

Revision: Issue 1
Date: 9th February 2015

Category Green

Habitus Fashion Limited

Gajariapara, Bhawal Mirzapur, Gazipur-1703

(24°05'14.5" N, 90°22'59.1" E)

08 February 2015

Structural Inspection Report

Authors: John Flaherty

Checked by: John Flaherty

Approved by: John Flaherty



Executive Summary

On the 8th February 2015 Mr John Flaherty and Connor McGrath of Arup carried out a visual structural survey of the **Habitus Fashions Ltd.** factory at the address and coordinates given on the cover page of this report.

We met with factory management including Mr. Ruhul Abrar (Managing Partner) and Eng. Mir Enayet Hossain (Zen Consultants).The building is a purpose built facility on a campus site. The Campus comprises a 6 storey Office Building, 6 storey Factory Building, 2 storey Energy Building, and a 6 storey Domestic and Welfare building. The domestic/welfare building is referenced security building on the drawings

The Factory Building 2 was constructed first, followed closely by the Office Building 1. Both buildings are interconnected. At the time of the inspection both buildings were still being fitted out. Construction commenced in June 2013. The floors are used for light factory operations including offices, cutting, sewing, finishing and accessories storage. There was storage noted on two of the floors with large areas of the building unused. The energy centre and Domestic buildings were substantially complete with only minor fitout works to be done. We inspected all areas of the building.

We were presented with the following documentation:

- Permit drawings 2013 approved by the Local Authority.
- Structural drawings by Zen Consulting engineers Nov 3013
- Soils reports Delta Soil Engineers Feb 2013
- Concrete Cylinder test results
- Architectural Layouts by Indigenous Architects 2013

Executive Summary (Continued)

There was close correlation between all of the drawings and the as-built structure with only minor alterations noticed on site.

The soil report recommended pile foundations and these were reflected on the structural drawings. It was not possible to verify the use of pile foundations.

The concrete test results showed a concrete consistently in excess of the design strength to 25kPa
Stone Chip aggregate was proven on site in two locations

A high level and non exhaustive list of key concerns are:

Office (Building 1)

Partially constructed expansion joint between Office building and Factory building

Minor variation between structural drawing and As-built. (beam omitted on underside of roof)

Water tanks on the staircores were of unusual construction

Factory (Building 2)

No Loading plans

Build up in toilet areas

Water tanks noted on the staircores were of unusual construction

Domestic/Welfare and Energy centre(Building 3)

Water tank of unusual construction

Executive Summary (Continued)

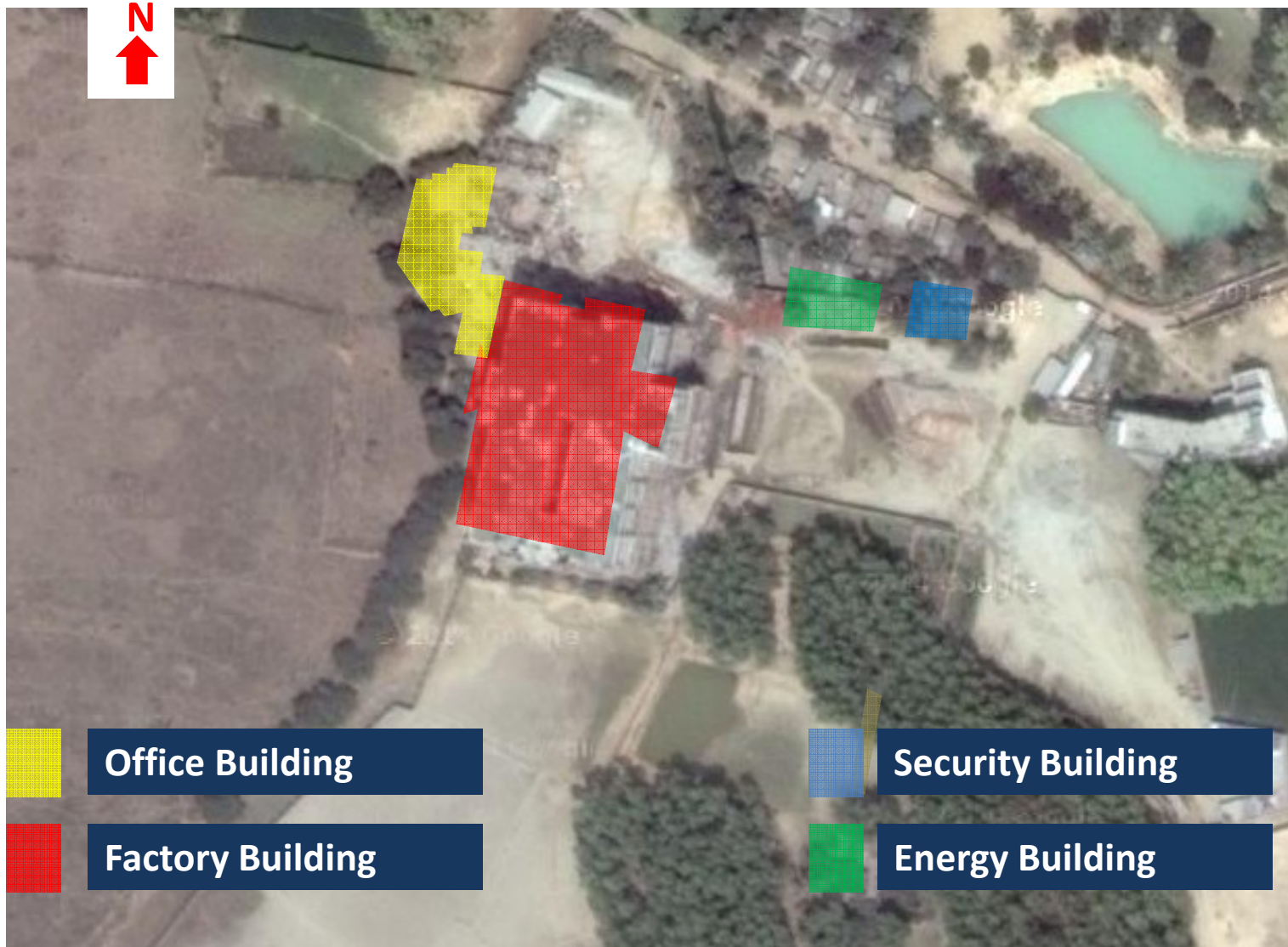
We see no reason to suspend operations in the Building due to structural concerns (subject to the required actions noted at the end of this report).

Further actions with associated priorities and timeframes are given at the end of this report. Please note that these actions should be completed as soon as practically possible and certainly within the time frame noted.

We have reviewed the property from an outline seismic perspective and would consider that the building, along with many others in the Dhaka region, to be at significant risk in a major Seismic event.

Our Limitations and Assumptions are also noted at the end of this report.

Building Extents



Building Extents

Building 1: Factory Building



Front Elevation of Factory Building (North)



East Elevation of Factory Building

Building 2: Office Building



Front Elevation of Office Building
(North)



East Elevation of Office Building connected with
Factory Building

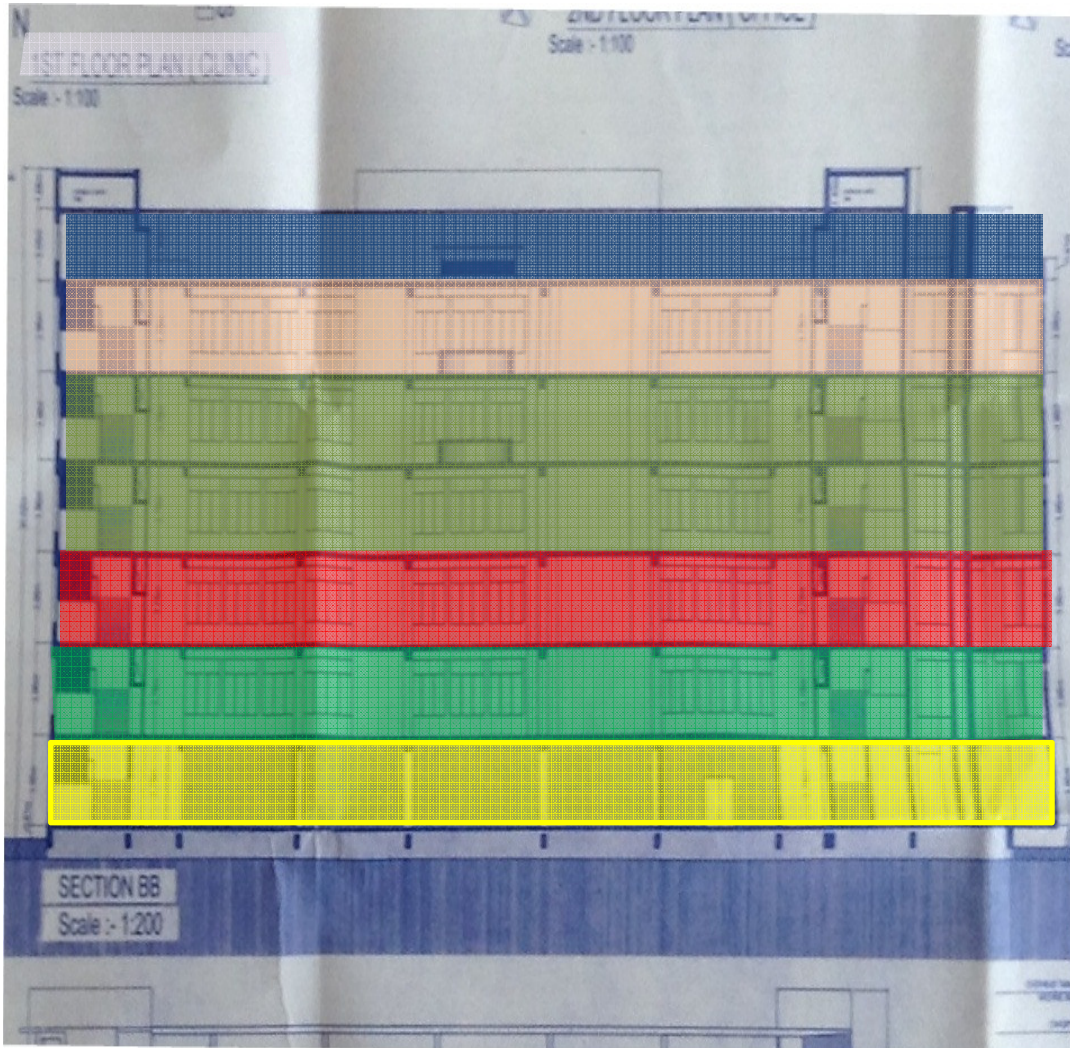
Building 3: Energy Building & Security Building



Energy Building & Security Building (South-West View)









Front Elevation of Security Building (East)



Front Elevation of Factory Building

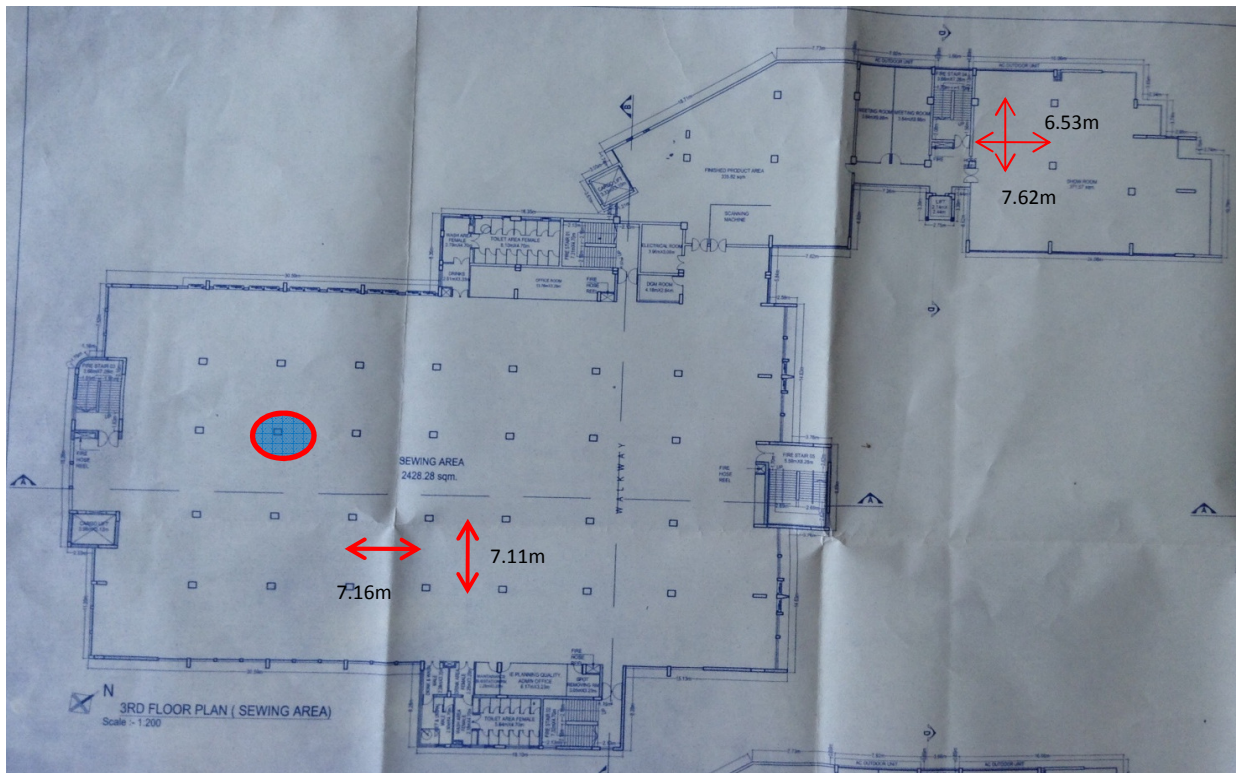
Floor Uses

-  Roof free from activity
-  5th currently unused. Proposed for Sewing Area
-  3rd floor to 4th floor is currently used for Storage but proposed use is for Sewing Area.
-  2nd floor is used as Sewing Area as per drawing.
-  1st Floor is used for cutting Area.
-  Ground floor is used for Finished Product Storage.

Building Extents

Building Extents

Structural System



Factory and Office building (3rd Floor Plan)

Structural System:
R.C. Beam-Column Frame System.

Stability System:
Provided by moment frame action.

Slab thickness: 200mm + 40mm finishes

Concrete aggregate: Stone Chips noted in one column tested

Grid size :
Typical 7.16m x 7.11m (Factory)
Typical 7.62m x 7.53m (Office)

Column size:
Typical 0.73m x 0.64m

Beam size :
0.35m width x 0.42 m depth

Structural System

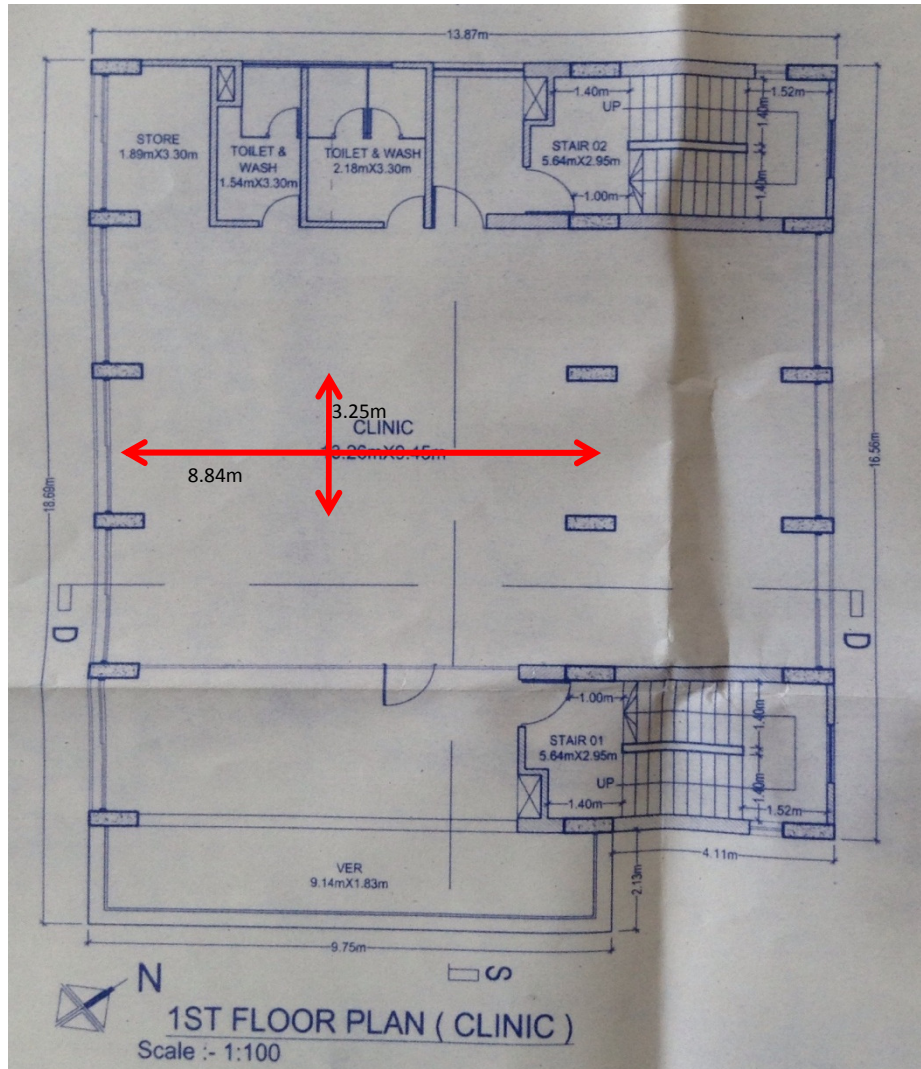


Typical Internal Bay: two way spanning slab (Factory Building)



Frame system (2nd Floor, Factory Building)

Structural System



**Domestic/welfare building (1st Floor Plan)
(security building)**

Structural System

Structural System:
R.C. Beam-Column Frame System.

Stability System:
Provided by moment frame action.

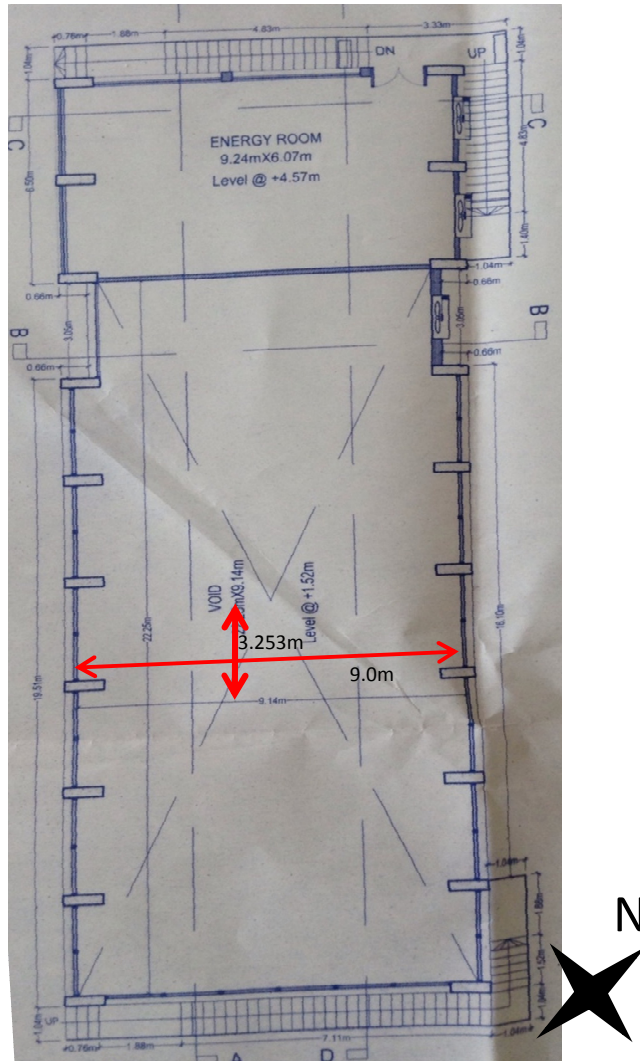
Slab thickness: 200mm + 40mm
finishes

Concrete aggregate: Stone Chips

Grid size :
Typical 8.84m x 3.25m

Column size:
Typical 0.61m x 0.3m

Beam size :
0.35m width x 0.42 m depth



Energy building (1st Floor Plan)

Structural System

Structural System:
R.C. Beam-Column Frame System.

Stability System:
Provided by moment frame action.

Slab thickness: 200mm + 40mm finishes

Concrete aggregate: Stone Chips noted in one column tested

Grid size :
Typical 9.0m x 3.253m

Column size:
Typical 0.61m x 0.3m

Beam size :
0.35m width x 0.42 m depth



Energy Building (Grd. Floor)



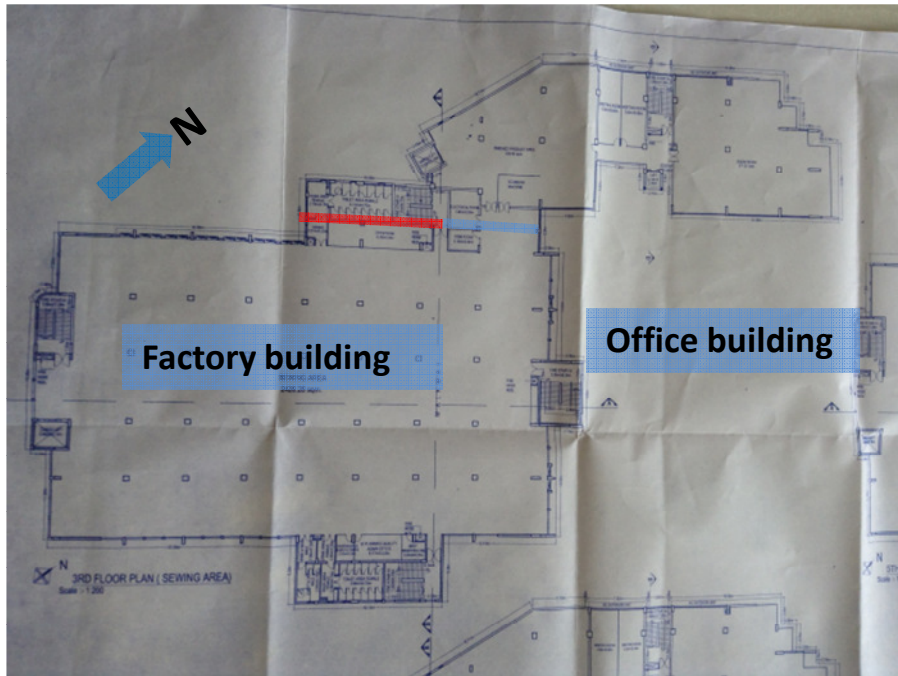
Domestic/Welfare Building

Structural System

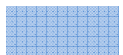
Observations

Office Building 1

Partial constructed expansion joint between Office building and Factory building

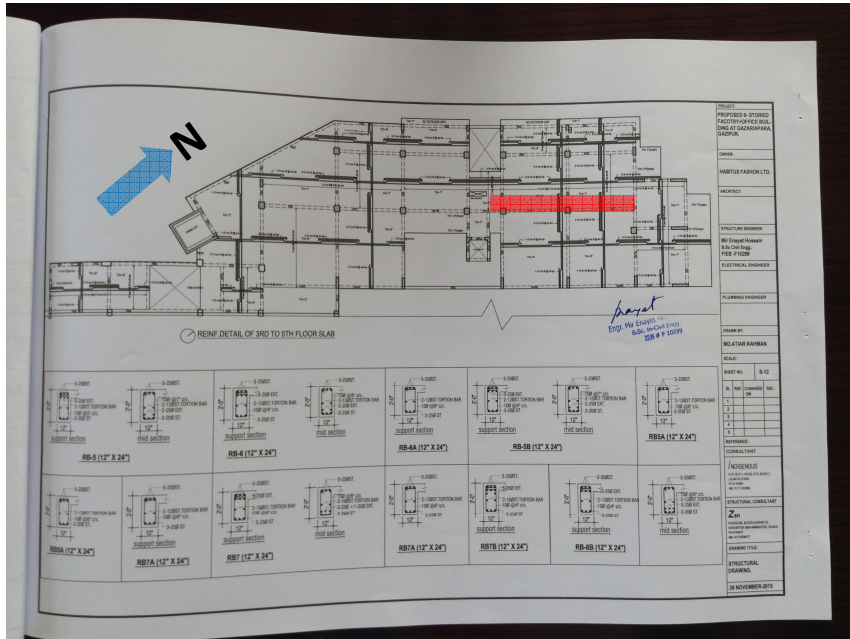


Expansion joint is constructed

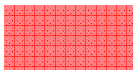


No expansion joint in this area

**Minor variation between structural drawing and
As-built. (beam omitted on underside of roof)**



Slab Reinforcement Drawing

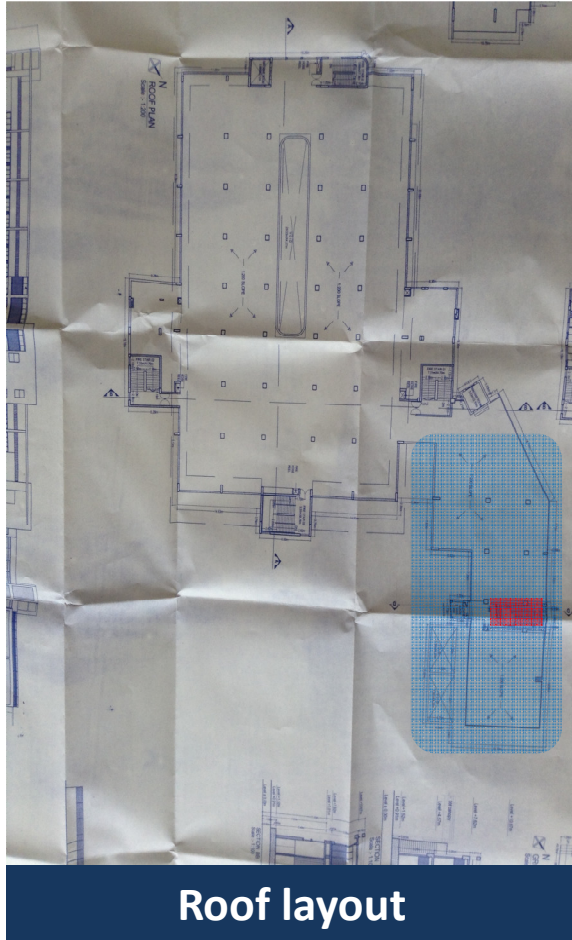


There is a beam shown on the structural drawing



No beam was found during the inspection on underside of roof slab

Water tanks on stair cores unusual construction



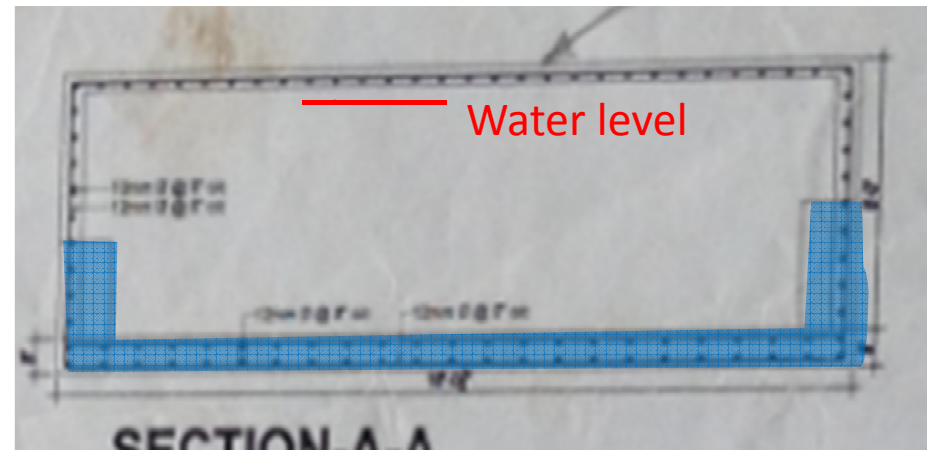
Roof layout



Position of water tanks



Water tank was observed on the stair cores of Office building



No Loading Plan



Storage on 3rd and 4th floors on Factory building

Problems Observed

Factory Building (1)

ITEM 1: Partially constructed expansion joint between Office building and Factory building

ITEM 2: Minor variation between structural drawing and As-built. (beam omitted on underside of roof)

Factory Building (2)

ITEM 1: No Loading plans

General Items

ITEM 1: Water tanks of unusual construction.

Item 1 and actions

Building 1

Partially constructed expansion joint between Office building and Factory building

Priority 1

(Immediate - Now)

- None required.

Priority 2

(within 6-weeks)

- None

Priority 3

(within 6-months)

- The Engineer is carry out a review of the partial expansion joint. Carry out any remedial works as required.

Item 2 and actions

Building 1

Minor variation between structural drawing and As-built. (beam omitted on underside of roof)

Priority 1

(Immediate - Now)

- None required.

Priority 2

(within 6-weeks)

- None Required

Priority 3

(within 6-months)

- Engineer to review the difference between the as constructed roof slab and the engineering drawings.
- Carry out any remedial work if required

Item 1 and actions

Building 2

Produce a loading plan factory building

Priority 1

(Immediate - Now)

- None required.

Priority 2

(within 6-weeks)

- None

Priority 3

(within 6-months)

- Engineer should develop a loading plan for each floor that is compatible with the structural design.
- Impediment loading plan

Item 1 and actions

General Items

ITEM 1: Water tanks of unusual construction.

Priority 1

(Immediate - Now)

- None required.

Priority 2

(within 6-weeks)

- None required.

Priority 3

(within 6-months)

- The Building engineer to review the design of the water tank.
- Carry out any remedial works as required.

Survey Limitations and Assumptions

This report is for the private and confidential use of Accord for whom it was prepared together with their professional advisors as appropriate. It should not be reproduced in whole or in part or relied upon by third parties for any use without the express written permission of Arup.

This report can be used in discussion with the supplier or factory owner as a means to rectify or address any observations made. The report is not comprehensive and is limited to what could be observed during a visual inspection of the building.

This Report is not intended to be treated as a generalised inspection and does not cover the deterioration of structural members through dampness, fungal or insect attack, nor does it deal with problems and defects of a non-structural nature. Other non structural aspects of the building such as fire safety have not been assessed in this survey.

Except as otherwise noted, drains and other services were not viewed or tested during our inspection and are therefore similarly excluded from this Report. We have not inspected any parts of the structure which are covered, unexposed or inaccessible and we are therefore unable to report that any such part of the property is free from defect.

External inspection of the façade walls has generally been carried out from ground level only by visual sighting. No opening up works were carried out (except as noted) and we rely on the Architects and Engineers drawings provided to us for our views on concealed parts of the structure and in particular foundations. Strengths of materials and components are untested and we recommend that the factory owners Building Engineer carries out insitu testing over and above those suggested to satisfy themselves with the material strengths and component details.

Recommendations, where given, are for the purpose of providing indicative advice only, are not exhaustive, relate solely to identifying key and obvious structural defects as identified in this presentation, and do not take the form of or constitute a specification for works. We take no responsibility for the works as constructed. This report does not interfere with the factory owners Building Engineers responsibility for the structural performance of this building, The Building Engineer remains fully responsible for the structural adequacy of the building.

This report does not comment in detail on the future seismic performance of the building and only highlights the fact that the building may experience significant damage or collapse in a seismic event along with many others in the Dhaka region.

The observations in this report are based on the Engineering Judgement of the lead surveyor/engineer at the time of the survey. We assume in making these observations that no covering up of faults defects, filling or plastering over cracking or significant repair work has been carried out by the building owner. Any future alteration or additional work by the building owner will void this report.