

Mark Sweater Ltd.

Surabari, Kashimpur, Gazipur-Sadar, Gazipur.
(23.9716797, 90.3213635)

1st March 2015

Structural Inspection Report

Observations & Actions

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Approved by: Dariusz Tomiak



Executive Summary

On 1st March 2015 Mr Dariusz Tomiak of Arup carried out a visual structural survey of the **Mark Sweater Ltd** complex at the address and coordinates given on the cover page of this report.

We met with **Mark Sweater Ltd** Management including Md Samar Chandra Roy (Manager HR & Admin), Md M. Anisul Alam (D G M) and Mr Tuhin Mir (Social Compliance Coordinator) from QA Services Hong Kong Ltd, Bangladesh Liaison Office.

This factory comprises 3 single buildings without basement: 9-storied factory building, 3-storied utility building and 3-storied security building. Mark Sweater Ltd occupies all levels in all buildings. We inspected all areas of all buildings.

The factory building is used for light manufacturing operations including winding, linking, trimming, sewing, mending, washing and finishing. There are also located storage, office, prayer, training and dining area. In the ground floor of the utility building there are located power generators and boilers. Upper floors are used as dining and rest area.

The building construction commenced in Sept 2013 and was completed in 2014. Utility and Security buildings were constructed in 2014.

The structural system of all buildings consists of RCC beam and column moment frames with a 2-way spanning slab.

We were provided with a copy of the permit drawing for the 8-storied industrial building approved by the Local Authority dated June 2013. There was generally good agreement between our site observations / measurements and the permit drawings. However the stair cores have been relocated in the further design stage.

Executive Summary (Continued)

The permit documentation for the utility and security buildings was not available on site at the survey day. We were also provided with the industrial permission drawing dated July 2014. The information shown on these drawings was generally in line with the structure as observed during the inspection.

We were also presented with a Soil Report dated January 2012 which recommends isolated shallow foundations with RCC columns for multi storied factory building. The Soil Investigation consisted of 59 boreholes.

There was a full set of structural design drawings provided for the main factory building dated Dec 2012. We were provided also with a full set of architectural drawings for the main factory building dated Dec 2012. The information shown on these drawings was generally in line with the structure as observed during the inspection.

There were no Loading Plans available.

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

ITEM 1: Locally heavy floor loading in some storage areas

ITEM 2: Stability Bracings of the cable holder structure is missing

Executive Summary (Continued)

We see no reason to suspend operations in the Building due to structural concerns (subject to the required immediate actions noted in 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.

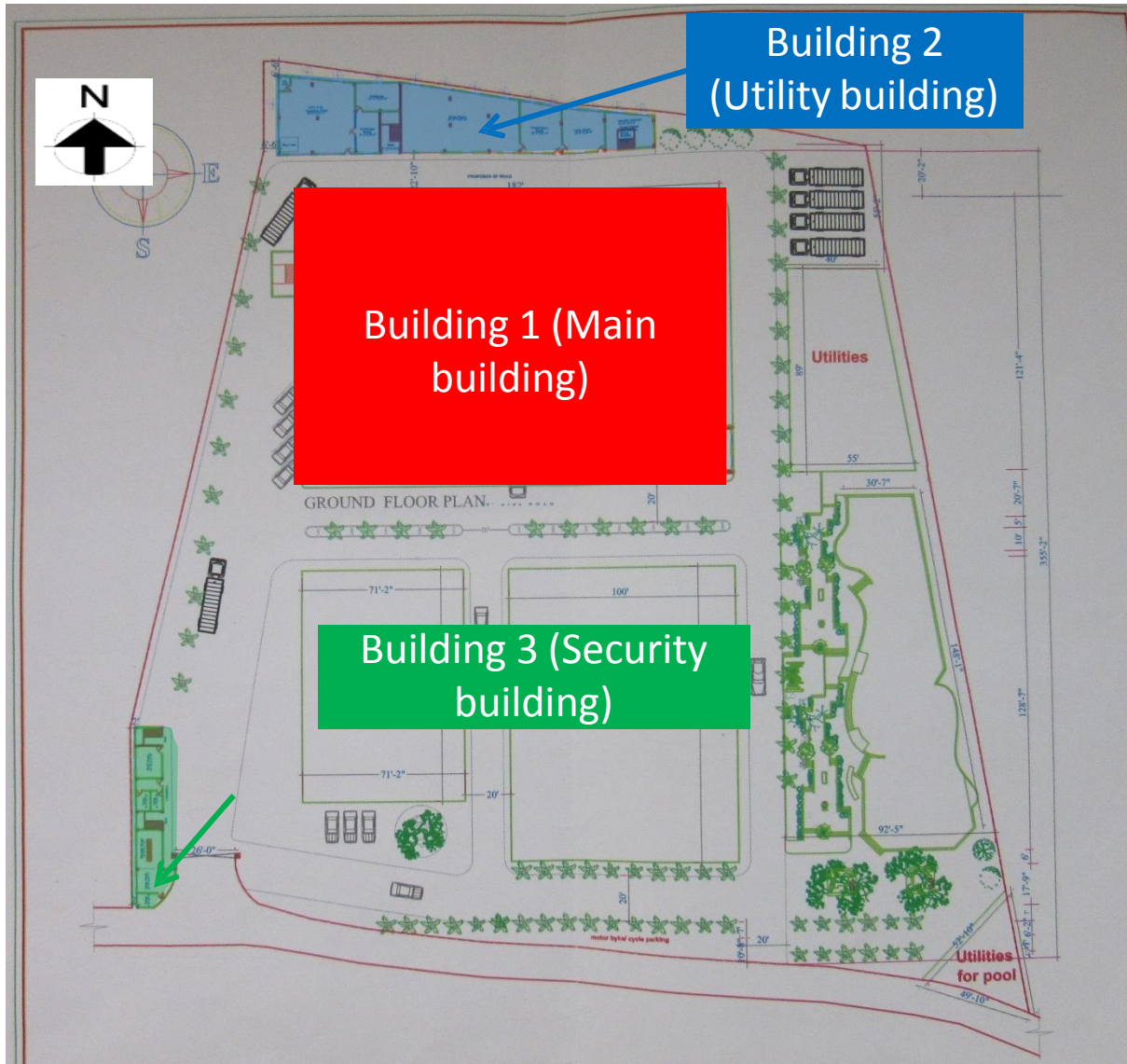
We have reviewed the property from an outline seismic perspective and would consider that the building, along with many others in the Dhaka region, to be at significant risk in a major Seismic event.

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

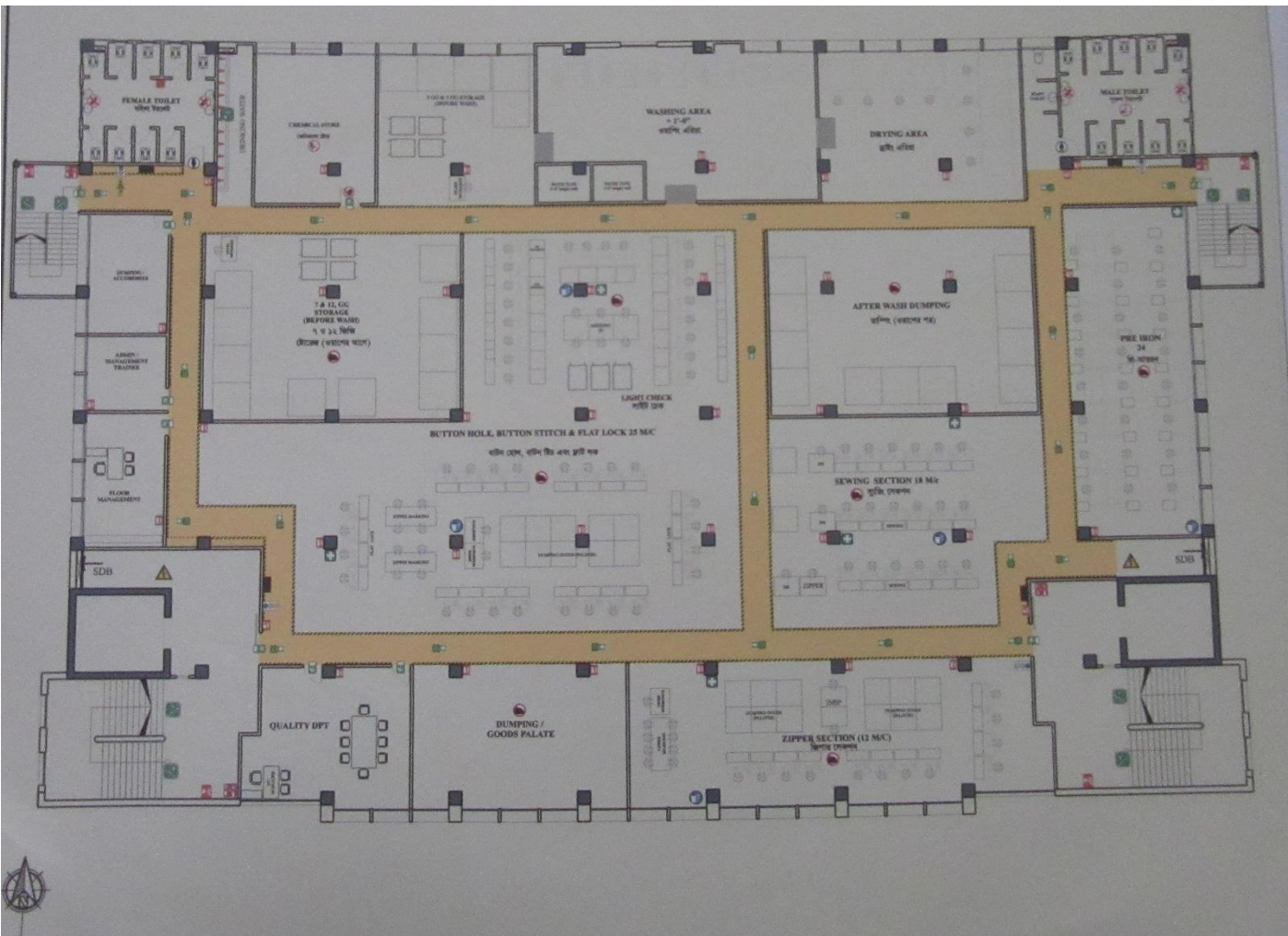
Building Extents



Building Extents



Building Extents



Typical Floor Plan (Extract from Evacuation Plan)

Building 1

Building Extents



South Elevation



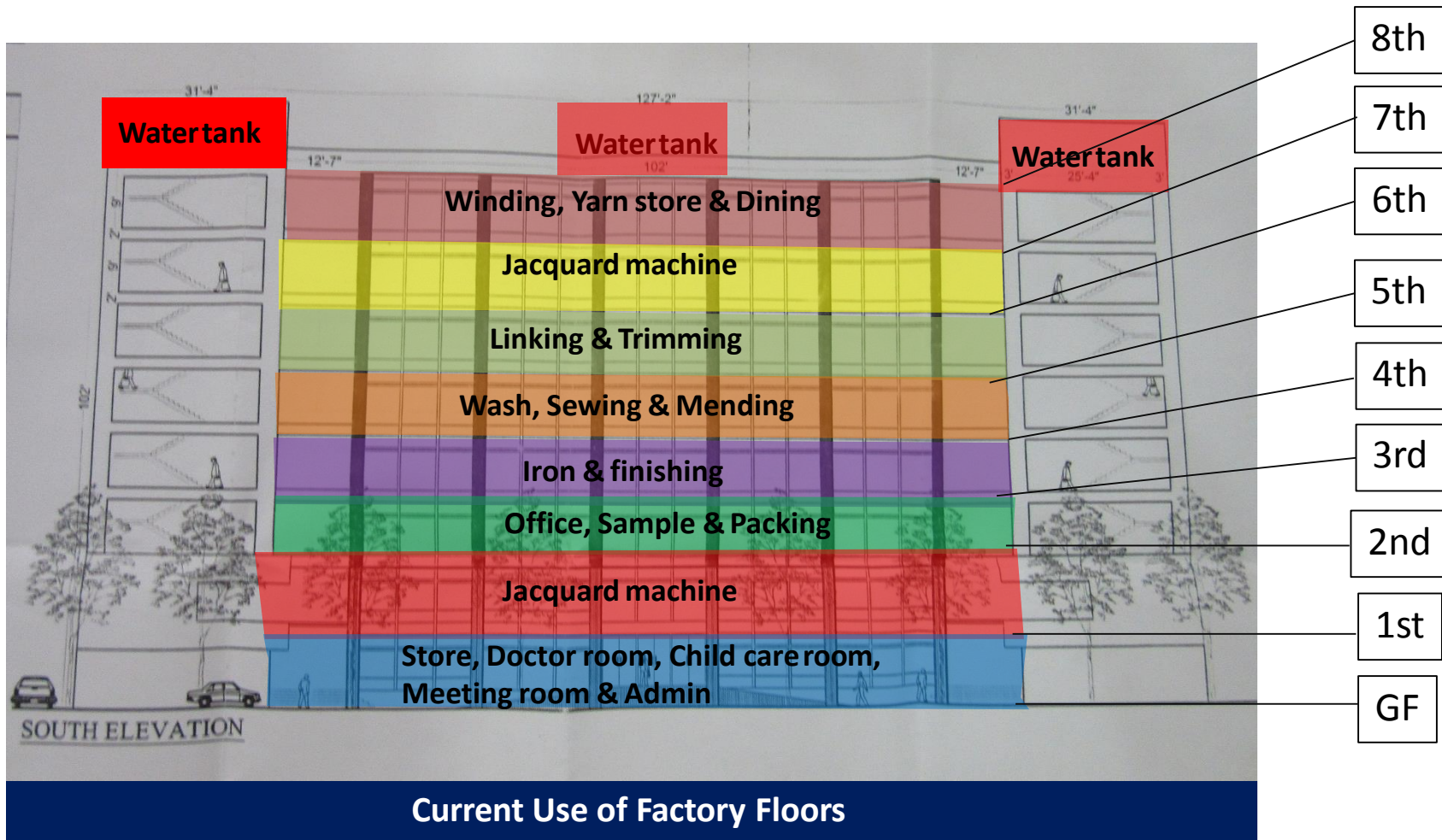
West Elevation



East Elevation

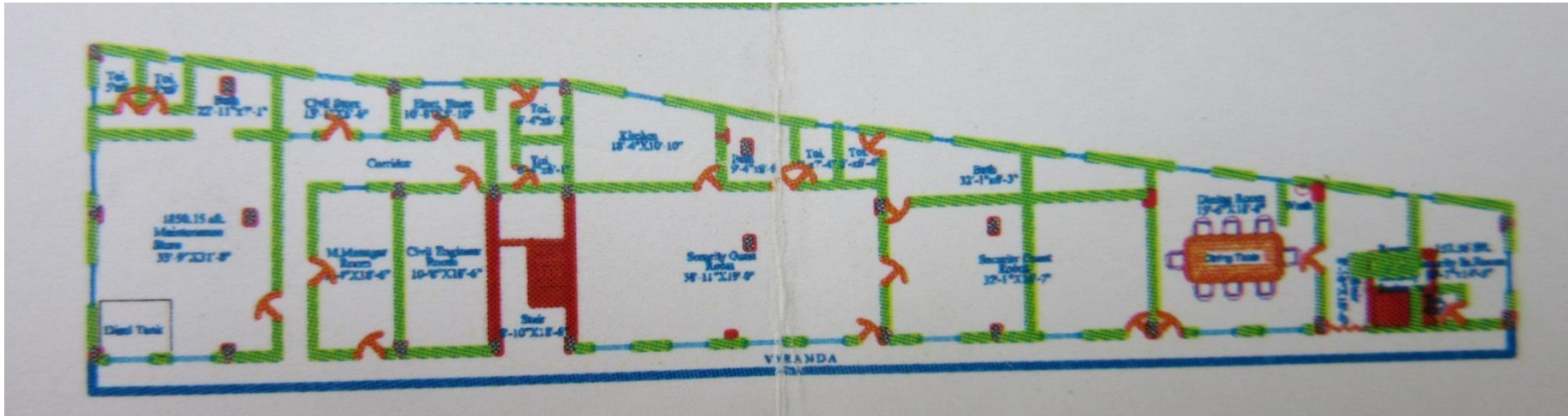
Building 1

Building Extents



Building 1

Building Extents



Typical Floor Plan (Extract from Structural Drawings)

Building 2

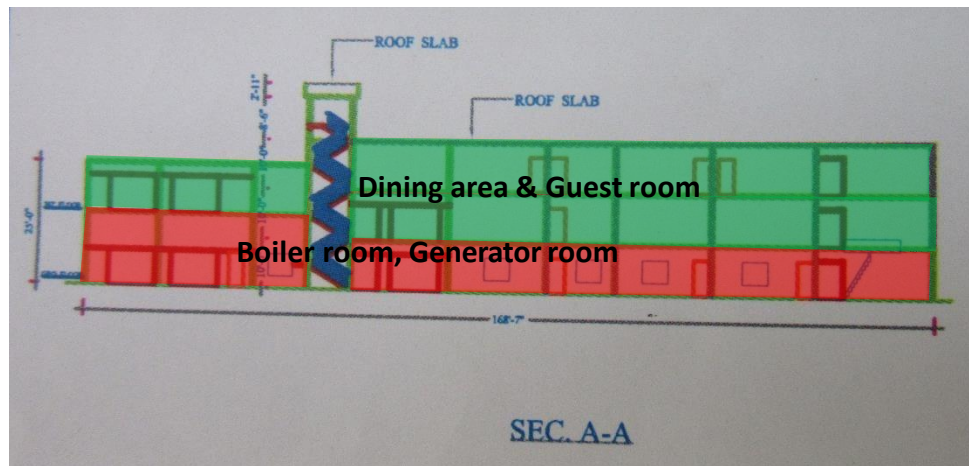
Building Extents



South Elevation



South-East Elevation



Current Use of Factory Floors

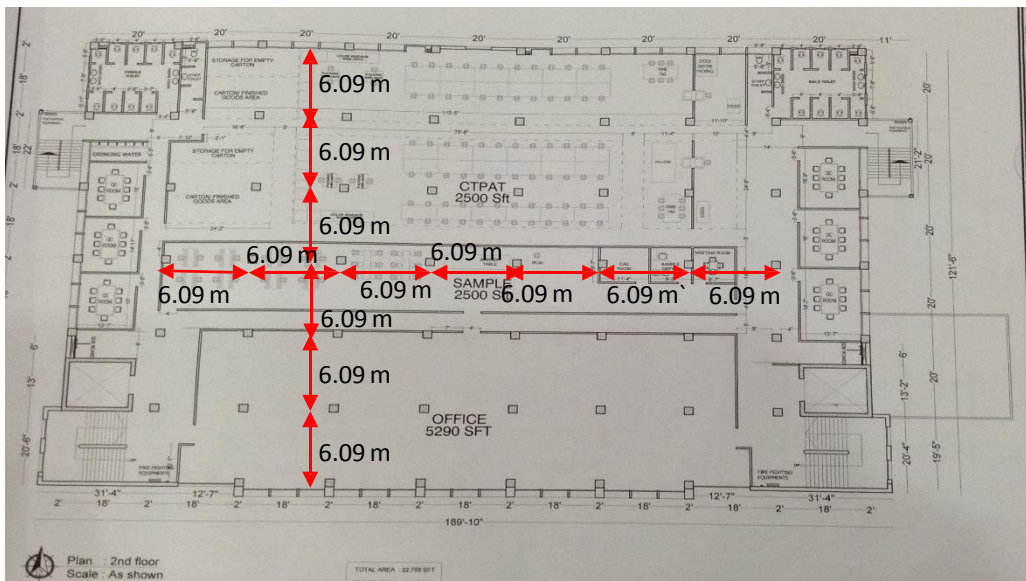
Building Extents

Building 2

Structural System

Building 1: Main factory building

Structural System



Typical Floor Plan (extract from Industrial Layout Drawings)



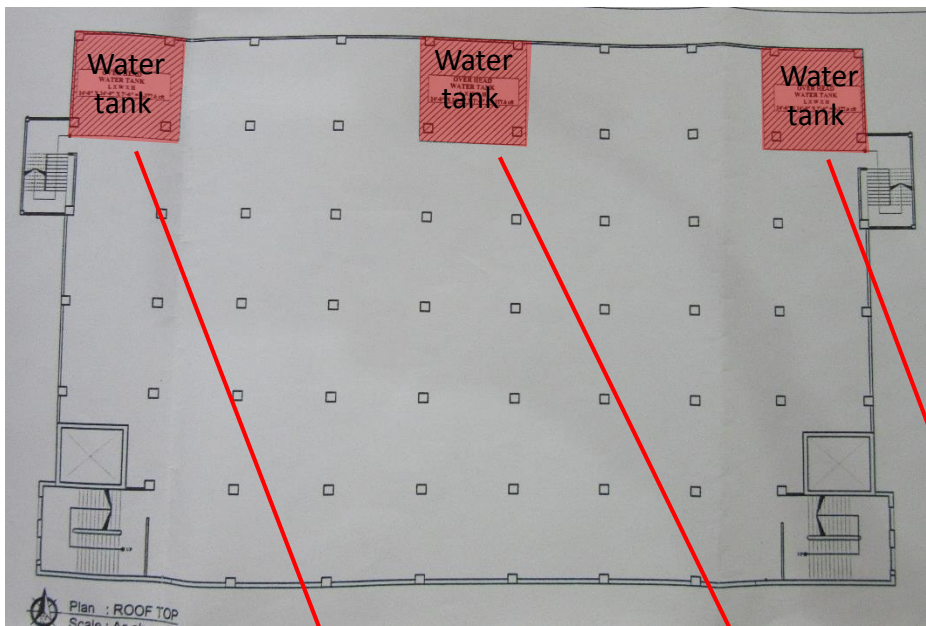
Typical Column Beam frame structure

Structural System:

- RCC Beam-Column Frame System with a 2-way concrete slab.
- Lateral stability is assumed to be provided by a moment frame system.
- **Columns:** 610x 610mm
- **Grid:** 6.09m x 6.09m maximum observed
- **Beams:** 325mm x 460mm deep.
- **Floor Slab:** 190mm thick (avg. excluding floor finishes)
- **Floor to Ceiling:** 3.1m
- **Foundation:** Pad Foundation according to structural drawings



Concrete aggregate:
Stone chips.



Structural System of water tanks:

- RCC Beam-Column Frame System.
- Lateral stability is assumed to be provided by a moment frame system.
- **Columns:** 610x 610mm
- **Grid:** 6.09m x 6.09m maximum observed
- **Beams:** 325mm x 460mm deep.
- **Bottom and top Slab:** 250mm thick
- **Floor to Ceiling:** 2.3m
- **Concrete aggregate:** Stone chips.

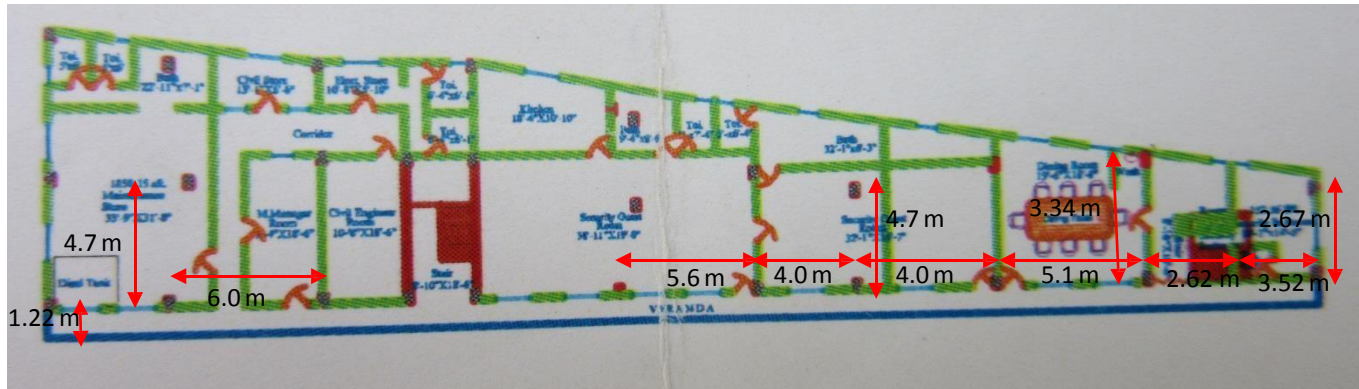
Roof Plan (Extract from Structural Drawings)



Structural System

Water tank over Roof

Building 2: Utility building



Typical Floor Plan (extract from Structural Drawings)

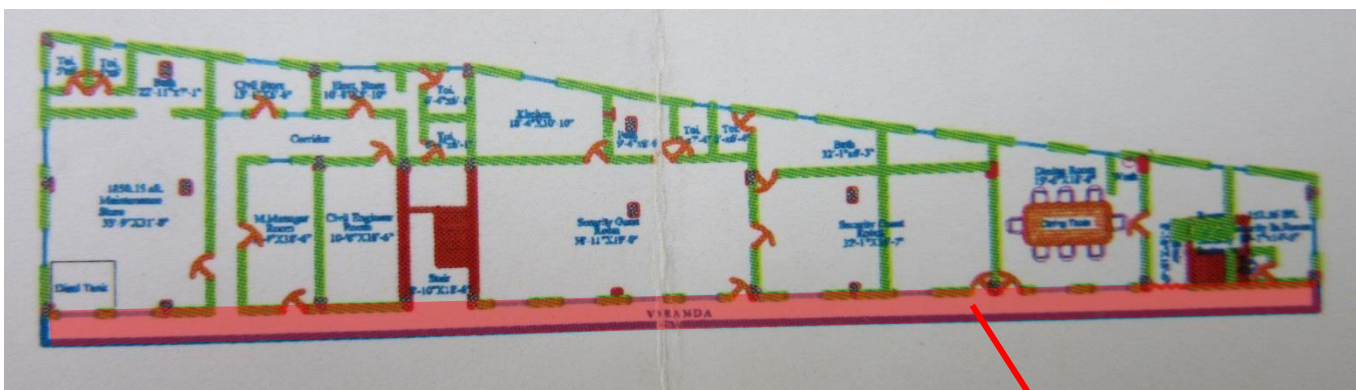


Typical Column Beam frame structure

Structural System:

- RCC Beam-Column Frame System.
- Lateral stability is assumed to be provided by a moment frame system.
- **Columns:** 400x 400mm
- **Beams:** 250mm x 450mm deep.
- **Floor Slab:** 160mm thick (avg. excluding floor finishes)
- **Floor to Ceiling:** 3.53m
- **Concrete aggregate:** Brick chips.
- **Foundation:** Pad Foundation assumed

Structural System



Typical Roof Plan (extract from Structural Drawings)



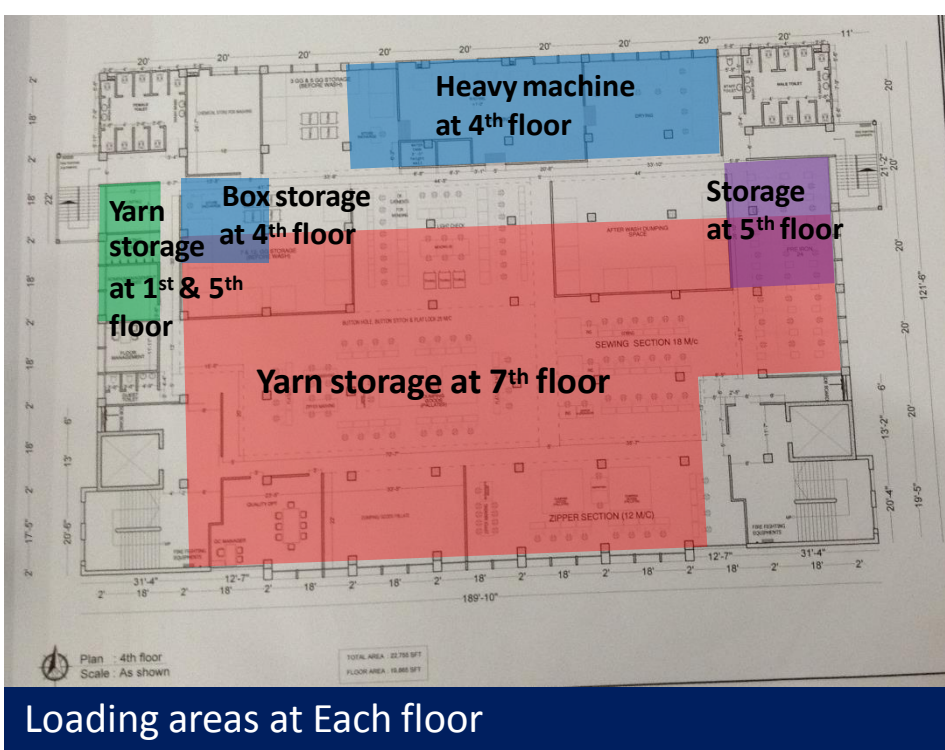
Roof Plan (Extract from Structural Drawings)



1.22m of Cantilever slab located front side of the building

Observations

**Building 1:
Locally heavy floor loading in some storage
areas**



Loading areas at Each floor



1st Floor – Yarn storage



4th Floor – Box storage



4th Floor – Heavily loaded machine



7th Floor – Yarn storage

**Building 2:
Lack of Stability bracing of the cable
holder structure**



Lack of stability bracing

Priority Actions

Problems Observed

ITEM 1: Locally heavy floor loading in some storage areas

ITEM 2: Stability Bracings of the cable holder structure is missing

Item 1 and actions

Locally heavy floor loading in some storage areas

Priority 1

(Immediate - Now)

- None required.

Priority 2

(within 6-weeks)

- None required.

Priority 3

(within 6-months)

- Factory Engineer to investigate if the applied loading can be safely carried by the slabs, beams and by the columns.
- Produce and actively manage a loading plan for all floor plates within the factory giving consideration to floor capacity and column capacity.

Item 2 and actions

Stability Bracings of the cable holder structure is missing

Priority 1

(Immediate - Now)

- None required

Priority 2

(within 6-weeks)

- None required

Priority 3

(within 6-months)

- Steel support frame - design to be reviewed by the Building Engineer
- Stability bracings to be implemented to ensure an appropriate lateral stability system

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.