

Designer Washing & Dyeing Limited

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(23.98009111868, 90.2249641319)

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1. Building Information

- The Washing Building is a currently two-storied (G+M+1) reinforced concrete (RC) building with a mezzanine floor.
- ETP is a single storied RC building.
- WTP is a single storied RC building

2. Observations

Observation-1: Inconsistencies in design report. (Washing building).

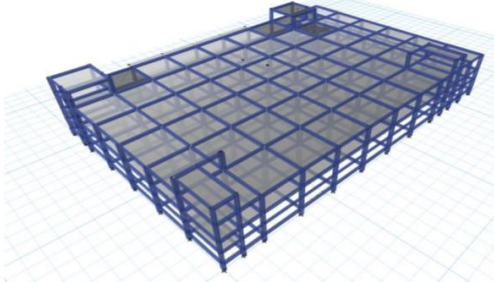


Figure 2.3D OF THE ETABS MODEL

4.1 Design load

- Dead Load:**
 - Weight of structural member
 - Floor finish = 1.2kN/m²
 - Exterior brick wall = 10.0 kN/m
 - Partition wall in Stair= 14.6 kN/m
 - Overhead water reservoir = 8.85 kN/m²
- Live Load:**
 - Mezzanine Floor= 3.0 kN/m²
 - 1st Floor = 6.0 kN/m²
 - 2nd- 4th Floor = 4.0 kN/m²
 - Roof = 2.0 kN/m²
 - Stair and lift lobby= 4.0 kN/m²
- Wind Load:**
 - In 3-D modeling wind pressure is applied in floor diaphragm center calculating from auto lateral load (UBC-97).
 - Basic wind speed, v_B = 210 kmph (Savar)
 - Importance co-efficient, I=1.0
- Earth Quake Load:**
 - Earth quake zone co-efficient, Z= 0.15
 - Response modification co-efficient, R=8.0 (IMRF)
 - Importance co-efficient, I=1.0
- Live load reduction:**
 - For foundation and column design live load reduction factor is considered as per BNBC.

Calculation of ultimate bearing capacity of soil

As per soil test report

Unconfined compressive strength of soil is 22 for BH-10. [Table No-6]

Average unconfined compression strength, q_u = 22 psi = 3.17 ksf

Cohesion of soil, c = q_u/2 = 1.58 ksf

Ultimate bearing capacity of soil for = cNc

= 1.58 x 7.0

= 11.00 ksf

Factor of safety chart against bearing capacity of soil:

Axial Load = DL+FF+PW+0.7LL

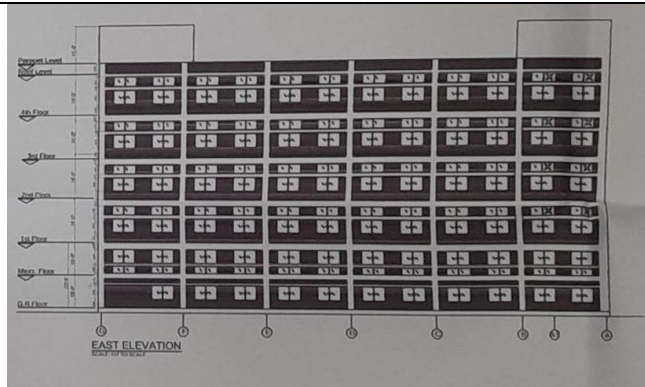
GRID NO	FOOTING ID	FOOTING SIZE, m		FOOTING AREA, sft	Axial Load, kip	Pressure, ksf	Ultimate B.C, ksf	Factor of Safety	Remarks
		F1	F2						
A/1	F4	3.6	3.3	127.83	290	2.27	11.00	4.85	OK
B/1	F2B	4.95	2.65	141.14	385	2.73	11.00	4.03	OK
C/1	F2	4.05	3.9	169.95	475	2.79	11.00	3.94	OK
D/1	F2	4.05	3.9	169.95	475	2.79	11.00	3.94	OK
E/1	F2	4.05	3.9	169.95	475	2.79	11.00	3.94	OK

Table No. SB. Bearing Capacities of the Shallow Foundation from Field and Laboratory Tests (Values in tsf, F. S. = 2.50):

Bore Hole	Depth in ft	Field SPT	Cohesion kg/ cm ²	Bearing capacity (tsf)	
				For Raft Foundation	For circular or square footing
BH-9	5	6	0.38	0.88	1.19
	10	8	0.50	1.11	1.46
	15	12	0.75	1.61	2.08
	20	17	1.06	2.24	2.92
	25	6	0.38	0.88	1.19
BH-10	10	8	0.50	1.11	1.46
	15	9	0.56	1.23	1.61
	20	10	-	1.36	1.74
	25	5	0.31	0.76	1.03
	30	7	0.44	0.99	1.31
BH-11	10	7	0.44	0.99	1.31
	15	8	0.50	1.11	1.46
	20	16	-	2.12	2.72
	25	7	0.44	0.99	1.31
	30	6	0.38	0.88	1.19
BH-12	10	10	0.62	1.36	1.74
	15	10	0.62	1.36	1.74
	20	21	0.31	0.76	1.03
	25	5	0.31	0.76	1.03
	30	9	0.56	1.23	1.61
BH-13	10	9	0.56	1.23	1.61
	15	10	0.62	1.36	1.74
	20	14	-	1.87	2.43
	25	8	0.50	1.11	1.46
	30	9	0.56	1.23	1.61
BH-14	10	12	0.75	1.61	2.08
	15	12	0.75	1.61	2.08
	20	20	-	2.61	3.40
	25	10	0.62	1.36	1.74
	30	9	0.56	1.23	1.61
BH-15	10	9	0.56	1.23	1.61
	15	12	0.75	1.61	2.08
	20	14	-	1.87	2.43
	25	18	1.13	2.36	3.08
	30	14	0.87	1.87	2.43
BH-16	10	13	0.81	1.74	2.25
	15	13	0.81	1.74	2.25
	20	16	1.00	2.12	2.72

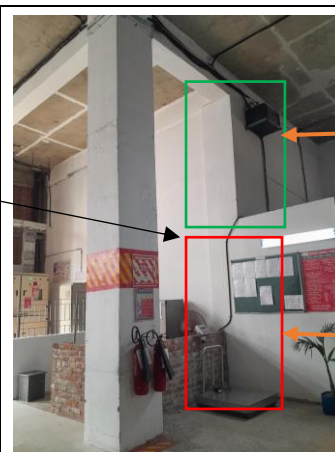
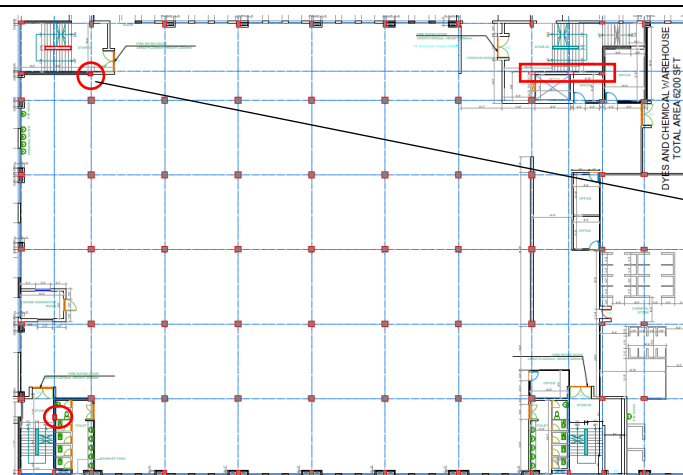
Description: A Design Report was provided for this structure where the intermediate moment resisting frame (IMRF, R=8) was considered without any justification. Also, the consideration of soil bearing capacity doesn't match with the soil test report. Moreover, the number of concrete cylinder test reports found on site doesn't comply with the frequency of testing requirements as per BNBC (Part VI, Chapter 5, 5.12.2), but in the design report, design strength 4500 psi considered for column and 3000 psi consider for beam & slab. The building engineer is required to revise the design report for the actual framing system with proper justification and confirm the design strength of in situ concrete by taking 100 mm diameter core (min 4 nos) from lower tier columns and revise foundation adequacy calculation. Submit the revised design report to the RSC for review.

Observation 2: Column and foundation stress above normal for possible vertical extension.
(Washing Building)



Description: This building is permitted for 5 (G+M+4) storied from PWD, Dhaka (Local Authority). Currently, the building is two storied. Proposed drawings were available during the inspection. Considering the proposed Five-storied building and minimum concrete strength, the stress in the column exceeds the normal design limit. However, the building engineer is required to carry out a Detailed Engineering Assessment (DEA) considering the BNBC provision and complete necessary remedial works prior to the commencement of further construction.

Observation-3: Mismatch in as-built drawing. (Washing Building)



Brick column

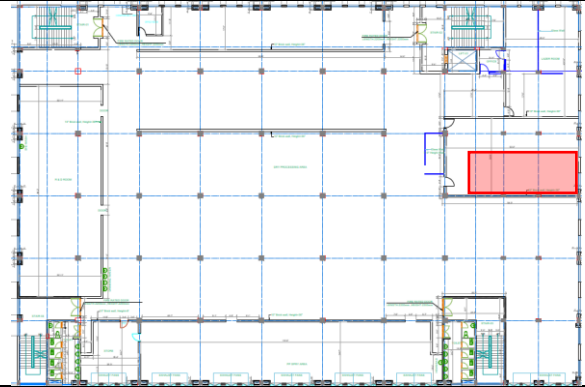
RC column up to 1st landing of stair.

Marked ground-floor columns were found up to 1st landing of stairs.

Onsite condition.

Description: During the inspection, some mismatch was found in the as-built drawing. Individual column layout was missing in the as-built drawing. There is a variation in column layout between the ground floor and the rest of the floors. The building engineer is required to survey the full structure and prepare accurate as-built drawings including floor wise column layout.

Observation-4: Vibration observed on the floor. (Washing Building).



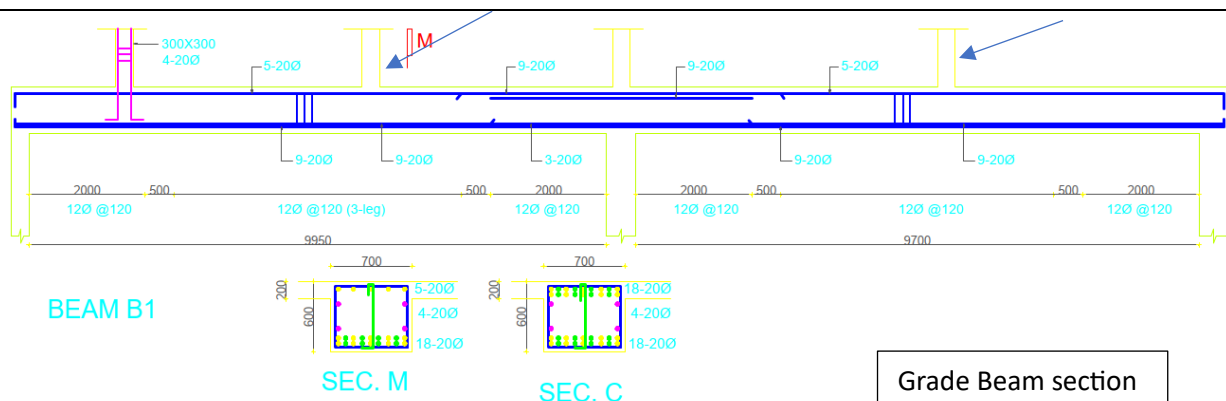
Description: During the inspection, significant vibration was observed on the 1st floor marked in the architectural layout. The building engineer is required to investigate the reason for the vibration and apply suitable damper material to reduce the vibration.

Observation-5: Water stagnant and lack of drainage system on the roof. (Washing Building)



Description: During the inspection, water stagnant was found on the roof, also no drainage system was provided on the roof. The building engineer is required to improve the water drainage system at the roof.

Observation-6: Shear & bending capacity check required for grade beams. (ETP)



Description: Columns are constructed from the grade beam. Building engineer is required to check the shear & bending capacity of the grade beams for the additional load from columns.

Observation-6: Corrosion in steel member at steel stair. (WTP)



Description: During inspection, corrosion was observed on the steel stair. The building engineer is required to remove corrosion and provide anti-corrosive coating.

3. Action Plan

SL No.	Observation	Action Plan	Timeline
01.	Inconsistencies in design report. (Washing building).	The building engineer is required to revise the design report based on in-situ material strength, actual soil bearing capacity & software-based analysis model and submit the documents to the RSC for review.	within 6 weeks
02.	Inconsistencies in design report. (Washing building).	Building engineer is required to take 4 nos of concrete core from the lower-tier columns to confirm the design strength of the concrete.	within 6 weeks
03.	Inconsistencies in design report. (Washing building).	Carry out suggested remedial works if required.	within 6 months
04.	Possible vertical extension. (Washing Building)	In case of extension, the building engineer is required to carry out a Detailed Engineering Assessment (DEA) considering the BNBC provision and complete necessary remedial works prior to the commencement of any further construction.	within 6 months
05.	Mismatch in the as-built drawing. (Washing Building)	The building engineer is required to survey the full structure and prepare accurate as-built drawings.	within 6 weeks
06.	Vibration observed on the floor. (Washing Building).	The building engineer is required to investigate the reason for the vibration and apply suitable damper material to reduce the vibration.	within 6 months
07.	Water stagnant and lack of drainage system on the roof. (Washing Building).	The building engineer is required to improve the water drainage system on the roof.	within 6 months
08.	Shear & bending check is required for grade beams. (ETP)	The building engineer is required to check the shear & bending capacity of the grade beams for the additional load from columns.	within 6 weeks
09.	Shear & bending check is required for grade beams. (ETP)	Carry out remedial works if necessary.	within 6 months
10.	Corrosion in steel member at steel stair. (WTP)	The building engineer is required to remove corrosion and provide anti-corrosive coating.	within 6 months