

# Summer Dress Ltd Elegance Orientale Ltd

Jangaliapara, Vawal Mirzapur, Gazipur Sadar, Gazipur, Bangladesh  
(24.092165N; 90.384487E)

23 April 2015

## Structural Inspection Report

Authors

George Faller

Reviewed & Approved by: George Faller



# Executive Summary

On Thursday 23<sup>rd</sup> April 2015 Mr. George Faller (lead), Avitav Ghosh and Yeasin Ahmed of Arup carried out a visual structural survey of the **Summer Dress Ltd** factory at the address and coordinates given on the cover page of this report. Summer Dress occupy almost the entire building, but **Elegance Orientale Ltd** occupy a small area on the S side of the large Production shed. The survey was non intrusive and we were allowed access to all areas in the buildings.

We met with Mr. Mohammad Jamir Khan (General Manager), Mr. Abdul Kashem (Deputy General Manager) and Mr. Md. Kaiser Ali (Head of HR and Compliance). We were accompanied on our survey by all three for part of the time, and by Mr Kaiser Ali throughout.

The Summer Dress Ltd factory is housed in a reinforced concrete building, adjacent to a large steel shed structure that is and connected to it at Ground Floor level. Both structures were reportedly built at the same time, started in 2007 and completed in 2008.

The 3-storey RC building is used generally as office space on the upper floors, with mixed office and some storage areas at Ground Floor level. The 2<sup>nd</sup> Floor was being refurbished at the time of the inspection to provide new office space. The building measures approximately 9m x 52.5m, and has two bays in the short direction and 9 bays in the long direction. The edge columns along the long faces of the building (E-W direction) are rectangular in shape with their weak axes parallel to the long E-W face of the building.

## Executive Summary (Continued)

The large steel production shed is an independent structure located adjacent to, and hard up against the N face of the RC office building, and measures approximately 52.5m x 158.3m in plan. It has portals at 6.1m centres spanning the width of the shed with three interior support columns at 13.6m centres. Over a width of 5 portal bays there is a storage area, constructed with a supplementary portals which are a continuation of the production shed portals. These supplementary portals are also at 6.1m centres, span a distance of 39.6m with one central support, providing a storage area of approximately 32m x 40m in plan.

The generator is housed in a separate building to the S of the RC office building. This is a single storey RC framed building with RC roof slab and brick infill walls.

We were shown permit drawings for the buildings stamped and signed by LGED, dated 16 Nov 2006. The permit drawing shows a 3-storey RC building (ground + 2 floors) with a floor layout similar in size to that represented on the structural drawings.

The permit drawing showed a steel shed with 23 bays, measuring a total of 140m in length, and a 5-bay wide area with an additional width of 42m. The surveyed shed building was 52.5m wide as shown on the drawings, but consisted of 26 bays, and measured a total of 158m in length. The 23 bays of the production shed shown on the permit drawing were used by **Summer Dress Ltd**, and the 3 additional bays not shown on the permit drawings were those occupied by **Elegance Orientale Ltd**.

We were also shown a set of Factory Inspectorate layout drawings for the office building and production shed, signed by the Dhaka Division in January 2014.

## Executive Summary (Continued)

There were no other architectural or structural drawings presented to us. The only structural information available was the layouts of the office building and the layouts and elevations of the steel portals shown on the permit drawings. There were no drawings with column schedules or reinforcement details.

We were also presented with a soils report dated May 2014 produced by Sufal Soil Engineers. 4 Boreholes and SPT tests were done, and the report concluded that the site had consistent homogenous soil conditions, with allowable bearing pressures of between 165 – 300 kPa. There were no drawings indicating foundation type for the RC office building. On the perimeter of the steel shed it was observed that the perimeter brick wall was supported by RC ground beams spanning onto RC columns.

A visual inspection of the building revealed brick aggregate concrete throughout.

Our visual inspection revealed little visible evidence of distress, damage, excessive deflections or settlements in the building. However, we do have some concerns that need to be addressed.

A high level and non exhaustive list of key concerns is as follows:

- ITEM 1** – Lateral stability system of Office building
- ITEM 2** – Lack of structural drawing
- ITEM 3** – Discrepancies with permit drawings
- ITEM 4** – No bracing to large production shed building

# Executive Summary (Continued)

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

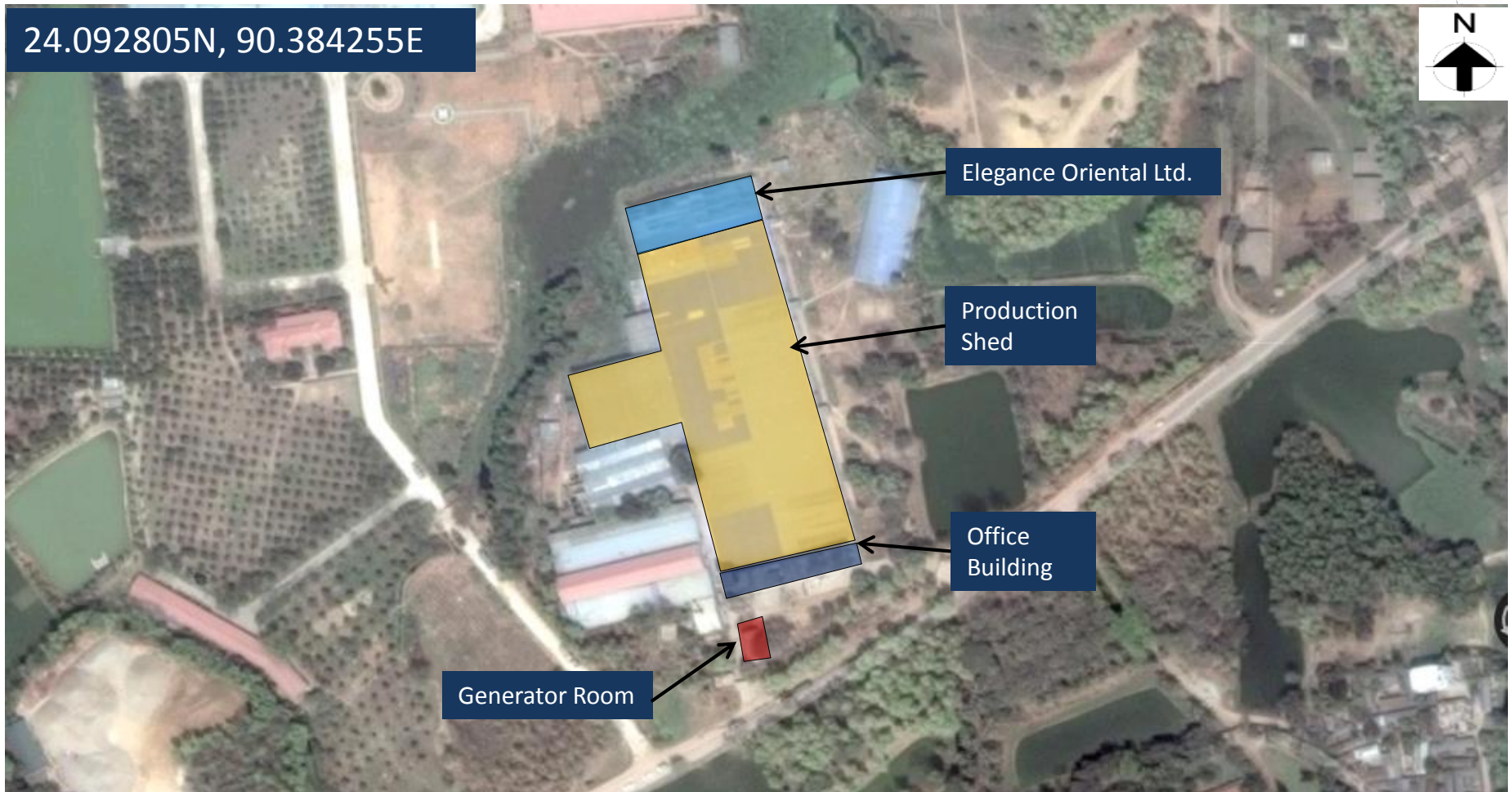
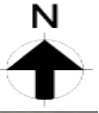
Further actions with associated priorities and timeframes are given at the end of this report. Please note that these actions should be completed as soon as practically possible and certainly within the timeframe noted.

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

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

# Building Extents

24.092805N, 90.384255E



Summer Dress Ltd. consists of :

- Three storey office building
- Single storey steel shed production building ( partially occupied Elegance Orientale Ltd.)

The whole factory complex has been rented and in operation by Summer Dress Ltd. since 2013.

## Building Extents – Location Plan



East Elevation

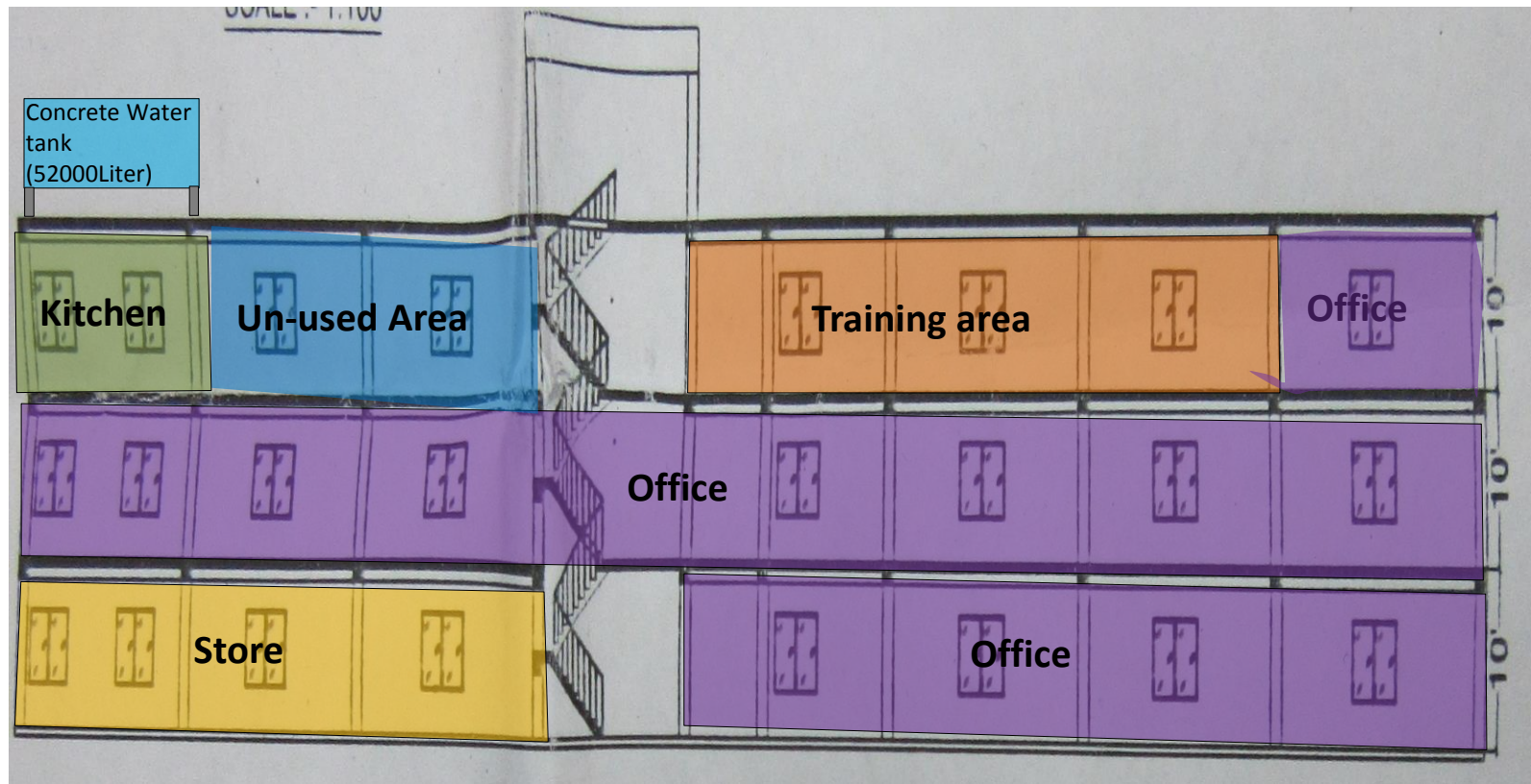


West Elevation



South Elevation

# Building Extents – Office Building Elevation



## Building Extents – Office Building floor usage

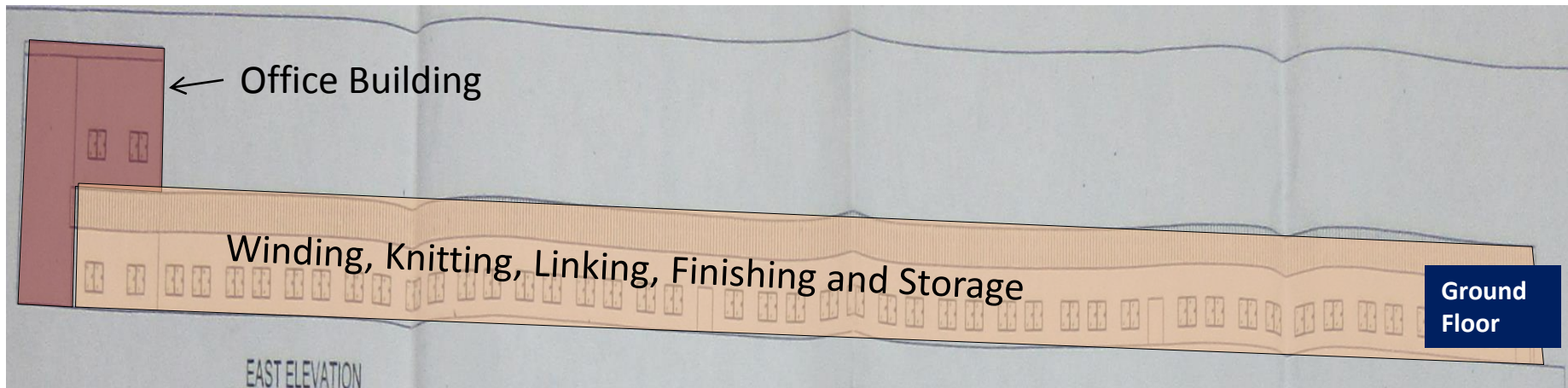


**North Elevation**



**East Elevation**

## **Building Extents – Production shed Elevation**



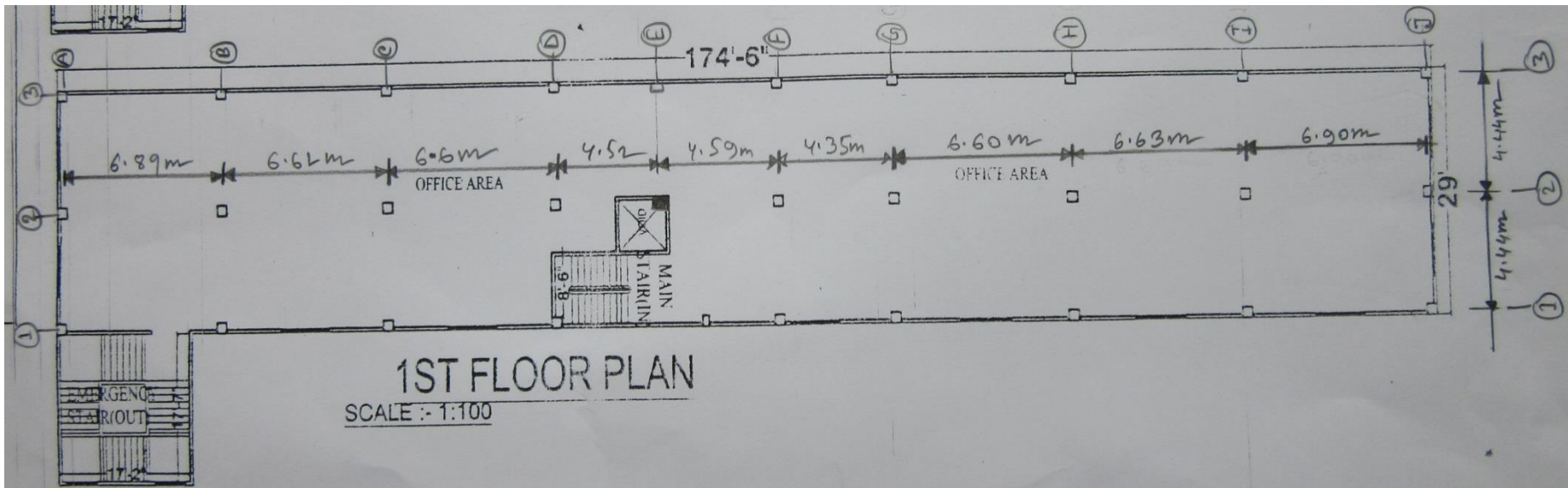
## Building Extents – Production shed Floor Usage



North Elevation

## Building Extents – Boiler room Elevation

# Structural System



### Office Building Structural System:

- RC beams with two-way spanning slabs.
- Lateral stability is assumed to be provided by moment frame system.
- **Columns:** 375mm x 375mm RC (Typical internal)  
250mm x 500mm RC (Typical corner & edge)
- **Grid:** 6.9m x 4.44m maximum observed
- **Beams:** 285mm wide x 350 mm downstand (with plaster)
- **Floor Slab:** 125 mm thick (avg. excluding floor finishes)
- **Floor to Ceiling:** 3.0m(1<sup>st</sup> & 2<sup>nd</sup> ) and 4.55m (Ground Floor)
- **Foundation:** Pad Foundation assumed (and as shown in permit drawing)



**Typical Floor**



**Ground Floor**

**Typical Internal Beam/Column Frame**

## Structural System – Office Building



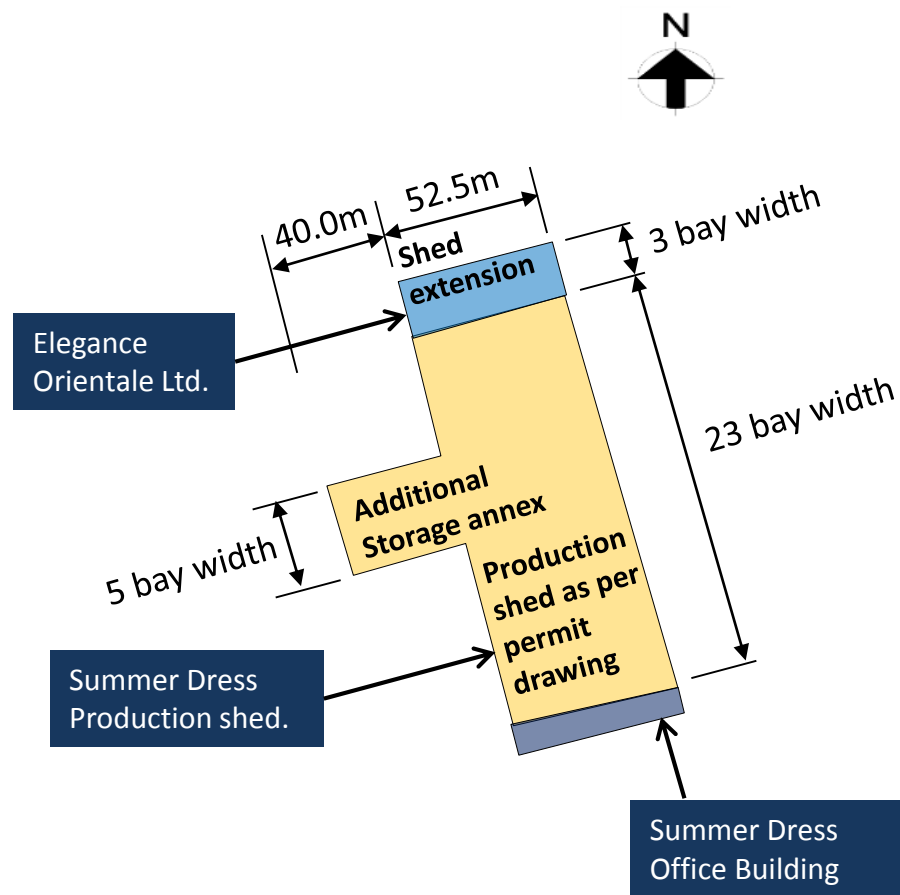
**4.55m high floor to ceiling height at Ground level**



**Typical beam and slab structure looking at 1<sup>st</sup> Floor from Ground Fl**

**Internal Beam/Column Frame looking from inside Production shed**

## Structural System – Office Building

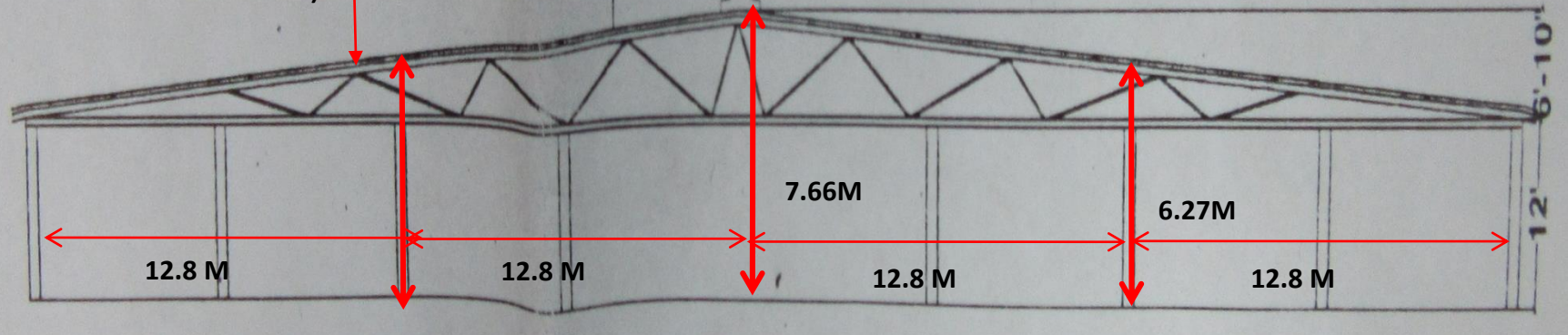


### Production shed building – 3 structural zones

- Main production shed – 23 portals at 6.1m c/c and width of 52.5m (Summer Dress Ltd)
- Additional storage annex - 5 portals at 6.1m c/c and width of 40.0m
- Main production shed extension – 3 portals at 6.1m c/c and width of 52.5m (Elegance Orientale Ltd)

## Structural System – Main Production shed

Portals with rafters (no roof trusses observed)



#### Stability System:

- Steel Portal frame (I Section - 420mmx 125mm x 6mm thk)
- 2.65m high brick wall on three sides with cleat welded to columns and built into top of brick wall

#### Portal:

- I-section stanchions and rafters.
- Portals at 6.1m centres, total width 52.5m with three intermediate supports at 12.8m centres (Typical)

#### Foundations:

- Pad Foundation assumed
- Ground beams supporting perimeter brick walls (observed)

## Structural System – Main Production shed



Typical Beam Column portal frame

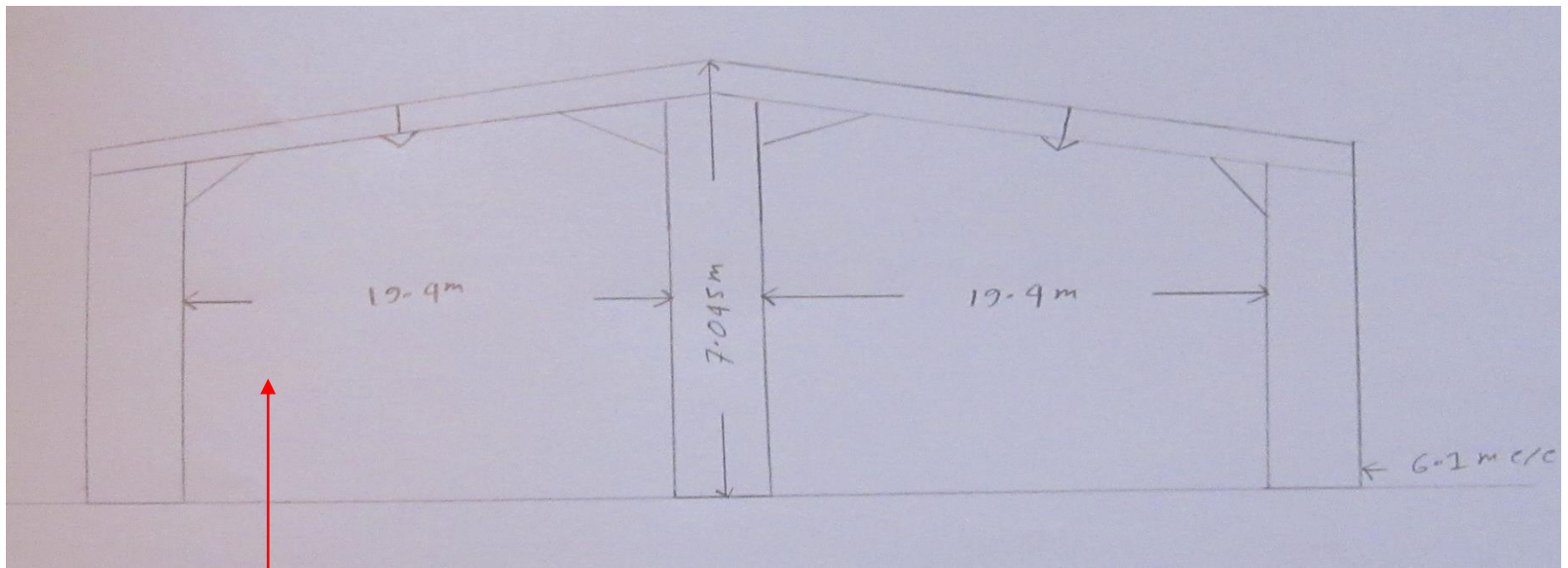
## Structural System – Main Production shed



Brick Wall up to 2.65m height



Cleat welded to Steel Column and  
built into the brick wall



Portals are a continuation of 6 Main Production shed portals, over a width of 5 bays

#### Stability System:

- Steel Portal frame (I Section (440mmx 135mm x 7mm dp)
- 2.65m high brick wall on three sides with cleat welded to columns and built into top of brick wall

#### Portal:

- I-section stanchions and rafters.
- Portals at 6.1m centres, total width 40m with one intermediate supports in centre making 19.9m spans

#### Foundations:

- Pad Foundation assumed.

## Structural System – Storage annex to Production shed



Portal with one central support



Portal rafters in Storage annex are a continuation of portals in Main Production shed, 6 portals to form a 5-bay wide storage shed

## Structural System – Storage annex to Production shed



### Structural System:

- RC beams with two-way spanning slabs.
- Lateral stability is assumed to be provided by moment frame system and brick infill
- **Foundation:** Pad Foundation assumed (and also shown in permit drawing)

## Structural System – Generator room

# Observations

**No safety parapet on perimeter of Office  
building roof**

**Observations - Office Building**



No safety barriers on any sides of roof top perimeter



## Observations - Office Building

# **Lateral Stability system of Office building**

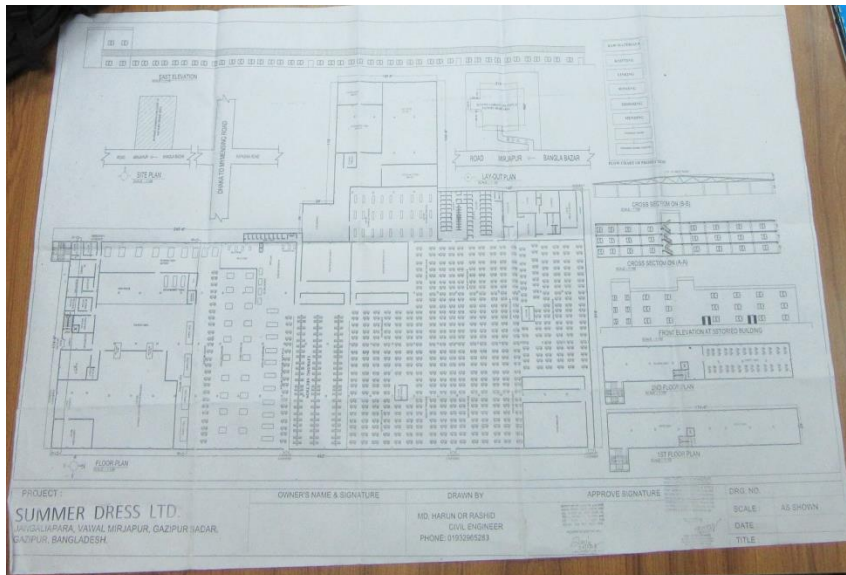


Building has 2 bays in short direction and 9 bays in long direction. The edge columns are 250mm x 500mm and orientated with the weak axis perpendicular to the short axis of the building. The ground floor height is 4.5m. This provides a weak lateral stability system for RC the building

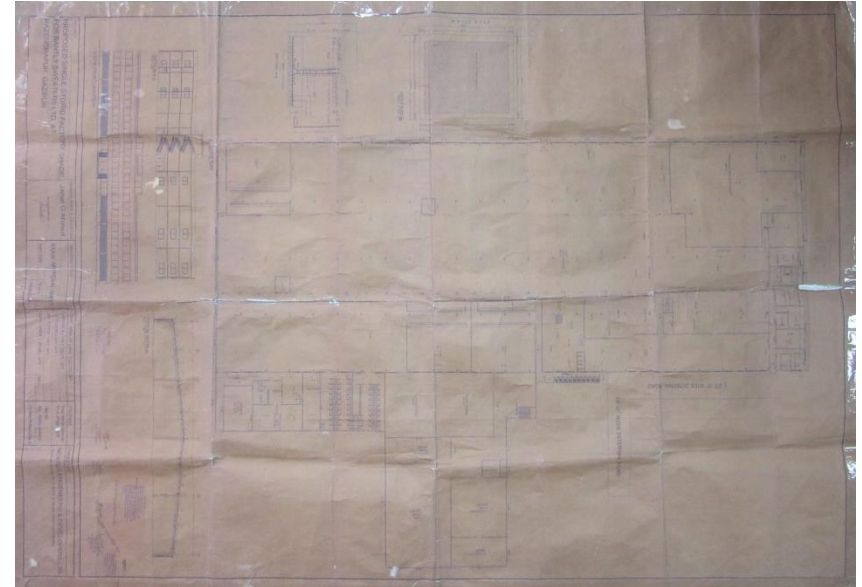
## Observations - Office Building

# **Lack of structural drawings**

**Observations - Office and Production shed Buildings**



Industrial permit drawing



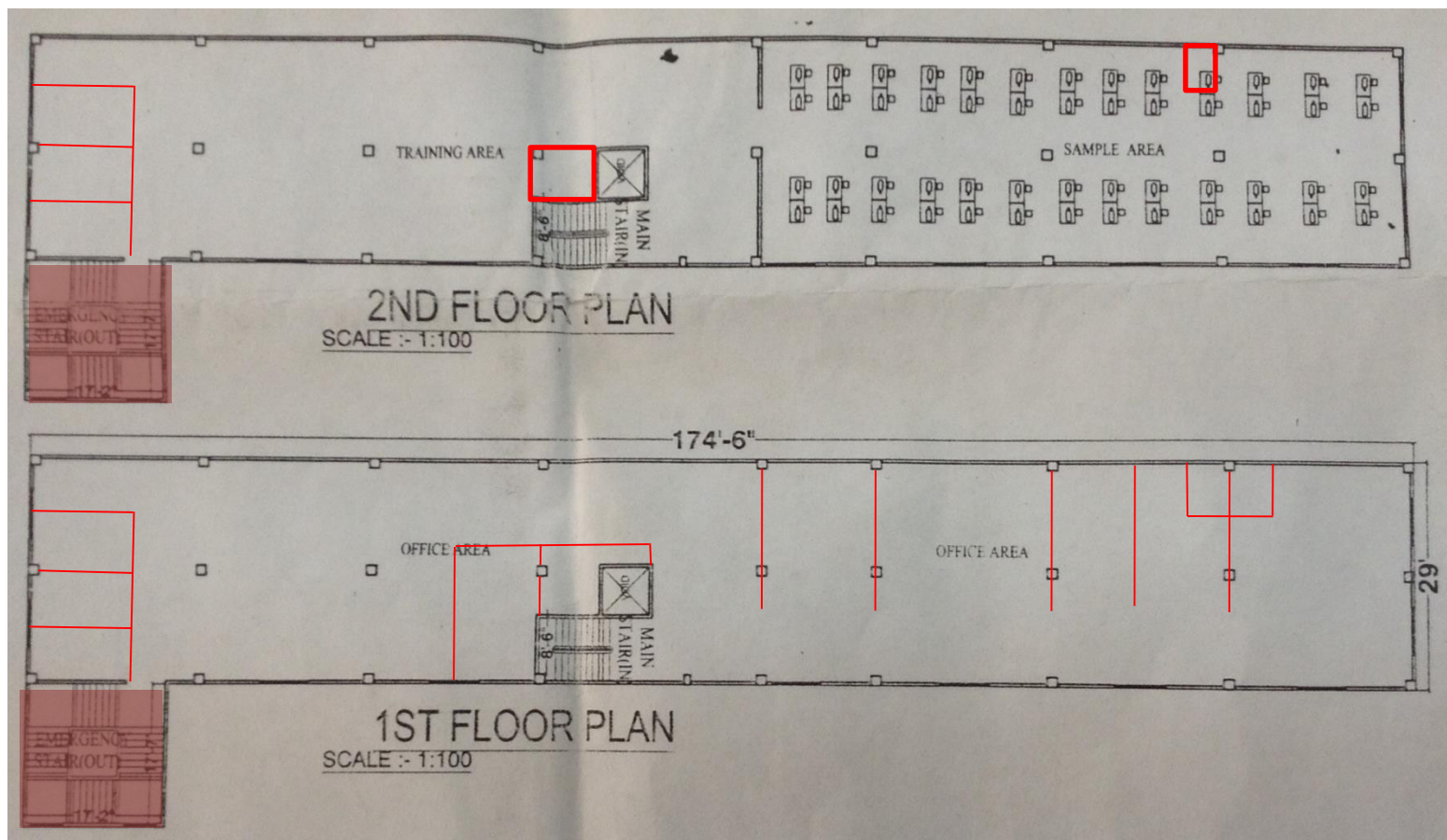
Building permit drawing

Except for what is shown on the Permit and Industrial Inspectorate drawings, no structural or architectural drawings were provided for Site survey visit

## Observations Office and Production shed

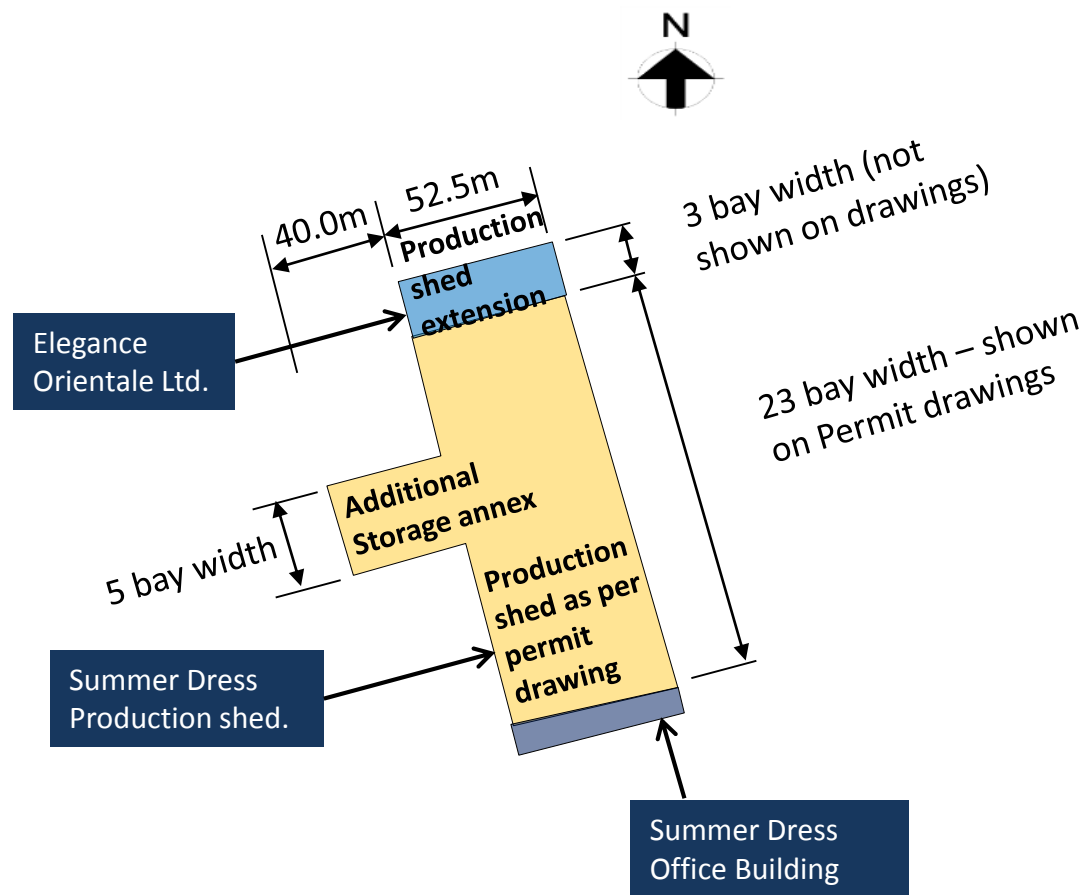
# **Discrepancies between drawings and site observations**

## **Observations - Office and Production shed Buildings**



Grid dimensions are incorrect where shown on the Permit drawing  
 The shaded area shows an RC staircase that does not exist – a steel spiral stair has been erected in this location  
 Red lines indicate the walls which are not present in the permit drawing

## Observations - Office Building

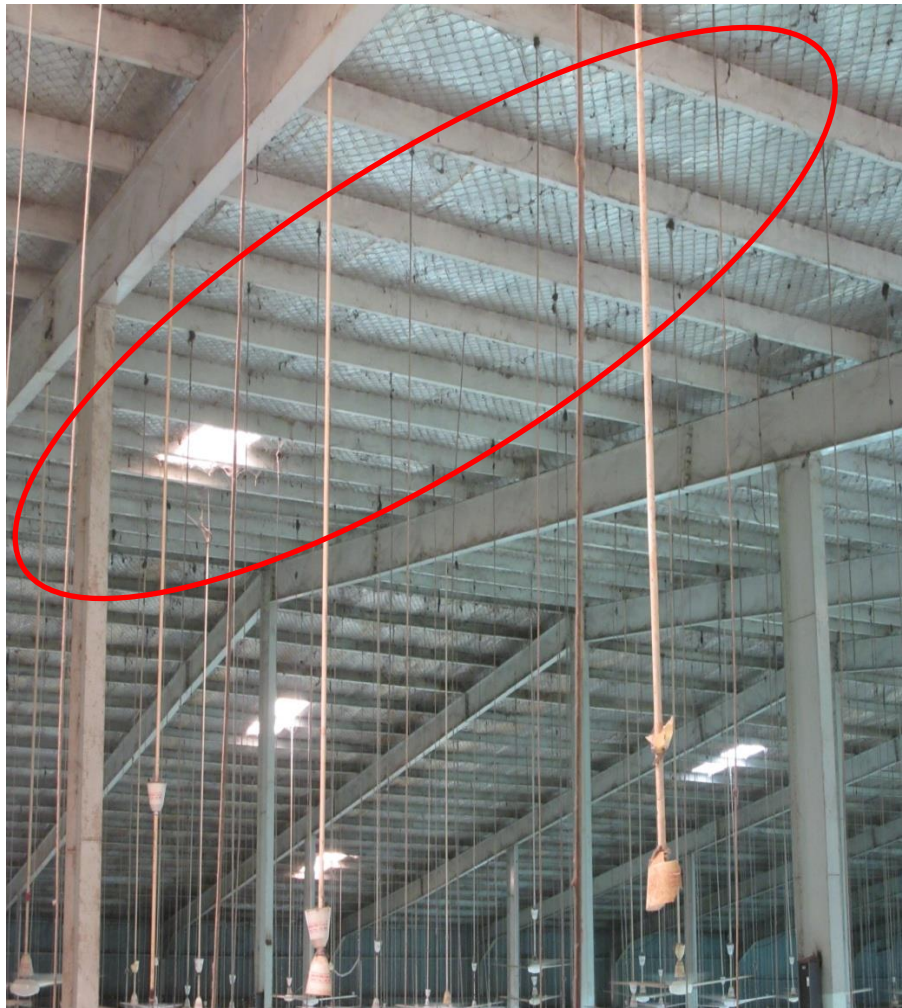


Permit drawings show a steel portal framed Production shed with 23 bays at 6.1m c/c; the shed observed on site has 26 bays at 6.1m c/c

## Observations – Production shed Building

# **No horizontal bracing of the portal structures**

**Observations Production shed**



No horizontal roof bracing in any line of portals



No cross bracing from eaves of the steel portals to the top of the brick wall  
The steel column cleats welded onto them and built into the top of the 2.65m brick wall to provide lateral stability at this level.

## Observations Building 2

# Problems Observed

**ITEM 1** – Lateral stability system of Office building

**ITEM 2** – Lack of structural drawing

**ITEM 3** – Discrepancies with permit drawings

**ITEM 4** – No bracing to large production shed building

Non-structural observation:

No safety parapet on perimeter of office building roof

# Item 1 and actions

Lateral stability system of Office building

## Priority 1

(Immediate - Now)

- None required.

## Priority 2

(within 6-weeks)

- None required.

## Priority 3

(within 6-months)

- Structural engineer to review lateral stability system for the RC office building.
- Apply appropriate remedial measures if lateral stability found to be inadequate

# Item 2 and actions

Lack of structural drawings for both office and production shed buildings

## Priority 1

(Immediate - Now)

- None required.

## Priority 2

(within 6-weeks)

- None required.

## Priority 3

(within 6-months)

- Building engineer to collect information and produce accurate and complete as-built structural documentation for all buildings at soonest opportunity.

# Item 3 and actions

Discrepancies between permit drawings and observations from site visit

## Priority 1

(Immediate - Now)

- None required.

## Priority 2

(within 6-weeks)

- None required.

## Priority 3

(within 6-months)

- Building engineer modify permit drawings and re-submit showing actual layouts of buildings.

# Item 4 and actions

No bracing to large production shed building

## Priority 1

(Immediate - Now)

- None required

## Priority 2

(within 6-weeks)

- None required

## Priority 3

(within 6-months)

- Structural engineer to review lateral bracing system for the Main production shed, and provide lateral bracing as appropriate.
- Document the bracing system on updated as-built drawings .

# 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.