

DNV Clothing Ltd. (Extension)

Plot#97-99, AEPZ, Siddhirganj, Narayanganj

(23.677279N, 90.526634E)

30 July 2023

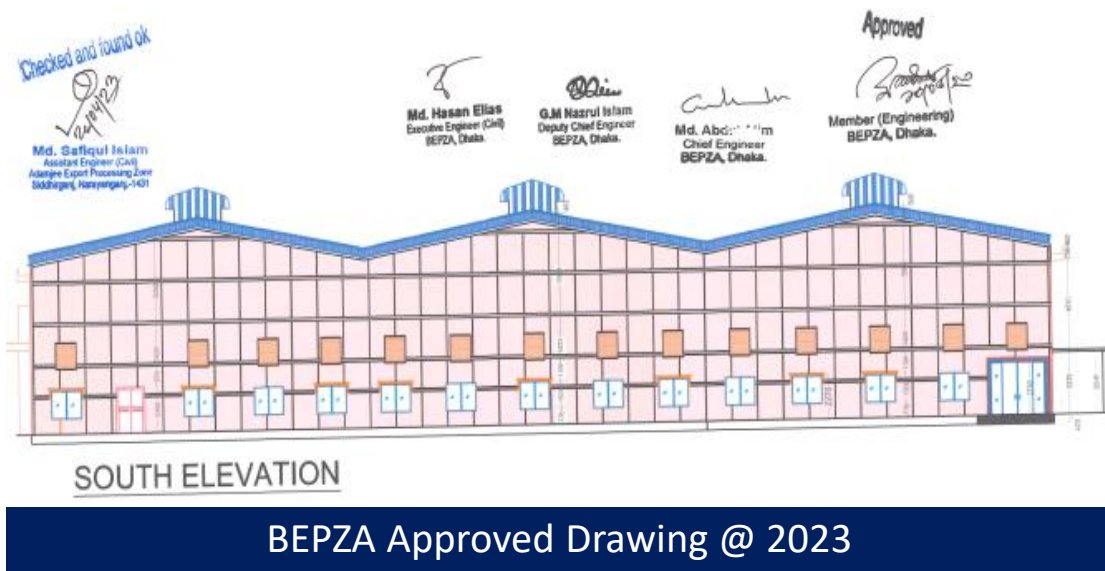
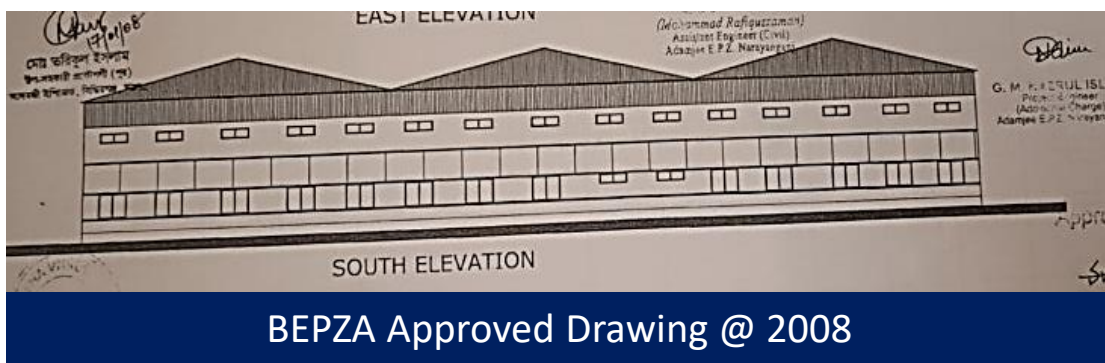


Building Information

1. Production Building-02 is a single storied (G) steel structure.
2. Utility Building is a single storied (G) RC structure.
3. Jhute godown is a single storied (G) RC structure.

Observation

Applicable version of BNBC



PART – 3 STRUCTURAL

3.1 Design Consideration

The structural element has been designed and considering the follow

USING CODES & STANDARD.

The following codes are used to check the feasibility of the existing

- Bangladesh National Building Code (BNBC)-2006,1993
- American Concrete Institute (ACI318-99)
- Uniform Building Code (UBC-94)
- American Society for Testing Materials (ASTM)
- International Building Code (IBC)
- Federal Emergency Management Agency (FEMA)
- The Accord on Fire and Building Safety in Bangladesh

Selected BNBC 2006 Code in DEA Report



Existing trusses replaced by portal frame

As per BEPZA approved drawing 2008, this structure was steel truss shed. The major structural alteration work (existing trusses replaced by portal frame & new roof monitor built) conducted in the period of 2021-2022.

According to BNBC 2020, For alteration of a building, the provisions of this Code (2020) shall apply to the whole building whether existing or new.

The building engineer is required to enforce all the provisions of the latest building code.

Observations: Production Building-02

1.2.6.2 Before demolishing a building of construction Type 1 Part 4 Fire Protection the owner shall notify all utilities having service connections within the building or plot, such as water, gas, electricity, sewer and other connections.

1.2.6.3 A permit to demolish a building shall not be issued until a clearance is obtained from utilities stating that their respective service connections and appurtenant equipment, such as, meters and regulators have been removed or sealed and plugged in a safe manner.

1.3 Implementation

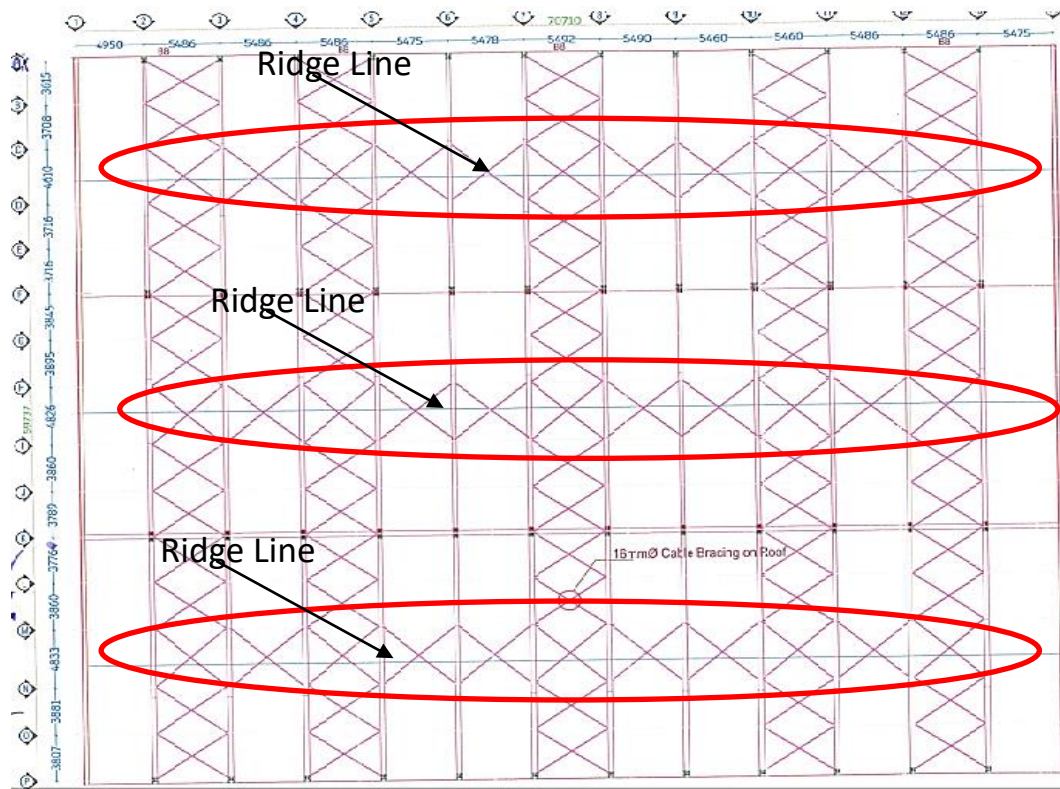
1.3.1 Investigation and Evaluation

For the proposed works relating to alteration, addition to and change of use, the owner of the building shall cause the existing buildings to be investigated and evaluated by competent professionals in accordance with the provisions of this Code.

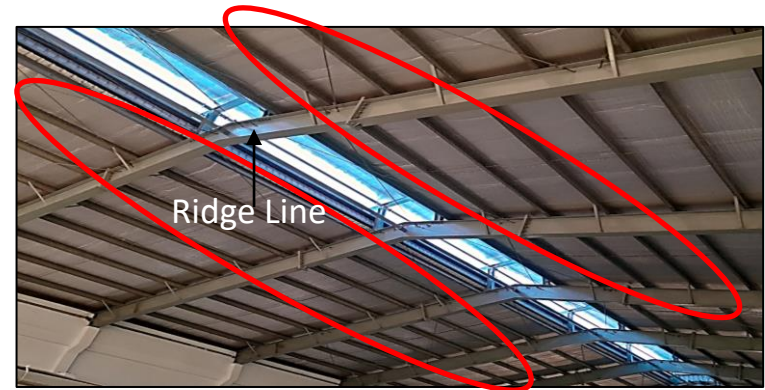
PART IX - ALTERATION, ADDITION TO AND CHANGE OF USE OF EXISTING BUILDINGS

For alteration of a building, the provisions of this Code shall apply to the whole building whether existing or new.

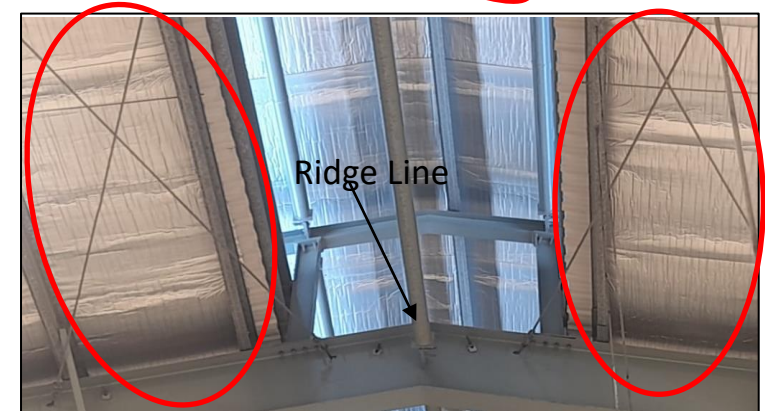
Discrepancy & Lack of information in as-built drawing



Cable Bracing Layout Plan: Concentric cable bracing

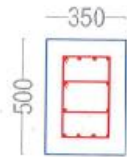
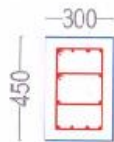
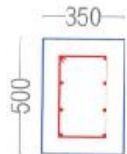
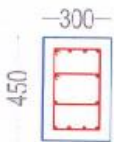


Concentric cable connection at Ridge

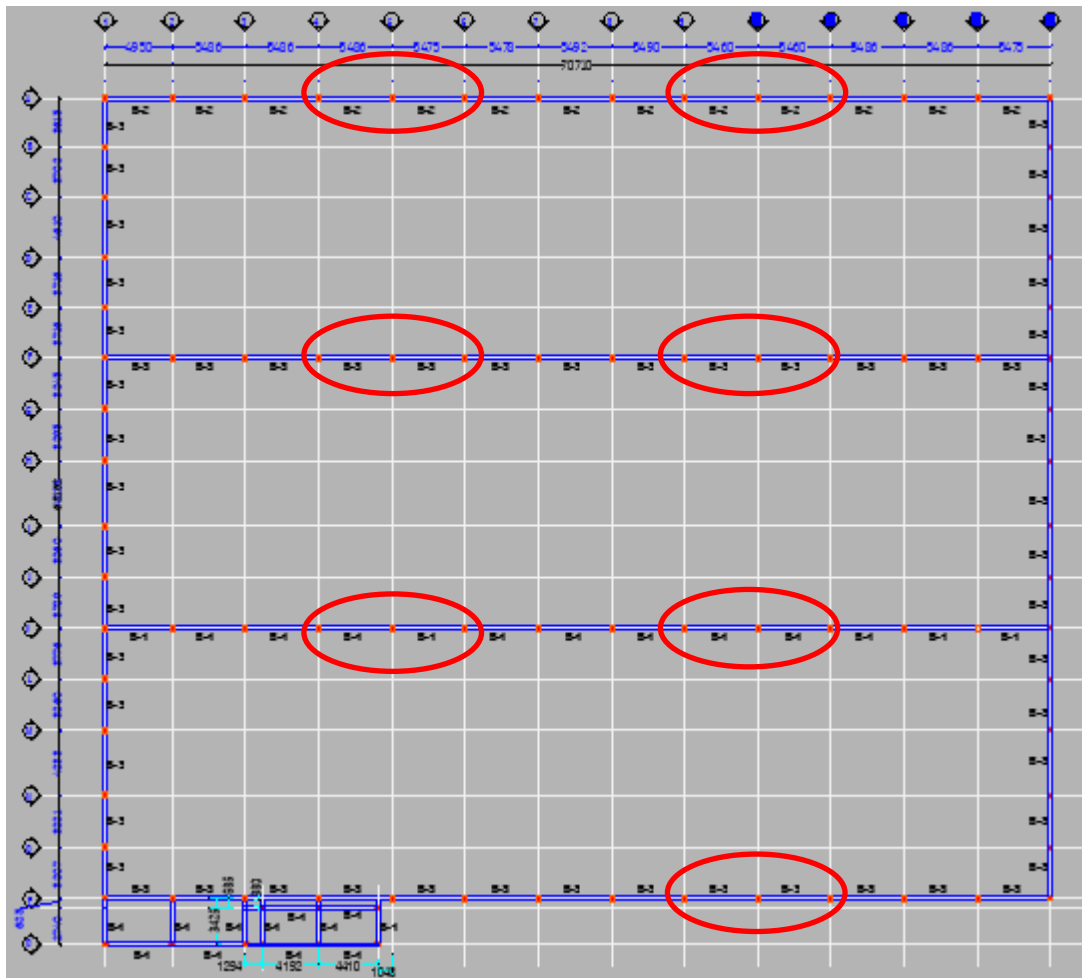


Roof cable bracing were provided. As-built drawing shows that the single line cross bracing in the longitudinal direction of the ridges. But on-site double line cross bracing observed in the all ridges. The building engineer is required to survey the whole structures and prepare accurate as-built drawings accordingly.



Adamjee Export Processing Zone, Sittirgari, Narayanganj-1431 COLUMN TYPE	SHORT COLUMN	LONG COLUMN (GB TO BASE PLATE)
<i>Certified</i>  Md. Atiqul Rahman Superintending Engineer Adamjee Export Processing Zone Sittirgari, Narayanganj.	(350mmX500mm)  10-20mmØ Covering = 75mm	(300mmX450mm)  10-20mmØ Covering = 50mm
<i>Dr. K. K. K.</i> C2 ডা. আব্দুল কবীর নির্বাহী প্রকৌশলক আদমজী রপ্তানি অঞ্চল সিটরিগারী, নারায়ণগঞ্জ-১৪৩১	(350mmX500mm)  8-20mmØ Covering = 75mm	(300mmX450mm)  8-20mmØ Covering = 50mm

Column rebar mismatch observed during the ferro scanning. The amount of rebar in the column C1 & C2 doesn't match with the ferro scanning. The building engineer is required to ensure number and diameter of column rebar and prepare accurate schedule.

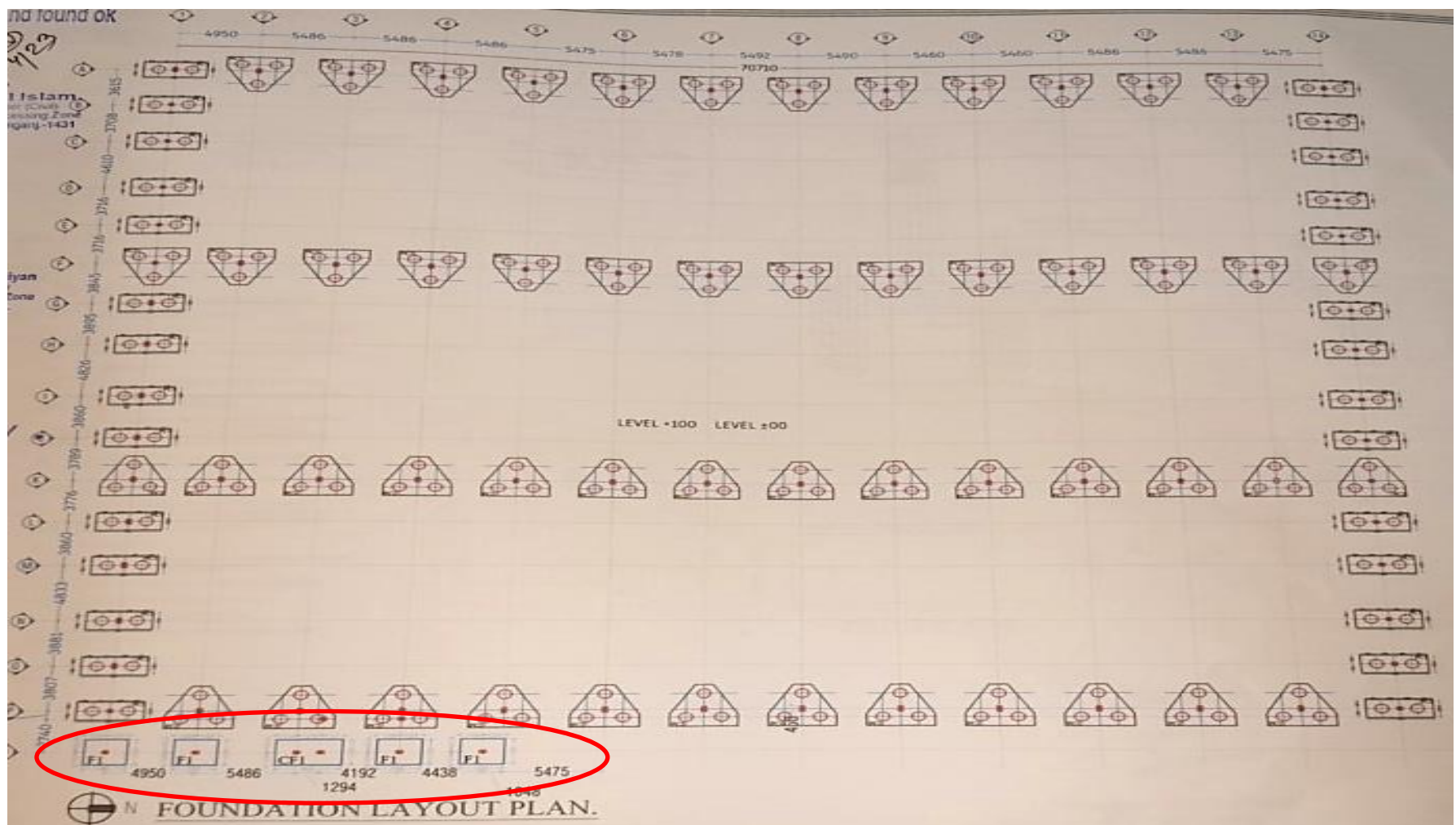


Tie Beam Layout at level +3m, +6m & +8m



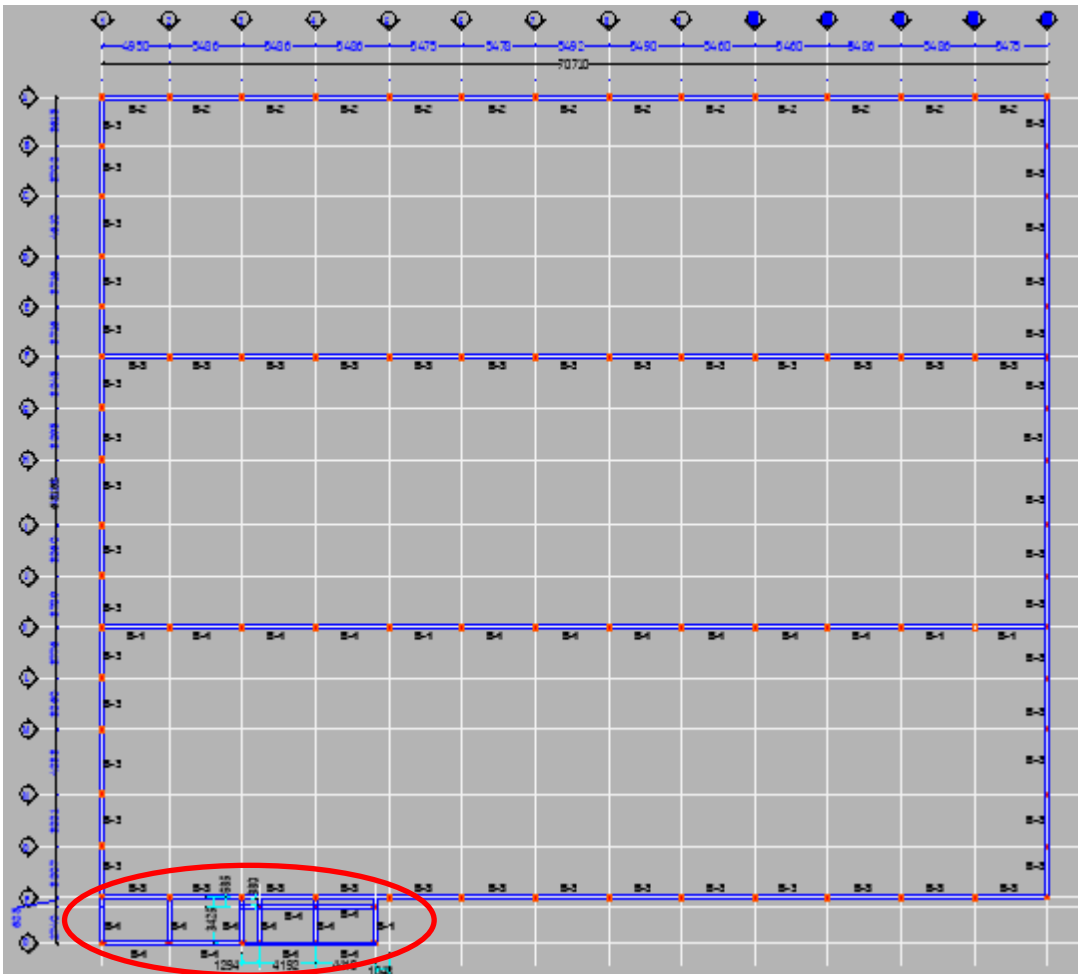
Tie Beam level offset at Grid 4-6 & 9-11 for level +3m

The building engineer is required to survey the whole structures and prepare as-built drawing reflecting the actual site condition.



Foundation Layout

In foundation detail, only pile foundations were shown. However, no information was available regarding the shallow footing F1 & CF1. The building engineer is required to investigate the foundation system and update as-built drawing accordingly.



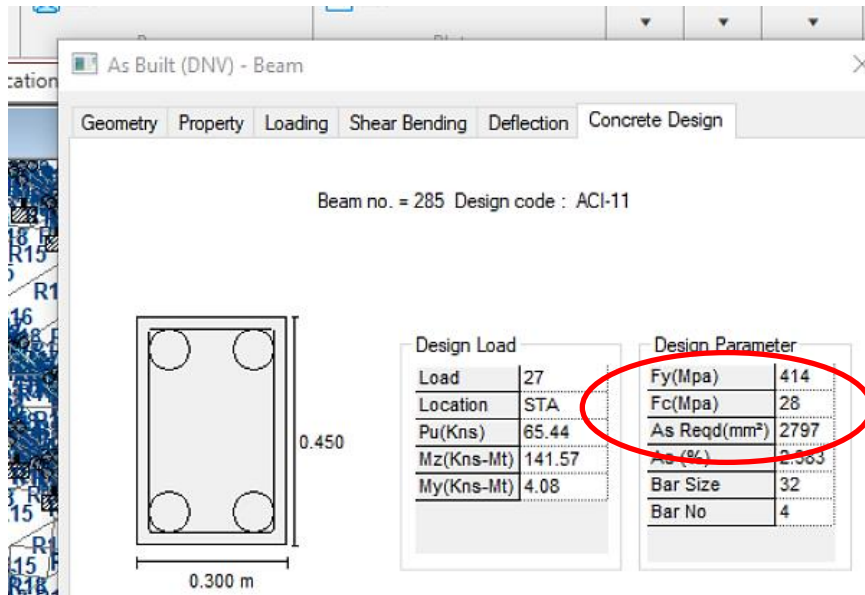
Beam Layout (Compression Room Roof Beam)



Compression Room Roof

In beam layout plan, RC portion roof beam was shown. However, no information was available regarding RC roof slab. The building engineer is required to prepare accurate as-built structural drawing with slab details. Also, ensure update the aggregate information in the drawing and design.

Revise material strength in design report



Material strength of column considered $f'_c = 28$ MPa in the design report.

Concrete strength of column considered $f'_c = 28$ MPa without any equivalent strength calculation where core test report shows maximum $f'_c = 15.3$ MPa as per ACI 562. Building engineer is required calculate equivalent material strength and revise the design report accordingly.

At the time of inspection, 2 sets core test report found. However, sample locations were not matched in the site condition. Building engineer is required to produce a core layout and mark all the locations of the taken cores.

DEPARTMENT OF CIVIL ENGINEERING
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http://btrc.ce.buet.ac.bd/whome
CONCRETE LABORATORY

BRTC No. : 1102-4263421-22/CE; Dt: 25/9/2021
Client : Engr. Pabitra Chandra Paul
Ref. No. : Matrix Construction
Letter: Dt: 25/9/2021
Project : DNV Chitkong Ltd., (Extension), Plot-97-99, Adanjan EPZ, Siddhargan, Narayanganj, (Saleha Building-2 Staircase)
Sample : Concrete Cylindrical Core [Mix Proportion (as quoted): Not Mentioned]
Year of Construction : Not Mentioned
Sample Collected by : Client
Date of Sample Collection : Not Mentioned
Test : Compressive Strength of Concrete Cylindrical Core [ASTM C 49C 42M]
Date of Test : 21/10/2021

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Sl. No.	Location	Sample Identification Mark	Length of Sample	Diameter of Sample	Average Cross Sectional Area	Ultimate Load	Crushing Strength	Type of Failure
			In.	In.	Sq. In.	Lb.		
1	Ground Floor Column: Gnd-F08	SBC1	5.3	2.68	5.94	13,924	2470 psi (17 MPa)	Mortar (Stone Chips)
2	Ground Floor Column: Gnd-K04	SBC2	5.3	2.68	5.94	14,800	2580 psi (17.9 MPa)	Mortar (Stone Chips)
3	Ground Floor Column: Gnd-L01	SBC3	5.3	2.68	5.94	12,573	2230 psi (15.4 MPa)	Mortar (Stone Chips)
4	Ground Floor Column: Gnd-H01	SBC4	5.3	2.68	5.94	11,897	2110 psi (14.6 MPa)	Mortar (Stone Chips)
5	Ground Floor Column: Gnd-F04	SBC5	5.3	2.68	5.94	13,899	2430 psi (16.9 MPa)	Mortar (Stone Chips)
6	Ground Floor Column: Gnd-J14	SBC6	5.1	2.68	5.94	18,654	3310 psi (22.8 MPa)	Mortar (Stone Chips)

Notes:

- The diameter of core specimens for the determination of compressive strength in load bearing structural members shall be at least 3.75 in. (94 mm). For non-load bearing structural members or when it is impossible to obtain cores with length-diameter ratio (L/D) greater than or equal to 1, core diameters less than 3.75 in. (94 mm) are not prohibited.
- The compressive strengths of nominal 2-in. (50 mm) diameter cores are known to be somewhat lower and more variable than those of nominal 4-in. (100 mm) diameter cores. In addition, smaller diameter cores appear to be more sensitive to the effect of the length-diameter ratio.

COMMENT — Please compare the results with your corresponding design values and consult with your design engineer.

Countersigned by: Dr. A. B. M. Badruzzaman, Professor, Department of Civil Engineering, BUET, Dhaka-1000, Bangladesh.

Test Performed by: Snigtha Ahana, Assistant Professor, Department of Civil Engineering, BUET, Dhaka-1000, Bangladesh.

Warning: Samples as supplied to us have been tested in our lab. BRTC 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 cover/pack/container under signature of the competent authority. In order to avoid fraudulent fabrication of test results, it is recommended that all test reports are collected by duly authorized person, and not by the Contractor/Supplier.

Concrete core test report for column: Maximum strength 22.8 MPa

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Page 1 of 2

Sl. No.	Location	Sample Identification Mark	Length of Sample	Diameter of Sample	Average Cross Sectional Area	Ultimate Load	Crushing Strength	Type of Failure
			In.	In.	Sq. In.	Lb.		
1	Ground Floor Column: Gnd-F-4	SBB1	5.3	2.68	5.94	12,348	2190 psi (15.1 MPa)	Mortar (Stone Chips)
2	Ground Floor Column: Gnd-P-5	SBB2	5.3	2.68	5.94	13,023	2310 psi (15.9 MPa)	Mortar (Stone Chips)
3	Ground Floor Column: Gnd-K-3	SBB3	5.8	2.68	5.94	12,122	2150 psi (14.8 MPa)	Mortar (Stone Chips)
4	Ground Floor Column: Gnd-K-4	SBB4	5.3	2.68	5.94	12,348	2190 psi (15.1 MPa)	Mortar (Stone Chips)

Notes:

- The diameter of core specimens for the determination of compressive strength in load bearing structural members shall be at least 3.75 in. (94 mm). For non-load bearing structural members or when it is impossible to obtain cores with length-diameter ratio (L/D) greater than or equal to 1, core diameters less than 3.75 in. (94 mm) are not prohibited.
- The compressive strengths of nominal 2-in. (50 mm) diameter cores are known to be somewhat lower and more variable than those of nominal 4-in. (100 mm) diameter cores. In addition, smaller diameter cores appear to be more sensitive to the effect of the length-diameter ratio.

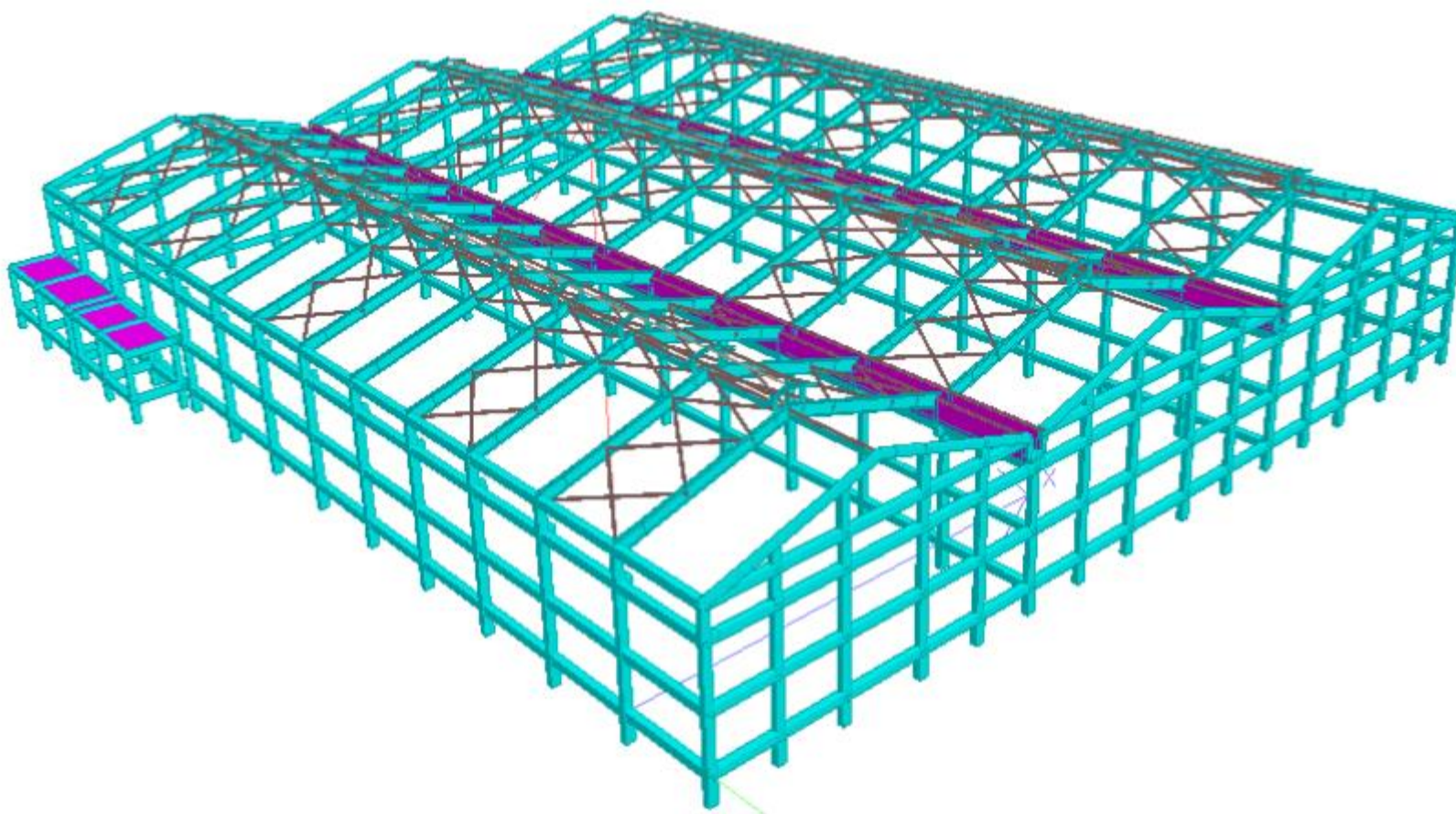
COMMENT — Please compare the results with your corresponding design values and consult with your design engineer.

Countersigned by: Dr. A. B. M. Badruzzaman, Professor, Department of Civil Engineering, BUET, Dhaka-1000, Bangladesh.

Test Performed by: Snigtha Ahana, Assistant Professor, Department of Civil Engineering, BUET, Dhaka-1000, Bangladesh.

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Design report needs to be updated

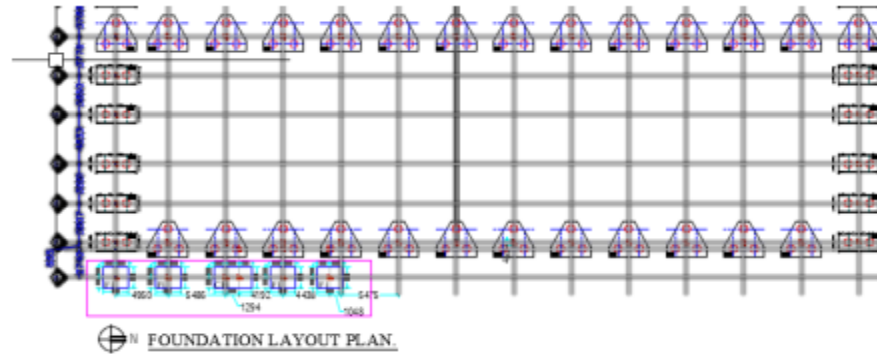


FEA Model

Deflection & displacement checks were not found in the report. The building engineer is required to update the design report with necessary information.

Footing Area Check:

Considering Maximum Support Re-action



Area Check						
Node	Load Combination	Force-Y kip	Soil Bearing Capacity(KSF)	Required AREA	Provided AREA	Remarks
585	35	36.06	0.65	55.48	56	ok
586	35	22.92	0.65	35.26	96	ok
587	35	28.45	0.65	43.77	56	ok
591	35	15.16	0.65	23.32	56	ok
592	35	33.86	0.65	52.09	56	ok
593	35	33.36	0.65	51.32	96	ok

Foundation checks in the design report

In the design report, flexure and punching checks of shallow foundation was not provided. And only two sample pile foundation checks were provided. The building engineer is required to incorporate all kinds of checks for the shallow foundation and include a table of foundation adequacy for both shallow and pile foundations.

Verify in-situ material strength

Strength Estimation of Concrete and Reinforcing Bar:

- The grade of steel used in the design of columns, slabs and beams are of $f_y = 60000$ psi.

Table 1: Input Parameters:

1	Yield Strength of steel	f_y	60000 psi
2	Compressive Strength of Concrete for Column	f'_c	3500 psi
3	Young's Modulus of Concrete	E_c	$57000\sqrt{f'_c}$ (Stone chip)

Material strength of considered $f'_c = 3500$ psi & $f_y = 60000$ psi in the design report

At the time of inspection, no test report was available for column. Building engineer is required to verify in-situ material strength and revise the design report accordingly.

Design report needs to be updated

3.1 Design Consideration

The structural element has been designed and considering the following criteria.

USING CODES & STANDARD.

The following codes are used to check the feasibility of the existing structure.

- Bangladesh National Building Code (BNBC)-2020
- American Concrete Institute (ACI318-08)
- Uniform Building Code (UBC-94)
- American Society for Testing Materials (ASTM)
- International Building Code (IBC)
- Federal Emergency Management Agency (FEMA)
- The RSC on Fire and Building Safety in Bangladesh Building Standard.

Considered design code BNBC 2020

(ii) Live Load (L):

Live load is the gravity load due to non-permanent objects like machines, furniture, and human. Analysis has been carried out base on load recommended by BNBC (2006) for Buildings in Bangladesh and actual load acting on building. Following are the live load values used in the analysis.

INPUT PARAMETER:

Following seismic parameters are considered for the finite element analysis as per BNBC (2006):

Basic wind speed, V_b	137 mph
Exposure category	B
Structural Importance Factor, I	1

- **Serviceability:** All kind of serviceability checks are found within limit like deflection against earthquake and wind load, rotation is also within limit as we conducted modal analysis (dynamic analysis), drift ratio etc. as per BNBC (2006).

The building is designed following BNBC-2020 code but BNBC-2006 is mentioned in the live load, wind load and serviceability chapter. The building engineer is required to update the design report following BNBC-2020 code.

Crack on brick wall



Brick Wall Crack

Brick wall crack observed in the generator room during inspection. Building engineer is required to investigate the cause of wall cracks and suggest any remediation required.

Verify in-situ material strength

Strength Estimation of Concrete and Reinforcing Bar:

- The grade of steel used in the design of columns, slabs and beams are of $f_y = 60000$ psi.

Table 1: Input Parameters:

1	Yield Strength of steel	f_y	60000 psi
2	Compressive Strength of Concrete for Column	f'_c	3500 psi
3	Young's Modulus of Concrete	E_c	$57000\sqrt{f'_c}$ (Stone chip)

Material strength of considered $f'_c=3500$ psi & $f_y=60000$ psi in the design report

At the time of inspection, no test report was available for column. Building engineer is required to verify in-situ material strength and revise the design report accordingly.

Design report needs to be updated

3.1 Design Consideration

The structural element has been designed and considering the following criteria.

USING CODES & STANDARD.

The following codes are used to check the feasibility of the existing structure.

- Bangladesh National Building Code (BNBC)-2020
- American Concrete Institute (ACI318-08)
- Uniform Building Code (UBC-94)
- American Society for Testing Materials (ASTM)
- International Building Code (IBC)
- Federal Emergency Management Agency (FEMA)
- The RSC on Fire and Building Safety in Bangladesh Building Standard.

Considered design code BNBC 2020

(ii) Live Load (L):

Live load is the gravity load due to non-permanent objects like machines, furniture, and human. Analysis has been carried out base on load recommended by BNBC (2006) for Buildings in Bangladesh and actual load acting on building. Following are the live load values used in the analysis.

INPUT PARAMETER:

Following seismic parameters are considered for the finite element analysis as per BNBC (2006).

Basic wind speed, V_b	137 mph
Exposure category	B
Structural Importance Factor, I	1

The building is designed following BNBC-2020 code but BNBC-2006 is mentioned in the live load, wind load and serviceability chapter. The building engineer is required to update the design report following BNBC-2020 code.

- **Serviceability:** All kind of serviceability checks are found within limit like deflection against earthquake and wind load, rotation is also within limit as we conducted modal analysis (dynamic analysis), drift ratio etc. as per BNBC (2006).

Problems Observed

Production Building-02:

Item 01: Applicable version of BNBC

Item 02: Discrepancy & Lack of information in as-built drawing

Item 03: Revise material strength in design report

Item 04: Design report needs to be updated

Utility Building:

Item 05: Verify in-situ material strength

Item 06: Design report needs to be updated

Item 07: Crack on brick wall

Jhute Godown:

Item 08: Verify in-situ material strength

Item 09: Design report needs to be updated

Priority Actions

Item No.	Observation	Recommended Action Plan	Recommended Timeline
01	Applicable version of BNBC. (Production Building-02)	The building engineer is required to enforce all the provisions of the latest building code.	6-weeks
02	Applicable version of BNBC. (Production Building-02)	Prepare design report as per the applicable version of BNBC.	6-weeks
03	Discrepancy & Lack of information in as-built drawing (Production Building-02)	The building engineer is required to survey the whole structures and prepare accurate as-built drawings accordingly.	6-weeks
04	Discrepancy & Lack of information in as-built drawing (Production Building-02)	The building engineer is required to survey the whole structures and prepare accurate as-built drawings in compliance with section 1.9.1, part-6 of BNBC and submit it to RSC for review.	6-weeks

Item No.	Observation	Recommended Action Plan	Recommended Timeline
05	Revise material strength in design report (Production Building-02)	Building engineer is required calculate equivalent material strength and revise the design report accordingly.	6-weeks
06	Revise material strength in design report (Production Building-02)	Building engineer is required to produce accurate concrete core layout plan.	6-weeks
07	Revise material strength in design report (Production Building-02)	Implement remedial actions where required.	6-months
08	Design report needs to be updated (Production Building-02)	The building engineer is required to incorporate all adequacy checks for the shallow foundation and include a table of foundation adequacy for both shallow and pile foundations.	6-weeks
10	Design report needs to be updated (Production Building-02)	Building engineer is required incorporate the serviceability checks in design report.	6-weeks

Item No.	Observation	Recommended Action Plan	Recommended Timeline
11	Design report needs to be updated (Production Building-02)	Implement remedial actions if required.	6-months
12	Verify in-situ material strength (Utility Building)	Building engineer is required to verify in-situ material strength and revise the design report accordingly.	6-weeks
13	Verify in-situ material strength (Utility Building)	Implement remedial actions if required.	6-months
14	Design report needs to be updated (Utility Building)	The building engineer is required to update the design report following section 1.9.1 of part-6, BNBC-2020.	6-weeks
15	Design report needs to be updated (Utility Building)	Implement remedial actions if required.	6-months

Item No.	Observation	Recommended Action Plan	Recommended Timeline
16	Crack on brick wall (Utility Building)	Building engineer is required to check the cause of crack and repair with a suitable method.	6-months
17	Verify in-situ material strength (Jhute Godown)	Building engineer is required to verify in-situ material strength and revise the design report accordingly.	6-weeks
18	Verify in-situ material strength (Jhute Godown)	Implement remedial actions if required.	6-months
19	Design report needs to be updated (Jhute Godown)	The building engineer is required to update the design report following section 1.9.1 of part-6, BNBC-2020.	6-weeks
20	Design report needs to be updated (Jhute Godown)	Implement remedial actions if required.	6-months