

# Ahsan Composite Ltd.

Ward-08, Pollibidut Road, Chandra, Kaliakoir, Gazipur  
(24.04278N 90.25977E)

27 April 2014



# Observations

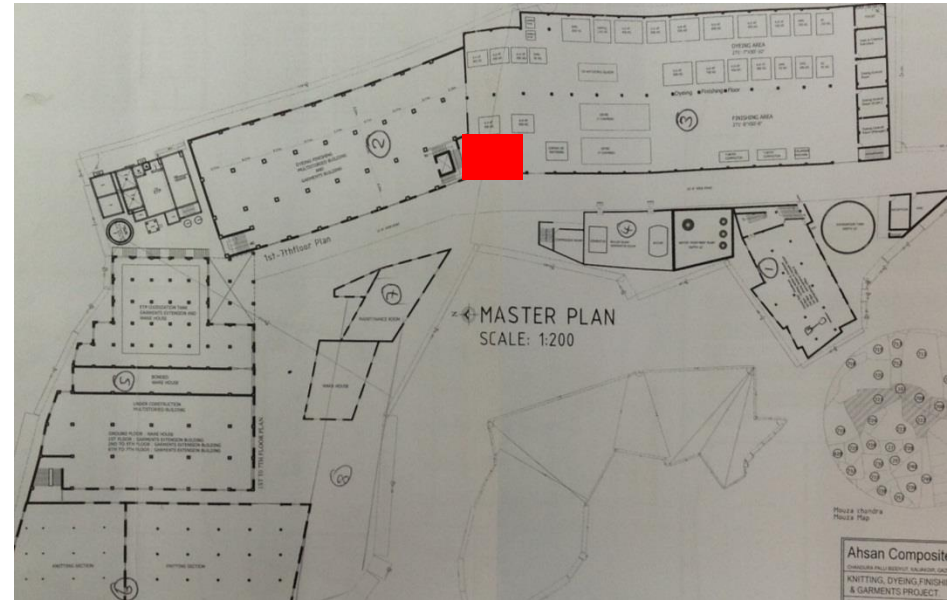
# Buildings 1 and 2 - Heavy storage loads on slabs



# Building 3 - Columns removed, leaving beams cantilevering



- Columns under ends of beams removed to accommodate ground floor plant.
- The beams are therefore now cantilevering.
- Although beams are currently not live loaded, there is a blockwork wall at the tip of the cantilever and the cantilever is sagging by about 40mm.



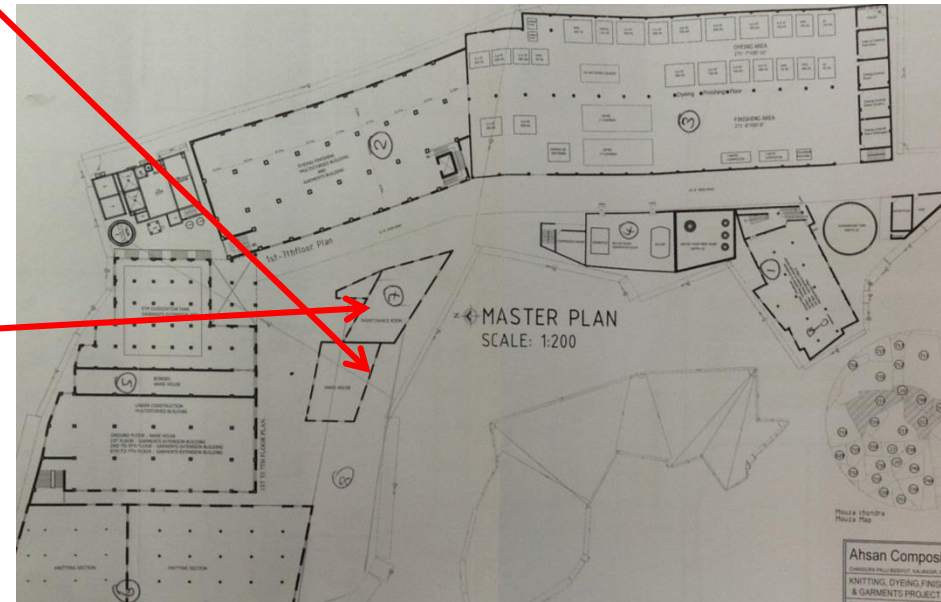
6 Columns removed leaving beams cantilevering

# **Building 7 - Column cut at mid-height and propped with bricks**



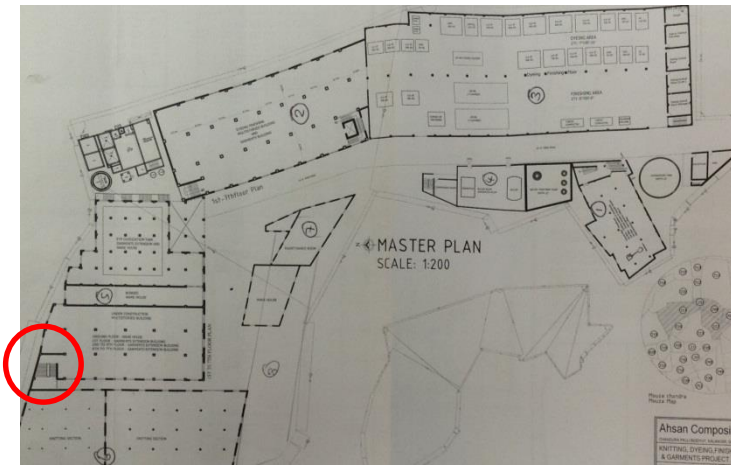
## Holes broken through walls.

- In left hand image the broken column on the right supports the roof truss; the adjacent length of brick wall is propped only by a single stack of bricks.
- Although building will shortly be demolished, in the short term it is still accessed and used for storage.



Column cut at mid-height and propped with bricks

# Building 5 - Missing beams around stair



**At the level above, the stair opening is framed by beams.**

**However, at 1<sup>st</sup> floor there are no beams, meaning that the 105thk slab must span approx. 7m supporting itself, the stair which hangs from it and the wall which is built off it.**

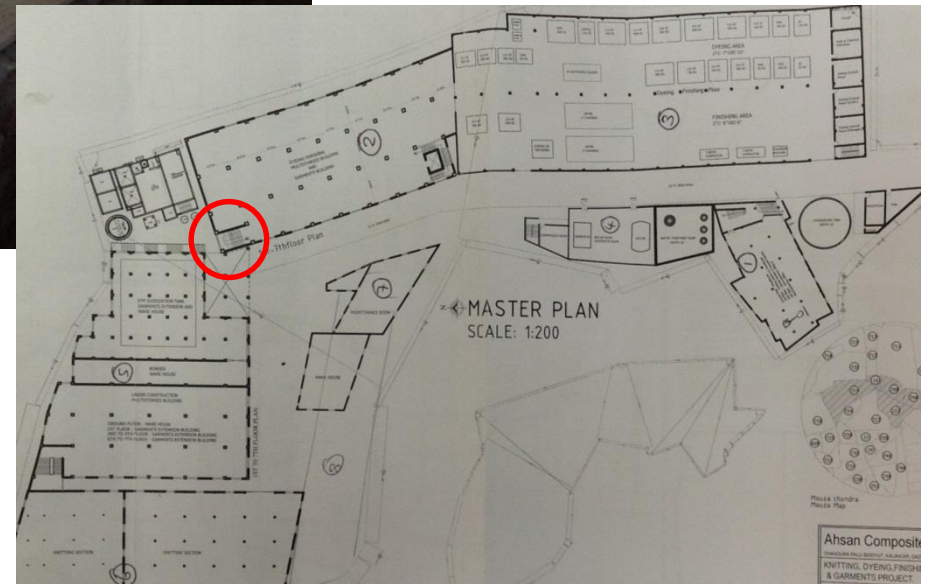
**Missing beams around stair**

# Building 2 - Loose roof to lift shaft



**Stack of bricks sitting on corrugated sheeting which loosely sits atop unused lift shaft.**

**No balustrade to lift shaft at roof level.**



**Loose roof to lift shaft**

# Building 4 - Extension to cantilever slab

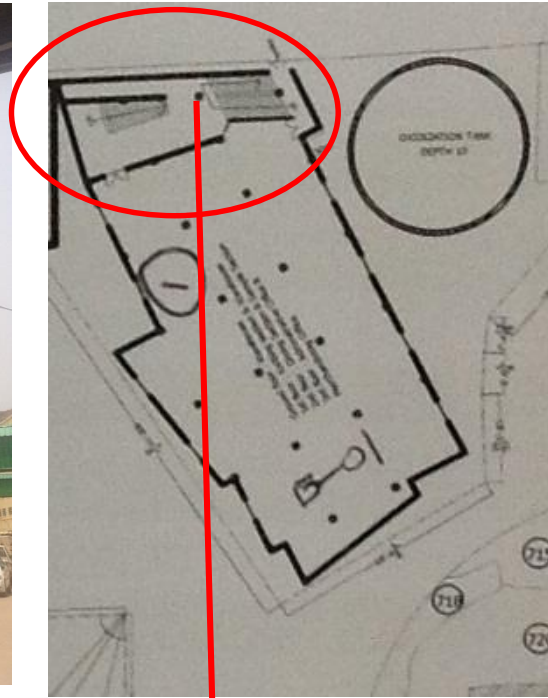


Original cantilever slabs at 1<sup>st</sup> and 2<sup>nd</sup> floors have been extended.

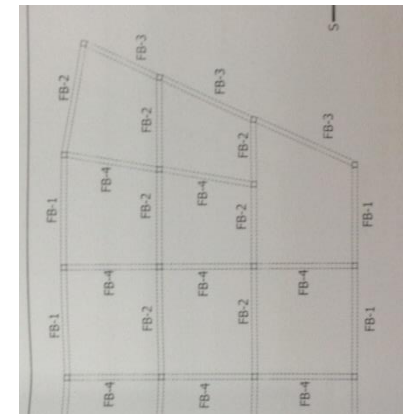
It is difficult to see how the new reinforcement can have been adequately anchored.



**Buildings not as drawings or permits: including additional structures, missing columns and cantilevers without backspans**

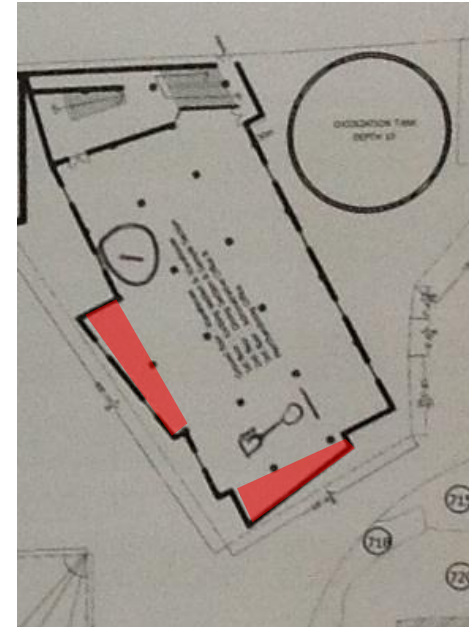
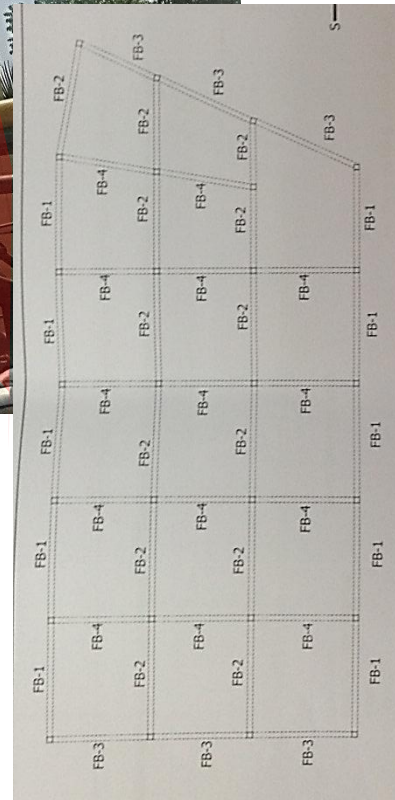


- Along the front elevation, the as-built layout and the architectural drawing (left) are different from the simple structural layout (below).
- Beams and columns have a different layout, and the edge cantilever is missing a backspan (bottom left image) due to the adjacent staircase.





The two red shaded areas on the architectural layout (below) are not reflected on the structural drawing (below left). They appear to be variously supported by RC beams and loadbearing half brick walls.

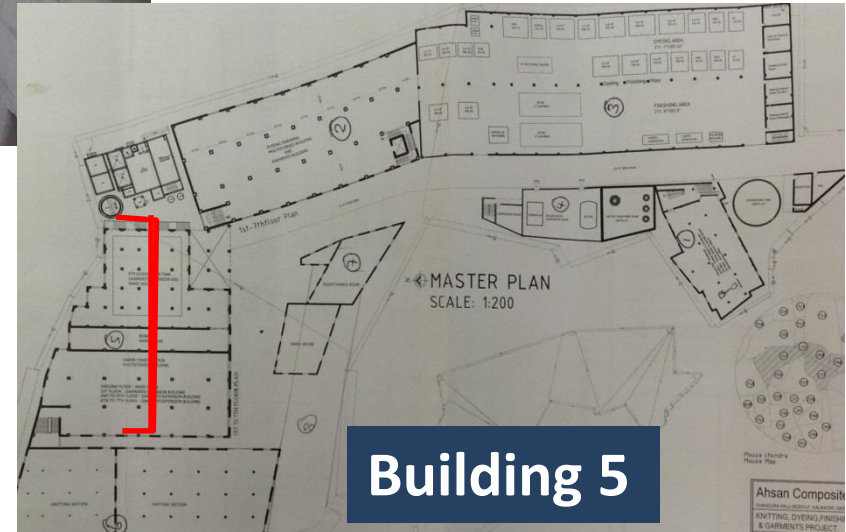
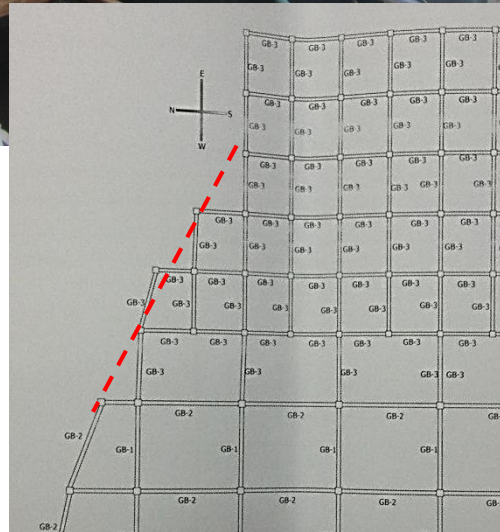
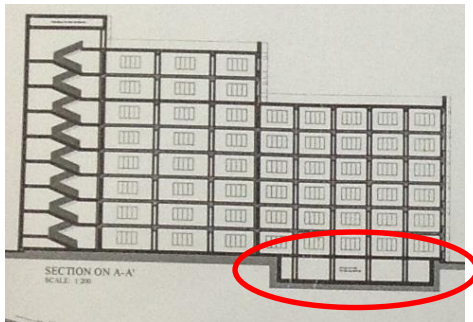


**Building 1 - Floor slabs larger than shown on structural drawing**



Cross-section shows a basement reservoir, but actual reservoir is at ground floor.

Also, the stepped slab edge as drawn at all floors has been changed to a diagonal (see dashed line on plan, bottom centre).



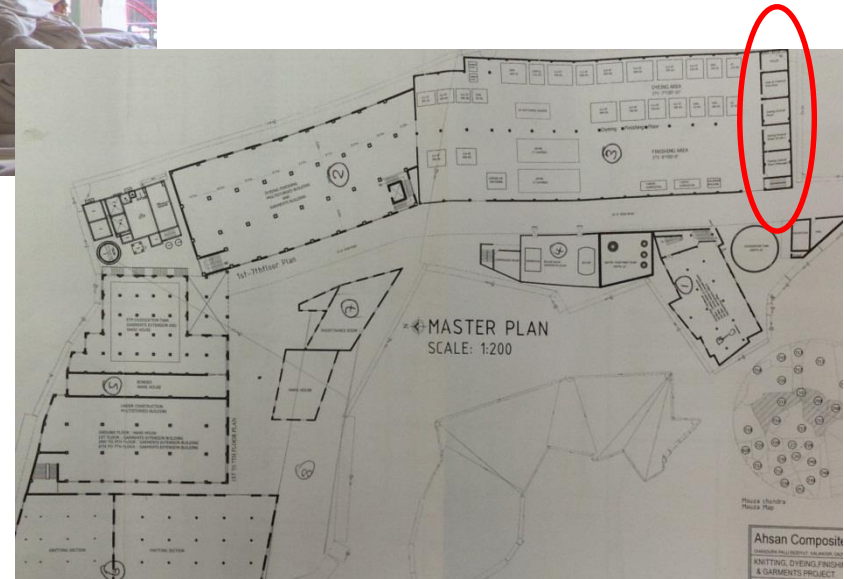
**Building 5**

18 **Basement doesn't appear to exist**



No structural drawings  
for 2 storey RC structure

**Building 3 - No structural drawings  
for 2-storey RC structure**

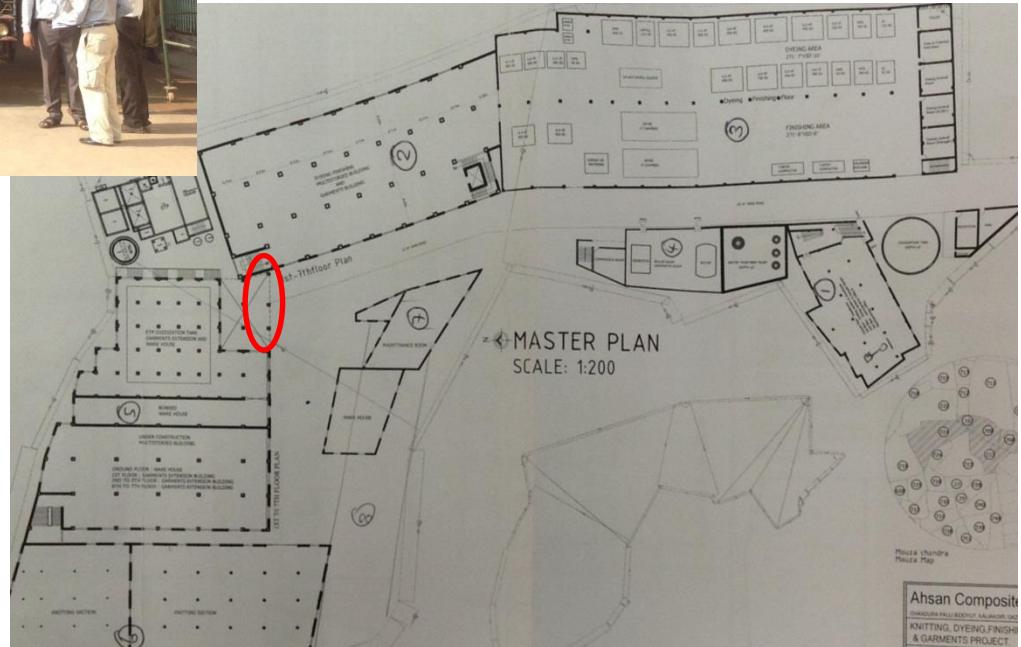


# Building 5 - Columns at risk of vehicle impact



Tall loading bay columns (which carry the building above) have no protection against vehicle impact.

**Building 5 - Columns at risk of vehicle impact**

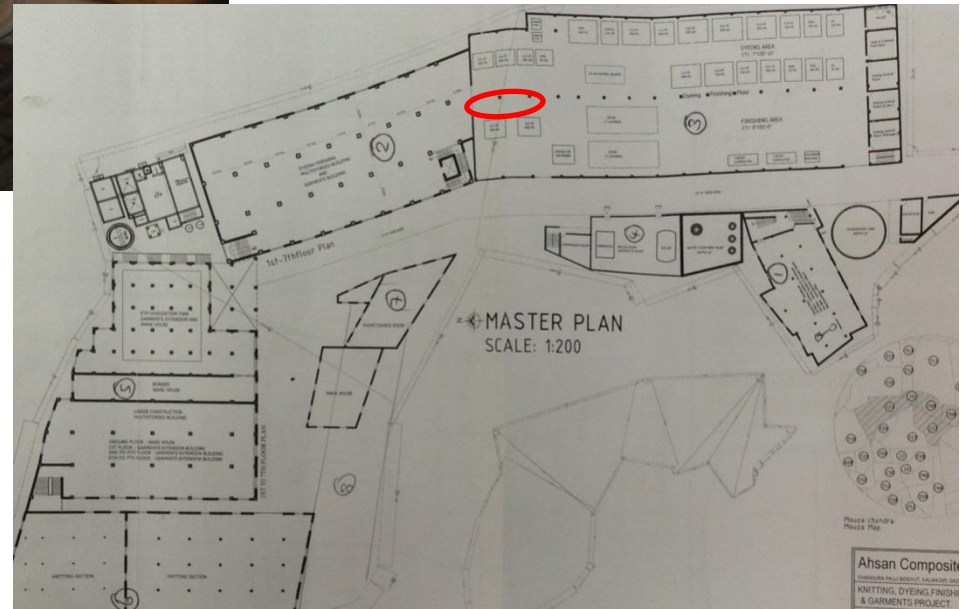


# Building 3 - Columns pinned at mid-height



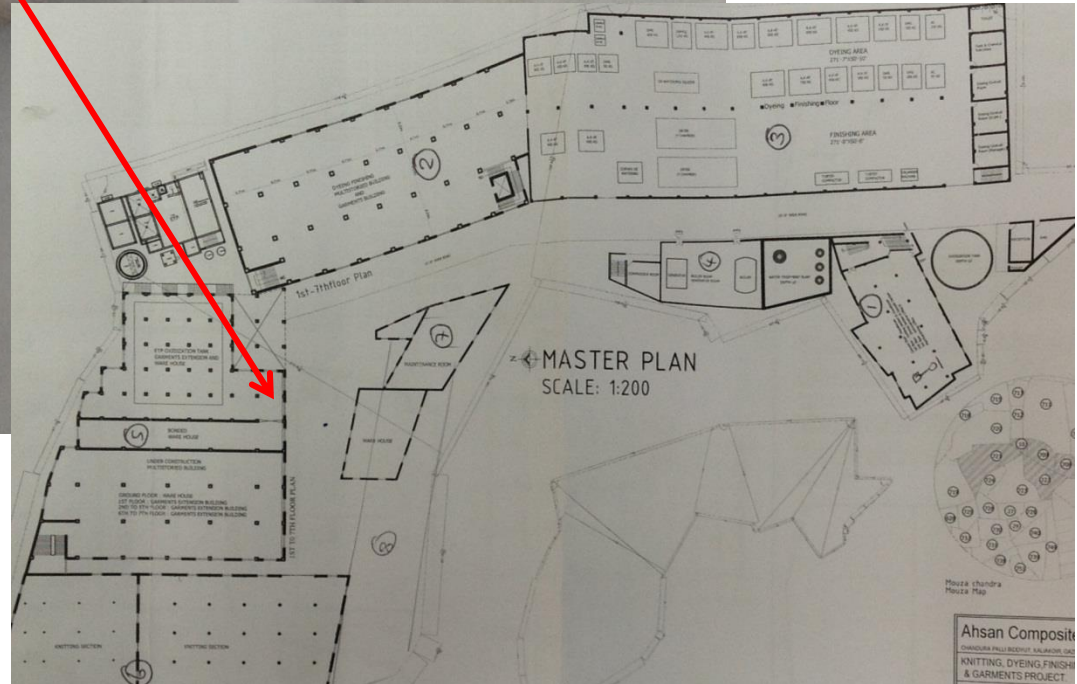
- Two steel columns supporting roof are built off 2.5m high RC columns.
- Steel baseplate has inadequate fixing into the RC column.
- It is also unlikely that the RC column was designed as a cantilever, in which case the column is effectively pinned at mid-height.

## Building 3 - Columns pinned at mid-height



# Building 5 - Poorly-compacted beam

**Coarse aggregate is exposed along full length of the beam, suggesting lack of vibration.**

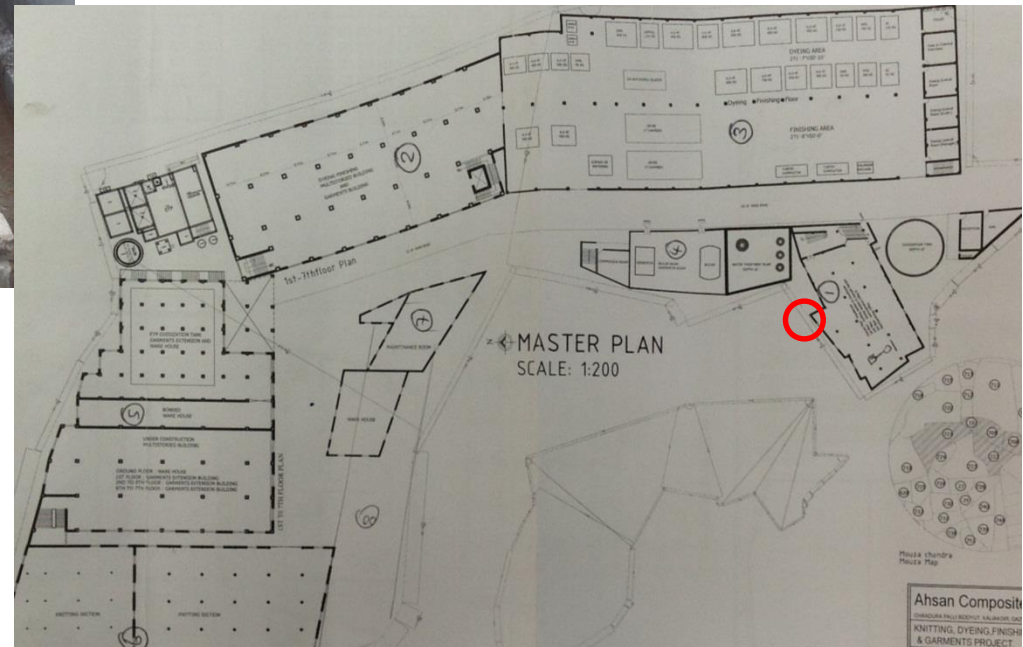


**Building 5 –  
Very poorly compacted beam**

# Building 1 - RC column damaged by fixings



Gate hinges had been fixed to small RC column supporting corner of building. Concrete has been poorly made good at hinge locations and is spalling, suggesting corrosion of the reinforcement.

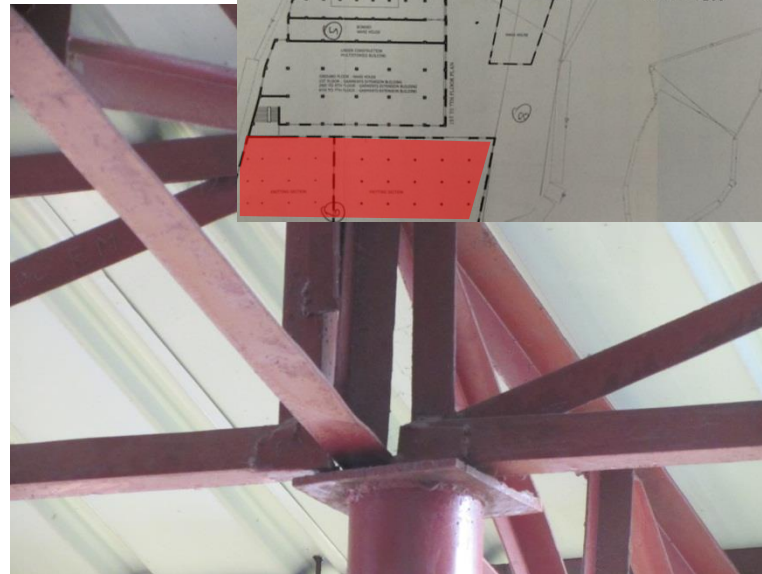
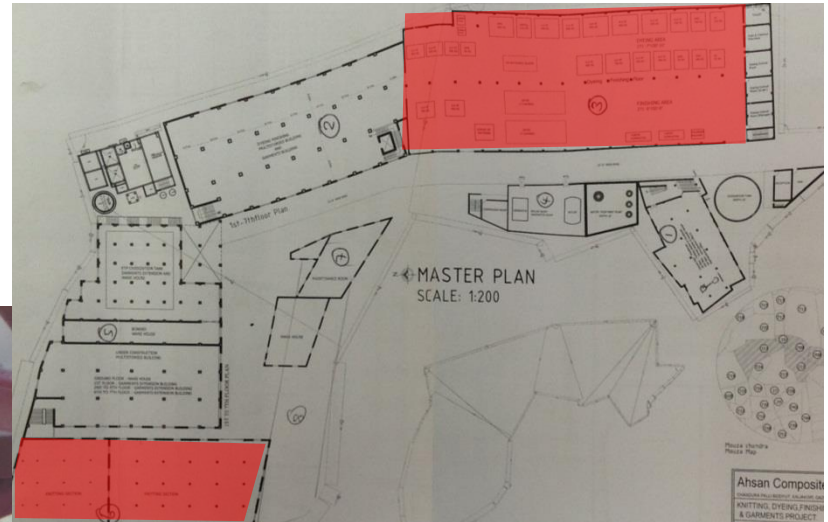


## Building 1 – RC column damaged by fixings

**Buildings 3 and 6 –  
Non-engineered steel sheds including weak roof  
connections, no roof bracing, potentially missing  
lintels and unrestrained brick facades**



Non-engineered steel sheds including weak roof connections, no roof bracing, potentially missing lintels and unrestrained brick facades.

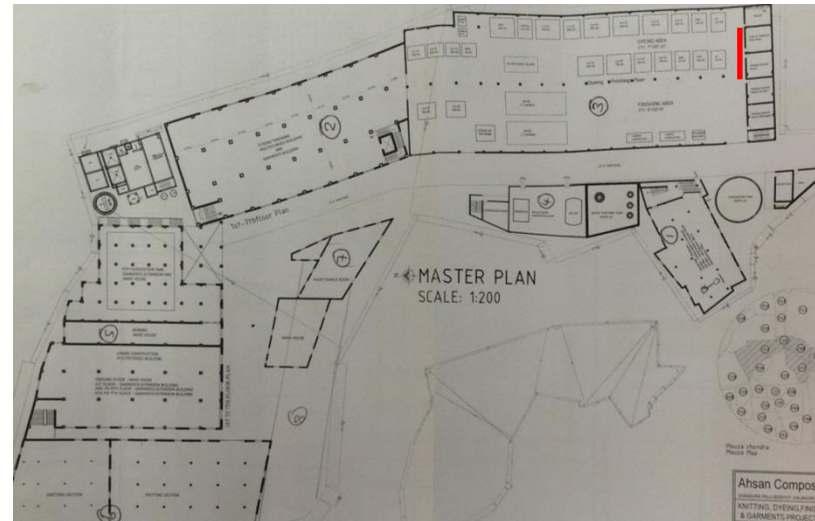


# Non-engineered steel sheds

# Building 3 - Leaning partition



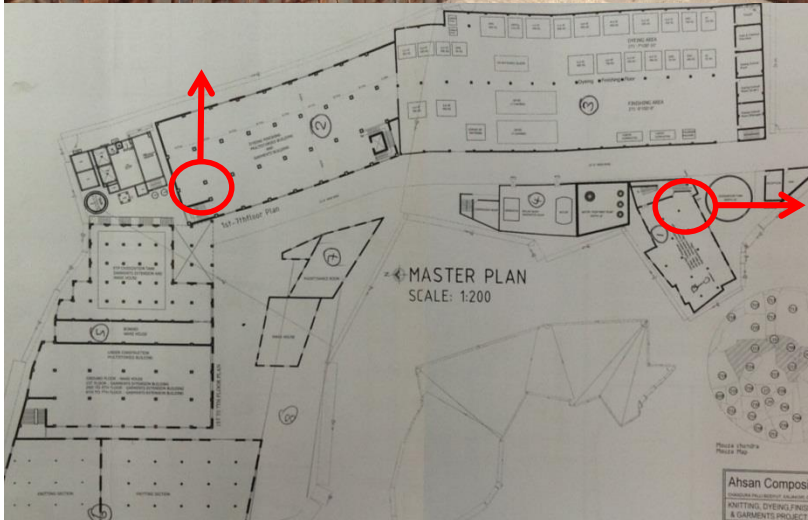
Partition (bottom left) is visibly leaning outwards. Stability will depend on degree of bonding to the buttresses built against the rear face.



# Buildings 1 and 2 - Rubble and bricks on roof



Heavy brick loading on roofs (left, where brick structure has been demolished, and right, where bricks are being stored during construction of roof parapets).

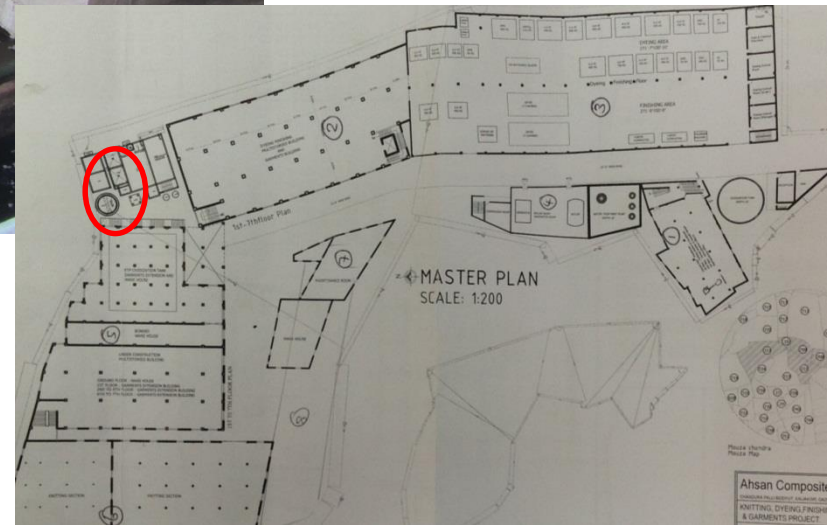


# ETP - Very large and heavily-loaded RC water tanks



Vertical and lateral loads on RC tanks will be significant.

Large RC water tanks

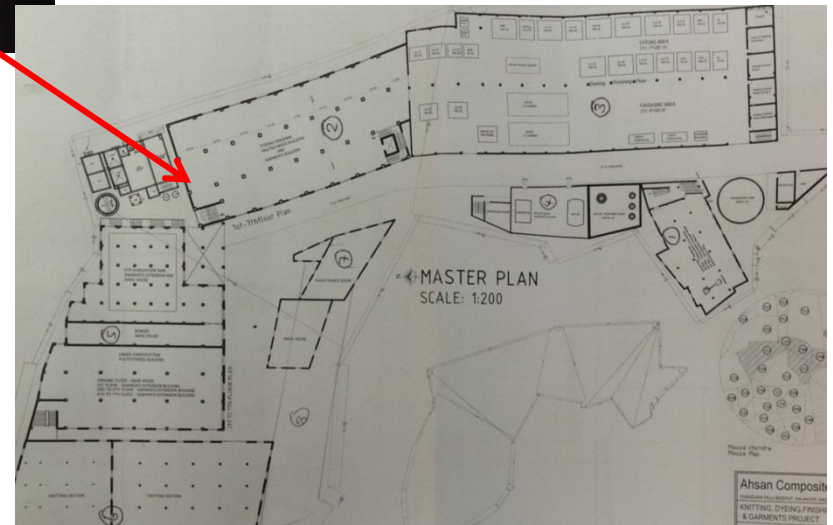


# Building 2 - Structurally unsafe access ramp



Access to mezzanine storage area is via a structurally unsafe timber ramp, loosely propped by bamboo.

Structurally unsafe access ramp

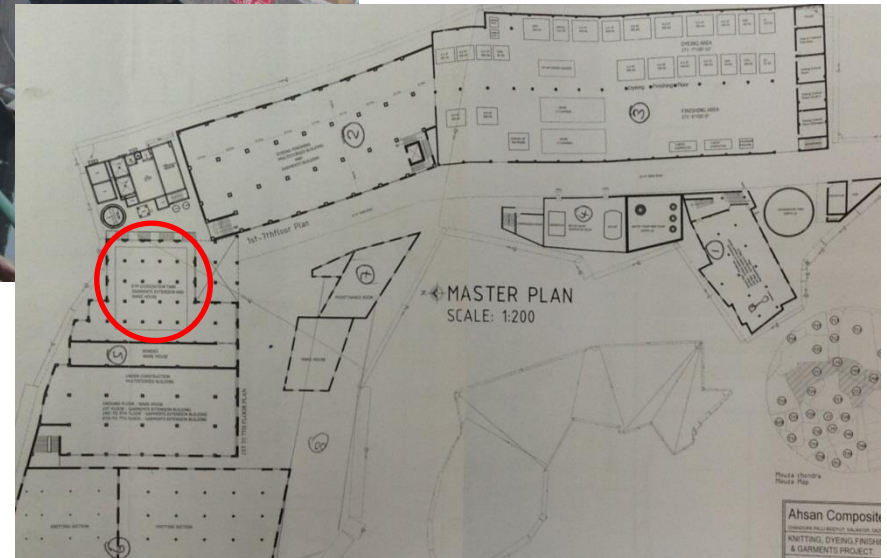


# Building 5 - Columns standing in water



Ground floor columns are standing in reservoir. Depending on cover and cement content this could lead to corrosion and affect strength of columns.

**Columns standing in water**

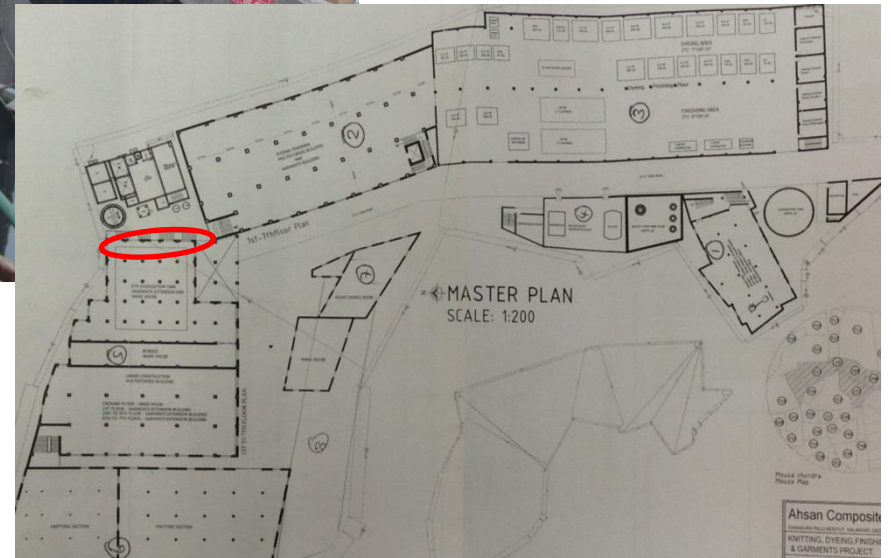


# Building 5 - External long-span stair

## Longspan stair



**External long-span stair**

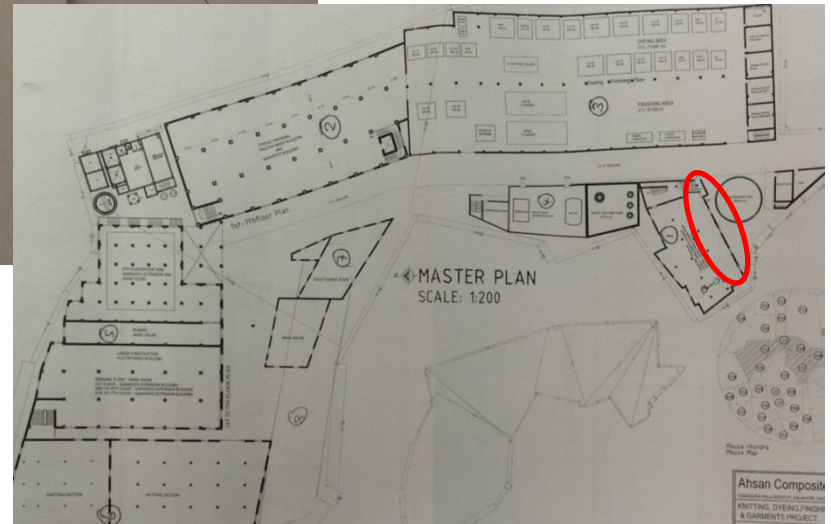


# Building 1 - Minor settlement cracking to facades



Red lines showing typical hairline cracking which is evident to all windows.

Minor settlement cracking to facades



# Priority Actions

# Problems Observed

1. High column and beam/slab stresses due to storage loading – Building 1
2. Columns removed, leaving beams cantilevering – Building 3
3. Column cut at mid height and propped with bricks – Building 7
4. Missing beams around stair – Building 5
5. Loose roof to lift shaft and missing balustrade – Building 2
6. External long-span stair – Building 5
7. Extension to cantilever slab – Building 4
8. Columns at risk of vehicle impact – Building 5
9. Columns pinned at mid-height – Building 3
10. Poorly-compacted beam – Building 5
11. Rubble and bricks on roofs – Buildings 1 & 2
12. Structurally unsafe access ramp – Building 2
13. Non-engineered steel sheds including weak roof connections, no roof bracing and potentially missing lintels and unrestrained brick facades – Buildings 3 & 6
14. RC column damaged by fixings – Building 1
15. Office building framing not consistent with drawings; also leaning adjacent partition – Building 3
16. Very large and heavily loaded RC water tanks - ETP
17. Columns standing in water – Building 5
18. Minor settlement cracking to facades – Building 1

Item No.	Observation	Recommended Action Plan	Recommended Timeline
1	High column and beam/slab stresses due to storage loading in Building 1, and discrepancies between structural and as-built layouts (see slide 33)	Reduce storage load to a maximum of 4kPa in Building 1 immediately. Live load on all other suspended floors to be limited to 2kPa.	<b>Immediate - Now</b>
2	High column and beam/slab stresses due to storage loading in Building 1, and discrepancies between structural and as-built layouts (see slide 33)	Factory Engineer to review design, loads and columns stresses in Building 1.	<b>Immediate - Now</b>
3	High column and beam/slab stresses due to storage loading in Building 1, and discrepancies between structural and as-built layouts (see slide 33)	Verify insitu concrete stresses either by min 4 no. 100mm diameter cores or existing cylinder strength data for the ground floor columns.	<b>Immediate - Now</b>
4	High column and beam/slab stresses due to storage loading in Building 1, and discrepancies between structural and as-built layouts (see slide 33)	A Detail Engineering Assessment of Building 1 to be undertaken (see following slide).	<b>Immediate - Now</b>
5	High column and beam/slab stresses due to storage loading in Building 1, and discrepancies between structural and as-built layouts (see slide 33)	Produce and actively manage a loading plan for all floor plates within the factory, giving consideration to floor capacity and column capacity.	<b>6-weeks</b>

# Detail Engineering Assessment

This Schedule develops a minimum level of information, analysis and testing expected as part of a Detailed 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 the 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 elevation 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
6	High column and beam/slab stresses due to storage loading in Building 1, and discrepancies between structural and as-built layouts (see slide 33)	Detail Engineering Assessment to be completed.	6-weeks
7	High column and beam/slab stresses due to storage loading in Building 1, and discrepancies between structural and as-built layouts (see slide 33)	Continue to implement load plan.	6-months
8	Building 3 - Columns removed, leaving beams cantilevering	Cantilever beams to be either propped or demolished.	Immediate - Now
9	Building 3 - Columns removed, leaving beams cantilevering	Because this was an immediate safety issue, it was raised with the factory owner at the close-out meeting, who offered to demolish the beams the next day. The photograph on the following slide was received the next day showing works already in progress.	Immediate - Now
10	Building 3 - Columns removed, leaving beams cantilevering	Factory Engineer to undertake engineering assessment of the remaining RC mezzanine structure, paying particular attention to lateral stability.	6-weeks
11	Building 3 - Columns removed, leaving beams cantilevering	Factory Engineer to prepare loading plans.	6-weeks



## Photograph and email from factory owner received day after Arup survey

*Dear Mr. Lawrence/ Read,*

*It was nice to have you in our factory Ahsan Composite Ltd on the date of 27<sup>th</sup> April. We are grateful to you that you come to ensure the structural safety for factory. We are really honored for this. During your visit you highlight three weak points for the factory. We ensure that among those three points we already repair the temporary tin shed wall (Please see the Attach file Pic 1). Secondly the stair slab support wall is under construction (Please see the Attach file Pic 2). Thirdly we already start to demolish the extension slab in main Dye House. Right now the wall on the extended portion has been removed (Please see the Attach file Pic 3).*

*Thanks for your support once again .*

*With Kind Regards,  
Md. Tanvir Ahsan  
Director.*

Item No.	Observation	Recommended Action Plan	Recommended Timeline
12	Building 7 - Column cut at mid-height and propped with bricks	Since building will shortly be demolished, we recommend temporarily bricking up the wall and then grouting the gaps in the columns.	<b>Immediate - Now</b>
13	Building 7 - Column cut at mid-height and propped with bricks	Works will need to be undertaken very carefully to avoid collapse during the works. Factory Engineer to be present at all times.	<b>Immediate - Now</b>
14	Building 7 - Column cut at mid-height and propped with bricks	Because this was an immediate safety issue it was raised with the factory owner at the close-out meeting, who agreed to repair the wall the next day. The photograph on the following slide was received the next day showing repairs completed.	<b>Immediate - Now</b>
15	Building 5 - Missing beams around stair and discrepancies between as-built and structural drawings	Build brick wall (A) off ground floor to support full width of half landing and (B) to support full length of edge of slab.	<b>Immediate - Now</b>
16	Building 5 - Missing beams around stair and discrepancies between as-built and structural drawings	Because this was an immediate safety issue it was raised with the factory owner at the close out meeting, who agreed to construct wall A the next day. The photograph on the following slide was received the next day showing construction of wall A already in progress.	<b>Immediate - Now</b>
17	Building 5 - Missing beams around stair and discrepancies between as-built and structural drawings	Engineering assessment of area to be undertaken by Factory Engineer. Assessment also to include location along North side of building where stepped slab edge has been changed to a diagonal (see previously noted observations).	<b>6-weeks</b>



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<b>Item No.</b>	<b>Observation</b>	<b>Recommended Action Plan</b>	<b>Recommended Timeline</b>
18	Building 2 - Loose roof to lift shaft & missing balustrade	Balustrade to be installed to avoid falling into lift shaft	<b>Immediate - Now</b>
19	Building 2 - Loose roof to lift shaft & missing balustrade	Loose bricks and corrugated sheeting over lift shaft to be removed.	<b>Immediate - Now</b>
20	Building 5 – Long-span external stair	Engineering assessment of external stair to be undertaken by Factory Engineer.	<b>6-weeks</b>
21	Building 5 – Long-span external stair	Implement actions arising from assessment.	<b>6-months</b>
22	Building 4 - Extension to cantilever slab	Engineering assessment of slab extension to be undertaken by Factory Engineer.	<b>6-weeks</b>
23	Building 4 - Extension to cantilever slab	Implement actions arising from assessment, including strengthening if required.	<b>6-months</b>
24	Building 5 - Columns at risk of vehicle impact	Install temporary warning notices around columns.	<b>Immediate - Now</b>
25	Building 5 - Columns at risk of vehicle impact	Install bollards, spaced away from the columns, to protect the columns from impact.	<b>6-weeks</b>



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26	Building 3 - Columns pinned at mid-height	Engineering assessment of columns to be undertaken by Factory Engineer.	6-weeks
27	Building 3 - Columns pinned at mid-height	Implement actions arising from assessment, including strengthening if required.	6-months
28	Building 5 - Poorly compacted beam	Provide structural repair under supervision of Factory Engineer.	6-weeks
29	Buildings 1 & 2 - Rubble and bricks on roofs	Bricks and rubble to be removed.	6-weeks
30	Building 2 - Structurally unsafe access ramp	Replace with new ramp, to be designed by Factory Engineer.	6-weeks
31	Buildings 3 & 6 - Non-engineered steel sheds including weak roof connections, no roof bracing and potentially missing lintels and unrestrained brick facades	Engineering assessment of steel sheds to be undertaken by Factory Engineer.	6-weeks
32	Buildings 3 & 6 - Non-engineered steel sheds including weak roof connections, no roof bracing and potentially missing lintels and unrestrained brick facades	Implement actions arising from assessment, including strengthening if required.	6-months

Item No.	Observation	Recommended Action Plan	Recommended Timeline
33	Building 1 - RC column damaged by fixings	Factory Engineer to inspect damage to columns.	6-weeks
34	Building 1 - RC column damaged by fixings	Repairs to column to be made under direction of Factory Engineer.	6-months
35	Building 3 - Office building framing not consistent with drawings; adjacent leaning partition	Engineering assessment to be undertaken by Factory Engineer.	6-months
36	Building 3 - Office building framing not consistent with drawings; adjacent leaning partition	Carry out actions arising from assessment.	6-months
37	Building 3 - Office building framing not consistent with drawings; adjacent leaning partition	Drawings to be amended to show as-built condition (after any remedial works).	6-months
38	ETP - Very large and heavily loaded RC water tanks	Engineering assessment of water tanks to be made by Factory Engineer.	6-months
39	ETP - Very large and heavily loaded RC water tanks	Implement actions arising.	6-months

Item No.	Observation	Recommended Action Plan	Recommended Timeline
40	Building 5 - Columns standing in water	Tests to be undertaken on liquid to assess if it is corrosive; if liquid is corrosive, detailed checks to be made on concrete for evidence of damage.	6-months
41	Building 5 - Columns standing in water	Detailed inspection to be made by Factory Engineer to check for evidence of spalling. Repeat annually.	6-months
42	Building 1 - Minor settlement cracking to facades	Factory Engineer to inspect annually to check for evidence of any ongoing movement.	6-months