Sayam Knit Fab
Rose Tex Knitting
Vaivai Printing
Rahman Sports
Paisley Printers

A/88,BSCIC 1/A, Shasongaon, Enayetnagar, Fatullah, Narayangonj, Bangladesh

(23.62304N 90.47902E)

14 May 2014

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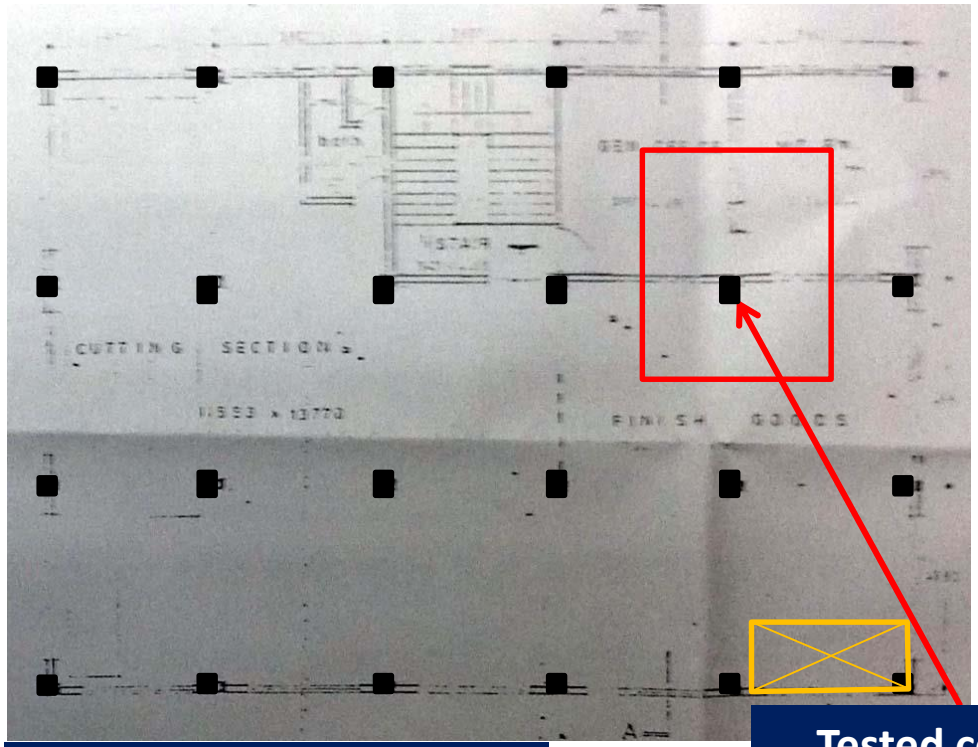
Observations - Building 2

Columns appear to be stressed to a high level and require immediate review



Typical column layout – Building 2

Tested Ground Floor Column – Brick Chips

Outline calculations indicate that columns are stressed to a high level and require immediate review.

Building Engineer to perform detailed calculations including a Detail Engineering Assessment (see attached scope) and concrete tests to prove adequacy of column sizes, and (if required):

- **Reduce loads by vacating floors**
- **Reinforce columns**

Column Strength

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Structural adequacy of steel roof structures

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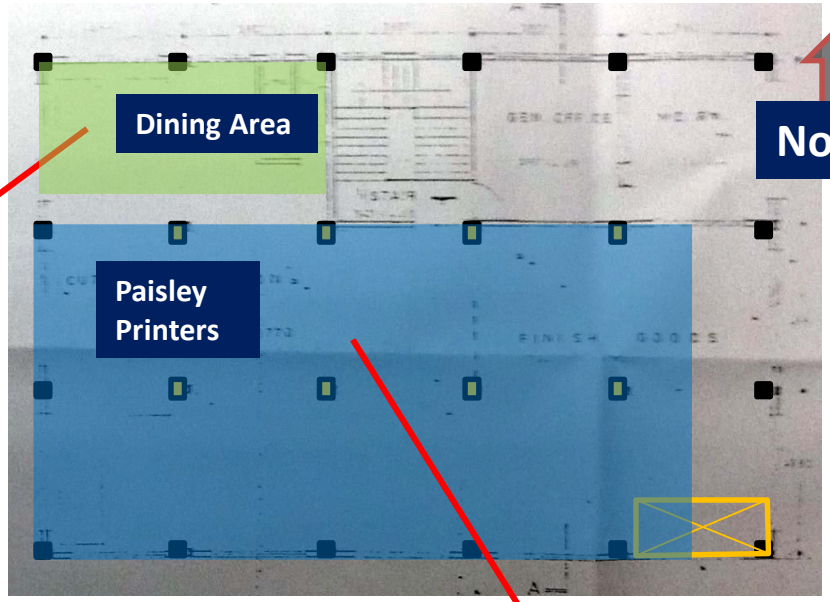
Consider bracing for lateral stability



Building Engineer to check adequacy of the steel roof structures and connections for code specified live load and wind loads

Column/Truss Connections to be reviewed

Steel Roof Structures

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Management of floor loads

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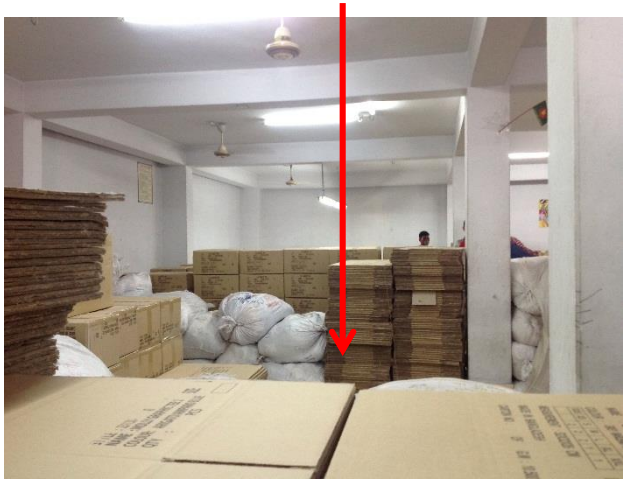
Floor loads at 4th Floor



Floor loads at 3rd floor

Floor loads at 3rd floor

Building Engineer to prepare controlled loading plans, based on floor slab and column capacity, for all floors which will designate allowable storage density and where storage may be placed.

Management of Floor Loads

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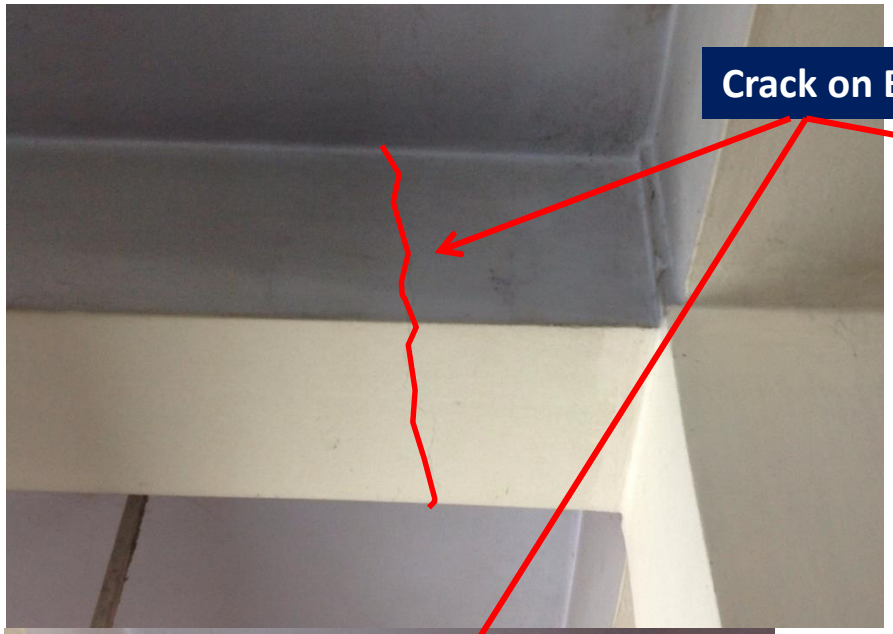
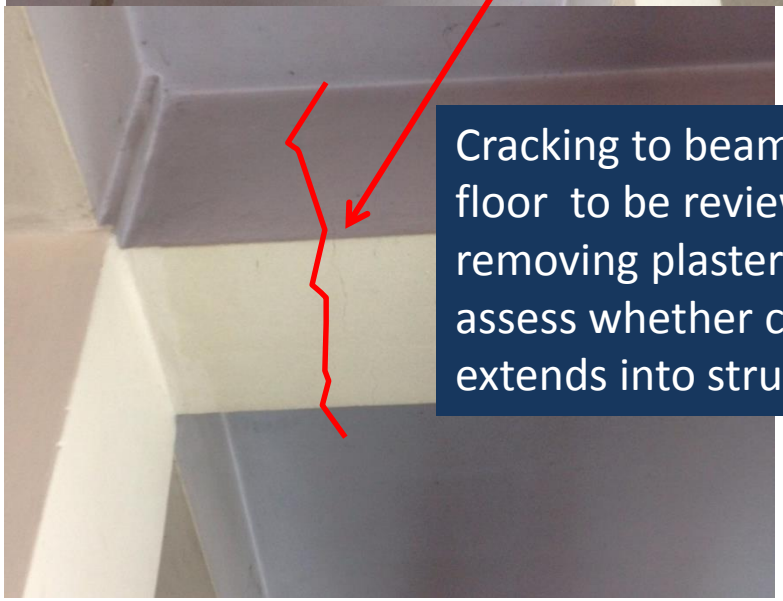
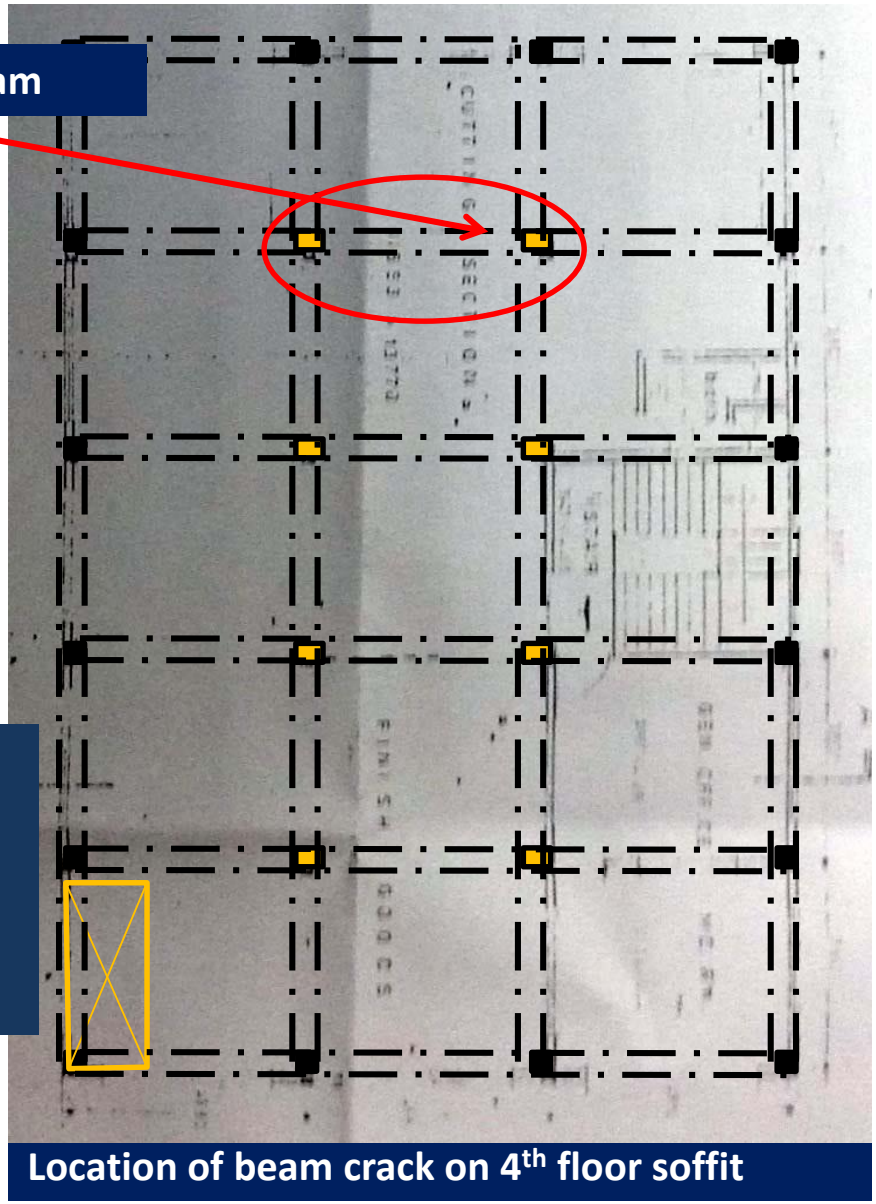
Cracking of beam on the 4th floor soffit, cracking of roof slab soffit and apparent hanging brickwork on the 2nd floor soffit





Cracking to beam on 4th floor to be reviewed by removing plaster to assess whether crack extends into structure.



Location of beam crack on 4th floor soffit

Beam Crack on 4th Floor Soffit

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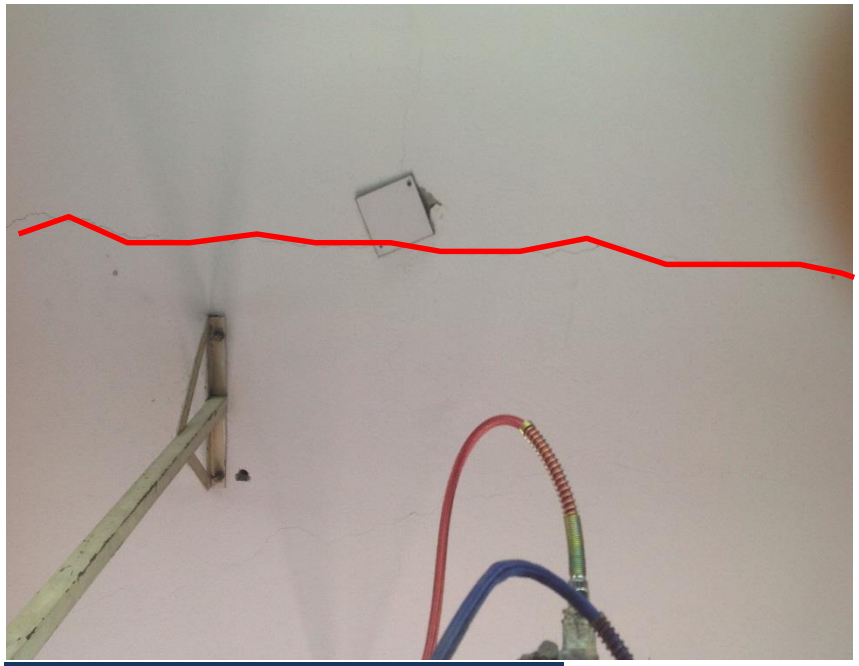
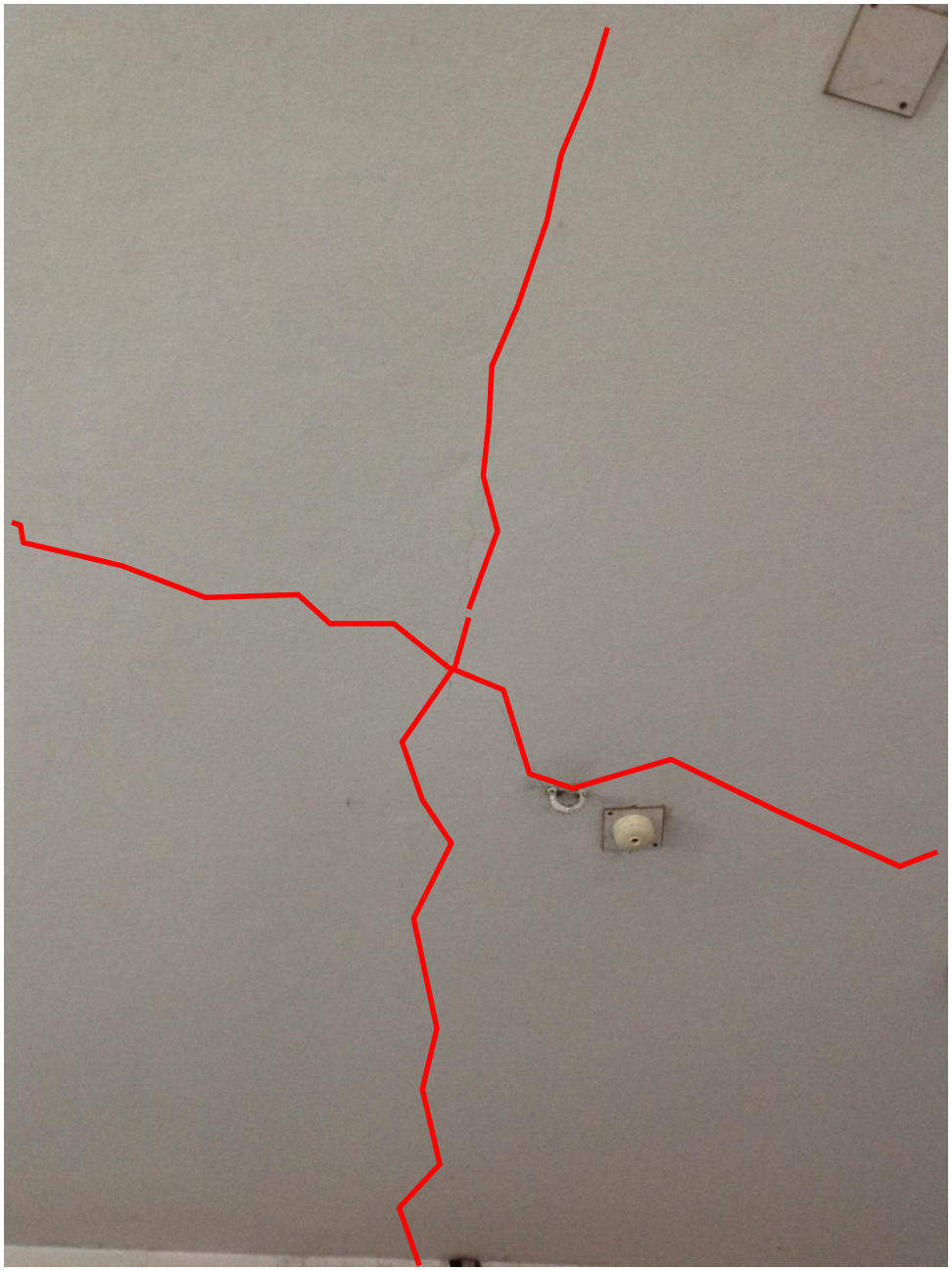
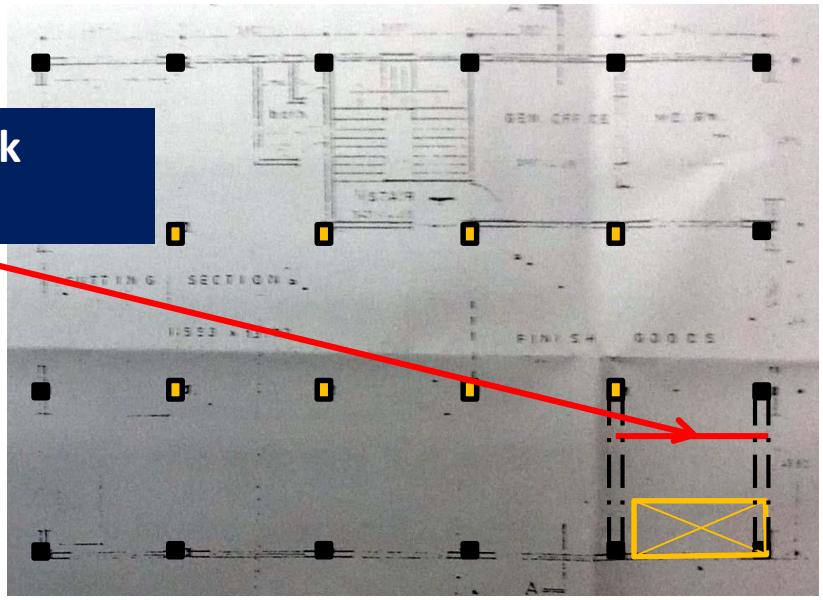


Signs of cracking in a number of locations on the roof slab soffit.

Cracking in soffit of flat slab to be reviewed by removing plaster to assess whether cracks extend into structure. Building Engineer to confirm flat slab imposed design load capacity.



Cracking of Roof Slab Soffit



Evidence of a demolished wall remain hanging from the slab soffit. Building Engineer to review if this is of concrete or brick construction. If constructed of brickwork these works should be removed.

Apparent hanging Brickwork on 2nd Floor Soffit

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Structural adequacy of the roof top water tank support structure

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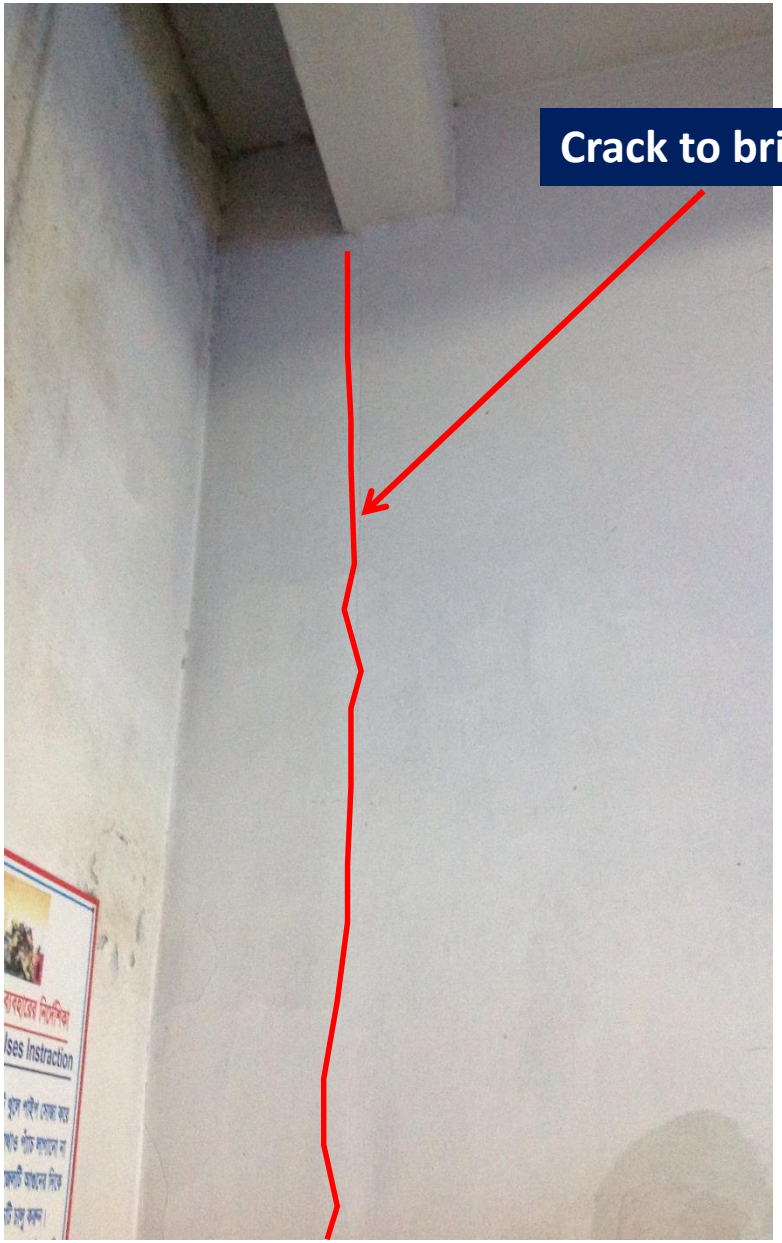
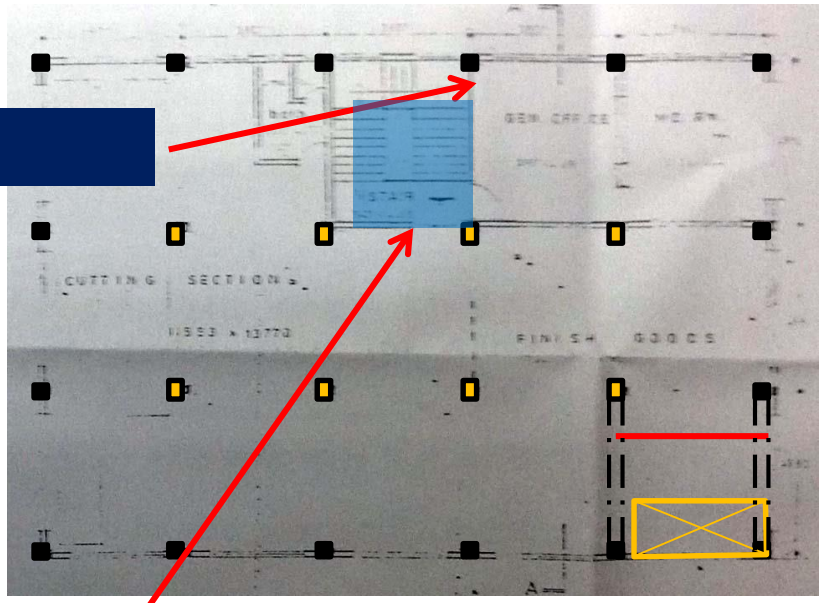


Crack to brick wall



Water Tank

Concrete Water Tank may be supported on brick work on one side resulting in cracking – Building Engineer to review and confirm adequacy of water tank support structure.

Water Tank Support

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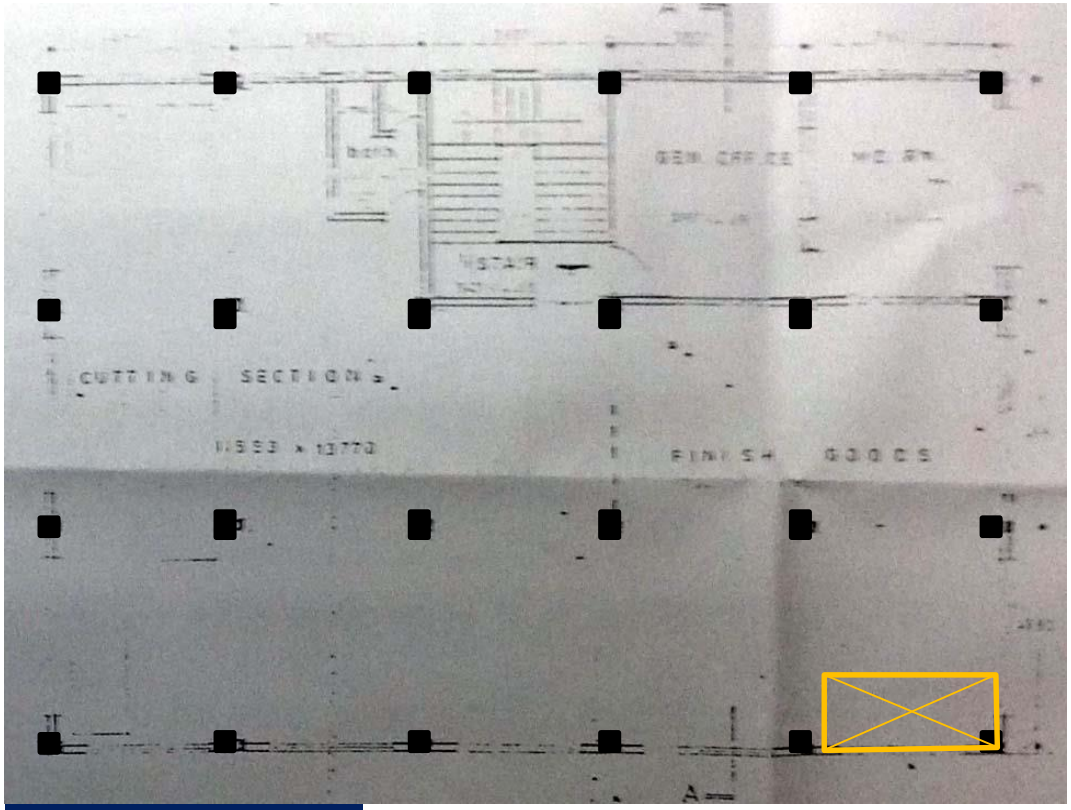
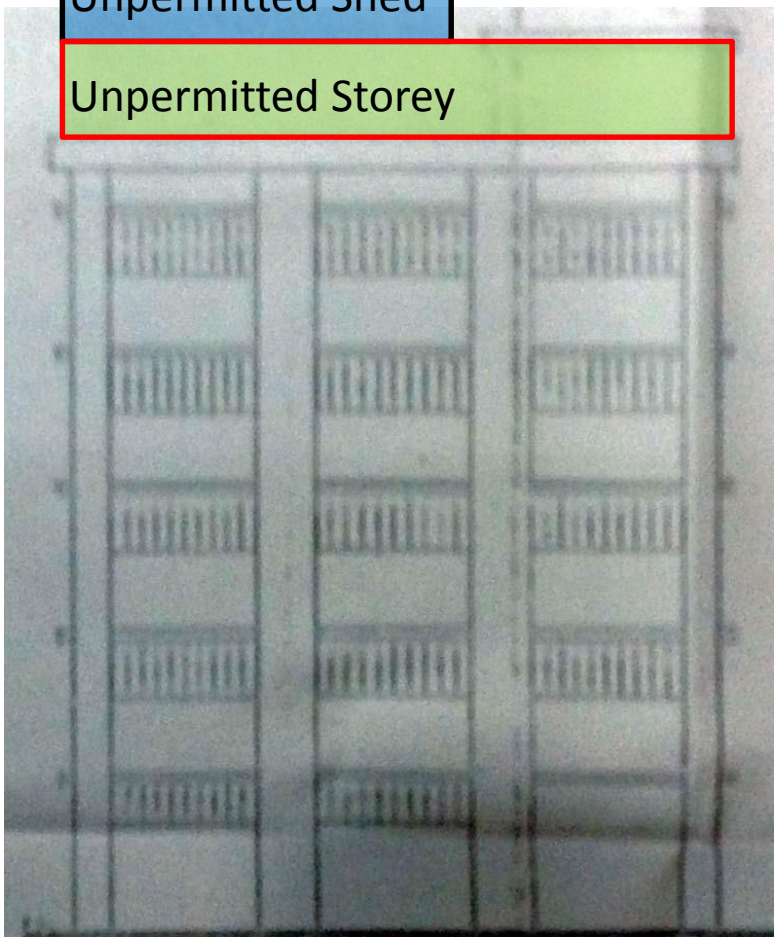
Missing structural drawings and discrepancies with the as-constructed building



Typical floor level



Permit structural drawings were provided. These do not show details of roof flat slab construction. Building Engineer to update drawings with as-constructed survey.

Permit drawing shows 5 storeys, but 6 storeys plus sheds at roof level are constructed.

Missing structural drawings and discrepancies

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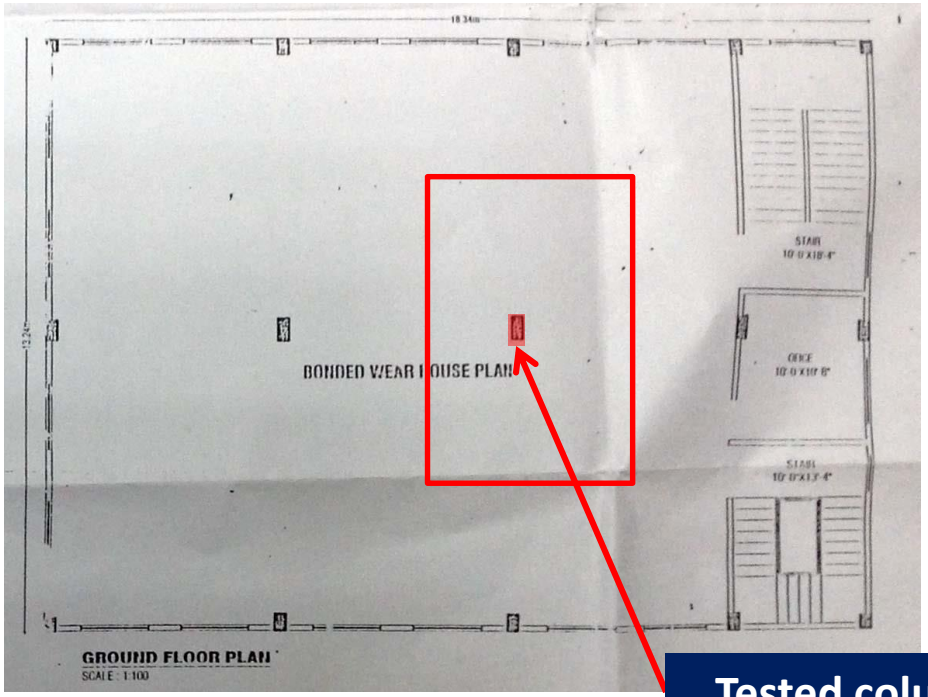
Observations - Building 1

Columns appear to be stressed in excess of normal design limits



Tested column

Typical column layout – Building 1

Tested Ground Floor Column – Stone Chips

Outline calculations indicate that columns are stressed in excess of normal design limits.

Building Engineer to perform detailed calculations and concrete tests to prove adequacy of column sizes, and (if required):

- **Reduce loads by vacating floors**
- **Reinforce columns**

Column Strength

Management of floor loads and water tank loads at roof level

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Storage loads in roof shed

Loads on 2nd floor

2 x 2,000 litre plastic water tanks at roof level

Building Engineer to prepare controlled loading plans, based on floor slab (including punching shear) and column capacity, for all floors which will designate allowable storage density and where storage may be placed.

Management of Floor & Water Tank Loads

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Structural adequacy of steel roof structures

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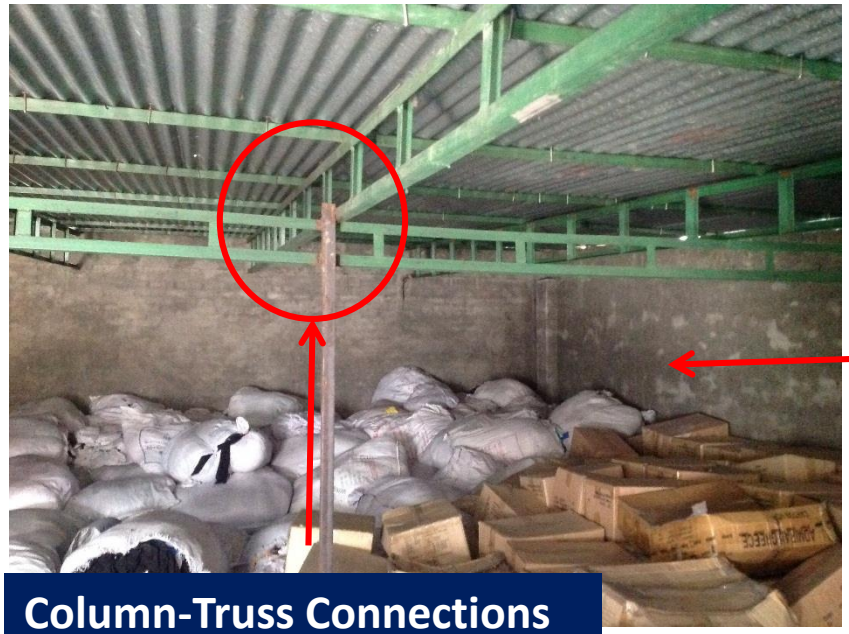
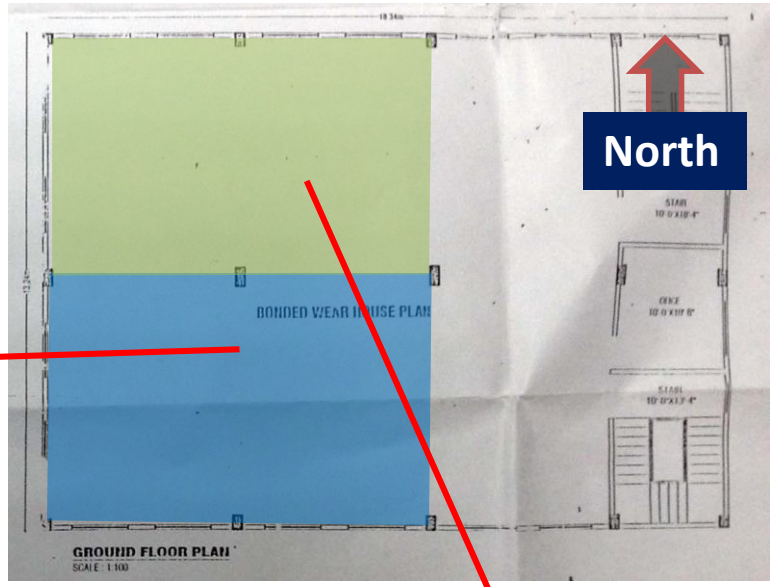


Column-Truss Connections to be reviewed



Building Engineer to check adequacy of the steel roof structure and connections for code specified live load and wind loads

Anchorage of Roof Trusses to be reviewed

Steel Roof Structures

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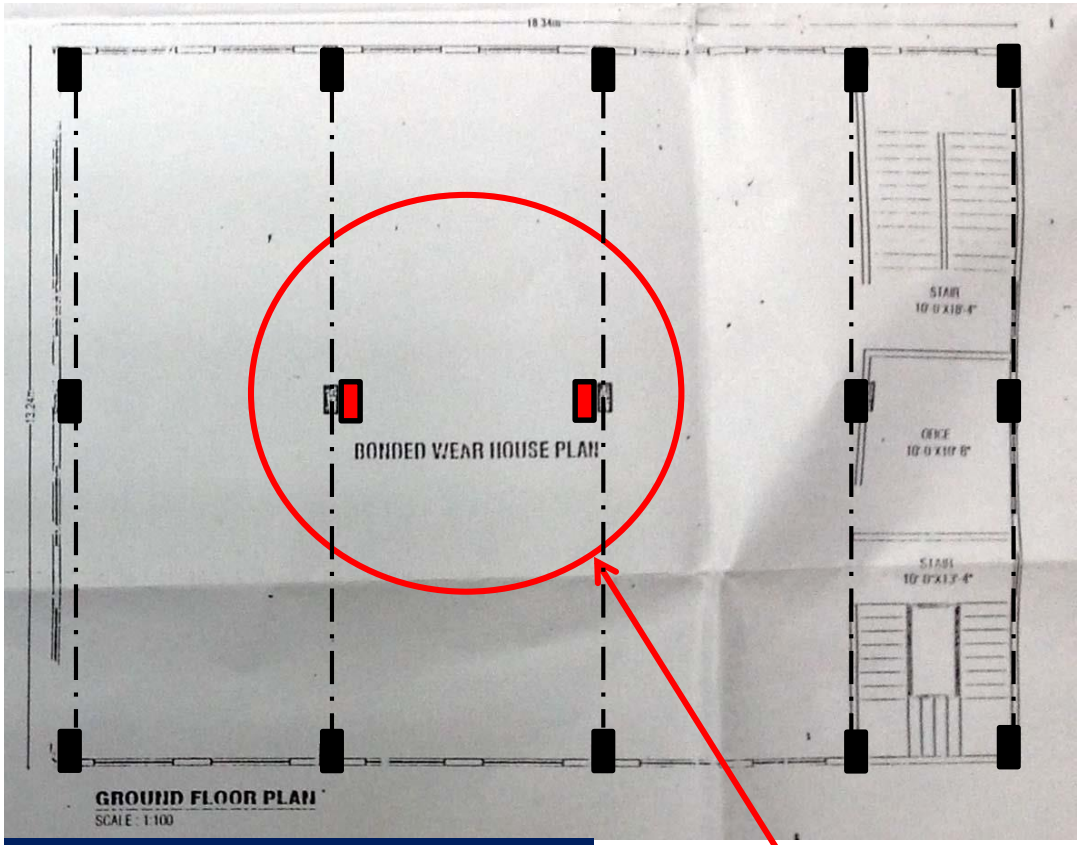
Discrepancies between drawings provided and the as-constructed building



Typical floor level – Building 1

Column do not line up contrary to layout shown on the survey drawings

Structural drawings show beam & slab construction. The as-constructed structure is flat slab on all floors except 1st floor.

Building Engineer to update drawings to match as-constructed structure

Central columns are not in line with the perimeter columns

Missing structural drawings and discrepancies

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Priority Actions

Problems Observed

1. Building 2 columns appear to be stressed to a high level and require immediate review – including preparation of a Detail Engineering Assessment
2. Building 1 columns appear to be stressed in excess of normal design limits
3. Buildings 1 and 2 - Structural adequacy of steel roof structures
4. Buildings 1 and 2 - Management of floor loads and water tank loads at roof level
5. Building 2 - Cracking of beam on the 4th floor soffit, cracking of roof slab soffit and hanging brickwork on the 2nd floor soffit
6. Building 2 - Structural adequacy of the roof top water tank support structure
7. Buildings 1 and 2 - Missing structural drawings and discrepancies with the as-constructed building

Item No.	Observation	Recommended Action Plan	Recommended Timeline
1	Building 2 columns appear to be stressed to a high level and require immediate review	Factory Engineer to review design, loads and column stresses in all columns in Building 2.	**Immediate - Now**
2	Building 2 columns appear to be stressed to a high level and require immediate review	Verify insitu concrete strength either by 100mm diameter cores or existing cylinder strength data for cores from min. 4 columns. Verify grade of steel reinforcement used.	**Immediate - Now**
3	Building 2 columns appear to be stressed to a high level and require immediate review	A Detail Engineering Assessment of Building 2 to be commenced, see attached Scope.	**Immediate - Now**
4	Building 2 columns appear to be stressed to a high level and require immediate review	Detail Engineering Assessment for Building 2 to be completed.	**6-weeks**
5	Building 2 columns appear to be stressed to a high level and require immediate review	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	Building 2 columns appear to be stressed to a high level and require immediate review	Continue to implement load plan	**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. T his 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
7	Building 1 - columns appear to be stressed in excess of normal design limits	Factory Engineer to review design, loads and column stresses in area identified above.	**6-weeks**
8	Building 1 - columns appear to be stressed in excess of normal design limits	Verify insitu concrete strengths (using min. 4 no. 100mm dia. Cores) and existing reinforcement for all columns.	**6-weeks**
9	Building 1 - columns appear to be stressed in excess of normal design limits	Produce and actively manage a loading plan for all floor plates within Building 1 giving consideration to floor capacity and column capacity.	**6-weeks**
10	Building 1 - columns appear to be stressed in excess of normal design limits	Continue to implement load management plan	**6-months**
11	Buildings 1 and 2 - Structural adequacy of steel roof structures	The steel roofs in Buildings 1 and 2 – including connections – should be designed by the Building Engineer and, if required, upgraded to support code vertical and wind loads.	**6-months**
12	Buildings 1 and 2 - Management of floor loads & water tank loads at roof level	Produce and actively manage a loading plan for all floor plates and the roof within Buildings 1 and 2, giving consideration to floor capacity and column capacity.	**6-weeks**
13	Buildings 1 and 2 - Management of floor loads & water tank loads at roof level	Continue to implement load plan	**6-months**

Item No.	Observation	Recommended Action Plan	Recommended Timeline
14	Building 2 - cracking of beam on the 4th floor soffit, cracking of roof slab soffit and apparent hanging brickwork on the 2nd floor soffit.	Sections of plaster finish to beam and slab to be removed to investigate if cracks penetrate the building structure. If cracks penetrate the building structure, Building Engineer to carry out design check and remedial works.	**6-weeks**
15	Building 2 - cracking of beam on the 4th floor soffit, cracking of roof slab soffit and apparent hanging brickwork on the 2nd floor soffit.	Building Engineer to review apparent hanging brickwork on the 2nd floor soffit and remove if this is of brick construction.	**6-weeks**
16	Building 2 - cracking of beam on the 4th floor soffit, cracking of roof slab soffit and apparent hanging brickwork on the 2nd floor soffit.	Continue to monitor for cracking on an on-going basis	**6-months**

Item No.	Observation	Recommended Action Plan	Recommended Timeline
17	Building 2 - Structural adequacy of the roof top water tank support structure	Building Engineer to carry out as-constructed survey to clarify which structural elements support the concrete water tank at roof level, and prepare calculations to demonstrate the adequacy of the structural support elements.	**6-weeks**
18	Buildings 1 and 2 - Missing structural drawings and discrepancies between drawings provided and the as-constructed building.	Commence check of survey of as-constructed building	**6-weeks**
19	Buildings 1 and 2 - Missing structural drawings and discrepancies between drawings provided and the as-constructed building.	Building Engineer to update survey of as-constructed building.	**6-months**
20	Buildings 1 and 2 - Missing structural drawings and discrepancies between drawings provided and the as-constructed building.	Updated drawings to be prepared showing the correct as-constructed layout.	**6-months**
21	Buildings 1 and 2 - Missing structural drawings and discrepancies between drawings provided and the as-constructed building.	Prepare controlled loading plans for all floors designating allowable storage density and where storage may be placed	**6-months**