

The Civil Engineers Woven Limited (Extension)

8, 9, 159 & 160 Baghbari, Horindhara, Hemayatpur, Savar, Dhaka, Bangladesh.

(23.790403, 90.257397)

14 February 2024

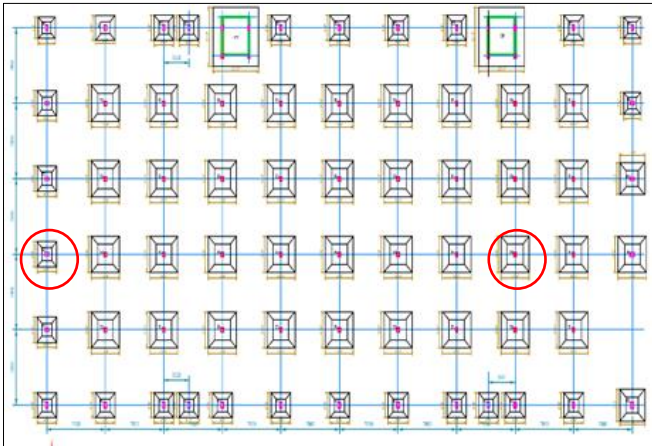


1. Building Information

1. Warehouse Steel Building: This is a three-storied (G+2) prefabricated steel building.
2. Gas Generator Building: This structure is a two (G+1) storied Reinforced Concrete (RC) building.
3. Guard Room-1: This is a single storied RC building.
4. Guard Room-2: This is a single storied RC building.
5. Guard Room-3 & RMS Room: This is a single storied RC building.
6. Guard Room-4 & Driver Rest Room: This is a single storied RC building.
7. Cycle Stand: This structure is a single-storied prefabricated steel shed.
8. Security Watch Tower: This structure is a single-storied steel structure.
9. Connecting Bridge: This structure is a single-storied prefabricated steel connecting bridge.

2. Observations

Observation 1: Cursory calculation indicates the column and foundation is marginally overstressed. (Warehouse Steel Building)



Description: The cursory calculation indicates that columns and footings are stressed above the normal design limit at the marked locations considering floor live load of 6 kPa for the typical floors. We have considered minimum concrete strength based on aggregate type (16.3 MPa), steel plate strength 345 MPa and rebar strength 415 MPa from the available test report. We have also considered ultimate soil bearing capacity 1.44 Ksf from available soil test report. The building engineer is required to review design loads, and column-foundation stresses based on in-situ material strength at the marked location. Also, produce and actively manage a set of floor live load plan.

Observation-2: Discrepancy and lack of information in the provided drawing. (Warehouse Steel Building)



Lack of connection details in the drawing

Description: During the inspection, discrepancies and lack of information were observed between the provided drawing and on-site conditions. The building engineer is required to survey the whole structure and update the drawing reflecting on-site condition.

Observation-3: Lack of material test report. (Warehouse Steel Building)

DEPARTMENT OF CIVIL ENGINEERING
 Moulvibazar Engineering College, Moulvibazar, Dhaka-1205
CONCRETE LABORATORY

EMTC No: 1182-31514 (20-21CE); Dt: 10/02/2021
 Drawn by: The Civil Engineer Unit
 Dhaka
 Ref. No: TCE/2021; Dt: 03/02/2021
 Project: TCE/21, 03 entered steel building, Moulvibazar, Savar.
 Sample: Concrete Cylinder (this specimen is coded: 1.2.4, Aggregate type: brick-chips)
 Location: 1st Floor slab (this value is added for per cent) (not mentioned)
 Test: Compressive Strength Test of Concrete Cylinder (ASTM C39)
 Date of Test: 11/02/2021

TEST REPORT

Sl. No.	Date of Casting as per the label	Specimen Designation	Specimen Area	Maximum Load	Crushing Strength	Average Crushing Strength	Mode of Failure
1	25/12/2021	-	12.92	18,334	5.667	-	Compressed *
2	18 days test	-	12.92	58,642	4.551	-	Compressed *
3	-	-	12.07	61,183	6.407	-	Compressed *

Note: * Samples were received in sealed condition.

Commented by: Dr. A. N. M. Bishwas
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26 Feb, 2022

SL No	Data	
A	Yield strength of re-bar and compressive strength of concrete.	Concrete strength, $f'_c = 3500$ psi Steel strength, $f_y = 60$ ksi.

Description: During the inspection, 2 sets of cylinder test report (slab=2) were provided without average crushing strength. No test report was provided for the pedestal column and footing also re-bar test report was missing. In the design report, f'_c was considered 24.14 MPa and f_y was considered 415 MPa without any justification. The building engineer is required to check the frequency of testing requirements as per BNBC (Part VI, Chapter 5.12) and verify in-situ material strength by further testing if required. Update the analysis & design report accordingly.

Observation-4: Justification of the geotechnical investigation test report. (Warehouse Steel Building)

Geo-Technical Investigation Report for
 Building Construction Project at Moulvibazar Shengpur, Moulvibazar, Savar, Dhaka

Table: 3.3.1: Allowable Bearing Capacity for Shallow Foundation (F.S.-3.00)

Borehole No.	Depth (m)	Allowable Bearing Capacity, q_a , kN/m ²	
		Square Footing	Strip Footing
BH-01	1.50	85.00	68.75
	3.00	113.33	91.67
	4.50	113.33	91.67
	6.00	85.00	68.75
BH-02	1.50	85.00	68.75
	3.00	56.67	45.83
	4.50	85.00	68.75
	6.00	113.33	91.67
BH-03	1.50	85.00	68.75
	3.00	113.33	91.67
	4.50	141.67	114.58
	6.00	56.67	45.83
BH-04	1.50	113.33	91.67
	3.00	113.33	91.67
	4.50	170.00	137.50
	6.00	141.67	114.58
BH-05	1.50	85.00	68.75
	3.00	141.67	114.58
	4.50	113.33	91.67
	6.00	170.00	137.50
BH-06	1.50	141.67	114.58
	3.00	85.00	68.75
	4.50	113.33	91.67
	6.00	170.00	137.50
BH-07	1.50	141.67	114.58
	3.00	198.33	160.42
	4.50	170.00	137.50
	6.00	56.67	45.83
BH-08	1.50	85.00	68.75
	3.00	113.33	91.67
	4.50	170.00	137.50
	6.00	198.33	160.42

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26 Feb, 2022

Exterior footing, F3 (Grid line-A-8)

D Size and thickness of footing 8'-9"x 8'-9" single spread footing at 5'-6" ft below from GL, thickness is 18 inch near column pedestal and 12 inch at edge.

Fig. Size & thickness of interior and exterior footing - F3

SL No	Item	Required	Provided	Remarks
1	Maximum uplift force	Required maximum uplift force capacity - 18.67 kip (-W ₂)	Available uplift force capacity = (13.12'x13.12'x 5.5x80pcf)/1000 = 65.80 kip (Min)	Adequate
2	Soil bearing pressure	Required maximum capacity 2.22 ksf for 170.80 kips (Grid line- A-8) (DL + 0.85 LL)	Available 2.53 ksf (from soil investigation report)	Adequate

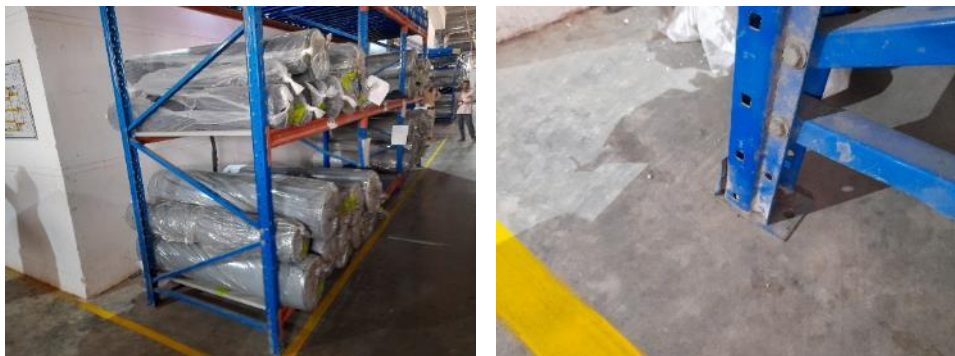
Description: The consideration of bearing capacity is not clear, cursory calculation from soil test shows less than the considered value. The building engineer is required to provide detailed clarification of specific sourcing of the values considered for the bearing capacity in the design report.

Observation-5: Cracks in brick wall. (Warehouse Steel Building)



Description: Cracks was found in brick wall at 1st floor office area. These cracks may have been generated due to the torsional irregularity of the structure or/and deflection of slab. The building engineer is required to investigate the cause of crack and repair the crack as per the building engineer recommendation.

Observation-6: Anchorage missing for the non-structural elements. (Warehouse Steel Building)



Description: During the inspection, storage racks were observed on the several floors and locations without anchorage. The non-structural elements suspended from, attached to, or resting atop the structure shall be adequately anchored and braced to resist earthquake forces. The factory is required to brace/anchor all non-structural elements.

Observation-7: Lack of building permit from local authority. (Cycle Stand and Connecting Bridge)



Description: During the inspection, it was observed that the local authority approval was not available for the following structures i.e. Cycle Stand and Connecting Bridge.

Observation-8: Frequency of testing doesn't comply with BNBC requirement. (Gas Generator Building)


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CONCRETE LABORATORY

BRTC No: 1182-84829/23-24CE: Dt: 28/02/23
 Sent by: Project Engineer, The Civil Engineers Ltd.
 Ref. No: Civil Engineers Shaban (Level 06), 66, Mahabul C/A, Dhaka-1212.
 Letter: Dt: 28/02/23
 Project: TCCL 2-Storey Gas generator Building, Hameyapur.
 Sample: Concrete Cylinder (Aggregate Type: Stone chips)
 Location: Column Casting (Mix proportion(as quoted): 1:1.25:2.50)
 (Admixture Added (as per letter): Not mentioned)
 Test: Compressive Strength Test of Concrete Cylinder (ASTM C39)
 Date of Test: 1/5/2023

TEST REPORT							
SL No.	Date of Casting as per the letter	Specimen Designation/ Frog Mark	Specimen Area	Maximum Load	Crushing Strength	Average Crushing Strength	Mode of Failure
			(sq. in)	(kg)	(psi)		
1	26/1/2023	Column	12.57	98,167	7,826	7826 psi	Crushed *
2	(28 days test)	Column	12.42	98,354	7,956	(54.5 MPa)	Combined *
3		Column	12.57	100,053	7,897	(555 kg/cm ²)	Combined *

Note: Samples were received in uncracked condition.

Contersigned By: 
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Important Notes: Samples as supplied to us have been tested in our laboratory. BETC does not have any responsibility as to the representative character of the samples required to be tested. It is recommended that samples are sent in a secure and sealed container/bag under supervision of the responsible authority. In order to avoid fraudulent manipulation of test results, it is recommended that all test results are collected by duly authorized persons, and sent by the Project Engineer/Supplier.
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22, May, 2023

2.4 Concrete strength consideration:

Foundation
 Concrete Cylinder test reports: Footings foundation
 Aggregate type: Stone Chips

Sample 1	4195 psi
Sample 2	3109 psi
Sample 3	3457 psi

Grade Beams
 Concrete Cylinder test reports: Footings foundation
 Aggregate type: Stone Chips

Sample 1	6958 psi
Sample 2	6161 psi
Sample 3	7107 psi

Column
 Concrete Cylinder test reports: Ground Floor column
 Aggregate type: Stone Chips

Sample 1	7826 psi
Sample 2	7956 psi
Sample 3	7097 psi

Slab
 Concrete Cylinder test reports: Ground Floor column
 Aggregate type: Stone Chips

Sample 1	7930 psi
Sample 2	7208 psi
Sample 3	8162 psi

Here, Considering from design strength For
 Column $f_c = 3500$ Psi (Min.)
 Foundation & Grade Beams $f_c = 3000$ Psi (Min.)
 And For Floor Beam and Slab $f_c = 3000$ Psi (Min.)

Description: During the inspection, 3 sets of cylinder test reports (1 from column, 1 from slab and 1 from grade beam) were found on-site. As per the structural construction drawing, concrete strength of column and beam was considered 3500 psi and 3000 psi respectively. To confirm the design strength, the number of cylinders taken are not adequate as per the frequency test criteria of BNBC (Section 5.12). The building engineer is required to verify the mentioned design strength of concrete by taking adequate core samples, update the FEA model & design report accordingly.

3. Action Plan:

Observation	Action Plan	Timeline
Cursory calculation indicates the column and foundation is marginally overstressed (Warehouse Steel Building)	Building engineer is required to review the design load and foundation stresses.	within 6 weeks
	Building engineer is required to prepare a full set of design documents in compliance with BNBC- Article 1.9.1	within 6 weeks
	Produce and actively manage a set of floor live load plan.	within 6 weeks
	Carry out remedial work where required.	within 6 months
Discrepancy and lack of information in the provided drawing (Warehouse Steel Building)	The building engineer is required to survey the whole structure and revise as-built drawing reflecting the on-site condition.	within 6 weeks
Lack of material test report (Warehouse Steel Building)	verify in-situ material strength by further testing if required.	within 6 weeks
Justification of the geotechnical investigation test report (Warehouse Steel Building)	The building engineer is required to provide detailed clarification of specific sourcing of the values considered for the bearing capacity in the design report.	within 6 weeks
Cracks in brick wall (Warehouse Steel Building)	The building engineer is required to investigate the cause of crack and repair the crack as per the building engineer recommendation.	within 6 months
Anchorage missing for the non-structural elements (Warehouse Steel Building)	The factory is required to brace/anchor all non-structural elements.	within 6 months
Lack of building permit from local authority. (Cycle Stand and Connecting Bridge)	The factory is required to collect building permit from the government approved local authority and revise design documents based on the BNBC for all structure.	within 6 months
Frequency of testing doesn't comply with BNBC requirement. (Gas Generator Building)	The building engineer is required to verify the mentioned design strength of concrete by taking minimum 4 number concrete core samples, update the FEA model & design report accordingly.	within 6 weeks
	Carry out remedial work where required.	within 6 months