Jeans Plus Ltd
Khalifa Apparels Ltd

Plot No-398, Sreepur Bus Stand, Ganakbari, Savar, Dhaka
(23.960985N 90.269380E)

13 May 2014

ACCORD on Fire and Building Safety in Bangladesh

ARUP

Observations

Heavy loading on slabs from finishes build-up in toilets, storage and water tanks

- Heavy slab loading was noted in (A) toilet areas (up to 420mm average build-up) and (B) on 2nd floor slab (about 4-5 kPa).
- We were also advised that there was up to 14,000 litres of water tanks on the roof to the stairs, but this could not be verified as there was no safe access.

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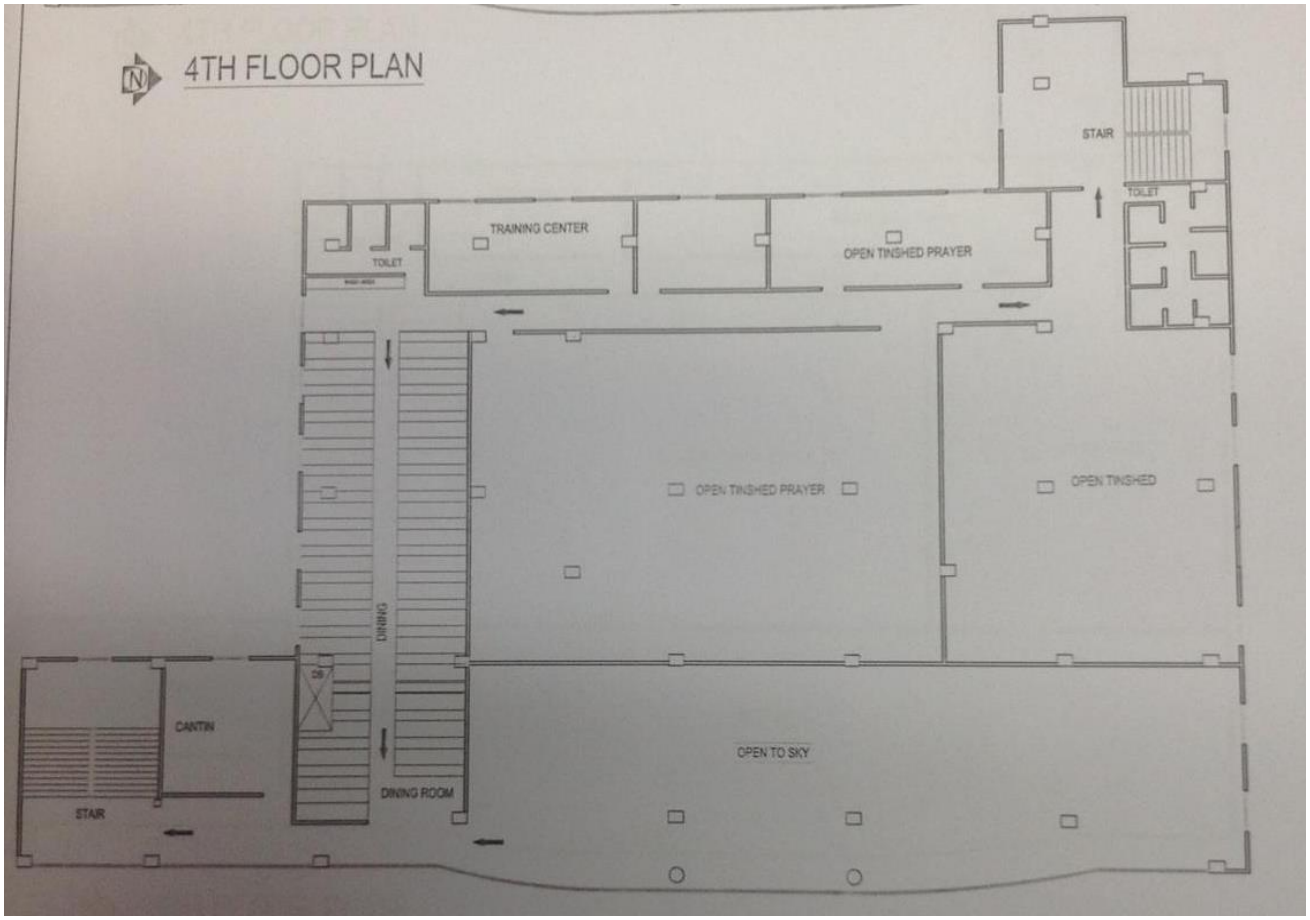
Non-engineered steel/bamboo sheds and roof

- The roof to both the 5th floor and the various sheds round the building are non-engineered, and are unlikely to be able to withstand strong winds.

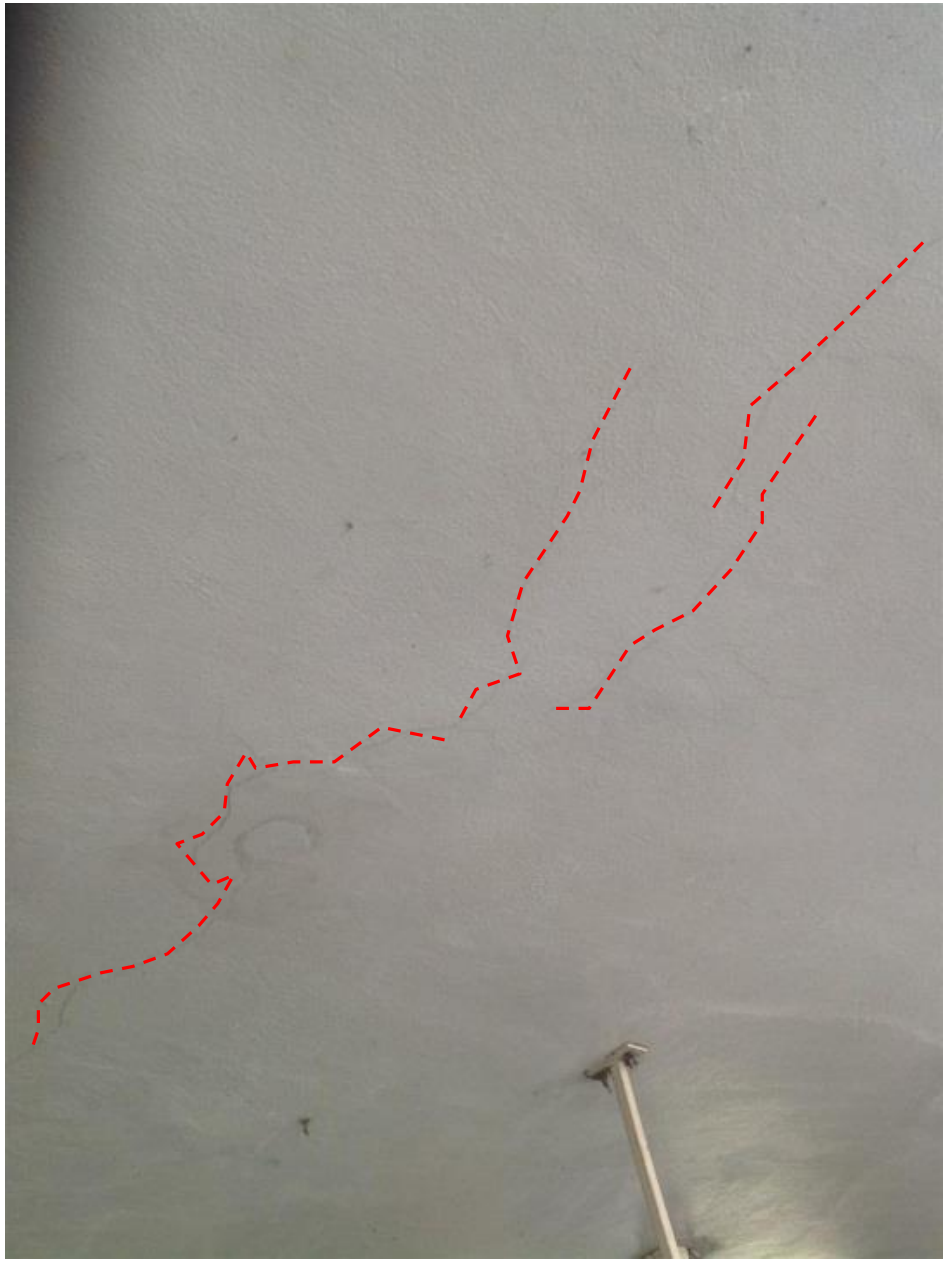
Very irregular column layout



- The column layout is highly irregular and there is also a huge variation in column sizes.
- The column layout does not precisely match the drawings
- The drawings were signed 3 years after construction
- Only part of the building shown on the drawings has actually been built

This all suggests that the building may not have been properly engineered.

Flexural cracking to the 5th floor soffit



There is hairline flexural cracking throughout the 5th floor soffit.

Brick aggregate in columns

Removal of the plaster at ground floor revealed brick aggregate concrete.

Priority Actions

Problems Observed

1. Factory Building - high column stresses in columns supporting toilets and storage
2. Factory Building - high punching shear stresses in flat slabs
3. Non-engineered 5th floor roof (Factory Building) and steel/bamboo sheds
4. Factory Building - cracking to soffit of 5th floor slab

Item No.	Observation	Recommended Action Plan	Recommended Timeline
1	Verify concrete strengths in columns supporting (a) toilets in NW corner of factory and (b) 2nd floor storage	4m zone next to toilets on all floors in factory building to be emptied of all storage and equipment, with access only to toilet area, shown in full report.	**Immediate - Now**
2	Verify concrete strengths in columns supporting (a) toilets in NW corner of factory and (b) 2nd floor storage	Building Engineer to review design, loads and columns stresses in the area identified in Full report.	**Immediate - Now**
3	Verify concrete strengths in columns supporting (a) toilets in NW corner of factory and (b) 2nd floor storage	Verify insitu concrete stresses either by 100mm diameter cores or existing cylinder strength data for the identified columns. Building Engineer to determine a safe location for coring.	**Immediate - Now**
4	Verify concrete strengths in columns supporting (a) toilets in NW corner of factory and (b) 2nd floor storage	A Detail Engineering Assessment of Factory to be commenced, see attached Scope.	**Immediate - Now**
5	Verify concrete strengths in columns supporting (a) toilets in NW corner of factory and (b) 2nd floor storage	Produce and actively manage a loading plan for all floor plates within the factory giving consideration to floor capacity and column capacity.	**6-weeks**
6	Verify concrete strengths in columns supporting (a) toilets in NW corner of factory and (b) 2nd floor storage	Detail Engineering Assessment to be completed.	**6-weeks**
7	Verify concrete strengths in columns supporting (a) toilets in NW corner of factory and (b) 2nd floor storage	Continue to implement load plan.	**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
8	High punching shear stress in flat slabs throughout the factory building	4m zone next to toilets on all floors to be emptied of all storage and equipment, as noted in Item 1.	**Immediate - Now**
9	High punching shear stress in flat slabs throughout the factory building	As part of Detail Engineering Assessment (see Item 1), Building Engineer to review design, loads and punching shear stresses throughout the factory building.	**Immediate - Now**
10	High punching shear stress in flat slabs throughout the factory building	Verify insitu concrete stresses in flat slabs either by minimum of 4 no. 100mm diameter cores or existing cylinder strength data. Building Engineer to determine safe location for cores to be taken.	**Immediate - Now**
11	High punching shear stress in flat slabs throughout the factory building	Review of punching shear stresses to be incorporated in loading plan (see Item 1).	**6-weeks**
12	High punching shear stress in flat slabs throughout the factory building	Continue to implement load plan.	**6-months**
13	Non-engineered 5th floor roof (Factory) and steel/bamboo sheds	Building Engineer to check design of 5th floor roof and steel/bamboo sheds against code vertical and wind loads	**6-weeks**
14	Non-engineered 5th floor roof (Factory) and steel/bamboo sheds	Structures to be upgraded as required following design check, or they should be vacated and removed.	**6-months**
15	Cracking to soffit of 5th floor slab in factory building	Building Engineer to assess cracking as part of Detail Engineering Assessment (see Item 1).	**6-weeks**
16	Cracking to soffit of 5th floor slab in factory building	Building Engineer to propose remedial work if necessary.	**6-months**