PN Composite Ltd.

Ambagh, Konabari,Gazipur
(24.0201 N, 90.32127 E)

13 April 2014

ACCORD on Fire and Building Safety in Bangladesh

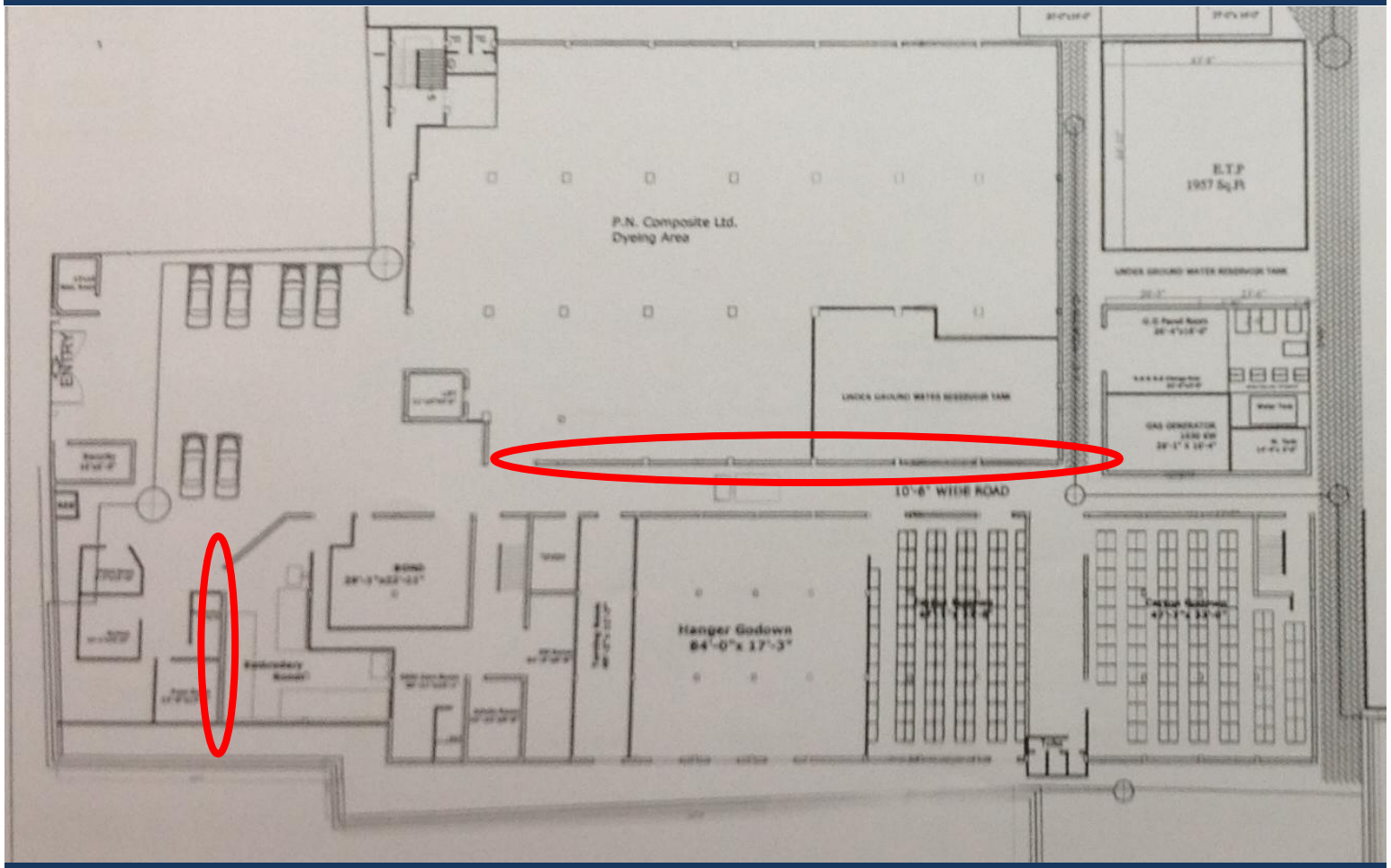
ARUP

Observations

High stress levels in columns

Observations

Outline calculations indicate the circled columns below are highly stressed under their current loading condition.



High stress levels in columns

Observations

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Cracking in corbel column

Observations

Cracking in corbel column

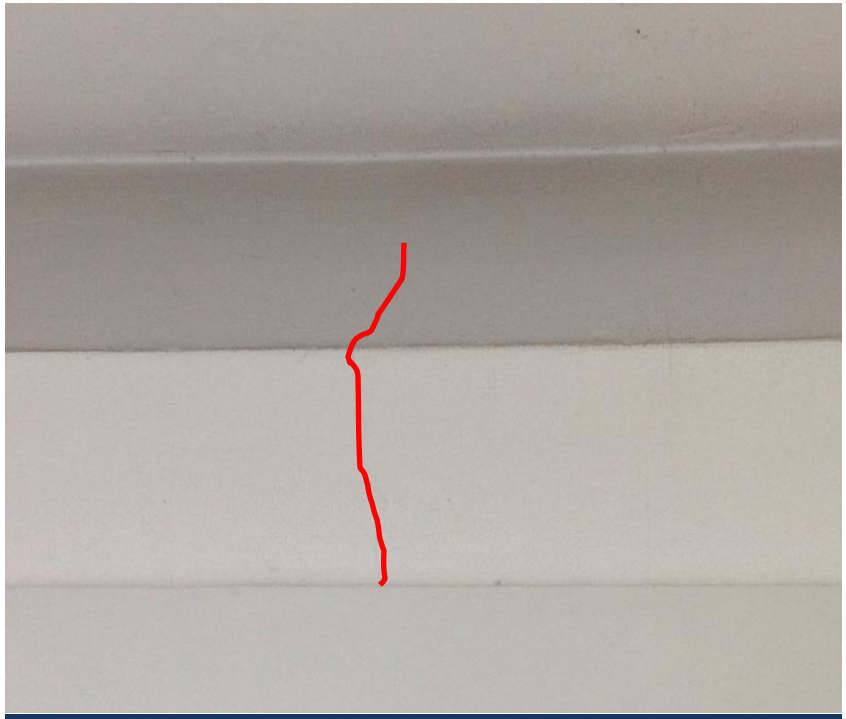
Cracking was observed from Level 2 in the corbel column.

Observations

Cracking in beams and slabs

Observations

Cracking was observed in beams and/or floor slabs at most levels.



Cracking in beam

Cracking in slab

Observations

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Cracking was observed at the two expansion joint locations in the slabs and beams.

Cracking in beam

Cracking in slab

Observations

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Discrepancies between drawings and actual observations

Observations

Discrepancies between drawings and actual observations

Flat slab at Level 3 Ceiling

Several observations in the main factory building did not correlate with the information presented in the structural drawings.

A non-exhaustive list of discrepancies includes:

- Structural system (beams vs. flat slab)
- Beam locations
- Column sizes
- Grid dimensions

Missing beam

Observations

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Water Tank slab alteration

Observations

A portion of the water tank slab is being raised to create head-room for stair access onto the roof.

Water tank slab alteration

Observations

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Apparently non-engineered structures

Observations

Apparently non-engineered structures

Steelwork supported on smaller brick piers

Non-engineered connection

Many structures on site appeared to be non-engineered.

A non-exhaustive list of observations includes:

- Large wall panels
- Unclear load path
- Steelwork supported on smaller brick piers
- Lack of roof bracing
- Roof purlin which has been cut
- Non-engineered connection from column to roof

Observations

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Apparently non-engineered structures

Lack of roof bracing

Unclear load path

Cut roof purlin

Observations

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Priority Actions

Problems Observed

1. Stress levels in columns
2. Cracking in corbel column
3. Cracking in beams and slabs
4. Discrepancies between structural drawings and actual observations
5. Water Tank slab alteration
6. Apparently non-engineered structures

Item No.	Observation	Recommended Action Plan	Recommended Timeline
1	Stress levels in columns	Main Building: Temporarily cease all construction activities at Level 7. Ensure Level 6 remains unoccupied. Loading in the zone highlighted above to be limited to 1.5kN/m2 (Levels 2 to 5) and 2.5 kN/m2 (Level 1).	**Immediate - Now**
2	Stress levels in columns	Factory Engineer to review design, loads and stresses in all columns.	**Immediate - Now**
3	Stress levels in columns	Verify insitu concrete stresses either by 100mm diameter cores or existing cylinder strength data for cores from 4 columns. Verify grade of steel reinforcement used.	**Immediate - Now**
4	Stress levels in columns	A Detail Engineering Assessment of entire Main Building to be commenced - see attached Scope.	**Immediate - Now**
5	Stress levels in columns	Detail Engineering Assessment to be completed for complete building.	**6-weeks**
6	Stress levels in columns	Make structural alterations as advised by Engineer.	**6-weeks**
7	Stress levels in 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**
8	Stress levels in columns	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 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	Cracking in corbel column	Factory Engineer to investigate the corbel cracking, as part of the Detail Engineering Assessment (see Item 1)	**6-weeks**
10	Cracking in corbel column	Make any necessary structural alterations as directed by the Engineer.	**6-months**
11	Cracking in beams and slabs: mid-span and at movement joint	Factory Engineer to investigate if the cracking has any structural significance, as part of the Detail Engineering Assessment (see Item 1).	**6-weeks**
12	Cracking in beams and slabs: mid-span and at movement joint	Carry out any remedial work as directed by the Engineer.	**6-months**
13	Discrepancies between structural drawings and actual observations	Factory Engineer to update the drawings to "as constructed" status to reflect the actual site dimensions and column locations as part of the Detail Engineering Assessment. The drawings should show the integrated building (dyeing, garments and offices).	**6-weeks**

Item No.	Observation	Recommended Action Plan	Recommended Timeline
14	Water Tank slab alteration	Factory Engineer to check construction to ensure compliance with design intent.	**6-weeks**
15	Water Tank slab alteration	Make any alterations as directed by the Engineer.	**6-weeks**
16	Apparently non-engineered structures	Factory Engineer to check the capacity of the lightweight roofs to Shed Buildings and to Main Roof areas under horizontal and vertical loading, and make any necessary alterations.	**6-months**
17	Apparently non-engineered structures	Factory Engineer to check the capacity of the masonry wall panels under horizontal and vertical loading and make any necessary alterations.	**6-months**