Sharmin Apparels Ltd.
Sharmin Fashions Ltd.
Ha-Meem Washing Plant Ltd.
Sharaf Apparels Ltd.

Narashinghapur, Ashulia, Savar, Dhaka
(+23.932017N, 90.306716E)
08 April 2014

ACCORD on Fire and Building Safety in Bangladesh ARUP

Observations
Main Garment Factory

ACCORD on Fire and Building Safety in Bangladesh

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Issues highlighted in BUET Structural Assessment Report

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Repairs to cracking on soffit of 5th floor

Cracking on ground floor adjacent to column

Building Engineer to carry out a Detail Engineering Assessment including:

- Review of remedial works carried out to date.
- Detailed remedial scheme for any further works, including foundation remedial works, required to ensure that the existing 5 storey building is provided with an adequately robust structural system.
- Documentation of load limitations and preparation of Floor Loading Plans for strict compliance during factory operations.
- Implications of the under-reinforced zones within the post tensioned floor slabs.
- Details of the strengthening works required to the existing structure and foundations if further storeys are to be constructed.

Issues highlighted in BUET Report

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Stability of external brick wall piers to resist lateral loads

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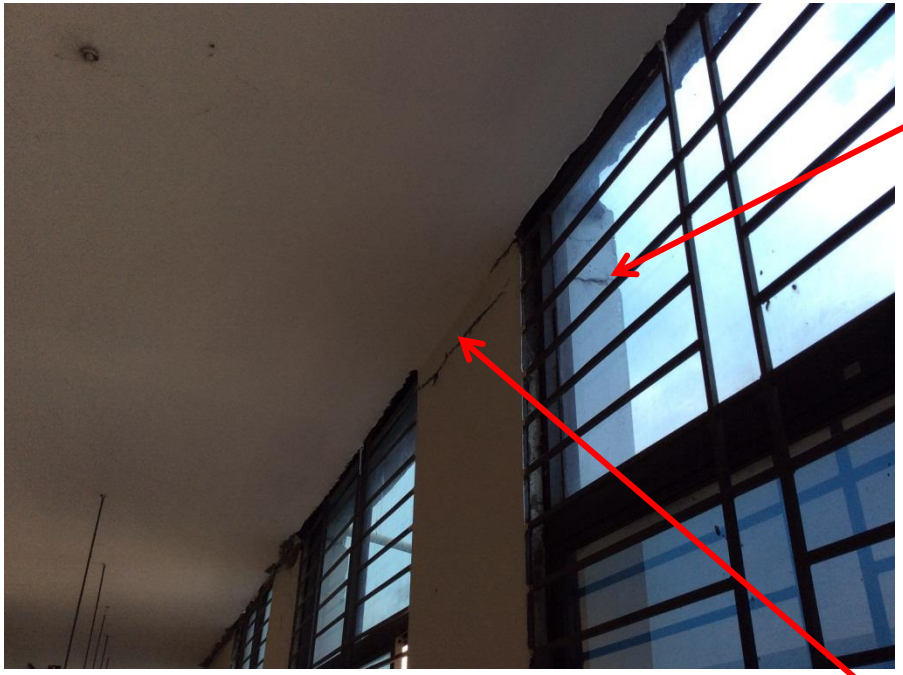

Crack penetrates to outside face of pier at underside of 5th floor

Building Engineer to check that the piers have adequate capacity to resist lateral loads

4th floor appears to be deflecting more relative to the 5th floor (roof) causing the pier to separate from the underside of the roof.

Stability of external brick wall piers

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Cracking in the pier observed throughout

Main Garment Factory - East Elevation

Building Engineer to check that the piers have adequate capacity to resist lateral loads.

Stability of external brick wall piers

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Cracking in RC beams and soffit of PT floor slabs

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Numerous examples of cracking in RC perimeter beams

Cracking in beams to be reviewed by removing plaster to confirm that cracks do not extend into structure.

Cracking in RC Beams

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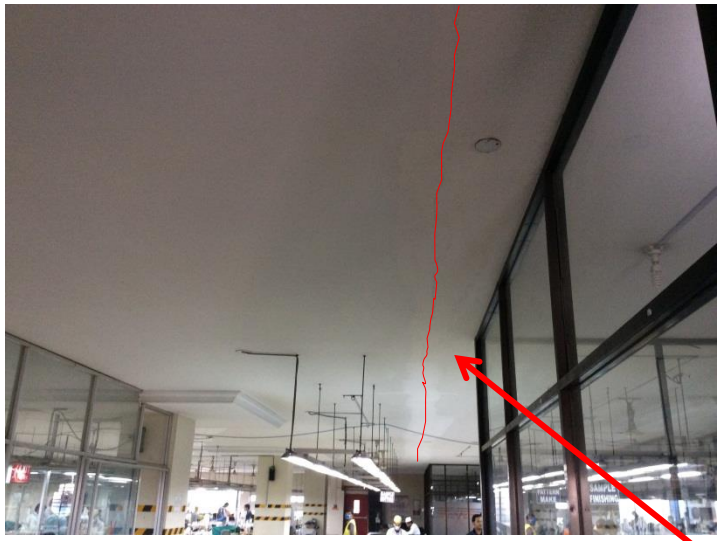

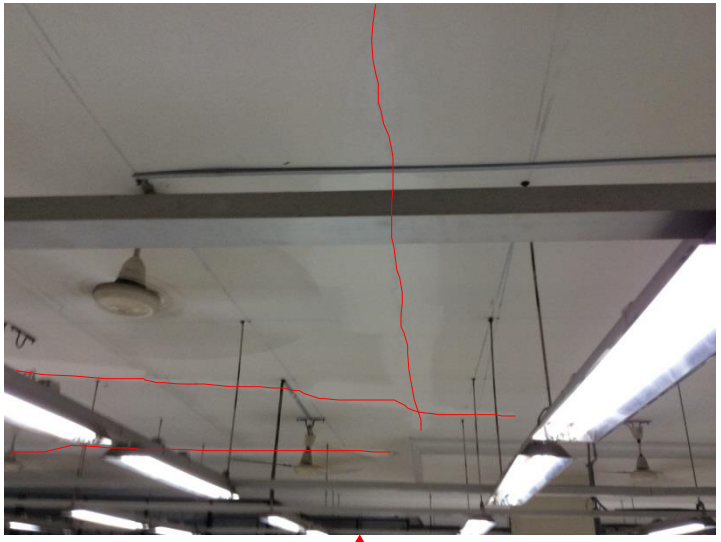

Numerous examples of cracking and evidence of repair to cracking on soffit of floor slabs

Underside of roof being strengthened as recommended by BUET

Cracking in soffit of flat slabs to be reviewed by removing plaster to confirm that cracks do not extend into structure.

Cracking to underside of PT slab

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Cracking in internal brickwork walls

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ARUP

Numerous examples of cracking and evidence of repair to cracking

Cracking in internal brickwork wall

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Lightweight steel roof construction to stairs

Lightweight steel roof structure.
Building Engineer to review adequacy of roof structure to resist high wind loading

Lightweight Roof Construction

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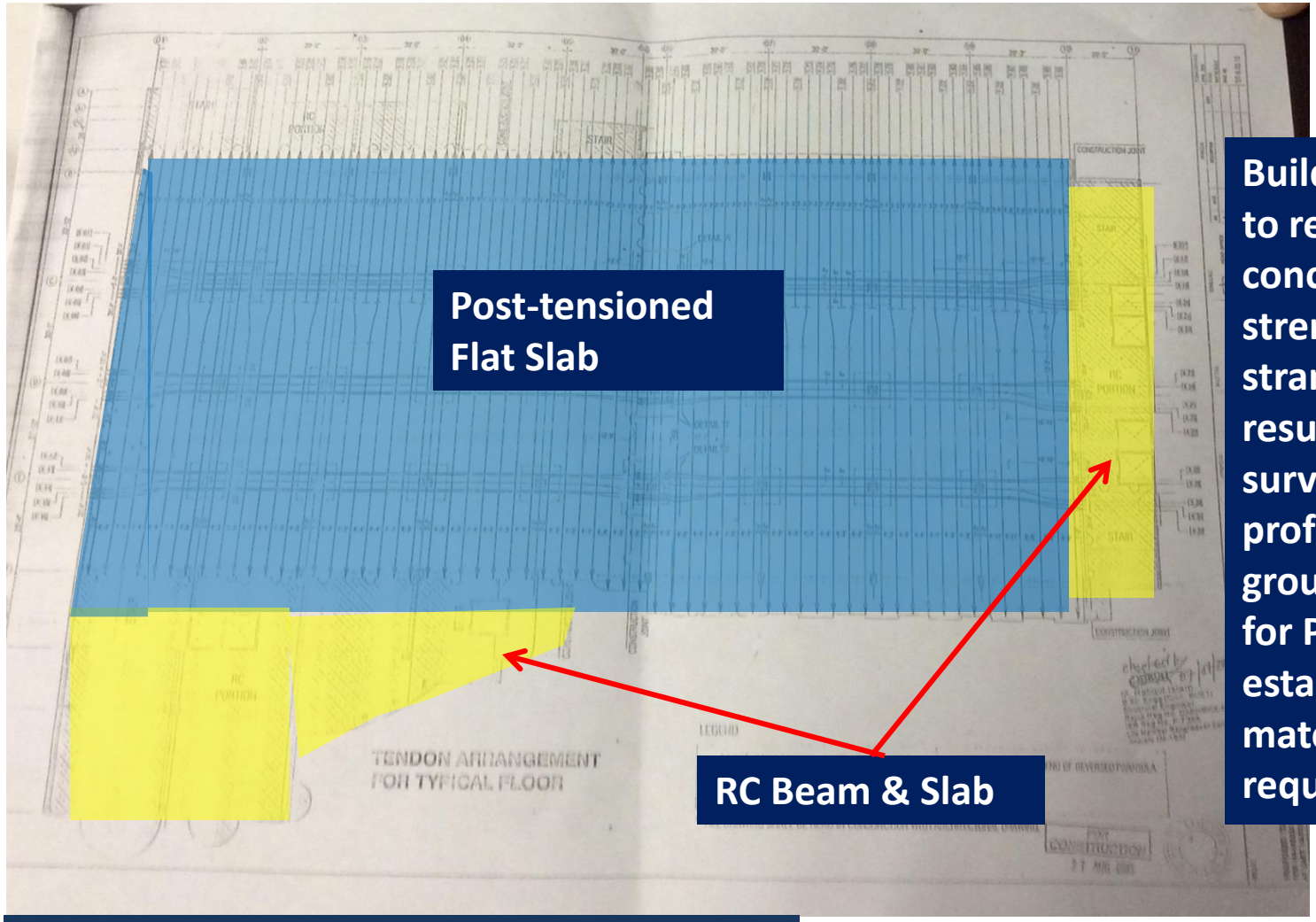
Post-tensioned floor slab construction requires a high level of quality control during construction



Typical Floor Slab and Tendon Layout

Building Engineer to review concrete cylinder strength records, strand extension results, as-surveyed cable profiles and grouting records for PT slabs to establish if these match design requirements

P.T Floor Slab – Quality Records

ACCORD on Fire and Building Safety in Bangladesh

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Observations

Washing & Garments Building

Management of storage loads

Bonded Warehouse

Storage of Finished Goods

Washing & Garments Building Load Management

Building Engineer to prepare controlled loading plans, based on floor slab and column capacity, for all floors which will designate storage density and where storage may be placed.

Priority Actions

Problems Observed

Main Garment Factory

1. BUET Report – updated Structural Assessment Report required
2. Stability of external brick wall piers to resist lateral loads
3. Cracking in RC beams and soffit of P.T floor slabs
4. Cracking in internal brickwork walls
5. Lightweight steel roof construction to stairs
6. Post tensioned floor slab construction requires a high level of quality control during construction

Washing & Garments Building

7. Management of storage loads

Item No.	Observation	Recommended Action Plan	Recommended Timeline
1	BUET Report – Detail Engineering Assessment required for Main Garment Factory	Commence preparation of Detail Engineering Assessment	**Immediate - Now**
2	BUET Report – Detail Engineering Assessment required for Main Garment Factory	Detail Engineering Assessment to be completed.	**6-weeks**
3	BUET Report – Detail Engineering Assessment required for Main Garment Factory	Produce and actively manage a loading plan for all floor plates within the factory giving consideration to foundation, floor and column capacity.	**6-weeks**
4	BUET Report – Detail Engineering Assessment required for Main Garment Factory	Continue to implement load plan	**6-months**
5	Stability of external brick wall piers to resist lateral loads	Sections of plaster finish to wall to be removed and extent of crack to be reviewed by Building Engineer	**Immediate - Now**
6	Stability of external brick wall piers to resist lateral loads	Cracks to be monitored by Building Engineer	**Immediate - Now**
7	Stability of external brick wall piers to resist lateral loads	Building Engineer to confirm whether walls rely on concrete structure for lateral support	**6-weeks**
8	Stability of external brick wall piers to resist lateral loads	If required, remedial works to be carried out.	**6-weeks**
9	Stability of external brick wall piers to resist lateral loads	Building Engineer to continue to monitor walls for cracking.	**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 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
10	Cracking in RC beams and soffit of P.T floor slabs	Sections of plaster finish to beams/slab to be removed to investigate if cracks penetrate the building structure.	**Immediate - Now**
11	Cracking in RC beams and soffit of P.T floor slabs	Existing crack injection and repair works to assessed by Building Engineer	**Immediate - Now**
12	Cracking in RC beams and soffit of P.T floor slabs	Building Engineer to monitor cracks and issue details of any further remedial works required.	**6-weeks**
13	Cracking in RC beams and soffit of P.T floor slabs	Carry out remedial works	**6-months**
14	Cracking in RC beams and soffit of P.T floor slabs	Building Engineer to continue to monitor cracks	**6-months**
15	Cracking in internal brickwork walls	Building Engineer to review cracking on an on-going basis and propose further remedial works , if required.	**6-weeks**
16	Cracking in internal brickwork walls	Building Engineer to continue to monitor cracks	**6-months**

Item No.	Observation	Recommended Action Plan	Recommended Timeline
17	Check required to confirm that lightweight steel roof to the stairs is adequately designed to resist high wind loading	Design of steel roof to stairs to be checked by the Building Engineer	**6-weeks**
18	Check required to confirm that lightweight steel roof to the stairs is adequately designed to resist high wind loading	If required, upgrade roof to support code vertical and wind loads.	**6-weeks**
19	Post-tensioned floor slab construction requires a high level of quality control during construction	Survey typical PT tendon top and bottom covers in slab to confirm that profile of cables matches the design requirements	**6-weeks**
20	Post-tensioned floor slab construction requires a high level of quality control during construction	Building Engineer to review concrete cylinder strength records, strand extension results, as-surveyed cable profiles and grouting records for PT slabs to establish if these match design requirements	**6-weeks**
21	Post-tensioned floor slab construction requires a high level of quality control during construction	This will be required as an input to the controlled loading plans	**6-weeks**
22	Post-tensioned floor slab construction requires a high level of quality control during construction	As part of Detail Engineering Assessment – confirm allowable load for floor slabs	**6-weeks**
23	Management of storage loads	Produce and actively manage a loading plan for all floor plates within the Washing & Garments Building giving consideration to floor capacity and column capacity.	**6-weeks**
24	Management of storage loads	Continue to implement load management plan	**6-months**