

Tropical Knitex Ltd.

Chandra, Kaliakoir, Gazipur-1751, Bangladesh

Co-ordinates: 24.036378N, 90.256497E

24th September 2019 , 6th October 2019 & 15th October 2019





Observations



Apparent lack of lateral stability

**Observations: Building 2, Building 3, Building 4,
Building 9**



Building 2



No horizontal, vertical bracing and compression strut observed

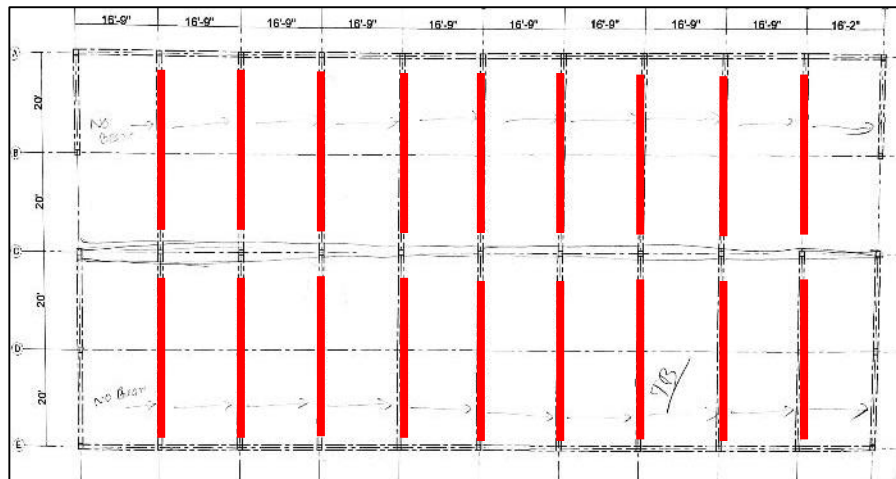
Building 3



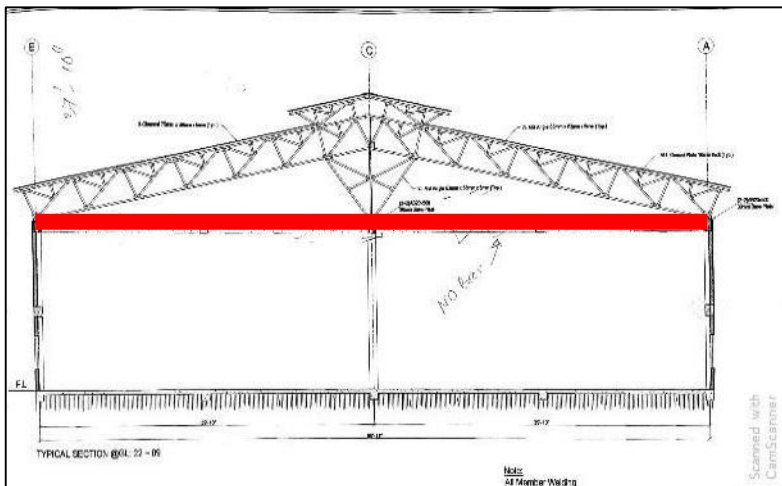
No connection details between steel roof truss and RC frame was available. The connections need check against the uplift forces to ensure structural stability.



Building 4



Missing beams are marked in Beam Layout plan.

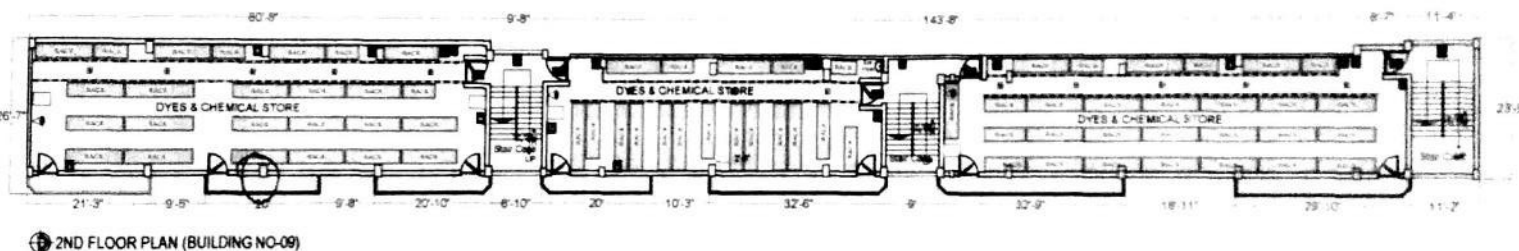


Missing beam marked in Section

Missing tie beams in short direction. No horizontal bracing was found. And connection details unknown. Check for lateral stability and uplift is required to ensure building safety.



Building 9



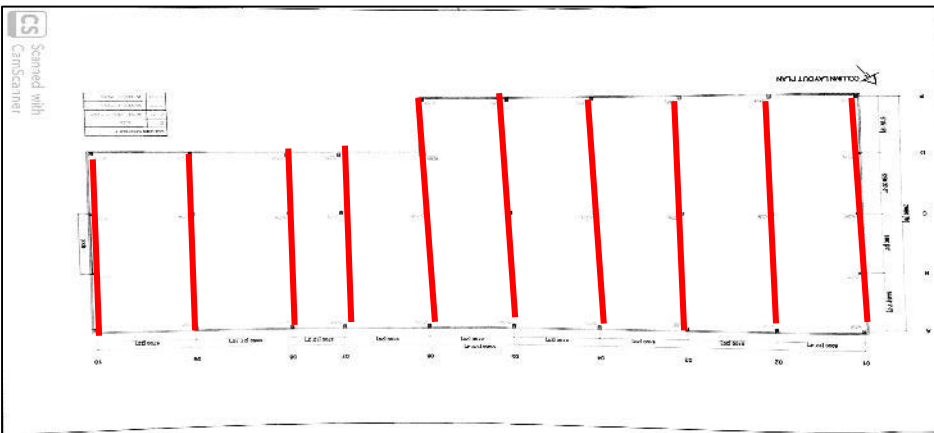
Floor plan



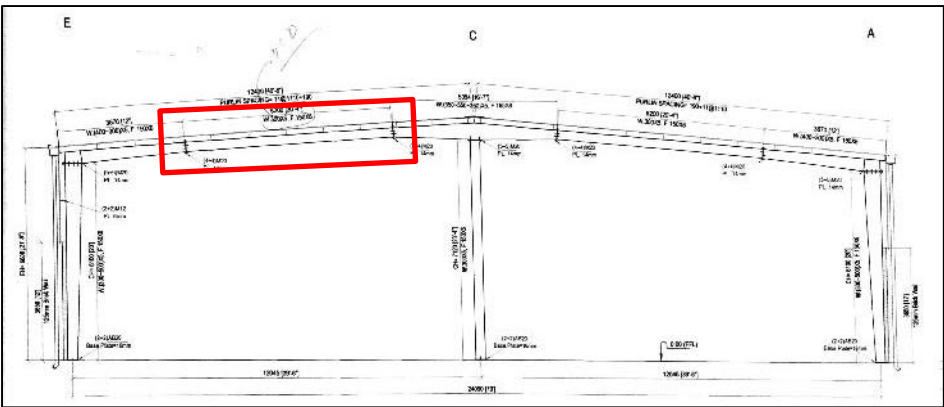
Apparently Building 9 is a slender building. Only one bay in weak direction. Lateral stability check is required.



Discrepancies between as-built drawings and on-site observation



Rafters marked in Plan

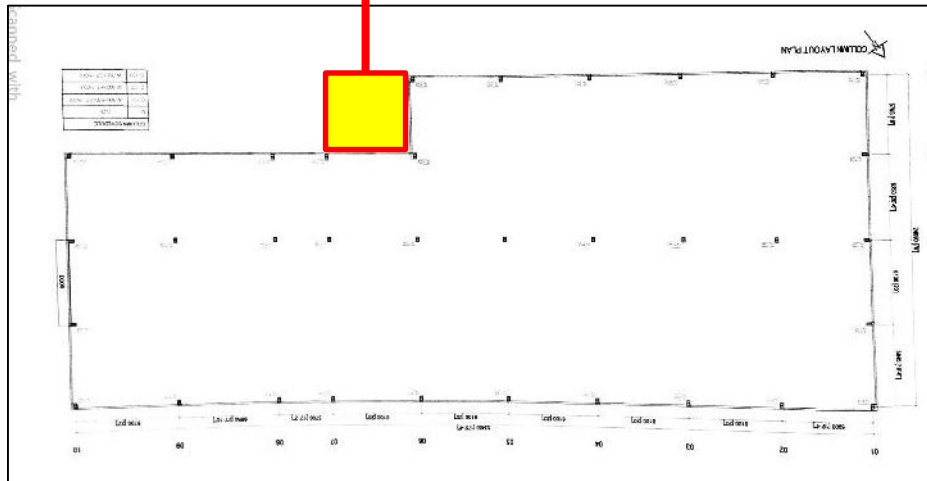


Typical Section



Steel Column Rafter system

As per drawings, the marked rafters should have a width of 300 mm but on site the rafters width was found 250 mm.



Typical Section



Inside undocumented portion

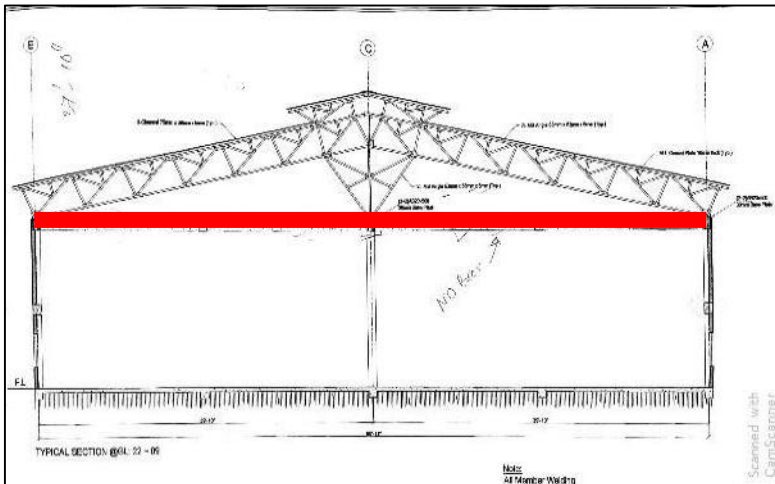
An extra undocumented portion was found which is not shown in the as built drawings.



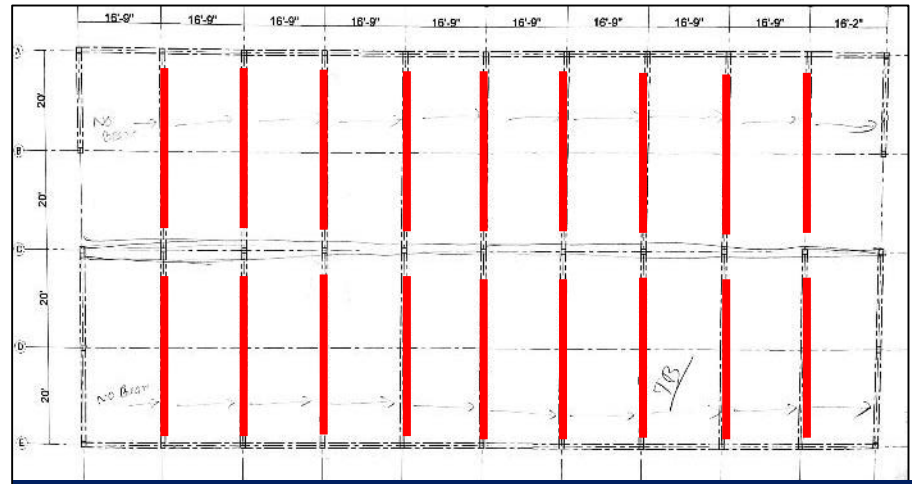
Discrepancies between as-built drawings and on-site observation



Steel Column Rafter system



Missing beam marked in Section



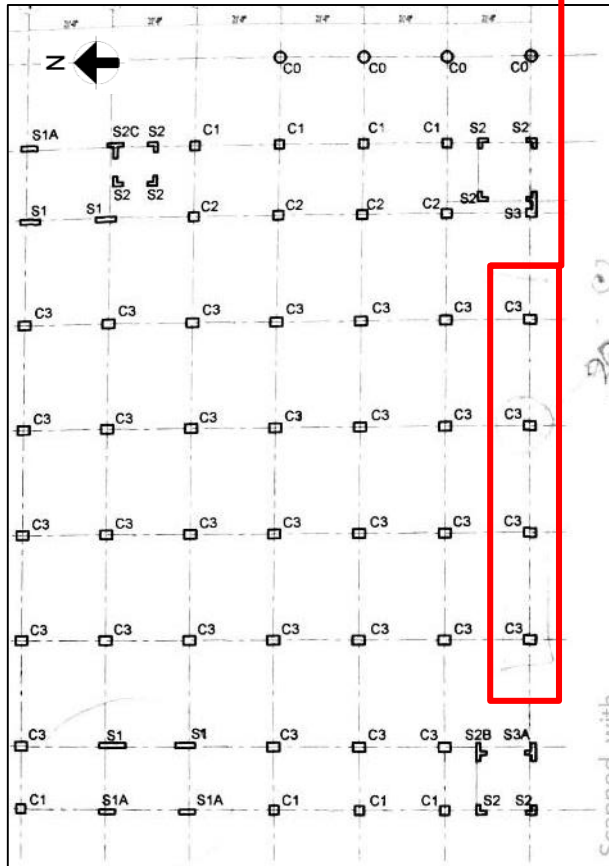
Missing beams are marked in Beam Layout plan.

As per beam layout the beams in the lateral direction were not observed during inspection.

Observations: Building-4



Discrepancies between as-built drawings and on-site observation



Partial Column Layout

C3		30-25mm		30-25mm		30-25mm		28-25mm-4th 22-25mm-6th
	36" X 27"		36" X 27"		36" X 27"		36" X 27"	

C3 column size in column schedule is mentioned to be 36" x 27"



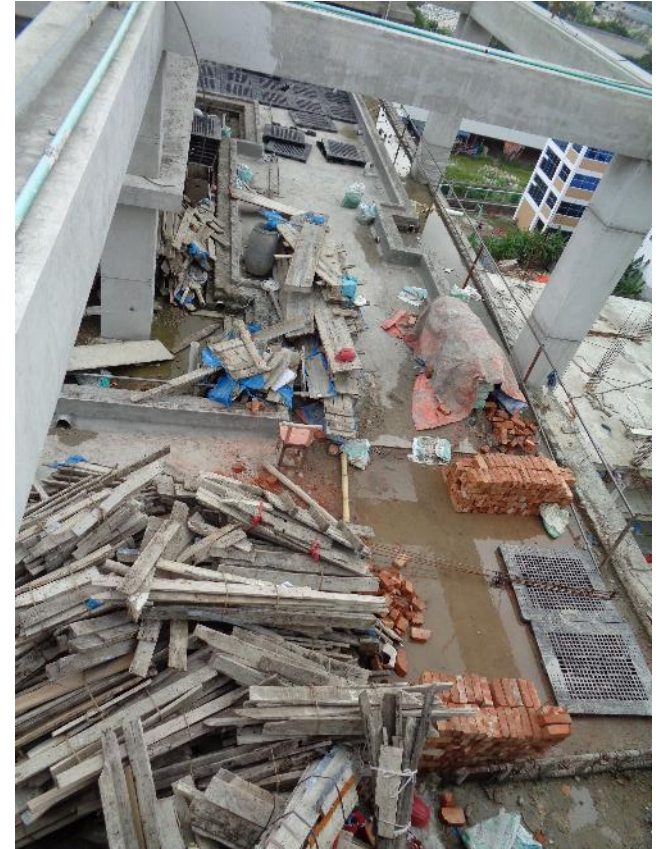
During inspection, the marked columns in the column layout were found smaller than the indicated size in as built drawings. C3 column size in column schedule is mentioned to be 36"x 27". But during inspection, the column was measured 32" x 27".

Observations: Building-7



Water clogging, Construction Materials stacking and vegetation on roof

Observations: Building-7



Water clogging , Construction materials stacking, and Vegetation was observed in the roof and 7th floor.

Observations: Building-7



Exposed corroded rebars in the roof

Observations: Building-7

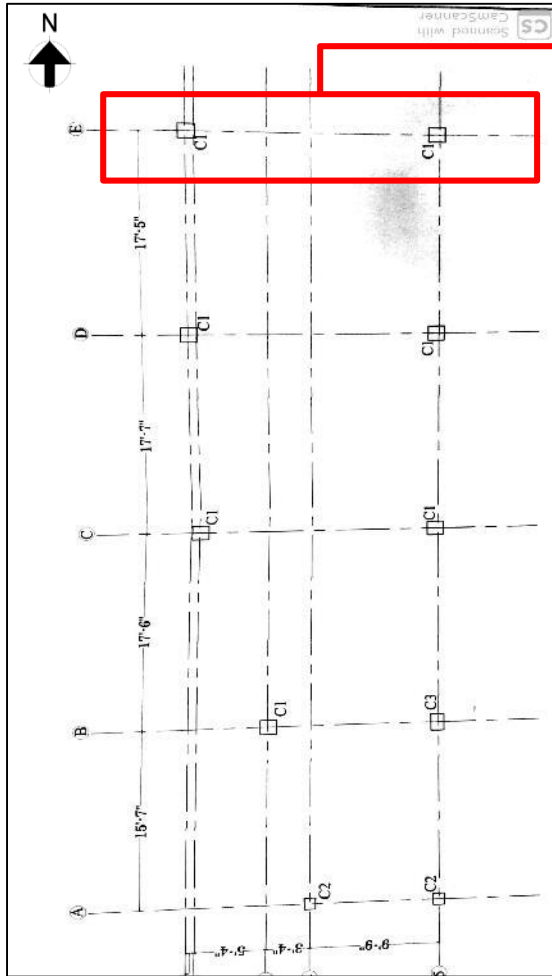


Exposed corroded rebars were found on the rooftop.

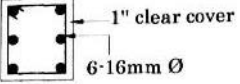
Observations: Building-7



Discrepancies between as-built drawings and on-site observation



Column Layout

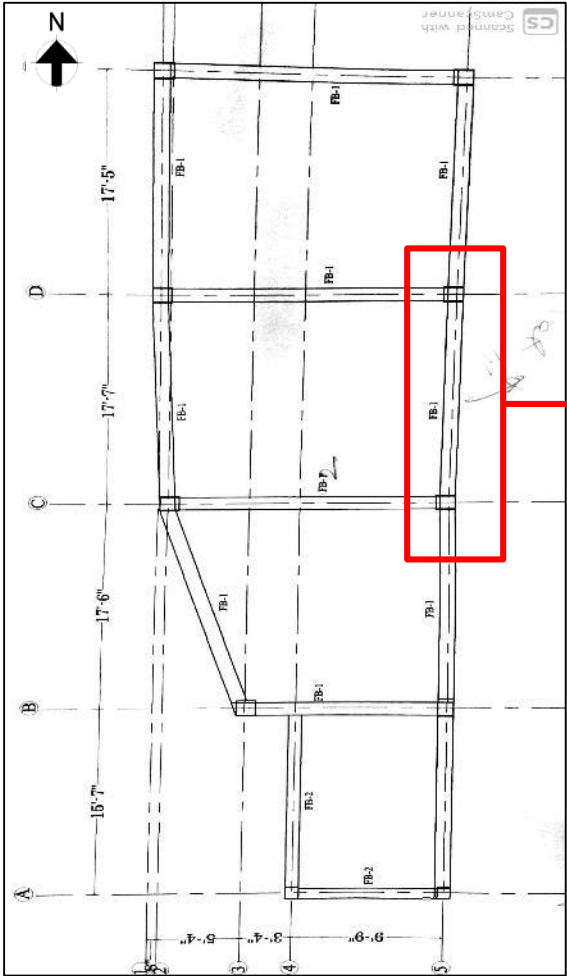
	SIZE	VER.BAR
C1	15" X 15"	 1" clear cover 6-16mm Ø

C1 column size in column schedule is mentioned to be 15" x 15"



During inspection, the marked columns in the column layout were found smaller than the indicated size in as built drawings. C1 column size in column schedule is mentioned to be 15"x 15". But during inspection, the column was measured 12" x 12"

Observations: Building-8



Beam Layout



During inspection, the marked beam in the beam layout was found missing at 11' level.

Observations: Building-8



Analysis report for retrofitting works was not available



Retrofitted columns



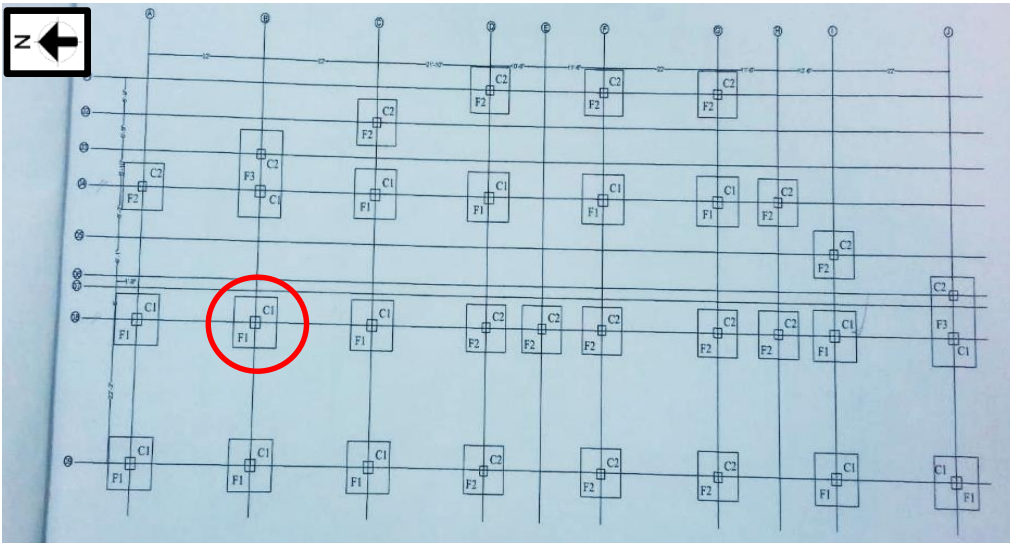
Discontinuous strap footing above ground.

Factory has completed retrofitting works in Building 9 and constructed a strap footing around the building. But no analysis report of these retrofitting works were available. Moreover, the load paths to ground aren't clear.

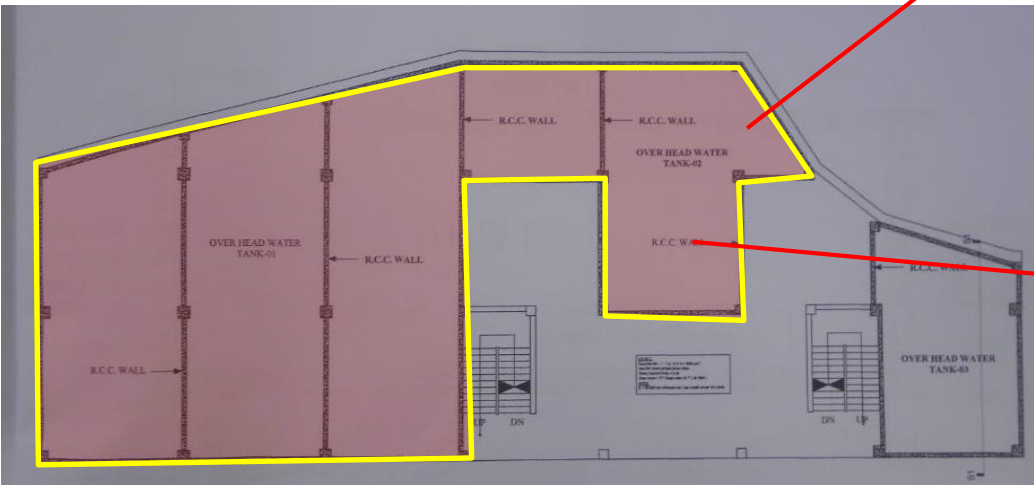
Observations: Building-9



Foundation stress above normal design limit



Red marked footing found over stressed



Layout of OHWT on Part-1

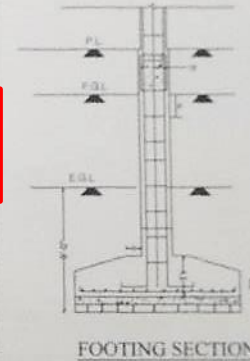


Heavy water reservoirs



FOOTING SCHEDULE.

MARKING OF FOOTING		SIZE	T1	T2	S	REINFORCEMENT
3	F 1	9'-0" X 9'-0"	24"	14"	10"	20mm ϕ @ 6" c/c. in both ways
3	F 2	8'-6" X 8'-6"	20"	12"	10"	16mm ϕ @ 5" c/c. in both ways
7	F 3	8'-6" X 14'-0"	22"	14"	10"	12mm ϕ @ 6" c/c. in top layer. 20mm ϕ @ 6" c/c. in bottom layer.



Foundation Schedule

Sub-soil Investigation Report

16. RECOMMENDATION:

On the basis of aforesaid conclusion, the following recommendations are suggested for proposed Multi Storied Industrial Building at Plot No.- 2016, 2022, 2023, 2035, 2036, 2037, 2038, 2039, 2040, 2041 & 2042, Mouza- Chandura, P.S - Kuliakair, Dist - Gazipur.

SHALLOW FOUNDATION as Isolated column footing:

The average bearings capacity of the Shallow Foundation as isolated column footing may be considered in the following way:

- To be considered 1.40 Tsf (F. S. = 2.5) at depth of 8ft measured from E.G.L. particularly at and around the test points for BH-113, BH-115, BH-116, BH-117, BH-118, BH-121, BH-125, BH-127, BH-128, BH-130, BH-133 & BH-135 only.

- To be considered 1.50 Tsf (F. S. = 2.5) at a depth of 8ft measured from E.G.L. particularly at and around the test points for BH-114, BH-119, BH-120, BH-122, BH-123, BH-126, BH-131, BH-132 & BH-134 only.

- To be considered 1.30 Tsf (F. S. = 2.5) at BH-1a depth of 8ft measured from E.G.L. particularly at and around the test points for BH-124, BH-129 & BH-136 only.

R.C.C. CAST-IN-SITU PILE:

The average bearing capacities (F.S.=2.50) of different diameter pile with the embedment length up to 50ft from E.G.L. of each boring may be considered as follows:

- 58 Ton for 18 inch dia pile
- 70 Ton for 20 inch dia pile

Note:

- 1 Tsf = 1.094 Kg/cm² = 2ksf, 1 Ton = 2000 lbs = 9.87kN, 1m = 3.28ft, E.G.L. = Existing Ground level & F. S. = Factor of Safety.
- The designer may select any others alternative type, depth as well as the bearing capacity of the foundation in the light of information provided in this report.
- Foundation base should be kept dry during construction period.
- Pile load test should be performed. If pile load test is not performed then value of pile capacity should be considered half.

Md. Mohsinur Ali
22-11-2012

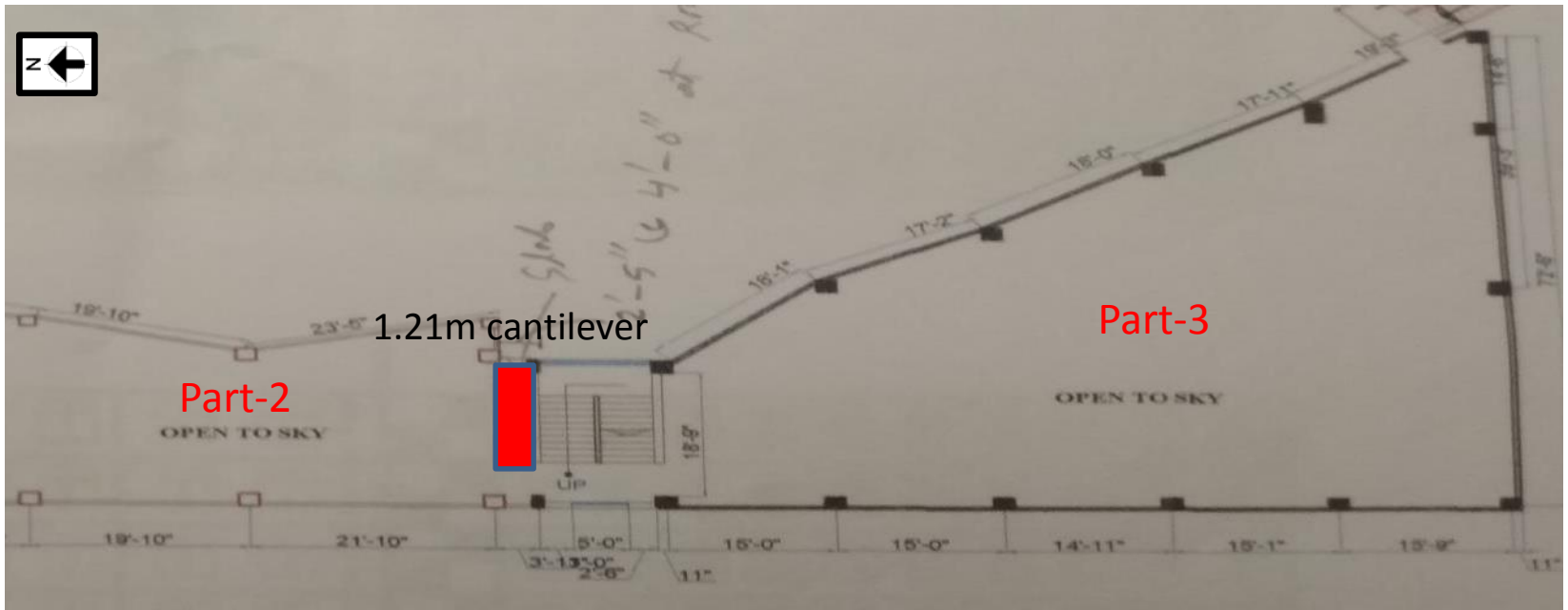
Md. Mohsinur Ali

Recommendation of soil test report

Cursory calculation indicates that the soil below isolated footing appears to be stressed above normal design limit considering the recommended soil bearing capacity in geotechnical investigation report and footing sizes mentioned in the provided drawing. Factory engineer is required to review the adequacy of footings and comply with BNBC.



Discrepancies between provided as-built drawings and on-site condition



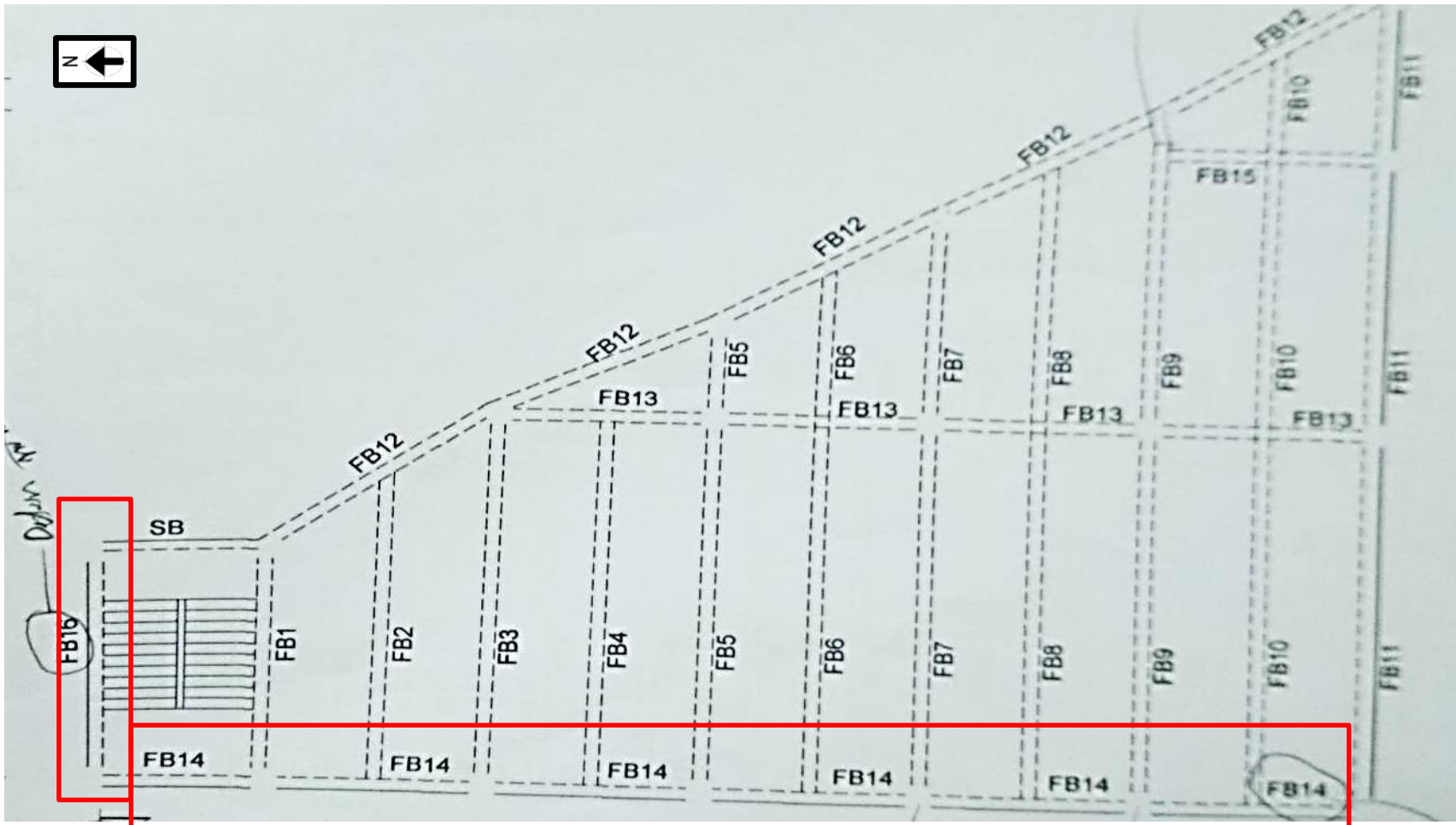
The cantilever slab of Part-3 was not mentioned in the as-built drawing.



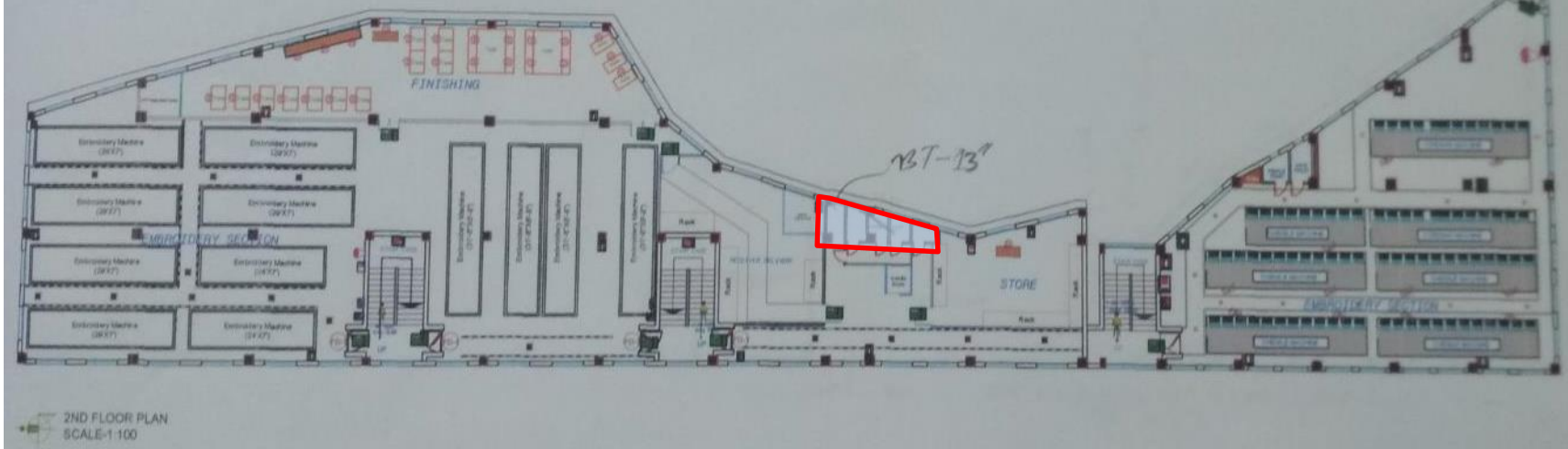
1.21m cantilever at stair top



0.8m cantilever at floor level



Structural Details of FB14 & FB15 was not found in as built drawing. Factory engineer is required to update the as built drawing as per actual site condition.



Floor Layout



Build up

325 mm high build up was found at toilet zone on 1st & 2nd floor. No information has been provided regarding build up in as built drawing. Factory engineer is required to survey the whole structure and produce as built documentation.



Hairline Crack in roof beams



Hairline crack was found in beam at several locations of the structure. Factory engineer is required to investigate the reason and extend of cracks and produce an investigation report including the remedial measures.



Missing Bolts in joint of Steel Stair



Bolt was found missing at several column joints. Factory engineer is required to installed the missing bolt where required.



Lateral Stability of Steel Stair

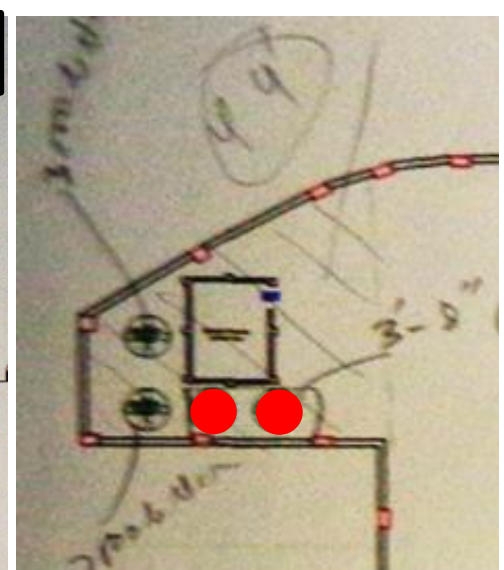
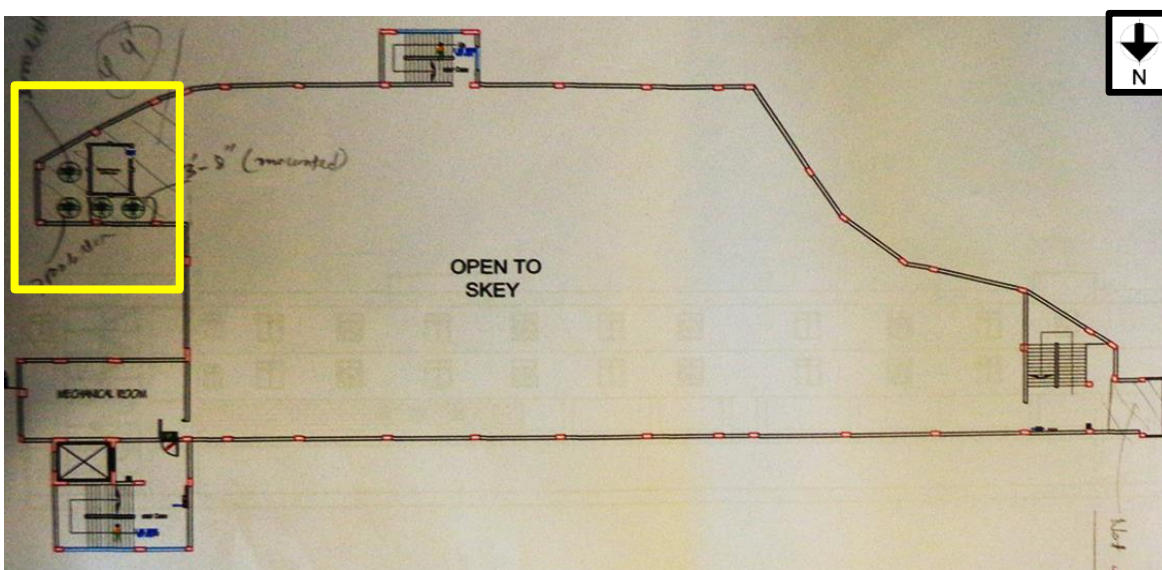


No obvious lateral load resisting system of the steel stair was found. Factory engineer is required to check the stability of the steel stair against lateral loading.

Observations: Building -10



Discrepancies between provided drawings and on-site condition



Roof floor Layout plan. Location of plastic water tank



Brick pedestal

At roof, 1.12 m pedestal was found supporting plastic water tank. No information regarding the pedestal has been provided in as-built drawing. Factory engineer is required to assess the capacity of the slab, carrying the load of plastic water tank & pedestal.

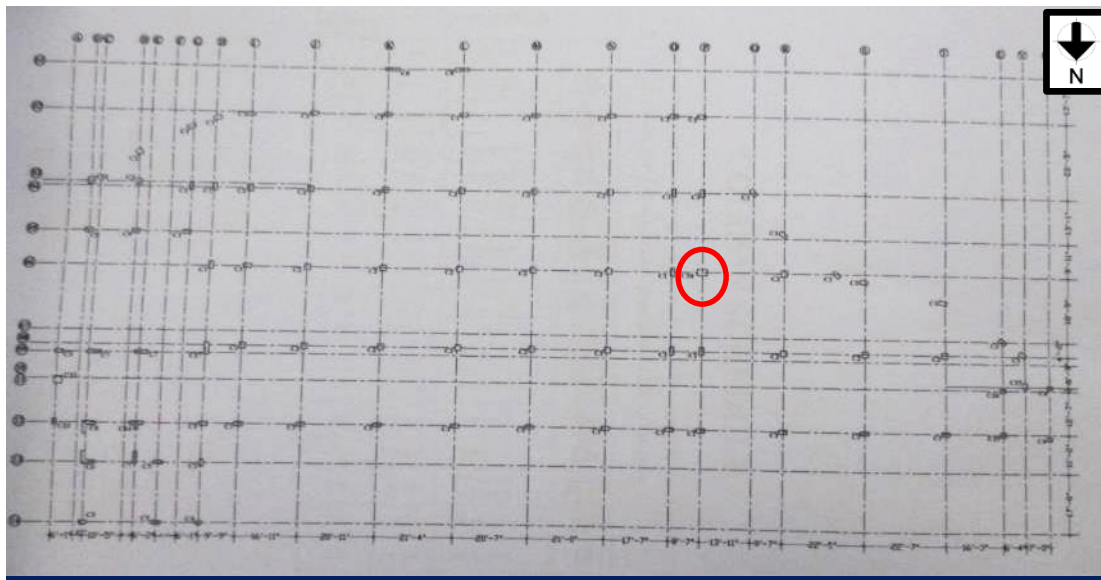


Floor Layout



Toilet floor build up

250 mm high floor build-up at toilet zone. No information has been provided regarding build up in as built drawing. Factory engineer is required to survey the whole structure and produce as built documentation.



Column Layout plan.

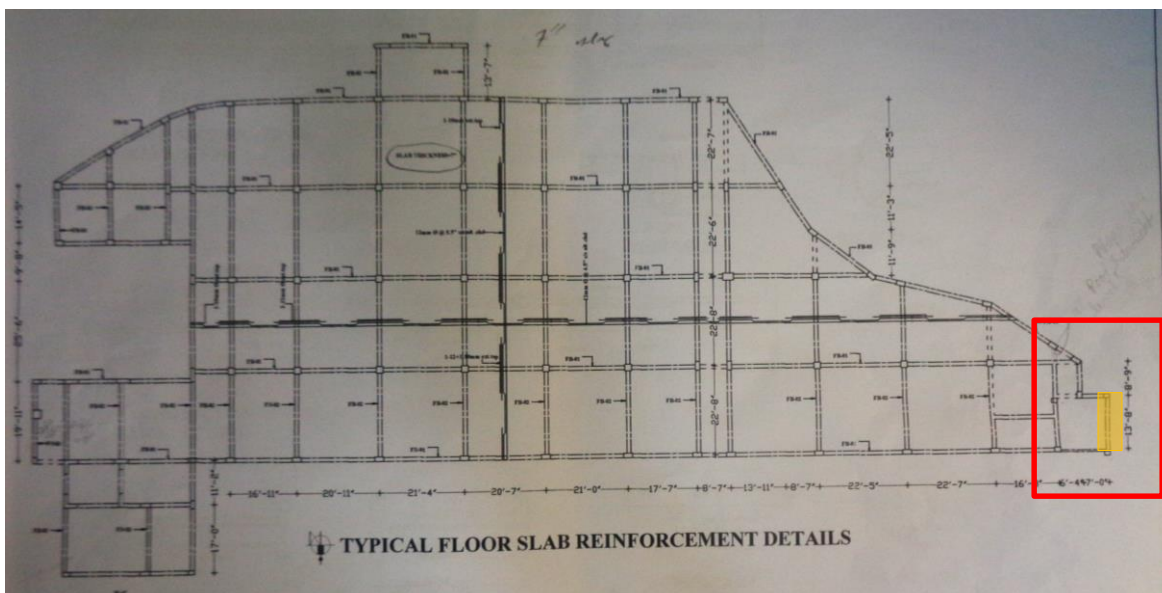
C10	33"X22"	16-20mm Ø
C11		

Size of C10 column has been shown 825 mm X 550 mm

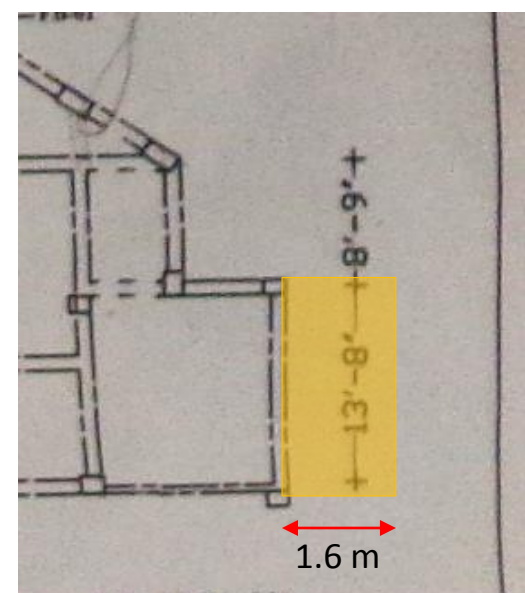
Size of C10 at grid P/6 column has been shown 825mm X 550mm. But at actual site condition the column size was found 500mmX500mm. Factory engineer is required to survey the structure and update the column schedule with re-bar details.



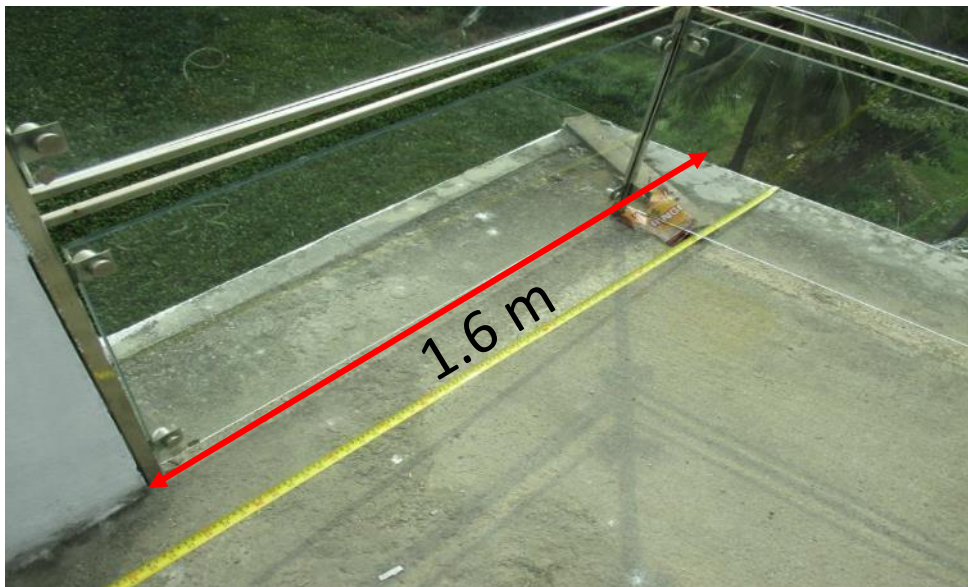
Size of C10 column was found 500mmX500 mm



Beam & slab re-bar Layout plan.



Cantilever slab

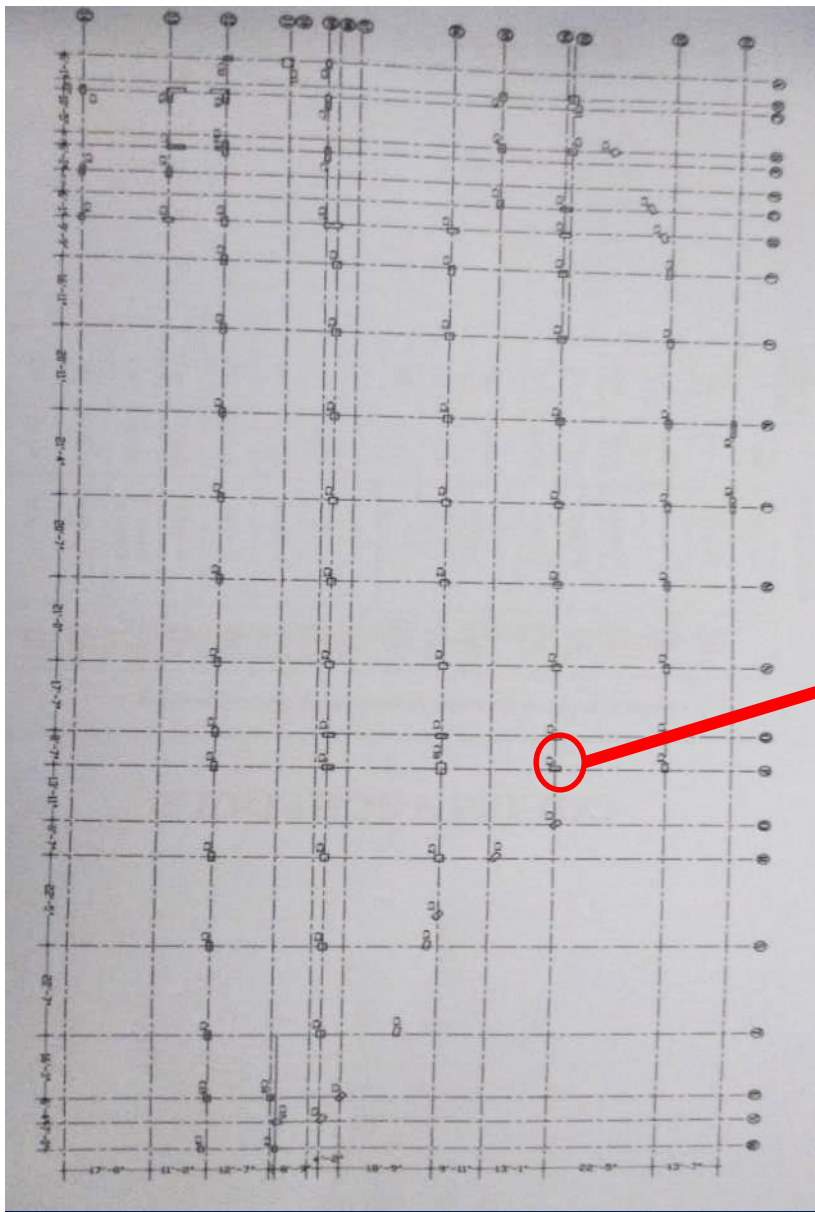


Cantilever slab

1.6 m cantilever slab was found at west side of the building. The slab details has not been added in as-built structural drawing. Factory engineer is required to develop accurate as-built drawing and assess the load bearing capacity of the cantilever slab.



Electrical outlet hole in column



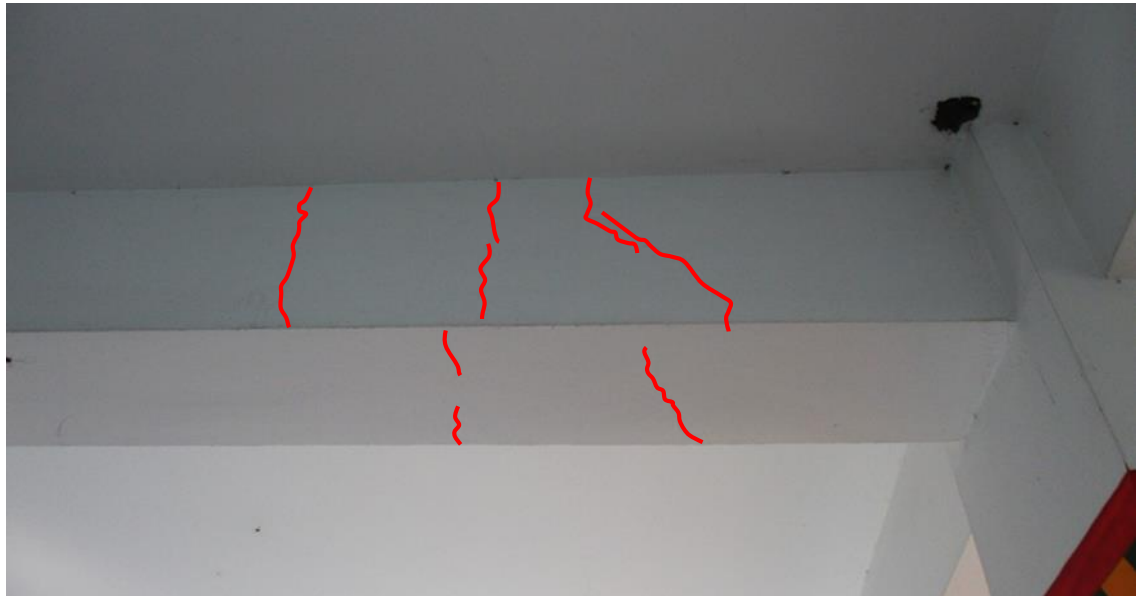
Column Layout plan



Hole was found in column due to electricity outlet purpose at marked column in figure. Factory engineer is required to investigate the hole and suggest repair methodology.



Hairline Crack in beam



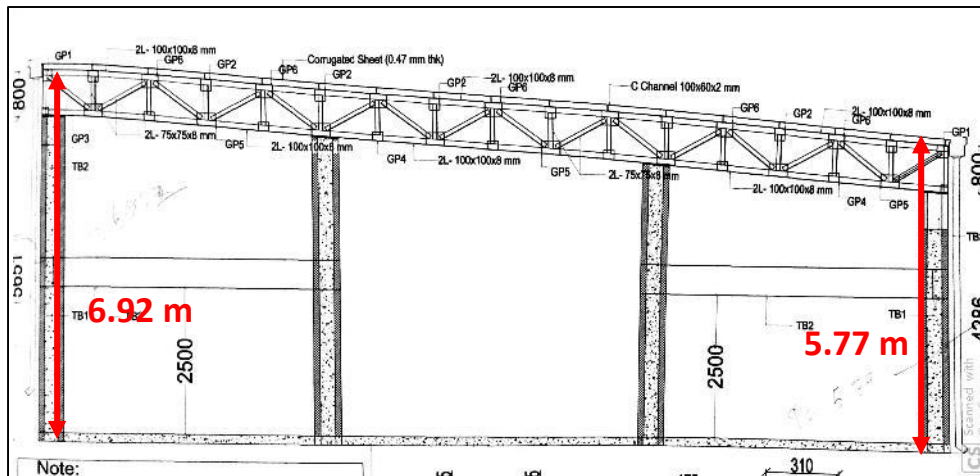
Hairline crack was found in beam at several locations of the structure. Factory engineer is required to investigate the cracks and produce a crack investigation report including the reason, extend of crack and recommendation for the repair of the cracks.



Discrepancies between as-built drawings and on-site observation



As built condition.



Typical section drawing

Number of vertical members in the truss were found less than the number shown in as built drawings. In as built drawings, 14 vertical members are shown but on site 12 were found.

Also on site the heights from floor to truss top were found greater than the height value mentioned in the as built drawings.

Observations: Building-13



Problems Observed

Building 2:

01: Discrepancies between as-built drawings and on-site observation.

02: Apparent lack of lateral stability.

Building 3:

03: Apparent lack of lateral stability.

Building 4:

04: Discrepancies between as-built drawings and on-site observation.

05: Apparent lack of lateral stability.

Building 7:

06: Discrepancies between as-built drawings and on-site observation.

07. Water clogging, Construction Materials stacking and vegetation on roof

08. Exposed corroded rebars in the roof

Building 8:

09: Discrepancies between as-built drawings and on-site observation.

Building 9:

10: Analysis report for retrofitting works was not available

11: Apparent lack of lateral stability.



Problems Observed

Building 10:

- 12: Foundation stress above normal design limit
- 13: Discrepancies between provided as-built drawings and on-site condition
- 14: Hairline Crack in roof beams
- 15: Missing Bolts in joint of Steel Stair
- 16: Lateral Stability of Steel Stair

Building 11:

- 17: Discrepancies between provided drawings and on-site condition
- 18: Utility hole in column
- 19: Hairline Crack in beam

Building 13:

- 20. Discrepancies between provided drawings and on-site condition



Priority Action



Item No.	Observation	Recommended Action Plan	Recommended Timeline
1	Building 2: Discrepancies between drawings and on-site observation	Building Engineer to survey the whole structure and prepare accurate as-built drawings.	6-weeks
2	Building 2: Apparent lack of lateral stability	Factory engineer is required to check the lateral stability system.	6-weeks
3	Building 2: Apparent lack of lateral stability	Carry out remedial works where necessary.	6-months
4	Building 3: Apparent lack of lateral stability	Factory engineer is required to check the lateral stability & adequacy of the connection against uplift.	6-weeks
5	Building 3: Apparent lack of lateral stability	Carry out remedial works where necessary.	6-months
6	Building 4: Discrepancies between drawings and on-site observation	Building Engineer to survey the whole structure and prepare accurate as-built drawings.	6-weeks



Item No.	Observation	Recommended Action Plan	Recommended Timeline
7	Building 4: Apparent lack of lateral stability	Factory engineer is required to check the lateral stability & adequacy of the connection against uplift.	6-weeks
8	Building 4: Apparent lack of lateral stability	Carry out remedial works where necessary.	6-months
9	Building 7 : Discrepancies between drawings and on-site observation	Building Engineer to survey the whole structure and prepare accurate as-built drawings.	6-weeks
10	Building 7: Water clogging, Construction Materials stacking and vegetation on roof	Improve drainage system by providing adequate sloping and drainage outlets.	6-weeks
11	Building 7: Water clogging, Construction Materials stacking and vegetation on roof	Remove all the construction materials.	6-weeks
12	Building 7: Exposed corroded rebars in the roof	Provide protection to all exposed reinforcement to prevent corrosion.	6-weeks



Item No.	Observation	Recommended Action Plan	Recommended Timeline
13	Building 8: Discrepancies between drawings and on-site observation	Building Engineer to survey the whole structure and prepare accurate as-built drawings.	6-weeks
14	Building 9 : Analysis report for retrofitting works was not available	Factory engineer is required to prepare an analysis report for the retrofitting works along with necessary supporting documents.	6-weeks
15	Building 9 : Analysis report for retrofitting works was not available	Carry out remedial works as per report recommendation if required.	6-months
16	Building 9: Apparent lack of lateral stability	Factory engineer is required to analyze the structure for lateral stability.	6-weeks
17	Building 9: Apparent lack of lateral stability	Carry out remedial works if required.	6-months
18	Building-10: Foundation stress above normal design limit	Factory Engineer to review design, loads, column and foundation stresses.	6-weeks
19	Building-10: Foundation stress above normal design limit	Produce and actively manage a loading plan for all floor plates considering the floor, column and foundation capacity.	6-weeks
20	Building-10: Foundation stress above normal design limit	Carryout remedial works if necessary.	6-months
21	Building-10: Foundation stress above normal design limit	Continue to implement floor load plan.	6-months



Item No.	Observation	Recommended Action Plan	Recommended Timeline
22	Building-10: Discrepancies between provided as-built drawings and on-site condition	Building Engineer to survey the structure and prepare accurate as-built drawings.	6-weeks
23	Building-10: Hairline Crack in roof beams	Factory engineer is required to investigate the cracks and produce a crack investigation report including the reason of crack, extend of crack and recommendation for the repair of the cracks.	6-weeks
24	Building-10: Hairline Crack in roof beams	Complete remedial works arising from investigation report.	6-months
25	Building-10: Missing Bolts in joint of Steel Stair	Factory engineer is required to check the structure and install the missing bolts where requires.	6-weeks
26	Building-10: Lateral Stability of Steel Stair	Factory engineer is required to check the stability of this structure against lateral loading.	6-weeks
27	Building-10: Lateral Stability of Steel Stair	Complete remedial works arising from engineering assessment.	6-months



Item No.	Observation	Recommended Action Plan	Recommended Timeline
28	Building-11: Discrepancies between provided drawings and on-site condition	Building Engineer to survey the structure and prepare accurate as-built drawings.	6-weeks
29	Building-11: Discrepancies between provided drawings and on-site condition	Factory is required to check the adequacy of cantilever slab.	6-weeks
30	Building-11: Discrepancies between provided drawings and on-site condition	Complete remedial works if required.	6-months
31	Building-11: Utility hole in column	Factory engineer is required to investigate the hole and suggest repair methodology.	6-weeks
32	Building-11: Utility hole in column	Repair the hole as per the suggestion of factory engineer.	6-months
33	Building-11: Hairline Crack in beam	Factory engineer is required to investigate the cracks and produce a crack investigation report including the reason of crack, extend of crack and recommendation for the repair of the cracks.	6-weeks
34	Building-11: Hairline Crack in beam	Complete remedial works arising from investigation report.	6-months
35	Building-13: Discrepancies between provided as-built drawings and on-site condition	Building Engineer to survey the structure and prepare accurate as-built drawings.	6-weeks