Denim Processing Plant Ltd

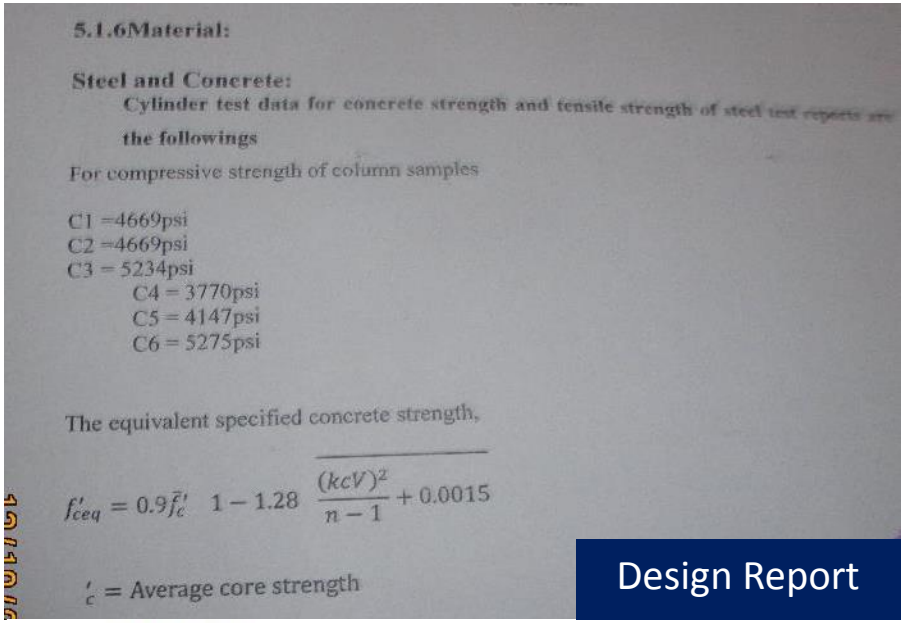
Belashahor, Chandina, Comilla-3510
(23.486273, 90.986197)
15th October 2019

ACCORD
on Fire and Building Safety in Bangladesh

Observations

Review of design report

Observation: RMG building



5.1.6Material:

Steel and Concrete:

Cylinder test data for concrete strength and tensile strength of steel test reports are the followings

For compressive strength of column samples

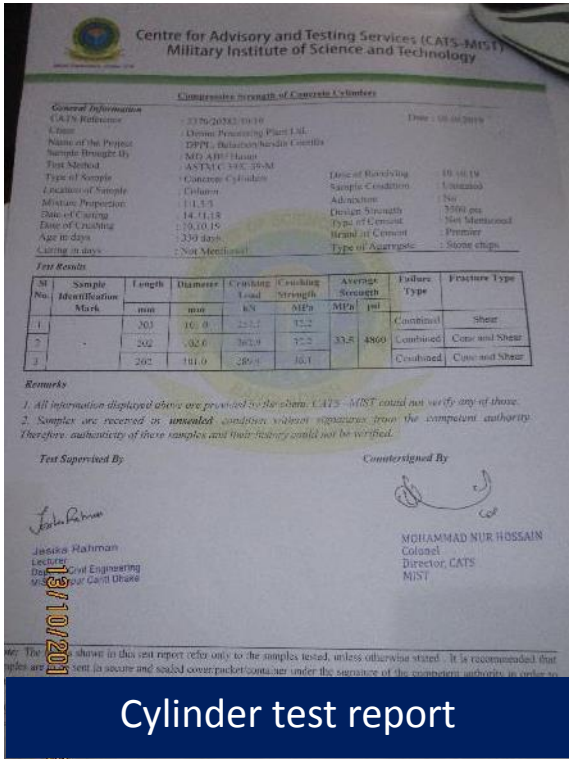
C1 =4669psi
C2 =4669psi
C3 = 5234psi
C4 = 3770psi
C5 = 4147psi
C6 = 5275psi

The equivalent specified concrete strength,

$$f'_{ceq} = 0.9\bar{f}'_c \left(1 - 1.28\sqrt{\frac{(kcV)^2}{n-1} + 0.0015}\right)$$

$\bar{f}'_c$ = Average core strength

Design Report



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

Compressive Strength of Concrete Cylinders

General Information

Test Results

Sl No.	Sample Identification Mark	Length mm	Diameter mm	Crushing Load kN	Crushing Strength MPa	Average Strength MPa	Average Strength psi	Failure Type	Fracture Type
1		203	102.0	223.1	27.2			Combined	Shear
2	-	202	102.0	282.9	34.5	33.8	4860	Combined	Cone and Shear
3		202	101.0	280.9	34.1			Combined	Cone and Shear

Remarks

1. All information displayed above are provided by the client. CATS-MIST could not verify any of those.
2. Samples are received in unsealed condition without signatures from the competent authority. Therefore authenticity of these samples and their history could not be verified.

Test Supervised By

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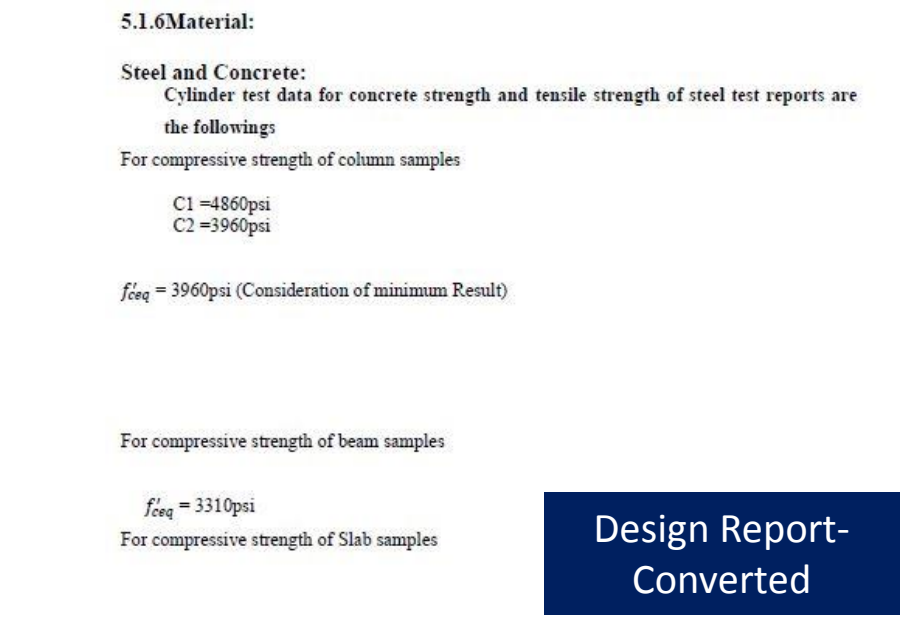
19/10/201

Cylinder test report



5.1.6Material:

Steel and Concrete:

Cylinder test data for concrete strength and tensile strength of steel test reports are the followings

For compressive strength of column samples

C1 =4860psi
C2 =3960psi

f'_{ceq} = 3960psi (Consideration of minimum Result)

For compressive strength of beam samples

f'_{ceq} = 3310psi

For compressive strength of Slab samples

Design Report-Converted

In design report, the number of concrete samples did not match with the provided report. The calculation of evaluating concrete strength is required to be reviewed following BNBC.

Observation: RMG building

Table for report on Foundation:

SL No	Item	Data		Remark
		Designed	Required	
1	Size and thickness of footing, F1	Size of Footing, F1= (8'-6" x 8'-6") and thickness **24"** and 20mm@5"c/c in both direction. Depth of foundation level is 10ft from existing ground level. Allowable bearing capacity of soil is 5.0ksf (**F.S. = 2.5**).	Size of Footing, F1= (7'-0" x 7'-0") and thickness **20"** and 20mm@6"c/c in both direction. Depth of foundation level is 10.0ft from existing ground level. Allowable bearing capacity of soil 5.0ksf (**F.S. = 2.5**).	Adequate.
2	Size and thickness of footing, F2	Size of Footing, F2= (12'-0" x 12'-0") and thickness **32"** and 20mm@5"c/c in both direction. Depth of foundation level is 10ft from existing ground level. Allowable bearing capacity of soil is 5.0ksf (**F.S. = 2.5**).	Size of Footing, F2= (9'-3" x 9'-3") and thickness **23"** and 20mm@6"c/c in both direction. Depth of foundation level is 10ft from existing ground level. Allowable bearing capacity of soil 5.0ksf (**F.S. = 2.5**).	Adequate.
3	Size and thickness of footing, F3.	Size of Footing, F3= (9'-9" x 9'-9") and thickness **28"** and 20mm@6"c/c in both direction. Depth of foundation level is 10ft from existing ground level. Allowable bearing capacity of soil is 5.0ksf (**F.S. = 2.5**).	Size of Footing, F3= (9'-3" x 9'-3") and thickness **25"** and 20mm@7"c/c in both direction. Depth of foundation level is 10ft from existing ground level. Allowable bearing capacity of soil is 5.0ksf (**F.S. = 2.5**).	Adequate.
4	Size and thickness of footing, CF1.	Size of Footing, CF1= (18'-10" x 16'-5") and thickness **24"** and 20mm@6"c/c in both direction. Depth of foundation level is 10ft from existing ground level. Allowable bearing capacity of soil is 5.0ksf (**F.S. = 2.5**).	Size of Footing, CF1= (12'-3" x 12'-3") and thickness **20"** and 20mm@7"c/c in both direction. Depth of foundation level is 10ft from existing ground level. Allowable bearing capacity of soil is 5.0ksf (**F.S. = 2.5**).	Adequate.
5	Size and thickness of footing, F5.	Size of Footing, F5= (10'-0" x 10'-0") and thickness **24"** and 20mm@6"c/c in both direction. Depth of foundation level is 10ft from existing ground level. Allowable bearing capacity of soil is 5.0ksf (**F.S. = 2.5**).	Size of Footing, F5= (9'-6" x 9'-6") and thickness **22"** and 20mm@6"c/c in both direction. Depth of foundation level is 10ft from existing ground level. Allowable bearing capacity of soil is 5.0ksf (**F.S. = 2.5**).	Adequate.

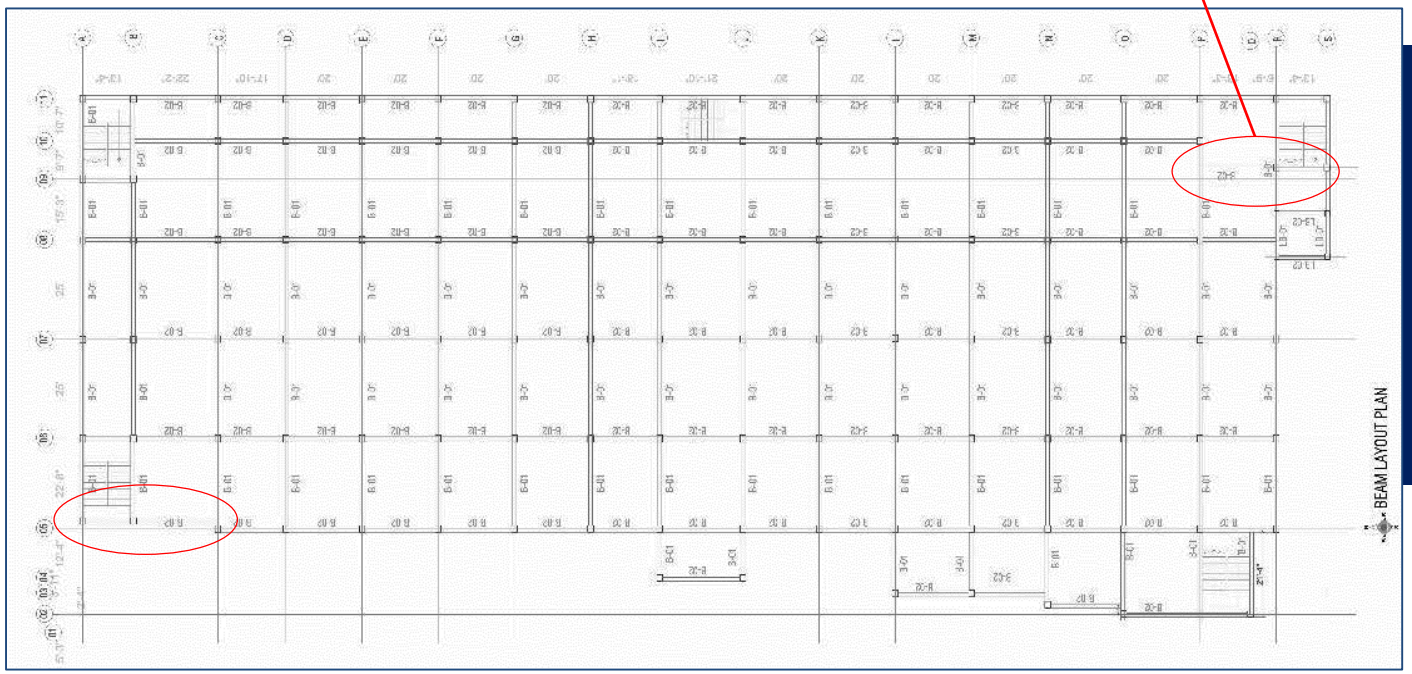
Cursory calculation indicates that the some of the foundations are stressed above design limit considering mentioned bearing capacity of soil.

In design report, detail foundation adequacy check, loading information & bearing capacity calculations are not provided.

Observation: RMG building

Discrepancy between as-built drawing and site condition

Observation: RMG building



Beam offset was found in the as-built drawing, but the extension of offset & details was not provided in the drawing.

Observation: RMG building

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Water ponding on the roof

Observation: RMG building

Water ponding was found on the roof. Factory is required to improve the drainage system and apply suitable method of water proofing on the roof.

Observation: RMG building

Construction material on roof

Observation: RMG building

Piling up of construction material on the roof may cause overloading. Building engineer required to remove all the construction materials.

Observation: RMG building

Exposed rebar on the roof

Observation: RMG building

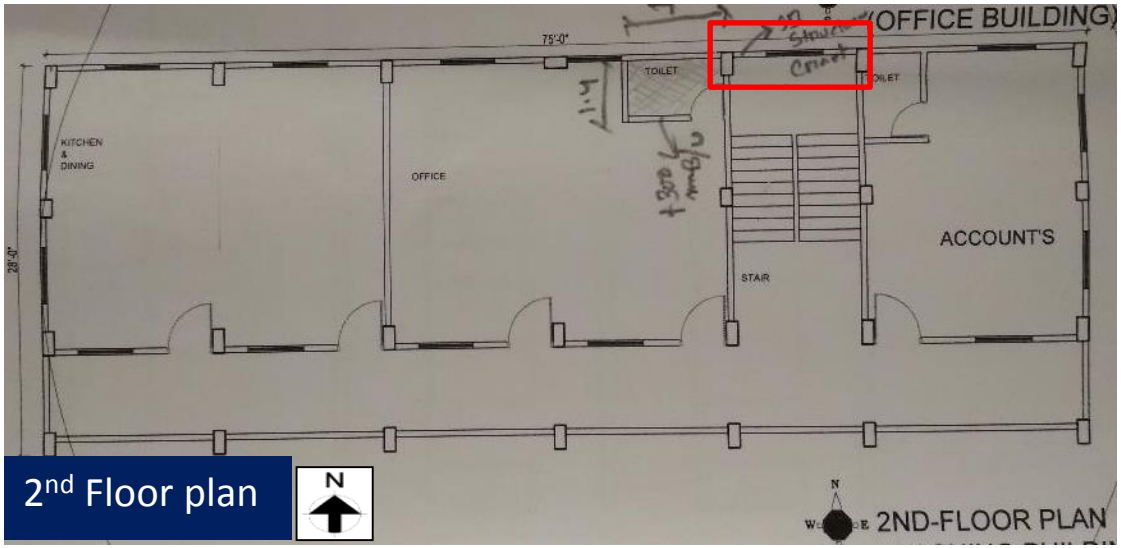
Expose rebar prone to corrosion

Rebar was found exposed on the roof. Factory is required to take necessary measure to protect the rebar from corrosion.

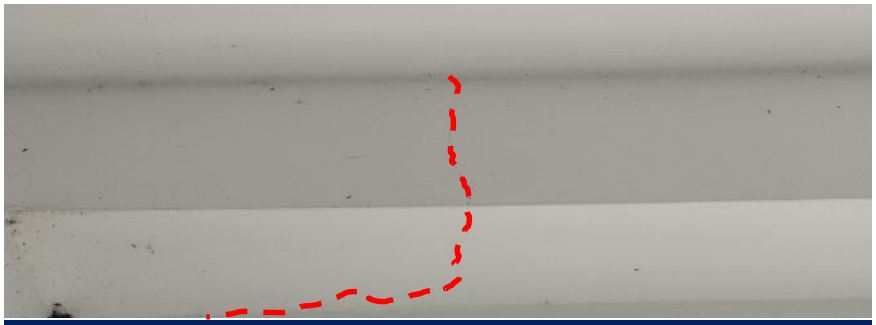
Observation: RMG building

Crack on beams

Observation: Office building



2nd Floor plan



Crack on floor beam

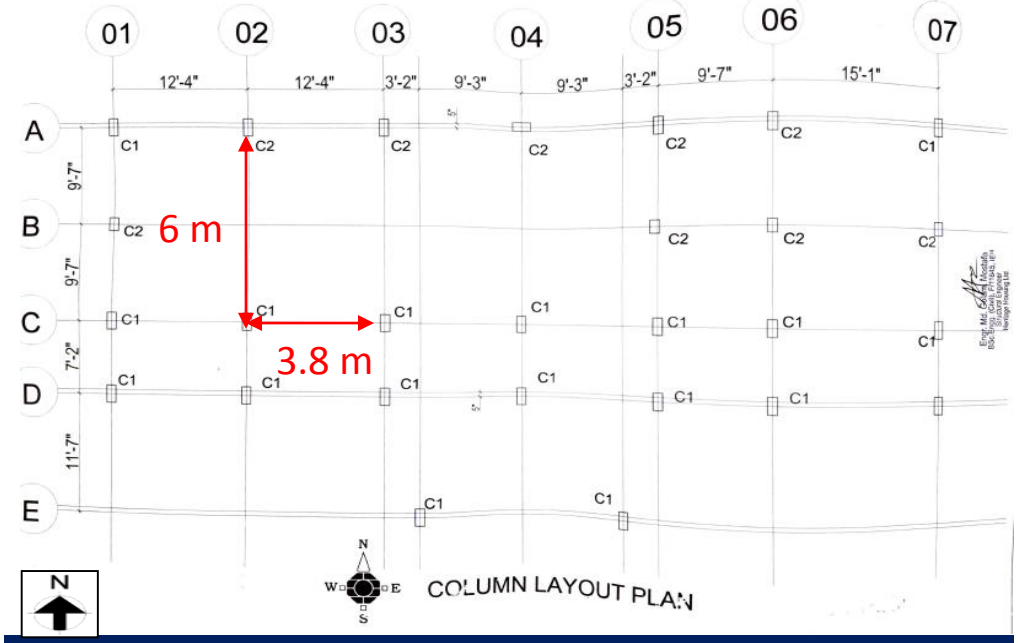
Structural crack observed on stair beam

Cracks were observed on floor beams. Building engineer is required to investigate the cracks and carry out suitable repair work as per recommendation of investigation report. Provide temporary prop support to the cracked stair beam until further investigation and completion of remediation.

Observation: Office building

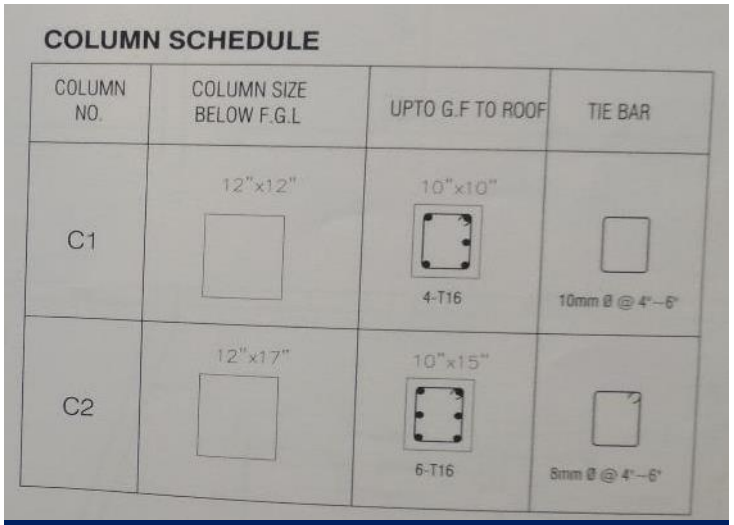
Cursory calculation indicates column stress above normal design limit

Observation : Office building



Column layout plan

Cursory calculation indicates that columns are stressed above normal design limits considering 2 kPa live load on typical floor & minimum concrete strength for brick chips.



C1 column-4-16 mm bar & rebar strength considered 275 MPa.

Brick chips aggregate

Observation : Office building

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Lack of lateral stability system

Observation : Shed 2

No lateral stability system (roof bracing, wall bracing, compression strut) observed. Building engineer is required to carry out an engineering assessment to check the lateral stability of the shed.

Observation : Shed 2

Non engineering shed

Observation : Shed 3

Apparently non engineering shed: poor connection details, inadequate member sizes and corroded steel members.

Observation : Shed 3

Problems Observed

RMG building :

1: Review of design report.

2: Discrepancy between as-built drawing and site condition.

3: Construction debris on the roof.

4: Water ponding on the roof.

5: Exposed rebar susceptible to corrosion.

Office building :

6: Crack on beams.

7: Cursory calculation indicates column stress above normal design limit.

Shed-2

8: Lack of lateral stability system.

Shed-3 :

9: Non engineering shed.

Priority Actions

Item No.	Observation	Recommended Action Plan	Recommended Timeline
1	Review of design report. (RMG building)	Building engineer is required to review the design report including the foundation design, load and stresses.	**6-weeks**
2	Review of design report. (RMG building)	Carry out any remedial works where necessary.	**6-months**
3	Discrepancy between as-built drawing and site condition. (RMG building)	Building engineer is required to survey the structure and update the as-built drawings.	**6-weeks**
4	Construction debris on the roof. (RMG building)	Remove all the construction debris from the roof.	**Immediate - Now**
5	Construction debris on the roof. (RMG building)	Implement better supervision of loadings in all level.	**6-weeks**
6	Water ponding on the roof. (RMG building)	The roof slab drainage system should be improved. In addition waterproofing material is to be applied on the roof slab.	**6-weeks**
7	Exposed rebar susceptible to corrosion. (RMG building)	Factory is required to take necessary measure to protect the rebar from corrosion.	**6-weeks**

Item No.	Observation	Recommended Action Plan	Recommended Timeline
8	Crack on beams. (Office building)	Provide temporary prop support to the cracked beam.	**Immediate - Now**
9	Crack on beams. (Office building)	Building engineer is required to carry out the investigation and suggest remedial works.	**Immediate - Now**
10	Crack on beams. (Office building)	Carry out suitable repair works as per investigation report.	**6-weeks**
11	Cursory calculation indicates column stress above normal design limit. (Office building)	Factory Engineer to review design, loads and columns stresses.	**6-weeks**
12	Cursory calculation indicates column stress above normal design limit. (Office building)	Verify in-situ concrete stresses by 100mm dia. cores from min. 4 no. column from lower tier.	**6-weeks**
13	Cursory calculation indicates column stress above normal design limit. (Office building)	Produce and actively manage a loading plan for all floor plates within the factory considering floor capacity and column capacity.	**6-weeks**
14	Cursory calculation indicates column stress above normal design limit. (Office building)	Carry out remedial works where necessary.	**6-months**

Item No.	Observation	Recommended Action Plan	Recommended Timeline
15	Lack of lateral stability system. (Shed-2)	Building engineer is required to check the lateral stability & serviceability against the lateral load as per BNBC.	**6-weeks**
16	Lack of lateral stability system. (Shed-2)	Carry out remedial works where necessary.	**6-months**
17	Non engineering shed. (Shed-3)	Building engineer is required to suggest any alteration/demolition of the shed.	**6-weeks**
18	Non engineering shed. (Shed-3)	Carry out alteration/demolition works.	**6-months**