

AKH Apparels Ltd.

133-134, Hernayetpur, Savar, Dhaka, Bangladesh
(23.794784N, 90.273399E)

21 June 2014



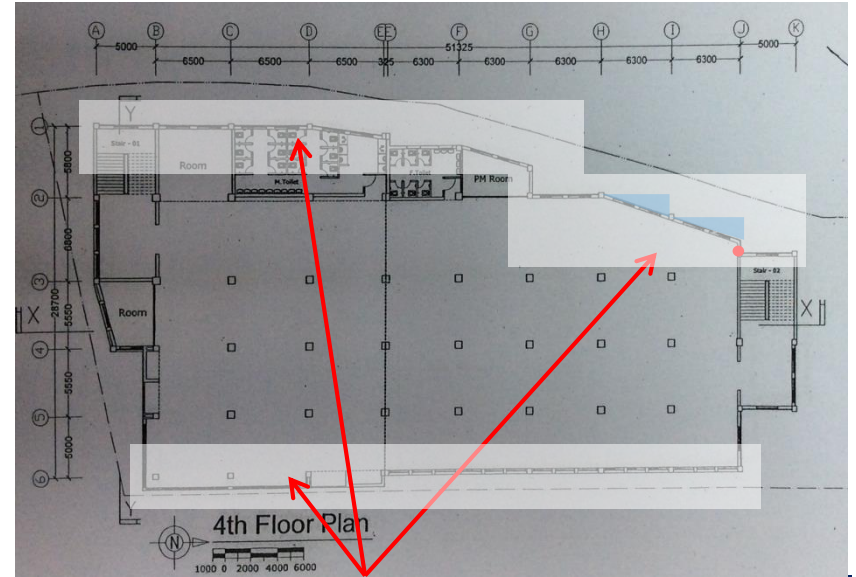
Observations

Highly Stressed Columns Building 1

Highly stressed columns Building 1



Stone aggregate visible in column at G Floor



Column at cantilevers and at building edge appear stressed at levels that require immediate review



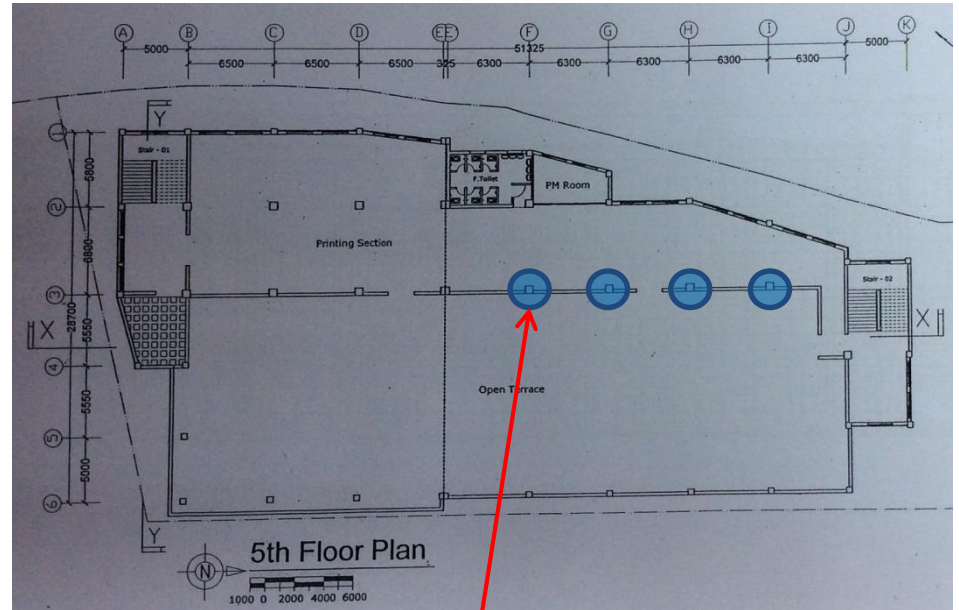
Observations

High Loading From Water Tanks on Roof Building 1

High loading from water tanks on roof Building 1



4 x 5000L water tanks with 485mm build up

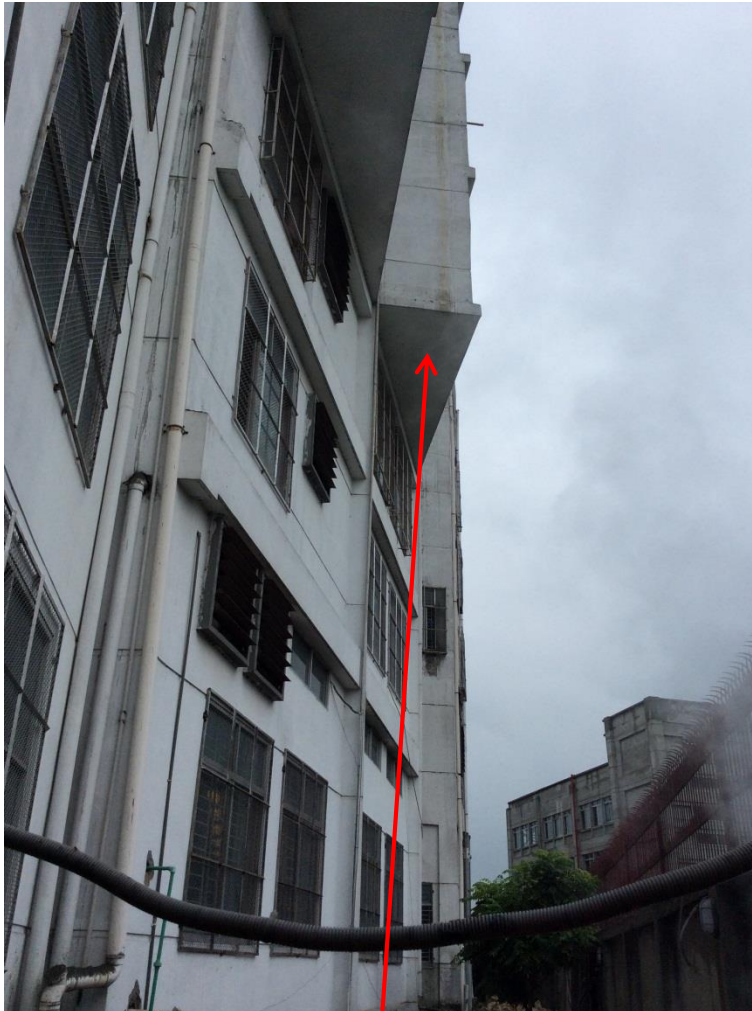


Water tank locations on roof Building 1

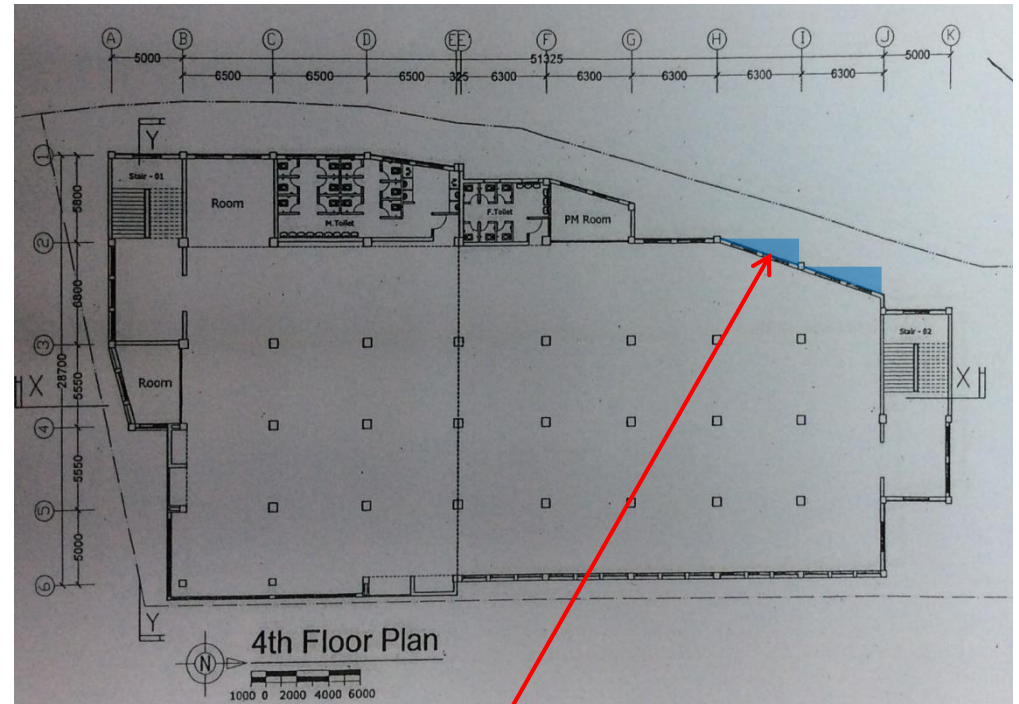
Observations

Stepped Cantilever on West Façade Building 1

Stepped cantilever on west façade



Cantilevers from L3 on West façade



Cantilevers on L3 – Roof not shown on drawings

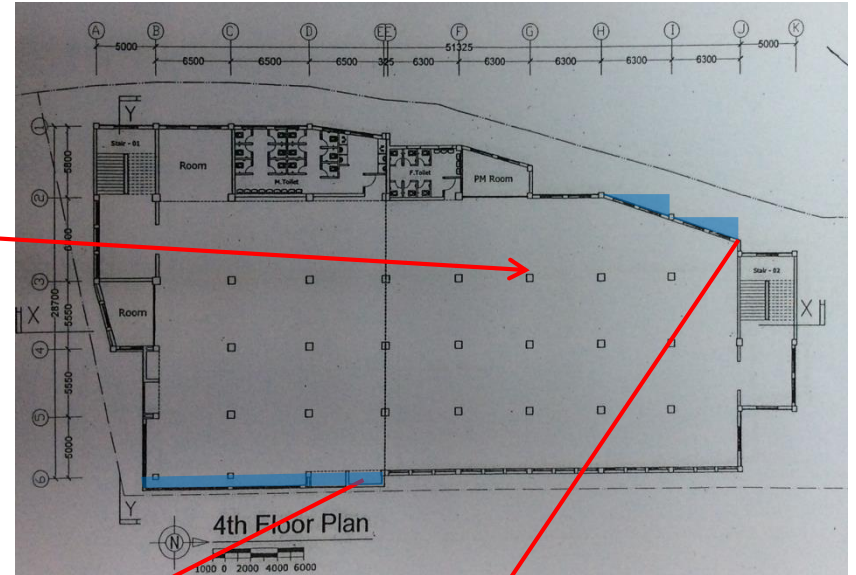
Observations

Cracking – Building 1

Cracking Building 1



Cracking and damp patch at column supporting water tank on roof



Cracking at cantilever east façade

Cracking in wall/beam at cantilever L5



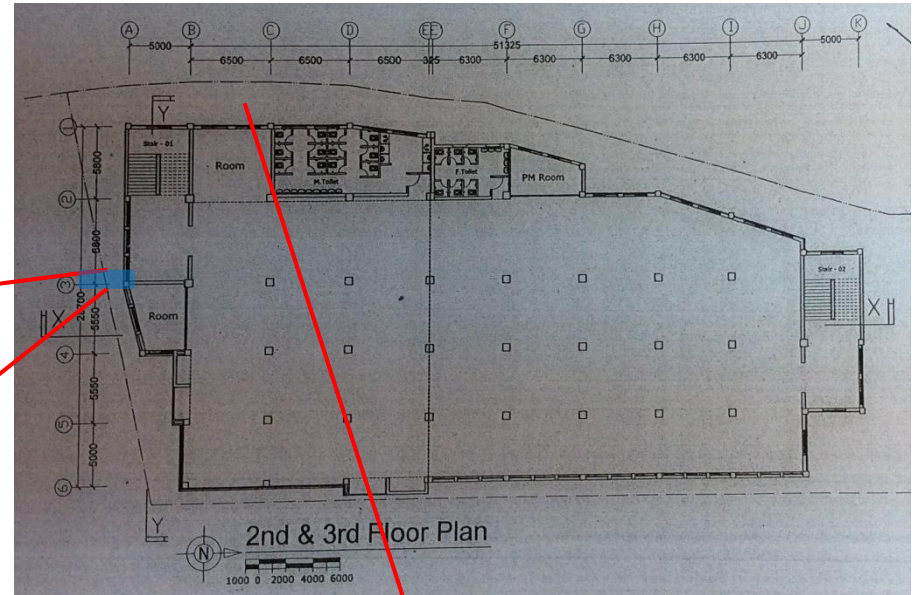
Observations

Bridge Between Buildings

Bridge between buildings



Steel bridge between Building 1 and other building (inspected by Alliance) - No drawings available



Currently constructing bridge between Building 1 and Building 2 – No structural drawings available



Observations

Steel Connections Building 2

Steel connections Building 2



Poorly welded bracing onto column



Bracing welded onto gusset plate of bracing in orthogonal direction



Typical bracing system - Tie not connected to column node

Bracing not in accordance with structural drawings:
Diagonal brace elements do not connect at nodes
Cross brace CHS replaced with cable

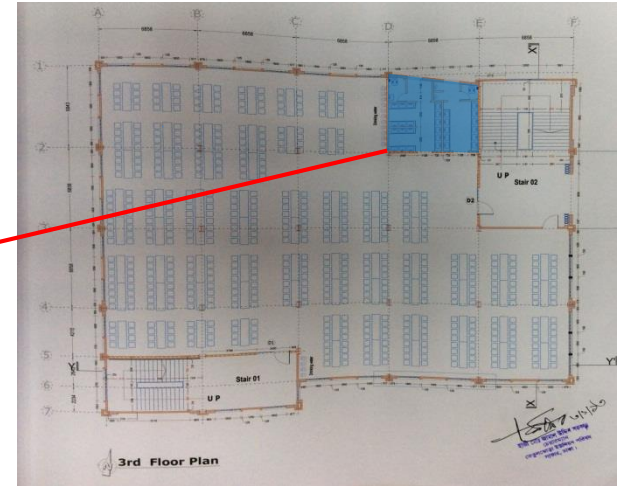
Observations

Heavy Loading Building 2

Heavy loading Building 2



Heavy loading from toilet plinths 210mm+170mm



Warehouse loading on GL, L2, and L3

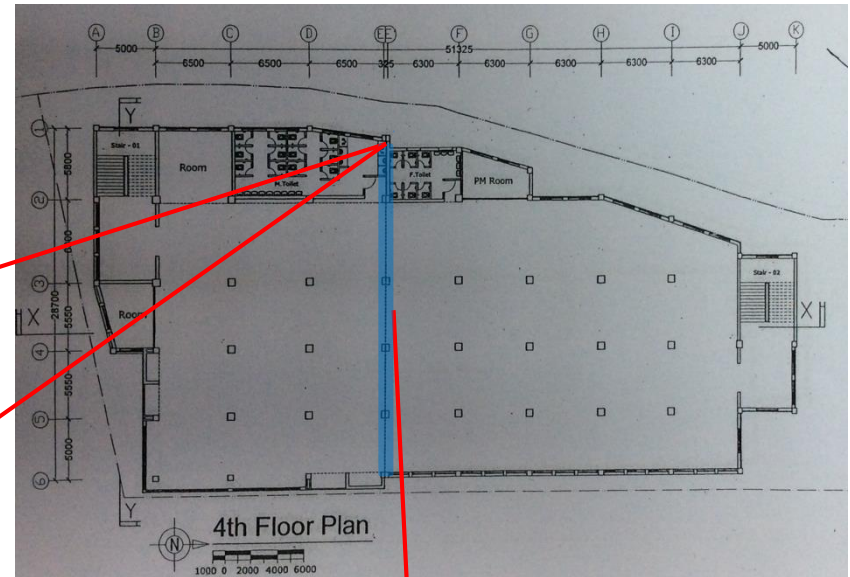
Observations

Uncontrolled Cracking Movement Joint Building 1

Uncontrolled cracking - movement joint



Uncontrolled cracking MJ in façade



Highlighted area indicates movement joint



Observations

ACCORD
on Fire and Building Safety in Bangladesh

ARUP

Priority Actions

Problems Observed

ITEM 1: Highly Stressed Columns Building 1

ITEM 2: High Loading From Water Tanks on Roof - Building 1

ITEM 3: Stepped cantilever on West façade – Building 1

ITEM 4: Cracking - Building 1

ITEM 5: Bridges between buildings

ITEM 5: Steel connections Building 2

ITEM 6: Heavy Loading Building 2

ITEM 7: Uncontrolled Cracking - Movement Joint - Building 1

Item No.	Observation	Recommended Action Plan	Recommended Timeline
1	Highly Stressed Columns Building 1	Factory Engineer to review design, loads and columns stresses in all columns.	Immediate - Now
2	Highly Stressed Columns Building 1	Verify insitu concrete strength by taking 100mm diameter cores from 4 No. basement columns. Verify reinforcement grade, diameter and number of bars in columns.	Immediate - Now
3	Highly Stressed Columns Building 1	A Detail Engineering Assessment of Building 1 to be commenced, see attached Scope	Immediate - Now
4	Highly Stressed Columns Building 1	Produce and actively manage a loading plan for all floor plates within the factory giving consideration to floor capacity and column capacity.	6-weeks
5	Highly Stressed Columns Building 1	Detail Engineering Assessment to be completed	6-weeks
6	Highly Stressed Columns Building 1	Continue to implement loading plan	6-months
7	High loading from water tanks Building 1	Building engineer to verify that column/beam/slab has sufficient capacity to support water tank as part of Detail Engineering Assessment.	6-weeks
8	High loading from water tanks Building 1	Produce and actively manage a loading plan for all floor plates within the factory giving consideration to floor capacity and column capacity.	6-weeks
9	High loading from water tanks Building 1	Continue to implement loading 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. This 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
10	Stepped cantilever on West façade in Building 1	Building engineer to provide detailed calculations that show that column/beam/slab has sufficient capacity to support cantilever load as part of Detail Engineering Assessment.	6-weeks
11	Stepped cantilever on West façade in Building 1	Building engineer to check, collect information and produce accurate and complete as-built documentation as part of Detail Engineering Assessment.	6-weeks
12	Cracking in Building 1	Sections of plaster finish to beams to be removed to investigate if cracks penetrate the building structure.	6-weeks
13	Cracking in Building 1	Building Engineer to carry out design check on beams as part of the Detail Engineering Assessment.	6-weeks
14	Cracking in Building 1	Carry out any remedial actions as directed by the Building Engineer.	6-months
15	Existing bridge and bridge under construction between buildings	Building engineer to provide detailed calculations that show the bridges are structurally adequate as part of Detail Engineering Assessment.	6-weeks
16	Existing bridge and bridge under construction between buildings	Building engineer to check, collect information and produce accurate and complete structural drawings as part of Detail Engineering Assessment.	6-weeks
17	Existing bridge and bridge under construction between buildings	Carry out any necessary structural alterations as advised by the Building Engineer.	6-months

Item No.	Observation	Recommended Action Plan	Recommended Timeline
18	Steel connections Building 2	Building engineer to check connection capacities including gusset bending and shear of bracing system and propose additional strengthening, if required.	6-weeks
19	Steel connections Building 2	Review adequacy of cable bracing in stair core.	6-weeks
20	Steel connections Building 2	Implement connection strengthening and any other remedial structural works if directed by the Building Engineer.	6-months
21	Heavy Loading Building 2	Building engineer to check slab, beam and column capacity.	6-weeks
22	Heavy Loading Building 2	Produce and actively manage a loading plan for all floor plates within the Building giving consideration to floor capacity and column capacity.	6-weeks
23	Heavy Loading Building 2	Continue to implement loading plan.	6-months
24	Uncontrolled Cracking - Movement Joint - Building 1	Carry out remedial work to movement joint as directed by the Building Engineer.	6-months