

SQ Celsius Ltd.

Beraiderchala, Keowa, Maona, Sreepur, Gazipur, Bangladesh.
(24°12'36"N, 90°24'58" E)
3rd June 2014

Structural Inspection Report

Observations & Actions

Authors: Maciej Lewonowski, Emilian Szarow

Checked by: Maciej Lewonowski

Approved by: Maciej Lewonowski



Executive Summary

On 3rd of June 2014, Mr. Maciej Lewonowski(lead) and Mr. Emilian szarow of Arup carried out a visual structural survey of the **SQ Celsius Ltd.** buildings at the address and coordinates given on the cover page of this report.

We have met with Mr. Aruna Muthumumi (Cchief Executive Office of SQ Group) and Mr Humayun Mostaque (General Manager of SQ Celsius). On interview there were present Mr Shihan (Architect & Building Engineer), Mr Aminur Rahman Khan (General Manager) and Mr Md. Warisul Abid (Chief People Office), both represinting SQ Group.

This factory comprises of 3 buildings: Production Buildings 1&2 steel frames 3-storey structure, and in-situ concrete 3-storey Administration Building in front. There are also few small technical buildings nearby to Production Building 2. The building owner , Mr. Ghulam Faruq wasn't present on the meeting.

The factory was design in acc. To ASTM, Structural design and drawings were available for review. The factory was constructed in 2 phases: Production Bldg-1 and office building on 2002, and Production Bldg-2 in 2006.

The production buildings are steel frame system with reinforced concrete slabs and foundation pads under columns. The usage of each floor is explained in building extents below.

We inspected all areas of the building. The loading plans are recorded on all floor of the factory.

Permit drawings (architectural) were approved by the local authority in Feb.2013 for a 3-storey buildings.

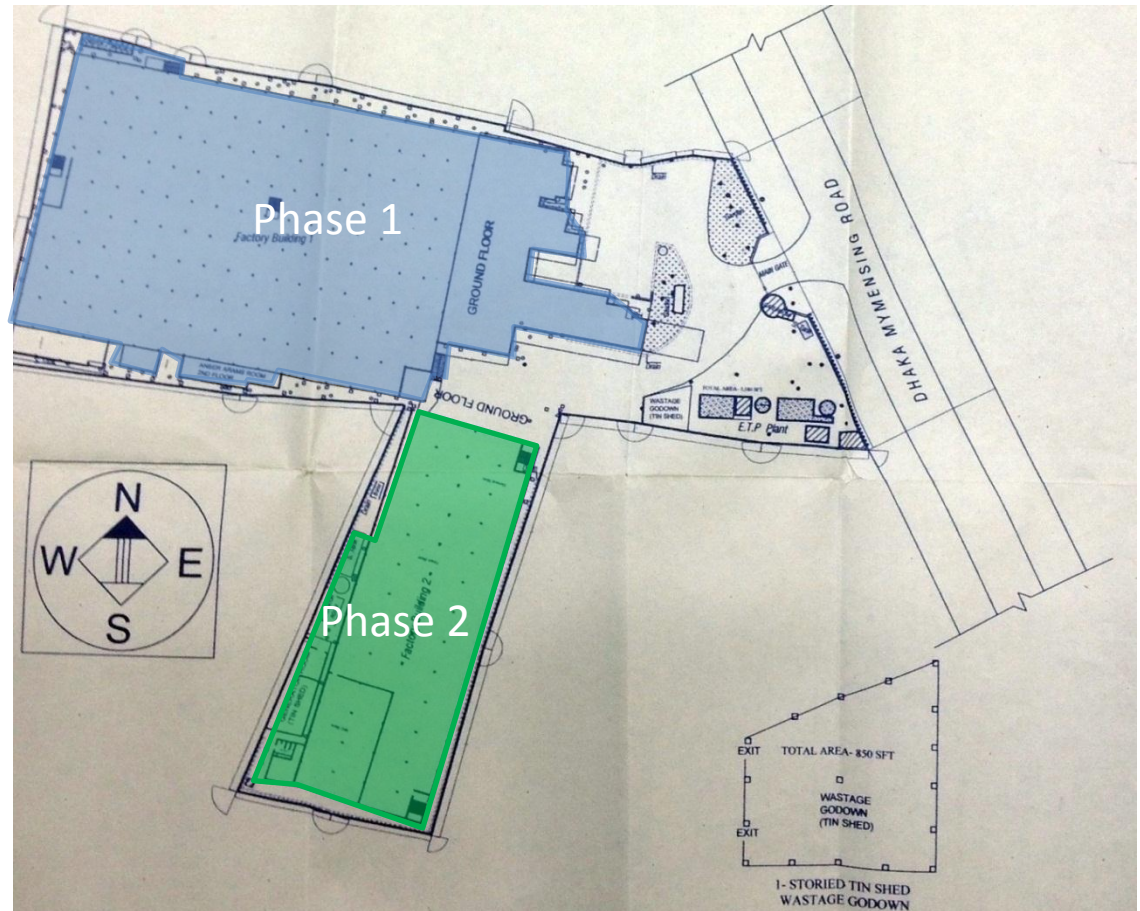
We were provided with a copy of all requested reports and drawings.

The building appears to be generally in good structural condition and there was good co-relation between the record structural drawings and the as built structure .

Executive Summary

List of documents provided for review:

- 1 Soil investigation reports ,for both construction stages, made by Expert Soil Engineers ,in Februar 2013.
2. Structural Design (for both stages) made by Zamil Steel, 27.09.2000
3. Building Permit (Feb.2014)
4. As-built architectural drawings
5. As-built structural drawings
6. Preliminary Structural Assessment report made by BV, 20.04.2014
7. Structural Assessment reports made by Auspicious, 27.04.2014
8. Visual Structural Appraisal report Made by GGA, 26 June 2013



Key plan of the factory

Executive Summary (Continued)

There was no visible evidence of overloading, distress, damage, excessive deflections or settlements of the building structure. The steel and concrete structures seem to function properly.

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

- The extended structure on 2nd Floor composite steel / concrete structure to be indicated on the structural drawings
- The extended 2nd Floor in Production Bldg-1 structure checked for the additional loads and verified.

We see **no reason to suspend operations in the facility due to any 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.

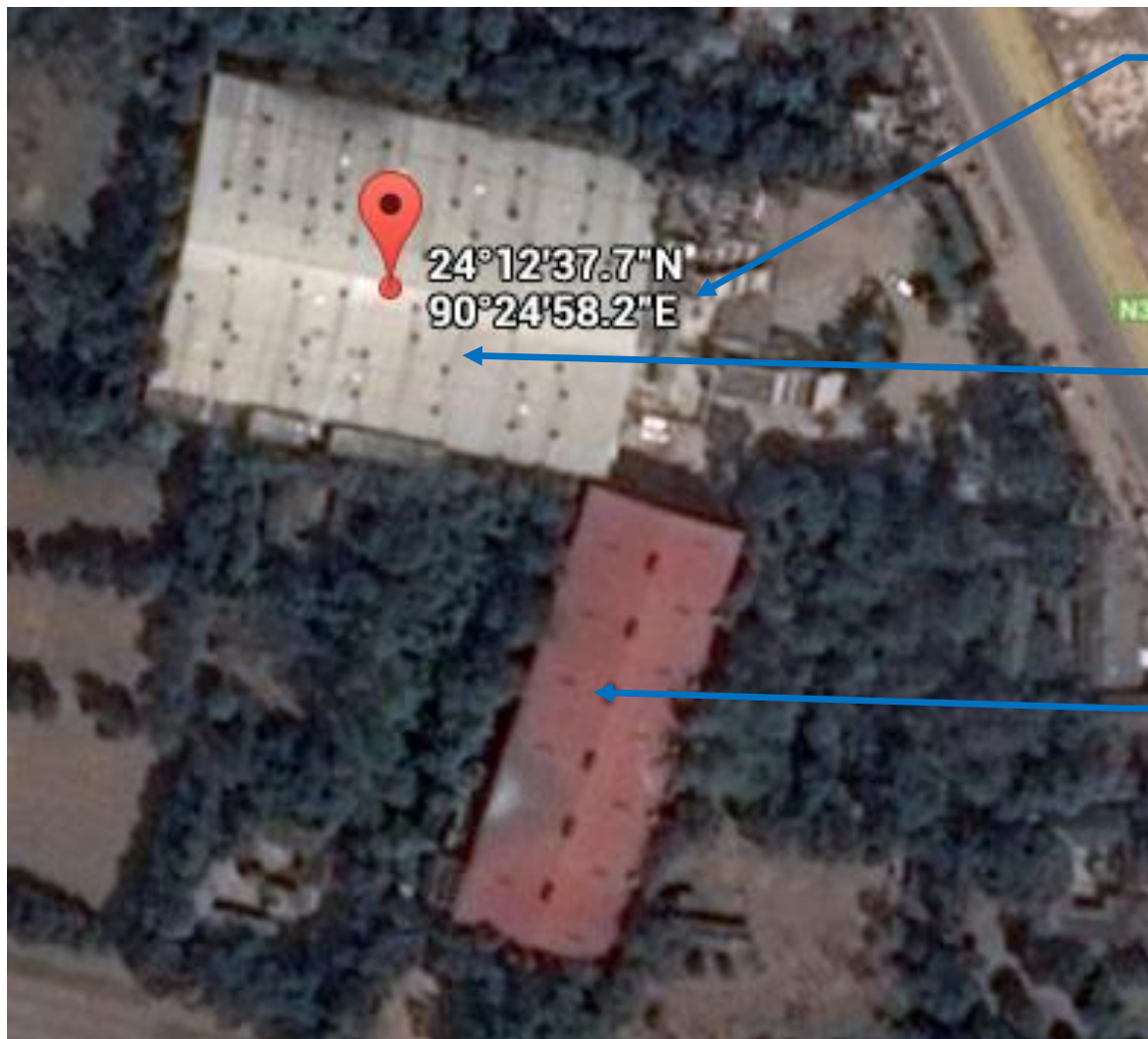
Please note that these actions should be completed as soon as practically possible and certainly within the timeframe noted.

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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



RC in-situ structure
office building

Steel frame structure
with composite
concrete slabs
Production Building #1

Steel frame structure
with composite
concrete slabs
Production Building #2

Building Extents



Front (east) elevation of Office Building



Front (north) elevation of Production Bldg #2

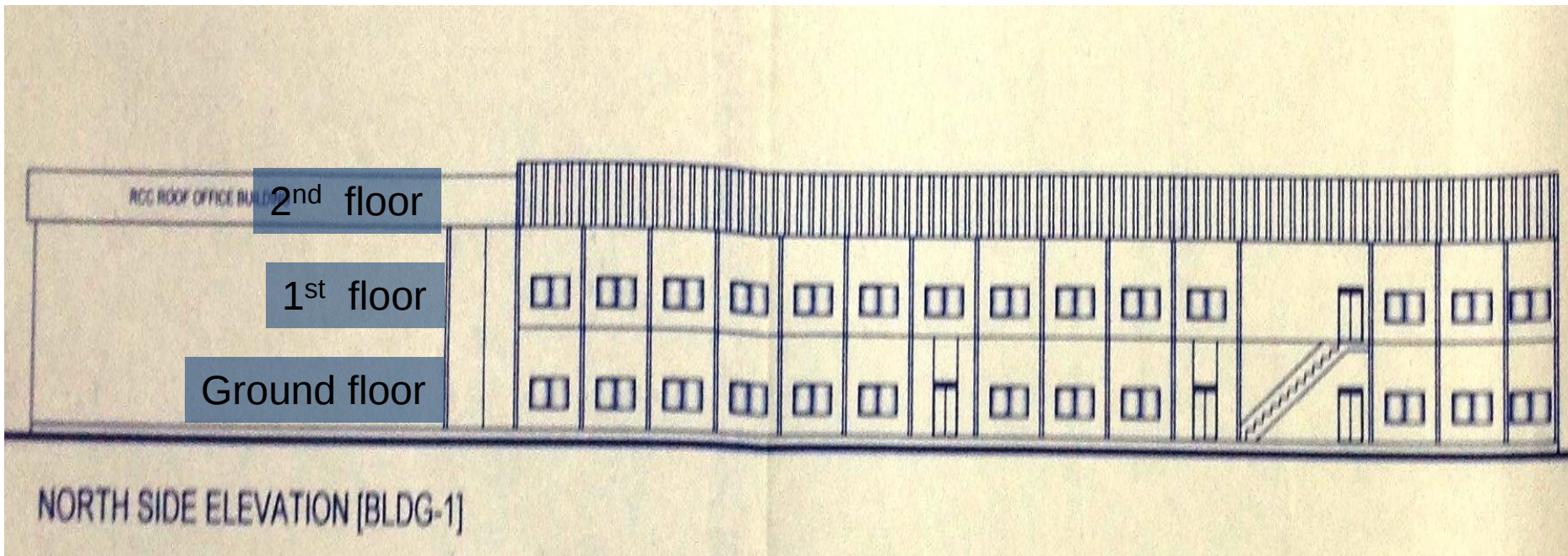


Front (east) elevation of Production Building #1



South elevation of Office Building

Building Extents



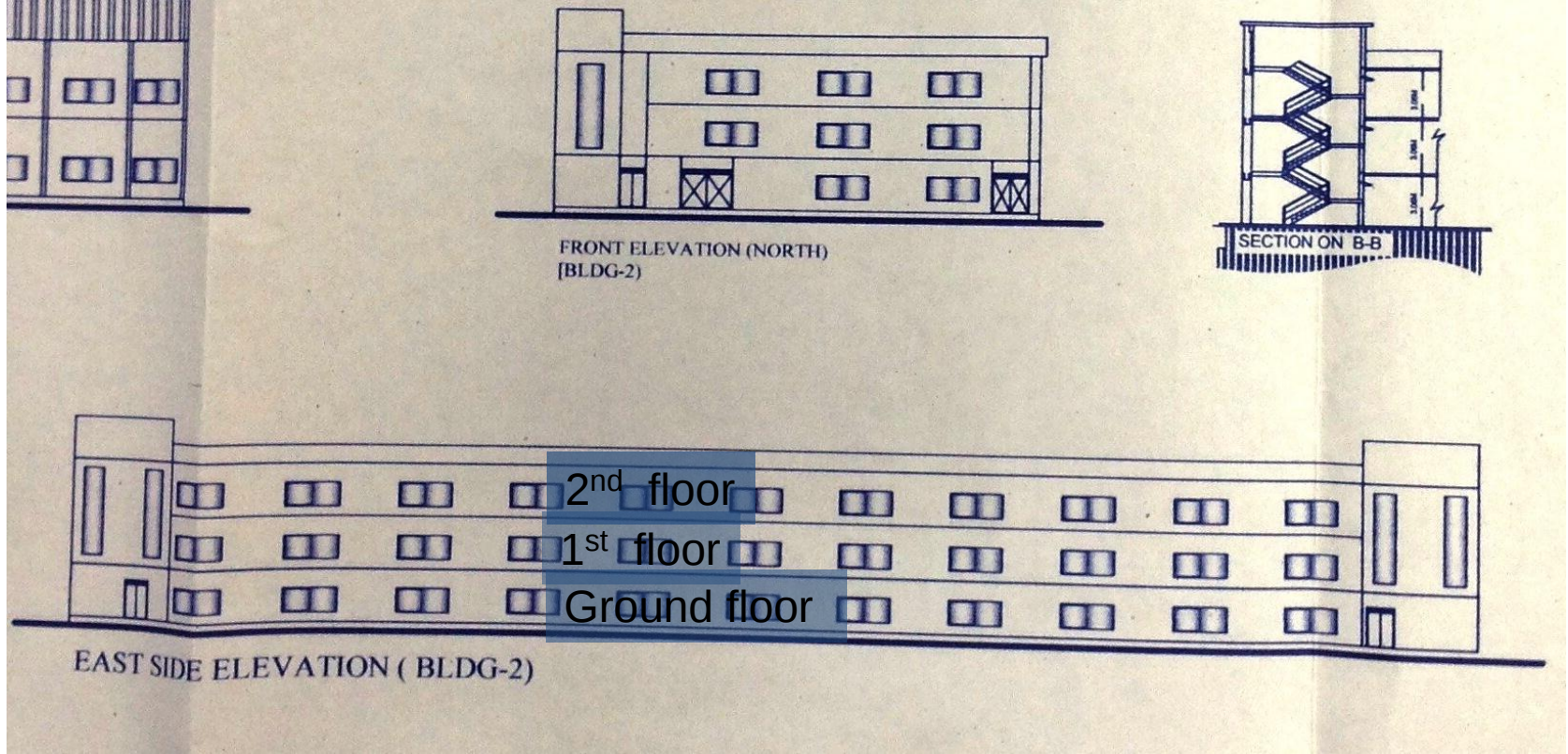
Building #1: Current Use of Factory Floors

2nd floor: Assembly, sample & general office.

1st floor: Assembly, wash, sewing, finishing, packing, office & child care room

Ground floor: Winding, knitting, finishing, assembly, dining, canteen, maintenance & medical room

Building Extents



Building #2: Current Use of Factory Floors

2nd floor: Knitting & knitting distribution

1st floor: Knitting section, production office & auto collar section.

Ground floor: Warehouse

Building Extents



Number of Stories: Building # 1 – three storey (GF+2) and Building # 2- three story (GF+2)

Year of construction:
Completed construction in between 2001 to 2003

Drawing permission:
Permission for two buildings up to three storey from Gazipur local authority.

Status of permit:
Construction work completed as per the drawing permission

Building Extents

Structural System

Production #1 Building

Grid system

17x5.2m longitudinal

9x6.4m portal frame

Columns

520x5W, 250x10F

Beams:

610x5W, 150x10F

Secondary beams:

300x4W, 150x5F

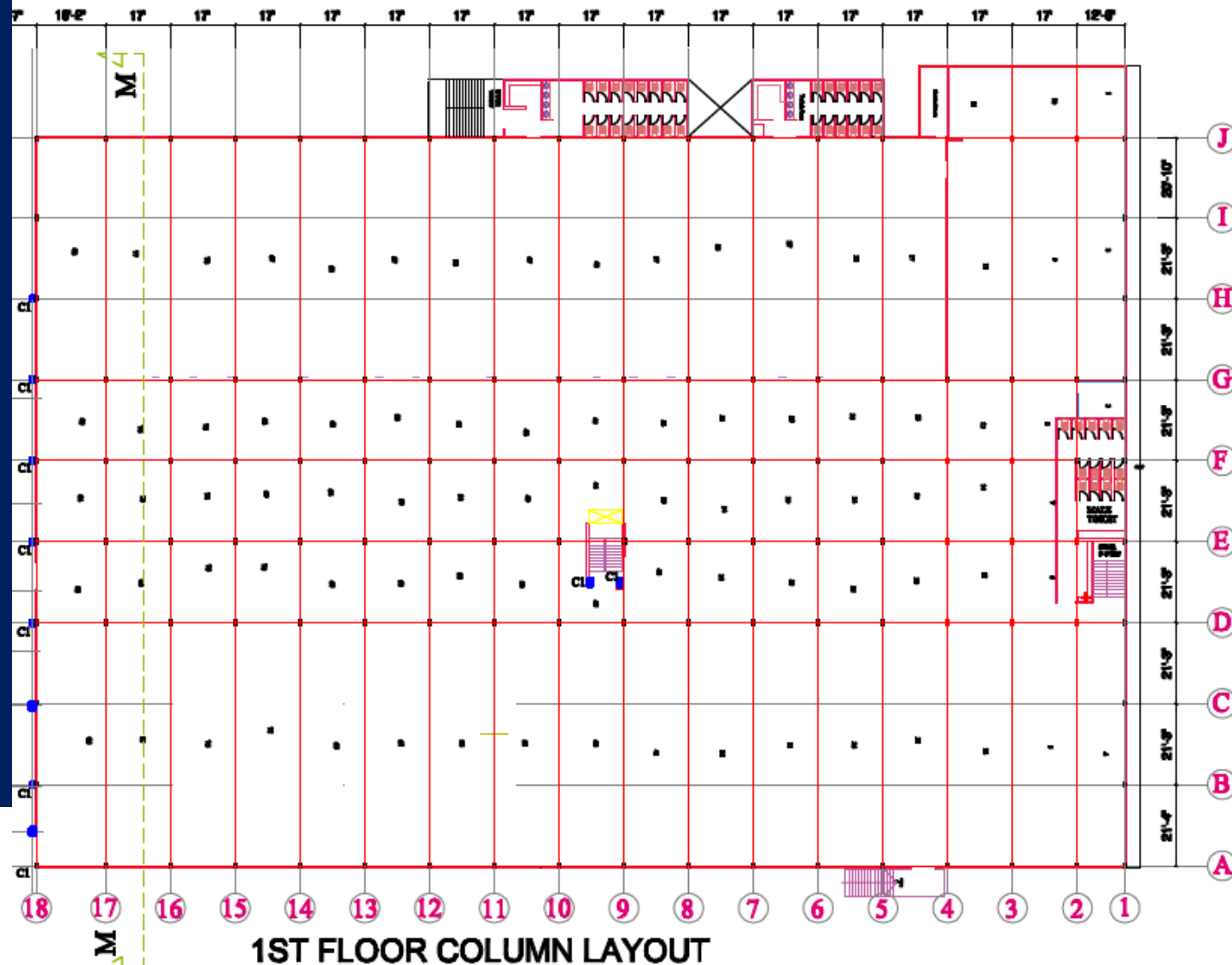
Slab:

Composite RC 125mm

Purlins:

Z-profiles 300Z15 and

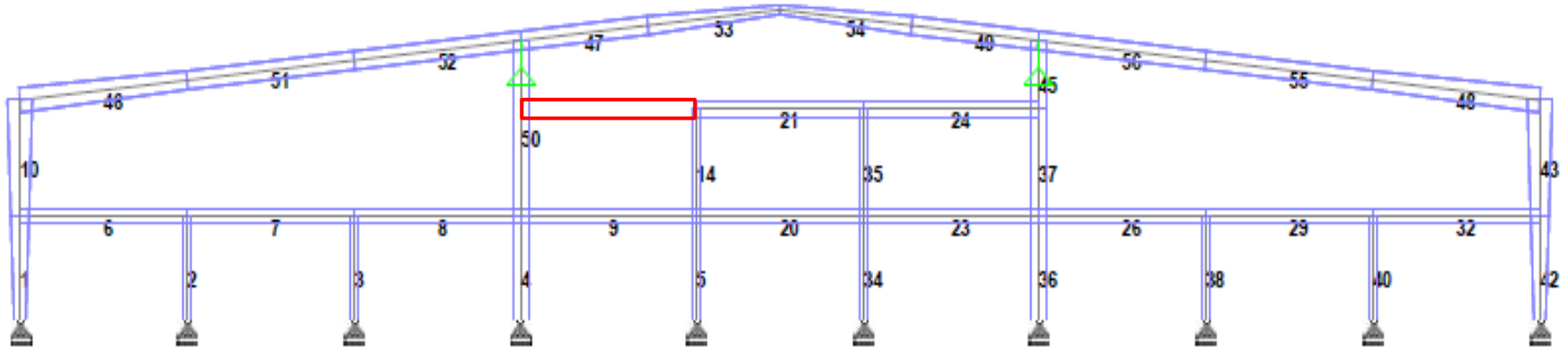
C-profiles 300x85x2x25



Structural systems

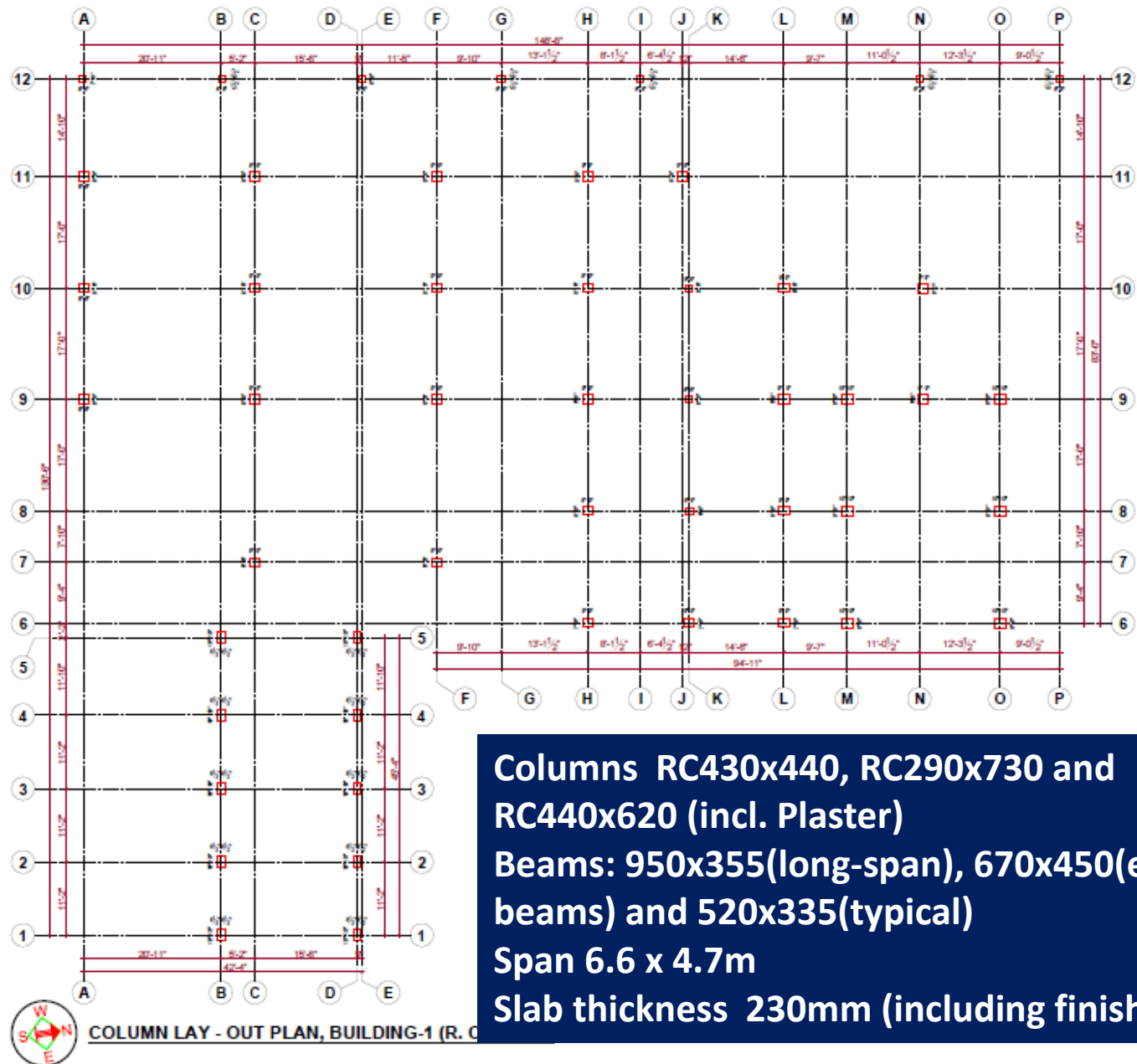
Production #1 Building

Roof: Steel sheeting on purlins supported by portal frames



Composite steel / concrete floor structure fully braced vertically on façade at every 4th bay down to ground level

Structural systems



Structural system

Office building



RC in-situ structure



Concrete beam-columns frame system



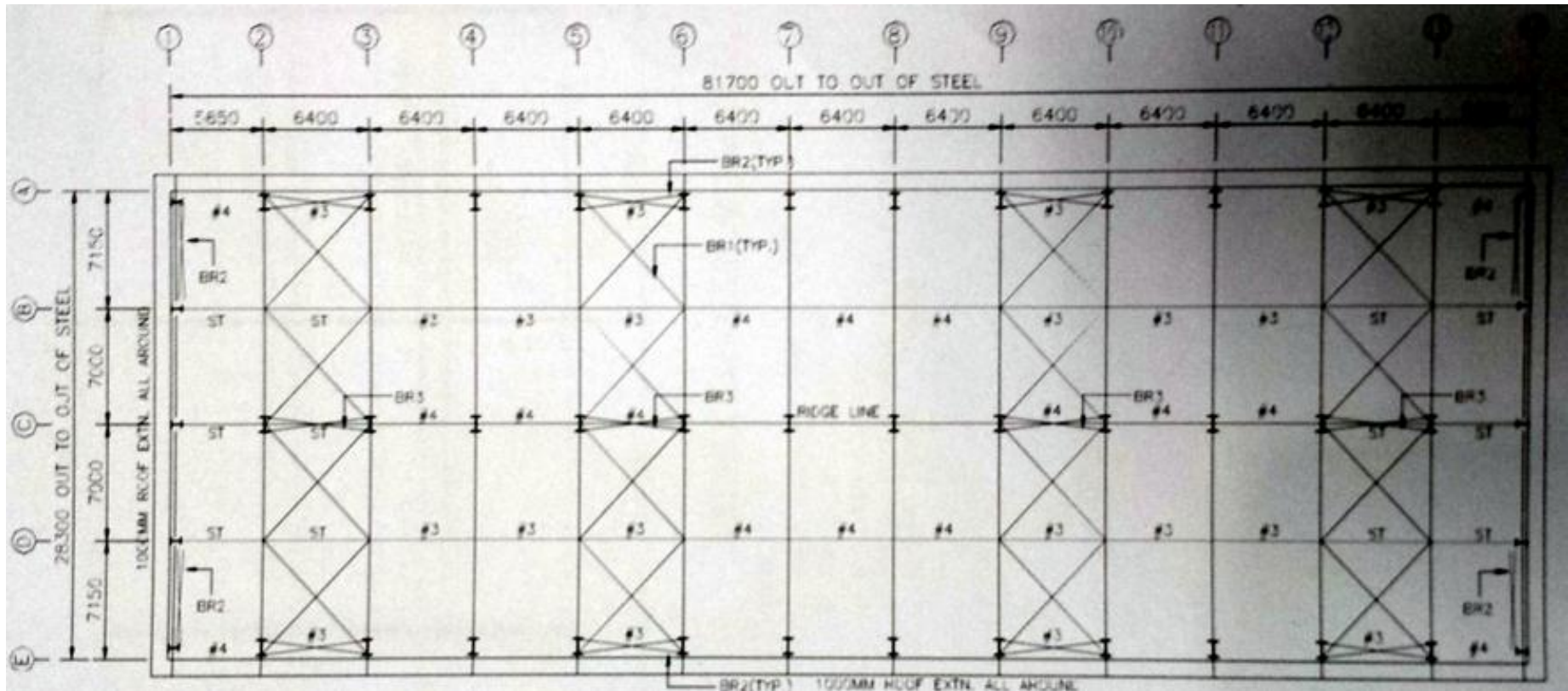
Linking bridge between Production bldgs

Structural system



Concrete beam-columns frame system

Production #2 building



Bracing: two rods $D=52\text{mm}$

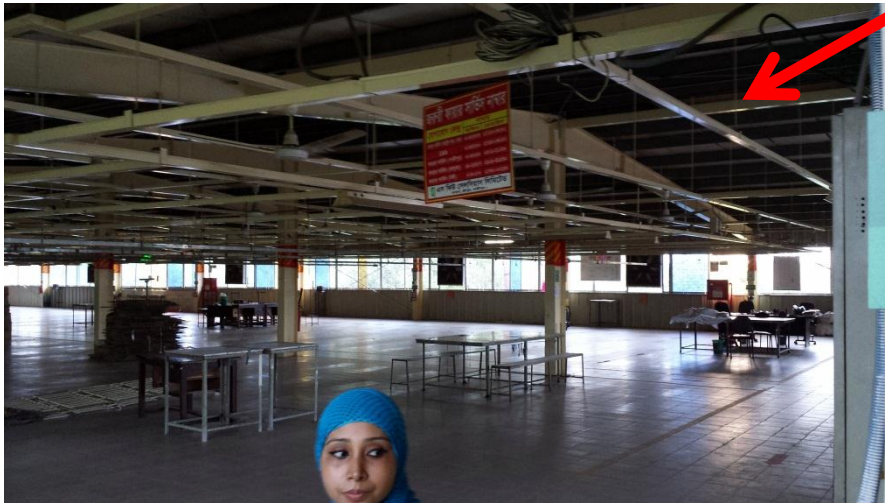
Floor to floor height: 3.66m

Composite slab: RC topping 125 mm with floor finish 25mm

Structural system

Production #2 building

Steel structure, braced laterally at roof level and facade every 4th bay



Composite steel / concrete floor structure fully braced vertically on façade at every 3rd bay down to ground level



Structural system

Adjusting buildings



ETP – Effluent treatment station



Guard house



Diesel generator room

Structural system

Observations

Extended structure on 2nd Floor in Production Building #1

Building Permit shows reduced layout of the 2nd floor (mezzanine) of Production Bulding #1

Extended 2nd floor structure present during factory inspection – changed beams layout



Mezzanine extension not shown on drawings



Structural system

Layout of extended floor at 2nd Floor present on site

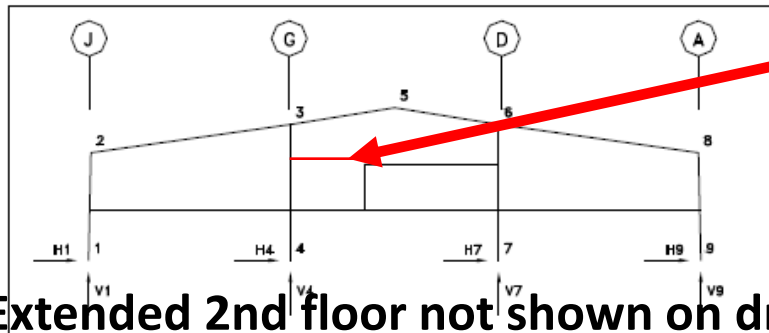
DESIGN SHEET

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	Job No.	J2-8631	Building No.	01	Rev. No.	00
	Customer	FS SWEATERS LIMITED			Date	27-09-00
	Description	Reactions			Designed By	SEK
					Checked By	SHS

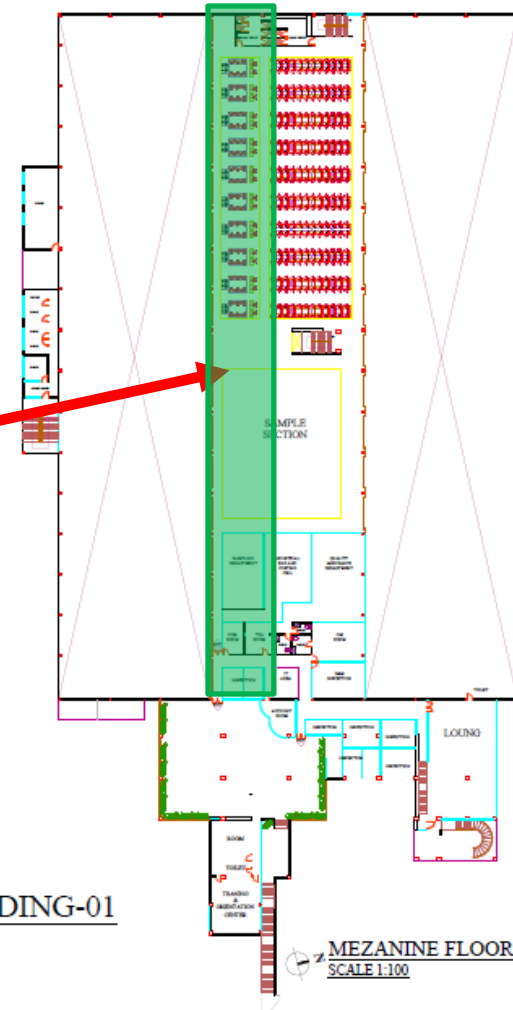
Column Reactions

SIGN CONVENTION	WIND COLUMN REACTIONS	WIND COLUMN REACTIONS-MCH	WIND COLUMN REACTIONS-MCH	WIND COLUMN REACTIONS-MCH
	WL=8KN WL=62KN DL=8KN LL=12KN ML=43KN WL=45KN	ML=240KN ML-MEZZANINE LOAD	ML=505KN	ML=770KN



Extended 2nd floor not shown on drawings

STRUCTURE REACTIONS J2-8631-REV-0-GL-3 TO 8 & 11 TO 17									
Load Cases	V1 (kN)	H1 (kN)	V4 (kN)	H4 (kN)	V7 (kN)	H7 (kN)	V9 (kN)	H9 (kN)	Frames at Grid Lines
DEAD LOAD	14	5	22	1	23	-1	14	-4	3-8 & 11-17
LIVE LOAD	31	13	57	2	57	-2	30	-13	3-8 & 11-17
MEZZANINE LOAD	220	9	237	1	432	-3	219	-7	3-8 & 11-17
SEISMIC LEFT	-11	-24	10	-20	-9	-31	11	-24	3-8 & 11-17
SEISMIC RIGHT	11	24	-10	20	9	31	-11	24	3-8 & 11-17
TEMPERATURE-1	2	3	-2	1	-2	-1	2	-3	3-8 & 11-17
TEMPERATURE-2	-2	-3	2	-1	2	1	-2	3	3-8 & 11-17
WINDEND	-99	-18	-171	-1	-171	1	-98	17	3-8 & 11-17
WINDLEFT	-96	-51	-170	-3	-118	1	-62	5	3-8 & 11-17
WINDRIGHT	-62	-5	-117	-1	-170	3	-96	51	3-8 & 11-17



BUILDING-01

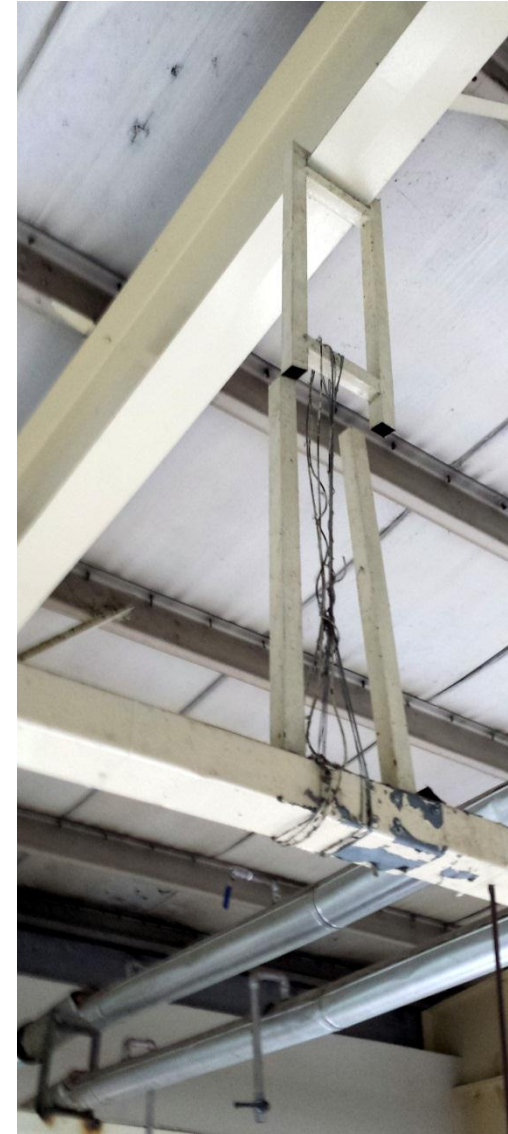
MEZZANINE FLOOR
SCALE 1:100

DESIGNED BY	DR. ABU BAKAR ALI	CHECKED BY	MR. ABU BAKAR ALI	DATE	27-09-00
APPROVED BY	MR. ABU BAKAR ALI	DATE	27-09-00	PROJECT NO.	J2-8631

Differences between the computational model and built

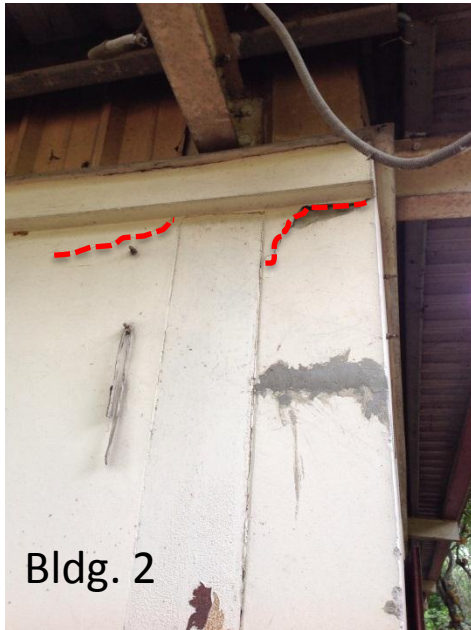
Non-engineered supports

Non-engineered consoles & hangers



Observations

Cracking in masonry walls



Cracks on the masonry walls. It is recommended to repair and maintain.

Cracks in masonry walls (elevation)

Bldg. 1

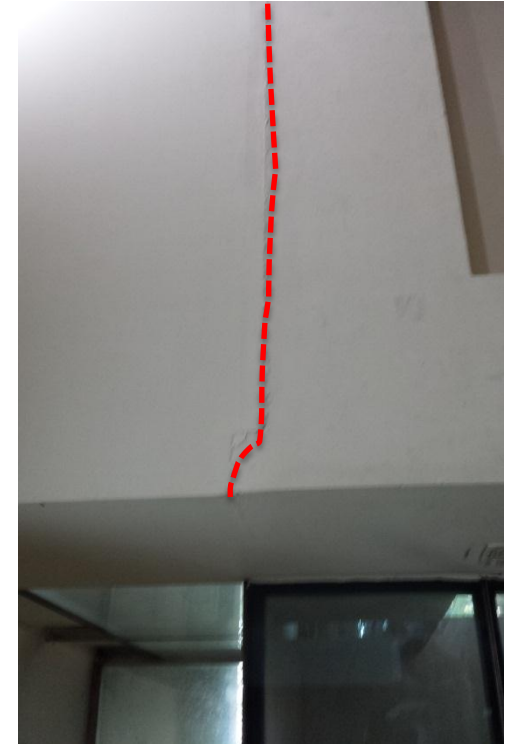


Bldg. 1



Cracks on the masonry walls.
It is recommended to repair and maintain.

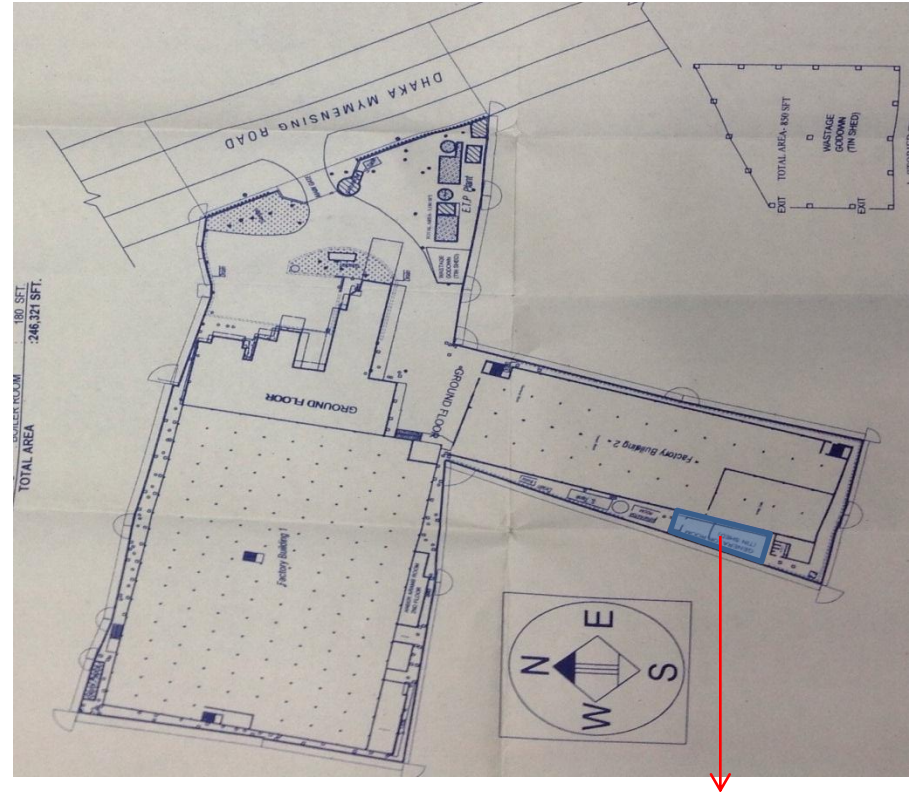
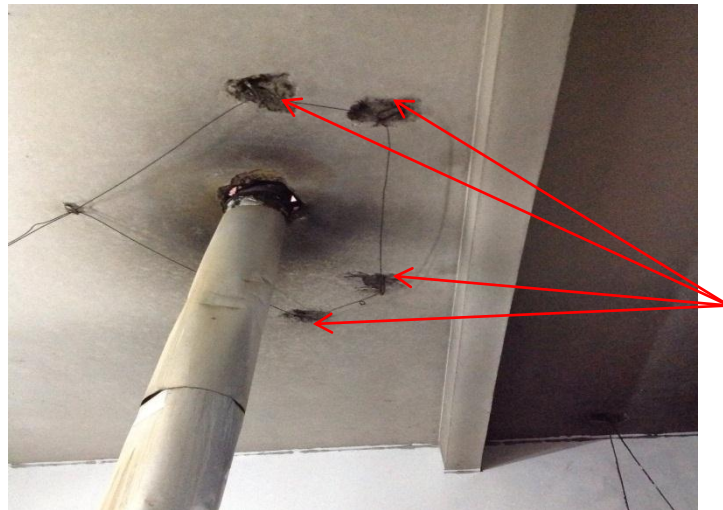
Cracks in masonry walls (elevation)



Cracks on the masonry walls.
It is recommended to repair and maintain.

Cracks in masonry walls

Generator room



Local cavern in roof slab

Generator room

Cracks in the generator room.
It is recommended to repair and maintain.

Cracking in masonry walls

Leakages on the external slabs

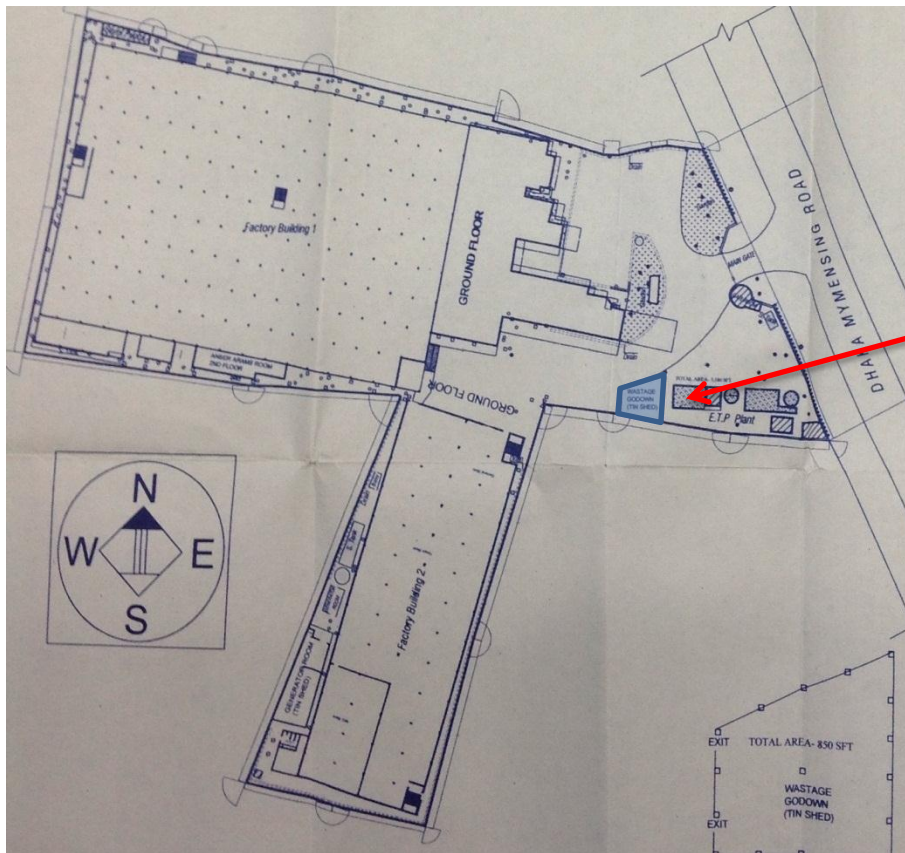


Located on the ceiling leak.
It is recommended to repair and maintain.



Leakages on the external slab (terraces)

Lightweight steelwork



Non-engineered lightweight steel roof.

These structures do not appear to be engineered, and drawings were not available to show structural intent. Building Engineer to review the design of these structures and to implement any upgrade works if required.

Lightweight steel roof

Priority Actions

Problems Observed

ITEM 1: Discrepancies between 'as built' drawings and existing structure require check

ITEM 2: Water leakages in the Office Building

ITEM 3: Repair movement joints (cold joints) on the walls between buildings

Item 1 and actions

Design check required due to discrepancies between 'as built' drawings and building structure – extended mezzanine floor on 2nd floor in Production Building #1

Priority 1

(Immediate - Now)

- None required

Priority 2

(within 6-weeks)

- None required

Priority 3

(within 6-months)

- Factory Engineer to review design, loads and column stresses in area identified above. The current “as-built” structure is more symmetrical, much more regular scheme that shown in the Design.

Item 2 and actions

Water leakages under terraces

Priority 1

(Immediate - Now)

- None required.

Priority 2

(within 6-weeks)

- None required.

Priority 3

(within 6-months)

- Repair and maintain waterproof of the slab exposed to rain water.

Item 3 and actions

Repair on the gap between Office and Production #1 buildings

Priority 1

(Immediate - Now)

- None required

Priority 2

(within 6-weeks)

- None required

Priority 3

(within 6-months)

- Local refurbishment on the movement joints on the walls

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.