GMS Composite Knitting Ind. Ltd. (New Building)

Sardaganj, Kashimpur, Gazipur-1346,Bangladesh,
(23.96859, 90.29699)
24th & 31st May & 06th September 2021

RSC RMG SUSTAINABILITY COUNCIL

Buildings Information

1. Building-7 (Basement Building) (Wash Building) (B+G+5) (reinforced concrete structure).
2. Building 8 (All Over Printing) (G+5) (reinforced concrete structure).
3. Building-9 (Washing Building) (G+3) (pre-fabricated steel structure).
4. Building 10 (Sample Dyeing Building) (G+4) (reinforced concrete structure).
5. Building 11 (ETP Lab Building) (G+2) (reinforced concrete structure).
6. New Dyeing Building (Building-12) (G+5) (reinforced concrete structure).
7. Building-13 (Fair Shop Building) (G+2) (reinforced concrete structure).
8. Building-14 (New Utility Building) (G+Mz+1) (reinforced concrete building).
9. Building-15 (Fire Pump Building) (G+1) (reinforced concrete building).
10. Building-24 (2 No. Security office) (G) (reinforced concrete building).
11. Building-25 (3 No. Security office) (G) (reinforced concrete building).
12. Shed-1 (01 No Security Office) (G) (masonry building with RC slab).
13. Shed-2 (04 No Boiler Room) (G) (reinforced concrete building).
14. Shed- 3 (01 No Fire Pump) (G) (masonry building with RC slab).
15. Shed-4 (3 No Boiler Room) (G) (pre-fabricated steel structure).
16. Shed-5 (Lath Workshop & RCU) (G) (pre-fabricated steel structure).
17. Shed-6 (Yarn Store) (G) (pre-fabricated steel structure).

Buildings Information

18. Shed-7 (Big Go-down) (G) (pre-fabricated steel structure).
19. Shed no. 08 (Left Over shed) (G) (pre-fabricated steel structure).
20. Shed no. 09 (Left Over store shed) (G) (steel building).
21. Shed no. 10 (New chemical shed 1&2) (G) (steel building).
22. Shed no. 11 (Finished fabric shed) (G) (steel building).
23. Shed no. 12 (Central wastage shed 1&2) (G) (steel building).
24. Shed no. 13 (04 no. Security office) (G) (bamboo shed).
25. Shed no. 14 (New Yarn shed) (G) (pre-fabricated steel structure).

Observations

Heavy loading observed on floors

Observation: Building 7

Fifth Floor

Fourth Floor

Third Floor

Second Floor

Heavy loading observed throughout the building which exceeds the prepared live load of 3 kPa (3rd, 4th,5th floor), 5kPa (2nd, 1st, Ground floor). Building engineer is required to actively manage the floor load plan also maintain floor loading below 3 kPa.

Observation: Building 7

RSC RMG SUSTAINABILITY COUNCIL

Inconsistency in the design report

Observation: Building 7

2.4.4 FOUNDATION COMPLIANCE STUDY

MATERIAL STUDY:

f'c =4451 psi (Reference from core test report)
fy =72000 psi

The Foundation is an RCC Footing system, footing bearing capacity is taken from soil test report Table No-5.
15' bellow from EGL
Average bearing capacity, 2.62 TSF (F.S=3.0)

7.85 ksf for F.S=2.0.

Factor of Safety Considered 2 instead of 2.5

Column shows overstressed as per PMM ratio>1. But no recommendation provided in the design report.

Footing Bearing Capacity Table. WSD

Story	Joint Label	Load Combo	FZ	Q KSF	AREA REQ.	AREA PROV	RATIO %	COMP.
Base	5	DL	398.568					
Base	6	DL	421.998					
Base	9	DL	435.346					
Base	10	DL	421.274					
Base	11	DL	421.667					
Base	14	DL	553.542					
Base	15	DL	328.081					
Base	18	DL	433.607					
Base	19	DL	419.392					
Base	20	DL	423.182					
Base	25	DL	667.978					
Base	26	DL	715.869					
Base	29	DL	740.211					
Base	30	DL	714.066					
Base	31	DL	714.73					
Base	32	DL	721.056					
Base	33	DL	720.502					
Base	34	DL	719.292					
Base	35	DL	714.058					
Base	36	DL	745.797					
Base	37	DL	740.249					
Base	42	DL	731.18					
Base	43	DL	688.505					
Base	44	DL	833.353					
Base	45	DL	685.556					
Base	74	DL	371.879					
Base	93	DL	257.143					
Base	96	DL	416.001					
Base	99	DL	421.059					
Base	100	DL	435.408					
Base	101	DL	422.219					
Base	102	DL	415.666					
Base	152	DL	426.281					
Base	153	DL	592.014					
		TOTAL LOAD	30853.72	7.85	3930.41	8963	43.85	OK

Only dead load considered for foundation bearing capacity check.

Observation: Building 7

12/31/2019

The findings from the analysis are given below Accord/Alliance/NTP Standard:

- **Deflection**:
  Maximum story drifts due to lateral loading within allowable Limit.
- **Beam Capacity:**
  Beams are inadequate for carry the load.
- **Column Capacity:**
  All Columns are adequate according to carry the prescribed loading also PMM ratio is within allowable limit.
- **Footing Capacity:**
  Geotechnical Capacity: Based on existing Footing Capacity is adequate.

As per design report floor beams are inadequate for carry the load. But no recommendation provided in the design report. Also beam adequacy check not fully provided.

Material Properties

fy = 72000 psi (Referenced from Rebar chalan copy)
f'c =4451psi (Referenced from Core Test Report)
Code & Standard = BNBC 2006

(Maximum required steel against factored load combination has been collected from Etabs design for each section and analyzed accordingly)

Different Material Properties (Concrete strength, Rebar strength) mentioned in the design report.

EXECUTIVE SUMMARY

The primary purpose of the assessment was to confirm the structural integrity, risk and to determine the necessary steps for the factory. Detail Assessment Included-

- Preparation of As-built drawings
- Visual inspection to identify distress
- Conduct tests to evaluate material strength
- Structural analysis to assess safety and serviceability against loading as set out in Alliance/Accord/NTPA

According to the need of assessment our Sr. Engineers and team of Jr. Engineers have done the assessment. For completing the assessment we have done Ferro-scanning in number of locations, in-sit core testing of concrete.

The following findings have been identified during assessment:

- The as-built configuration almost matches with the provided design drawings. However we have prepared corrected as-built structural drawings to conduct the structural analysis.

Concrete core testing confirmed that the concrete strength of the Column is 4050 psi

The reinforcement of beam, column and footing has been considered as 60 grades as per physical checking and chalan copy.

The building structure is 6(six) storied frame structure consisting of RCC slab, RCC beam and RCC column supported by MAT/Footing Foundation. Detail structural analysis has been conducted using Finite Element Package ETABS 16.2.1 Dead load has been taken from the actual drawing that is prepared based on the existing structure as provided in **As Built Drawings**. Floor finish, interior wall and exterior partition wall along the periphery are also taken into consideration. Minimum live load has been considered to be 42 psf as per NTPA standard. Wind loads have been considered as per BNBC.

Table 2.1.1.2.1: Live load & Floor Finish Load considered for the structure is specified below:

Floors	Uses	Live Load (psf)	Floor Finish (psf)
Ground Floor	Storage	105 psf	20 psf
1st Floor	storage	105 psf	20 psf
2nd Floor	Storage	105 psf	20 psf
3rd Floor	Fabric Area	63 psf	20 psf
4th Floor	Fabric Area	63 psf	20 psf
5th Floor	Fabric, yarn area	63 psf	20 psf
Roof	Open Roof Area	30 psf	20 psf

Different live load mentioned in the same report.

Observation: Building 7

DETAIL ENGINEERING ASSESSMENT REPORT

GMS COMPOSITE KNITTING INDUSTRIES LIMITED.

Building Name: Basement Building

Three Storied Steel Building

Burir Bazar Road,1150117, Baipail, Ashulia, Saver, Bangladesh.

Date of Submission: 28/Dec/19

Submitted By

EQMS CONSULTING LTD.

Office:

House No#53, Road#04, Block#C,Banani, Dhaka-1213

Bangladesh.

Email: info@eqmsbd.com

Phone: +880 1818184315

Adequacy check of slab; Serviceability checks as per BNBC not included in the design report.

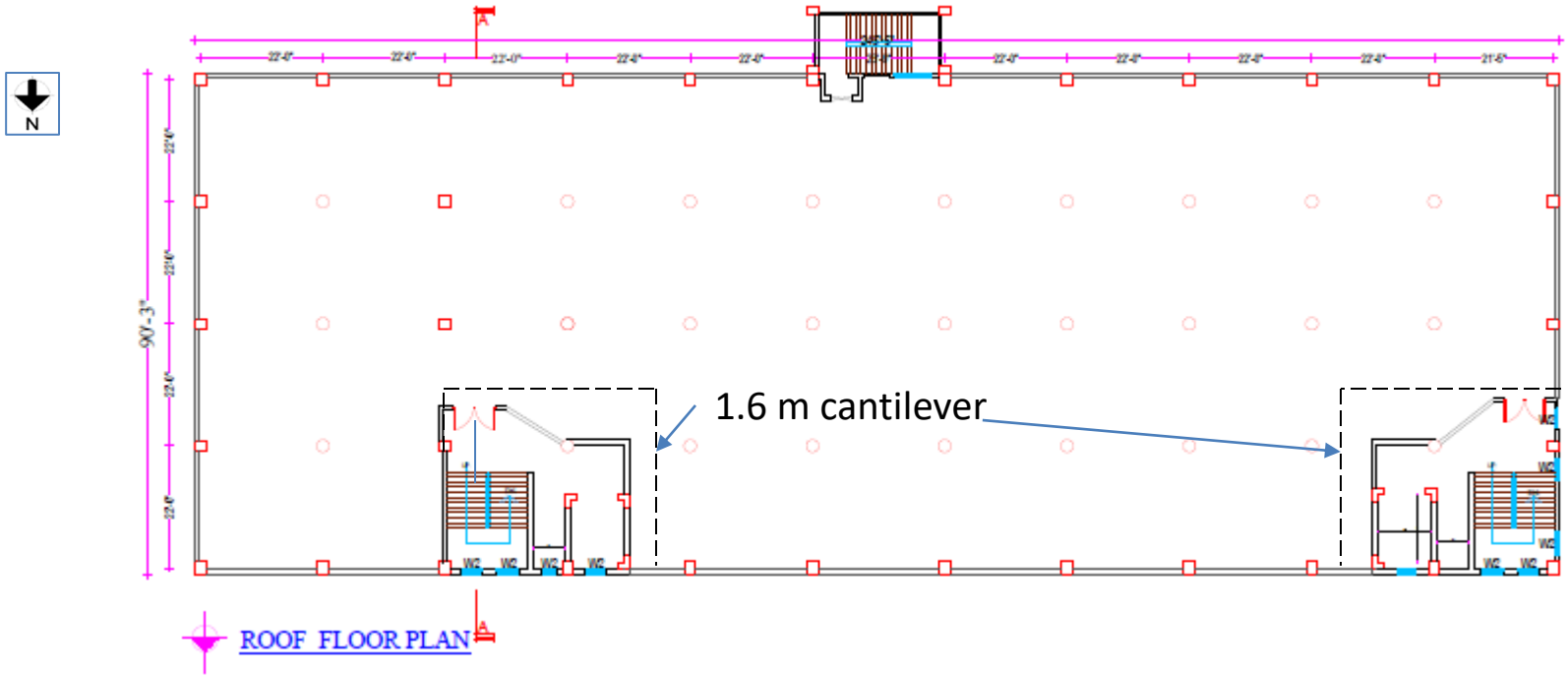
As per BNBC, every building or structure Designed shall have its design documents Prepared in accordance with the provision of Section 1.9.1 The design document shall include a design report, and a set of structural drawings, which shall be prepared in compliance with Section 1.9.1.1 and section 1.9.1.2 as per BNBC.

The available design report not fully comply with BNBC. Building engineer is required to prepare design report in compliance with section 1 9 1 1 (part 6 BNBC)

Observation: Building 7

Lack of information in as-built drawing

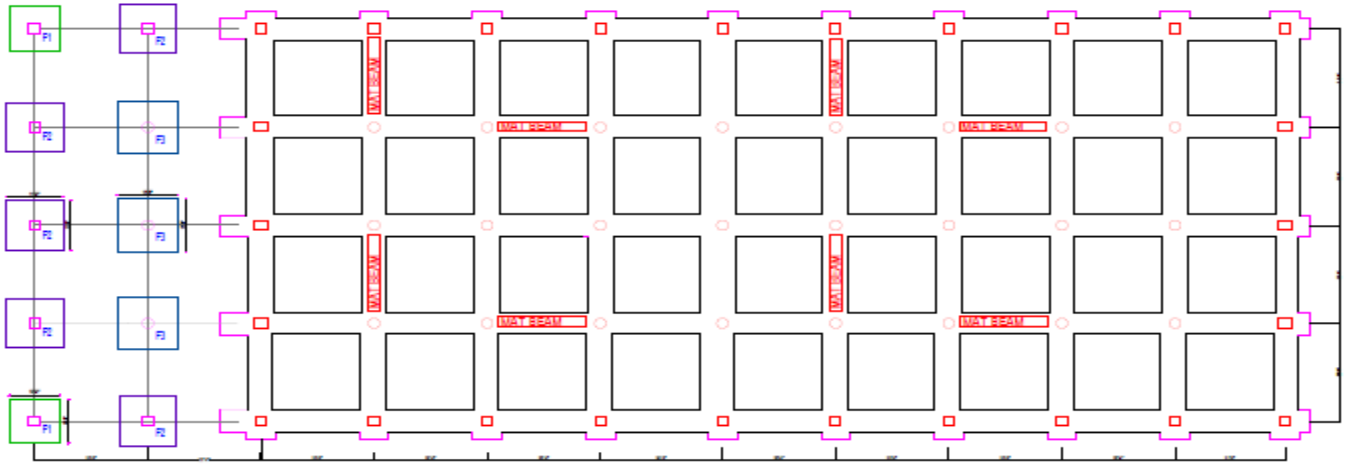
Observation: Building 7



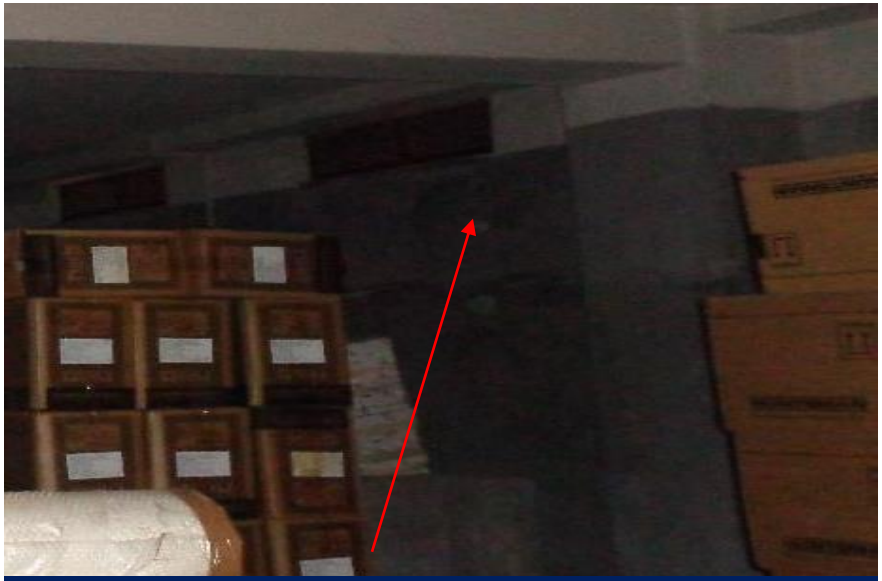
Extension of roof with 1.6 m cantilever not shown in drawing

Observation: Building 7

RSC RMG SUSTAINABILITY COUNCIL



Building engineer is required to survey the structure & prepare as-built drawings.

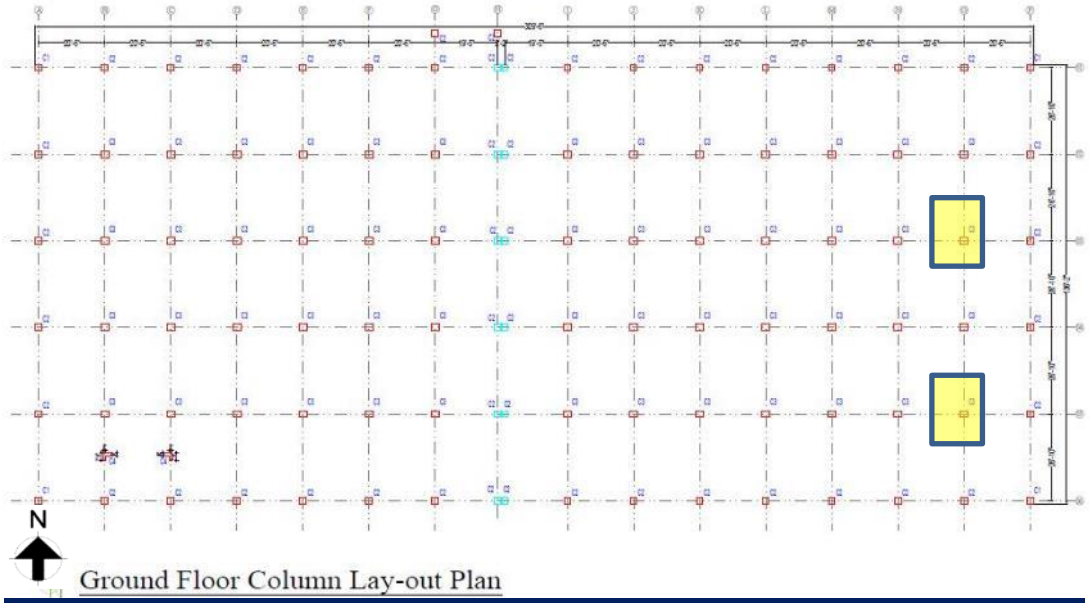


Retaining wall layout plan not shown in drawing

Observation: Building 7

Column and foundation stressed above normal design limits

Observations: Allover Printing Building-(Building-8)



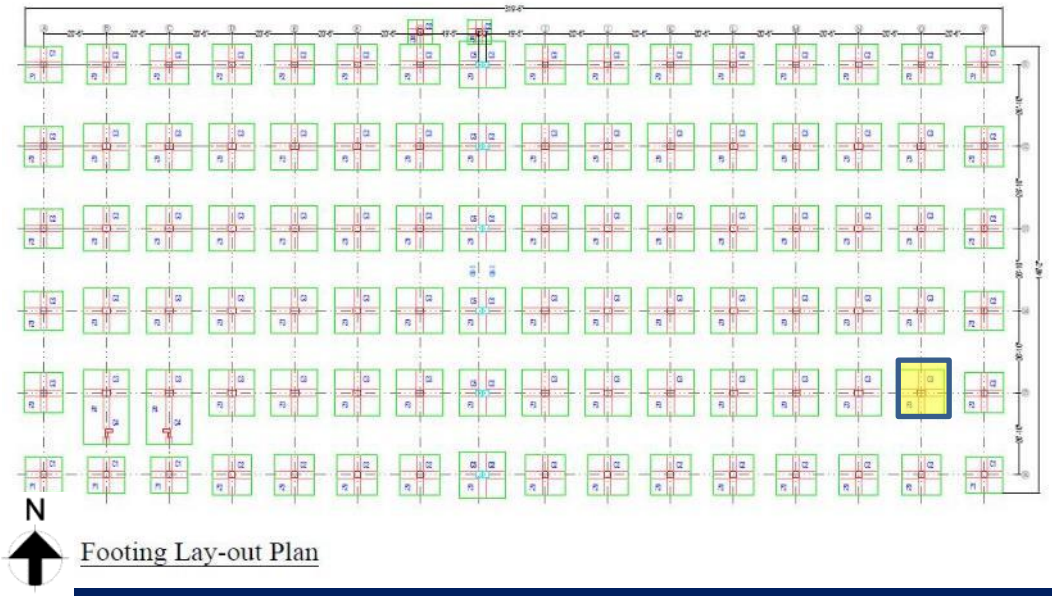
Column layout plan

Cursory calculation indicates that columns are stresses above normal design limits at the marked locations considering 3 kPa live load on typical floor. Building engineer to review design, loads and columns stresses.

250mm Build up at toilet area

Typical floor loading

Observations: Allover Printing Building-(Building-8)



Foundation Layout plan

Typical floor loading

Cursory calculation indicates that foundation is stressed above normal design limits at the marked locations considering 3 kPa live load on typical floor. Building engineer to review design, loads and foundation stresses.

Loading from extended floor and RC water tank

Observations: Allover Printing Building-(Building-8)

RSC RMG SUSTAINABILITY COUNCIL

Remediation plan for inadequate footing

Observations: Allover Printing Building-(Building-8)

Footing F2								
Story	Joint Label	Load Combo	FZ Kip	Q ksf	Area Req. Sft	Area Prov. Sft	Ratio%	Comp.
Base	18	COMB1	585.803	6.21	94.33	169	55.82	OK
Base	19	COMB1	594.639	6.21	95.76	169	56.66	OK
Base	20	COMB1	586.611	6.21	94.46	169	55.89	OK
Base	21	COMB1	580.868	6.21	93.54	169	55.35	OK
Base	22	COMB1	603.39	6.21	97.16	169	57.49	OK
Base	23	COMB1	870.665	6.21	140.20	169	82.96	OK
Base	24	COMB1	1069.626	6.21	172.24	169	101.92	OK
Footing F5								
Story	Joint Label	Load Combo	FZ Kip	Q ksf	Area Req. Sft	Area Prov. Sft	Ratio%	Comp.
Base	122	COMB1	370.079	6.21	59.59	64	93.116	OK
Base	123	COMB1	452.691	6.21	72.90	64	113.9	~Ok

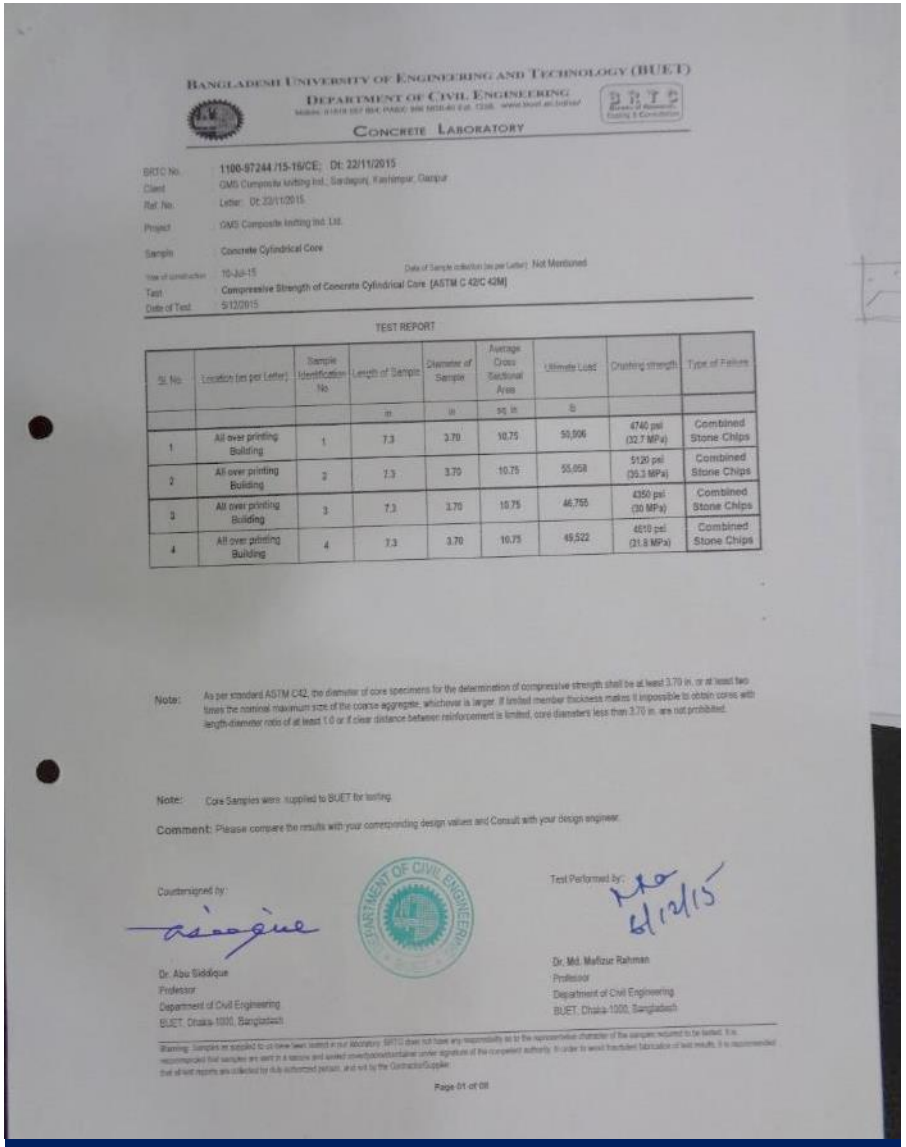
Some footings are found inadequate as per prepared DEA

As per prepared DEA, some footings are found inadequate. However, no remediation plan has been prepared for those inadequate footings. Building engineer is required to prepare remediation plan for all inadequate footings and complete remediation work accordingly.

Observations: Allover Printing Building-(Building-8)

Location of concrete cylinder core not found on site

Observations: Allover Printing Building-(Building-8)



BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY (BUET)

DEPARTMENT OF CIVIL ENGINEERING

CONCRETE LABORATORY

BRTC No. 1100-97244 /15-16/CE; Dt: 22/11/2015
Client: OMS Composite Knitting Ind.; Sardapuri, Kashimpur, Gazipur
Ref. No.: Letter: Dt.23/11/2015
Project: OMS Composite Knitting Ind. Ltd.
Sample: Concrete Cylindrical Core
Date of Sample collection (as per Letter): Not Mentioned
Year of construction: 10-Jul-15
Test: Compressive Strength of Concrete Cylindrical Core [ASTM C 42/C 42M]
Date of Test: 5/12/2015

TEST REPORT

Sl. No.	Location (as per Letter)	Sample Identification No.	Length of Sample	Diameter of Sample	Average Cross Sectional Area	Ultimate Load	Crushing strength	Type of Failure
			in	in	sq. in	lb		
1	All over printing Building	1	7.3	3.70	10.75	50,906	4740 psi (32.7 MPa)	Combined Stone Chips
2	All over printing Building	2	7.3	3.70	10.75	55,058	5120 psi (35.3 MPa)	Combined Stone Chips
3	All over printing Building	3	7.3	3.70	10.75	46,755	4350 psi (30 MPa)	Combined Stone Chips
4	All over printing Building	4	7.3	3.70	10.75	49,522	4610 psi (31.8 MPa)	Combined Stone Chips

Note: As per standard ASTM C42, the diameter of core specimens for the determination of compressive strength shall be at least 3.70 in. or at least two times the nominal maximum size of the coarse aggregate, whichever is larger. If limited member thickness makes it impossible to obtain cores with length-diameter ratio of at least 1.0 or if clear distance between reinforcement is limited, core diameters less than 3.70 in. are not prohibited.

Note: Core Samples were supplied to BUET for testing.

Comment: Please compare the results with your corresponding design values and Consult with your design engineer.

Countersigned by:

Dr. Abu Siddique
Professor
Department of Civil Engineering
BUET, Dhaka-1000, Bangladesh

Test Performed by:

Dr. Md. Mafizur Rahman
Professor
Department of Civil Engineering
BUET, Dhaka-1000, Bangladesh

Page 01 of 01

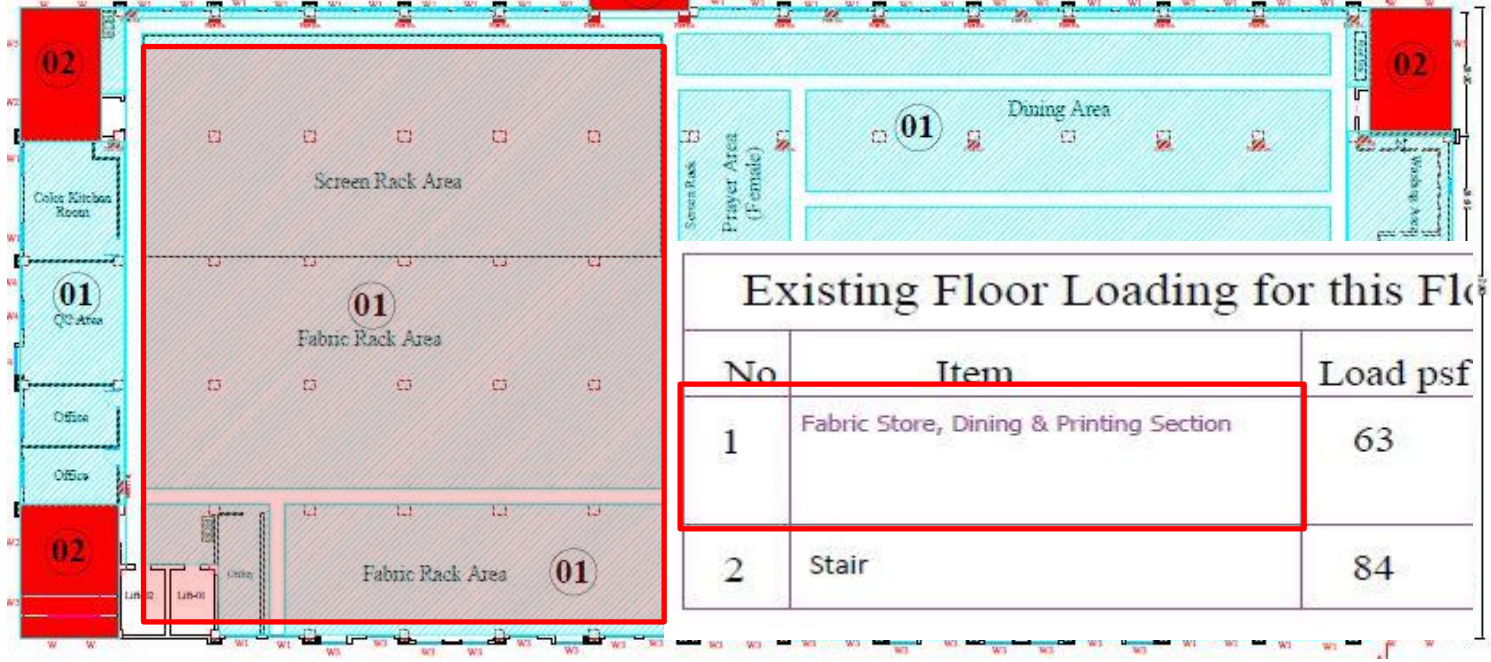
Provided concrete cylinder core test report

At the time of inspection one set of concrete cylinder core test report was available for this structure. However, no sample location was mentioned in test report. Also, no trace of the cores was found at site. Building engineer is required to produce a core layout and mark all the locations of the taken cores.

Observations: Allover Printing Building-(Building-8)

Load plan doesn’t comply with BNBC

Observations: Allover Printing Building-(Building-8)



Existing Floor Loading for this Flo

No	Item	Load psf
1	Fabric Store, Dining & Printing Section	63
2	Stair	84

Load plan for 4th floor

Live load at storage areas are considered as 3 KPa in prepared load plan. However, as per BNBC-Part 6 live load for light storage areas is required to be considered as 6 KPa. Building engineer is required to revise the load plan as per BNBC part-6.

INDUSTRIAL, STORAGE & HAZARDOUS (Occupancy - G, H & J)	Workshop, factory, warehouse	1 Light workroom without storage	3.0	2.7
		2 Machinery hall & circulation area	4.0	4.5
		3 Factory, workshop etc.	5.0	4.5
		4 Manufacturing : light	6.0	4.5
		heavy	12.0	9.0 (5)
		ice	15.0	9.0 (5)
		5 Printing plant :		(5)
		Press room	7.0	11.0
		Composing and linotype room	5.0	9.0 (5)
		Paper storage room	12.0	9.0 (5)
		6 Motor room, fan room etc. including the weight of machinery	7.5	4.5
		7 Cold storage, grain storage	15.0	9.0 (5)
		8 Storage warehouses : light	6.0	4.5 (5)
		heavy	12.0	9.0
		9 Foundries	20.0	12.0

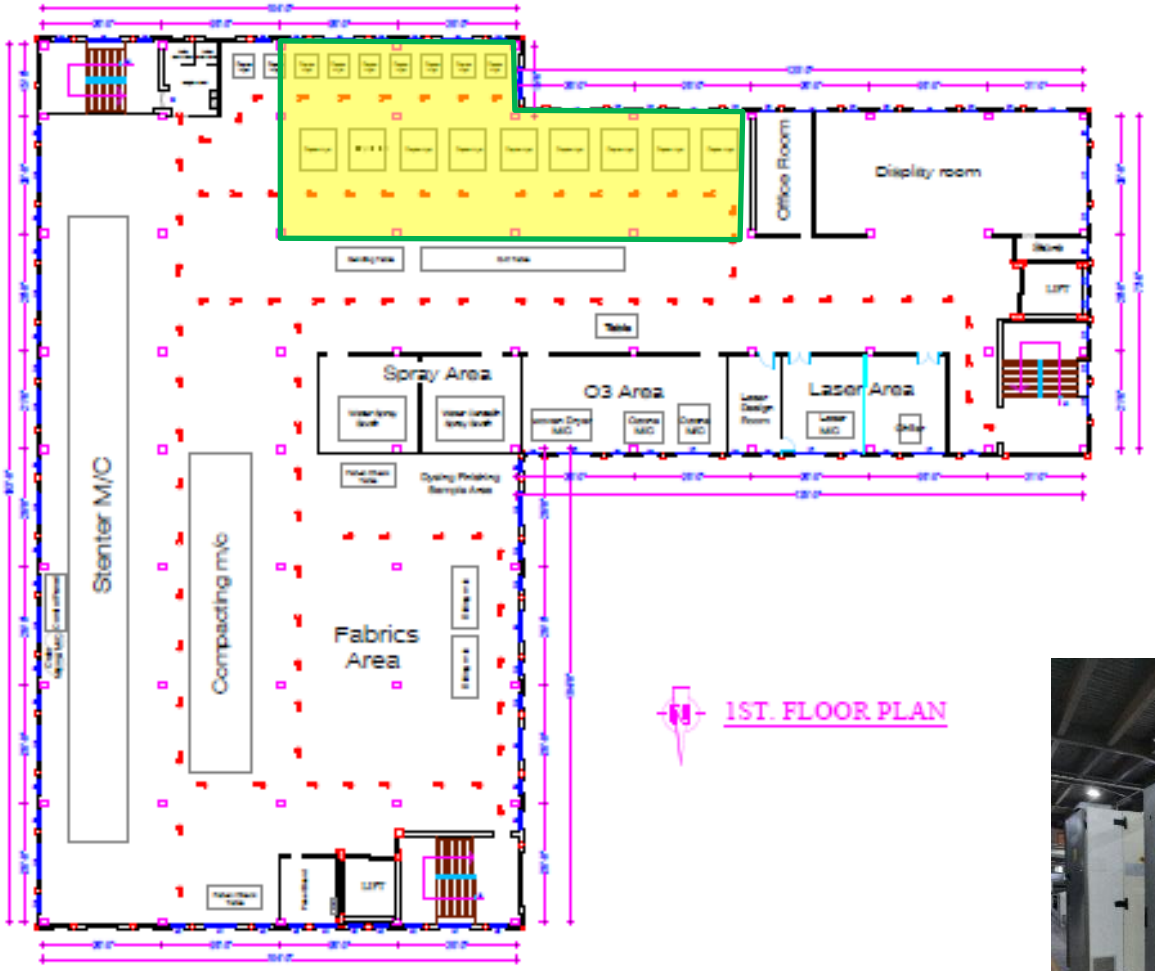
Typical storage area

Typical storage area

Observations: Allover Printing Building-(Building-8)

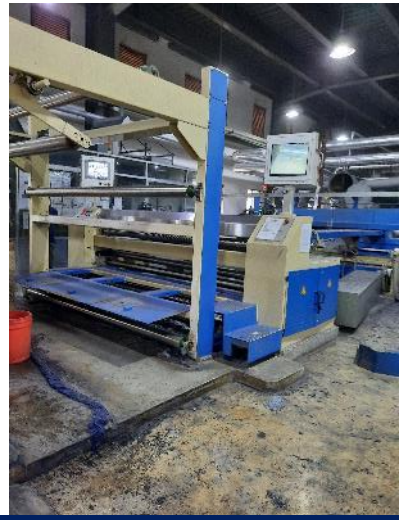
RSC RMG SUSTAINABILITY COUNCIL

Vibration on floor due to operation of heavy machineries



First floor layout plan

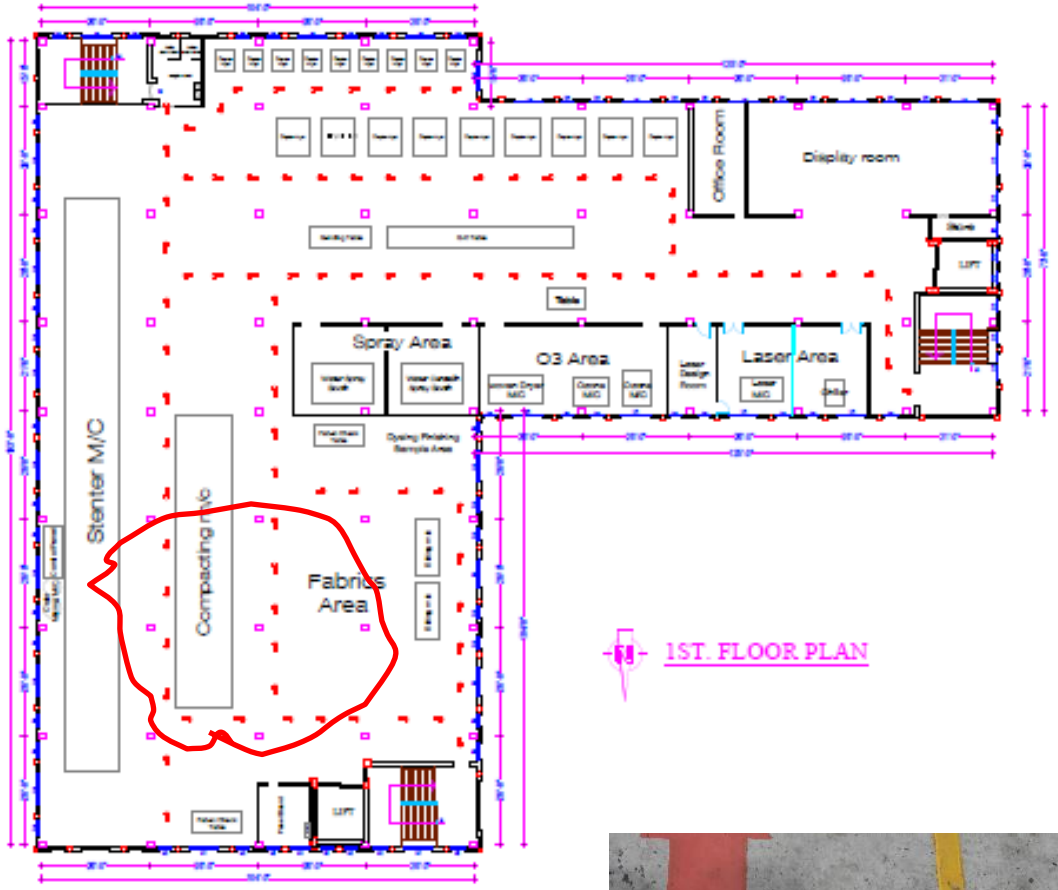
Significant vibration was felt on the first floor due to operation of heavy machineries. Building engineer is required to investigate the long-term effect of the vibration and suggest remediation.



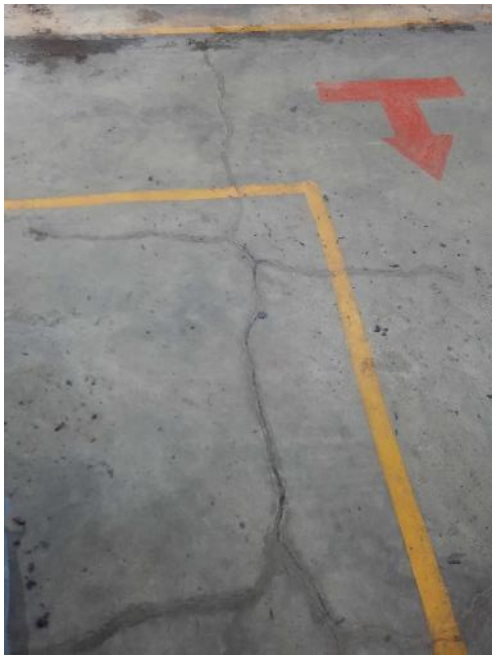
Heavy machineries

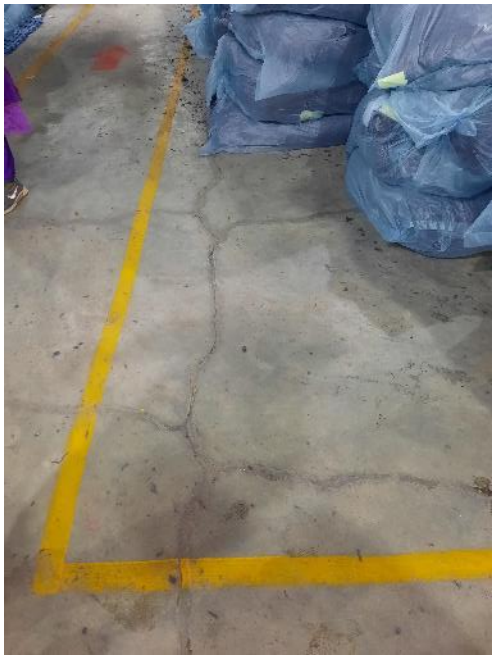
Observation: Building 9

Crack on first floor slab



1ST. FLOOR PLAN



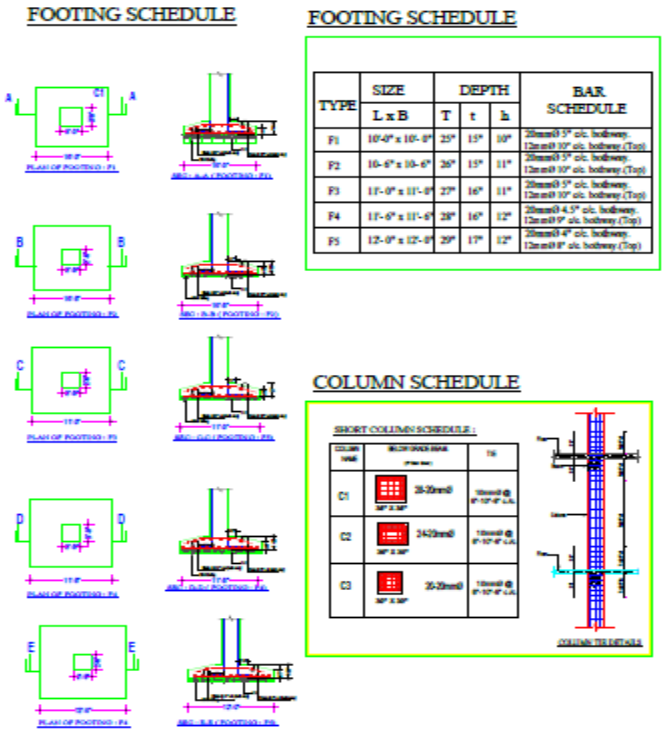


Crack observed on the 1st floor slab apparently due to presence of heavy machineries and vibration. Building engineer is required to check the extent of the crack and suggest remediation.

Observation: Building 9

Inconsistency in design report

Observation: Building 9



3. Foundation Compliance

Area and punching Compliance

Joint Label	Load Combo	Fy Kip	Fac. Fy Kip	ID	area prov	Qksf	area req	Area Comp	T in	D in	a	b	Punching Capacity Kip	Punching comp
385	12 DL+LF +LR	167	218	2	110	4	42	OK	26	23	30	30	652	OK
386	12 DL+LF	260	338	2	110	4	65	OK	26	23	30	30	652	OK

GMS COMPOSITE KNITTING INDUSTRIES LTD

	DL+LF +LR						4							
403	12 DL+LF +LR	454	590	5	144	4	113	OK	29	26	30	30	779	OK
404	12 DL+LF +LR	456	592	3	110	4	114	OK	27	24	30	30	694	OK
405	12 DL+LF +LR	456	592	2	110	4	114	OK	26	23	30	30	652	OK
406	12 DL+LF +LR	458	595	3	110	4	114	OK	27	24	30	30	694	OK
	12													

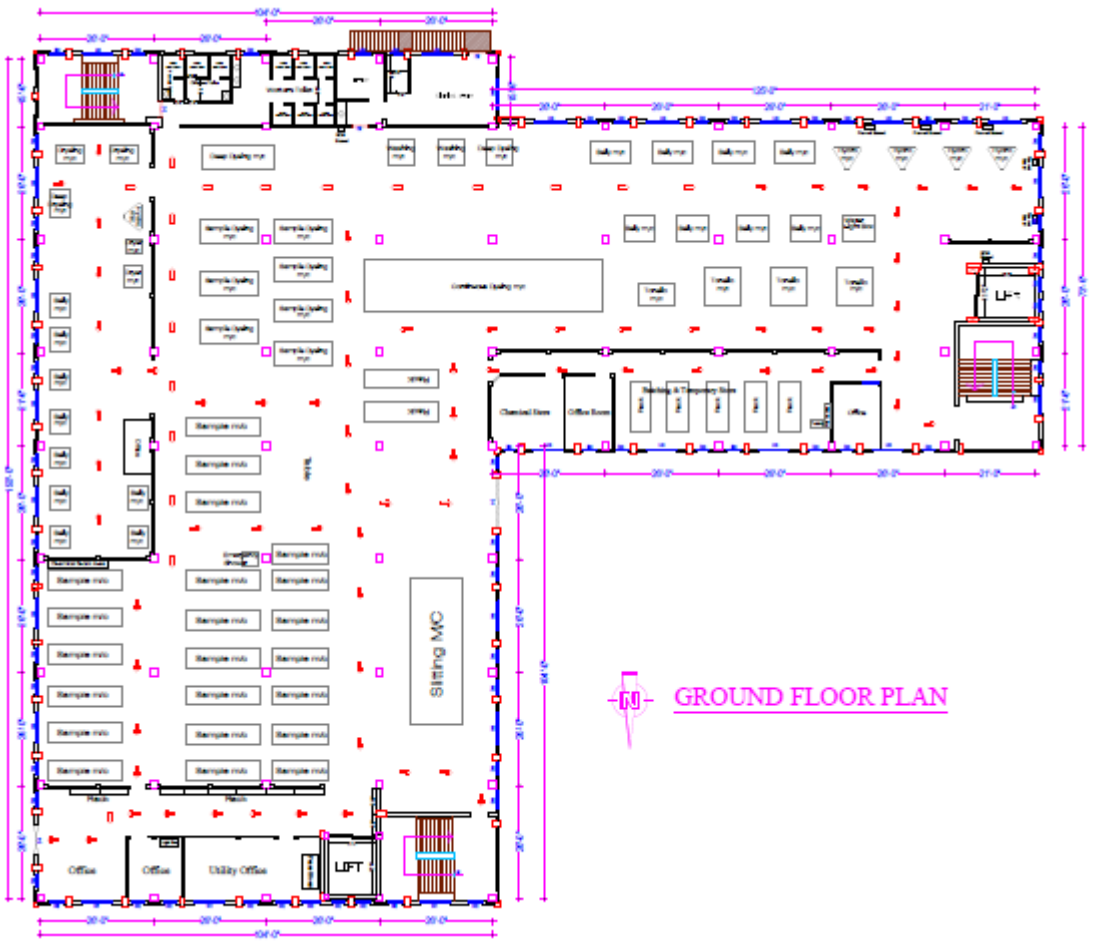
Depth of footing not mentioned in the drawing.

Some footings required area > provided area. Building engineer is required review the design, load & footing stresses.

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. The available design report not fully comply with BNBC. Building engineer is required to prepare design report in compliance with section 1 9 1 1 (part 6 BNBC).

Observation: Building 9

Vertical bracing missing at ground floor



Vertical bracing at ground floor found missing in the marked location. Building engineer is required to install the missing bracing also check the lateral stability in long direction.

Observation: Building 9

Crack on roof slab

Crack observed on roof slab. However, the factory has repaired the crack by bituminous treatment. No investigation report was available to determine the reason of crack, extent of crack & detail repair methodology. Building engineer is required to investigate the reason of crack, extent of crack and check whether the crack are repaired with suitable method.

Observation: Building 9

Stagnant of water on roof

Stagnant of water observed on roof. Building engineer is required to improve the roof drainage system.

Observation: Building 9

Prepared DEA report needs to be revised

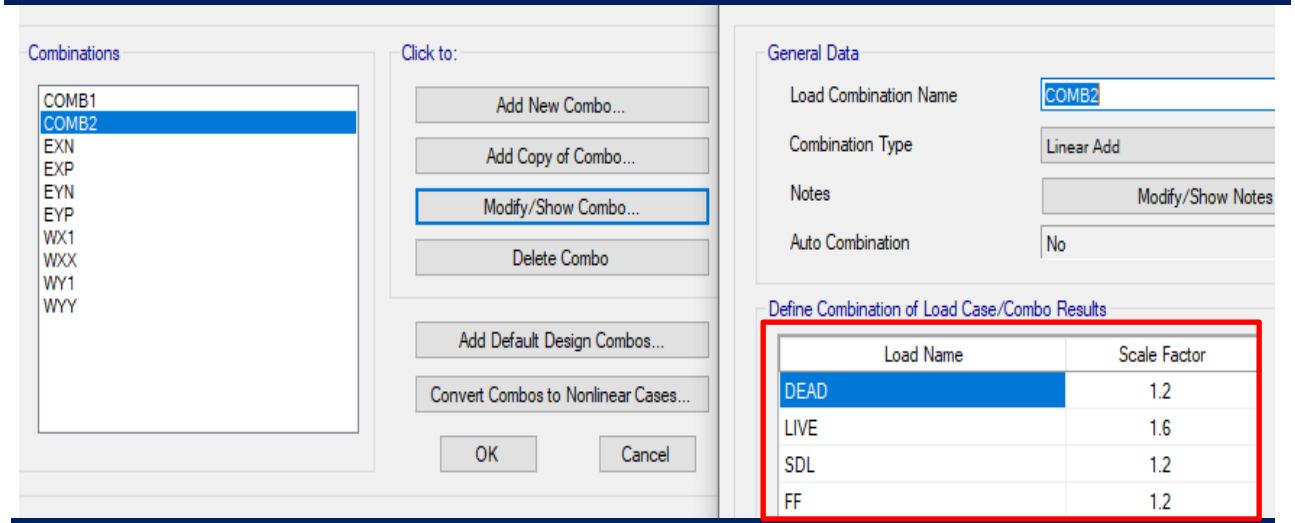
Observations: Sample Dyeing Building (Building-10)

2.2 LOAD COMBINATIONS

Load combinations used for the building analysis. (Alliance load combination)

Load Combinations	
Combination Name	**Combination Definition**
COMUNFACT	1.000*DEAD + 1.000*LIVE + 1.000*PW + 1.000*SDL + 1.000*FF
COMFACT	1.200*DEAD + 1.600*LIVE + 1.200*PW + 1.200*SDL + 1.200*FF
COMWX1	1.050*DEAD + 1.250*LIVE + 1.050*PW + 1.050*SDL + 1.050*FF + 1.000*WX
COMWX2	1.050*DEAD + 1.250*LIVE + 1.050*PW + 1.050*SDL + 1.050*FF – 1.000*WX
COMWY1	1.050*DEAD + 1.250*LIVE + 1.050*PW + 1.050*SDL + 1.050*FF + 1.000*WY
COMWY2	1.050*DEAD + 1.250*LIVE + 1.050*PW + 1.050*SDL + 1.050*FF – 1.000*WY
COMEX1	1.050*DEAD + 1.250*LIVE + 1.050*PW + 1.050*SDL + 1.050*FF + 1.000*EQX
COMEX2	1.050*DEAD + 1.250*LIVE + 1.050*PW + 1.050*SDL + 1.050*FF – 1.000*EQX
COMEY1	1.050*DEAD + 1.250*LIVE + 1.050*PW + 1.050*SDL + 1.050*FF + 1.000*EQY
COMEY2	1.050*DEAD + 1.250*LIVE + 1.050*PW + 1.050*SDL + 1.050*FF – 1.000*EQY

NTPA load combination mentioned in DEA report



NTPA load combination considered in software-based analysis model

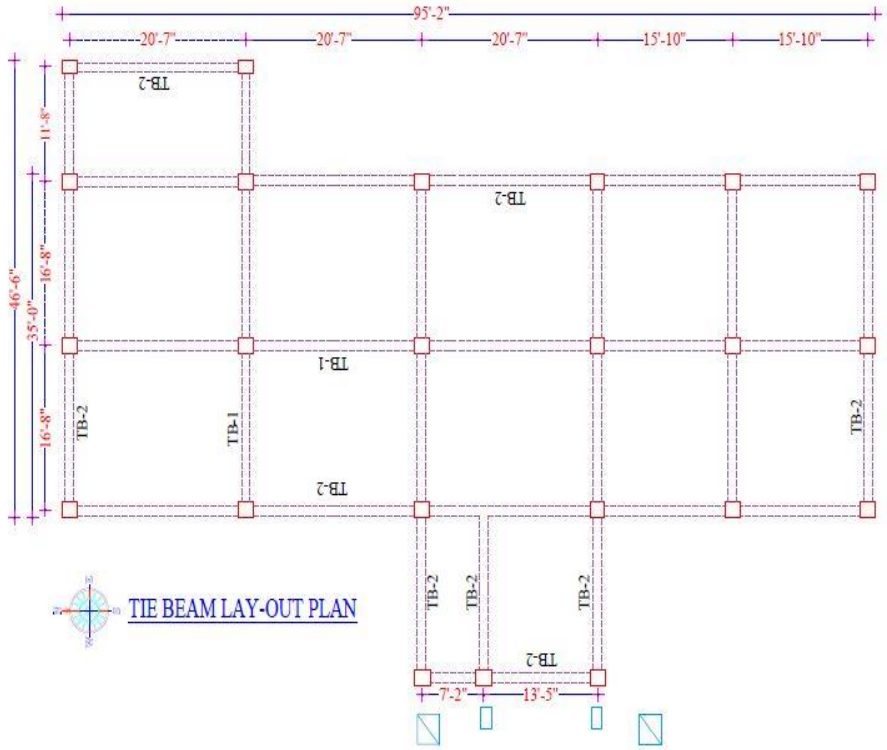
The building was constructed between November 2016 and December 2017 but in software-based analysis load combination has been considered as NTPA which doesn't comply with BNBC part-6. Building engineer is required to revised the prepared DEA report as per BNBC part-6.

Observations: Sample Dyeing Building (Building-10)

Discrepancy in as-built drawing

Observations: Sample Dyeing Building (Building-10)

Tie beam of 1st floor found at different levels



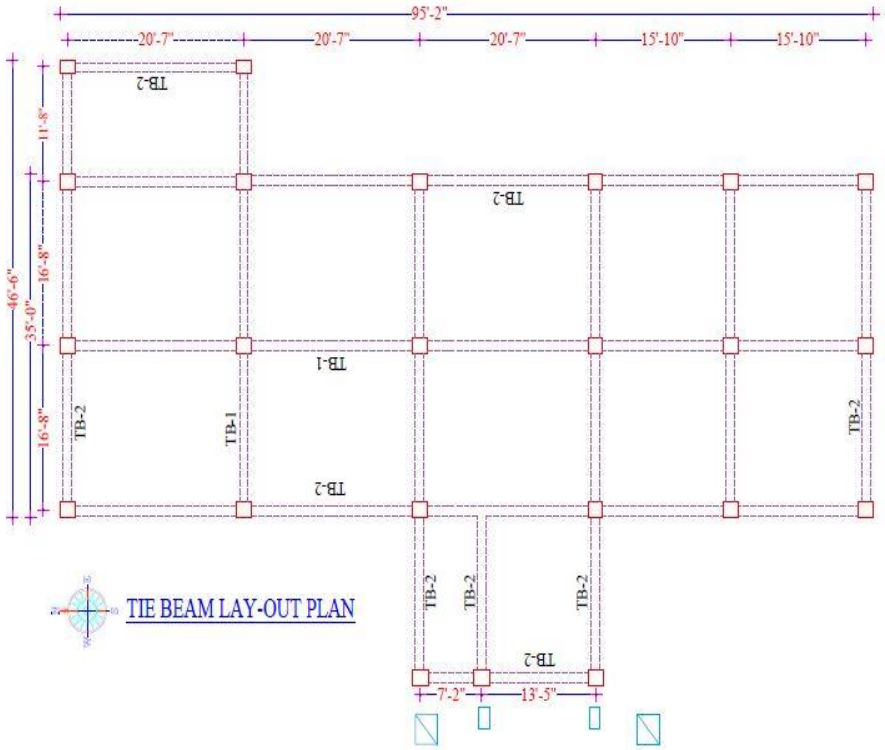
Tie beam layout

Tie beam of 1st floor were found at different levels but not shown in drawing. Also, dimension of tie beam at different levels differs from each other which is not shown in drawing. Building engineer is required to update the as-built drawing.

Observations: Sample Dyeing Building (Building-10)

RSC RMG SUSTAINABILITY COUNCIL

Tie beam of Ground floor found at different levels



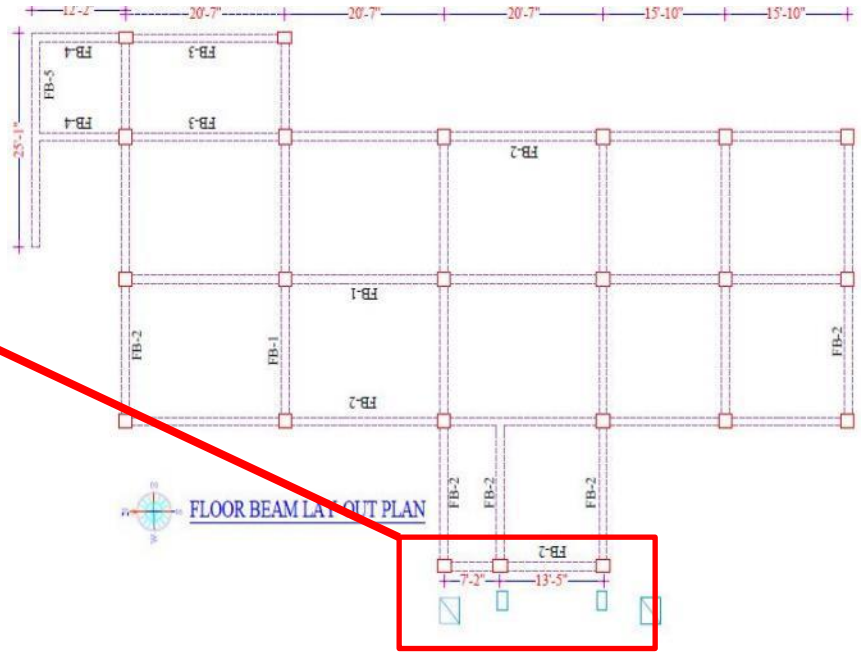
Tie beam layout

Tie beam of Ground floor were found at different levels but not shown in drawing. Also, dimension of tie beam at different levels differs from each other which is not shown in drawing. Building engineer is required to update the as-built drawing.

Observations: Sample Dyeing Building (Building-10)

RSC RMG SUSTAINABILITY COUNCIL

Cantilever beam not shown in layout



Cantilever beam at south side

Cantilever beams at south side extended area are not shown in drawing. Building engineer is required to update the as-built drawing.

Observations: Sample Dyeing Building (Building-10)

Sectional detail of overhead water tank not shown in layout

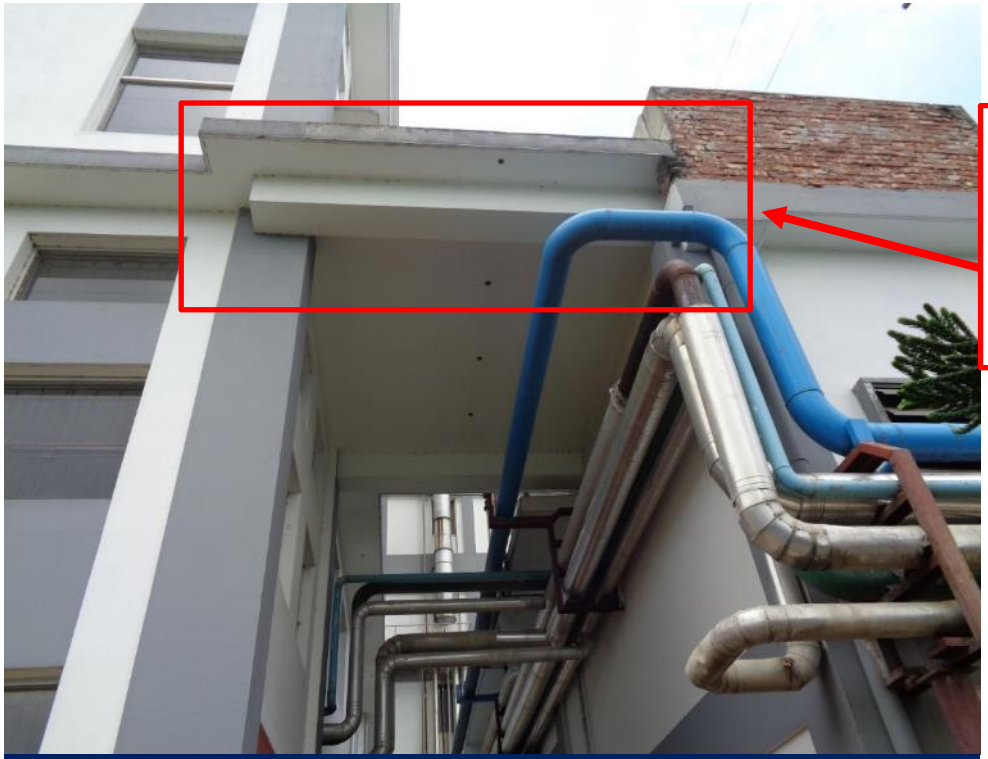
Dimension of overhead water tank was not shown in as-built drawing. Building engineer is required to update the as-built drawing.

Observations: Sample Dyeing Building (Building-10)

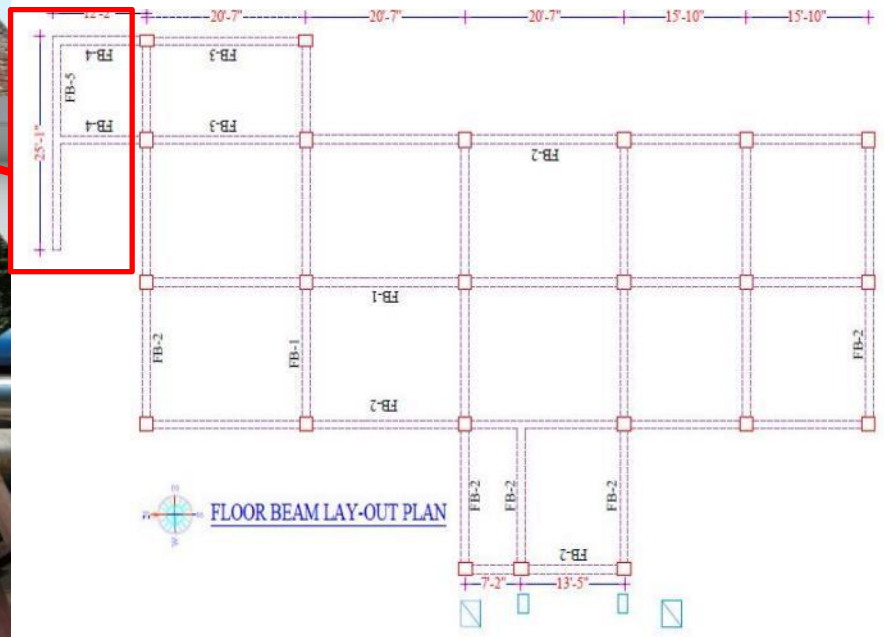
Irregularities in load transfer system

Observations: Sample Dyeing Building (Building-10)

42



Marked portion was found only at 1st floor



Typical floor beam layout

Beams at marked portion are not found as per beam layout and regular pattern which indicates irregularity in load transfer system. Also, marked portion of Building-10 was appeared to be structurally connected with Boiler building but these two structures have been analysed separately. Building engineer is required to update the as-built drawing, check adequacy of the highlighted beams. In-case of any structural connection between Building-10 and Boiler Building, separate the two structures. Otherwise review the lateral load transformations between the buildings.

Observations: Sample Dyeing Building (Building-10)

RMG SUSTAINABILITY COUNCIL

Sample Location of concrete core not repaired properly

Observations: Sample Dyeing Building (Building-10)

Core cutting hole filled with mortar

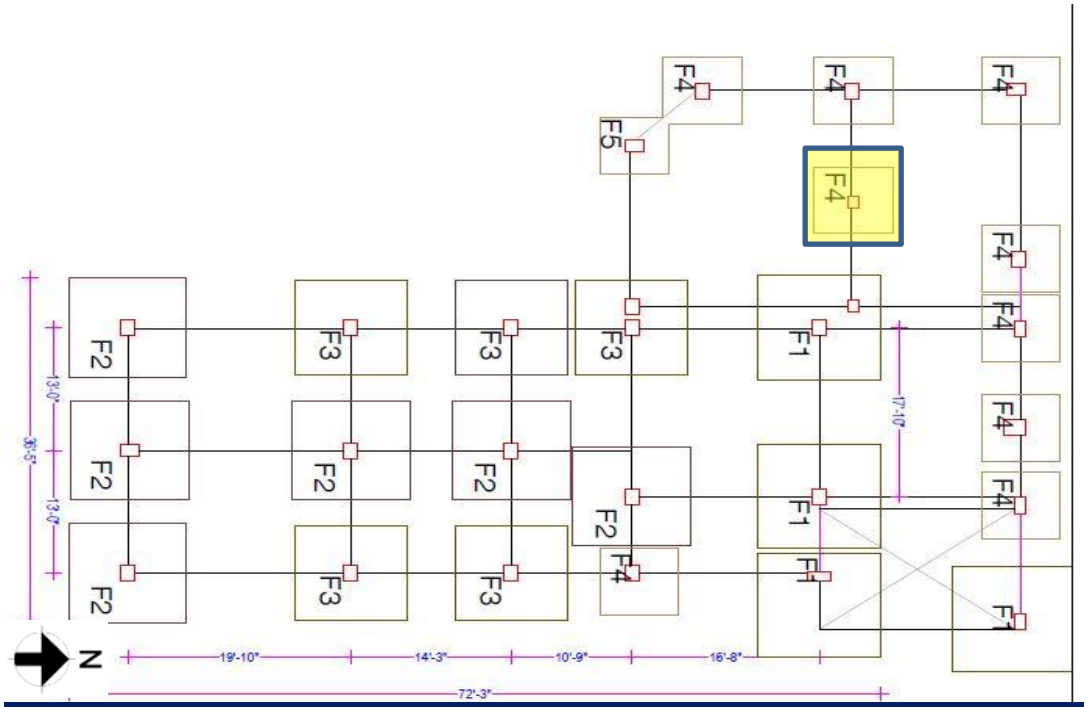
Core cutting hole filled with mortar

Core cutting hole were found filled with only mortar which may impact on column stress level. Building engineer is required to fill all the core cutting hole with micro-concrete.

Observations: Sample Dyeing Building (Building-10)

Foundation stressed above normal design limits

Observations: ETP Lab Building-(Building-11)



Foundation Layout plan

Cursory calculation indicates that foundation is stressed above normal design limits at the marked locations considering 3 kPa live load on typical floor as per prepared live load plan. Building engineer to review design, loads and foundation stresses.

Typical floor loading

Observations: ETP Lab Building-(Building-11)

Prepared DEA report needs to be revised

Observations: ETP Lab Building-(Building-11)

2.4.4 FOUNDATION COMPLIANCE STUDY

MATERIAL STUDY:

f'c =4050 psi (Reference from core test report)
fy =60000 psi

The Foundation is an RCC Footing system, footing bearing capacity is taken from soil test report Table No-3
10' bellow from EGL
Minumum SPT, BH-14=0.86 Tsf (F.S=3.0)

2.6 ksf for F.S=2.0.

Footing Bearing Capacity Table. WSD

Story	Joint Label	Load Case/Combo	FZ	ID	Prov Area	Req. Area	ratio (%)	comp
Base	3	DL	57.128	f4	49	21.97	44.84	OK
Base	4	DL	60.726	f4	49	23.36	47.67	OK
Base	5	DL	78.169	f4	49	30.07	61.36	OK
Base	6	DL	56.204	f4	49	21.62	44.12	OK

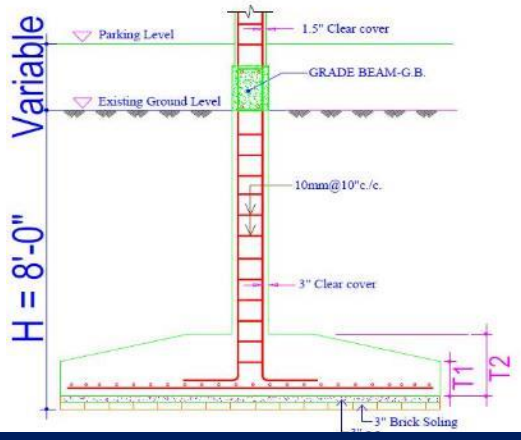
In DEA report, bearing capacity is considered at 3.04m depth and FOS considered as 3.0

In geotechnical investigation report, factor of safety of soil capacity considered as 2.50 and foundation depth mentioned at 2.44 m depth in provided drawing. However, in prepared DEA report soil bearing capacity used for 3.04m depth and factory of safety used as 3.0 which may result in significant change in foundation capacity calculation. Building engineer is required to revised the foundation capacity calculation.

TABLE NO. 5: A. BEARING CAPACITIES OF THE SHALLOW FOUNDATION FROM FIELD AND LABORATORY TEST (VALUES IN TSF, F. S. = 2.5):

Bore Hole No.	Depth in Ft	Field SPT	Cohesion Tsf	Bearing capacity (Tsf)	
				For Strip footing	For Circular or Square footing
BH-11	5	5	0.31	0.76	1.05
	10	12	0.75	1.61	2.55
	15	14	0.87	1.87	2.95
	20	12	0.75	1.61	2.55
BH-12	5	4	0.25	0.68	0.86
	10	12	0.75	1.61	2.55
	15	14	0.87	1.87	2.95
	20	15	0.94	1.99	3.15
BH-13	5	5	0.31	0.76	1.05
	10	14	0.87	1.87	2.95
	15	16	1.00	2.12	3.36
	20	17	1.03	2.24	3.60
BH-14	5	3	0.19	0.54	0.68
	10	4	0.25	0.68	0.86
	15	6	0.38	0.88	1.28
	20	15	0.94	1.99	3.15

FOS in soil test report considered as 2.50



Foundation depth mentioned as 2.44 m

Observations: ETP Lab Building-(Building-11)

Location of concrete cylinder core not found on site

Observations: ETP Lab Building-(Building-11)

50

Centre for Advisory and Testing Services (CATS-MIST)
Military Institute of Science and Technology

Mirpur Cantonment, Dhaka-1216

Compressive Strength of Concrete Drilled Cores

CATS Reference	: 2376/Con/21251-21254/11/19	**Date**	: 21.11.2019
Client	: A+ Consultancy & Mega Solutions.		
Project Name & Address	: GMS Composite Knitting Ind. Ltd. at Sardaganj, Kashimpur, Gazipur, Bangladesh.		
Sample Brought By	: Engr. Golam Saqlain	**Date of Receiving**	: 19.11.2019
Test Method	: ASTM C 42/C 42-M	**Date of Test**	: 20.11.2019
Type of Sample	: Drilled Core	**Sample Condition**	: Unsealed
Location of Sample	: ETP 1st Floor Column		
Construction Year	: Not Mentioned	**Quantity of Sample**	: 04 nos
No of Story	: Not Mentioned	**Type of Aggregate**	: Stone chips

Sl No.	Sample Identification Mark	Original Length	Sawed Length	Diameter	Crushing Load	Crushing Strength		Failure Type	Fracture Type
		mm	mm	mm	kN	MPa	psi		
5	Point-1	150.0	138.0	69.0	122.1	32.6	4730	Combined	Cone and Shear
6	Point-2	175.0	136.0	69.0	114.6	30.6	4440	Combined	Cone and Shear
7	Point-3	145.0	136.0	69.0	139.1	37.2	5390	Combined	Cone and Shear
8	Point-4	155.0	136.0	69.0	132.5	35.4	5130	Combined	Cone and Shear

REMARKS:

1. All information (other than the test results) displayed above was provided by the client. CATS –MIST did not verify any of those.

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

Test Supervised By:

Md. Jahidul Islam, PhD, Engrs
Lt Col
Instructor Class-A
CE Department, MIST
Mirpur Cantonment, Dhaka

Countersigned By:

Col
MUHAMMAD NUR HOSSAIN
Colonel
Senior Instructor
Civil Engineering Department
MIST

Note: The results shown in this test report refer only to the samples tested, unless otherwise stated . It is recommended that samples are to be sent in secured and sealed cover/packet/container under the signature of the competent authority in order to avoid fraudulent fabrication of test results. It is also recommended that all test reports are to be collected by duly authorized person and not by the contractor/supplier himself. This test report can not be reproduced, except in full, without prior written permission of the client.

Tel: +88-02-8000345, Cell: 01769-023904, Web: www.mist.ac.bd, cats.mist@gmail.com

Provided concrete cylinder core test report

One location of concrete core on column

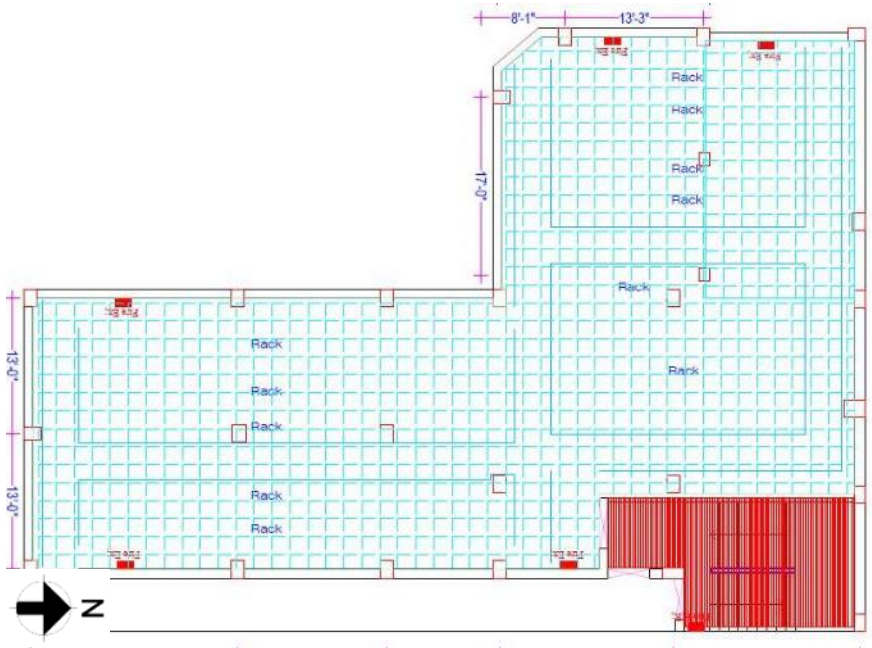
At the time of inspection one set of concrete cylinder core test report from column was available for this structure. However, only one location of the cores was found at site. Building engineer is required to produce a core layout and mark all the locations of the taken cores.

Observations: ETP Lab Building-(Building-11)

RSC RMG SUSTAINABILITY COUNCIL

Load plan doesn’t comply with BNBC

Observations: ETP Lab Building-(Building-11)



Load plan for 2nd floor

Existing Floor Loading for this Fl		
No	Item	Load psf
1	Toilet Area	63
2	Godown	63
3	Stair	105

Load consideration for store

Live load at storage areas are considered as 3 KPa in prepared load plan. However, as per BNBC-Part 6 live load for light storage areas is required to be considered as 6 KPa. Building engineer is required to revise the load plan as per BNBC part-6.

INDUSTRIAL, STORAGE & HAZARDOUS (Occupancy - G, H & J)	Workshop, factory, warehouse	1 Light workroom without storage	3.0	2.7
		2 Machinery hall & circulation area	4.0	4.5
		3 Factory, workshop etc.	5.0	4.5
		4 Manufacturing : light	6.0	4.5
		heavy	12.0	9.0 (5)
		ice	15.0	9.0 (5)
		5 Printing plant :		(5)
		Press room	7.0	11.0
		Composing and linotype room	5.0	9.0 (5)
		Paper storage room	12.0	9.0 (5)
		6 Motor room, fan room etc. including the weight of machinery	7.5	4.5
		7 Cold storage, grain storage	15.0	9.0 (5)
		8 Storage warehouses : light	6.0	4.5 (5)
		heavy	12.0	9.0
		9 Foundries	20.0	12.0

Live load at BNBC

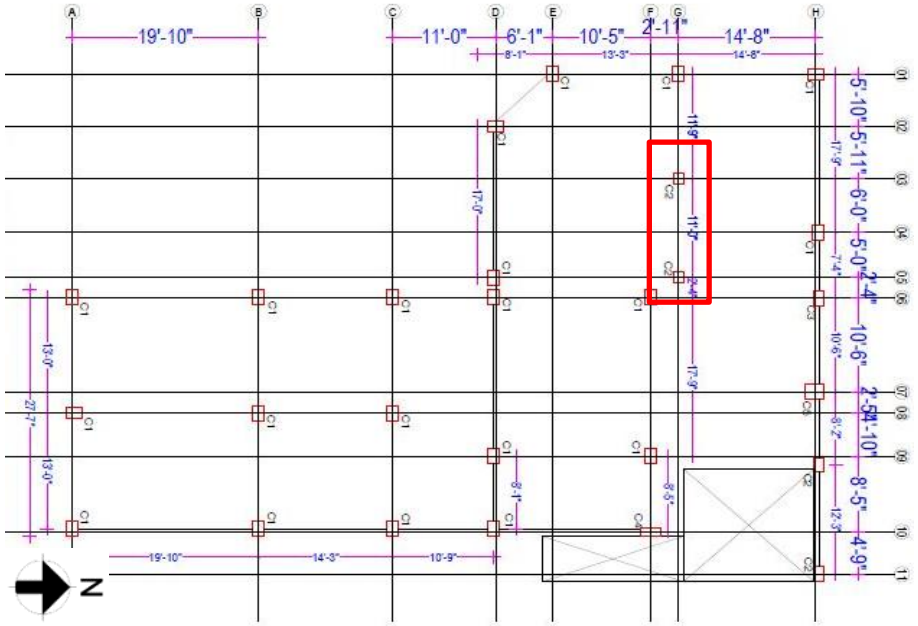
Typical storage area

Observations: ETP Lab Building-(Building-11)

Discrepancy in as-built drawing

Observations: ETP Lab Building-(Building-11)

54



Column layout

Column Schedule

Column Name	Ground Floor	1st Floor	Tie
C1	10-20mmØ 375 X 500 15"" X 20"	10-20mmØ 375 X 500 15" X 20"	10mmØ @ 6 c/c
C2	10-20mmØ 375 X 500 15" X 20"	10-20mmØ 375 X 500 15" X 20"	10mmØ @ 6 c/c
C3	10-16mm Ø 500 X 300 20" X 12"	10-16mm Ø 500 X 300 20" X 12"	10mmØ @ 6 c/c
C4	10-16mm Ø 600 X 300 24" X 12"	10-16mm Ø 600 X 300 24" X 12"	10mmØ @ 6 c/c
C5	14-16mm Ø 500 X 600 20" X 24"	14-16mm Ø 500 X 600 20" X 24"	10mmØ @ 6 c/c

Column schedule

Dimension of Columns at grid and were mentioned as 375mmX500mm but actual dimension of these two columns measured as 300mmX375mm. Building engineer is required to re-survey the whole structures and update as-built drawing as per actual site condition.

Column dimension measured as 300mmX375mm

Observations: ETP Lab Building-(Building-11)

RMG SUSTAINABILITY COUNCIL

Exposed reinforcement at roof level

Observations: ETP Lab Building-(Building-11)

Exposed reinforcement at roof level

Exposed reinforcement was found left at roof level. Building engineer is required to provide rust proof paint on the exposed rebar.

Observations: ETP Lab Building-(Building-11)

Water ponding on roof slab

Observations: ETP Lab Building-(Building-11)

Water ponding on roof slab

Water ponding was found on roof slab. Any cracks or damage on the roof surface will allow water to seep into the concrete slab beneath the finishes and cause long term soaking of the slab and corrosion of the rebar. Factory is required to provide necessary slope and improve drainage system to prevent water ponding.

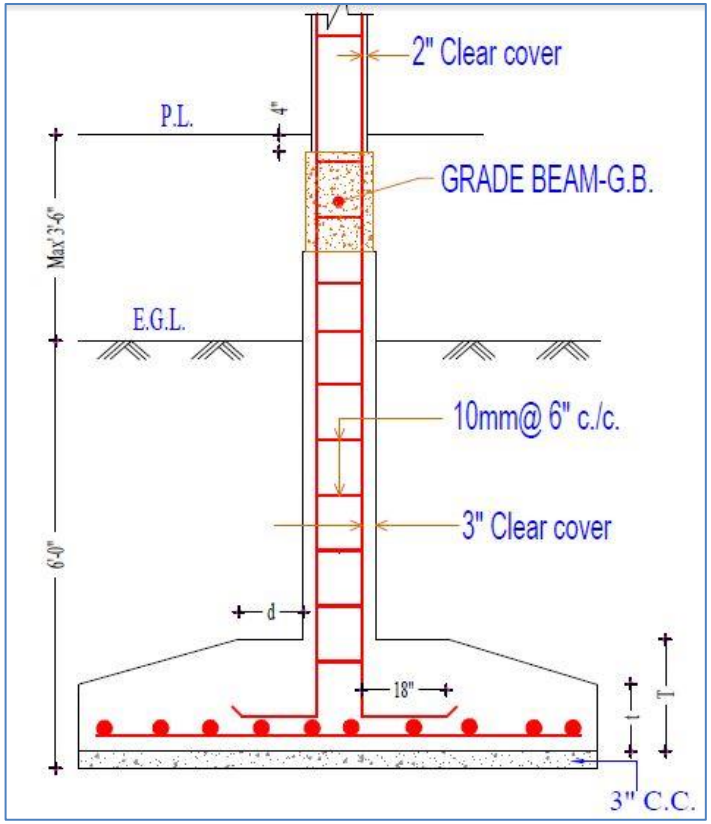
Observation: ETP Lab Building-(Building-11)

Footing stressed above normal design limits

Observations: Building 12

FOOTING SCHEDULE

NAME OF FOOTING	SIZE OF FOOTING	BASE BEAM		REINFORCEMENT	BASE THICKNESS	
	L X B	t1	T		t1	T
F1	11'-0" X 11'-0"	18"	31"	16mmØ & 20mmØ @ 5" C/C both way (Alternatively)	12"	20"
F2	12'-0" X 12'-0"	20"	34"	16mmØ & 20mmØ @ 5" C/C both way (Alternatively)	13"	22"
F3	12'-6" X 12'-6"	23"	40"	16mmØ & 20mmØ @ 5" C/C both way (Alternatively)	--	--
F4	13'-0" X 13'-0"	22"	36"	16mmØ & 20mmØ @ 5" C/C both way (Alternatively)	14"	24"
F5	13'-6" X 13'-6"	22"	37"	16mmØ & 20mmØ @ 5" C/C both way (Alternatively)	14"	25"



Borehole No	Depth in (ft)	Depth in (m)	"N"Field SPT	Allowable Bearing Capacity (qa) in tsf
BH-1	5	1.524	5	0.9
	10	3.048	13	2.3
	15	4.572	13	2.38
	20	6.096	12	2.2
BH-2	5	1.524	6	1.1
	10	3.048	12	2.2
	15	4.572	14	2.44
	20	6.096	13	2.38
BH-3	5	1.524	4	0.7
	10	3.048	11	2.06
	15	4.572	14	2.44
	20	6.096	13	2.38
BH-4	5	1.524	4	0.7
	10	3.048	12	2.2
	15	4.572	15	2.6
	20	6.096	12	2.2
BH-5	5	1.524	4	0.7
	20	6.096	11	2.06
	15	4.572	15	2.6
	20	6.096	12	2.2
BH-6	5	1.524	4	0.7
	10	3.048	12	2.2
	15	4.572	14	2.44
	20	6.096	12	2.2

As per provided structural drawing footings are in 6 feet below from the EGL

Cursory calculation indicates that internal footings of the building are stressed above design limit considering the bearing capacity from soil test report. A Detail Engineering Assessment is required carryout by Building Engineer.

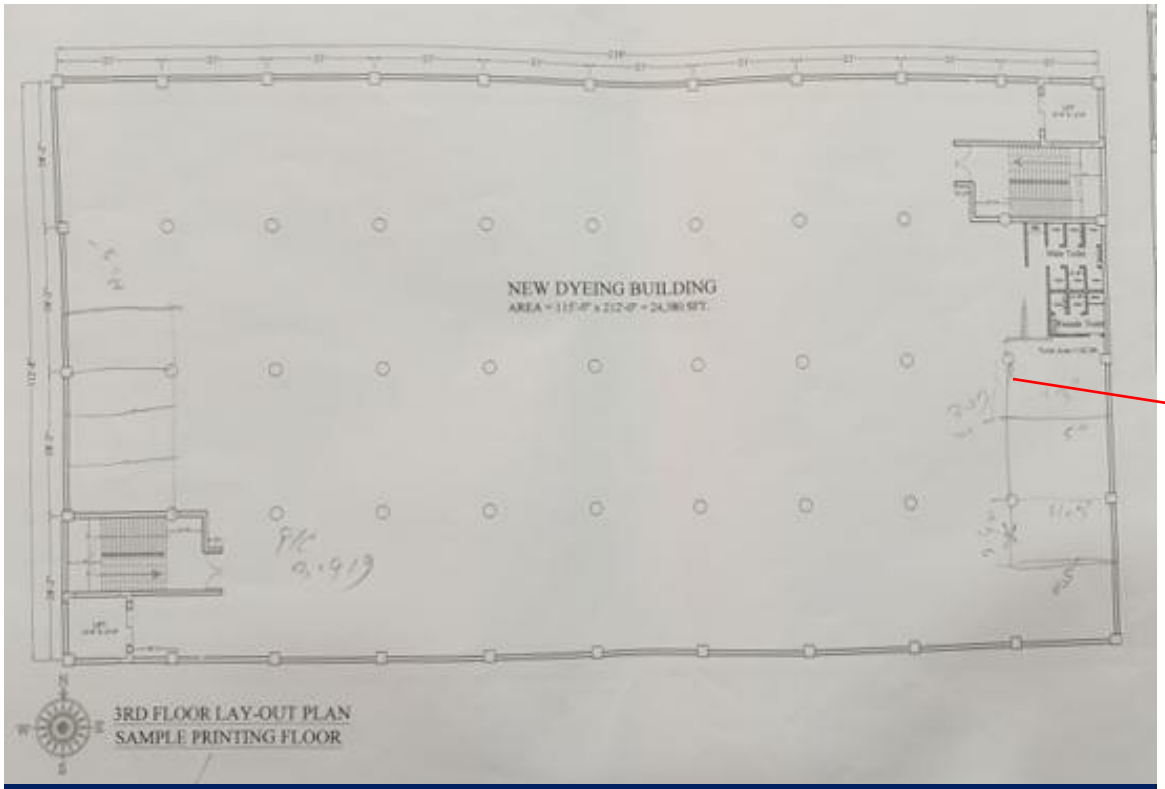
Observations: Building 12

Discrepancies in as-built drawing

Observations: Building 12

62

Architectural drawings are not updated as per as built condition. Toilet zone and partition walls of 3rd and 4th floor are found different with the drawings. Also, the porch of both exits are shown in the drawings.



3rd floor layout plan

Undocumented Porch at Exits

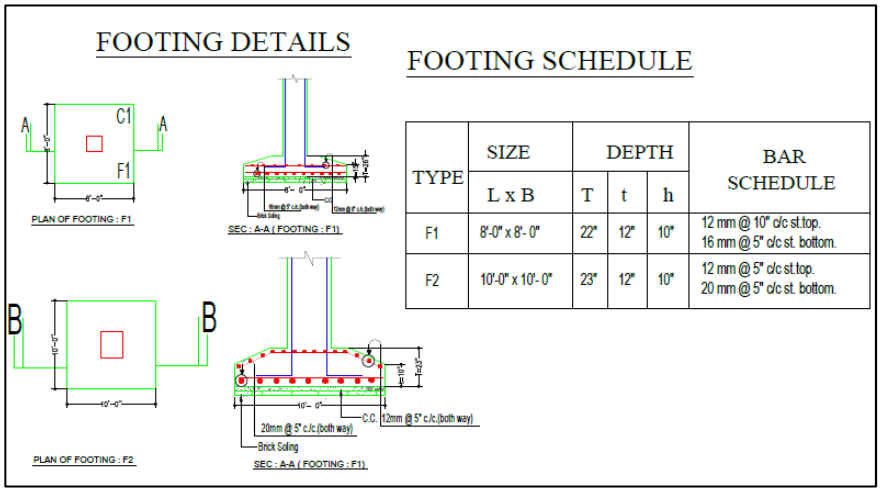
Partition walls at 3rd floor

Observations: Building-12

Inconsistency in design report

Observation: Building 13- Fair Price Shop

Depth of footing not mentioned in the drawing



TYPE	SIZE	DEPTH			BAR SCHEDULE
	L x B	T	t	h	
F1	8'-0" x 8'- 0"	22"	12"	10"	12 mm @ 10" c/c st.top. 16 mm @ 5" c/c st. bottom.
F2	10'-0" x 10'- 0"	23"	12"	10"	12 mm @ 5" c/c st.top. 20 mm @ 5" c/c st. bottom.

Adequacy check of slab; Serviceability checks as per BNBC not included in the design report.

Some beams required reinforcement > provided reinforcement. Building engineer is required review the design, load & beam stresses.

2.3 BEAM SECTIONAL CAPACITY COMPLIANCE STUDY

Material Properties

fy = 72000 psi(Referenced from Rebar chalan copy)

f'c =2500psi

(Maximum required steel against factored load combination has been collected from Etabs design for each section and analyzed accordingly)

Beam Compliance for Top Reinforcement

2nd	B36	FB5	EYN	0.55	1.32	OK
1st	B36	FB5	EYP	0.55	1.32	OK
1st	B36	FB5	EYP	0.55	1.32	OK
GF	B1	GB-1	EXN	1.3246	1.32	OK
GF	B11	GB-1	EXN	1.2866	1.32	OK
GF	B12	GB-1	WY1	1.2761	1.32	OK
GF	B27	GB-1	WYY	1.1218	1.32	OK
GF	B30	GB-2	EYN	1.5319	1.32	~OK
GF	B31	GB-2	EYP	1.4299	1.32	~OK
GF	B30	GB-2	EYP	1.3791	1.32	~OK
GF	B13	GB-3	EYN	2.3147	2.25	OK
GF	B32	GB-3	EYP	2.2752	2.25	OK
GF	B13	GB-3	EYP	2.2453	2.25	OK

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. The available design report not fully comply with BNBC. Building engineer is required to prepare design report in compliance with section 1 9 1 1 (part 6 BNBC)

Observation: Building 13- Fair Price Shop

Stagnant of water observed on roof

Observation: Building 13- Fair Price Shop

Stagnant of water observed on roof. Building engineer is required to improve the roof drainage system.

Observation: Building 13- Fair Price Shop

Verify in-situ concrete strength

Observation: Building 14- New Utility Unit

BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY (BUET)

DEPARTMENT OF CIVIL ENGINEERING

Mobile: 01819 557 964; PABX: 966 5650-60 Ext. 7226; www.buet.ac.bd/ce/

CONCRETE LABORATORY

BRTC No. : 1100-97244 /15-16/CE; Dt: 22/11/2015
Client : GMS Composite knitting Ind.; Sardagonj, Kashimpur, Gazipur
Ref. No. : Letter; Dt: 22/11/2015
Project : GMS Composite knitting Ind. Ltd.
Sample : Concrete Cylindrical Core
Year of construction : 4-Jun-15 Date of Sample collection (as per Letter) : Not Mentioned
Test : Compressive Strength of Concrete Cylindrical Core [ASTM C 42/C 42M]
Date of Test : 5/12/2015

TEST REPORT

Sl. No.	Location (as per Letter)	Sample Identification No	Length of Sample	Diameter of Sample	Average Cross Sectional Area	Ultimate Load	Crushing strength	Type of Failure
			in	in	sq. in	lb		
1	Utility Building (Unit - 01)	1	7.0	3.70	10.75	55,058	5120 psi (35.3 MPa)	Combined Stone Chips
2	Utility Building (Unit - 01)	2	6.7	3.70	10.75	53,674	4990 psi (34.4 MPa)	Combined Stone Chips
3	Utility Building (Unit - 01)	3	6.7	3.70	10.75	55,981	5210 psi (35.9 MPa)	Combined Stone Chips
4	Utility Building (Unit - 01)	4	6.7	3.70	10.75	50,445	4690 psi (32.3 MPa)	Combined Stone Chips

Note: As per standard ASTM C42, the diameter of core specimens for the determination of compressive strength shall be at least 3.70 in. or at least two times the nominal maximum size of the coarse aggregate, whichever is larger. If limited member thickness makes it impossible to obtain cores with length-diameter ratio of at least 1.0 or if clear distance between reinforcement is limited, core diameters less than 3.70 in. are not prohibited.

Note: Core Samples were supplied to BUET for testing.

Comment: Please compare the results with your corresponding design values and Consult with your design engineer.

Countersigned by:

Dr. Abu Siddique
Professor
Department of Civil Engineering
BUET, Dhaka-1000, Bangladesh

DEPARTMENT OF CIVIL ENGINEERING * BUET *

Test Performed by:

Dr. Md. Mafizur Rahman
Professor
Department of Civil Engineering
BUET, Dhaka-1000, Bangladesh

Warning: Samples as supplied to us have been tested in our laboratory. 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/packet/container under signature of the competent authority. In order to avoid fraudulent fabrication of test results, it is recommended [illegible] collected by duly authorized person, and not by the Contractor/Supplier

Core test report

Material Properties

fy = 72000 psi (Referenced from Rebar test Report)
f'c =4223psi (Referenced from Core Test Report)
Type of Beam Slab = Two Way
Code & Standard = BNBC 2006

(Maximum required steel against factored load combination has been collected from Etabs design for each section and analyzed accordingly)

Brick chips aggregate

In design report concrete strength considered 4223 psi from the core test report. During inspection core test report available on site. Stone chips aggregate mentioned in core test report, but onsite brick chips aggregate found. Building engineer is required to verify in-situ concrete strength. Incorporate the concrete strength in design report

Observation: Building 14- New Utility Unit

Prepared DEA report needs to be revised

Observations: No-4 Boiler Building

2.2 LOAD COMBINATIONS

Load combinations used for the building analysis. (Alliance load combination)

Load Combinations	
Combination Name	**Combination Definition**
COMUNFACT	1.000*DEAD + 1.000*LIVE + 1.000*PW + 1.000*SDL + 1.000*FF
COMFACT	1.200*DEAD + 1.600*LIVE + 1.200*PW + 1.200*SDL + 1.200*FF
COMWX1	1.050*DEAD + 1.250*LIVE + 1.050*PW + 1.050*SDL + 1.050*FF + 1.000*WX
COMWX2	1.050*DEAD + 1.250*LIVE + 1.050*PW + 1.050*SDL + 1.050*FF – 1.000*WX
COMWY1	1.050*DEAD + 1.250*LIVE + 1.050*PW + 1.050*SDL + 1.050*FF + 1.000*WY
COMWY2	1.050*DEAD + 1.250*LIVE + 1.050*PW + 1.050*SDL + 1.050*FF – 1.000*WY
COMEX1	1.050*DEAD + 1.250*LIVE + 1.050*PW + 1.050*SDL + 1.050*FF + 1.000*EQX
COMEX2	1.050*DEAD + 1.250*LIVE + 1.050*PW + 1.050*SDL + 1.050*FF – 1.000*EQX
COMEY1	1.050*DEAD + 1.250*LIVE + 1.050*PW + 1.050*SDL + 1.050*FF + 1.000*EQY
COMEY2	1.050*DEAD + 1.250*LIVE + 1.050*PW + 1.050*SDL + 1.050*FF – 1.000*EQY

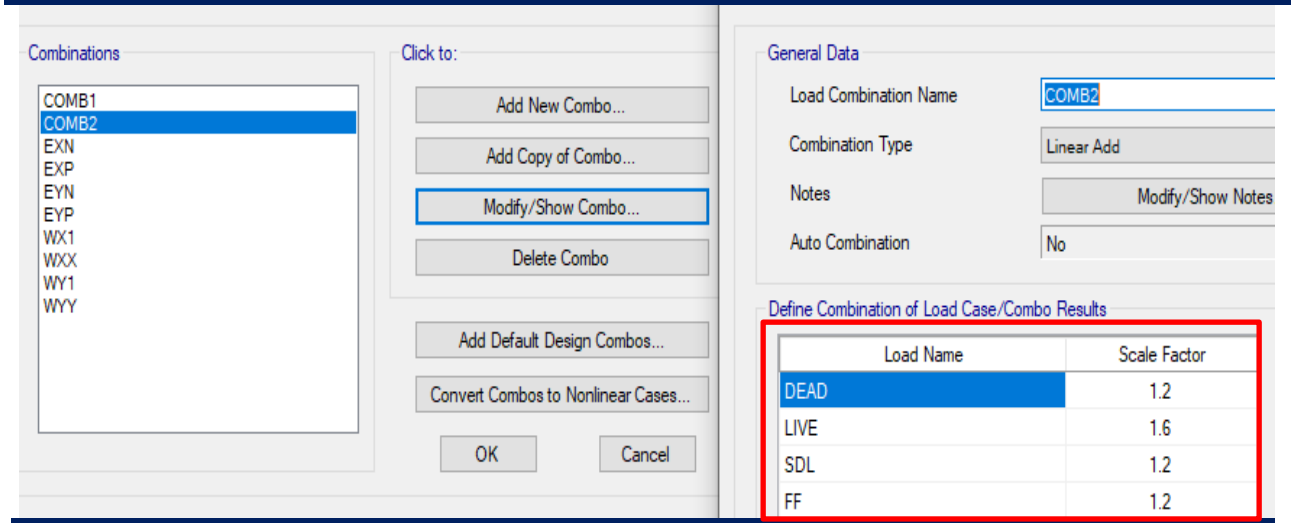
2.3 BEAM SECTIONAL CAPACITY COMPLIANCE STUDY

Material Properties

fy = 72000 psi (Referenced from Rebar chalan copy)

f'c =2500psi

NTPA load combination mentioned in DEA report



NTPA load combination considered in software-based analysis model

The building was constructed between May 2016 and October 2016 but in software-based analysis model, load combination has been considered as NTPA which doesn't comply with BNBC part-6. In addition, concrete strength has been used as 17.24 MPa but the columns are constructed with brick chips therefore the strength has been considered beyond the minimum concrete strength of brick chips. Neither any cylinder test report was available, nor any concrete core has been taken. Building engineer is required to revised the prepared DEA report as per BNBC part-6 along with proper concrete strength.

Observations: No-4 Boiler Building

Foundation depth to be verified

Observations: No-4 Boiler Building

The Foundation is an RCC Footing system, footing bearing capacity is taken from soil test report Table No-3.1.

15' bellow from EGL
BH-17=1.98Tsf (F.S=3.0)
BH-18=2.2Tsf (F.S=3.0)
BH-19=1.98Tsf (F.S=3.0)
BH-19=1.76Tsf (F.S=3.0)

3.96ksf F.S.=3.0

Foundation depth and soil bearing capacity mentioned in DEA report

FOOTING SCHEDULE :

TYPE	SIZE	DEPTH		BAR SCHEDULE
	L x B	T1	T2	
F1	8'-0" X 8'-0"	13"	20"	16mmØ @ 6"c./c. bothway bottom 12mmØ @ 6"c./c. top.

Footing schedule without mentioning the foundation depth

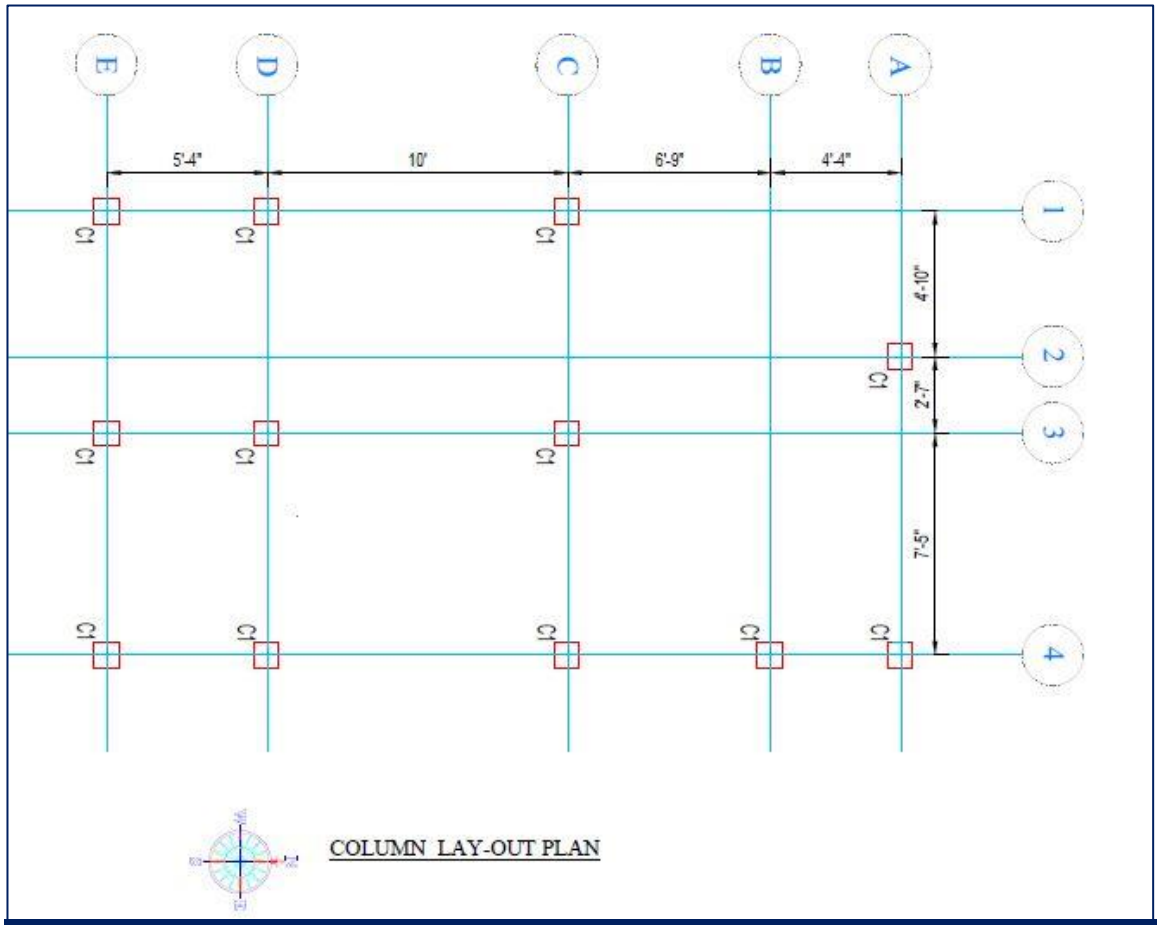
In DEA report, foundation depth has been mentioned at 4.57m but neither the foundation depth shown in footing schedule, nor any vertical section of footing has been shown in provided drawing. In addition, Bore Hole-19 shown twice in DEA report which have different soil bearing capacity. Building engineer is required to verify the foundation depth and check the adequacy of the foundation based on accurate borehole data.

Observations: No-4 Boiler Building

Inconsistency in drawings

Observations: 01 No Security Office & 01 No Fire Pump

Details drawing were not found for the fire pump room. On the other hand, the 01 Security Office was a masonry structure with a RC slab having 3-inch thickness. But provided as-built drawing shows RC beam-column frame structure with isolated footings.



Column layout plan of 01 No Security Office

01 No Fire Pump

01 No Security Office

Observations: 01 No Security Office & 01 No Fire Pump

RSC RMG SUSTAINABILITY COUNCIL

Apparently lack of lateral stability system

Observation: Shed 4- Boiler 3

No vertical bracings/ compression struts were provided in the long direction. No roof bracings provided along the short direction. Apparently lack of lateral stability observed.
The building engineer is required to check the lateral stability system of the shed.

Observation: Shed 4- Boiler 3

Apparently lack of lateral stability system

Observation: Shed 5- Lathe Workshop & RCU

No vertical bracings/ tie beam/ compression struts were provided in the long direction. No roof bracings provided along the short direction. Apparently lack of lateral stability observed.
The building engineer is required to check the lateral stability system of the shed.

Observation: Shed 5- Lathe Workshop & RCU

Apparently non-engineering shed

Observation: Shed 6-Yarn Store

Lack of lateral stability system

Poor connection details

Inadequate structural member

Lack of lateral stability system, inadequate structural member & poor connection details. Building engineer is required to check the lateral stability system or replace the non-engineering shed.

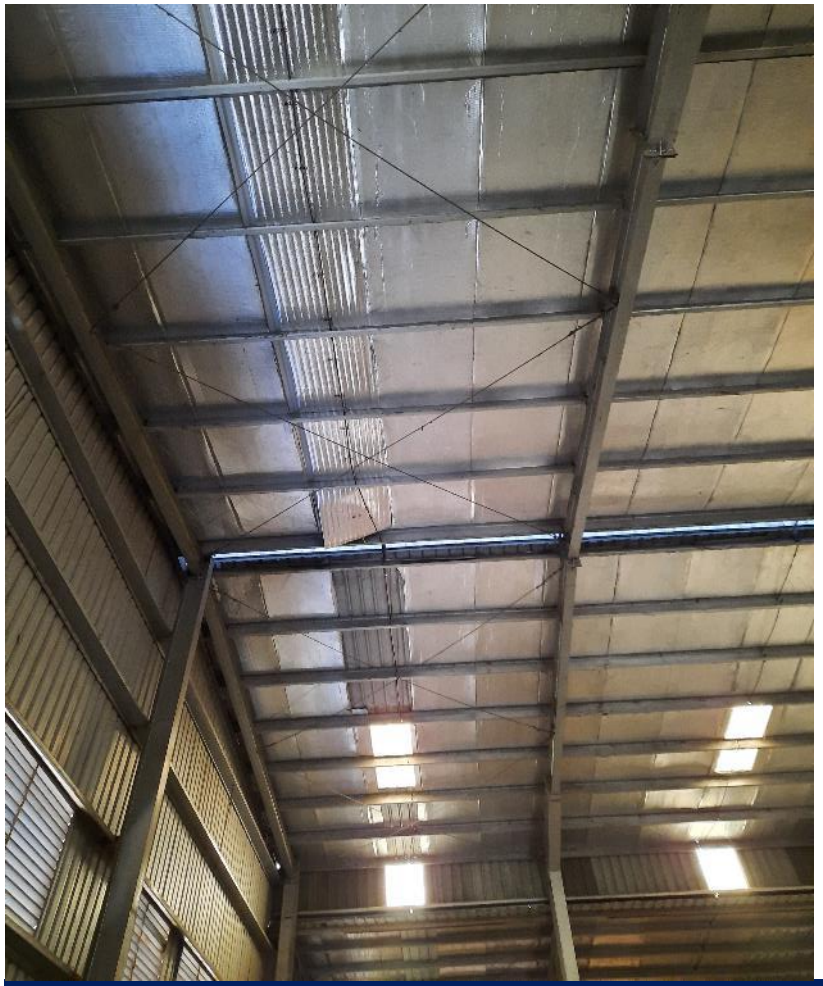
Observation: Shed 6-Yarn Store

Apparently lack of lateral stability system

No vertical bracings / tie beam / compression struts were provided in the long direction. Lateral stability along the long direction is appeared to be incomplete. The building engineer is required to check the lateral stability system of the shed.

Observation: Shed 7- Big Godown Shed

Loose cable bracing



Loose cable bracing observed on roof. Building engineer is required to tighten the bracing.

Observation: Shed 7- Big Godown Shed

RSC RMG SUSTAINABILITY COUNCIL

Lack of design documents

Observation: Shed-8,9,10,11,12,13,14


Shed 8


Shed 9


Shed 10(New)


Shed 12(Non-hazardous)


Shed 11


Shed 12(Hazardous)


Shed 14

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. During the inspection, design report was not available which is required to be prepared in compliance with section 1.9.1 (part-6, BNBC).

Observation: Shed-8,9,10,11,12,13,14

Apparently lack of lateral load resisting system

Observation: Shed-8,9,10,11,12,13,14

No compression strut/Load transfer media has been provided in the long direction. Building engineer is required to check the requirement of the any load transfer media in the long direction.

Observation: Shed-8,9,10,11,12,13,14


Shed 11


Shed 12


Shed 14


Shed 9

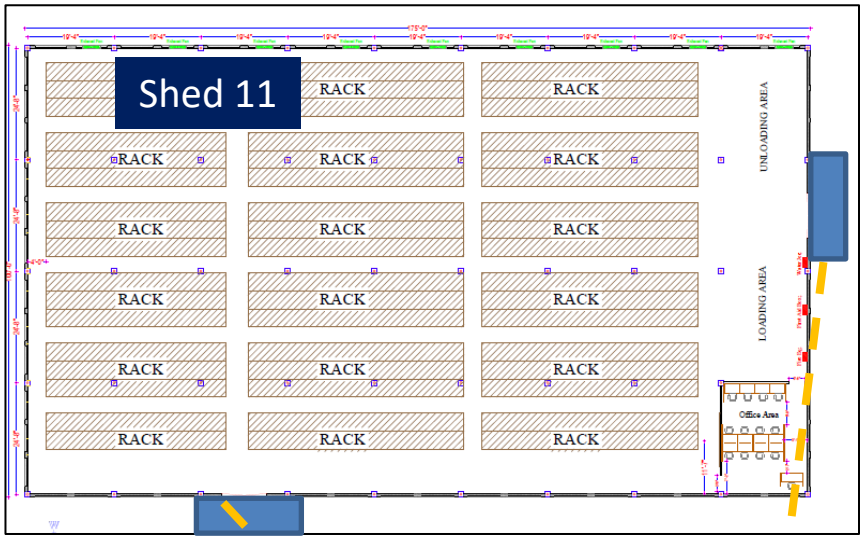

Shed 12

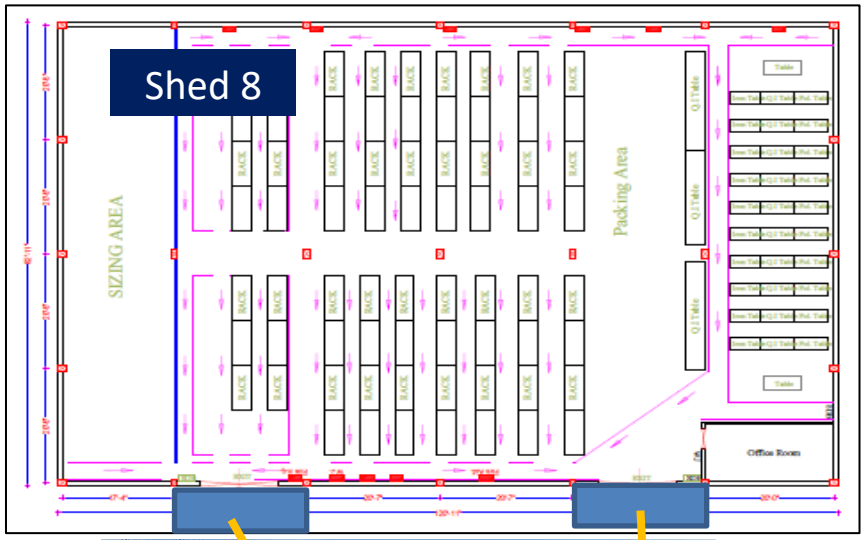
Wall & roof bracings are not provided. Building engineer is required to check the lateral load resisting system of the shed.

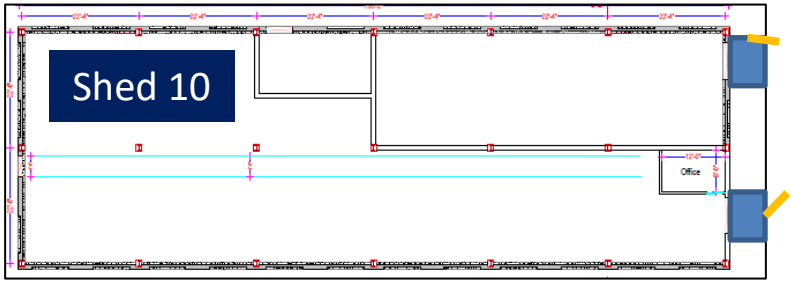
Observation: Shed-8,9,10,11,12,13,14

Incomplete as-built drawings and discrepancies between drawings & as-built condition.

Observation: Shed-8,9,10,11,12,13,14



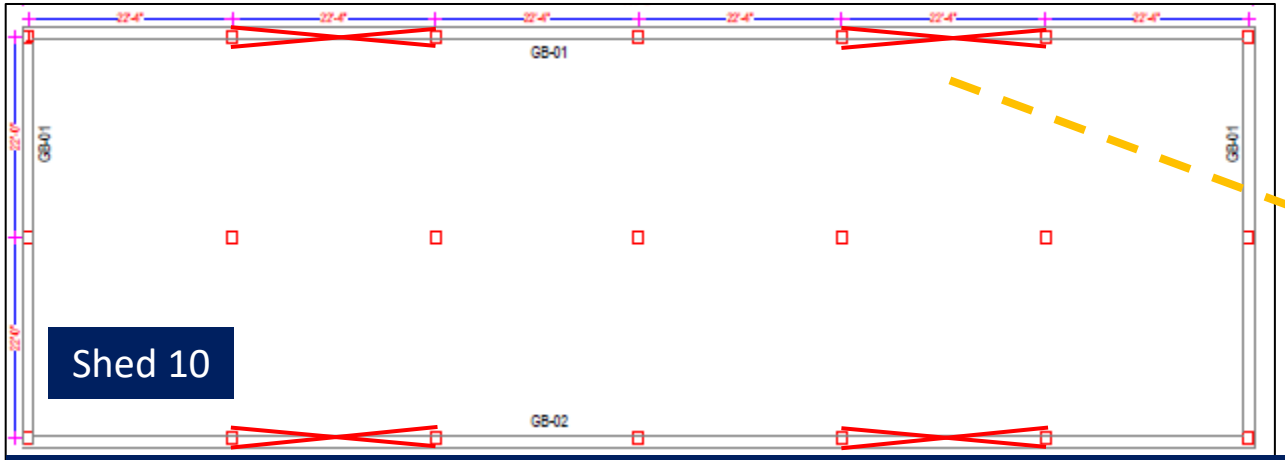




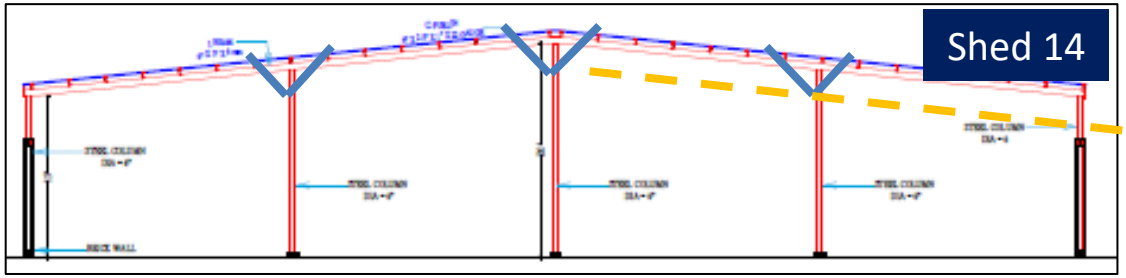
Undocumented canopy at shed 8, 10, 11 & 12.

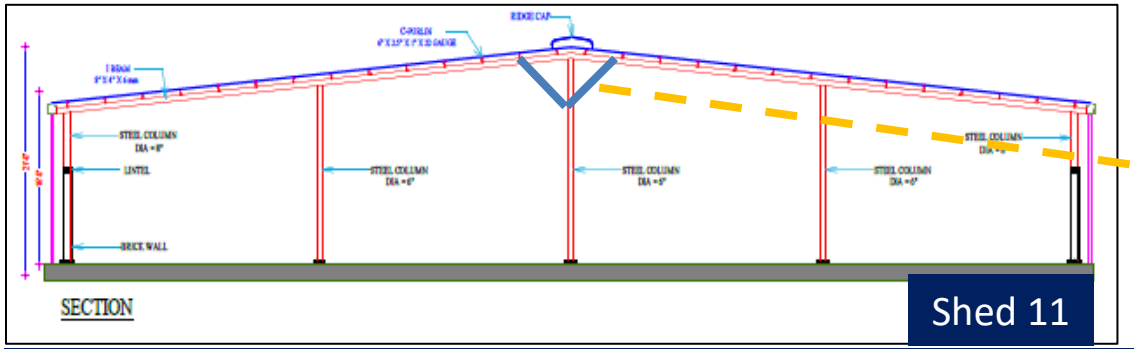
Observation: Shed-8,9,10,11,12,13,14

RMG SUSTAINABILITY COUNCIL



Undocumented wire bracings

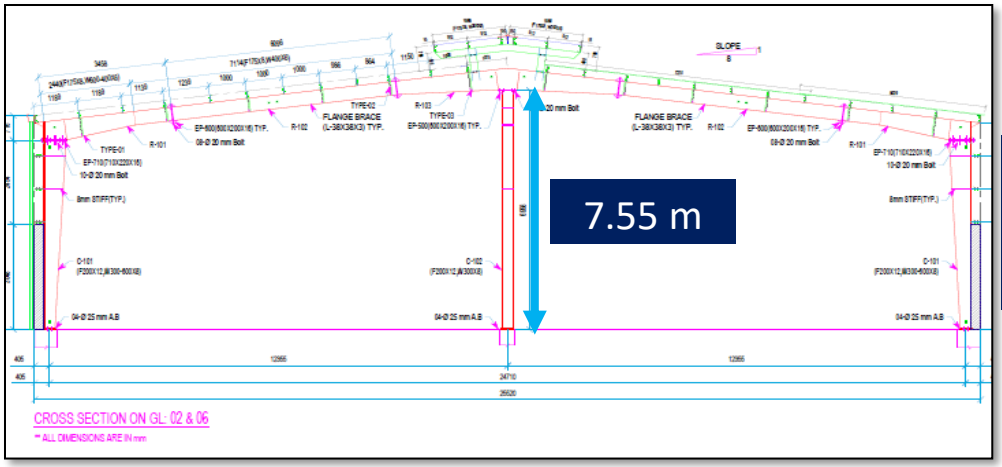




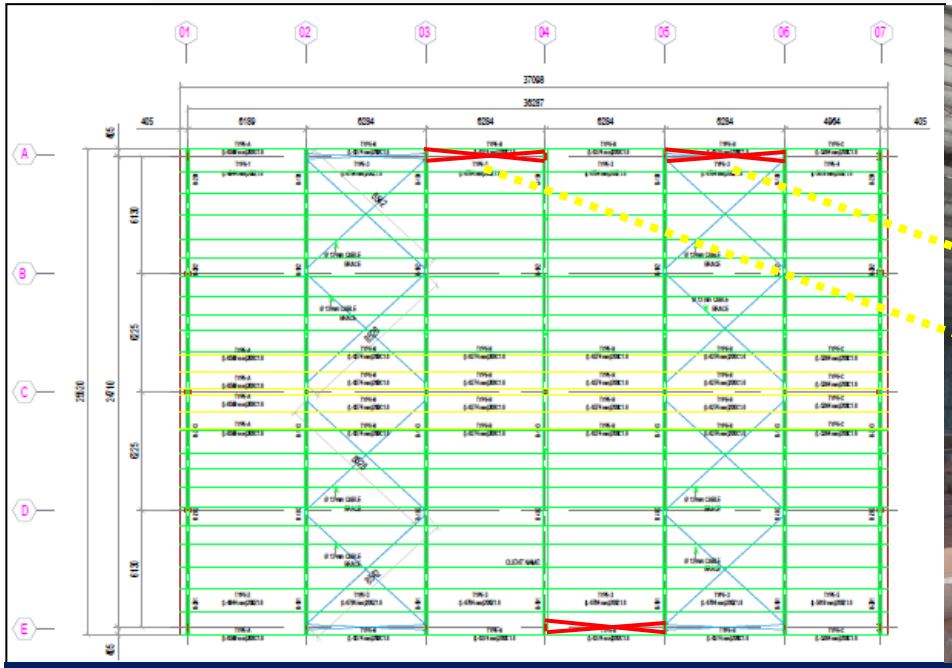
Undocumented knee bracings.

Observation: Shed-8,9,10,11,12,13,14

RSC RMG SUSTAINABILITY COUNCIL

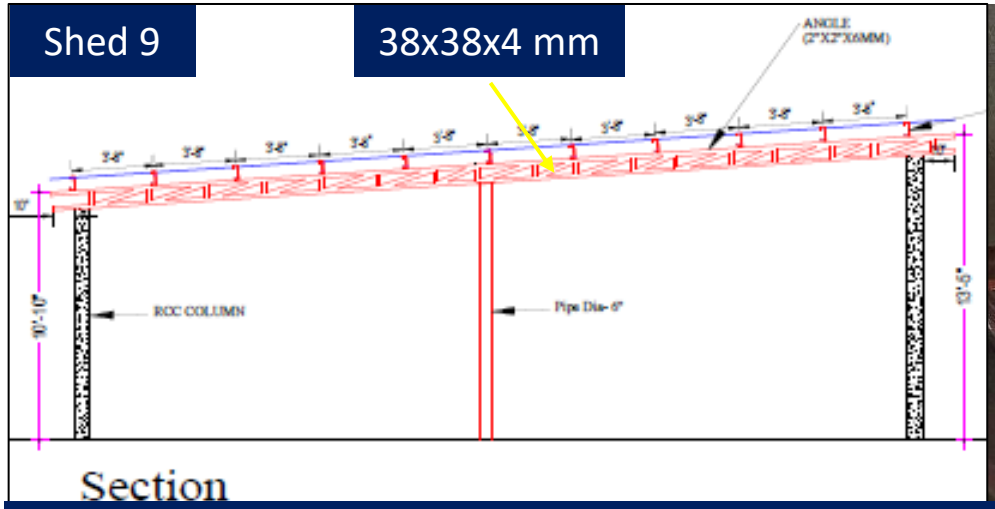


Shed height found 7.55 m instead of 6.9 m mentioned in the as-built drawing at shed 8



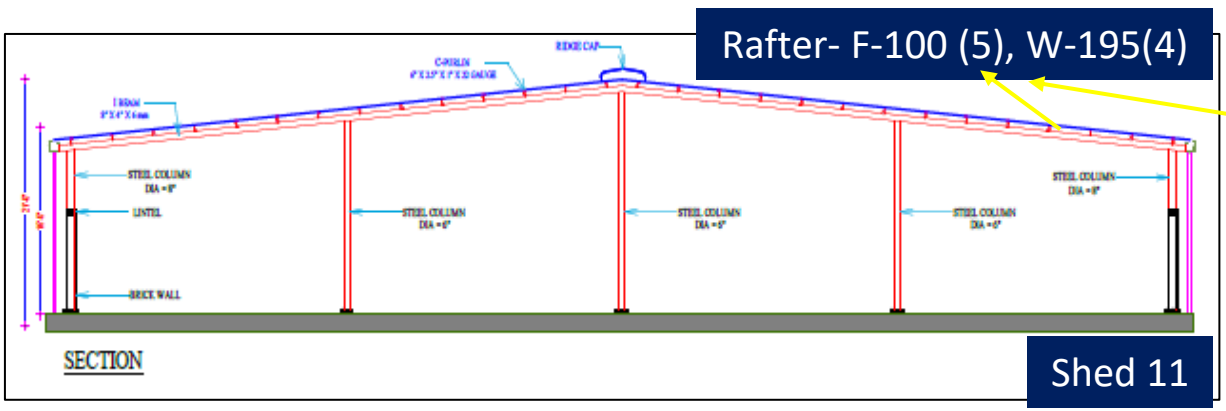
Location of horizontal wire brace is different than the provided drawing at shed 8.

Observation: Shed-8,9,10,11,12,13,14



Roof truss internal chord found 38x38x4 mm instead of 50x50x6 mm at shed 9

Similarly, internal chord of Roof truss found 38x38x4 mm & other chords 50x50x5mm at shed 12(hazardous)



Rafter size found F-100 (5) x W-195(4) instead of F-100 (6) x W-200(6) at shed 11

Similarly, Rafter size found F-100 (6) x W-200(4) instead of F-75 (6) x W-150(6) at shed 14

Observation: Shed-8,9,10,11,12,13,14

Poor connection

Observations: Shed 8, 9, 11, 12 & 14

Angle truss and C purlin is embedded in peripheral brick wall

Apparently poor connection details between steel pipe column and roof truss/rafter

Observations: Shed 8, 9, 11, 12 & 14

Steel pipe column is embedded to RCC short column at shed 9, 11, 12 & 14

No anchorage found between steel rack and ground floor slab at shed 8 & 11.

The steel roof angle truss and rafter is poorly connected to the steel pipe column (shed 9, 11, 12, 14). Steel pipe column is embedded to RCC short column (shed 9, 11, 12, 14) and there is no visible connection found between steel rack and ground floor slab (shed 8 & 11). As there is no as-built connection drawing found on site, building engineer is required to prepare accurate as-built drawings. Also, it is required to check the connection adequacy as part of Engineering Assessment (EA) Report in compliance with section 1.9.1 as per BNBC.

Observations: Shed 8, 9, 11, 12 & 14

Corrosion in steel member

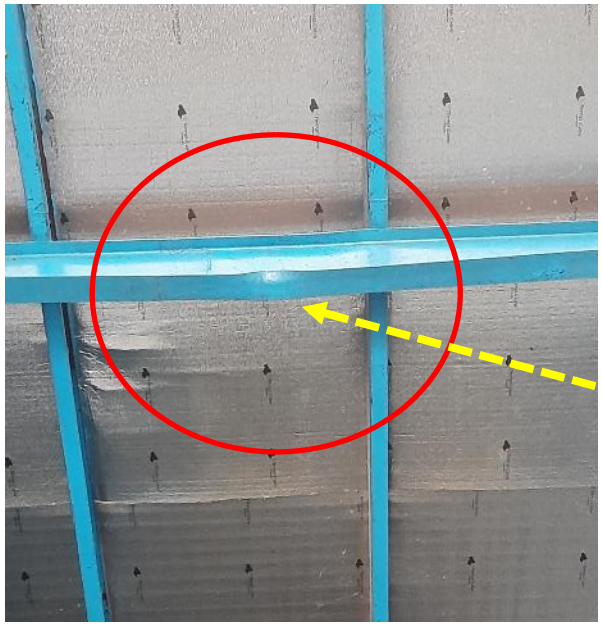
Corrosion in steel column

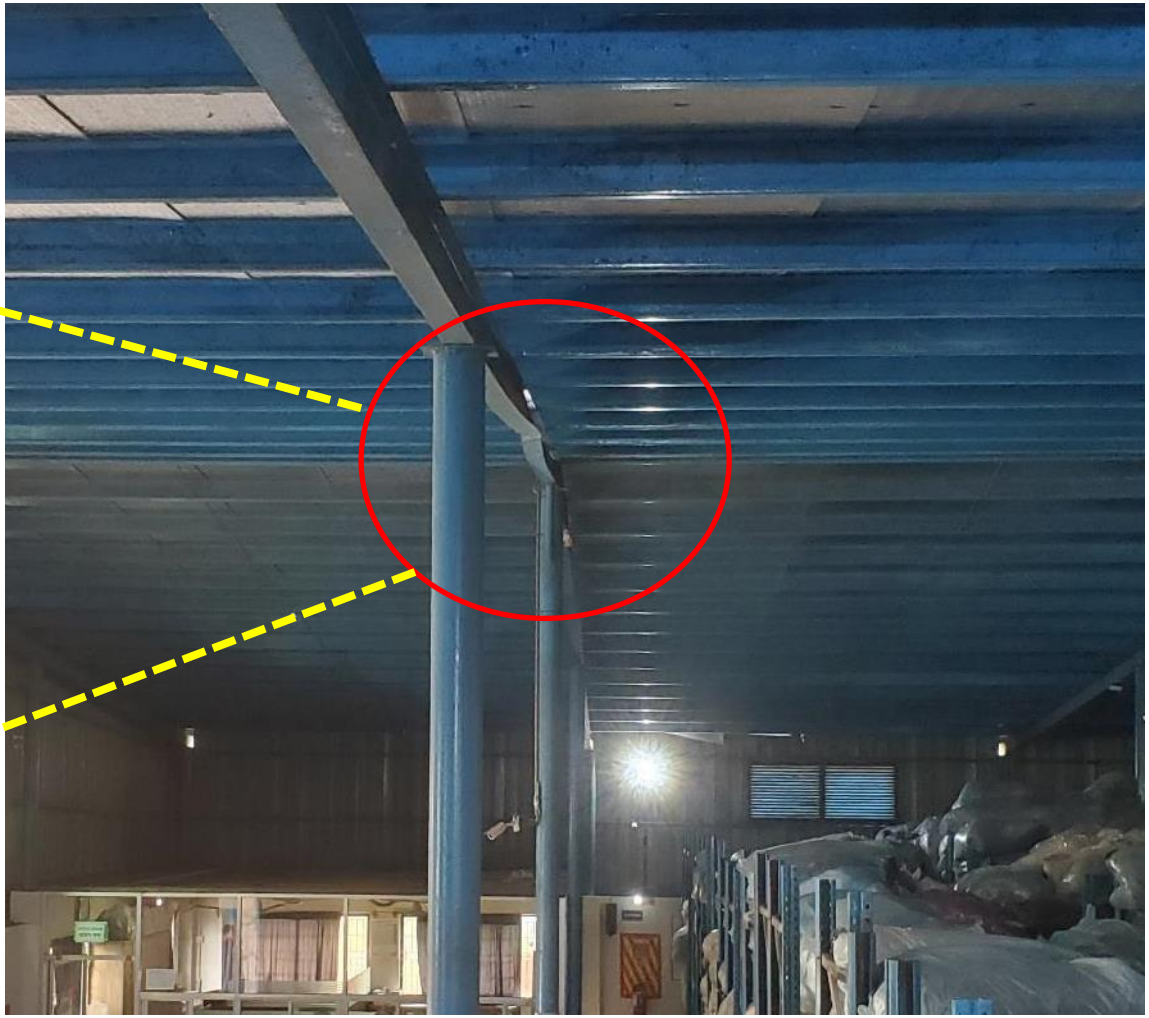
Corrosion in steel member was observed in various locations. The building engineer to investigate the reason & extent of corrosion and suggest proper remedial measure accordingly.

Observation: Shed 10 (New)

Damaged rafter

Observation: Shed 11



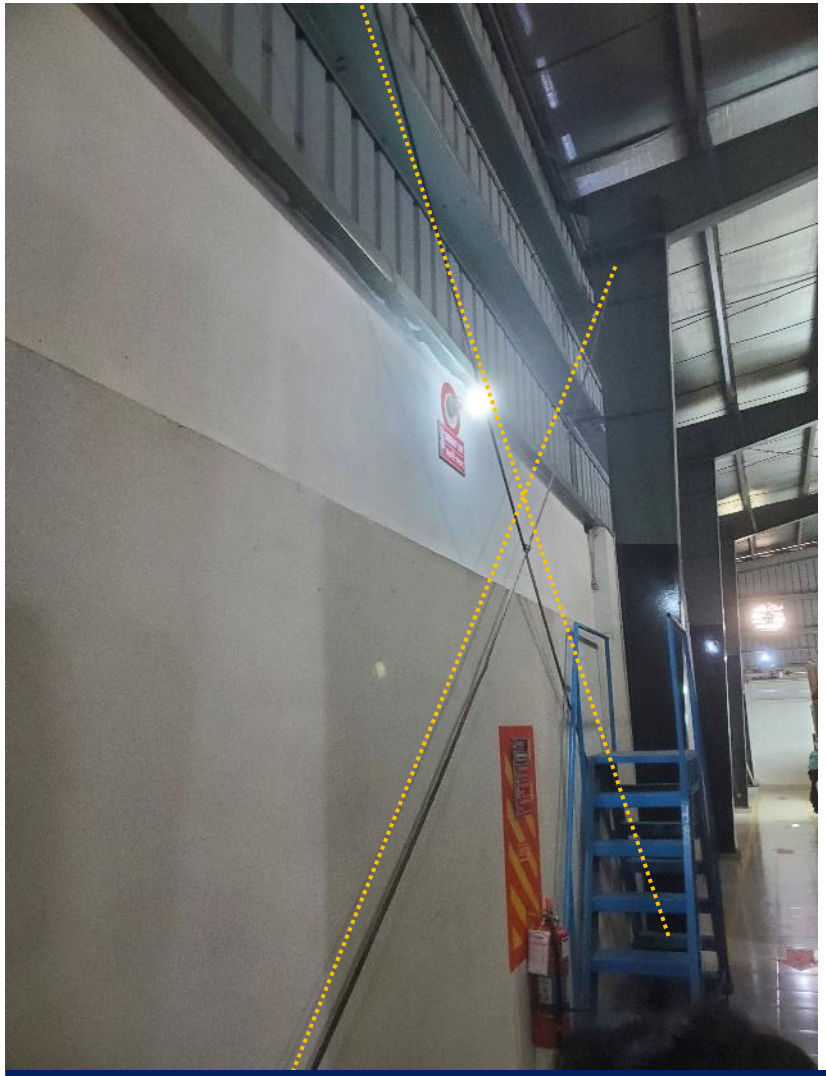


Damaged and twisted rafter observed at grid-B of the shed. Building engineer is required investigate the damaged rafter and suggest a suitable repair method.

Observation: Shed 11

Loose cable bracings

Observation: Shed 8



Horizontal wire bracings were found loose. Building Engineer to survey the whole structure and tighten loose bracings where necessary.

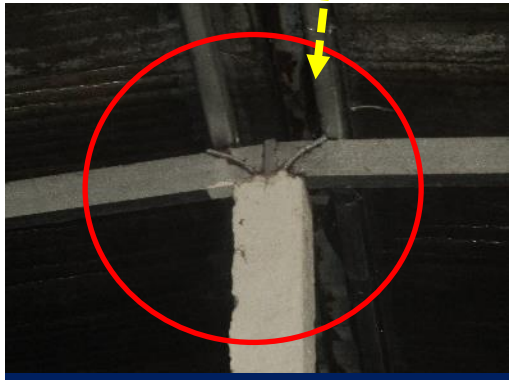
Observation: Shed 8

Non-Engineered structure

Observation: Shed 10 (New)

Inadequate structural members

Inadequate structural members



Poor Connection

Shed 10 (old) extension

Apparently inadequate steel members, Poor connection details and no clear/defined load path observed. Seemingly non-engineered shed. Building engineer is required to check the stability of the shed or replace by an engineered structure.

Non-Engineered structure

Observations: Shed-10 (Old), 13

Problems Observed

Building 7

Item 1: Heavy loading observed on floors.
Item 2: Inconsistency in the design report.
Item 3: Lack of information in as-built drawing.

Allover Printing Building-(Building-8):

Item 4: Column and foundation stressed above normal design limits.
Item 5: Remediation plan to be prepared as per prepared DEA.
Item 6: Location of concrete cylinder core not found on site

Building 9

Item 7: Vibration on floor due to operation of heavy machineries.
Item 8: Crack on first floor slab.
Item 9: Inconsistency in design report.
Item 10: Vertical bracing missing at ground floor.
Item 11: Crack on roof slab.
Item 12: Stagnant of water on roof.

Sample Dyeing Building (Building-10)

Item 13: Prepared DEA report needs to be revised
Item 14: Discrepancy in as-built drawing
Item 15: Irregularities in load transfer system
Item 16: Sample Location of concrete core not repaired properly

Problems Observed

ETP Lab Building-(Building-11)

Item 17: Foundation stressed above normal design limits
Item 18: Prepared DEA report needs to be revised
Item 19: Location of concrete cylinder core not found on site
Item 20: Load plan doesn't comply with BNBC
Item 21: Discrepancy in as-built drawing.
Item 22: Exposed reinforcement at roof level
Item 23: Water ponding on roof slab

Building-12

Item 24: Footing stressed above normal design limits
Item 25: Discrepancies in as-built drawing.

Building 13

Item 26: Inconsistency in design report.
Item 27: Stagnant of water observed on roof.

No-4 Boiler Building

Item 28: Prepared DEA report needs to be revised
Item 29: Foundation depth to be verified.

01 No Security Office & 01 No Fire Pump

Item 30: Inconsistency in drawings.

Building 14

Item 31: Verify in-situ concrete strength.

Shed 4

Item 32: Apparently lack of lateral stability system.

Problems Observed

Shed 5

Item 33: Apparently lack of lateral stability system.

Shed 6:

Item 34: Apparently non-engineering shed.

Shed 7 :

Item 35: Apparently lack of lateral stability system.

Item 36: Loose cable bracing.

Shed 08,09,10,11,12,13,14:

Item 37: Lack of design documents.

Item 38: Apparently lack of lateral load resisting system.

Item 39: Incomplete as-built drawings and discrepancies between drawings & as-built condition.

Shed 08, 09, 11, 12 & 14:

Item 40: Poor connection.

Shed 10 (New):

Item 41: Corrosion in steel member.

Shed-11:

Item 42: Damaged rafter.

Shed 08:

Item 43: Loose cable bracings.

Shed-10 (Old), 13:

Item 44: Non-Engineered structure.

Priority Actions

Item No.	Observation	Recommended Action Plan	Recommended Timeline
01	Heavy loading observed on floors. (Building 7)	Maintain an intermediate safe load plan of 3 kPa in all floors.	6-weeks
02	Heavy loading observed on floors. (Building 7)	Produce and actively manage a loading plan for all floor plates within the factory considering floor capacity and column capacity.	6-weeks
03	Heavy loading observed on floors. (Building 7)	Carry out any remedial works where necessary.	6-months
04	Heavy loading observed on floors. (Building 7)	Continue to implement loading plan.	6-months
05	Inconsistency in the design report. (Building 7)	Building engineer to prepare the Detail Engineering Assessment (DEA) report in compliance with section 1.9.1.1 and section 1.9.1.2 as per BNBC.	6-weeks

Item No.	Observation	Recommended Action Plan	Recommended Timeline
06	Inconsistency in the design report. (Building 7)	Carryout remedial works where necessary.	6-months
07	Lack of information in as-built drawing. (Building 7)	Building engineer is required to survey the structure & prepare as-built drawings.	6-weeks
08	Column and foundation stressed above normal design limits (Allover Printing Building-(Building-8))	Building engineer to review design, loads, columns and footings stresses.	6-weeks
09	Column and foundation stressed above normal design limits (Allover Printing Building-(Building-8))	Produce and actively manage a loading plan for all floor plates within the factory, considering floor, column and foundation capacity.	6-weeks
10	Column and foundation stressed above normal design limits (Allover Printing Building-(Building-8))	Complete implementation of any remedial works.	6-months

Item No.	Observation	Recommended Action Plan	Recommended Timeline
11	Column and foundation stressed above normal design limits (Allover Printing Building-(Building-8))	Continue to implement loading plan.	6-months
12	Remediation plan for inadequate footing (Allover Printing Building-(Building-8))	Building engineer is required to prepare remediation plan for all inadequate footings.	6-weeks
13	Remediation plan for inadequate footing (Allover Printing Building-(Building-8))	Complete implementation of the remedial works.	6-months
14	Load plan doesn't comply with BNBC. (Allover Printing Building-(Building-8))	Building engineer is required to revise the load plan as per BNBC part-6.	6-weeks
15	Load plan doesn't comply with BNBC. (Allover Printing Building-(Building-8))	Continue to implement loading plan.	6-months

Item No.	Observation	Recommended Action Plan	Recommended Timeline
16	Vibration on floor due to operation of heavy machineries. (Building 9)	Building engineer is required to investigate the long-term effect of the vibration and suggest remediation.	6-weeks
17	Vibration on floor due to operation of heavy machineries. (Building 9)	Carry out any remedial works where necessary.	6-months
18	Crack on first floor slab. (Building 9)	Building engineer is required to check the extent of the crack and suggest remediation.	6-weeks
19	Crack on first floor slab. (Building 9)	Produce and actively manage a loading plan for all floor plates within the factory considering floor capacity and column capacity.	6-weeks
20	Crack on first floor slab. (Building 9)	Carry out any remedial works where necessary.	6-months

Item No.	Observation	Recommended Action Plan	Recommended Timeline
21	Inconsistency in design report. (Building 9)	Building engineer to prepare the Detail Engineering Assessment (DEA) report in compliance with section 1.9.1.1 and section 1.9.1.2 as per BNBC.	6-weeks
22	Inconsistency in design report. (Building 9)	Carryout recommendations of DEA report where necessary.	6-months
23	Vertical bracing missing at ground floor. (Building 9)	Building engineer is required to install the missing bracing also check the lateral stability in long direction.	6-weeks
24	Vertical bracing missing at ground floor. (Building 9)	Carryout remedial works where necessary.	6-months
25	Crack on roof slab. (Building 9)	Building engineer is required to investigate the reason of crack, extent of crack and check whether the crack are repaired with suitable method.	6-weeks

Item No.	Observation	Recommended Action Plan	Recommended Timeline
26	Crack on roof slab. (Building 9)	Carryout remedial works where necessary.	6-months
27	Stagnant of water on roof. (Building 9)	Building engineer is required to improve the roof drainage system.	6-weeks
28	Prepared DEA report needs to be revised (Sample Dyeing Building (Building-10))	Building engineer is required to revised the prepared DEA report as per BNBC part-6.	6-weeks
29	Prepared DEA report needs to be revised (Sample Dyeing Building (Building-10))	Complete implementation of any remedial works.	6-months
30	Discrepancy in as-built drawing (Sample Dyeing Building (Building-10))	Building engineer is required to update the as-built drawing.	6-weeks

Item No.	Observation	Recommended Action Plan	Recommended Timeline
31	Irregularities in load transfer system (Sample Dyeing Building (Building-10))	Building engineer is required to check the adequacy of the highlighted beams. In-case of any structural connection between Building-10 and Boiler Building, separate the two structures. Otherwise analyze the two structures as a whole.	6-weeks
32	Irregularities in load transfer system (Sample Dyeing Building (Building-10))	Update as-built drawing.	6-weeks
33	Irregularities in load transfer system (Sample Dyeing Building (Building-10))	Complete implementation of any remedial works.	6-months
34	Sample Location of concrete core not repaired properly (Sample Dyeing Building (Building-10))	Building engineer is required to fill all the core cutting hole with micro-concrete.	6-weeks
35	Foundation stressed above normal design limits (ETP Lab Building-(Building-11))	Building engineer to review design, loads and footings stresses.	6-weeks

Item No.	Observation	Recommended Action Plan	Recommended Timeline
36	Foundation stressed above normal design limits (ETP Lab Building-(Building-11))	Produce and actively manage a loading plan for all floor plates within the factory, considering floor, column and foundation capacity.	6-weeks
37	Foundation stressed above normal design limits (ETP Lab Building-(Building-11))	Complete implementation of any remedial works.	6-months
38	Foundation stressed above normal design limits (ETP Lab Building-(Building-11))	Continue to implement loading plan.	6-months
39	Prepared DEA report needs to be revised (ETP Lab Building-(Building-11))	Building engineer to revise the prepared DEA as per geotechnical investigation report and actual site condition.	6-weeks
40	Prepared DEA report needs to be revised (ETP Lab Building-(Building-11))	Complete implementation of any remedial works.	6-months

Item No.	Observation	Recommended Action Plan	Recommended Timeline
41	Location of concrete cylinder core not found on site (ETP Lab Building-(Building-11))	Building engineer is required to produce a core layout and mark all the locations of the taken cores.	6-weeks
42	Load plan doesn't comply with BNBC (ETP Lab Building-(Building-11))	Building engineer is required to revise the load plan as per BNBC part-6.	6-weeks
43	Load plan doesn't comply with BNBC (ETP Lab Building-(Building-11))	Continue to implement loading plan.	6-months
44	Discrepancy in as-built drawing (ETP Lab Building-(Building-11))	Building engineer is required to re-survey the whole structures and update as-built drawing as per actual site condition.	6-weeks
45	Exposed reinforcement at roof level (ETP Lab Building-(Building-11))	Building engineer is required to provide rust proof paint on the exposed rebar.	6-weeks

Item No.	Observation	Recommended Action Plan	Recommended Timeline
46	Water ponding on roof slab (ETP Lab Building-(Building-11))	Building engineer is required to provide necessary slope and improve drainage system to prevent water ponding.	6-weeks
47	Footing stressed above normal design limits (Building-12)	A Detail Engineering Assessment of the building to be commenced immediately.	Immediate - Now
48	Footing stressed above normal design limits (Building-12)	Detail Engineering Assessment to be completed.	6-weeks
49	Footing stressed above normal design limits (Building-12)	Building engineer is required to check the foundation capacity considering vertical and lateral loading.	6-weeks
50	Footing stressed above normal design limits (Building-12)	Produce and actively manage a loading plan for all floor within the factory considering floor capacity and column capacity.	6-weeks

Item No.	Observation	Recommended Action Plan	Recommended Timeline
51	Footing stressed above normal design limits (Building-12)	Continue to implement load plan.	6-months
52	Footing stressed above normal design limits (Building-12)	Complete implementation of any remedial works deemed necessary.	6-months
53	Discrepancy in as-built drawing (Building 12)	Prepare “as constructed” drawings which reflect the actual site dimensions and complete structural & architectural information.	6-weeks
54	Inconsistency in the design report. (Building 13)	Building engineer to prepare the Engineering Assessment (EA) report in compliance with section 1.9.1.1 and section 1.9.1.2 as per BNBC.	6-weeks
55	Inconsistency in the design report. (Building 13)	Carryout remedial works where necessary.	6-months

Item No.	Observation	Recommended Action Plan	Recommended Timeline
56	Stagnant of water on roof. (Building 13)	Building engineer is required to improve the roof drainage system.	6-weeks
57	Verify in-situ concrete strength. (Building 14)	Building engineer is required to verify in-situ concrete strength by taking 100 mm diameter core from lower tier column (minimum 4 nos).	6-weeks
58	Verify in-situ concrete strength. (Building 14)	Incorporate the concrete strength in design report.	6-weeks
59	Verify in-situ concrete strength. (Building 14)	Carryout remedial works where necessary.	6-months
60	Prepared DEA report needs to be revised (No-4 Boiler Building)	Building engineer is required to revised the prepared DEA report as per BNBC part-6 along with proper concrete strength.	6-weeks

Item No.	Observation	Recommended Action Plan	Recommended Timeline
61	Prepared DEA report needs to be revised (No-4 Boiler Building)	Complete implementation of any remedial works.	6-months
62	Foundation depth to be verified (No-4 Boiler Building)	Building engineer is required to verify the foundation depth and check the adequacy of the foundation based on accurate borehole data.	6-weeks
63	Foundation depth to be verified (No-4 Boiler Building)	Complete implementation of any remedial works.	6-months
64	Inconsistency in drawings (01 No Security Office & 01 No Fire Pump)	Building Engineer to survey as-built structure and prepare accurate as-built drawings.	6-weeks
65	Apparently lack of lateral stability system. (Shed 4)	Building engineer is required to check the lateral stability of the shed.	6-weeks

Item No.	Observation	Recommended Action Plan	Recommended Timeline
66	Apparently lack of lateral stability system. (Shed 4)	Carryout remedial works where necessary.	6-months
67	Apparently lack of lateral stability system. (Shed 5)	Building engineer is required to check the lateral stability of the shed.	6-weeks
68	Apparently lack of lateral stability system. (Shed 5)	Carryout remedial works where necessary.	6-months
69	Apparently non-engineering shed. (Shed 6)	Building engineer is required to replace by an engineered structure otherwise check the stability system of the shed and suggest remedial works.	6-weeks
70	Apparently non-engineering shed. (Shed 6)	Carryout remedial works where necessary.	6-months

Item No.	Observation	Recommended Action Plan	Recommended Timeline
71	Apparently lack of lateral stability system. (Shed 7)	Building engineer is required to check the lateral stability of the shed.	6-weeks
72	Apparently lack of lateral stability system. (Shed 7)	Carryout remedial works where necessary.	6-months
73	Loose cable bracing. (Shed 7)	Building engineer is required to tighten the bracing.	6-weeks
74	Lack of design documents. (Sheds 8,9.10,11,12,13,14)	The Building engineer is required to prepare a set of design documents for all structures as per BNBC part-6, section 1.9.1	6-weeks
75	Lack of design documents. (Sheds 8,9.10,11,12,13,14)	Building engineer is required to review the design of structural members as a part of Engineering Assessment.	6-weeks

Item No.	Observation	Recommended Action Plan	Recommended Timeline
76	Lack of design documents. (Sheds 8,9.10,11,12,13,14)	Carry out remedial works where necessary.	6-months
77	Apparently lack of lateral load resisting system. (Shed 8,9,10,11,12,13,14)	Building engineer is required to check the requirement of the any load transfer media in the long direction.	6-weeks
78	Apparently lack of lateral load resisting system. (Shed 8,9,10,11,12,13,14)	Building engineer is required to check the lateral stability and prepare Engineering Assessment Report in compliance with section 1.9.1 as per BNBC.	6-weeks
79	Apparently lack of lateral load resisting system. (Shed 8,9,10,11,12,13,14)	Carry out remedial works where necessary.	6-months
80	Incomplete as-built drawings and Discrepancies between drawings & as-built condition (Shed 8,9,10,11,12,13,14)	Building engineer to survey the whole structure and prepare accurate as-built drawings in compliance with section 1.9.1.2 as per BNBC.	6-weeks

Item No.	Observation	Recommended Action Plan	Recommended Timeline
81	Poor connection (Shed 8, 9, 11, 12 & 14)	Building engineer is required to check the connection adequacy as part of Engineering Assessment (EA) Report in compliance with section 1.9.1 as per BNBC.	6-weeks
82	Poor connection (Shed 8, 9, 11, 12 & 14)	Implement the remedial works deemed necessary by the Engineering Assessment (EA).	6-months
83	Corrosion in steel members. (Shed-10 new)	Take necessary measures to prevent further corrosion and repair the corroded steel members as per engineer's suggestion.	6-weeks
84	Damaged rafter. (Shed 11)	Building engineer is required investigate the damage rafter and suggest a suitable repair method..	6-weeks
85	Damaged rafter. (Shed 11)	Carryout remedial works where necessary.	6-months

Item No.	Observation	Recommended Action Plan	Recommended Timeline
86	Loose cable bracing. (Shed-8)	Building Engineer to survey the whole structure and tighten loose bracings where necessary.	6-weeks
87	Non-engineered shed. (Shed-10 (Old), 13)	Building engineer is required to replace by an engineered structure otherwise check the stability system of the shed and suggest remedial works.	6-weeks
88	Non-engineered shed. (Shed-10 (Old), 13)	Carry out remedial works where necessary.	6-months