Al Islam Textile Ltd.

9 Kornopara,Savar,Dhaka-1340
(23.824207N, 90.256342E)

27 APRIL 2014

ACCORD on Fire and Building Safety in Bangladesh

ARUP

Observations

Item 1 observation

Column loads in excess of design loads
Verify concrete strengths in columns for all columns

Preliminary calculations suggest high stresses in columns.

Empty or relocate water tanks above area shaded in blue at roof level. Live load in area shaded in blue to maintained below 1kN/m2 at all levels (ie toilet access only – no production or storage) until DEA proves adequacy of column design

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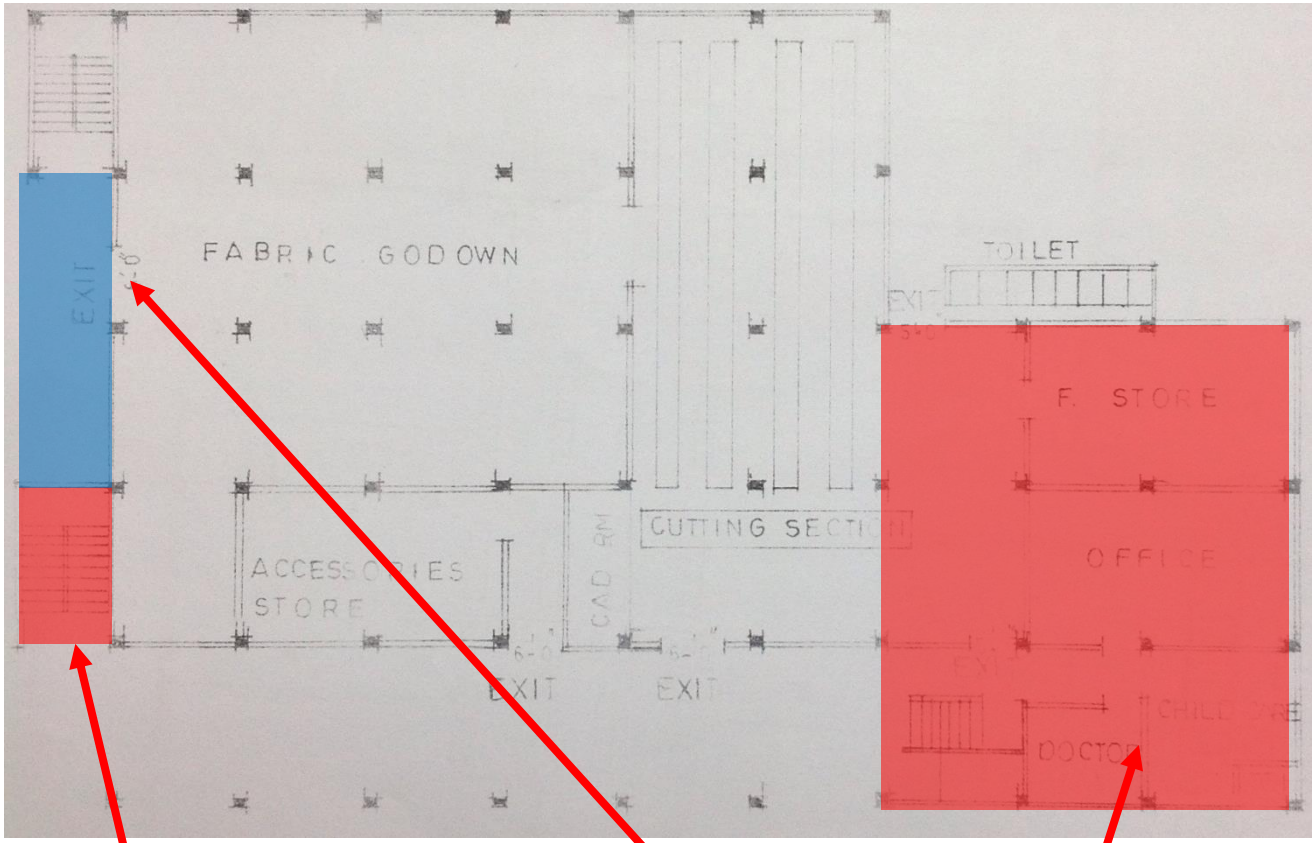
Item 2 observation

Documentation issues, Steel stair design and additional building was not shown.



No structural information was provided for the areas shown.

The owner informed us that the second and third floors were constructed using the original designs.

The steel shed recently built for storage (not shown in this sketch) is also not documented

No structural documentation of steel stair

No structural documentation of Generator room

No structural documentation of the 4 storey Building extension

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Item 3 observation

localized high loading from water tanks

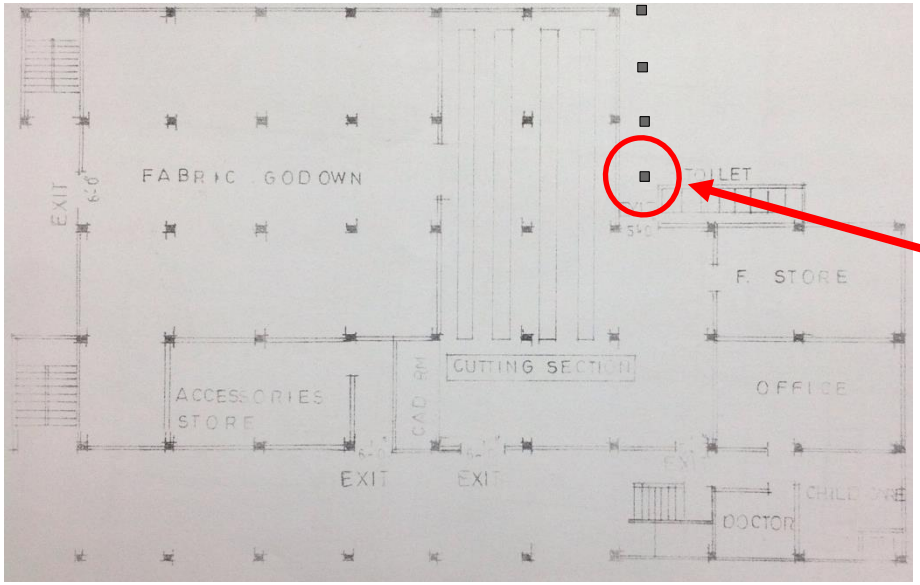
Water tanks observed on roof.

- 3no. 2000 lt. tanks by parapet
- 7no. 3000 lt. tanks by stairwell

Hairline cracking observed on underside of supporting beam.

Item 4 observation

Offset column/beam connection detail is a concern.



Concern with connection detail between primary and secondary beams with columns – limited bearing

Columns offset from beam centerline

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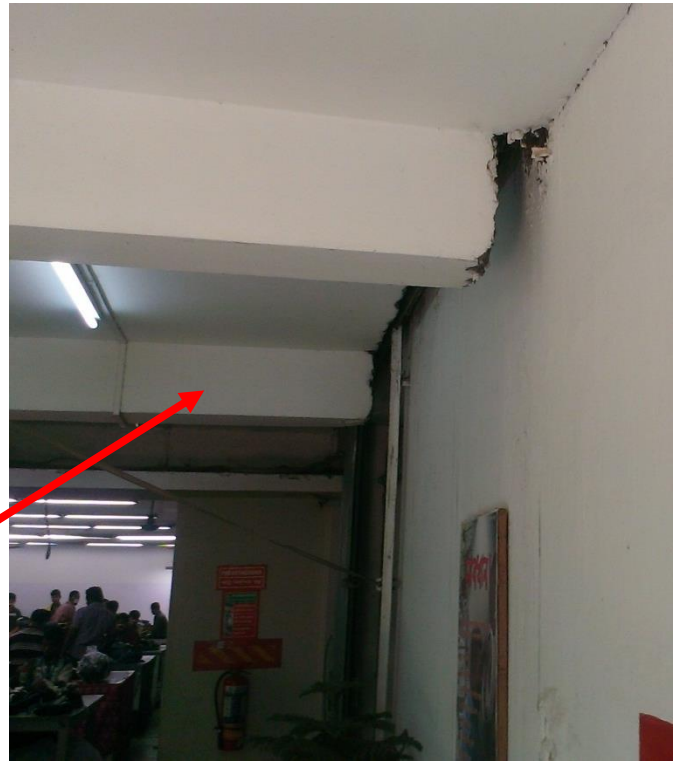
Item 5 observation

Cantilever landing between ground and first floor stairwell.

Supporting column subjected to bending from cantilever moment

Cantilever beam



No support to beams

No support provided at one end of landing between ground and first floor stairwell. The landing acts as a cantilever structure supported by a central beam.

Item 6 observation

Hairline cracks in beams on the underside of all floors.

Numerous hairline cracks observed in beams on **all** floor levels. Some appeared to be painted over at first and second floor level.

Two cracks inspected by removal of plaster

Crack 1
Did not run through plaster layer

Crack 2
Ran through plaster through to other side of beam. Occurred due to large cluster of poorly mixed aggregate (honeycomb cluster)

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Item 7 observation

Stability of steel staircase

Beam to column connections not meeting at centerlines.
Interaction between / connection of steel structure to building unclear; no evidence of building providing restraint to the steel structure
No bracing provided to provide lateral stability.
No documentation provided on design.

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Item 8 observations

Non engineered structure shed.

Non engineered truss supports.
- Bottom chord is supported directly on the column head.

Internal columns are slender and not restrained at the top.

Purlins not adequately secured to top boom of truss.

No stability provided for wind loads (horizontal / vertical bracings missing)

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Item 9 observation

Some piers of internal / external brick wall partitions / façade not extending to soffit of beam and by that not horizontally restrained at their top. Reduced resistance to horizontal loads (e.g. wind loads)

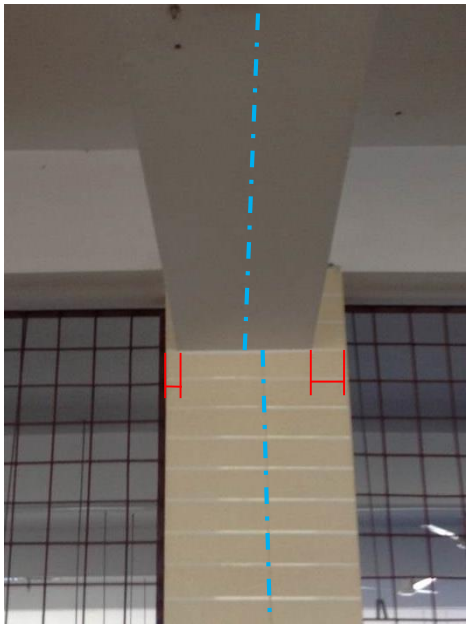
Ground floor between childcare and medical room (Internal wall)

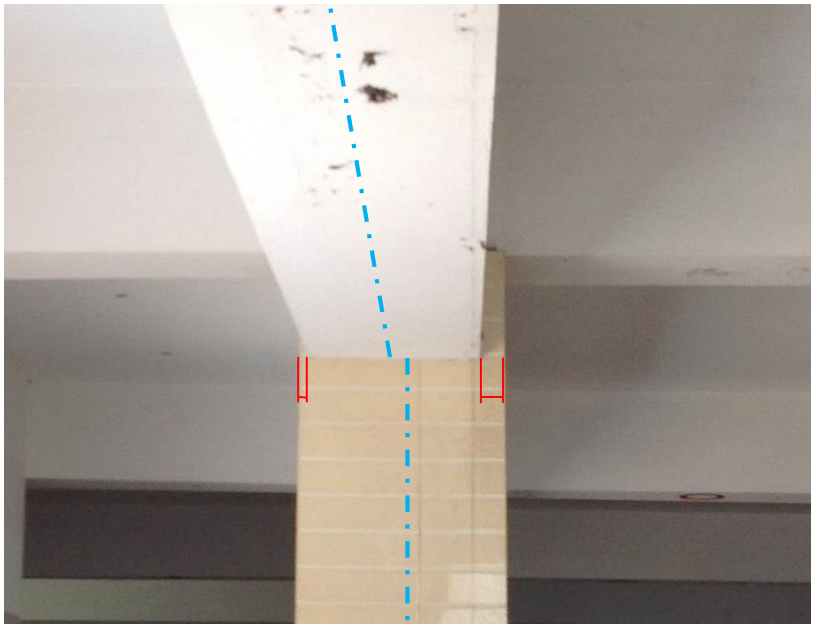
1st floor by stairwell (Internal wall)

1st floor office (External wall)

Item 10 observation

Eccentric connections between beams and columns observed at third floor level.





Several columns were observed not to line up with the center of the beams they intersected with.

This eccentricity should be included in any further analysis of the structure

Item 11 observation

Columns exposed to impact

Impact protection not provided to columns on south elevation. Columns are susceptible to impact loading from vehicles.

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Item 12 observation & actions

Cracking in lintels on third floor

Cracking observed at top of lintels in third floor where window frames were removed.
Floor is currently under construction. Management assured us that the façade panels are to be removed and replaced within the next six weeks => no further actions required

Item No.	Observation	Recommended Action Plan	Recommended Timeline
1	Column loads in excess of design loads Verify concrete strengths in columns for all columns	NO further levels to be built. Water tanks at roof level in blue area should be removed or relocated	**Immediate - Now**
2	Column loads in excess of design loads Verify concrete strengths in columns for all columns	Live load in area shaded blue to be maintained below 1kN/m2 at all floor levels (ie toilet access only – no production or storage)	**Immediate - Now**
3	Column loads in excess of design loads Verify concrete strengths in columns for all columns	Factory Engineer to review design, loads and columns stresses of all columns.	**Immediate - Now**
4	Column loads in excess of design loads Verify concrete strengths in columns for all columns	Verify insitu concrete stresses by 100mm diameter cores from minimum 4 columns in the building part from 1996 and 2 columns in the building part from 2011 (recent extension). All cores to be taken at Ground Floor.	**Immediate - Now**
5	Column loads in excess of design loads Verify concrete strengths in columns for all columns	A Detail Engineering Assessment (DEA) of Factory to be commenced, see attached Scope	**Immediate - Now**

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. 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 checks 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	Column loads in excess of design loads Verify concrete strengths in columns for all columns	Produce and actively manage a loading plan for all floor plates within the factory giving consideration to floor capacity and column capacity.	**6-weeks**
7	Column loads in excess of design loads Verify concrete strengths in columns for all columns	Detail Engineering Assessment to be completed	**6-weeks**
8	Column loads in excess of design loads Verify concrete strengths in columns for all columns	Continue to implement load plan	**6-months**
9	Documentation issues Steel stair design and additional building was not shown	Building engineer to check, collect information and produce accurate and complete as-built documentation as part of DEA	**6-weeks**
10	Documentation issues Steel stair design and additional building was not shown	As-built documentation to be complete.	**6-months**

Item No.	Observation	Recommended Action Plan	Recommended Timeline
11	localized high loading from water tanks	Reduce water storage on the roof as much as possible – see Item 1	**Immediate - Now**
12	localized high loading from water tanks	Disperse cluster of water tanks and place one tank per supporting column.	**Immediate - Now**
13	localized high loading from water tanks	As a result of the DEA the building engineer may advise where the water storage can be placed safely without distressing any structural elements (slabs / beams and columns).	**6-weeks**
14	Offset column/beam connection detail is a concern	Carry out detail calculation for offset beam/column connection and provide additional column to foundation level if necessary	**6-weeks**
15	Cantilever landing between ground and first floor stairwell	Building engineer to check the capacity of the supporting column and propose additional reinforcements and stability system, if required.	**6-weeks**

Item No.	Observation	Recommended Action Plan	Recommended Timeline
16	Hairline cracks in beams on the underside of all floors	Repair honeycomb cluster as advised by building engineer	**Immediate - Now**
17	Hairline cracks in beams on the underside of all floors	Continue to monitor all cracks.	**6-weeks**
18	Hairline cracks in beams on the underside of all floors	If cracks increase in size or length sections of plaster finish to be removed to investigate if cracks penetrate the building structure.	**6-weeks**
19	Hairline cracks in beams on the underside of all floors	Building Engineer to carry out design check on beams to confirm that these cracks are non-structural.	**6-months**
20	Hairline cracks in beams on the underside of all floors	Building Engineer to prepare Allowable Floor Loading Plans.	**6-months**
21	Stability of steel staircase	Steel structure design should be checked to support code vertical and wind loads by the Building Engineer and strengthened if necessary.	**6-weeks**
22	Stability of steel staircase	Provide proper fixation of steel structure to building	**6-weeks**
23	Stability of steel staircase	Strengthenings / modifications to be carried out in accordance to design by building engineer.	**6-months**

Item No.	Observation	Recommended Action Plan	Recommended Timeline
24	Non engineered structure shed	Building engineer to check the structures and propose additional reinforcements of stability system.	**6-weeks**
25	Non engineered structure shed	Strengthening as instructed by building engineer or removal of shed.	**6-months**
26	Brick columns/Piers not extending to soffit of beam at ground level between medical room and childcare, at first floor level between work area and stairwell and external façade on first floor level in office area	Building Engineer to review piers	**6-weeks**
27	Brick columns/Piers not extending to soffit of beam at ground level between medical room and childcare, at first floor level between work area and stairwell and external façade on first floor level in office area	If required, extend piers to soffit of second floor beam or provide other adequate means for making the walls resistant to wind loads.	**6-months**

Item No.	Observation	Recommended Action Plan	Recommended Timeline
28	Eccentric connections between beams and columns observed at third floor level	Address as part of the general DEA and take eccentricity into account when doing the column checks.	**6-weeks**
29	Impact protection to columns	Building Engineer to review column design and potential for vehicle impact to columns on south elevation. If appropriate impact protection to be provided.	**6-weeks**