Divine Textiles Ltd

Pollibiddut, Shafipur, Gazipur, Dhaka
(24.03977N, 90.25669E)

22 March 2014

ACCORD on Fire and Building Safety in Bangladesh

ARUP

Observations

Columns in all three buldings appear to be stressed in excess of normal design limits

Stone chips were found in the columns of the 6 and 8 storey buildings, while brick chips were found in the columns for the 4 storey building

Tested Basement Column 8 Storey Building – Stone Chips

Cursory calculations indicate that column working stress is at a high level in the columns in all three factory buildings. An outline of each building is given below.

4 Storey Building

This water tank should be emptied completely and the tank structure removed immediately. A Detail Engineering Assessment of the building should also be carried out immediately in order to ascertain the adequacy all columns (see attached Scope).

6 Storey Building

A Detail Engineering Assessment of the building should be carried out immediately in order to ascertain the adequacy all columns (see attached Scope).

8 Storey Building

While our calculations show that the column working stresses are not critical, they are still in excess of normal levels. Therefore, the Building Engineer is to perform detailed calculations and concrete tests to ascertain the adequacy of the columns and (if required):

- Reduce loads
- Reinforce columns

Column Strength

Management of Storage Loads

8 storey building - 4th Floor Storage Area

Uncontrolled stacking of material

8 storey building - Ground Floor Storage Area

Building Engineer to prepare controlled loading plans for all floors which will designate where storage can be placed.

Management of Storage Loads

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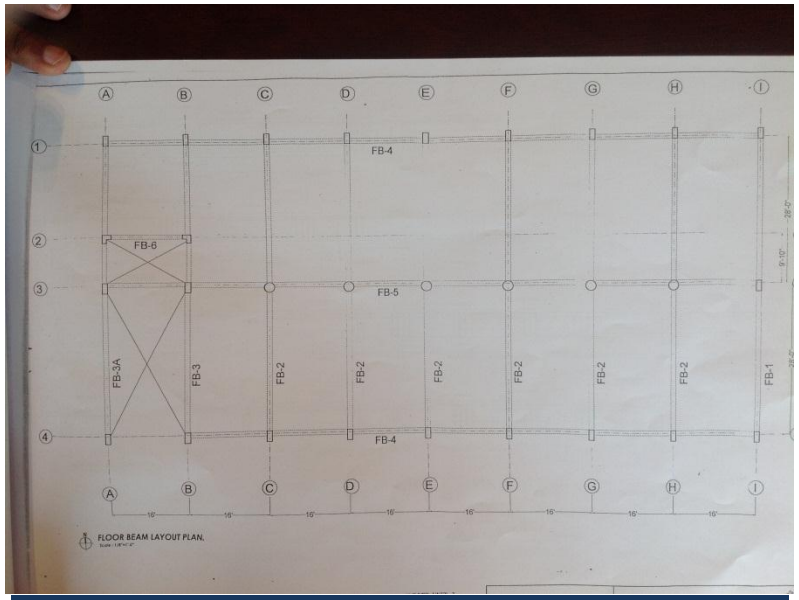
Inconsistencies between structural drawings and the as-constructed arrangement of the factory



8 storey building typical plan

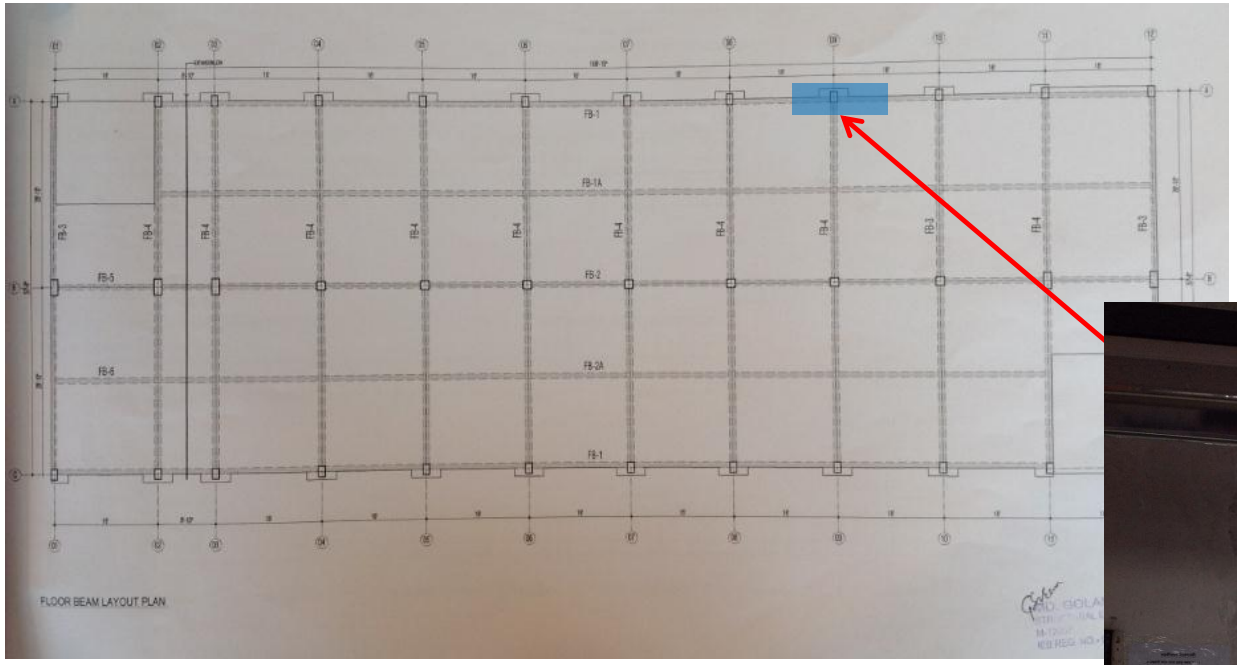
Longer grid dimension is 8.9 m (29’ 2’’) and not 8.53 m (28’)

Steel structures at roof level on 4 and 6 storey buildings are not shown on structural drawings.

Building Engineer to survey as-built structure and update drawings.

Structural Drawings

Water ingress through building structure



Water ingress on 4th floor of 6 storey building

Areas where water ingress is evident should be investigated and the cause of such should be remedied.

Water ingress

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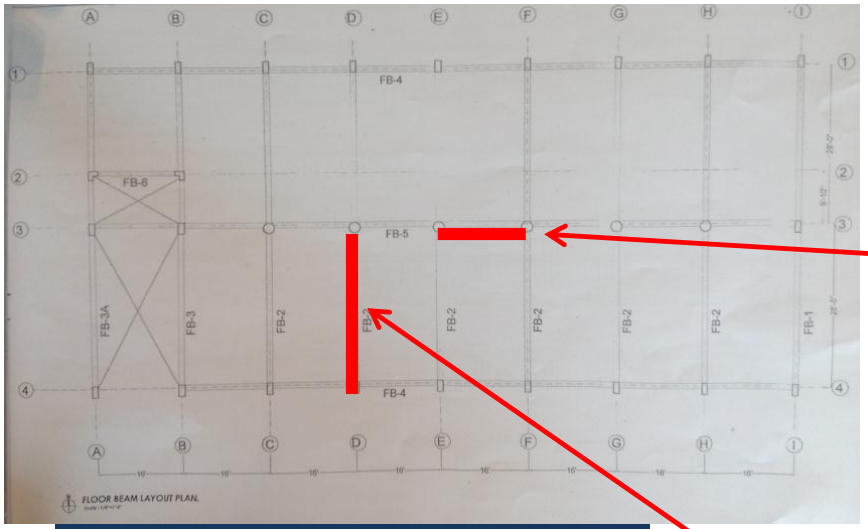
Hairline Cracking of Beams



8 storey building – Typical floor plan

Cracking in beam supporting 5th floor

Crack Locations

Cracking in beam supporting 2nd floor

All beam cracks to be reviewed by removing plaster to confirm that cracks do not extend into structure.

Hairline Cracking of Beams

Priority Actions

Problems Observed

1: Columns in the 4 and 6 storey buildings appear to be critically stressed
2: Columns in the 8 storey building appear to be stressed in excess of normal design limits
3: Management of storage loads
4: Inconsistencies between structural drawings and the as-constructed arrangement of the factory
5: Water ingress through structure
6: Hairline cracking in beams

Item No.	Observation	Recommended Action Plan	Recommended Timeline
1	Columns in the 4 and 6 storey buildings appear to be critically stressed	Water tank on 4 storey building should be emptied and the tank structure removed	**Immediate - Now**
2	Columns in the 4 and 6 storey buildings appear to be critically stressed	Ensure existing floor loads are not increased	**Immediate - Now**
3	Columns in the 4 and 6 storey buildings appear to be critically stressed	A Detail Engineering Assessment (DEA) to be commenced for both the 4 and 6 storey buildings - see attached Scope	**Immediate - Now**
4	Columns in the 4 and 6 storey buildings appear to be critically stressed	Detail Engineering Assessments to be completed	**6-weeks**
5	Columns in the 4 and 6 storey buildings appear to be critically stressed	Factory Engineer to review design, loads and columns stresses for all three buildings (four, six and eight storey buildings).	**6-weeks**
6	Columns in the 4 and 6 storey buildings appear to be critically stressed	Verify insitu concrete strengths (using min. 4 no. 100mm dia. cores) and existing reinforcement for all columns	**6-weeks**
7	Columns in the 4 and 6 storey buildings appear to be critically stressed	Produce and actively manage a loading plan for all floor plates within all buildings, giving consideration to floor capacity and column capacity. This should include a safe level to which water tanks can be filled.	**6-weeks**
8	Columns in the 4 and 6 storey buildings appear to be critically stressed	Continue to implement load management plan (See Item 3)	**6-months**

Detail 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 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	Columns in the 8 storey building appear to be stressed in excess of normal design limits	Factory Engineer to review design, loads and columns stresses in 8 storey building	**6-weeks**
10	Columns in the 8 storey building appear to be stressed in excess of normal design limits	Verify insitu concrete strengths (using min. 4 no. 100mm dia. cores) and existing reinforcement for all columns	**6-weeks**
11	Columns in the 8 storey building appear to be stressed in excess of normal design limits	Produce and actively manage a loading plan for all floor plates giving consideration to floor capacity and column capacity. This should include a safe level to which water tanks can be filled	**6-weeks**
12	Columns in the 8 storey building appear to be stressed in excess of normal design limits	Continue to implement load management plan (See Item 3)	**6-months**
13	Management of storage loads	Produce and actively manage a loading plan for all floor plates within the factory giving consideration to floor capacity and column capacity	**6-weeks**
14	Management of storage loads	Continue to implement load management plan	**6-months**

Item No.	Observation	Recommended Action Plan	Recommended Timeline
15	Inconsistencies between structural drawings and the as-constructed arrangement of the factory	Building Engineer to survey as-constructed buildings. Updated drawings to be prepared showing the correct as-constructed layout	**6-weeks**
16	Inconsistencies between structural drawings and the as-constructed arrangement of the factory	Prepare/update calculations showing the structural adequacy of the building structure taking into account the factory design imposed loading and the as-built structure	**6-months**
17	Inconsistencies between structural drawings and the as-constructed arrangement of the factory	Prepare controlled loading plans for all floors designating where storage can / cannot be placed (see Item 3)	**6-months**
18	Water ingress through structure	Building engineer to access extent and cause of water ingress and implement preventative measures to protect the structure from any further damage	**6-weeks**
19	Water ingress through structure	Continue to monitor structure for water ingress on an on-going basis	**6-months**
20	Hairline cracking of beams	Sections of plaster finish to beams to be removed to investigate if cracks penetrate the building structure. Building Engineer to review further if cracks are found to penetrate into building structure	**6-weeks**
21	Hairline cracking of beams	Carry out repair remedial works as required	**6-weeks**
22	Hairline cracking of beams	Continue to monitor for cracking on an on-going basis	**6-months**