Debonair Ltd Unit-2

Plot 356, Ozarpara, Sharifpur Road, Maleker Bari, Gazipur
(23.963308N, 90.366508E)
17th May 2014

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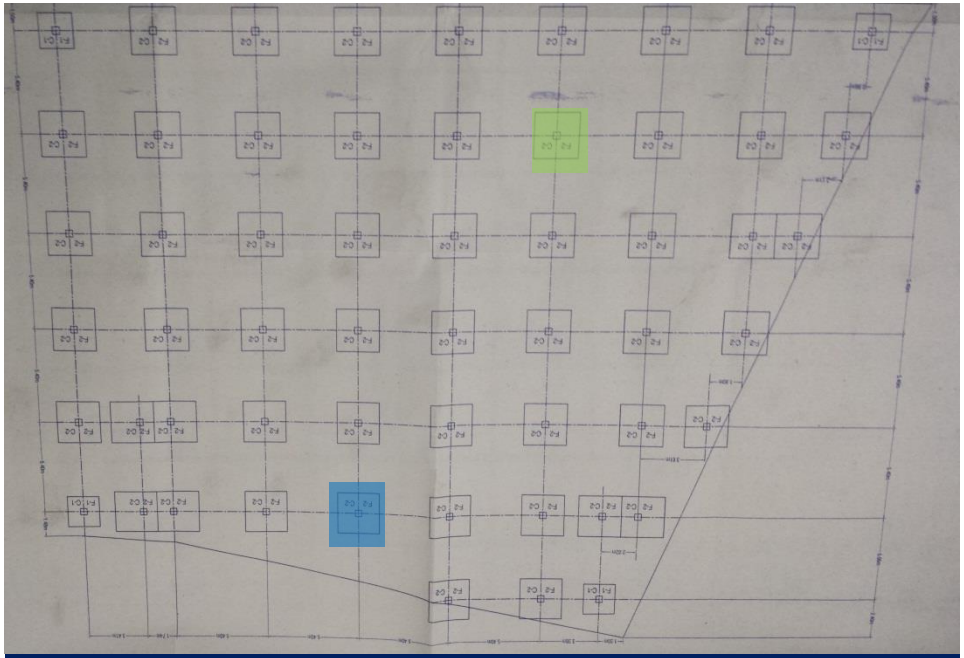
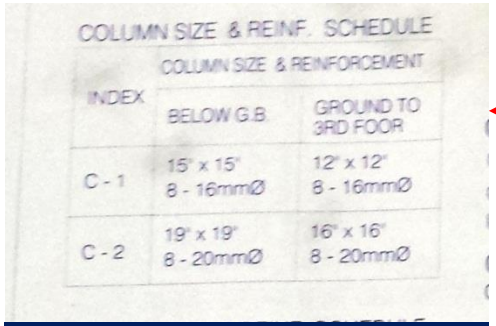
Observations

Stress in columns

Cursory calculations indicate that the working stresses to the Ground Floor and First floor columns are at a high level. Building Engineer to review design, loads and columns stresses.



Column Layout Plan



COLUMN SIZE & REINF. SCHEDULE

INDEX	COLUMN SIZE & REINFORCEMENT	
	BELOW G.B	GROUND TO 3RD FOOR
C - 1	15" x 15" 8 - 16mmØ	12" x 12" 8 - 16mmØ
C - 2	19" x 19" 8 - 20mmØ	16" x 16" 8 - 20mmØ

Column schedule

Column sizes in schedule are bigger than those observed on site

Tested Ground Floor Column (Type C-1)

Tested Ground Floor Column (Type C-2)

The date of construction of the 3-storey building is 2004-2013. The permit drawing from the local authority was undated. The soil investigation for the site was dated 2003. Grade 40 steel was recorded in the structural drawings. The reinforcement quantities recorded at Ground Floor level using the Ferroscanner coincided with the values provided in the Column Schedule. Stone aggregate was specified in the structural drawings, however, brick aggregate was observed on-site. No loading plan was provided for the building. From observation, there was toilet slab build-up, construction storage and water tanks supported on the suspended slabs.

Stress in columns

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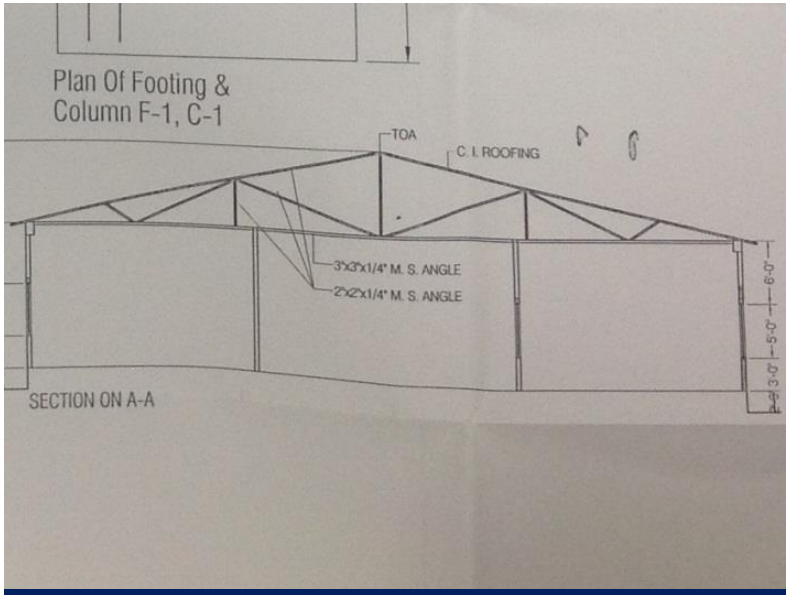
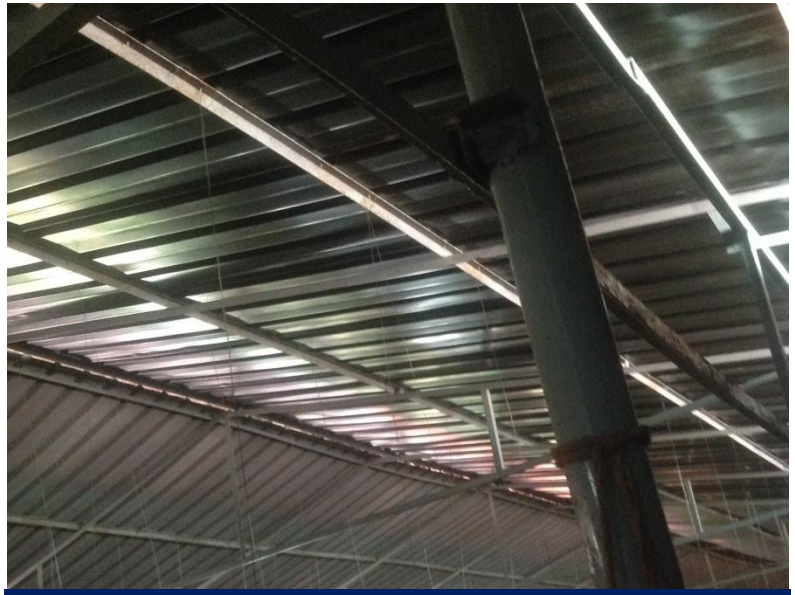
Lateral stability system unclear in steel roofed buildings

The lateral stability system to the steel roofed buildings on the site is unclear – vertical and horizontal bracing has not been provided. Note that provision for lateral stability is not highlighted in the as-built drawings. It is likely that the reinforced columns currently provide lateral stability through cantilever action. Building Engineer to carry out a lateral stability analysis of the buildings to review the design of the cantilevered columns to ensure they can adequately resist the horizontal loads imposed or if necessary, provide details of remedial works for the provision of vertical and horizontal bracing.



Section of roof framing for office building.



No roof bracing observed.

Lateral stability system unclear in steel roofed buildings

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Pin connection between portal frame and cantilevering RC columns – The horizontal force transferred into the top of the columns will need to be transferred into the foundation through cantilever action

No horizontal bracing observed in the new extension.

Lateral stability system unclear in steel roofed buildings

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Floor Cantilevers

Cantilever slabs were observed on the South elevation of the building. Building Engineer to check structural adequacy of the cantilever and propose and implement any strengthening works if required.

Cantilever on South elevation (internal view)

Cantilever on South elevation (external view)

Floor Cantilevers

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Apparently Non-Engineered/Lightweight Structures

Additional roof structures were present on level 4 that were not shown on the provided drawings. Lightweight steel structures were observed at the stairwells. These structures do not appear to be engineered. Building Engineer to review the design of these structures and to implement any upgrade works if required.

Lightweight steel shade structure on stairwell roof.

Internal view of lightweight steel shade structure.

Apparently Non-Engineered/Lightweight Structures

Cracking on Stairs

Cracking was observed to the stairs of the building under construction at the connection with the supporting masonry wall. Building Engineer to investigate the cause and extent of cracking. Building Engineer to advise if load reduction, repair and strengthening of the stairs is required.

Cracking of stairs

Cracking of stairs

Cracking on Stairs

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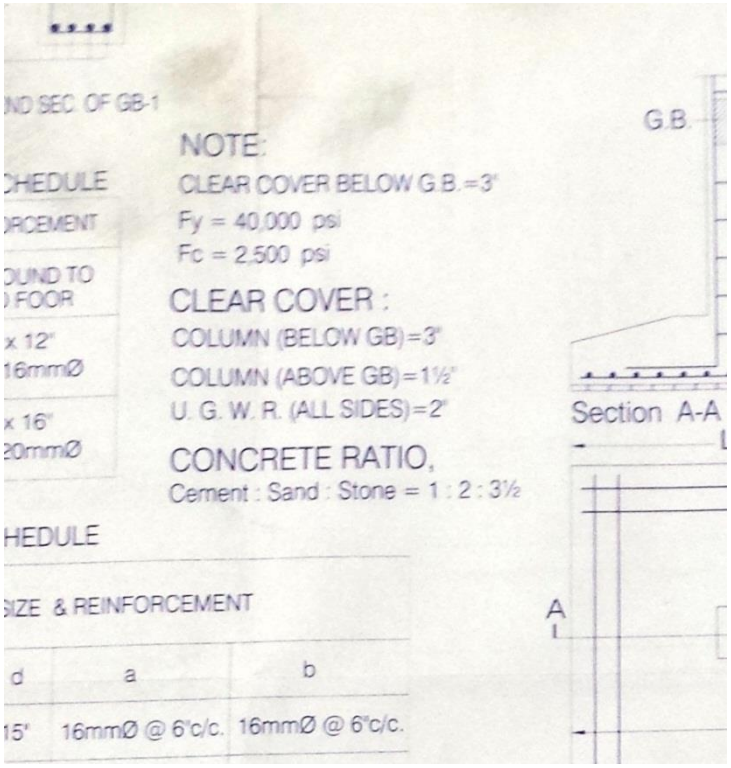
Inconsistencies in Documents Provided and Absence of Loading Plan

There are a number of inconsistencies between the permit drawings and the constructed buildings, principal of which are that brick aggregate was used where stone aggregate is specified and column sizes are smaller than specified. There were also differences between the observed floor occupancy and that shown on drawings. Building Engineer to provide an updated Permit drawing and a full set of as-built structural and architectural drawings for all of the buildings on the site.



Stone chip aggregate specified.

Brick aggregate was observed on site.

Inconsistencies in Documents Provided and absence of Loading Plan

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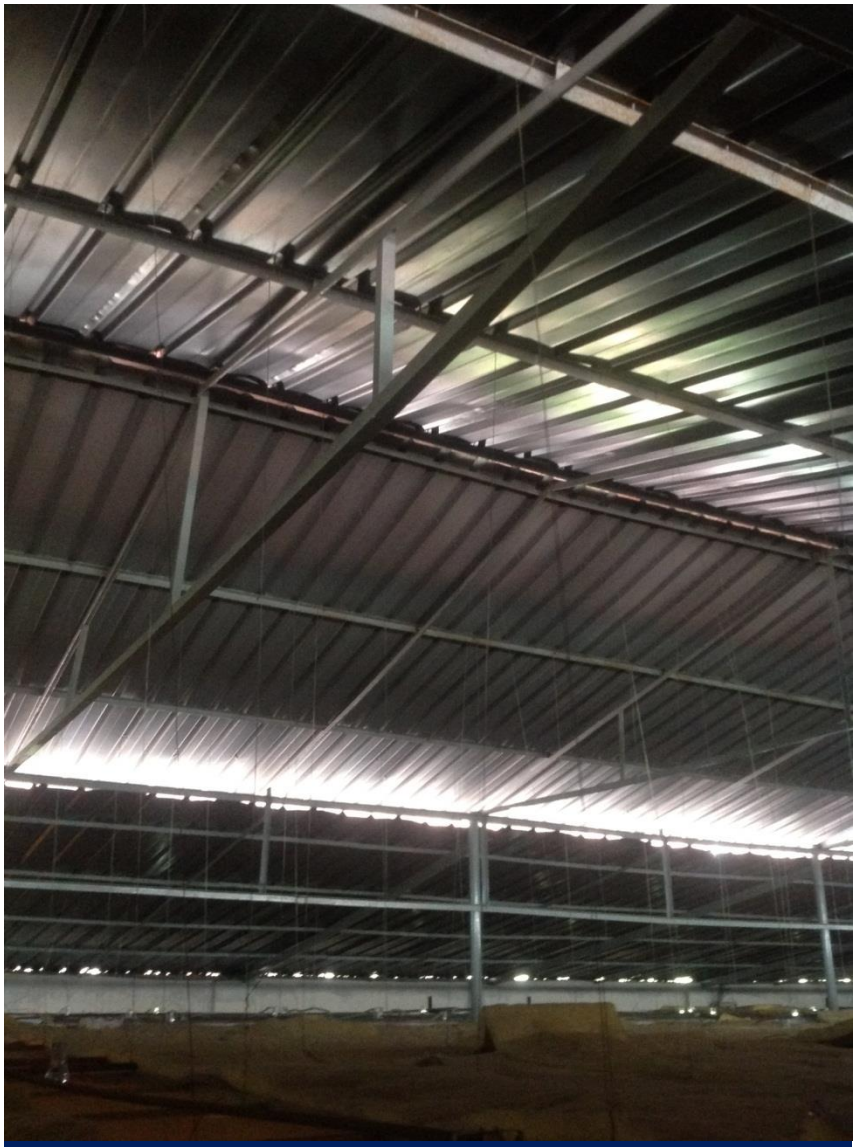
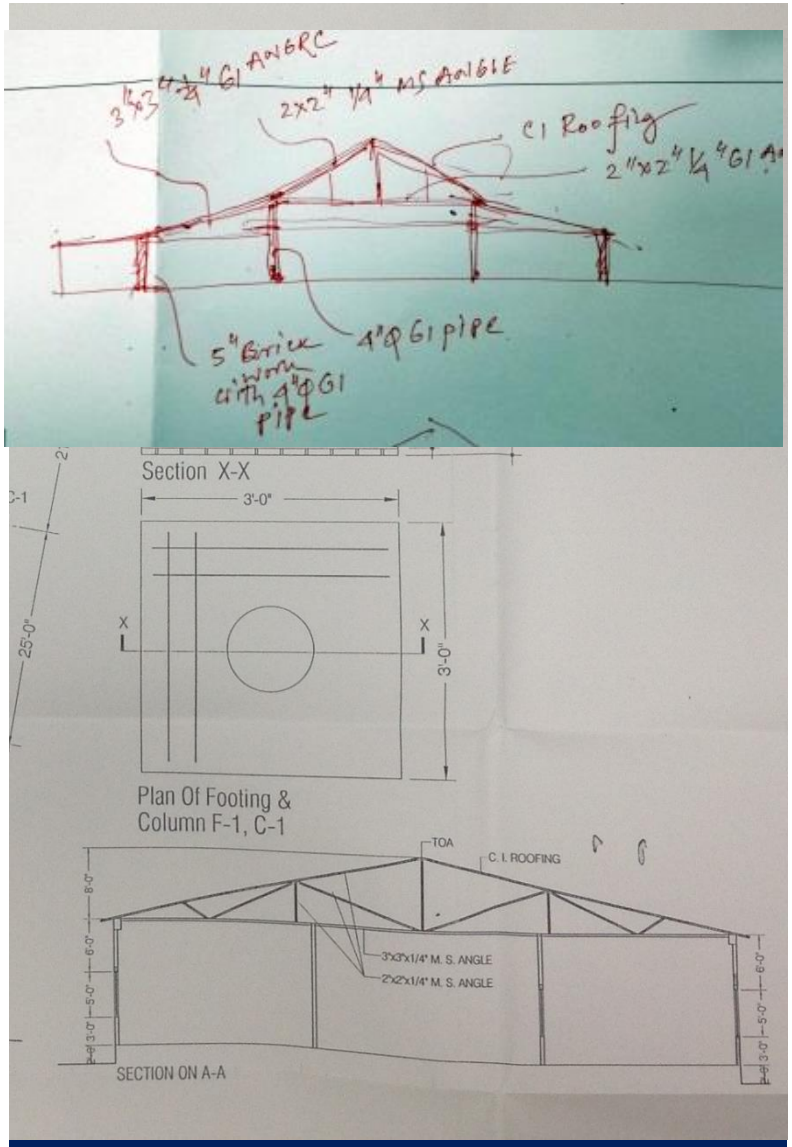


Diagonals missing from office building roof truss.



Drawing specifying diagonals in roof truss.

Inconsistencies in Documents Provided and absence of Loading Plan

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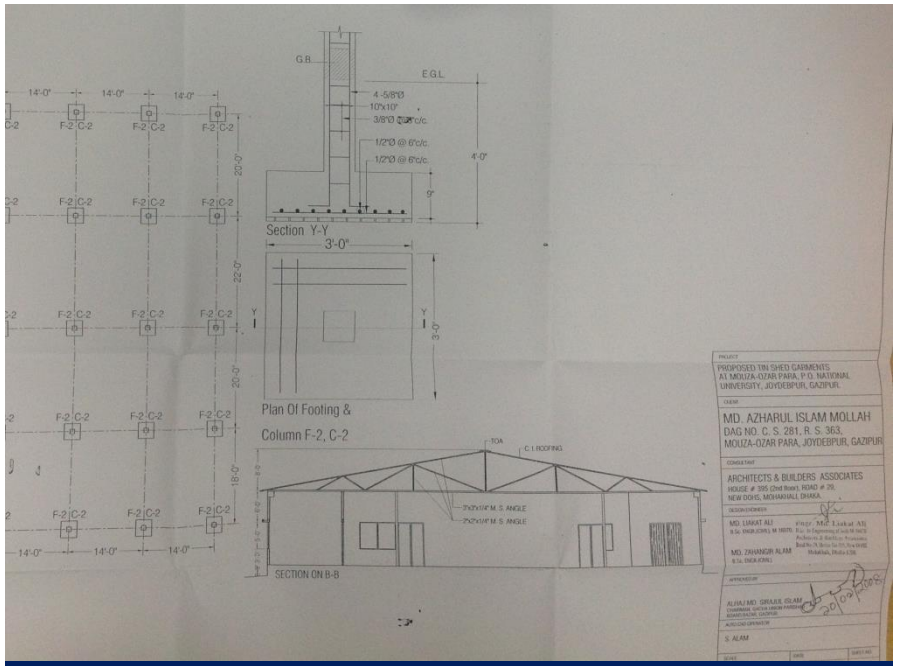
No roof trusses were observed in the Shed 2.



Drawing specifying trusses in roof.

Inconsistencies in Documents Provided

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Priority Actions

Problems Observed

ITEM 1: Stress in columns
ITEM 2: Lateral Stability System Unclear in Steel Roofed Buildings
ITEM 3: Floor Cantilevers
ITEM 4: Non-Engineered/Lightweight structures
ITEM 5: Cracking on stairs
ITEM 6: Inconsistencies in documentation and absence of load plan

Item No.	Observation	Recommended Action Plan	Recommended Timeline
1	Stress levels in Columns	Factory Engineer to review design, loads and columns stresses in all columns.	**Immediate - Now**
2	Stress levels in Columns	Verify insitu concrete stresses by taking 100mm diameter cores from a minimum of 4 columns. Verify grade of steel reinforcement used.	**Immediate - Now**
3	Stress levels in Columns	A Detail Engineering Assessment of Factory to be commenced, see attached Scope.	**Immediate - Now**
4	Stress levels in Columns	Make structural alterations as advised by Engineer.	**6-weeks**
5	Stress levels in Columns	Produce and actively manage a loading plan for all floor plates within the factory giving consideration to floor capacity and column capacity.	**6-weeks**
6	Stress levels in Columns	Detail Engineering Assessment to be completed.	**6-weeks**
7	Stress levels in Columns	Continue to implement load plan	**6-months**

Item No.	Observation	Recommended Action Plan	Recommended Timeline
8	Lateral stability system unclear	Building Engineer to review the design of all the buildings on the site with regard to lateral stability. The Building Engineer should either confirm that the cantilever concrete columns are adequate to carry the horizontal loads or advise on an appropriate vertical bracing system. In addition the Building Engineer is to provide guidance on the requirement for horizontal bracing in the plane of the roof.	**6-weeks**
9	Lateral stability system unclear	Carry out any remedial works as determined by the Building Engineer	**6-months**
10	Floor Cantilevers	Building Engineer to confirm that the cantilever slabs have been designed to take the floor and façade loads applied, as part of DEA (See Item 1)	**6-weeks**
11	Non-Engineered/Lightweight structures	Additional structures to be design checked to ensure adequacy for code vertical and wind loads by the Building Engineer.	**6-months**
12	Non-Engineered/Lightweight structures	Undertake strengthening if required.	**6-months**
13	Non-Engineered/Lightweight structures	Building Engineer to produce appropriate documentation and as built drawings.	**6-months**

Item No.	Observation	Recommended Action Plan	Recommended Timeline
14	Cracking to stairs	Building Engineer to investigate the cause and extent of cracking.	**6-months**
15	Cracking to stairs	Building Engineer to advise if load reduction, repair and strengthening of the stairs is required.	**6-months**
16	Inconsistencies in Documents Provided and Absence of Loading Plan	Building Engineer to update the structural and architectural drawings to reflect the as-built layouts as part of the Detailed Engineering Assessment (see Item1).	**6-weeks**