

S M Knitwears Ltd

Shirichala, Bhabanipur, Gazipur

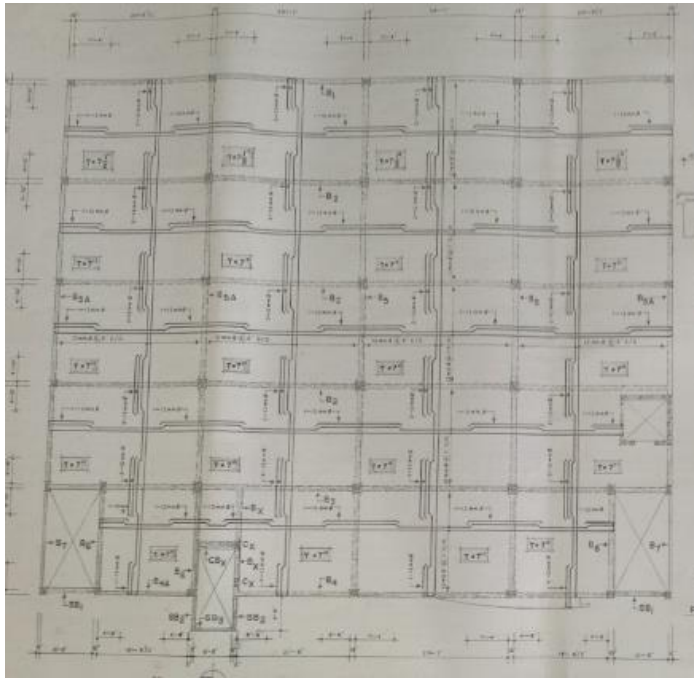
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13th April 2014



Observations

Building 1 (Original): Concrete Stress Levels in Columns

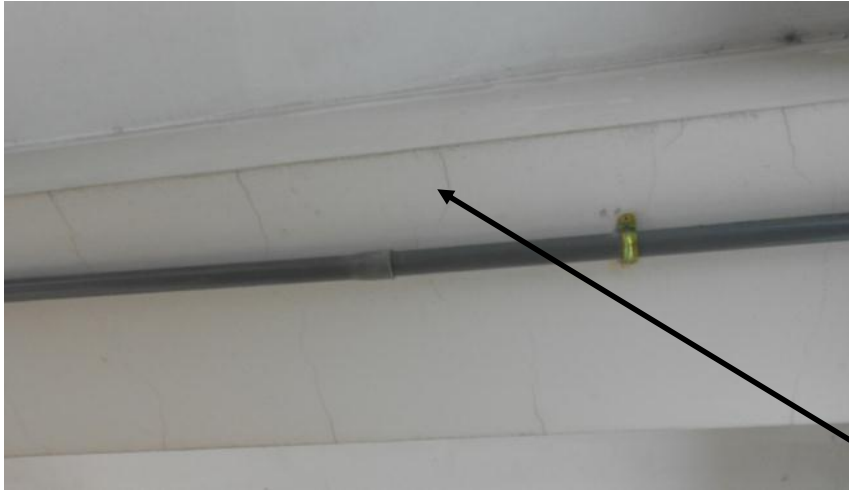


Preliminary calculations indicate that column working stress is at a high level in Building 1 (Original).

A Detailed Engineering Assessment of the building is required (see attached scope). The engineer is to perform detailed calculations based on the 'as constructed' structural arrangement, material properties and loading to verify column size suitability. If required, column loading shall be reduced, and columns possibly strengthened.

Building 1 (Original): High Column Loads

Building 1 (Original): Cracking in Beams and Slabs



Cracking observed to the soffit of beams and slabs in a number of locations.

Building 1 (Original): Beam and Slab Cracking

Building 1 (Original): Stability of Rooftop Steel Frame



Trusses assumed installed at a later date than main steel frame.

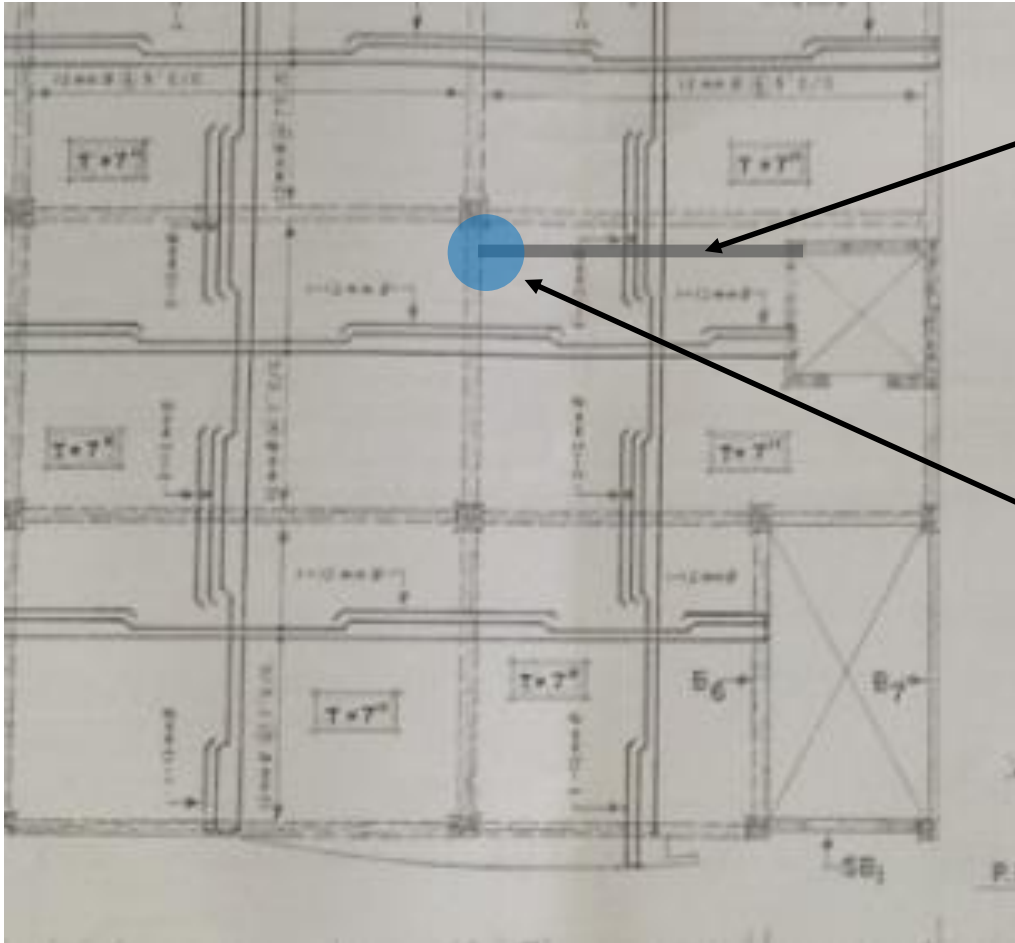
Cross-bracing.

The stability system of the 8.2m high steel roof appears inadequate for design wind load. Building Engineer to review and design the steel frame for design wind loads.

Building 1 (Original): Stability of Rooftop Steel Frame



Building 1 (Original): Primary/Secondary Beam Arrangement



Beam 'as-built' aligns with lift wall, which is not reflected on drawings), resulting in 'primary'/ 'secondary' beam arrangement.



Building 1 (Original): Primary/ Secondary Beam Arrangement

Building 1 (Original): Broken Panes of Glass to Main Facade



Broken panes of glass to main façade presents a significant safety risk to pedestrians on road below and building users.

Building 1 (Original): Broken Panes of Glass to Main Facade

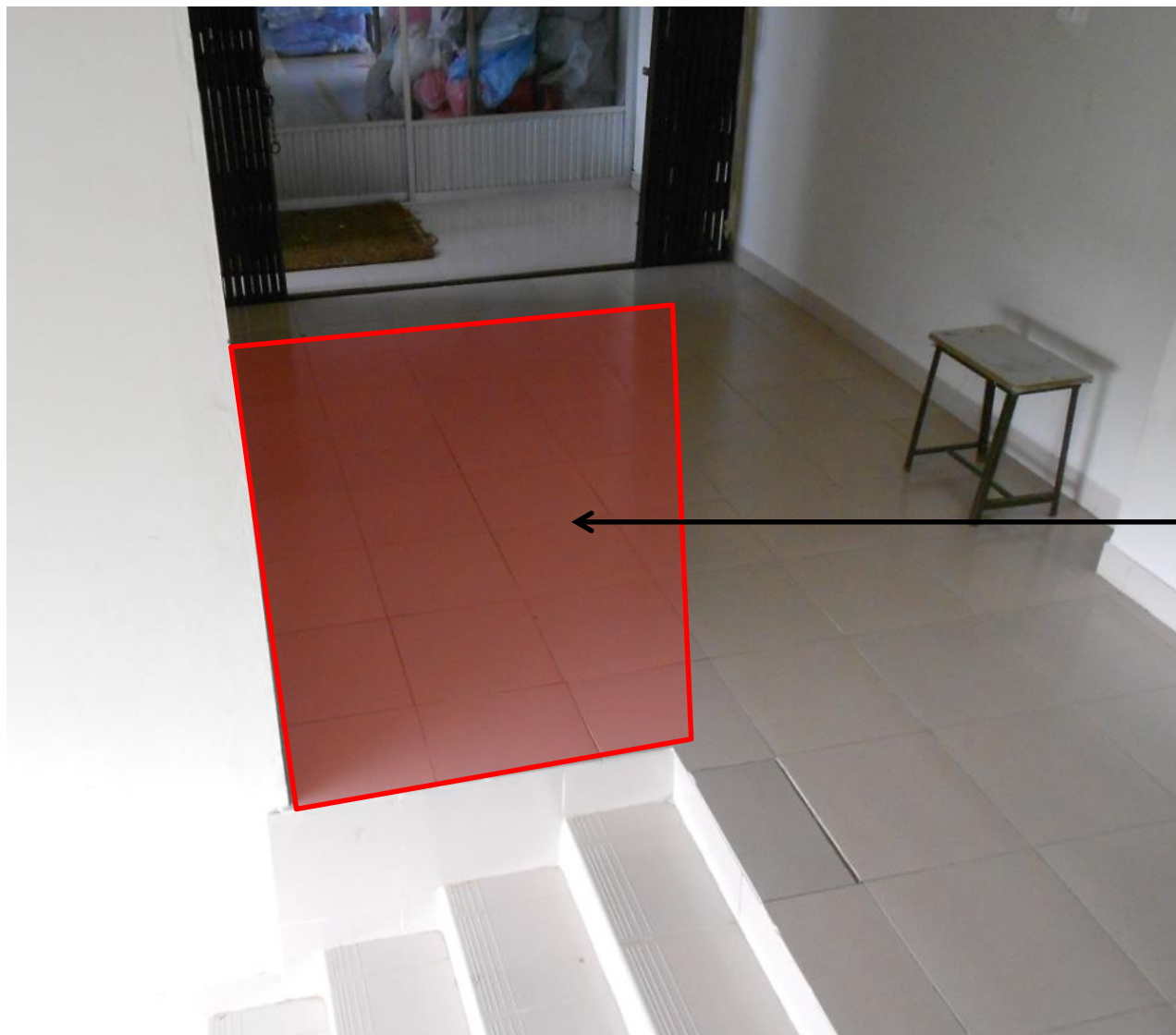
Building 1 (Extension): Stability of Steelwork Fire Escape Stair



The steelwork fire escape stair appeared to be insufficiently braced against lateral loads. Connection details appeared 'non-engineered'.

Building 1 (Extension): Stability of Steelwork Fire Escape Stair

Building 1 (Extension): Handrail Required



Handrail required
between lift lobby
and stair at Level 3.

Building 1 (Extension): Handrail Required

Building 2: Rooftop Steelwork Stability & Corrosion Protection



Stability loadpaths of roof steelwork are unclear; notably the portal frame to the North elevation.

Some areas of corroded steelwork were observed.

Some stockpiled roofing materials were observed.



Building 2: Rooftop Steelwork Stability & Corrosion Protection

Building 2: Stability of Steelwork Fire Escape Stair



The steelwork fire escape stair appeared to be insufficiently braced against lateral loads, with just a single lateral prop at Level 5 to the 'half-landing' end. Connection details appeared 'non-engineered'.

Building 2: Stability of Steelwork Fire Escape Stair

Building 2: Stability of Freestanding Masonry Walls to Rooftop



Freestanding masonry walls were observed with height up to 3.2m, with questionable capacity to resist lateral wind loading.

Building 2: Stability of Freestanding Masonry Walls to Rooftop

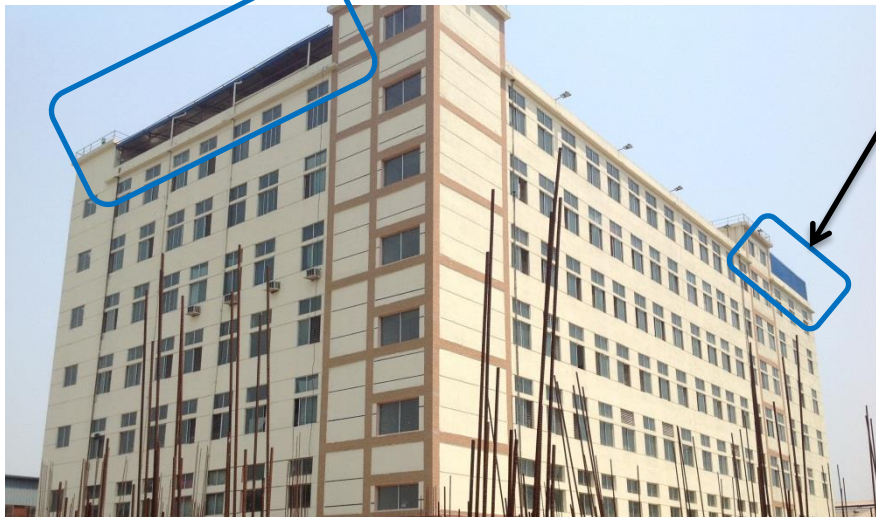
Building 3: Deep External Excavation Adjacent to Façade



Approximately 4m deep excavation for water treatment plant adjacent to west end of Building 3. The interaction between this excavation and the existing foundations of Building 3 is unknown.

Building 3: Deep External Excavation Adjacent to Façade

Building 3: Apparently Non-Engineered Structures



The two rooftop steelwork structures to Building 3 appear to be non-engineered.

The stability loadpaths of these structures are unclear, and columns appear very slender.

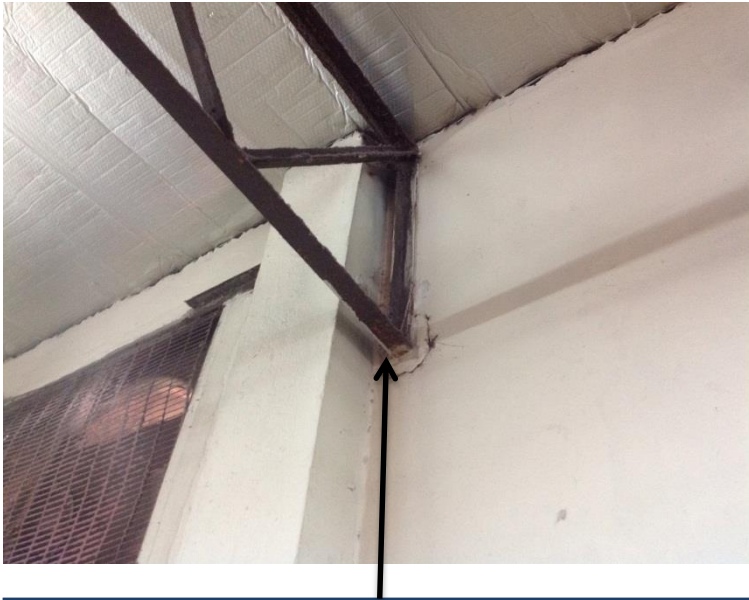
Building 3: Apparently Non-Engineered Structures- Rooftop

Ancillary Buildings: Apparently Non-Engineered Structures



Mezzanine floor within Finishing Unit does not appear to be tied to main steel frame and there is no clear stability load-path.

Ancillary Buildings: Apparently Non-Engineered Structures (Finishing Unit)



The roof structure to the Washing Unit appears to be non-engineered. Stability load-paths are unclear. Where trusses bear onto masonry walls there are signs of movement between the steelwork and brickwork.



Ancillary Buildings: Apparently Non-Engineered Structures (Washing Unit)



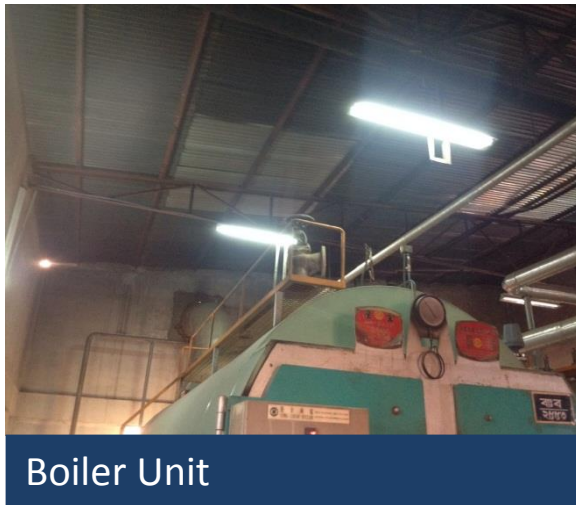
Shed to East end of Building 3



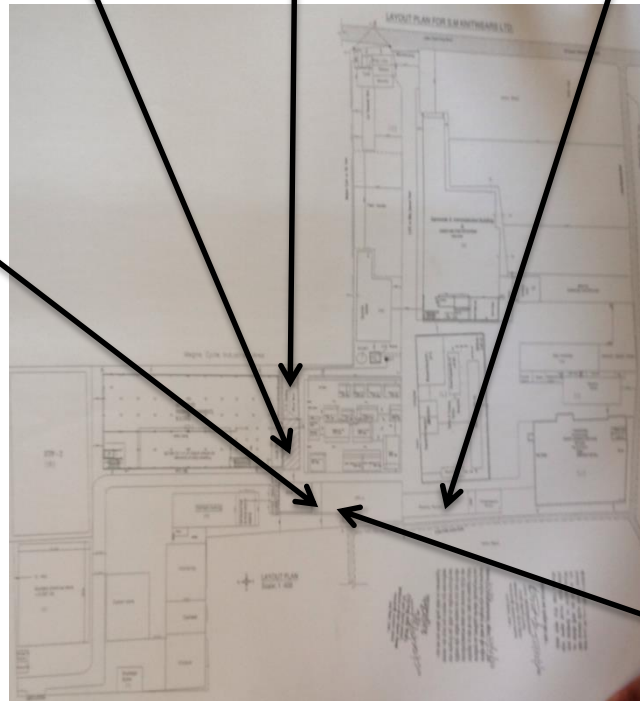
Dormitory



Central Compressor Unit

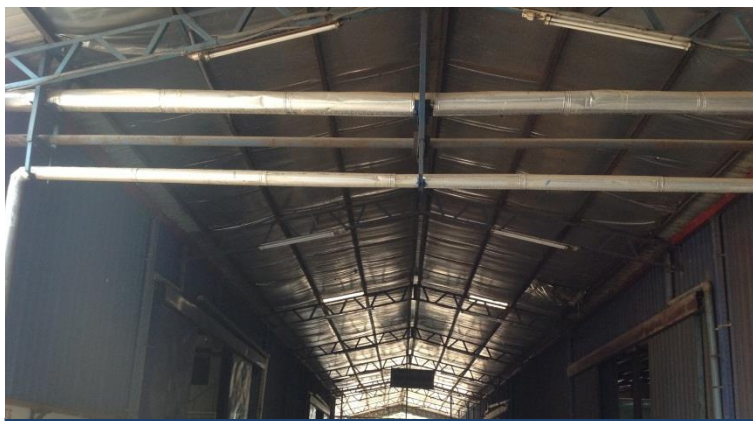


Boiler Unit



Boiler Unit

Ancillary Buildings: Apparently Non-Engineered Structures (Miscellaneous)



Shed connecting Dyeing & Finishing unit



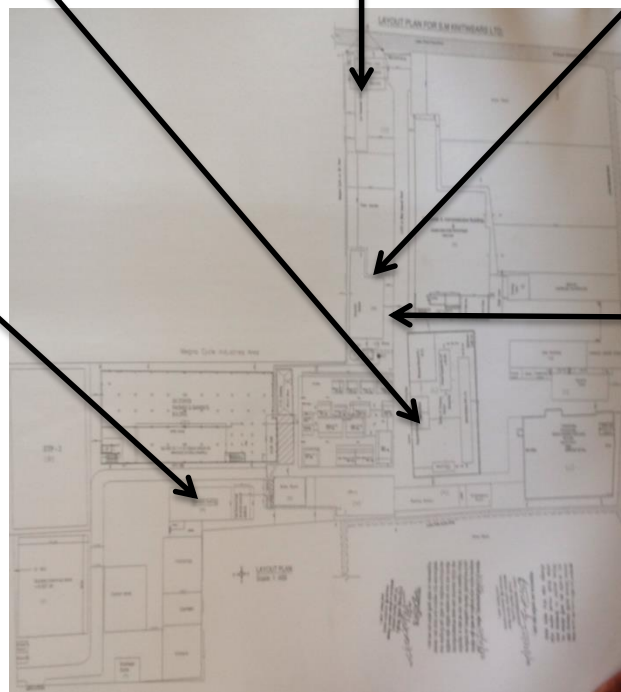
Check post, Reception,
Child care and Medical



Generator & Power house



Sample Dyeing unit



Generator & Power house
extension

Ancillary Buildings: Apparently Non-Engineered Structures (Miscellaneous)

Priority Actions

Problems Observed

BUILDING 1 (ORIGINAL)

ITEM 1: Concrete stress levels in columns.

ITEM 2: Cracking in beams and slabs, and in masonry panel to Grid 4 at Level 5.

ITEM 3: Stability of rooftop steelwork shed.

ITEM 4: Primary/secondary beam arrangement.

ITEM 5: Broken panes of glass to main façade.

BUILDING 1 (EXTENSION)

ITEM 6: Stability of steelwork fire-escape stair.

ITEM 7: Inadequate guarding to stair landing.

BUILDING 2

ITEM 8: Stability of rooftop steelwork frame and corrosion protection.

ITEM 9: Stability of steelwork fire-escape stair.

ITEM 10: Stability of free-standing masonry walls to rooftop.

BUILDING 3

ITEM 11: Deep excavation in close proximity to South elevation.

ITEM 12: Apparently non-engineered rooftop structures.

Problems Observed (continued)

ANCILLIARY BUILDINGS

ITEM 13: Apparently non-engineered structures.

Item No.	Observation	Recommended Action Plan	Recommended Timeline
1	Building 1 - Verify load capacity of all columns.	Maintain current use of the floors and don't change use or increase occupation, either of which could increase loading.	Immediate - Now
2	Building 1 - Verify load capacity of all columns.	For all columns in building engage a structural engineer to review loads, design, and concrete stress.	Immediate - Now
3	Building 1 - Verify load capacity of all columns.	Verify insitu concrete stresses either by 100mm diameter cores or existing cylinder strength data for 4 columns.	Immediate - Now
4	Building 1 - Verify load capacity of all columns.	A Detailed Engineering Assessment of Factory to be commenced; see attached scope.	Immediate - Now
5	Building 1 - Verify load capacity of all columns.	Produce and actively manage a loading plan for all floor plates within the factory giving consideration to column capacity.	6-weeks
6	Building 1 - Verify load capacity of all columns.	Detailed Engineering Assessment to be completed.	6-weeks
7	Building 1 - Verify load capacity of all columns.	Produce 'as-built' general arrangement structural drawings	6-months
8	Building 1 - Verify load capacity of all columns.	Continue to implement load plan.	6-months

Detailed 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 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
9	BUILDING 1 Cracking in slabs and beams, and at interfaces between masonry and reinforced concrete	As part of the Detailed Engineering Assessment the Engineer to investigate if cracks are only in the nominal render finish	6-weeks
10	BUILDING 1 Cracking in slabs and beams, and at interfaces between masonry and reinforced concrete	If cracks are structurally significant, close working areas below the affected areas, and engineer to specify repairs and strengthening.	6-weeks
11	BUILDING 1 Cracking in slabs and beams, and at interfaces between masonry and reinforced concrete	Carry out above works as required.	6-months
12	BUILDING 1 Stability of rooftop steelwork shed	As part of the Detailed Engineering Assessment Engineer to undertake calculations to assess the vertical and lateral load-carrying capacity of the rooftop steelwork shed and it's support structure, and to specify any necessary alterations or repairs as required.	6-weeks
13	BUILDING 1 Stability of rooftop steelwork shed	Carry out works as required.	6-months

Item No.	Observation	Recommended Action Plan	Recommended Timeline
14	BUILDING 1 Primary/secondary beam arrangement adjacent to the southern lift core	As part of the Detailed Engineering Assessment Engineer to assess the suitability and capacity of the primary/secondary beam arrangement adjacent to the southern lift core.	6-weeks
15	BUILDING 1 Primary/secondary beam arrangement adjacent to the southern lift core	Produce 'as-built' general arrangement structural drawings to reflect actual construction.	6-months
16	BUILDING 1 Primary/secondary beam arrangement adjacent to the southern lift core	Carry out any remedial works as required.	6-months
17	BUILDING 1 Broken panes of glass to main façade	Broken panes of glass to main façade pose significant safety risk, and are to be replaced as soon as practicably possible, and certainly within the six-week timescale noted.	6-weeks
18	BUILDING 1 Stability of steelwork fire-escape stair	As part of the Detailed Engineering Assessment Engineer to undertake calculations to assess the vertical and lateral load-carrying capacity of steelwork escape stair, and to specify any necessary alterations or repairs as required.	6-weeks
19	BUILDING 1 Inadequate guarding to stair landing	Missing handrail poses significant safety risk. Handrail to be installed as soon as practicably possible, and certainly within the six-week timescale noted.	6-weeks

Item No.	Observation	Recommended Action Plan	Recommended Timeline
20	BUILDING 2 Stability of rooftop steelwork frame and corrosion protection	Remove all stockpiled roofing materials (such as roof sheeting) from roof and from building.	Immediate - Now
21	BUILDING 2 Stability of rooftop steelwork frame and corrosion protection	If the rooftop steelwork frame is not being demolished in the forthcoming weeks then as part of the Detailed Engineering Assessment , the Engineer to undertake calculations to assess the vertical and lateral load-carrying capacity of the steelwork frame and it's support structure, and to specify any necessary alterations or repairs as required.	6-weeks
22	BUILDING 2 Stability of rooftop steelwork frame and corrosion protection	If the rooftop steelwork frame is not being demolished in the forthcoming weeks then any areas of corroded steelwork should be cleaned back to 'bright' and adequate corrosion protection (i.e. paint system) be reinstated.	6-months
23	BUILDING 2 Stability of steelwork fire-escape stair	As part of the Detailed Engineering Assessment the Engineer to undertake calculations to assess the vertical and lateral load-carrying capacity of steelwork escape stair, and to specify any necessary alterations or repairs as required	6-weeks
24	BUILDING 2 Stability of steelwork fire-escape stair	Carry out works as required.	6-months

Item No.	Observation	Recommended Action Plan	Recommended Timeline
25	BUILDING 2 Stability of free-standing masonry walls to rooftop	As part of the Detailed Engineering Assessment the Engineer to undertake calculations to assess the lateral stability of the free-standing masonry walls to the rooftop, and to specify any necessary alterations or strengthening as required. Alternatively, where possible free-standing masonry walls to be demolished, giving regard to whether or not they provide stability to other elements of structure.	6-weeks
26	BUILDING 2 Stability of free-standing masonry walls to rooftop	Carry out works as required	6-months
27	BUILDING 3 Deep excavation in close proximity to South elevation	Deep excavation is in close proximity to South elevation of Building 3: geotechnical engineer to provide advice to ensure that short term and long term stability of Building 3 foundations are maintained, and that they are not undermined due to adjacent construction works.	6-weeks
28	BUILDING 3 Deep excavation in close proximity to South elevation	Carry out any works as directed by the Engineer.	6-months
29	BUILDING 3 Apparently non-engineered rooftop structures	The Engineer to check the vertical and lateral load carrying capacity of the rooftop structures, and specify any necessary structural alterations or repairs as required.	6-months

Item No.	Observation	Recommended Action Plan	Recommended Timeline
30	ANCILLARY BUILDINGS Apparently non-engineered structures	The Engineer to check lateral load carrying capacity of Generator and Power House Extension and specify any necessary structural alterations or repairs as required.	6-months
31	ANCILLARY BUILDINGS Apparently non-engineered structures	The Engineer to check vertical and lateral load carrying capacity of ancillary structures, detailed as follows: Boiler Unit, Central Compressor Unit, Dormitory, Shed to East end of Building 3; Shed connecting Dyeing and Finishing Unit; Check Post/Reception; Sample Unit; Brush Machine & Sewing Unit; General Store. Engineer to specify any necessary structural alterations or repairs as required.	6-months
32	ANCILLARY BUILDINGS Apparently non-engineered structures	The Engineer to check lateral load carrying capacity of mezzanine structure within the Finishing Unit, and specify any necessary structural alterations or repairs as required	6-months
33	ANCILLARY BUILDINGS Apparently non-engineered structures	The Engineer to check vertical and lateral load carrying capacity of Washing Unit structure, giving regard to the connections between the roof trusses and masonry support walls. Engineer to specify any necessary structural alterations or repairs as required	6-months
34	ANCILLARY BUILDINGS Apparently non-engineered structures	Carry out works as required	6-months