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43 Chalabon, Ashique Complex, Azampur, Uttara, Dhaka
(23.86794, 90.41752)

30th March 2014



Observations

**Columns appear to be stressed to levels that
require immediate action**

Outline calculations indicate that the working stress of columns at Ground Floor level are at levels that require immediate action. Refer to Action 1.



Tested Ground Floor Columns

Tested Ground Floor Column C4 in the Ten Storey Building.

Construction of the Ten Storey building commenced in 1999 and was completed in 2004.

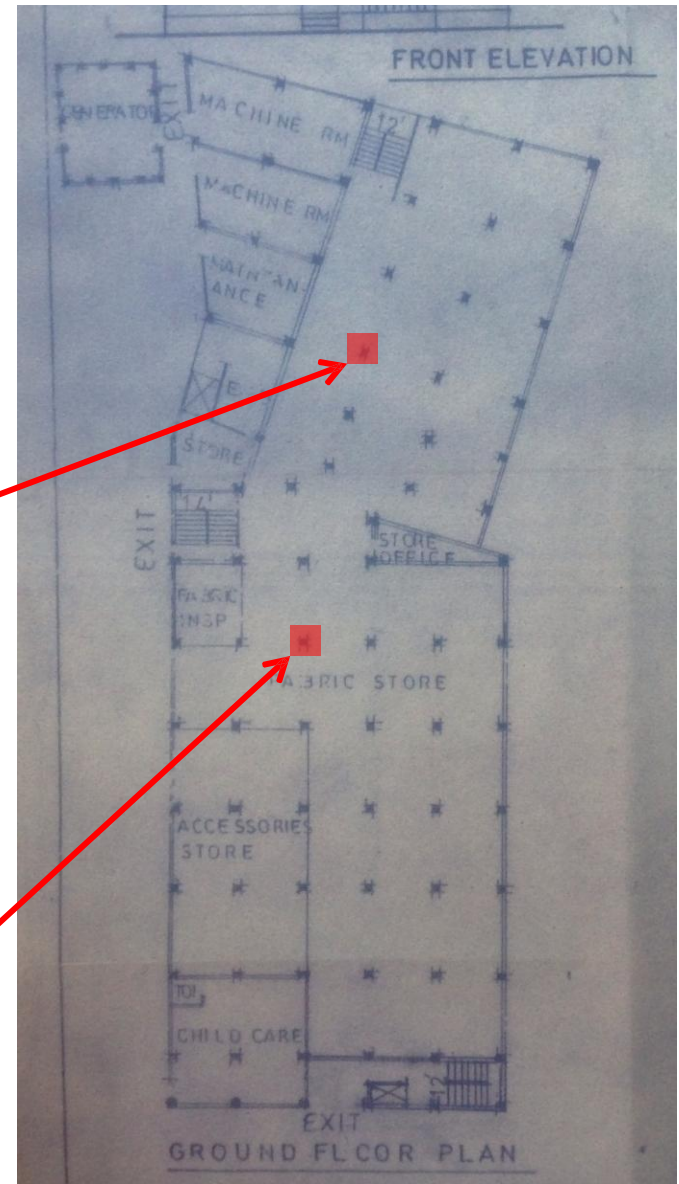
Stone aggregate was noted in the columns.



Tested Ground Floor Column C2 in the Eight Storey Building.

Construction of the Nine Storey building commenced in 1998 and was completed in 2001.

Brick aggregate was noted in the columns.

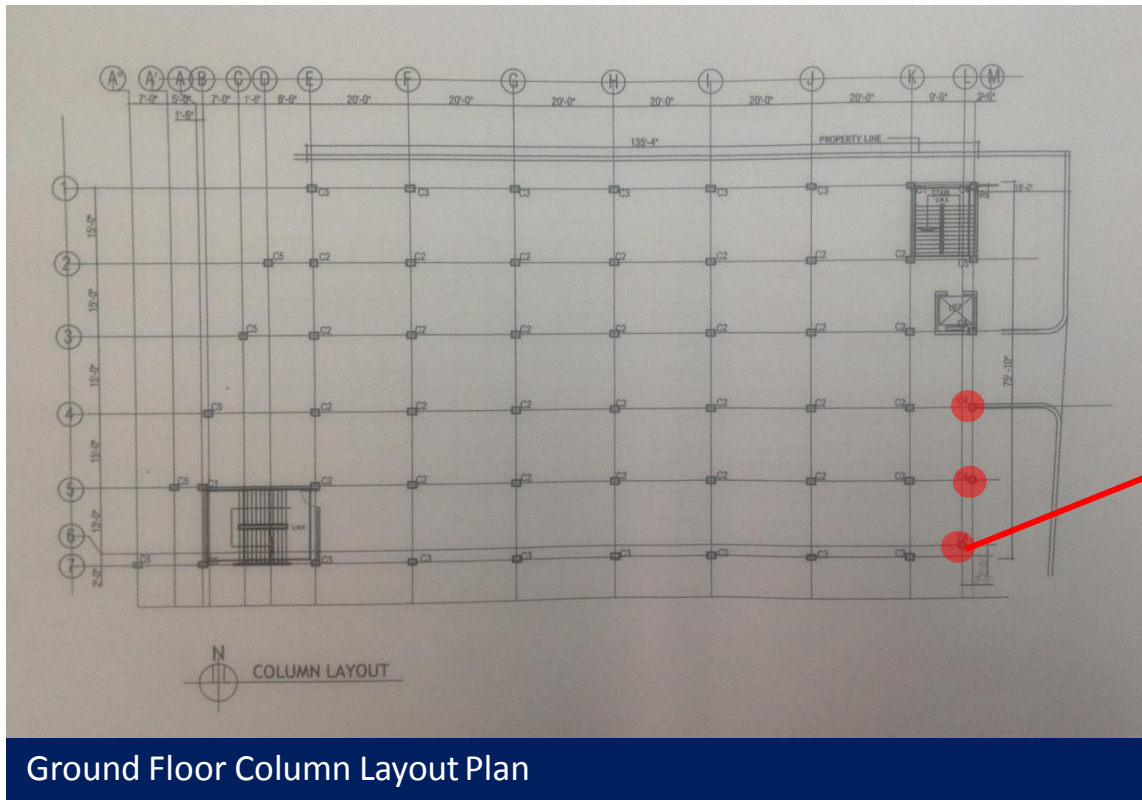


Ground Floor Plan

Column Strength

The feature columns adjacent to the entrance and car parking area are at risk of being accidentally struck by a vehicle. The robustness of the connection of these columns to the main structure also needs investigation

3 no. two-storey columns to the Main East elevation of the building, adjacent to the delivery entrance, are at risk of being accidentally struck by a vehicle. Column protection barriers need to be provided. Also Building Engineer to investigate the robustness of the connection of these columns to the main structure.



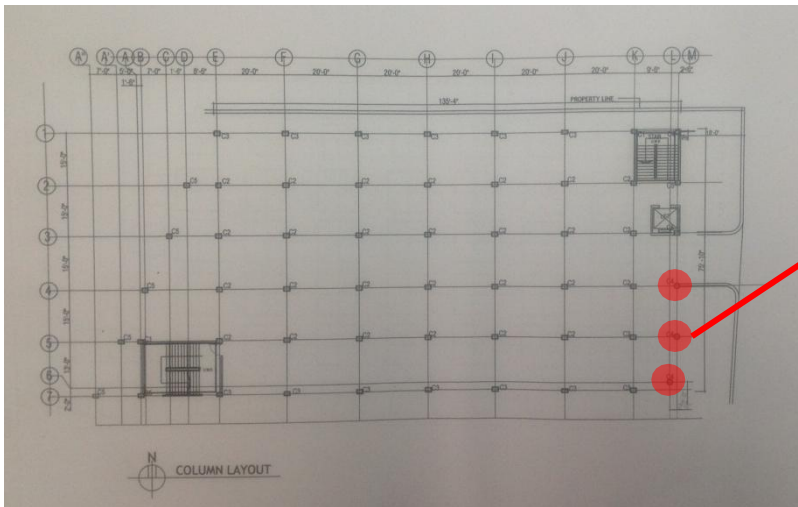
Two-Storey Ground Floor Columns at Risk from Impact



Column Impact Loading



View of Column Heads from 1st Floor Balcony



Ground Floor Column Layout Plan



Two-Storey Column Connection Detail to Beams

Column Connection Detail Unclear

**Design Check required for the storage areas,
particularly to the South-West corner of the
building, to confirm the capacity of the floor
structure**

There are large amounts of storage in the Ten Storey building, particularly in the South-West Corner, as indicated.

Building Engineer to check that the beams and slabs have been adequately designed to carry the associated loading.



9th Floor - Folded Cardboard



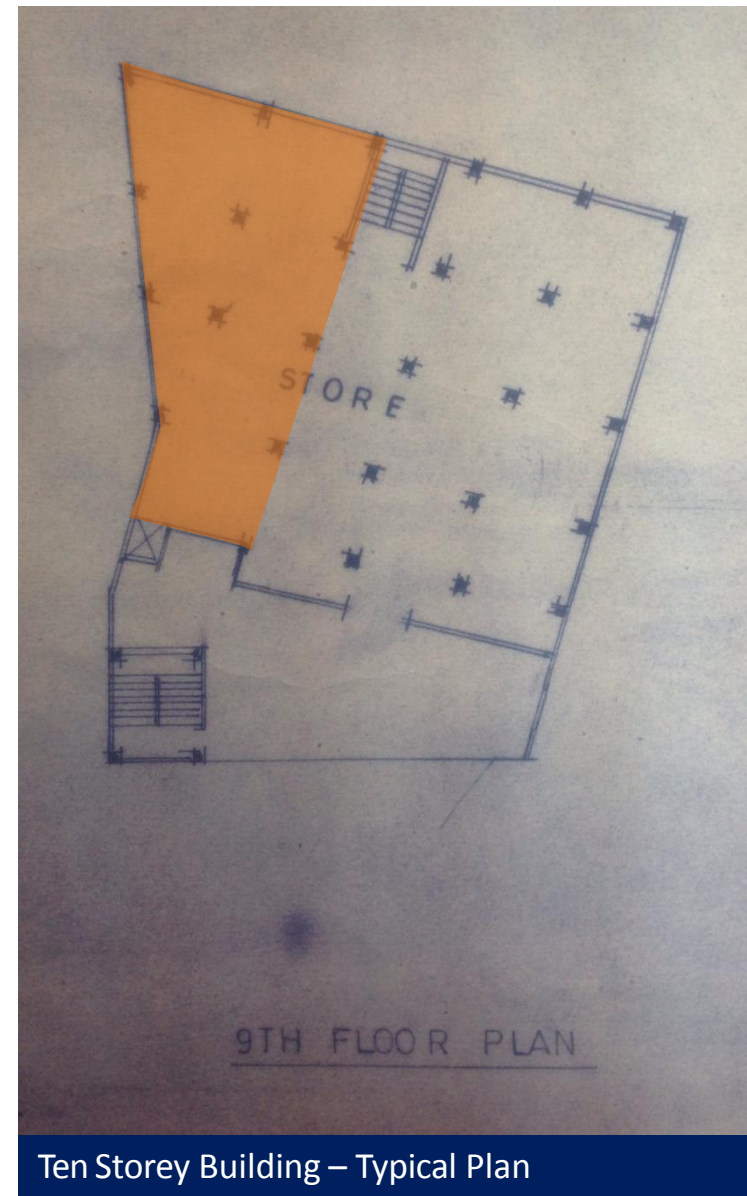
8th Floor – Leftover Fabric



8th Floor – New Fabric



3rd Floor – Boxed Goods



Ten Storey Building – Typical Plan



General Zone of Storage Area

Design check required for the floor cantilevers at the suspended floor levels to confirm their load capacity to support floor and façade loading

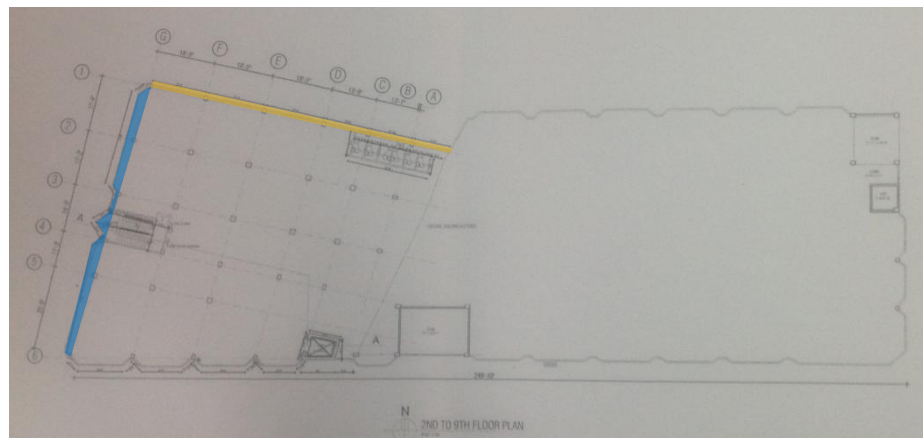
In the ten storey building, the slabs cantilever from First Floor level up on the East elevation, and from Seventh Floor level to the North elevation. There are no downstand beams supporting the cantilevering slab. Building Engineer to check that all the floor cantilevers at the suspended floor levels have the capacity to support the floor and façade loading.



Cantilevering slab to East elevation

Cantilever to all floors of East elevation

Cantilever to 8th and 9th Floors of North elevation



Typical Floor Plan



View of Façade to East Elevation

Design Check required for the light-weight steel roof structures to the 9-storey building dining area and the ancillary buildings, as indicated

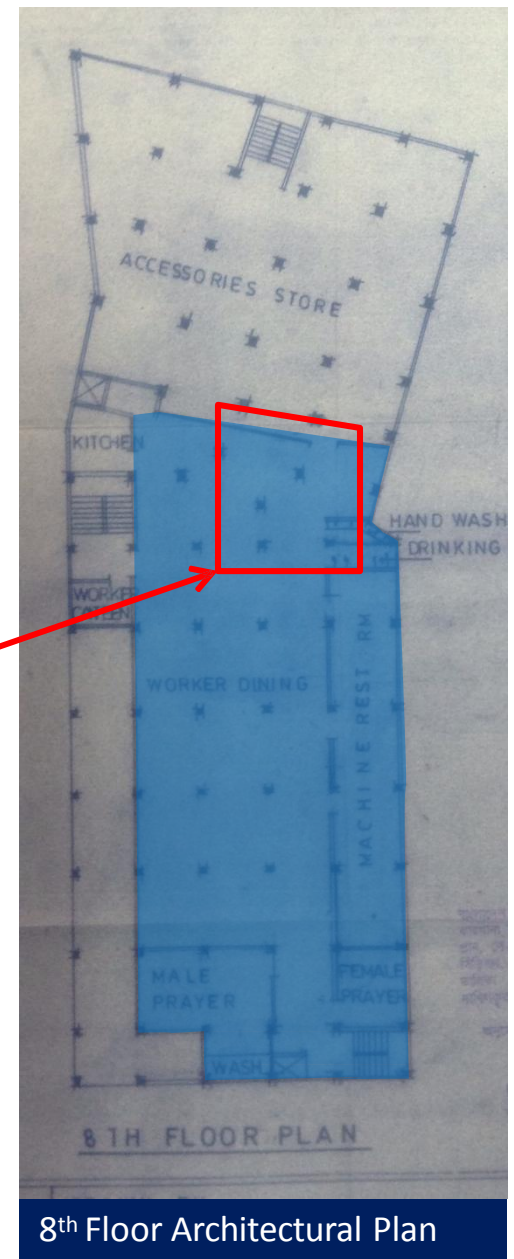
A design check is required for the light-weight steel roof structures to the nine-storey building dining area and to the ancillary buildings to the South of the Main Building to confirm that they are adequate to resist wind loading. Particular emphasis is required on a section of the steel roof above the dining area which appears unstable. Building Engineer to implement any upgrade works to these structures as required.



Steel Roof Column Connection



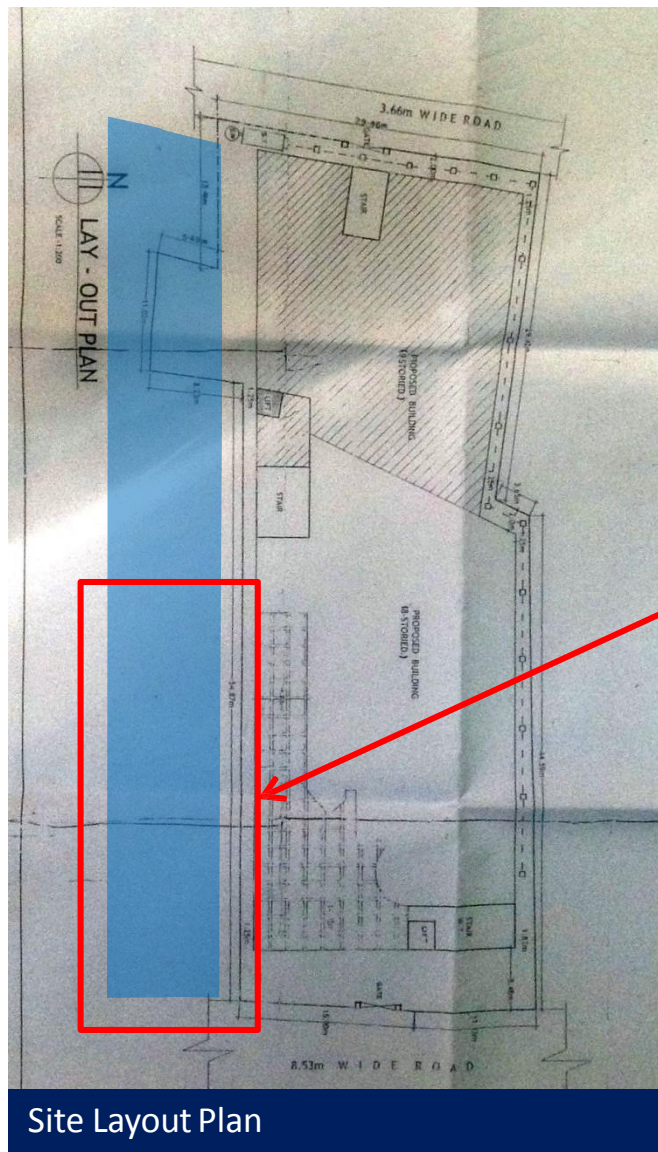
Remedial Works to Steel Roof



8th Floor Architectural Plan

Light-weight steel roof above dining area to 8th Floor of 9 storey building

Dining Area Steel Roof



View of Ancillary Building Roofs from Roof of Main Building



Lightweight Steel Structure



Lightweight Steel Structure

Extent of Ancillary Buildings at Ground Floor Level to the South of the Main Building

Ancillary Buildings Steel Roofs

Building Engineer to investigate the cause of the local cracking to the 8th floor level slab in the South-West corner and to areas of the façade

There is evidence of local cracking to the Eighth Floor slab in the South-West corner of the building.

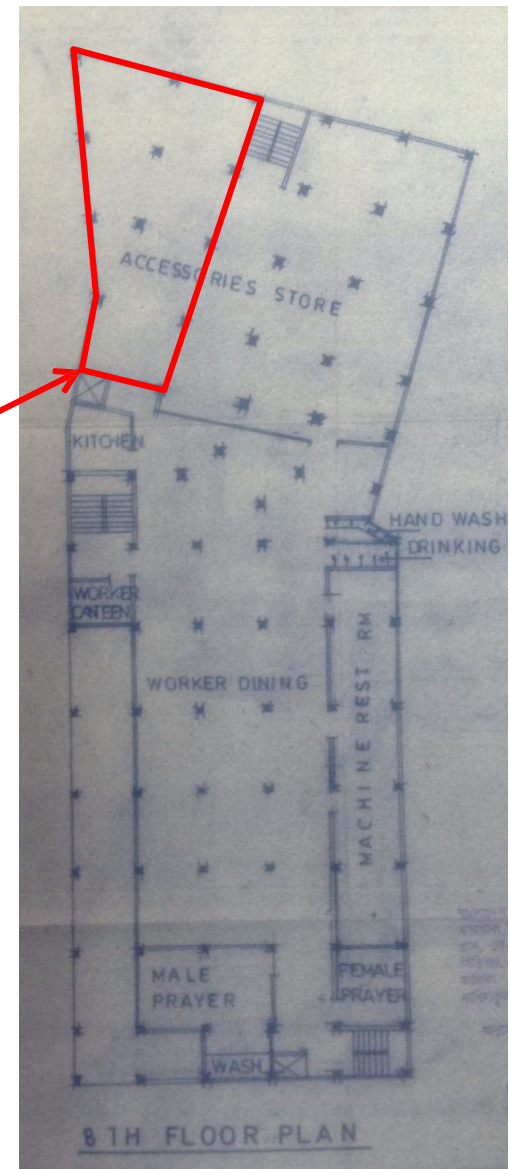
Building Engineer to investigate and carry out remedial works to the structure as required.



Local Cracking to 8th Floor Slab



Local Cracking to 8th Floor Slab



8th Floor Architectural Plan

Cracking to Floor Slab

There is evidence of local cracking to the façade to the East Elevation of the building.

Building Engineer to investigate and carry out remedial works to the façade as required.



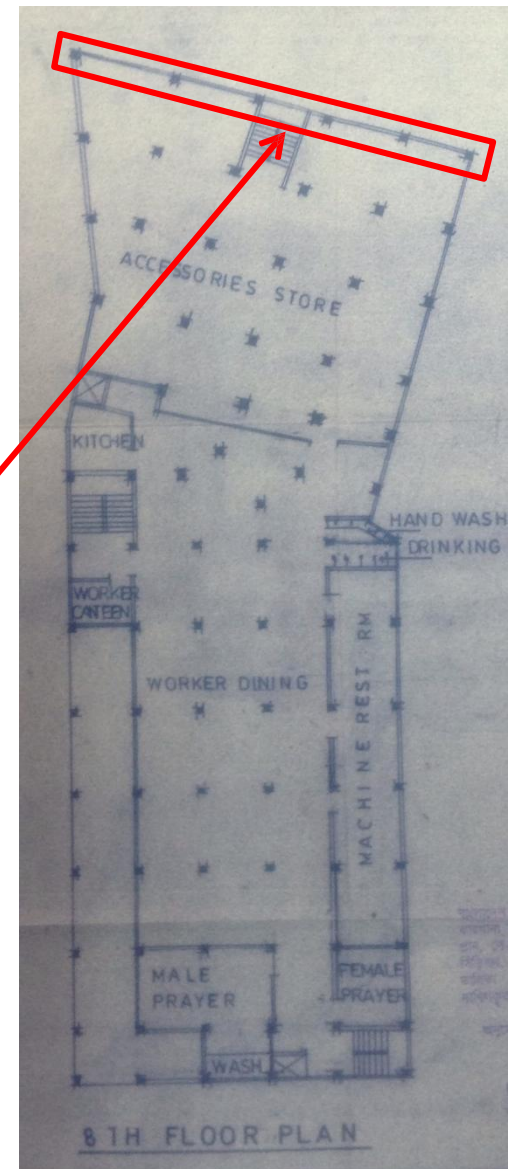
Local Cracking to Façade



Local Cracking to Façade



Local Cracking to Façade

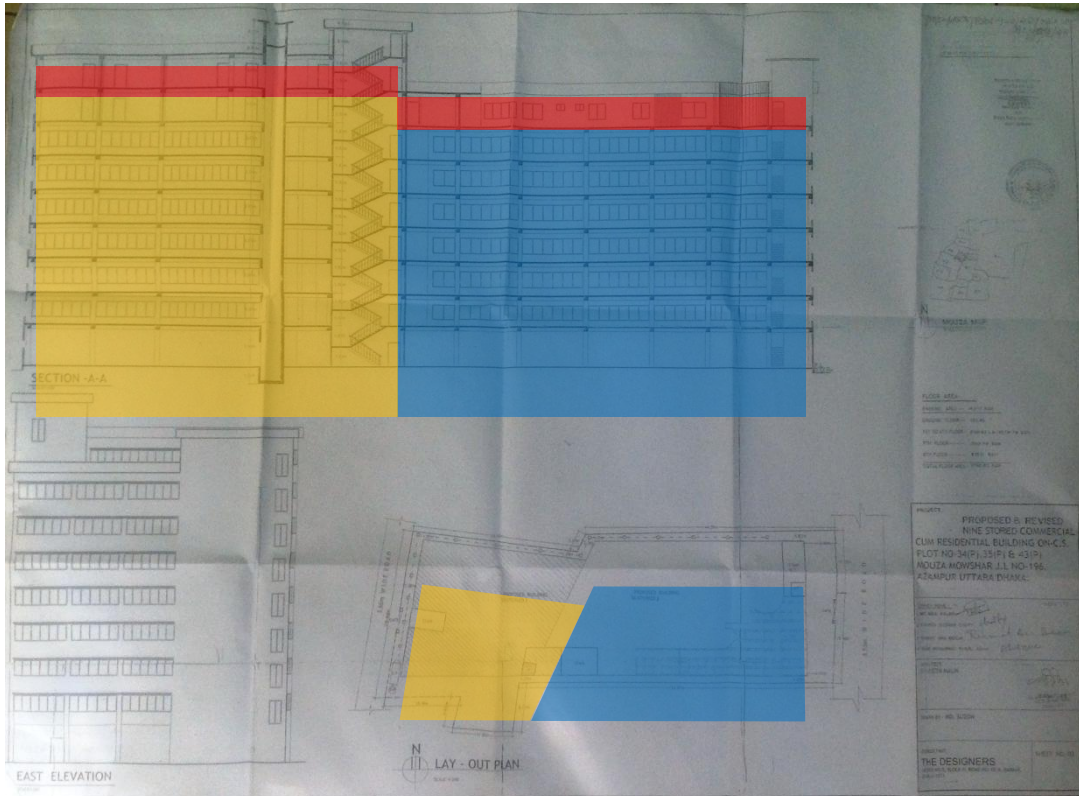


8th Floor Architectural Plan

Cracking to Facade

Inconsistencies in the Permit and Structural drawings presented

There are inconsistencies between the original building permit and the built structure. An additional floor has been included on each structure - the main build consists of a ten-storey building (1999-2004) and a nine-storey building (1998-2001), whereas the original Rajuk-approved building permit (1999) calls up a nine-storey building and an eight-storey building, respectively. Building Engineer to clarify.

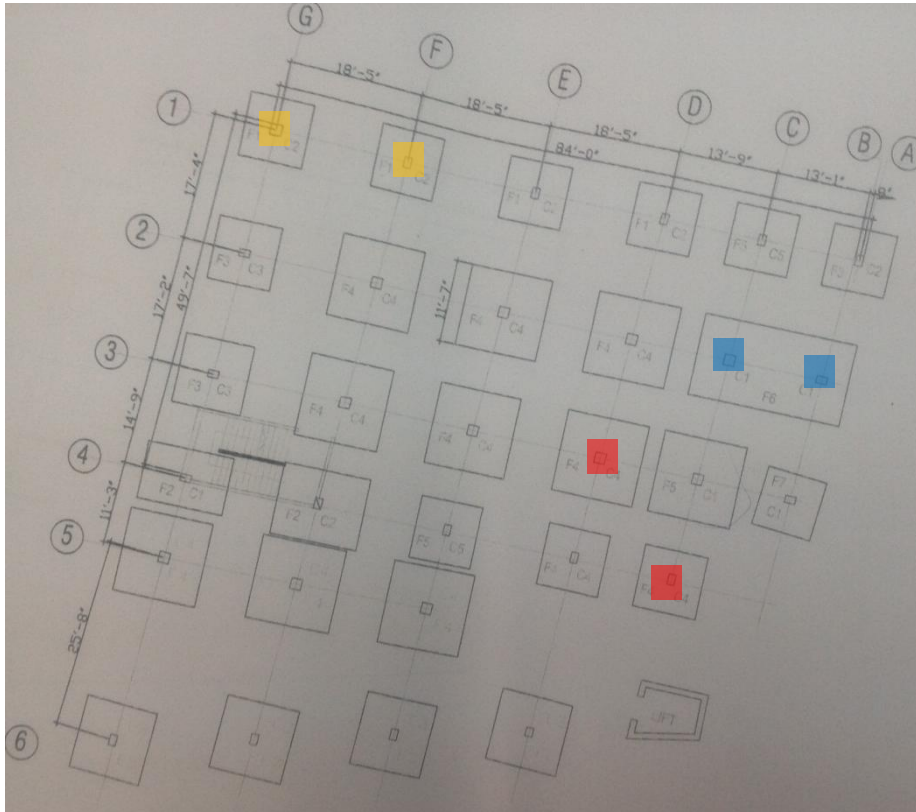


	Approved 8-Storey Building
	Approved 9-Storey Building
	Additional Floor (constructed)

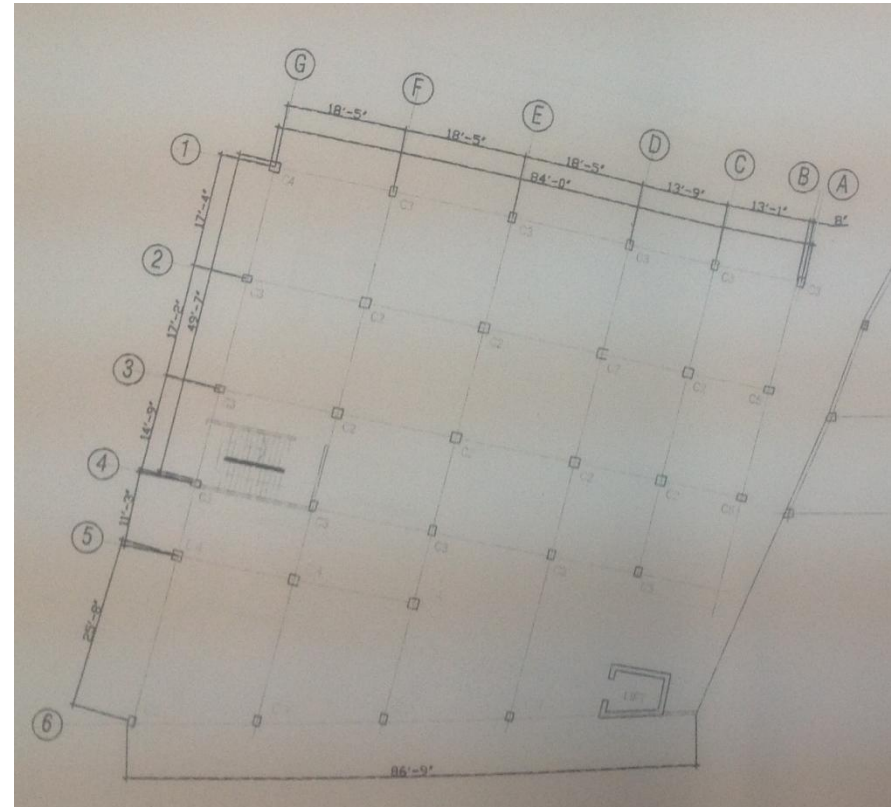
Original Rajuk-Approved Building Permit

Permit Inconsistencies

The structural drawings do not match the current arrangement of the building, and there are inaccuracies in the drawings. Building engineer to check, collect information and produce accurate and complete as-built documentation.



Inaccuracy in 10-storey building drawings:
The shape of the C1 (blue), C2 (yellow) and C4 (red) columns are shown up as both square and rectangular in the structural drawings, as indicated.



Inaccuracy in 10-storey building drawings:
The column sizes shown on the Footing Layout Drawing (left) and the Column Layout Drawing (right) do not match.

Drawing Inconsistencies

COL TYPE	SIZE GR FL	REINF (AC)	CONFIG
C1	12" x 16"	12-7/8" ϕ	
C2	16" x 18"	8-7/8" ϕ + 8-1" ϕ	

Inconsistency in column rebar for 8-storey building:
Drawings call up 16 no. bars in the C2 columns, whereas observed columns appear to have 12 no. bars (Ferroscanner).

C5	18" x 18"	4-7/8" ϕ 8-3/4" ϕ	
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Inconsistency in 10-storey building drawings:
The C5 column is called up as a square column (18" x 18") but is drawn as a rectangular column.

Drawing Inconsistencies

Priority Actions

Problems Observed

ITEM 1: Columns appear to be stressed to levels that require immediate action.

ITEM 2: The feature columns adjacent to the entrance and car parking area are at risk of being accidentally struck by a vehicle. The robustness of the connection of these columns to the main structure also needs investigation.

ITEM 3: Design Check required for the storage areas, particularly to the South-West corner of the building, to confirm the capacity of the floor.

ITEM 4: Design check required for the floor cantilevers at the suspended floor levels to confirm their load capacity to support floor and façade loading.

ITEM 5: Design Check required for the light-weight steel roof structures to the 9-storey building dining area and the ancillary buildings as indicated.

ITEM 6: Building Engineer to investigate the cause of the local cracking to the 8th floor level slab in the South-West corner, and to areas of the façade.

ITEM 7: Inconsistencies in the Permit and Structural drawings presented

Item No.	Observation	Recommended Action Plan	Recommended Timeline
1	Columns appear to be stressed to levels that require immediate action.	Floors 9,8,7,6 and 5 are to be closed immediately with all equipment and storage loading also removed immediately pending verification of the column capacities by the Building Engineer	Immediate - Now
2	Columns appear to be stressed to levels that require immediate action.	Imposed Floor loading on floors 1,2,3 and 4 to be reduced to/ maintained at a maximum of 1.0kPa pending verification of the column capacities by the Building Engineer	Immediate - Now
3	Columns appear to be stressed to levels that require immediate action.	Verify insitu concrete strengths either by 100mm diameter cores or existing cylinder strength data for cores from a minimum of 4 columns	Immediate - Now
4	Columns appear to be stressed to levels that require immediate action.	A Detail Engineering Assessment of the Factory Building to be commenced, see attached Scope	Immediate - Now
5	Columns appear to be stressed to levels that require immediate action.	Detail Engineering Assessment to be completed	6-weeks
6	Columns appear to be stressed to levels that require immediate action.	Produce and actively manage a loading plan for all floor plates within the Building giving consideration to floor capacity and column capacity	6-weeks
7	Columns appear to be stressed to levels that require immediate action.	Actions identified in the Detail Engineering Assessment to be implemented	6-months

Detail Engineering Assessment

This Schedule develops a minimum level of information, Analysis and testing expected as part of a Detail Engineering Assessment.

The Building(s) have been visually assessed and it is deemed necessary that a detailed engineering assessment be carried out by a competent Engineering Team employed by the factory Owner.

This Request should be read in conjunction with the BUET developed Tripartite Guideline document for Assessment of Structural Integrity of Existing RMG Factory Buildings in Bangladesh (Tripartite Document), the latest version of this document should be referenced. This document also gives guidance on required competency of Engineering Team.

We expect that the following will be carried out:

1. Development of Full Engineering As-Built Drawings showing Structure, loading, elements, dimensions, levels, foundations and framing on Plan, Section and Elevational drawings.
2. The Engineering team are to carry out supporting calculations with a model based design check to assess the safety and serviceability of the building against loading as set out in BNBC-2006, Lower rate provisions can be applied in accordance with the Tripartite Guidelines following international engineering practice, justification for these lower rate provisions must be made.
3. A geotechnical Report describing ground conditions and commenting on foundation systems used/proposed.
4. A report on Engineering tests carried out to justify material strengths and reinforcement content in all key elements studied.
5. Detailed load plans shall be prepared for each level showing current and potential future loading with all key equipment items shown with associated loads.
6. The Engineering team will prepare an assessment report that covers the following:
 - As-Built drawings including
 - Plans at each level calling up and dimensioning all structural components
 - Cross sectional drawings showing structural beams, slabs, floor to floor heights, roof build-ups and Basic design information of the structure
 - Highlight any variation between As-built compared to the designed structure
 - Results of testing for strength and materials
 - Results of geotechnical assessment and testing/investigation
 - Details of loading, inputs and results of computer modelling
 - Commentary on adequacy/inadequacy of elements of the structure
 - Schedule of any required retrofitting required for safety or performance of Structure

Any proposals for Retrofitting to follow guidance developed in the Tripartite Document

Item No.	Observation	Recommended Action Plan	Recommended Timeline
8	The feature columns adjacent to the entrance and car parking area are at risk of being accidentally struck by a vehicle. The robustness of the connection of these columns to the main structure also needs investigation	Building Engineer to check that the columns have been adequately designed for impact loading	6-weeks
9	The feature columns adjacent to the entrance and car parking area are at risk of being accidentally struck by a vehicle. The robustness of the connection of these columns to the main structure also needs investigation	Suitable column protection barriers to be designed and constructed	6-weeks
10	The feature columns adjacent to the entrance and car parking area are at risk of being accidentally struck by a vehicle. The robustness of the connection of these columns to the main structure also needs investigation	Robustness of connection from columns to building to be investigated and strengthened	6-weeks

Item No.	Observation	Recommended Action Plan	Recommended Timeline
11	Design Check required for the storage areas, particularly to the South-West corner of the building, to confirm the capacity of the floor structure	Locations of loading noted to be surveyed and capacity of floor structure to be assessed by the Building Engineer to confirm that the floor structure is designed to carry these loads	6-weeks
12	Design Check required for the storage areas, particularly to the South-West corner of the building, to confirm the capacity of the floor structure	Produce and actively manage a loading plan for all floor plates within the factory giving consideration to floor capacity and column capacity.	6-weeks
13	Design Check required for the storage areas, particularly to the South-West corner of the building, to confirm the capacity of the floor structure	Continue to implement and manage the loading plans	6-months
14	Design check required for the floor cantilevers at the suspended floor levels to confirm their load capacity to support floor and façade loading	Building Engineer to confirm the capacity of the slab to support the combination of the floor loading and the façade loading.	6-months

Item No.	Observation	Recommended Action Plan	Recommended Timeline
15	Design Check required for the light-weight steel roof structures to the 9-storey building dining area and the ancillary buildings as indicated	Building Engineer to provide detailed calculations for the noted structures and the associated light steel roofs. These should confirm their ability to withstand all wind loading pressure, suctions and uplift forces	6-months
16	Building Engineer to investigate the cause of the local cracking to the 8th floor level slab in the South-West corner, and to areas of the façade	Building Engineer to investigate the cause of the cracking and implement any remedial measures deemed necessary	6-months
17	Inconsistencies in the Permit and Structural drawings presented	Building engineer to check, collect information and produce accurate and fully complete as-built documentation	6-weeks