



IMPRESS FASHION LTD.

Dag No. 2224, Matuial, Konapara Katherpool, Jatrabari, Dhaka-1362
(23.713984N, 90.462352E)

27 August 2015





Observations



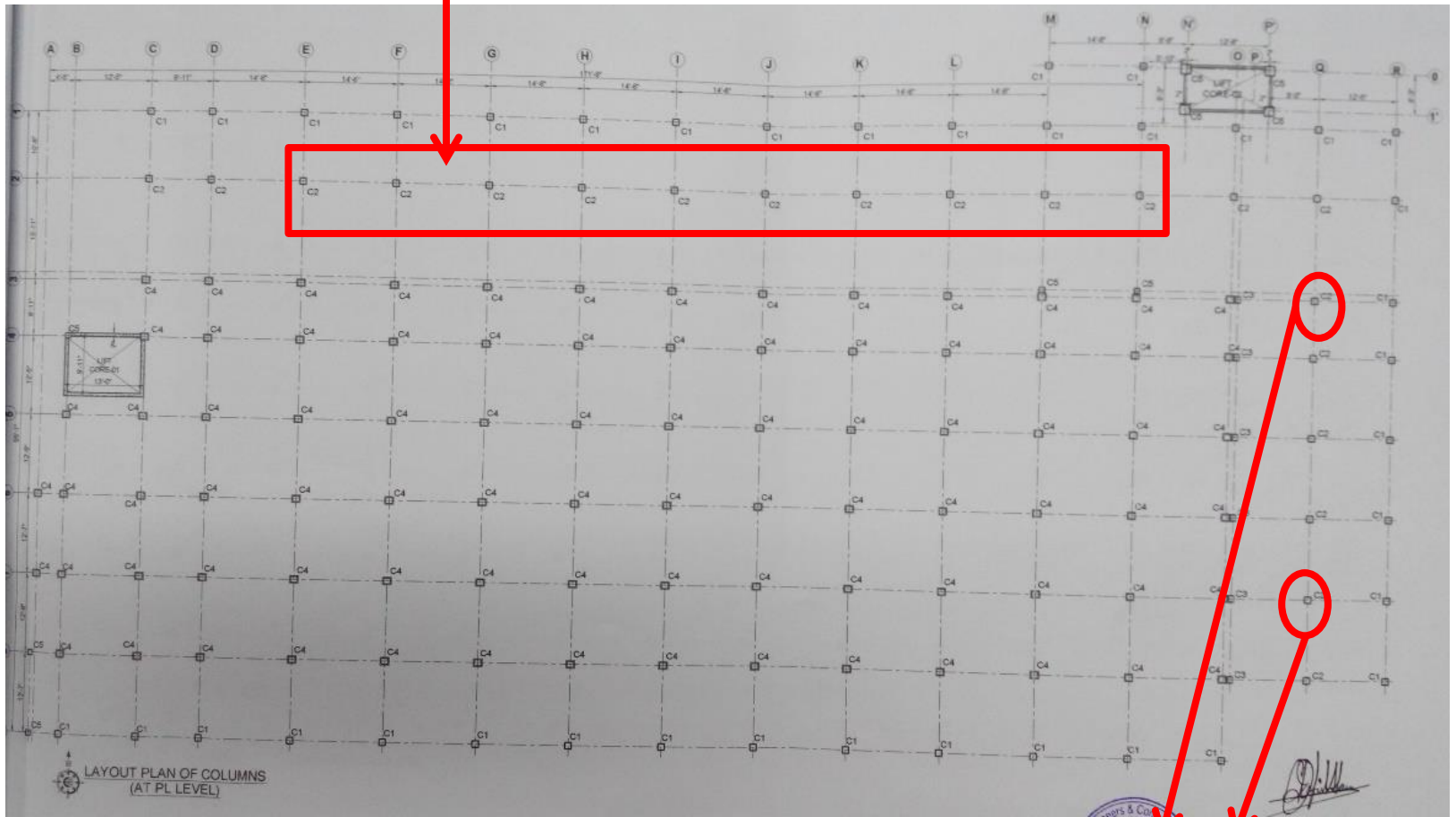
Building 1



High stress on column.



Overstressed Columns

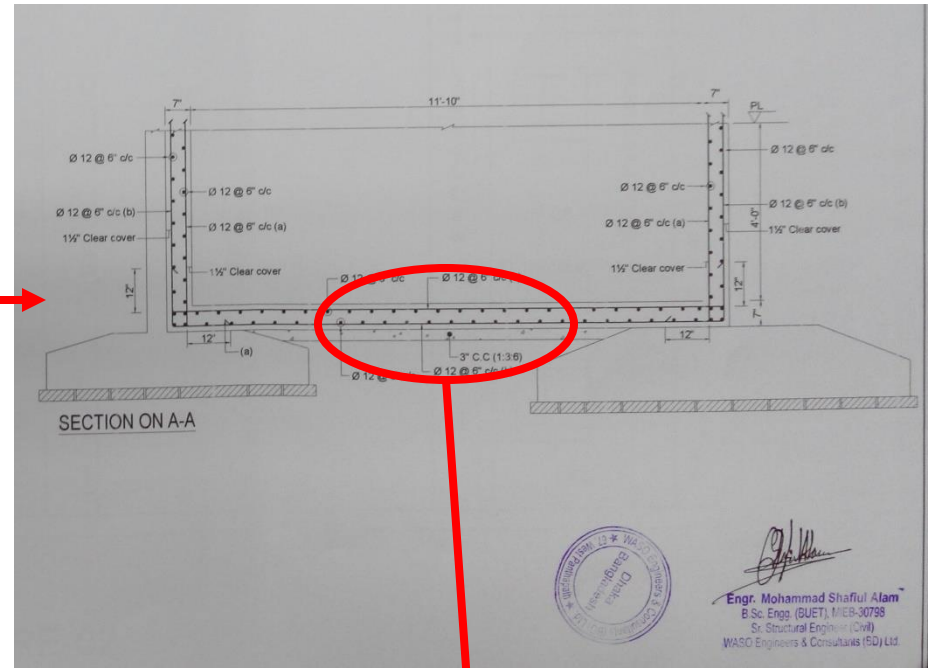
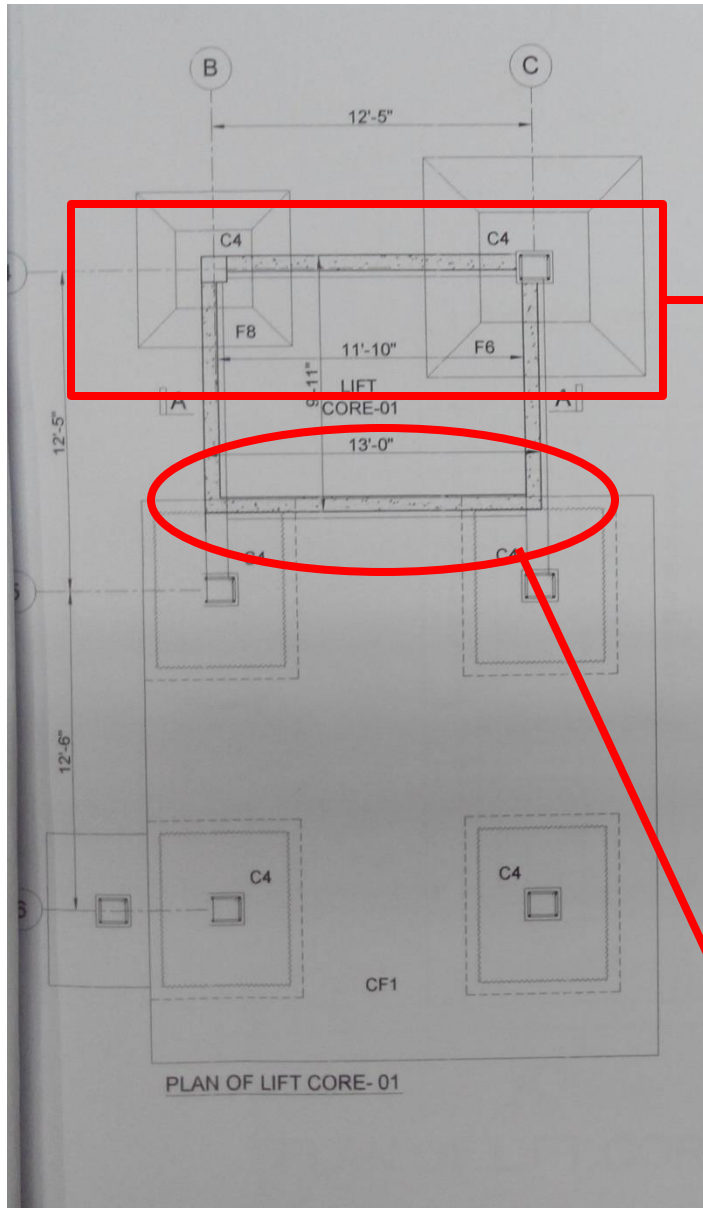


Highly Overstressed columns

High stress on column



Unusual foundation of shear wall



Support system is not clear

Foundation and load path is not clear.



Joint of beams and columns

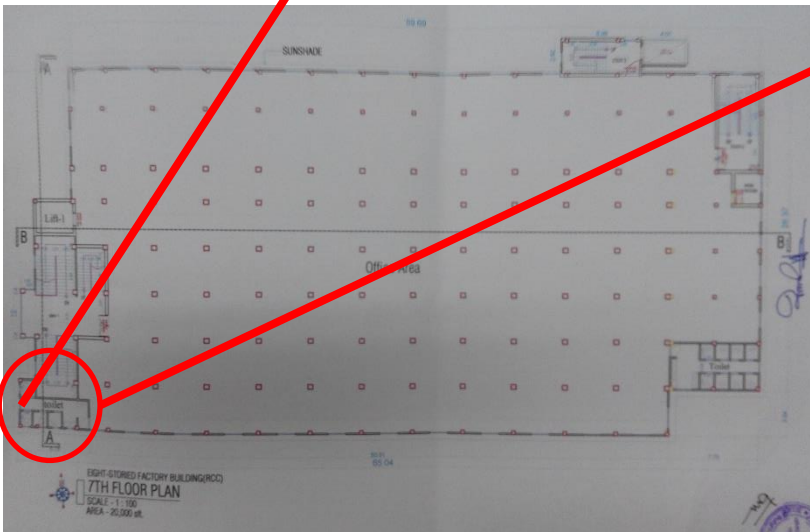


Beam and column joint on 2nd floor

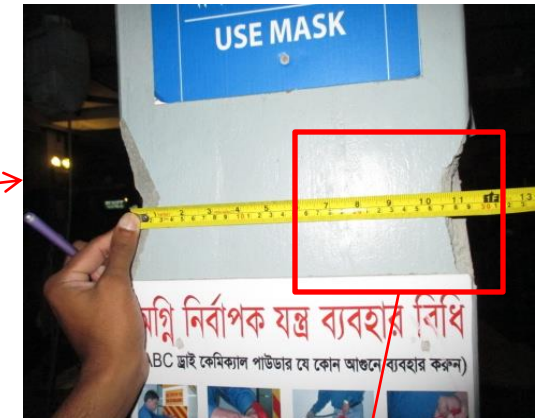
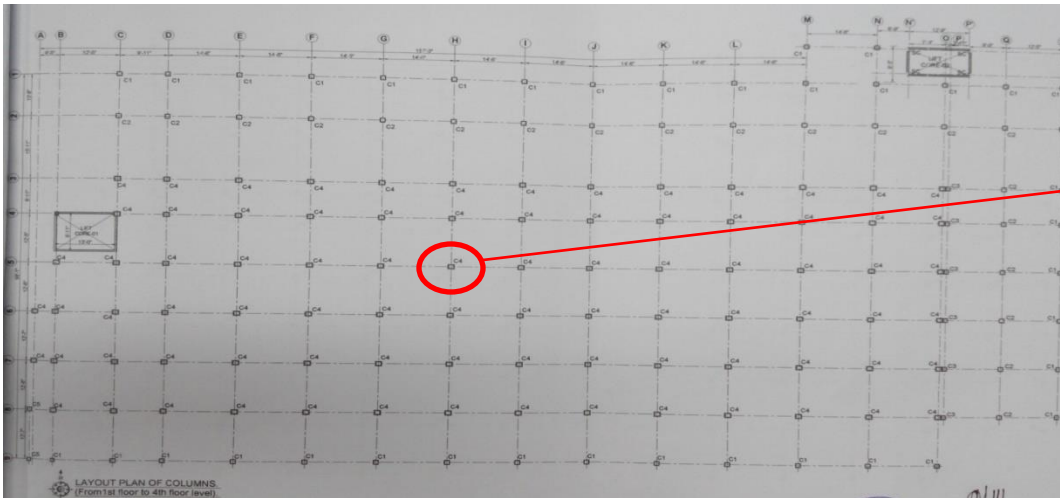
Connection of beams with columns and load path needs to be checked



Inconsistencies of drawings and As built construction.



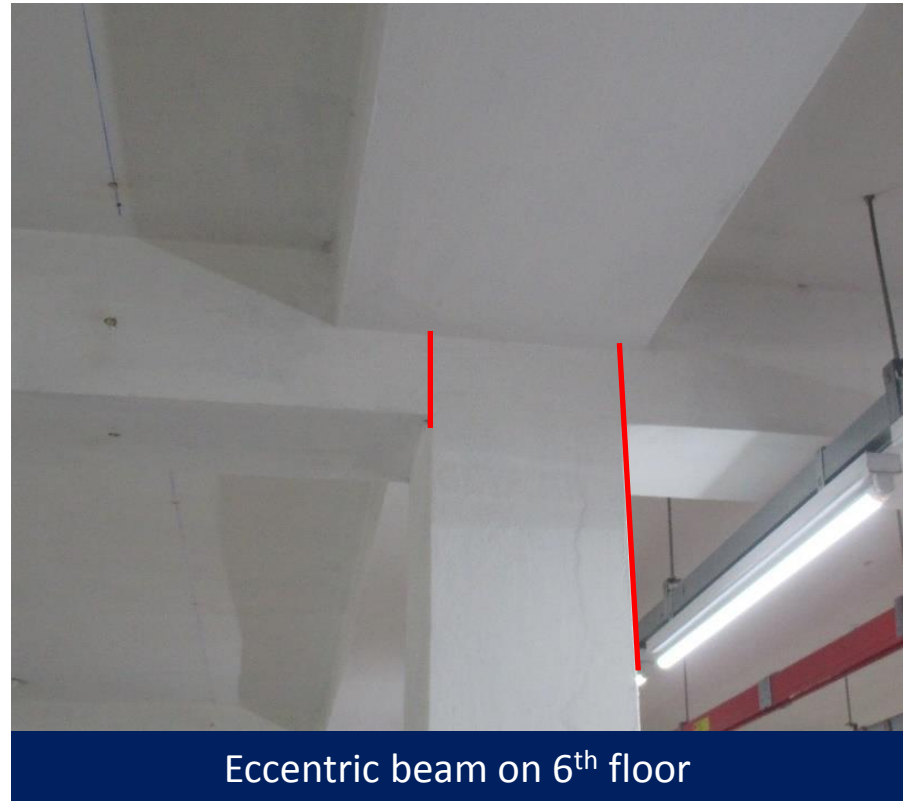
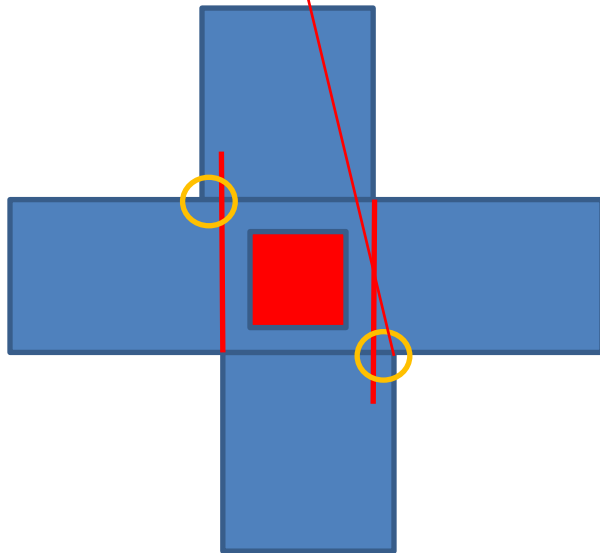
Architectural drawings of 7th floor plan don't match with actual situation.

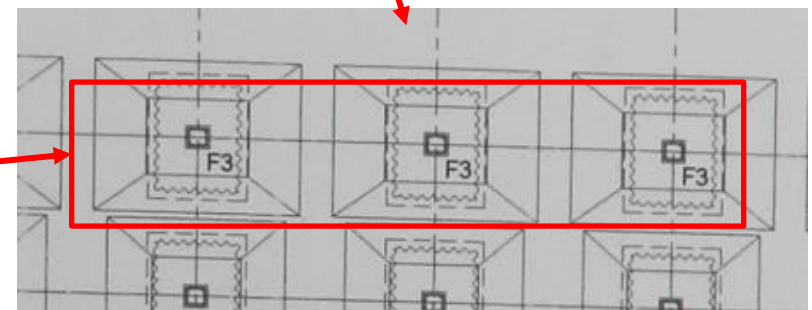
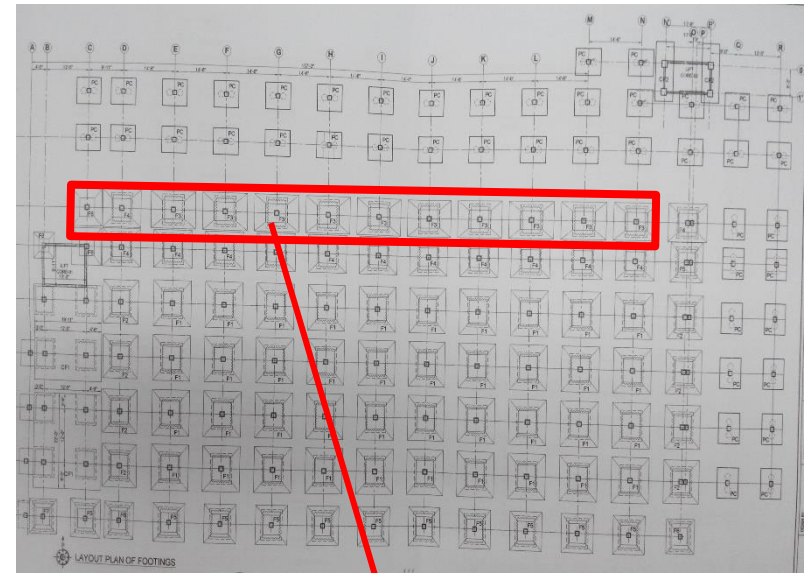
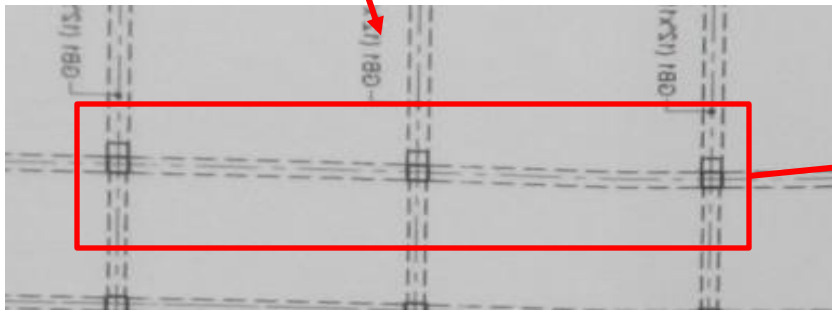
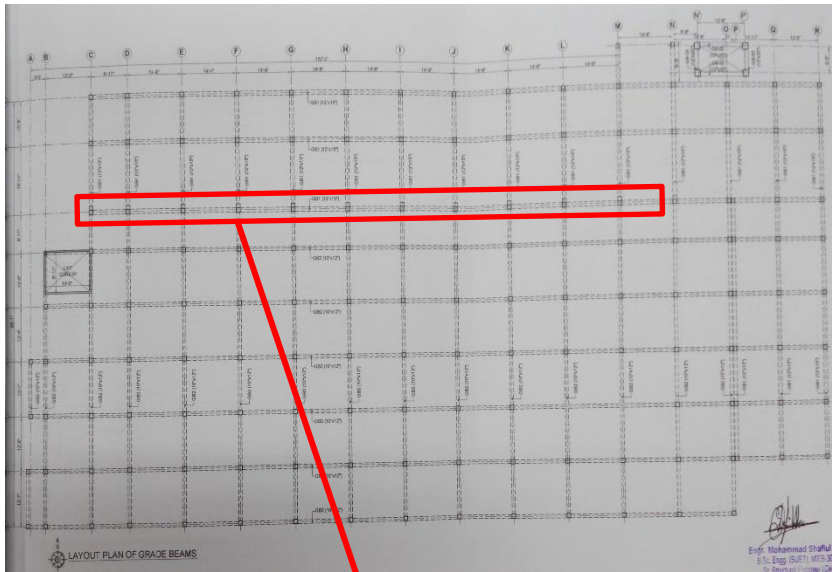


Size of some columns on site was found to be less than the that of the provided drawings.

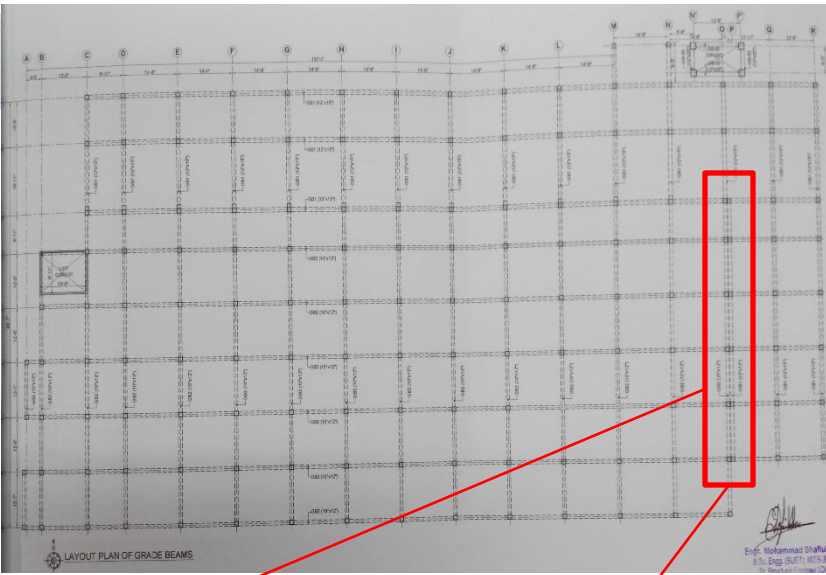
Indicated column appears to be 11 inch without plaster where drawing states 12 inch.



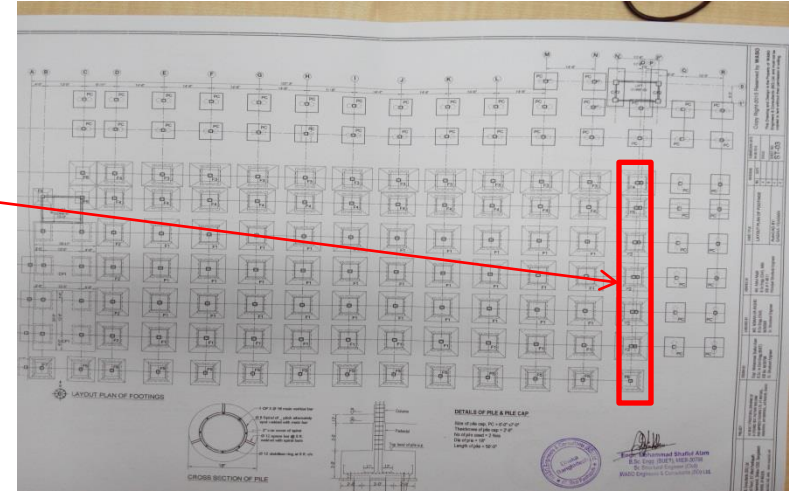
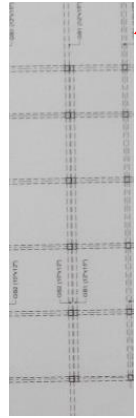


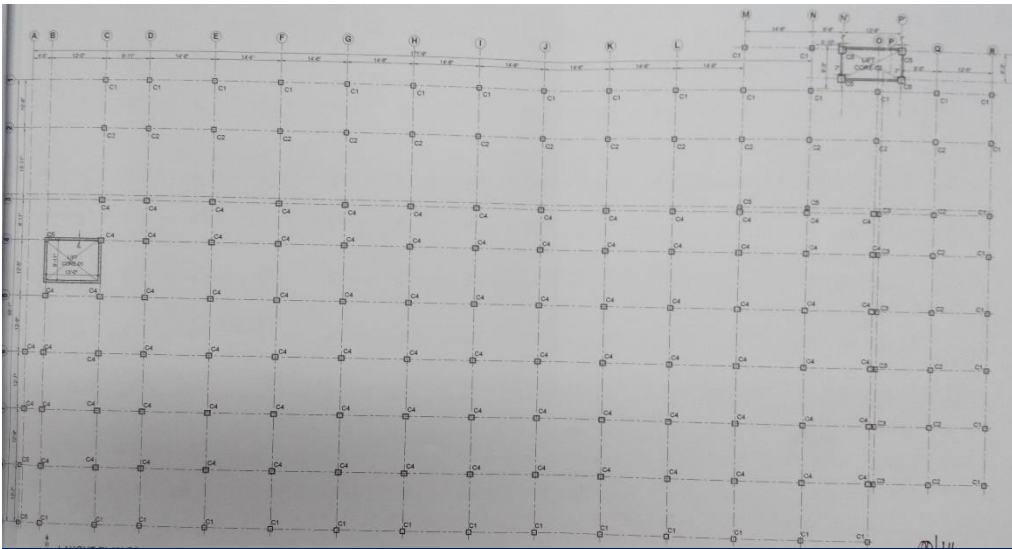


In layout plan of grade beam extra columns was shown on GL level in grid line 3, but in foundation layout it was shown as single column on isolated pad footing.

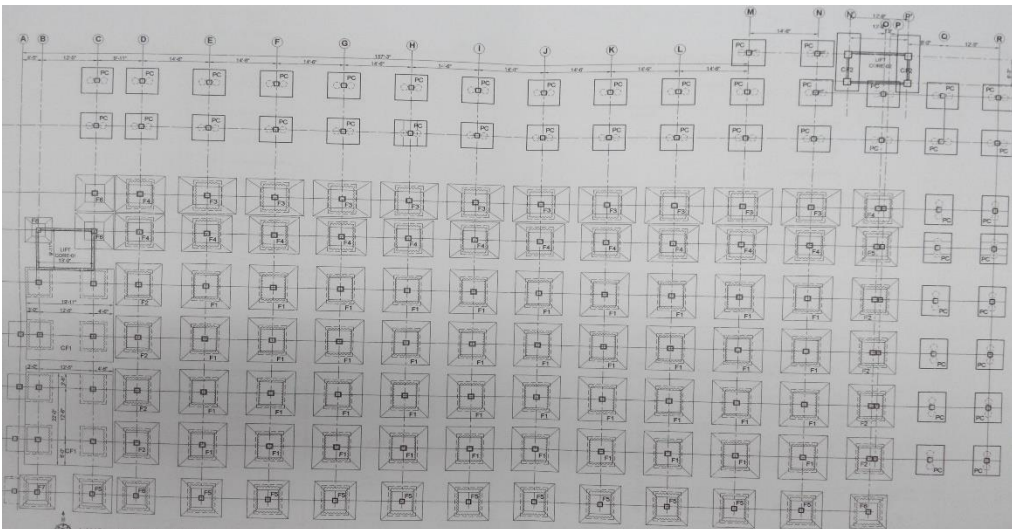


In drawing, in the Grid O & P, two columns exist with no gap between them upto 5th Floor. But the foundation section does not show foundation for two columns.





Layout plan of Column



Layout plan of Foundation

SCHEDULE OF COLUMNS		
DESIGNATION OF COLUMN	UP TO PL.	PL TO 7TH FLOOR LEVEL
C1		
C2		
C3		
C4		<p>PL TO 4TH FLOOR LEVEL</p>
C5		
C6		

Column schedule

In column schedule column type C6 is shown as provided below PL but location was not shown on any drawings.



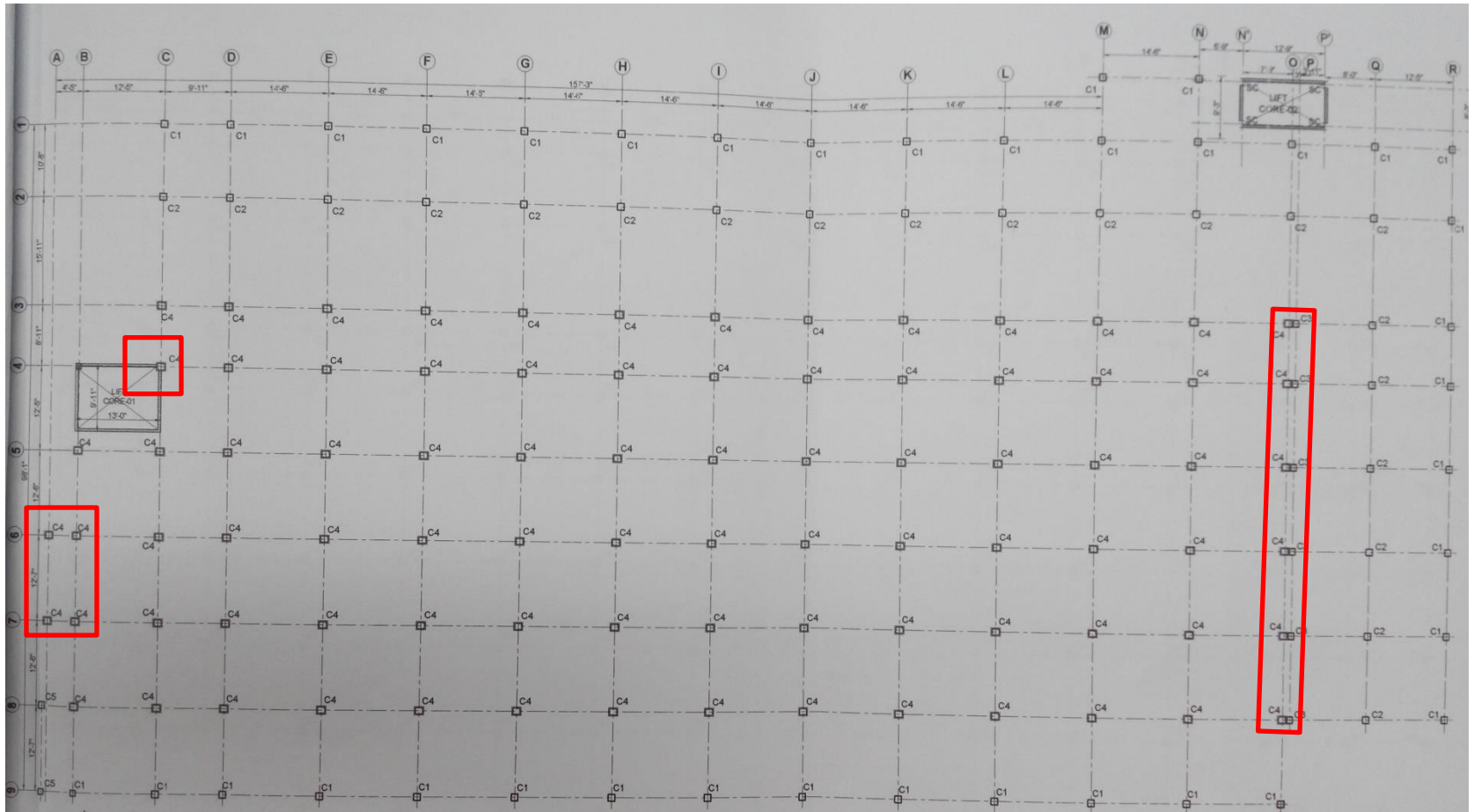
No water proofing membrane appears on roof.



No water proofing was found on roof



Unfinished retrofitting work.

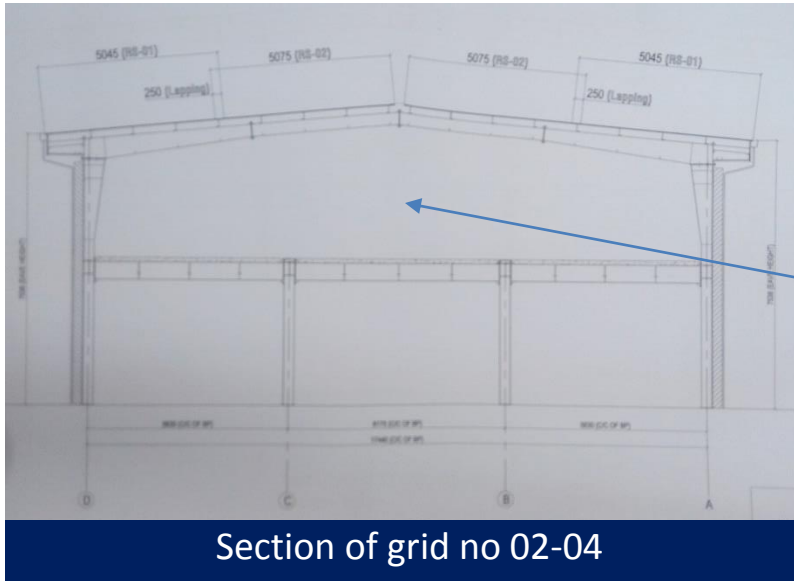


Layout plan of column 1st to 3rd floor

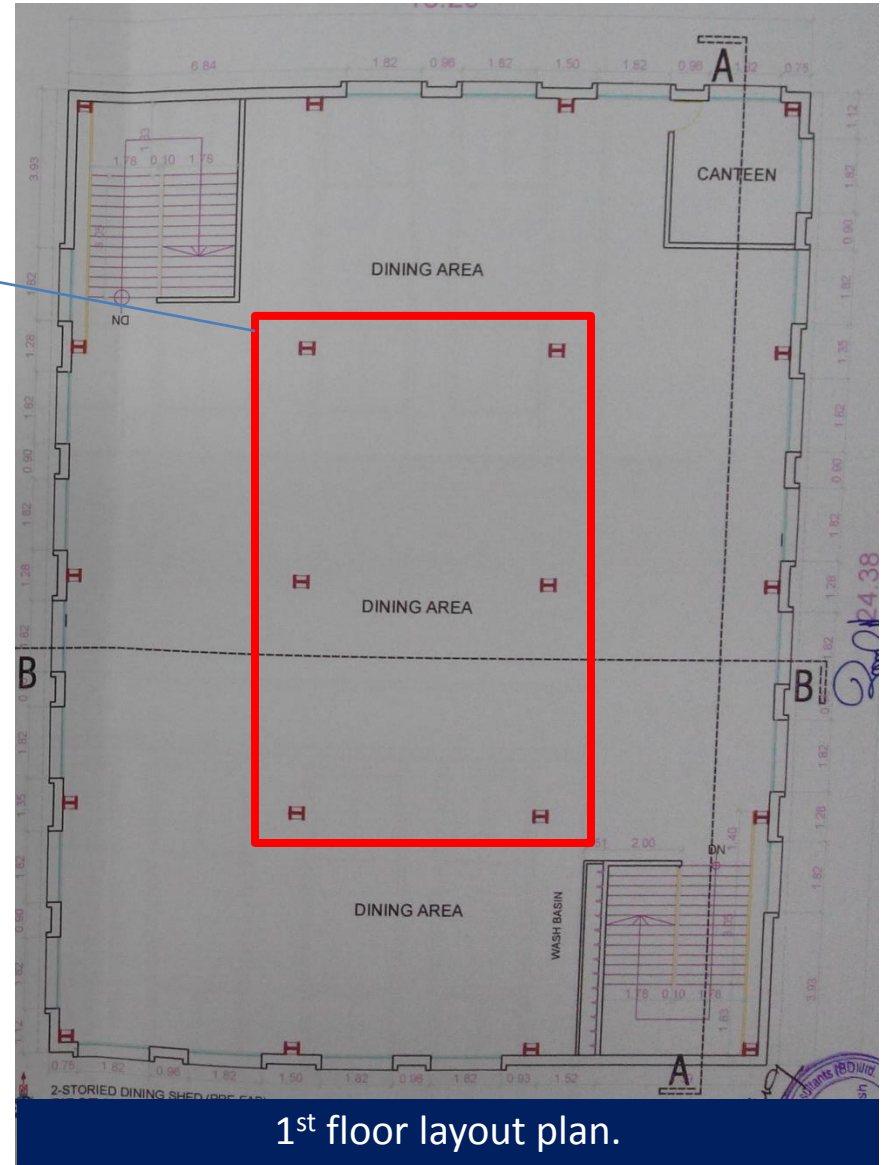
As per recommendations of “Sahidullah and new associates” all C4 columns needs to be retrofitted. But indicated(above drawing) C4 columns was not found retrofitted.



Dining Building



Indicated columns do not exist in the 1st floor.



Inconsistency of drawings



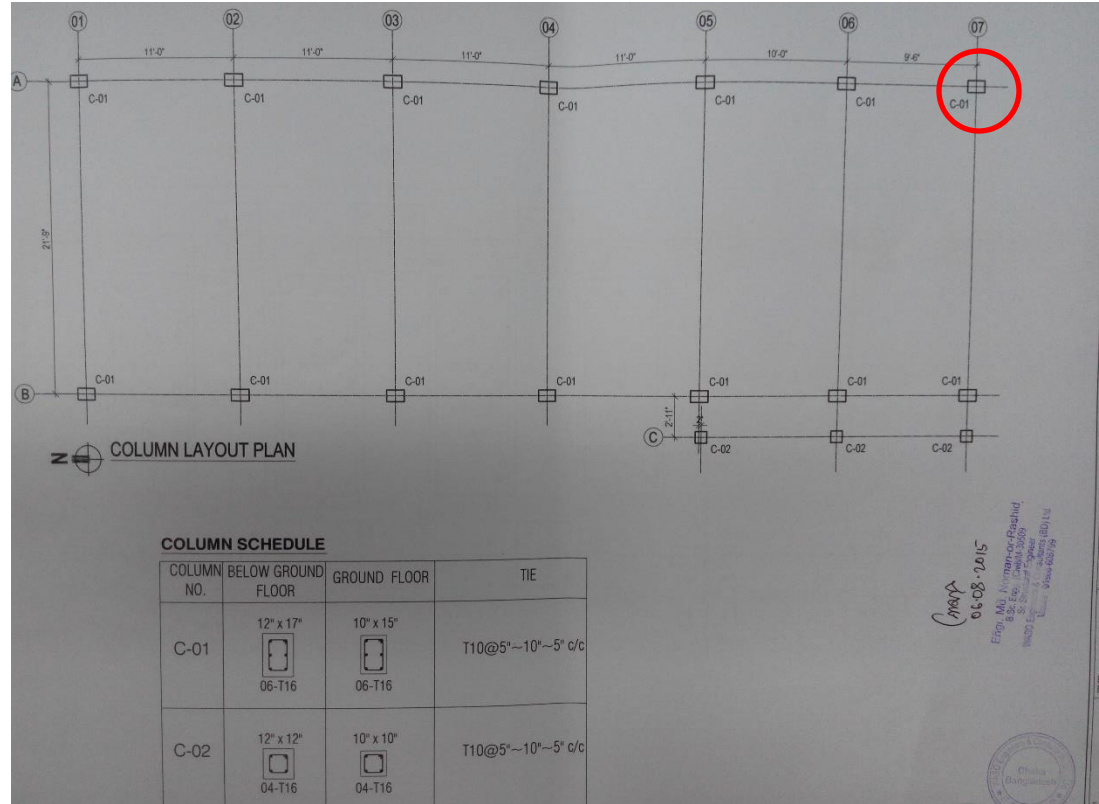
Utility building



A Steel column found instead of Reinforced concrete column



Steel corner Column



Column layout showing RC column in detail.

Steel corner column was observed instead of Reinforced Column



Observations On DEA report of WASO Engineers & consultants (BD).



Average crushing strength from core test report was considered as Concrete strength for analysis.



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DEPARTMENT OF CIVIL ENGINEERING
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CONCRETE LABORATORY

BRIC No. : 1100-70617/14-15/CE; Dt: 16/9/2014
 Client : Aupolous, Shahjadpur, Gulshan, Dhaka
 Ref. No. : Letter: Dt: 16/9/2014
 Project : Impress Fashion Ltd, Kosnapara, Dhaka

Sample : Concrete Cylindrical Core (Mix Proportion (as quoted); Not Mentioned, Aggregate Type: Stone Chips)
 Year of Construction : 2007 No. of Floors = 8-storied
 Sample Collected by : Client Date of Sample Collection: Not Mentioned
 Test : Compressive Strength of Concrete Cylindrical Core (ASTM C 42/C 42M)
 Date of Test : 16/9/2014

Sl. No.	Location	Sample Identification Mark	Length of Sample in.	Diameter of Sample in.	Average Cross Sectional Area sq. in.	Ultimate Load lb.	Crushing Strength psi	Type of Failure
1	Not Mentioned	C1	2.9	1.77	2.46	13,038	5150 psi (35.5 MPa)	Combined *
2	Not Mentioned	C2	2.3	1.77	2.46	12,822	4880 psi (33.7 MPa)	Combined *
3	Not Mentioned	C3	2.4	1.77	2.46	6,989	2580 psi (18.5 MPa)	Combined *
4	Not Mentioned	C5	3.1	1.77	2.46	12,608	5120 psi (35.3 MPa)	Combined *

* Combined = Mortar and Aggregate failure

NOTE 1 — The diameter of core specimens for the determination of compressive strength in load bearing structural members shall be at least 3.70 in. [94 mm]. For non-load bearing structural members or when it is impossible to obtain cores with length-diameter ratio (L/D) greater than or equal to 1, core diameters less than 3.70 in. [94 mm] are not prohibited.

NOTE 2 — The compressive strengths of nominal 2-in. [50-mm] diameter cores are known to be somewhat lower and more variable than those of nominal 4-in. [100-mm] diameter cores. In addition, smaller diameter cores appear to be more sensitive to the effect of the length-diameter ratio.

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

Countersigned by: *Dr. Muhammad Zakaria*
 Test Performed by: *Dr. Muhammad Zakaria*

From Footing to 4th Floor Level, $f'c = 3,000$ psi
From 4th Floor Level to Roof Level, $f'c = 2,800$ psi

Several cores have been taken from columns to determine the concrete strength. And they have considered 3000psi for retrofitted portion and 2500 psi for rest which is average of crushing strength.

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1	Not Mentioned	C4	3.3	1.77	2.46	3,745	1120 psi (7.8 MPa)	Combined *
2	Not Mentioned	C7	3.3	2.71	5.81	11,526	3460 psi (24.3 MPa)	Combined *
2	Not Mentioned	C8	5.3	2.71	3.81	10,889	2030 psi (14.3 MPa)	Combined *
4	Not Mentioned	C11	3.3	1.77	2.46	8,717	2600 psi (18.4 MPa)	Combined *

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1	Not Mentioned	C21	3.3	1.77	2.46	7,326	2190 psi (15.5 MPa)	Combined *
2	Not Mentioned	C22	3.3	1.77	2.46	16,846	4970 psi (34.8 MPa)	Combined *

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1	Not Mentioned	C12	3.3	1.77	2.46	6,124	2490 psi (17.5 MPa)	Combined *
2	Not Mentioned	C13	3.3	1.77	2.46	6,124	2490 psi (17.5 MPa)	Combined *
3	Not Mentioned	C14	3.3	1.77	2.46	4,828	1960 psi (13.8 MPa)	Combined *
4	Not Mentioned	C15	3.3	1.77	2.46	3,964	1560 psi (11.1 MPa)	Combined *

* Combined = Mortar and Aggregate failure

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1	Not Mentioned	C16	3.3	1.77	2.46	7,421	3020 psi (21.0 MPa)	Combined *
2	Not Mentioned	C17	3.3	1.77	2.46	8,833	3630 psi (25.5 MPa)	Combined *
3	Not Mentioned	C18	3.3	1.77	2.46	4,189	1700 psi (12.1 MPa)	Combined *
4	Not Mentioned	C19	3.3	1.77	2.46	2,020	820 psi (5.7 MPa)	Mortar

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**Pile Foundations was stated to be okay
considering FOS 1.5.**



130 tons.

So, $40 \text{ tons} \times 2 \text{ no. piles} = 80 \text{ tons} < 130 \text{ tons}$ (At F.S. = 2.5)

It indicates the failure of Pile Foundation.

As the existing structure is sustained under service load without showing any distress or symptom of settlement of foundation system, capacity of pile may get a huge resisting strength by utilizing Factor of Safety. At this circumstance, F.S. for the capacity of pile is decreased to 1.5. Then the capacity of single pile of 18" dia of 50ft length is increased to

67 tons.

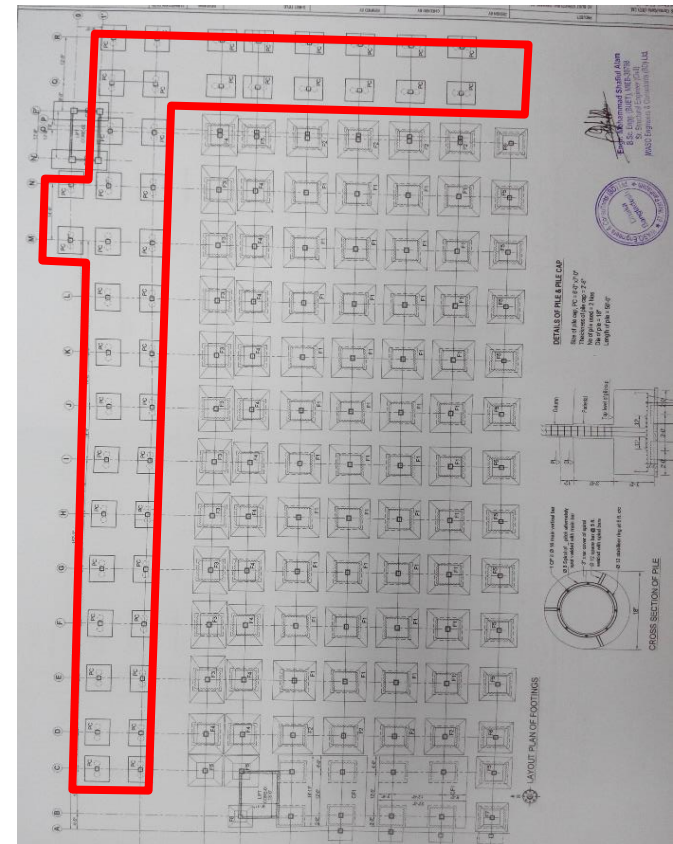
Now, $67 \text{ tons} \times 2 \text{ no. piles} = 134 \text{ tons} > 130 \text{ tons}$ (At F.S. = 1.5)

So, during assessment of pile foundation, considered capacity of single pile of 18" dia of 50ft length is 67 tons. (F.S. = 1.5)

Besides these, rest of the foundations has gotten safe with general considerations.



Engg. Md. Afsar Ali
B.Sc. in Engg. (Civil)
Fellow IEB (F/8043)
RAJUK Reg. DMINA/CE-0147
Principal Structural Engineer
Structural Consultants (BD) Ltd.



As mentioned in executive summary the structure is completed on 2013. From DEA report it was found the pile foundations were not ok with FOS of 2.5. But it was found ok if FOS is considered as 1.5. As per accord standard an existing factory that has performed for at least five years without indicating excessive settling, the factor of safety for pile foundation shall be at least 1.5.

v. Pile Foundation PC:

From Grid Q-7, Unfactored Load from Column = 287 kip (130 tons)

Capacity of Pile = 147 kip (67 tons)

For Pile Foundation, $2 \times 147 \text{ kip} = 294 \text{ kip} > 287 \text{ kip}$ (OK)

Column Size 12" x 12"

Punching Stress for Pile Cap is under allowable. (OK)

Flexural Stress for this Pile Cap is under allowable. (OK)

Bending Moment for this Pile Cap is under allowable. (OK)



Columns are stated to be ok but cursory calculations show few are highly stressed.



b. Column Capacity Check:

Axial Strength of Column For Factored Load :										
Column ID & Grid Line	L (in)	b (in)	As (in ²)	f _c (ksi)	f _y (ksi)	Capacity (kip)	p	Factored Load	Test	Variation
NC1 [C,8]	19	17	3.62	3	60	575.8	0.011	390	ok	47.64
	17	15	3.62	3	60	478.7	0.013	371	ok	29.03
	17	15	3.62	3	60	478.7	0.013	318	ok	50.53
	17	15	3.62	3	60	478.7	0.013	267	ok	79.29
	17	15	3.62	3	60	478.7	0.013	219	ok	118.56
	12	12	1.86	2.8	60	254.4	0.013	171	ok	48.77
	12	12	1.86	2.8	60	254.4	0.013	125	ok	103.52
	12	12	1.86	2.8	60	254.4	0.013	82	ok	210.24
	12	12	1.86	2.8	60	254.4	0.013	37	ok	587.57
	12	12	1.86	2.8	60	254.4	0.013			
Column ID & Grid Line	L (in)	b (in)	As (in ²)	f _c (ksi)	f _y (ksi)	Capacity (kip)	p	Factored Load	Test	Variation
EC1 [G,9]	14	14	1.86	2.8	60	323.7	0.009	262	ok	23.55
	12	12	1.86	2.8	60	254.4	0.013	250	ok	1.76
	12	12	1.86	2.8	60	254.4	0.013	224	ok	13.57
	12	12	1.86	2.8	60	254.4	0.013	190	ok	33.89
	12	12	1.86	2.8	60	254.4	0.013	157	ok	62.04
	12	12	1.86	2.8	60	254.4	0.013	123	ok	106.83
	12	12	1.86	2.8	60	254.4	0.013	90	ok	182.67
	12	12	1.86	2.8	60	254.4	0.013	55	ok	362.55
	12	12	1.86	2.8	60	254.4	0.013	22	ok	1056.36
	12	12	1.86	2.8	60	254.4	0.013			
Column ID & Grid Line	L (in)	b (in)	As (in ²)	f _c (ksi)	f _y (ksi)	Capacity (kip)	p	Factored Load	Test	Variation
EC2 [D,2]	14	14	2.48	2.8	60	344.0	0.013	280	ok	23.07
	12	12	2.48	2.8	60	275.3	0.017	271	ok	1.59
	12	12	2.48	2.8	60	275.3	0.017	243	ok	13.29
	12	12	2.48	2.8	60	275.3	0.017	210	ok	31.1
	12	12	2.48	2.8	60	275.3	0.017	168	ok	63.87
	12	12	2.48	2.8	60	275.3	0.017	127	ok	116.77
	12	12	2.48	2.8	60	275.3	0.017	85	ok	223.88
	12	12	2.48	2.8	60	275.3	0.017	53	ok	419.43
	12	12	2.48	2.8	60	275.3	0.017	25	ok	1001.2
	12	12	2.48	2.8	60	275.3	0.017			
Column ID & Grid Line	L (in)	b (in)	As (in ²)	f _c (ksi)	f _y (ksi)	Capacity (kip)	p	Factored Load	Test	Variation
EC3 [P,7]	14	12	1.86	2.8	60	286.4	0.011	160	ok	79
	12	10	1.86	2.8	60	222.4	0.016	155	ok	43.48
	12	10	1.86	2.8	60	222.4	0.016	140	ok	58.86
	12	10	1.86	2.8	60	222.4	0.016	115	ok	93.39
	12	10	1.86	2.8	60	222.4	0.016	97	ok	129.28
	12	10	1.86	2.8	60	222.4	0.016	87	ok	155.63
	12	10	1.86	2.8	60	222.4	0.016	62	ok	258.71
	12	10	1.86	2.8	60	222.4	0.016	35	ok	535.43
	12	10	1.86	2.8	60	222.4	0.016	12	ok	1753.33
	12	10	1.86	2.8	60	222.4	0.016			



b. Column:

Design of Column is checked through the computer program ETABS and analyzed data are also used to verify the section and capacity of column through CSI Col 8. The columns are found good enough to sustain accordingly the terms and conditions by The Accord on Fire and Building Safety in Bangladesh (Building Standard – December 30, 2013).

The retrofitted sections are also checked separately. They are safe from failure.

On page no 18 and 26 of DEA report, it was shown that all columns are ok. From cursory calculation it was found that marked columns on page 24 of this report are found overstressed due to toilet wall, built up of toilet and loads from observations. Those columns were not suggested for retrofitting



Overview of the DEA

1. ACCORD structural team inspected the building on the basis of the As-built drawing produced by WASO Engineers & Consultants (BD) Ltd.
2. Some columns were not found to be retrofitted though they were suggested for retrofitting. In the meeting with the consultant during the initial inspection, consultant assured that those columns along with their foundations were retrofitted upto the ground floor level. Those foundations need to be checked on site.
3. Analysis that has been carried out for this building was based on the concrete strength calculated from the test report.



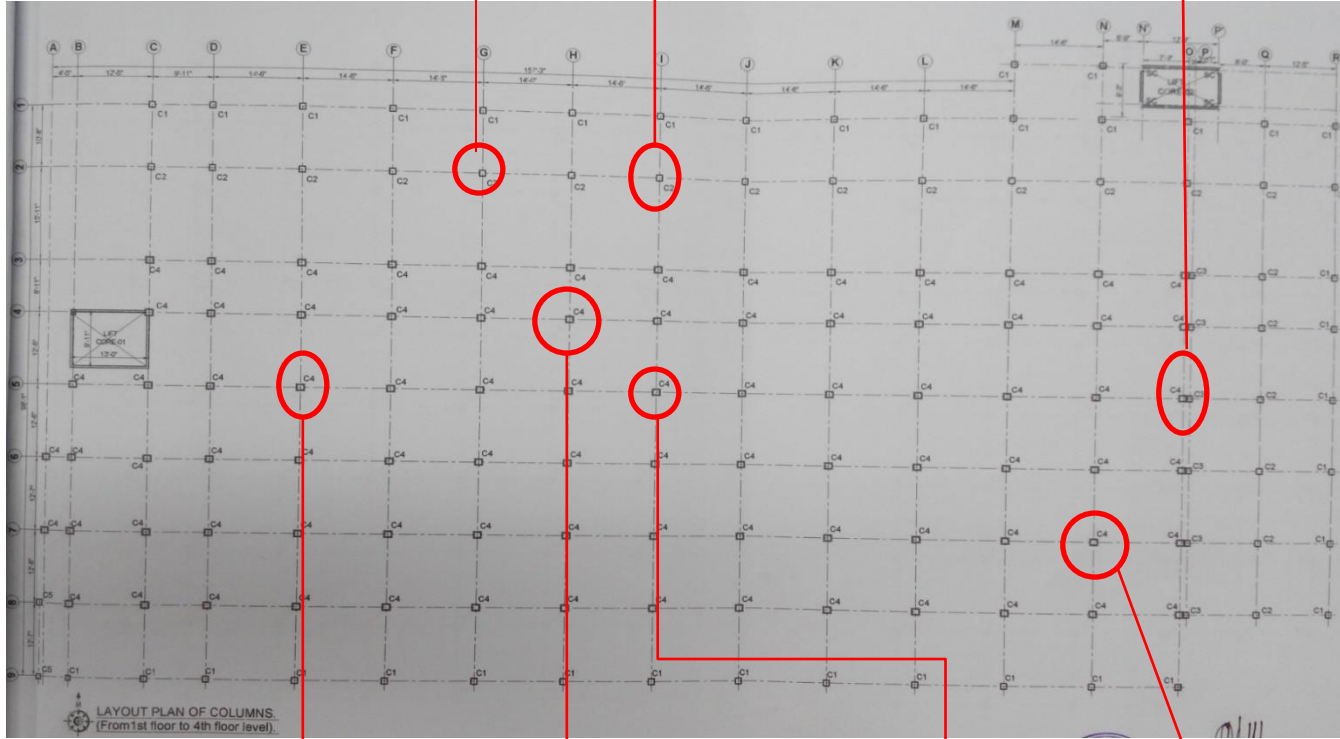
Test points



Brick aggregate in GF

Brick aggregate in 4th Floor

Brick aggregate in GF with no gap between the columns

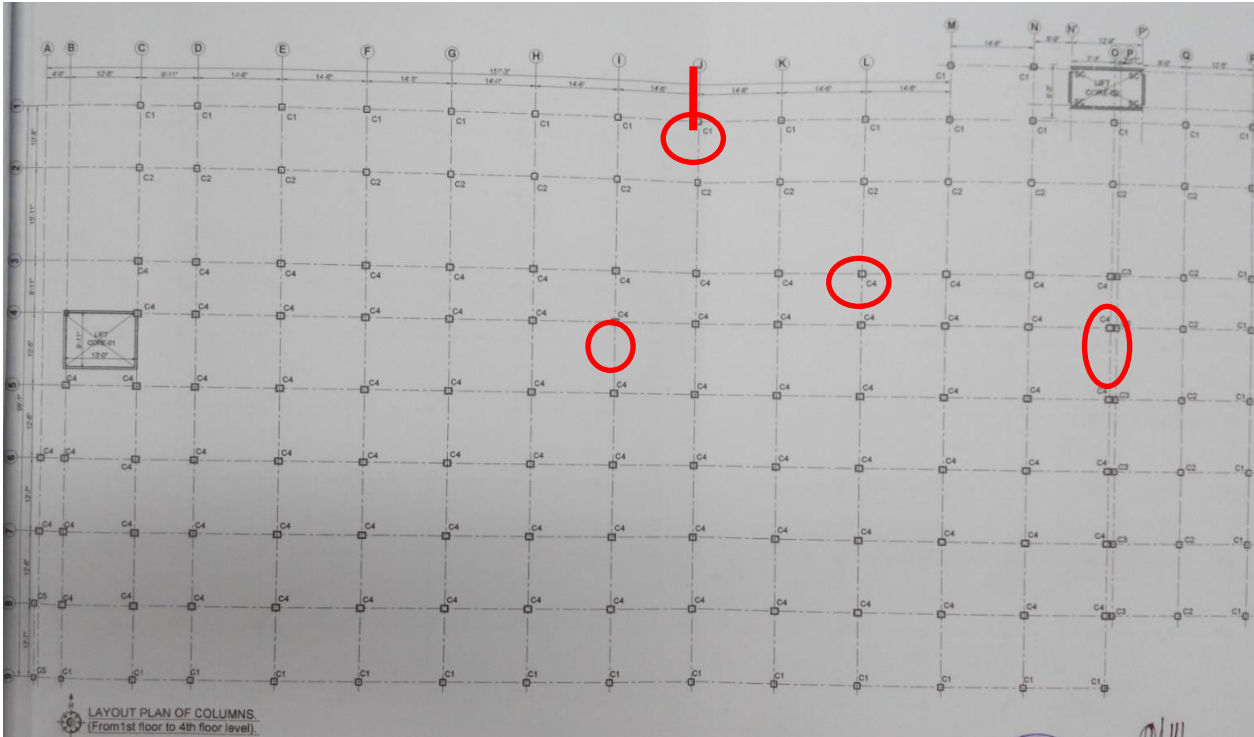


Stone aggregate was found on the Ground floor (retrofitted columns)

Brick aggregate in 5th Floor

Brick aggregate in 4th Floor

Test Point (Aggregate type)



DESIGNATION OF COLUMN	UP TO PL.	PL TO 7TH FLOOR LEVEL
C1		
C2		
C3		
C4		
C5		
C6		

Indicated points at different floors were scanned. No mismatch was found with the provided drawing.

Test Point (Rebar Scanning)



Priority Actions



Problems Observed

Building 1

Item 1: High stress on columns.

Item 2: Unusual foundation of shear wall.

Item 3: Joint of beams and columns

Item 4: Inconsistencies of drawings and As built construction.

Item 5: No water proofing membrane appears on roof.

Item 6: Unfinished retrofitting work.

Dining Building

Item 7: Inconsistencies of drawings

Utility Building

Item 8: Steel column instead of Reinforced concrete column.



Item 1 and actions

Building 1.

High stress on column

Priority 1

(Immediate - Now)

- Maintain 1 kPa load on this area (page 4) of all floors.
- Area shown on page 4 of 7th floor and roof cannot be used and cordon the construction work of toilet block before the revision of the detailed engineering assessment and maintain 1Kpa load on other floors.
- Verify insitu concrete stresses by considering existing core data and evaluate concrete strength using ACI code 562.
- Revise Detailed engineering assessment.

Priority 2

(within 6-weeks)

- Revise and actively manage a loading plan for all floors within the factory giving consideration to floor capacity and column capacity.
- Detail Engineering Assessment to be revised

Priority 3

(within 6-months)

- Continue to implement load plan
- Carry out remedial actions raised by Detail Engineering Assessment



Item 2 and actions

Building 1.

Unusual foundation of shear wall

Priority 1

(Immediate - Now)

- Not Applicable

Priority 2

(within 6-weeks)

- Investigate the foundation of shear wall.
- Revise Detail Engineering Assessment and check the foundation adequacy.

Priority 3

(within 6-months)

- Implement remedial actions raised or suggested by Detailed Engineering Assessment



Item 3 and actions

Building 1:
Joint of beams and columns.

Priority 1

(Immediate - Now)

- Not Applicable

Priority 2

(within 6-weeks)

- Check reinforcement details of those beams.(take pictures during investigation)
- Revise Detailed Engineering Assessment.

Priority 3

(within 6-months)

- Implement remedial actions raised or suggested by Detailed Engineering Assessment



Item 4 and actions

Building 1.

Inconsistencies of drawings and As built construction.

Priority 1

(Immediate - Now)

- Not applicable.

Priority 2

(within 6-weeks)

- Update of As-built architectural and structural drawings.

Priority 3

(within 6-months)

- Not Applicable



Item 5 and actions

Building 1.

No water proofing membrane appears on roof.

Priority 1

(Immediate - Now)

- Not Applicable

Priority 2

(within 6-weeks)

- Not Applicable

Priority 3

(within 6-months)

- Provide water proofing layer considering the serviceability of the building.(should be done after completing all other remediation suggested in revised DEA)



Item 6 and actions

Building 1.

Unfinished retrofitting work.

Priority 1

(Immediate - Now)

- Not applicable.

Priority 2

(within 6-weeks)

- Revise the DEA considering actual situation.

Priority 3

(within 6-months)

- Carry out the remedial measures of those columns if necessary or recommended by DEA after the acceptance of the revised DEA by ACCORD.



Item 7 and actions

Dining Building

Inconsistencies of drawings.

Priority 1

(Immediate - Now)

- Not Applicable.

Priority 2

(within 6-weeks)

- Not Applicable

Priority 3

(within 6-months)

- Building Engineer to update As built drawings



Item 8 and actions

Utility Building

A Steel column instead of Reinforced concrete corner column.

Priority 1

(Immediate - Now)

- Not Applicable

Priority 2

(within 6-weeks)

- Define the load path and check the connection details.
- Check the adequacy of that column.

Priority 3

(within 6-months)

- Carry out recommendations suggested by the engineer.