SB Style Composite Ltd.
ZS Apparels
ZS Embroidery
Jabber Fashions Ltd.
Patriot Printing Industry
Patriot Packaging Industry

Delpara, Fatullah, Narayanganj
(23.67101N 90.48441E)
30th April 2014

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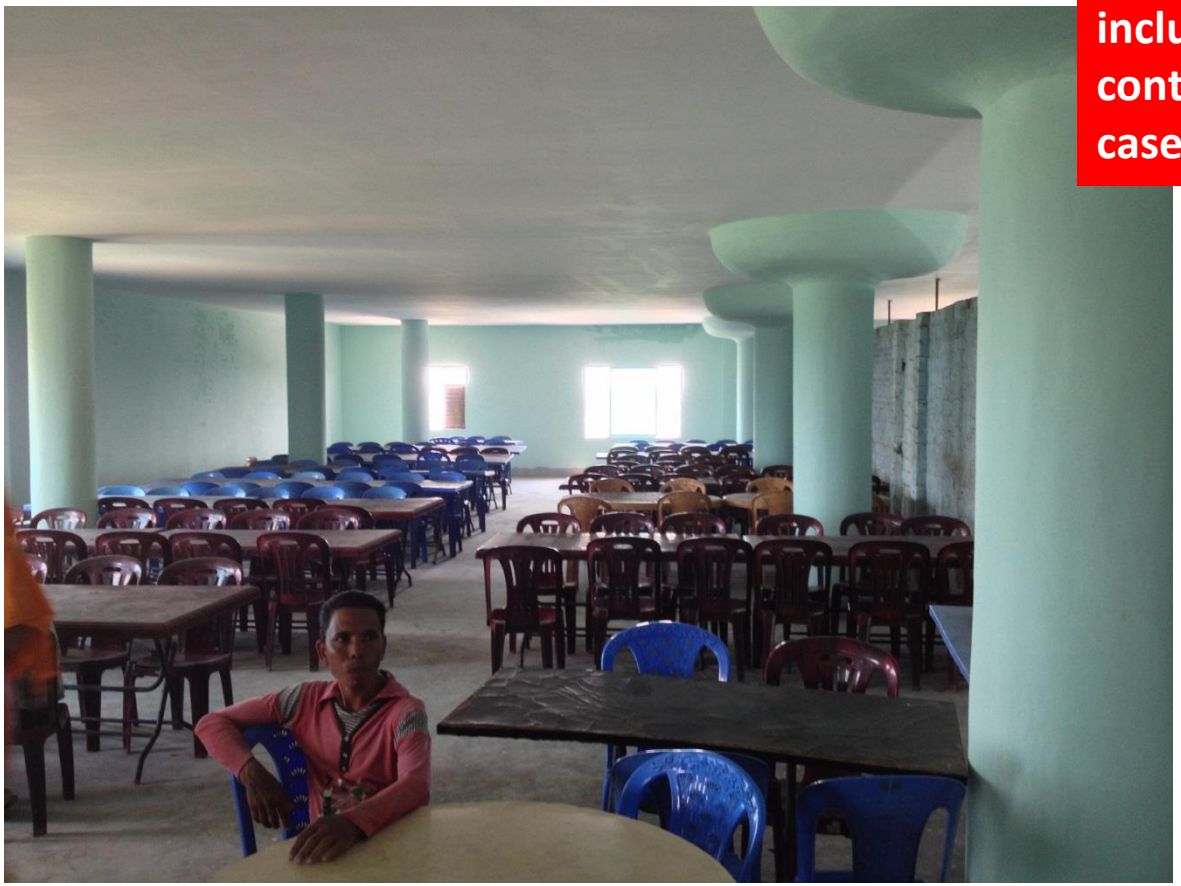
Observations

Building lateral stability System

Building has no obvious lateral stability as flat slabs between 170and 190mm are questionable in terms of adequate frame action. Perimeter Façade walls are half a brick thick (order of 130mm thick including render) and are not continuous to ground in many cases



Building has no obvious lateral stability

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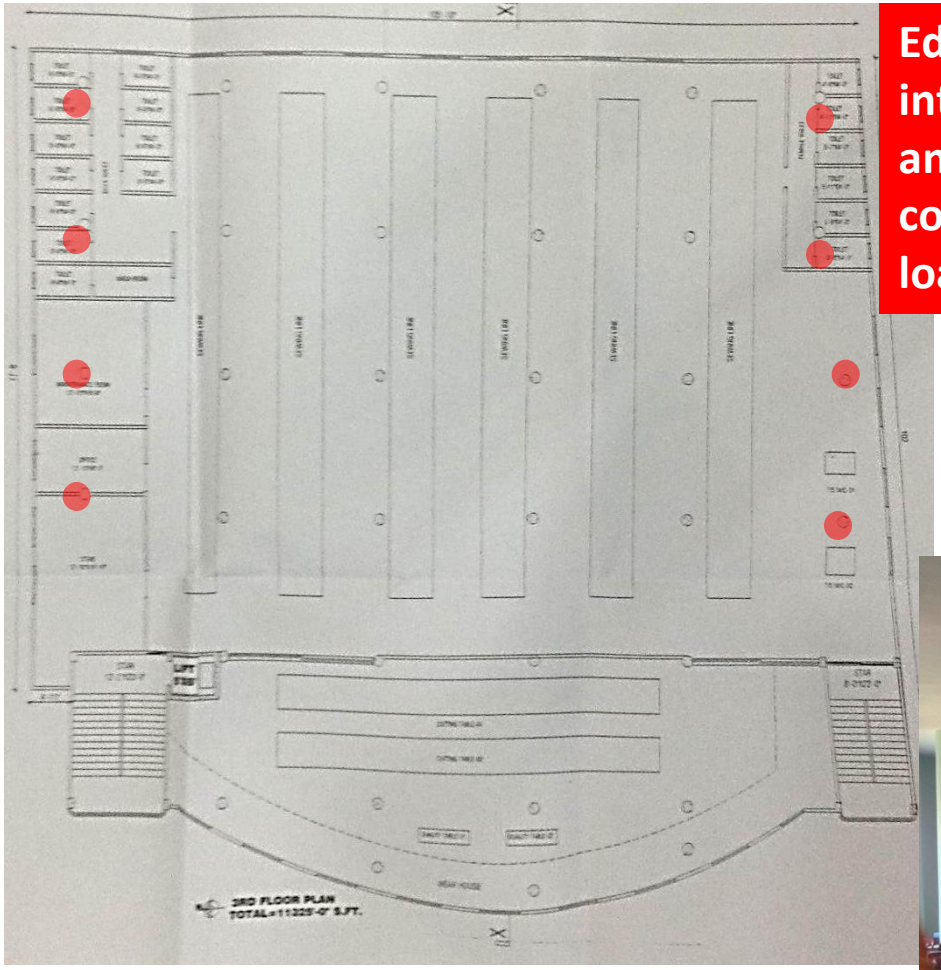
Edge columns small compared to internal columns



Edge columns (red) smaller than internal columns and pick up significant and similar loads to the internal columns due to cantilever and façade loading. They have no shear heads.

Small edge columns without shear heads

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Weak column concrete

No fines concrete observed to ground floor column (A) where accidentally damaged.Observed brick aggregate had open gaps between aggregate.

On new roof columns (B) lack of cement observed.

Weak column concrete

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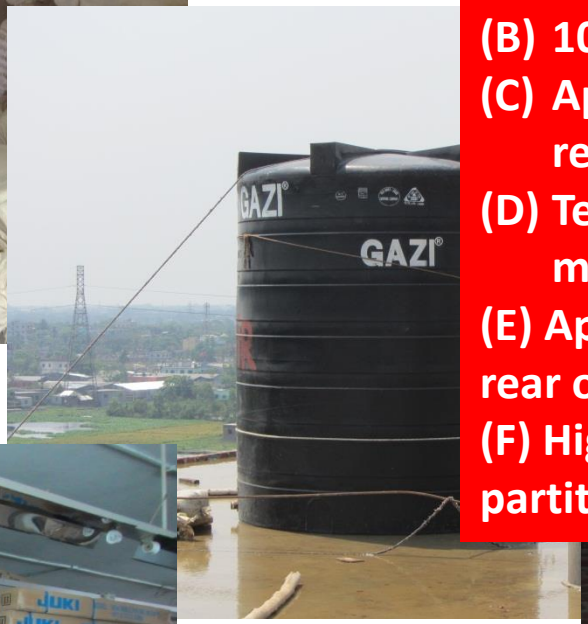
Areas of high loading

C



A

Highly loaded areas include:

(A) Temporary 10,000 litre tank in centre of roof bay

(B) 10,000 Litre water tank on 7th Floor

(C) Approx 7.5kPa loading from cotton reels on 1st floor slab

(D) Temporary storage of boxed sewing machines on 4th floor approx 6kPa

(E) Approx 8kPa loading on 2nd floor at rear of building

(F) High loading on edge columns from partitions and finishes in toilets.

D

B

E

Highly loaded areas

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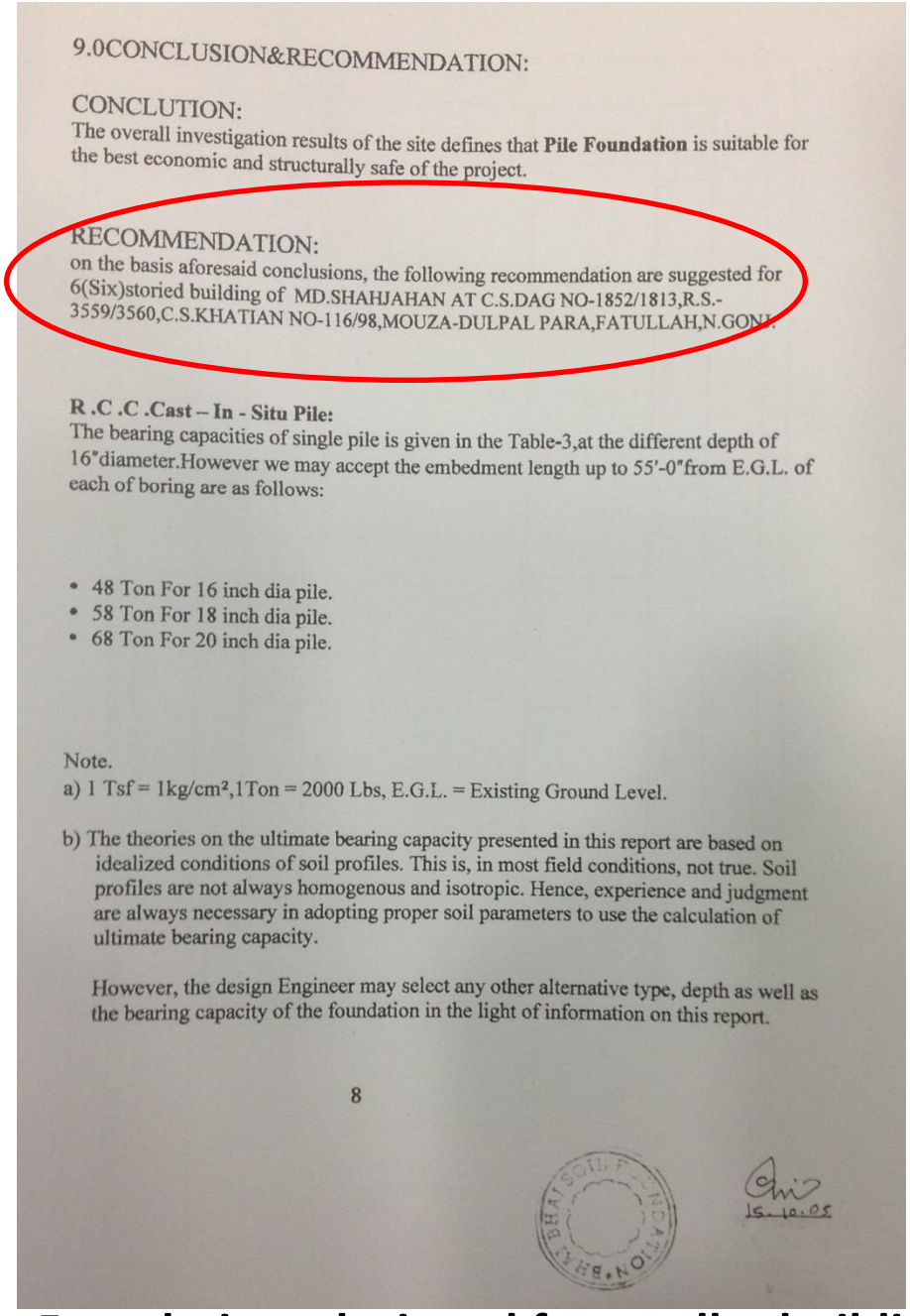
Differences between drawings and as-built structure



9.0CONCLUSION&RECOMMENDATION:

CONCLUTION:
The overall investigation results of the site defines that **Pile Foundation** is suitable for the best economic and structurally safe of the project.

RECOMMENDATION:
on the basis aforesaid conclusions, the following recommendation are suggested for 6(Six)storied building of MD.SHAHJAHAN AT C.S.DAG NO-1852/1813,R.S.-3559/3560,C.S.KHATIAN NO-116/98,MOUZA-DULPAL PARA,FATULLAH,N.GONJ.

R .C .C .Cast – In - Situ Pile:
The bearing capacities of single pile is given in the Table-3,at the different depth of 16"diameter.However we may accept the embedment length up to 55'-0"from E.G.L. of each of boring are as follows:

- 48 Ton For 16 inch dia pile.
- 58 Ton For 18 inch dia pile.
- 68 Ton For 20 inch dia pile.

Note.
a) 1 Tsf = 1kg/cm^2,1Ton = 2000 Lbs, E.G.L. = Existing Ground Level.

b) The theories on the ultimate bearing capacity presented in this report are based on idealized conditions of soil profiles. This is, in most field conditions, not true. Soil profiles are not always homogenous and isotropic. Hence, experience and judgment are always necessary in adopting proper soil parameters to use the calculation of ultimate bearing capacity.

However, the design Engineer may select any other alternative type, depth as well as the bearing capacity of the foundation in the light of information on this report.

8

Soils report states piles designed for a 6 storey building. Actual building is 10 storeys.

Foundations designed for smaller building

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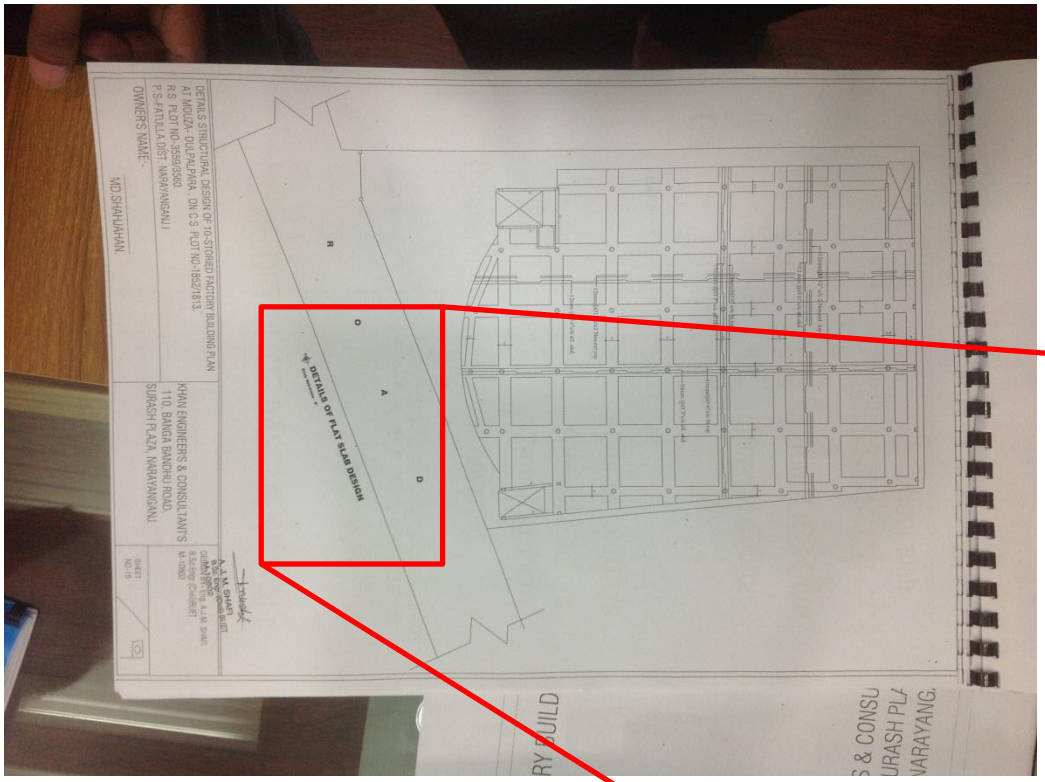
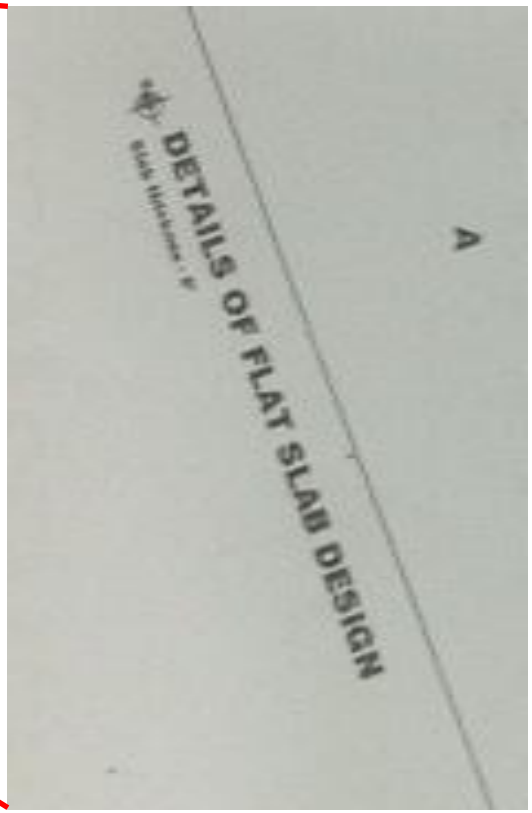
Layout drawing for typical flat slab shows 8” (200mm) thick slab. Slab thickness measured on site varied between 170 and 190mm





Slab thinner than shown on drawings

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3)

COLUMN	UP TO G.L	8TH TO 9TH FLOOR	ROD
	17"X14"	15"X12"	10-20mmØ BAR
	22X14"	20"X12"	2-16mmØ BAR 10-20mmØ BAR
	18X18"	18"X18"	14-20mmØ BAR
	22X22"	22"X22"	14-20mmØ BAR

Edge columns have only 12 vertical bars compared to the 14 shown on the drawing.

Sizes and dimensions different from drawings

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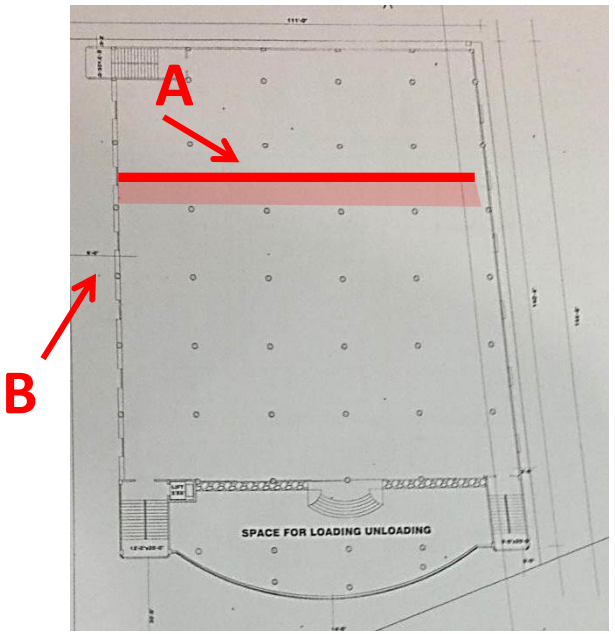
Main building 2 bays smaller than shown on drawings (see red line below). Final 2 bays is effectively a separate building with a double height ground floor and roof slab level with the third floor of the production building, although the slabs are continuous between the two buildings with no visible movement joint.



Building smaller than shown on drawings

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Rear of building appears to be non-engineered

The rear of the building has very long span slabs and a missing downstand beam (there is some evidence of a previous wall on the missing beam line).

Rear of building appears to be non-engineered

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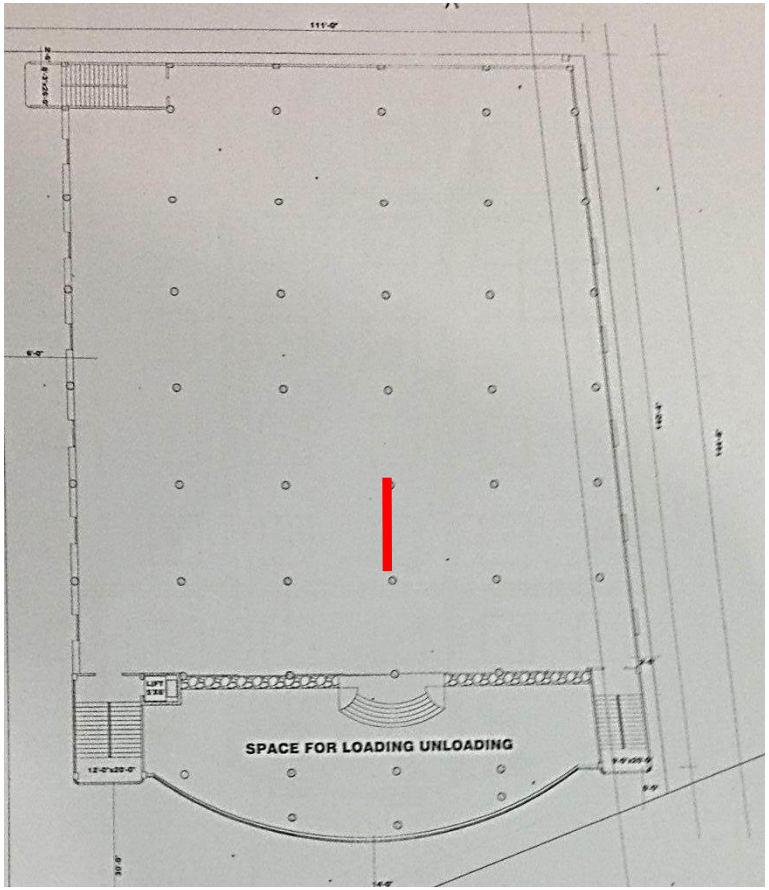
Missing lintel to door opening



Door opening has been formed without a lintel. Bricks could fall.

Missing lintel to door opening

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Lack of lateral restraint to brick facades

There are long lengths of single skin brick façade without piers that will have limited ability to resist lateral loads from storage, balustrade loading or wind. Problem exists on all floors particularly in NE corner but is most obvious visually at the 8th floor which is still being constructed.

Lack of lateral restraint to brick facades

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Priority Actions

Problems Observed

ITEM 1 - No lateral stability system evident. Façade construction at high level on-going leading to increasing wind loading on building.
ITEM 2 - Significant punching shear stress in slabs around edge columns without shear heads – reduce floor loads and verify slab capacity.
ITEM 3 - Significant compressive stress in all columns – reduce floor loads and verify column capacity.
ITEM 4 - High floor loads above generator at rear of building and missing downstand beam
ITEM 5 - High loading applied to slab by temporary 10 000 litre tank on roof at mid span of slab.
ITEM 6 - Missing lintel above door - install lintel or remove masonry above opening
ITEM 7 - Horizontal stability of masonry façade panels without piers– install barrier and check masonry stability.

Item 1 and actions

No lateral stability system evident. Façade construction at high level on-going leading to increasing wind loading on building.

Priority 1 (Immediate - Now)	• Qualified Structural Engineer to confirm adequacy of stability system. **Must be completed within 3 weeks and remedial actions taken as required.**
Priority 2 (within 6-weeks)	• None required.
Priority 3 (within 6-months)	• None required.

Item 2 and actions

Significant punching shear stress in slabs around edge columns without shear heads – reduce floor loads and verify slab capacity.

Priority 1 (Immediate - Now)	• Option 1 - Reduce number of toilet cubicles to one male and one female by demolishing all partition wall and removing all floor finishes above slab level as shown overleaf .Demolition works to be carried out with care to avoid impact loads on slab. Option 2 - Alternatively restrict access in toilet areas and install temporary lightweight toilet facilities on each floor as shown overleaf until DEA is complete. • Qualified Structural Engineer to carry out a Detailed Engineering Assessment of Factory, see attached scope. • In addition verify insitu concrete strength either by taking 4 no. 100mm diameter cores. Structural Engineer to determine safe locations for coring in centre of bay.
Priority 2 (within 6-weeks)	• Produce and actively manage a loading plan for all floor plates within the factory giving consideration to floor capacity. • Detailed Engineering Assessment to be completed.
Priority 3 (within 6-months)	• Continue to implement load plan.

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Detailed 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

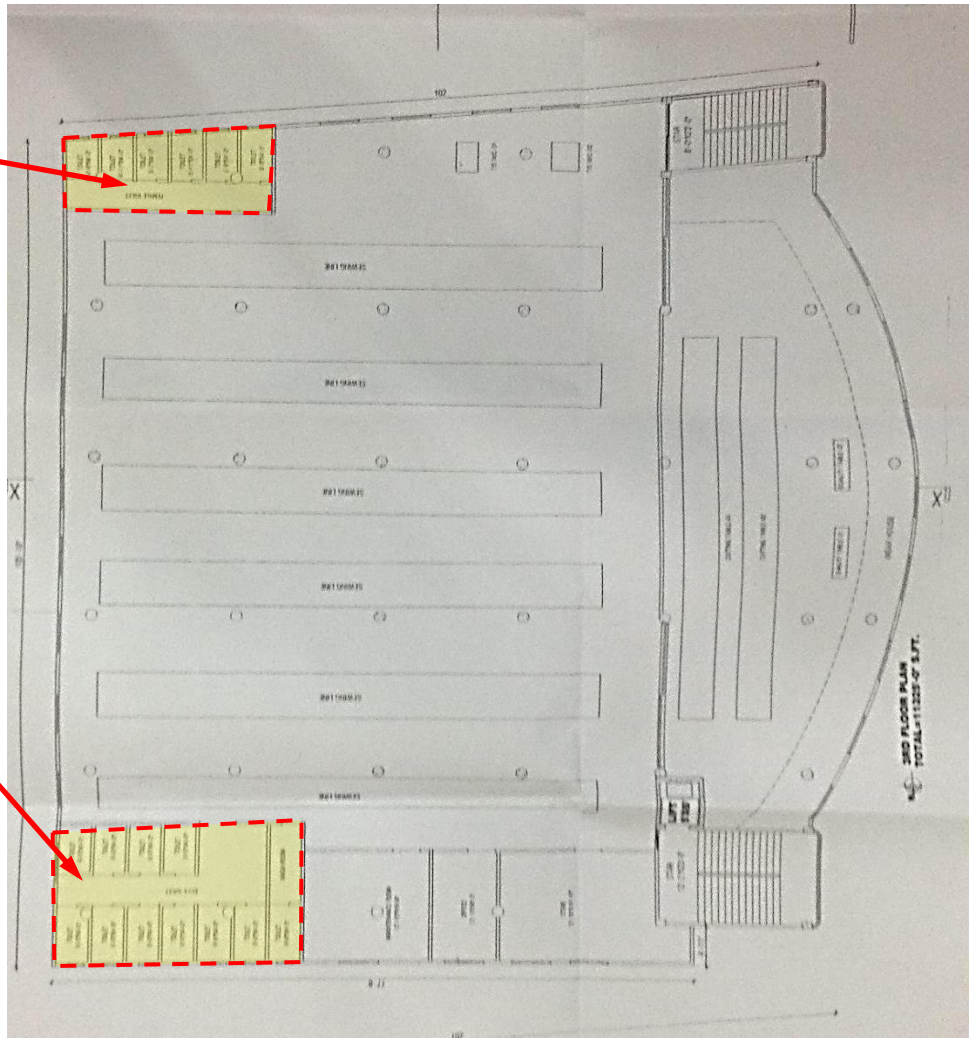
Any proposals for retrofitting to follow guidance developed in the Tripartite Document.

Executive Summary (Continued)

Maximum of 1 toilet cubicle allowed in this area at any floor.

Maximum of 1 toilet cubicle allowed in this area at any floor.

All other cubicles and floor finishes in these areas to be demolished and removed from building.



Toilet demolition - Option 1

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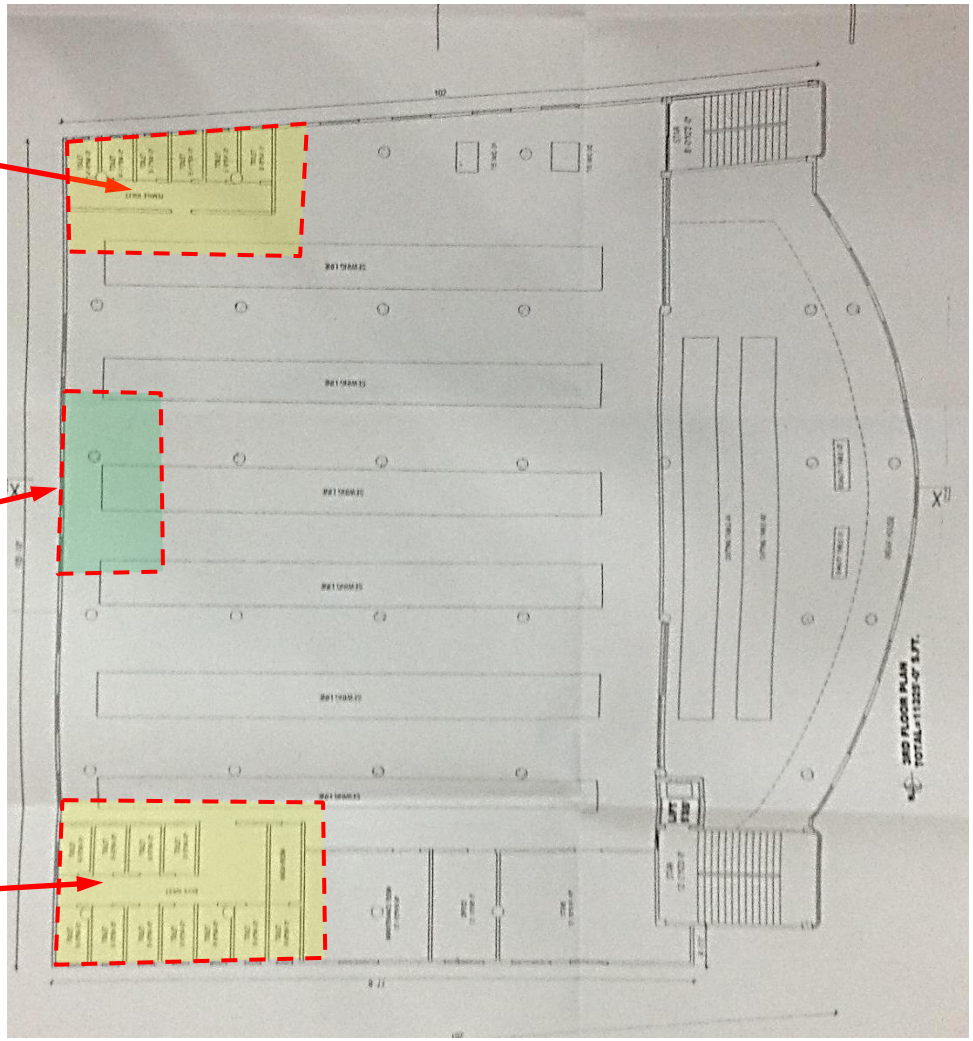
Executive Summary (Continued)

Isolate all access and personnel in this area, no access to Toilets

Provide lightweight temporary toilet facilities in area supported by large diameter column with column head

Isolate all access and personnel in this area, no access to Toilets



Toilet relocation - Option 2

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Item 3 and actions

Significant compressive stress in all columns – reduce floor loads and verify column capacity.

Priority 1 (Immediate - Now)	• Construction activities at high level to be stopped. • Restrict all floor loads to less than 1.5 kPa. This will involve emptying the areas shown overleaf. • Qualified Structural Engineer to review design, loads and stresses in all columns as part of Detailed Engineering see Item 2. • Verify insitu concrete stresses either by 100mm diameter cores or existing cylinder strength data for 4 columns. Factory Engineer to determine safe locations for coring. • Address overloading of columns supporting toilets as discussed in Item 2.
Priority 2 (within 6-weeks)	• Produce and actively manage a loading plan for all floor plates within the factory giving consideration to column capacity. • Detailed Engineering Assessment to be completed.
Priority 3 (within 6-months)	• Continue to implement load plan.

Floor areas to be unloaded

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Item 4 and actions

High floor loads above generator at rear of building and missing downstand beam

Priority 1 (Immediate - Now)	• High floor leads to be removed by completely emptying floor as noted on drawing under Item 1. • Adequacy of slabs and beams to be confirmed as part of Item 1 Detailed Engineering Assessment.
Priority 2 (within 6-weeks)	• Detailed Engineering Assessment to be completed and any remedial measures implemented.
Priority 3 (within 6-months)	• None required.

Item 5 and actions

High loading applied to slab by temporary 10 000 litre tank on roof at mid span of slab.

Priority 1 (Immediate - Now)	• Relocate temporary water tank on roof to a suitable position (to be confirmed by a qualified Structural Engineer). One option may be to locate a series of smaller tanks directly over internal columns..
Priority 2 (within 6-weeks)	• None required
Priority 3 (within 6-months)	• None required.

Item 6 and actions

Missing lintel above door - install lintel or remove masonry above opening

Priority 1 (Immediate - Now)	• Install lintel or remove masonry above opening Note: This was raised in the close out meeting. The factory manager agreed to remove the four courses of brick above the opening on 1st May
Priority 2 (within 6-weeks)	• None required.
Priority 3 (within 6-months)	• None required.

Item 7 and actions

Horizontal stability of masonry façade panels without piers– install barrier and check masonry stability.

Priority 1 (Immediate - Now)	• Temporary barrier to be installed around perimeter of building wherever there are missing brick piers to prevent people leaning on masonry façade or materials being stored against it.
Priority 2 (within 6-weeks)	• Structural Engineer to confirm that masonry panels are stable horizontally under all possible applied loads, including wind, material storage and balustrade loading.
Priority 3 (within 6-months)	• None required.