GMS Composite Ltd.

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(23.968661, 90.296963)

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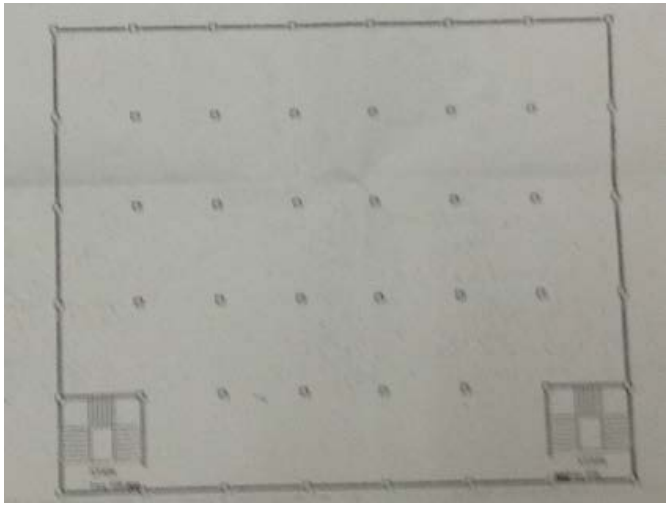
ACCORD on Fire and Building Safety in Bangladesh

ARUP

Observations

Highly stressed columns

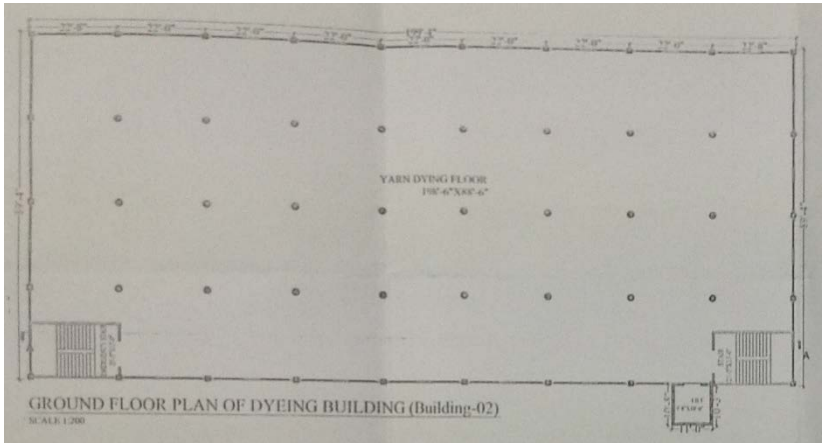


Typical Column Layout – Building 1

Cursory calculations indicate that the working stresses of columns are at a high level.

Building Engineer to check that columns have been designed to accommodate applied loads.

Brick aggregate observed.



Typical Column Layout – Building 2 - 4

Tested column at lower floors - Brick aggregate observed.

Highly Stress Columns

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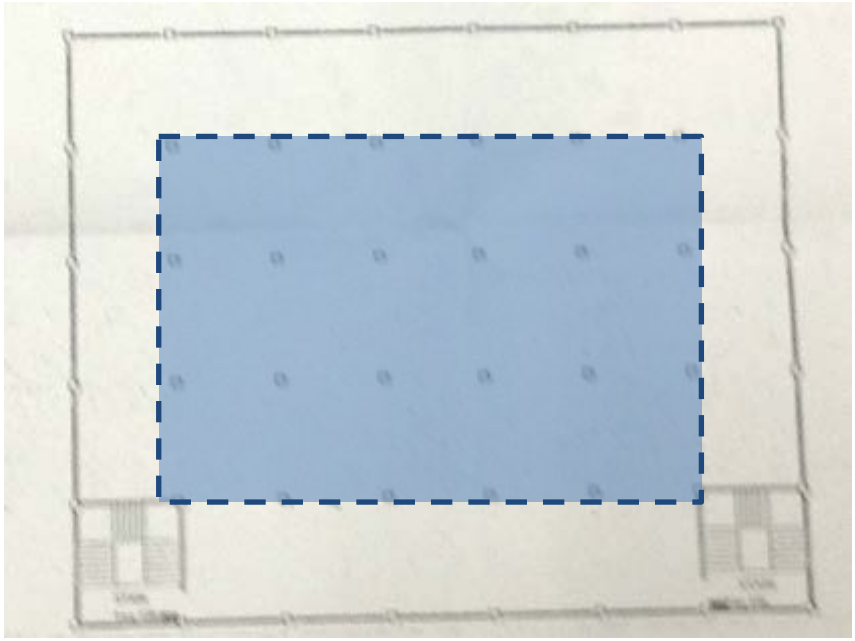
Vertical Extension



Vertical extension on roof comprising brick masonry walls with a lightweight steel trussed roof on Building 1. No evidence of horizontal bracing.

No structural or design documentation provided for extension. Subject to uplift forces .

Check on roof additions required

Local areas of high loading

Localised storage loading in a number of other areas in all of the surveyed buildings.

Water tanks with concrete bases located at roof level (Building 1) supported on regular slab and beam structure spanning between columns.

High Loading – Storage and Tanks

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Typical toilet block building

Storage on top of toilet block

Increased floor build-up in toilet block areas (~160 + 110mm in cubicles).

Partition walls around block and between additional cubicles

Additional approx. 100mm thick concrete ceiling above toilet blocks.

Storage added on top of ceiling slabs in a number of areas.

Loading – Water tanks & Toilet Blocks

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Horizontal Extensions

No structural or design documentation provided for horizontal extensions.

Building engineer to carry out detailed engineering assessment of extensions and impact of additional loading on the primary building structures.

Lift shafts added to a number of buildings

4 Storey Link Bridge between B1 and B2

Horizontal Extensions

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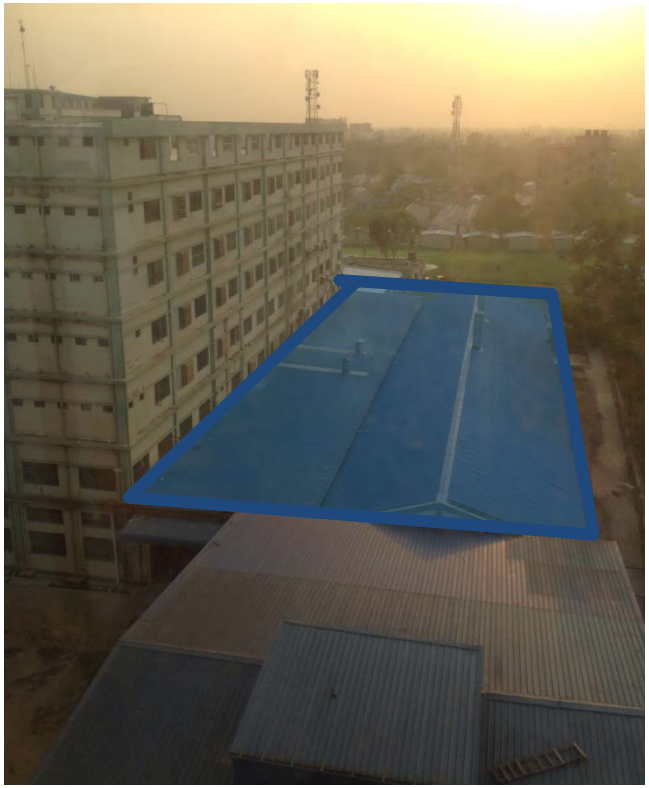

Shed extension (Building 3) supported off main building.

Undocumented cantilever structures from Building 2.

Horizontal Extensions

Undocumented alterations to structure

No structural or design documentation provided for alterations to structure.

Building engineer to carry out detailed engineering assessment of extensions and impact of additional loading on the primary building structures.

Undocumented mezzanine levels have been added to Buildings 2 and 4.

Structural Alterations

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Crane beams attached to a number of columns in Building 4 applying additional loading.

Additional steel frame for new ceiling/thermal barrier supported from structural column.

Communications mast supported on structure on roof of Building 1- Horizontal and vertical loads.

Structural Alterations

No structural or design documentation provided for alterations to structure (Buildings 5,6).

Building engineer to confirm design of proposed area usage. Extent of works comprised of 4 bays with 2 additional shallow beams in each direction.

Undocumented roof level strengthening proposed for heli-pad.

Structural Alterations

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Damage to Structural Elements

Damage to the base of a number of columns in the typical floors. No plaster finish observed. Repair of surface and protection of vulnerable columns required.

Damage to soffit of slab observed in Building 4. Extent of damage to be assessed by Building Engineer and repaired if necessary

Damage to Structural Elements

Priority Actions

Problems Observed

1. Highly stressed columns
2. Vertical extensions
3. Localised areas of high loading in all buildings.
4. Horizontal extensions
5. Undocumented alterations to structure.
6. Damage to structural elements

Item No.	Observation	Recommended Action Plan	Recommended Timeline
1	Highly stressed columns	Factory Engineer to review design, loads and columns stresses in area identified above including additional loads as documented in the observation section of this report.	**6-weeks**
2	Highly stressed columns	Verify insitu concrete stresses either by 100mm diameter cores or existing cylinder strength data for cores from minimum 4 columns in each building.	**6-weeks**
3	Highly stressed columns	Produce and actively manage a loading plan for all floor plates within the factory giving consideration to floor capacity and column capacity.	**6-months**
4	Engineering Assessment of extensions and alterations as observed	The Building Engineer should check the load plans and confirm that the main building structure is capable of safely supporting the additional loading on the structure from extensions and alterations.	**6-weeks**
5	Engineering Assessment of extensions and alterations as observed	Engineer to submit design for new and altered structural elements.	**6-months**
6	Engineering Assessment of extensions and alterations as observed	Building engineer to check, collect information and produce accurate and complete as-built documentation.	**6-months**

Item No.	Observation	Recommended Action Plan	Recommended Timeline
7	Localised areas of high loading in buildings.	Extent of build-up loading in toilet and wash areas to be surveyed and weight of water tanks on roof to be assessed. The capacity of floor /roof slabs and beams to be assessed to confirm that the structure is designed to carry these loads.	**6-weeks**
8	Localised areas of high loading in buildings.	Produce and actively manage a loading plan for all floor plates within the factory giving consideration to floor capacity and column capacity. Loading plans to be put on each factory floor.	**6-weeks**
9	Localised areas of high loading in buildings.	Continue to implement the loading plan.	**6-months**
10	Damage to structural elements	Damage to structure as outlined to be assessed by building engineer.	**6-weeks**
11	Damage to structural elements	Repairs to be carried out as required and bases of columns prone to impact to be protected from further damage.	**6-months**