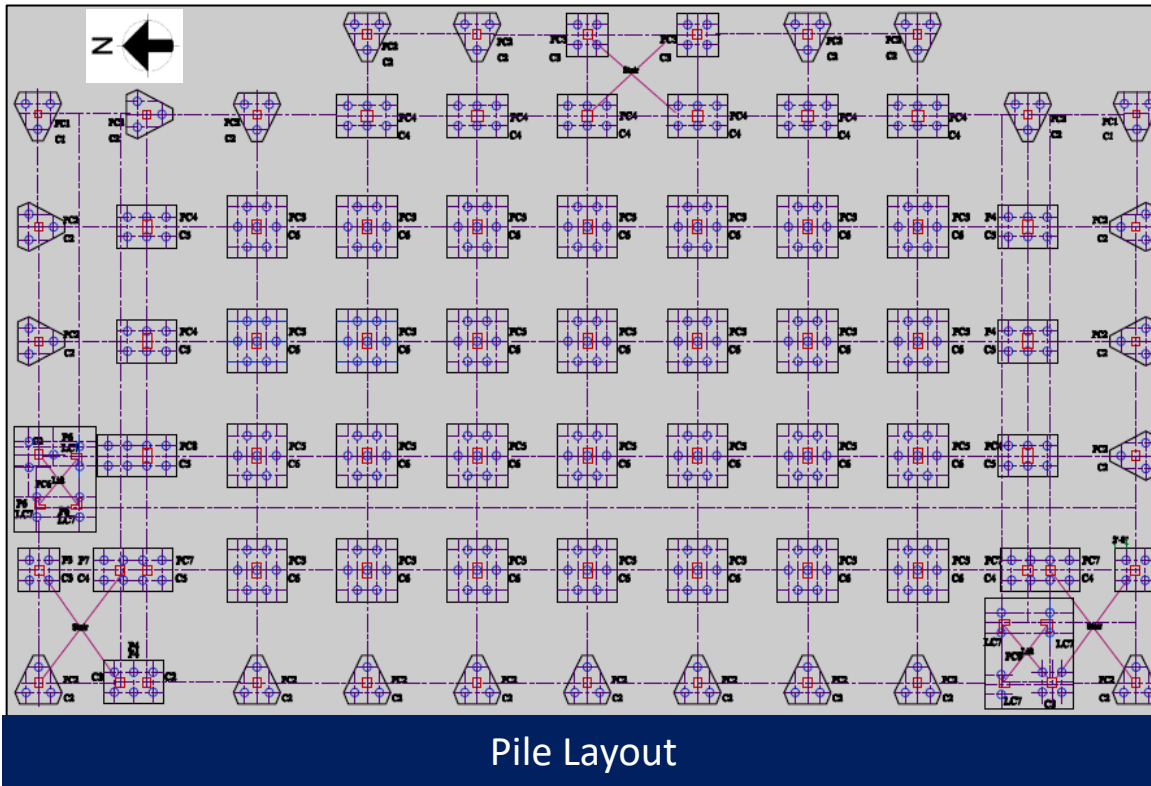


Buildings Information

1. Factory Building-2 (G+6)
2. Dining Building (G+5)
3. Utility Building (G+1)

Observations

Foundation stressed above normal design limit



Bearing Capacities of pile from the SPT & Soil Parameters.
Table No:-5 The Allowable skin friction & the point bearing capacities of driven pile foundation (Values in TSF) F.S.=2.5.

Depth (ft.)	BH-1				BH-2				BH-3			
	N	C	f_{sa}	q_{pa}	N	C	f_{sa}	q_{pa}	N	C	f_{sa}	q_{pa}
5	1	1	0.006	-	1	1	0.006	-	1	1	0.006	-
10	2	2	0.012	-	2	2	0.012	-	2	2	0.012	-
15	8	8	0.048	-	9	9	0.054	-	9	9	0.054	-
20	9	9	0.054	-	9	9	0.054	-	9	9	0.054	-
25	7	7	0.042	-	10	10	0.060	12.00	8	8	0.048	-
30	8	8	0.048	-	11	11	0.066	13.20	13	13	0.078	15.60
35	10	10	0.060	12.00	13	13	0.078	15.60	14	14	0.084	16.80
40	13	13	0.078	15.60	16	16	0.096	19.20	16	16	0.096	19.20
45	15	15	0.090	18.00	18	18	0.096	19.20	17	17	0.096	19.20
50	17	16	0.096	19.20	20	17	0.102	20.40	18	16	0.096	19.20
55	17	16	0.096	19.20	18	16	0.096	19.20	19	17	0.102	20.40
60	18	16	0.096	19.20	16	15	0.090	18.00	20	17	0.102	20.40
65	20	17	0.102	20.40	19	17	0.102	20.40	20	17	0.102	20.40
70	22	18	0.108	21.60	21	18	0.108	21.60	23	19	0.114	22.80
70	22	18	0.108	21.60	21	18	0.108	21.60	23	19	0.114	22.80

Depth (ft.)	BH-4				BH-5				BH-6			
	N	C	f_{sa}	q_{pa}	N	C	f_{sa}	q_{pa}	N	C	f_{sa}	q_{pa}
5	1	1	0.006	-	1	1	0.006	-	2	2	0.012	-
10	1	1	0.006	-	2	2	0.012	-	5	5	0.030	-
15	8	8	0.048	-	8	8	0.048	-	8	8	0.048	-
20	9	9	0.054	-	8	8	0.048	-	10	10	0.060	-
25	7	7	0.042	-	9	9	0.054	-	8	8	0.048	-
30	8	8	0.048	-	7	7	0.042	-	11	11	0.066	13.20
35	9	9	0.054	-	15	15	0.090	18.00	13	13	0.078	15.60
40	8	8	0.048	-	14	14	0.084	16.80	14	14	0.084	16.80
45	9	9	0.054	-	13	13	0.078	15.60	15	15	0.090	18.00
50	18	16	0.096	19.20	14	14	0.084	16.80	21	18	0.108	21.60
55	21	18	0.108	21.60	17	16	0.096	19.20	20	17	0.102	20.40
60	20	17	0.102	20.40	18	16	0.096	19.20	21	18	0.108	21.60
65	22	18	0.108	21.60	23	19	0.114	22.80	24	19	0.114	22.80
70	24	19	0.114	22.80	25	20	0.120	24.00	24	19	0.114	22.80

Depth (ft.)	BH-7				BH-8				BH-9			
	N	C	f_{sa}	q_{pa}	N	C	f_{sa}	q_{pa}	N	C	f_{sa}	q_{pa}
5	1	1	0.006	-	2	2	0.012	-	1	1	0.006	-
10	2	2	0.012	-	2	2	0.012	-	2	2	0.012	-
15	9	9	0.054	-	8	8	0.048	-	8	8	0.048	-
20	9	9	0.054	-	9	9	0.054	-	8	8	0.048	-
25	9	9	0.054	-	10	10	0.060	-	9	9	0.054	-
30	10	10	0.060	12.00	10	10	0.060	12.00	9	9	0.054	-
35	14	14	0.084	16.80	13	13	0.078	15.60	10	10	0.060	12.00
40	14	14	0.084	16.80	15	15	0.090	18.00	12	12	0.072	14.40
45	15	15	0.090	18.00	14	14	0.084	16.80	12	12	0.072	14.40
50	18	16	0.096	19.20	16	15	0.090	18.00	15	15	0.090	18.00
55	20	17	0.102	20.40	18	16	0.096	19.20	16	15	0.090	18.00
60	22	18	0.108	21.60	20	17	0.102	20.40	18	16	0.096	19.20
65	23	19	0.114	22.80	20	17	0.102	20.40	20	17	0.102	20.40
70	23	19	0.114	22.80	21	18	0.108	21.60	20	17	0.102	20.40

Depth (ft.)	BH-10				BH-11				BH-12			
	N	C	f_{sa}	q_{pa}	N	C	f_{sa}	q_{pa}	N	C	f_{sa}	q_{pa}
5	2	2	0.012	-	2	2	0.012	-	2	2	0.012	-
10	2	2	0.012	-	3	3	0.018	-	2	2	0.012	-
15	9	9	0.054	-	9	9	0.054	-	8	8	0.048	-
20	8	8	0.048	-	9	9	0.054	-	9	9	0.054	-
25	9	9	0.054	-	8	8	0.048	-	9	9	0.054	-
30	10	10	0.060	12.00	9	9	0.054	-	10	10	0.060	12.00
35	10	10	0.060	12.00	10	10	0.060	12.00	11	11	0.066	13.20
40	12	12	0.072	14.40	11	11	0.066	13.20	12	12	0.072	14.40
45	13	13	0.078	15.60	11	11	0.066	13.20	12	12	0.072	14.40
50	13	13	0.078	15.60	12	12	0.072	14.40	15	15	0.090	18.00
55	17	16	0.096	19.20	15	15	0.090	18.00	15	15	0.090	18.00
60	20	17	0.102	20.40	18	16	0.096	19.20	19	17	0.102	20.40
65	21	18	0.108	21.60	20	17	0.102	20.40	21	18	0.108	21.60
70	23	19	0.114	22.80	21	18	0.108	21.60	23	19	0.114	22.80

Note:
i. N = Field SPT values ii. C=Cohesion
iii. q_{pa} = Allowable point bearing capacity for pile foundation with F.S. = 2.5
iv. f_{sa} = Allowable skin friction with F.S. = 2.5
v. The above bearing capacities should be two third in case of RCC cast-in-situ pile
vii 1 Kg/cm² = 1 tsf and 1 ton = 2000 Lbs.

Cursory calculation indicates that bearing capacity of pile exceeds the normal design limit, considering 3 kPa live load on typical floors. Allowable capacity of pile has been considered 30 ton (FoS=2.5) at 15.25m depth from table of provided soil test report. Factory Engineer to review design, loads and foundation stresses.

Data from provided soil test report

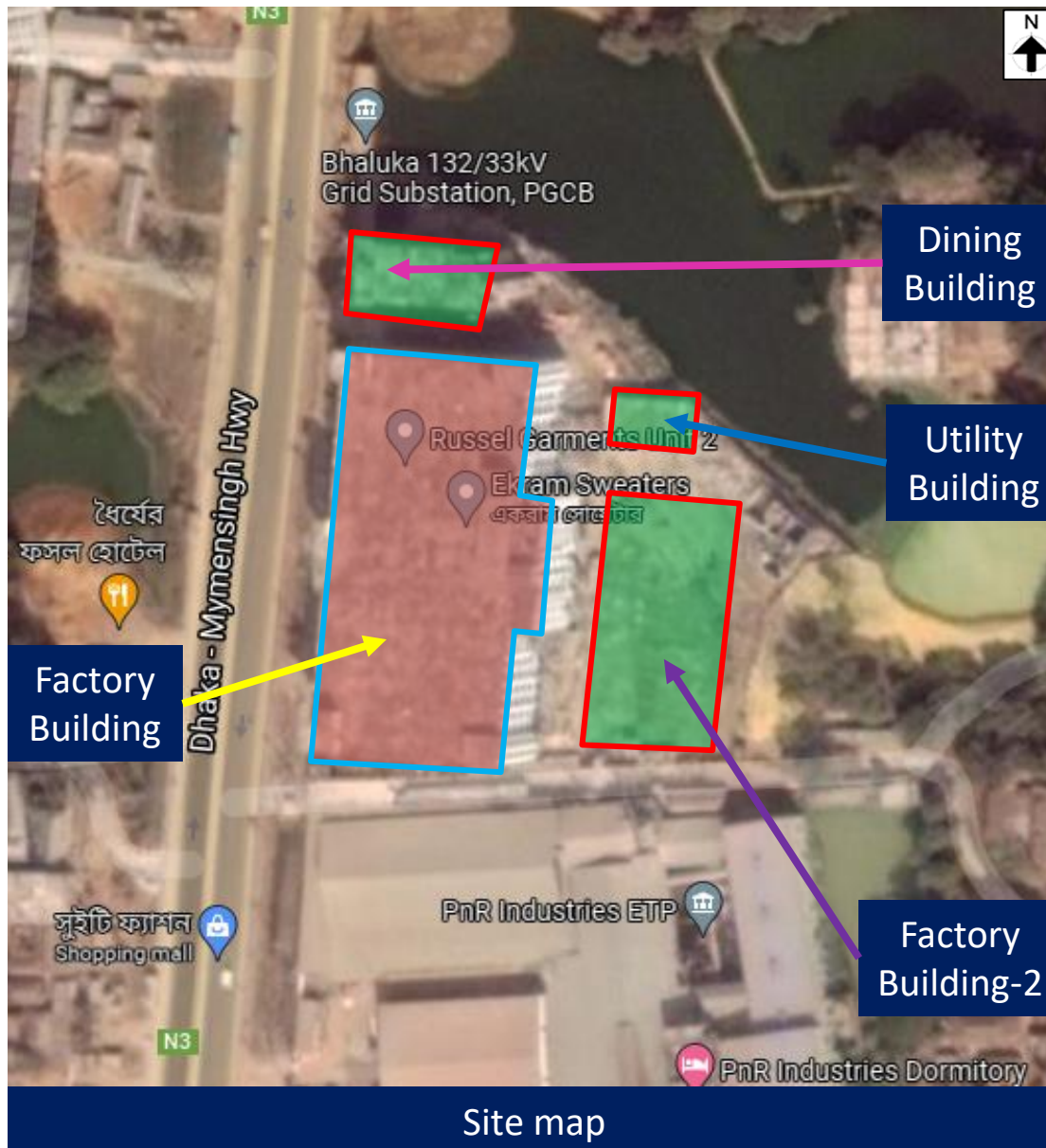
Water ponding on roof

Water Ponding on roof



Factory is required to develop proper drainage system on roof with adequate slope or apply water proofing compound on roof slab to resist water ingress.

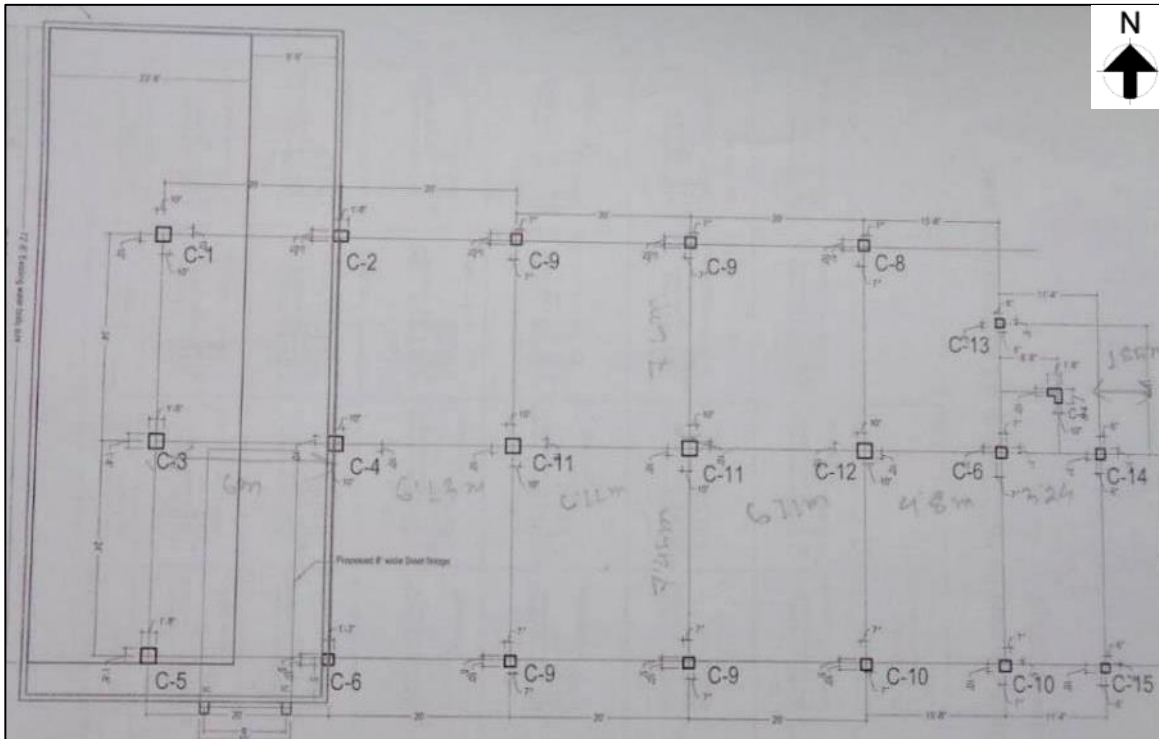
No geotechnical investigation report



No geotechnical investigation report was found for the Dining Building and Utility Building. The factory management stated that, the geotechnical evaluation was done for the mentioned buildings based on the previous geotechnical investigation report that was produced for the Factory Building & Factory Building-2. But no bore hole sample for Dining Building and Utility Building has been taken in the previous geotechnical investigation report. Thus, new geotechnical investigation report for the mentioned buildings is required to confirm the adequacy of foundation.

Observations: Dining Building & Utility Building

Column stressed above normal design limit



Column layout plan

Cursory calculation indicates that columns are stressed above normal design limit considering 3 kPa live load and minimum concrete strength (16.34 MPa) based on aggregate type. Factory engineer is required to review design, load & column stresses of the building.



1st to 3rd floor loading



4th floor loading



5th floor loading



Roof loading

Structural design report not available



No design reports was available for Utility Building

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 as per BNBC. At the time of inspection, no design report was available which is required to be prepared in compliance with section 1.9.1.1 (part-6, BNBC).

Observations: Utility Building

Water ponding on roof

Water Ponding on roof

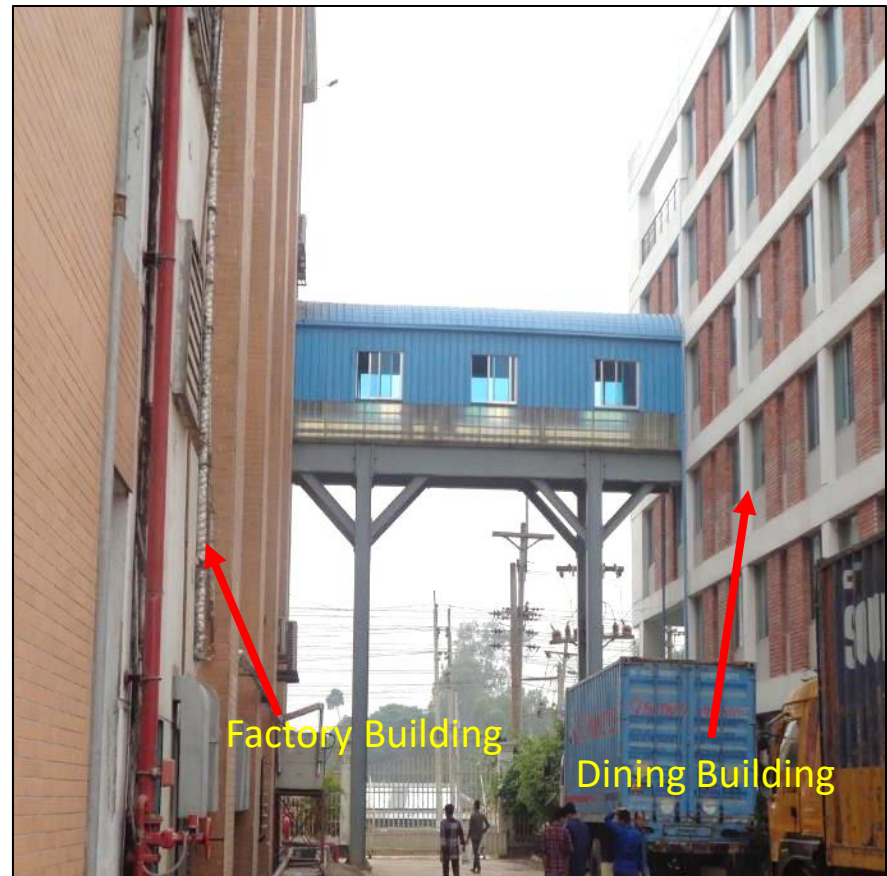


Factory is required to develop proper drainage system on roof with adequate slope and apply water proofing compound on roof slab to resist water ingress.

Undocumented connecting bridges



Connecting bridge between
Factory Building & Factory Building-2



Connecting bridge between
Factory Building & Dining Building

Building engineer is required to produce as-built drawing, check member adequacy for both connecting bridges and recommend remedial measures accordingly.

Observations: Connecting Bridges

Problems Observed

Factory Building-2

Item 1: Foundation stressed above normal design limits.

Item 2: Water ponding on roof.

Dining Building and Utility Building

Item 3: No geotechnical investigation report.

Dining Building

Item 4: Columns stressed above normal design limit.

Utility Building

Item 5: Structural design report not available.

Item 6: Water ponding on roof.

Link Bridges:

Item 7: Undocumented connecting bridges.

Priority Actions

Item No.	Observation	Recommended Action Plan	Recommended Timeline
01	Foundation stressed above normal design limits. [Factory Building-2]	Factory Engineer to review design, loads, footings stresses and prepare the design documents including a design report & a set of structural drawings in compliance with section 1.9.1.1 and section 1.9.1.2 as per BNBC part 6 and submit to RSC for review.	6-weeks
02	Foundation stressed above normal design limits. [Factory 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 stressed above normal design limits. [Factory Building-2]	Complete implementation of any remedial works.	6-months
04	Foundation stressed above normal design limits. [Factory Building-2]	Continue to implement loading plan.	6-months
05	Water ponding on roof. [Factory Building-2]	Factory engineer is required to develop proper drainage system on roof with adequate slope or apply water proofing compound on roof slab to resist water ingress.	6-weeks
06	No geotechnical investigation report. [Dining Building and Utility Building]	Carryout geotechnical investigation to confirm the ground bearing capacity.	6-weeks

Item No.	Observation	Recommended Action Plan	Recommended Timeline
07	No geotechnical investigation report. [Dining Building and Utility Building]	Check the foundation adequacy and include in the design report.	6-weeks
08	No geotechnical investigation report. [Dining Building and Utility Building]	Carry out remedial works if necessary.	6-months
09	Columns stressed above normal design limit. [Dining Building]	Factory Engineer to review design, loads and columns stresses.	6-weeks
10	Columns stressed above normal design limit. [Dining Building]	Verify in situ concrete stresses either by 100mm dia. Cores(Min.4 nos.) or existing cylinder strength data.	6-weeks
11	Columns stressed above normal design limit. [Dining Building]	Produce and actively manage a loading plan for all floor plates within the factory considering floor capacity and column capacity..	6-weeks
12	Columns stressed above normal design limit. [Dining Building]	Carry out remedial works if necessary.	6-months
13	Columns stressed above normal design limit. [Dining Building]	Continue to implement loading plan.	6-months

Item No.	Observation	Recommended Action Plan	Recommended Timeline
14	Structural design report not available. [Utility Building]	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 as per BNBC part 6 and submit to RSC for review.	6-weeks
15	Structural design report not available. [Utility Building]	Complete remedial works arise from design report.	6-months
16	Water ponding on roof. [Utility Building]	Factory engineer is required to develop proper drainage system on roof with adequate slope and apply water proofing compound on roof slab to resist water ingress.	6-weeks
17	Undocumented connecting bridges.	The factory engineer to produce as-built drawing with necessary structural details.	6-weeks
18	Undocumented connecting bridges.	Carry out adequacy check for both the connecting bridges.	6-weeks
19	Undocumented connecting bridges.	Implement necessary remedial actions.	6-months