Category Yellow

DK Global Fashion Wear Ltd.

H#330/1, West Souldubi, Kashimpur, Gazipur
(23.965755N, 90.305558E)
17 July 2023

Structural Inspection Report

Observations & Actions

Authors: Md. Abu Zafar-Al-Mansur, Koushik Biswas, Md. Ashraf Ullah and Md. Jahidul Islam
Reviewed By : Md. Moshiur Rahman/Md. Kamruzzaman Mahfuz
Approved By : Mohammad Ahsan Ullah

RSC RMG SUSTAINABILITY COUNCIL

Executive Summary

On 17 July 2023, Abu Zafar-Al-Mansur, Koushik Biswas, Md. Ashraf Ullah and Md. Jahidul Islam of **RMG Sustainability Council (RSC)** carried out a visual structural survey of the **DK Global Fashion Wear Ltd.** at the address and coordinate given in front page.

We met with factory management including Mahmud Hossain (Managing Director), Sajjad Mostafa Sazin (Deputy Managing Director) and many more.

The factory comprises four structures named Production Building, Utility Building, Canteen Building, and Security Guard room which are owned by DK Global Fashion Wear Ltd. and we were given access to all areas of the mentioned structures.

Production Building: The structure is a two storied (G+1) prefabricated steel structure. The structure is being used for light garments manufacturing including cutting, finishing, packaging, Swing section, warehouse, office and sample section. The structure was constructed between October 2016 and June 2018. This structure has been occupied since June 2019. The approximate per floor area is 1332 sqm.

Utility Building: The structure is a two storied (G+1) reinforced concrete building. General floor operation in different floors of this building are Generator, Boiler, Sub-station, Maintenance room, and Compressor Room. The roof is open to sky. There were 3 nos PVC water tank with a capacity of (2 nos 2000 and 1 nos 3000 litre). This building was constructed between October 2016 to June 2018. This building has been occupied since June 2019. The approximate per floor area is 90 sqm.

Executive Summary (Continued)

Canteen Building: The structure is a single storied reinforced concrete building which is being used for canteen, childcare, treatment room, prayer room. Roof is open to sky. This building was constructed between October 2016 to April 2020. This building has been occupied since June 2019. The approximate per floor area is 173 sqm.

Security Guard Room: The structure is a two storied (G+1) reinforced concrete building. General floor operation in different floors of this building are Guard Room and for dorm. This building was constructed between October 2016 to June 2018. This building has been occupied since June 2018. The approximate per floor area is 23 sqm.

We were provided with a copy of the permit drawing approved by Tangi Pouroshova, Gazipur Sadar for all structures dated 5th December 2012.

A copy of industrial layout permit drawings from Department of Inspection for Factories and Establishments (DIFE) dated 29th January 2023.

Executive Summary (Continued)

The following documents were available on site for review:

Production Building:

- Architectural and structural drawing prepared by “BEE Construction”.
- A set of load plan considering live load 3 kPa for typical floor and 1 kPa for pitch roof.
- Design report prepared by “BEE Construction”.
- Concrete cylinder test reports tested from BUET (3 sets for column).
- 2 sets of MS Plate test report. Fy 345 MPa achieved.
- Geotechnical investigation report for the whole premises prepared by “Nodi Soil Engineering” dated May 2016. Recommendation- shallow foundation based 8 bore holes data. Recommended allowable bearing capacity is 2 tsf considering factor of safety 2.50.

Utility Building:

- Architectural and structural drawing prepared by “BEE Construction”.
- A set of load plan considering live load 3 kPa for typical floor and 1.5 kPa for roof.
- Design report prepared by “BEE Construction”.
- Concrete core test reports tested from BUET (4 sets of concrete core test reports from ground floor columns). Equivalent concrete strength is mentioned 20.71 Mpa in the design report.
- Ferro-scan report.
- Geotechnical investigation report for the whole premises prepared by “Nodi Soil Engineering” dated May 2016. Recommendation- shallow foundation based 8 bore holes data. Recommended allowable bearing capacity is 2 tsf considering factor of safety 2.50.

Executive Summary (Continued)

Canteen Building:

- Architectural and structural drawing prepared by “BEE Construction”.
- Design report prepared by “BEE Construction”.
- Concrete core test reports tested from BUET (4 sets of concrete core test reports from ground floor and first floor columns). Equivalent concrete strength is mentioned 13.53 Mpa in the design report.
- Geotechnical investigation report for the whole premises prepared by “Nodi Soil Engineering” dated May 2016. Recommendation- shallow foundation based 8 bore holes data. Recommended allowable bearing capacity is 2 tsf considering factor of safety 2.50.

Security Guard Room:

- Architectural and structural drawing prepared by “Power IT & Electronics Ltd.” and “Design Den” Ltd.
- A set of load plan considering 3 kPa live load for typical floor.
- Geotechnical investigation report for the whole premises prepared by “Nodi Soil Engineering” dated May 2016. Recommendation- shallow foundation based 8 bore holes data. Recommended allowable bearing capacity is 2 tsf considering factor of safety 2.50.

Executive Summary (Continued)

We have also checked the column capacity as below:

Production Building: Considered live load (3 kPa for floor and 1 kPa for pitch roof) and Yield strength of steel 345 MPa based on available MS plate test report.
Utility Building: Considered live load (3 kPa for floor and 1.5 kPa for roof) and equivalent concrete strength 20.71 MPa based on available core test report.
Security Guard Room: Considered live load in slab layout (3 kPa for typical floor and 1.5 kPa for roof) and minimum concrete strength based on aggregate type.

Individual color category is given as below:

Production Building	Yellow
Utility Building	Green
Canteen Building	Green
Security Guard Room	Yellow

Executive Summary (Continued)

A level of non-exhaustive list of key concerns are:

Building-1 (Production Building):
Item 01: Lack of lateral stability system.
Item 02: Lack of information in as-built drawing.
Item 03: Significant gap in connection at several location.
Building-2 (Utility Building):
Item 04: Discrepancies in as-built drawing
Canteen Building:
Item 05: Lack of fall protection.
Item 06: Lack of water proofing at MCAC roof.
Security Guard Room:
Item 07: Lack of as-built drawings and design documents.
Item 08: Cracks on masonry walls.
Item 09: Non engineered steel stair.

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

Executive Summary (Continued)

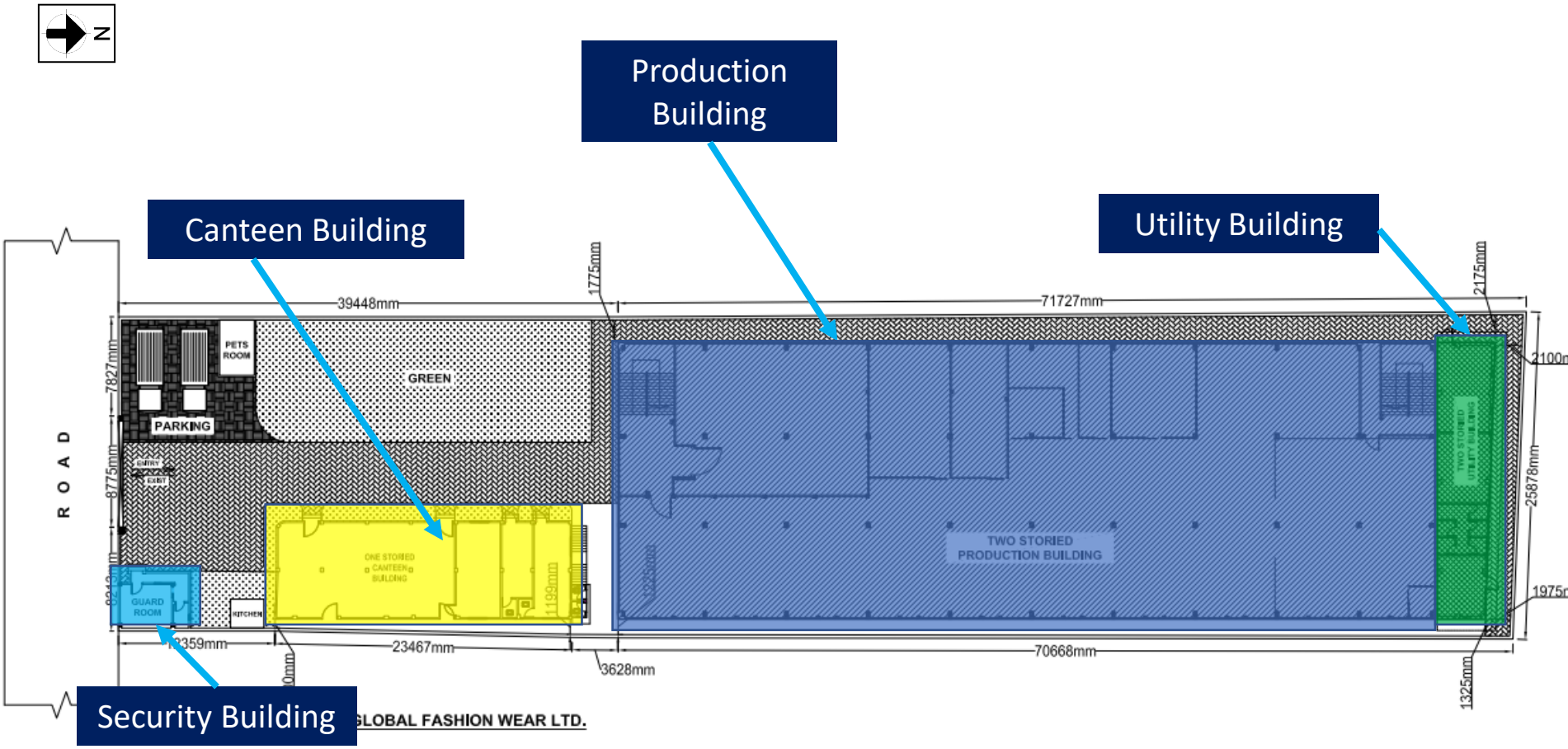
Further actions with associated priorities and timeframes are given at the end of this report. Please note that these actions should be completed as soon as practically possible and certainly within the time frame noted.

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 of damage in a major Seismic event.
Our Limitations and Assumptions are also noted at the end of this report.

Building Extents

DK Global Fashion Wear Ltd.- Geographical Location

Building Extents



DK Global Fashion Wear Ltd.– Master Layout Plan

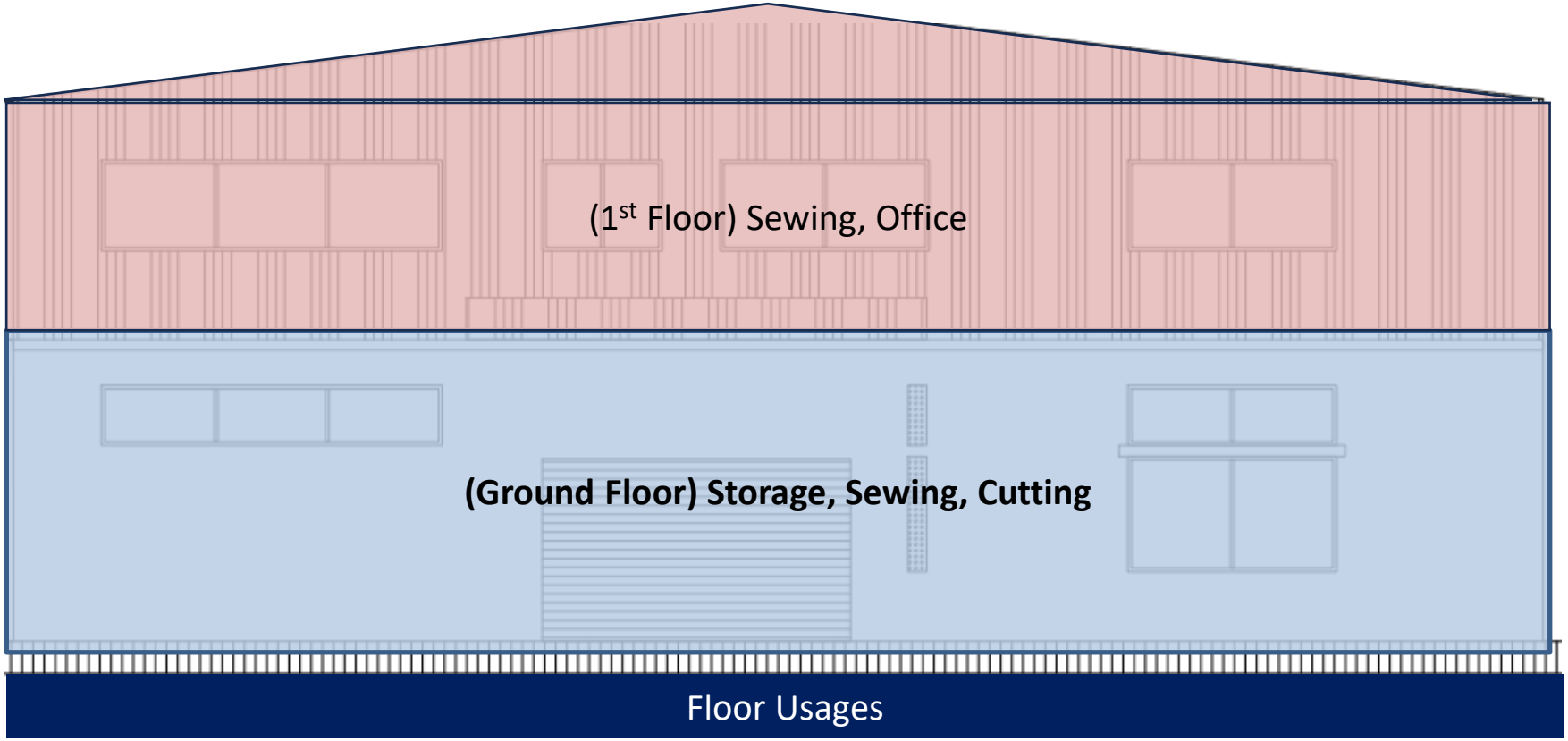
Building Extents

South Elevation

West Elevation

Building Extents : Production Building

RSC RMG SUSTAINABILITY COUNCIL



Building Extents : Production Building

Utility Building & Production Building Structurally Separated with Expansion Gap

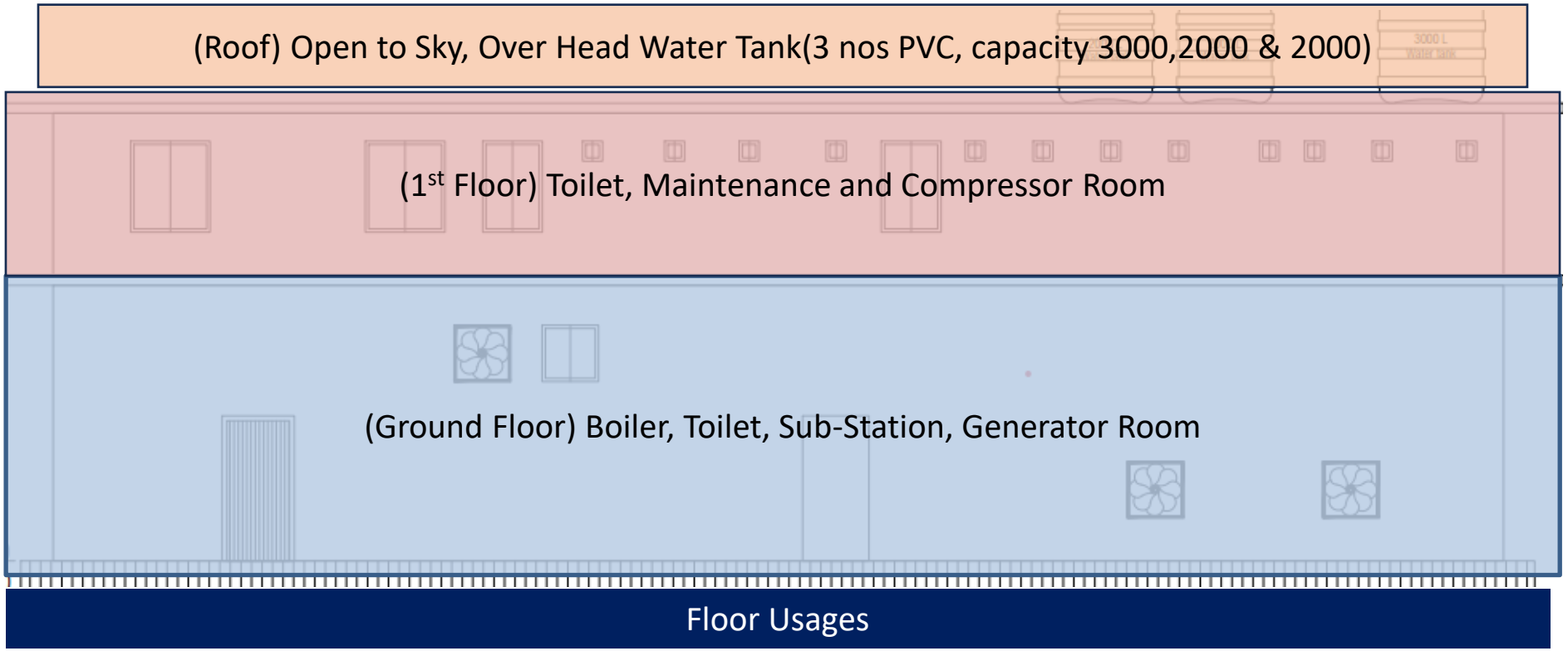
Building Extents : Utility & Production Building

North Elevation

North-West Elevation

Building Extents : Utility Building

RSC RMG SUSTAINABILITY COUNCIL



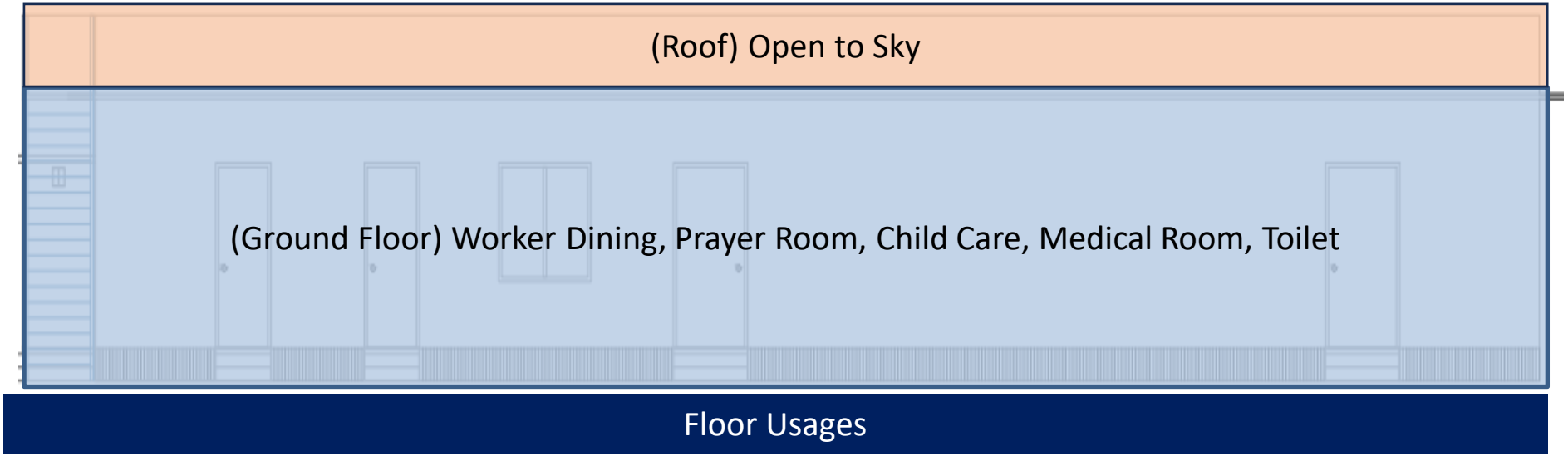
Building Extents : Utility Building

West Elevation

South Elevation

Building Extents : Canteen Building

RSC RMG SUSTAINABILITY COUNCIL



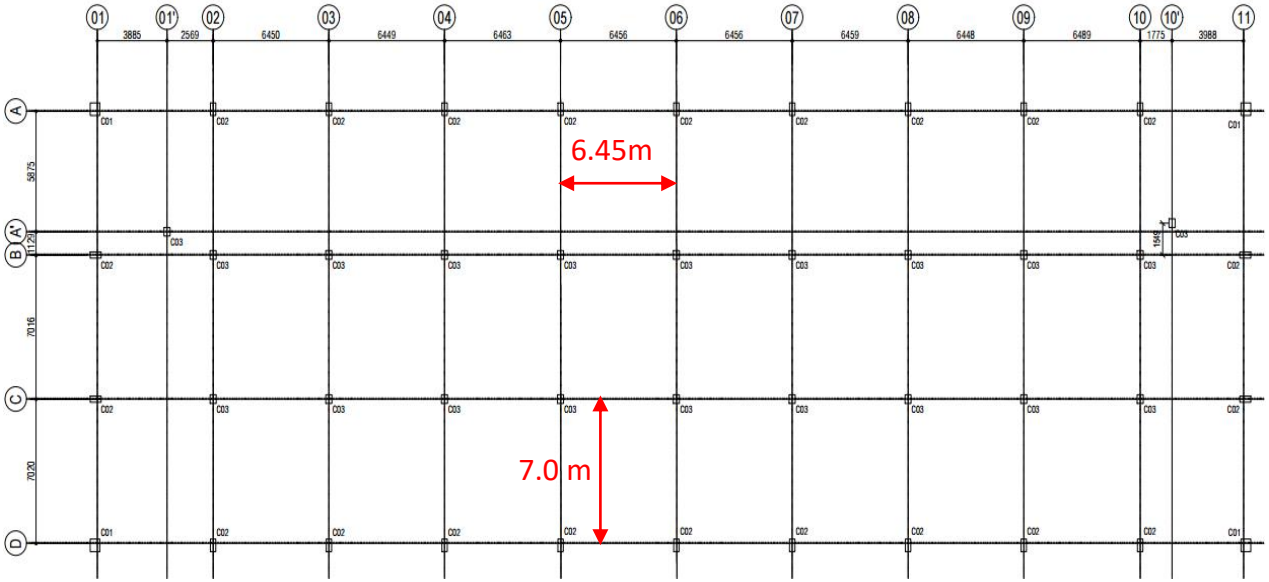
Building Extents : Canteen Building

North-West Elevation

Building Extents : Security Guard Room

Structural System

RMG SUSTAINABILITY COUNCIL



Ground floor layout

Structural System:

1st Floor: Pre-fabricated steel portal frame.

Ground Floor: Steel beam-column frame system with decking slab.

Stability system:

1st Floor: Portal frame action along short direction and horizontal & vertical bracing along long direction.

Ground Floor: Moment resisting frame along short direction with wall bracings along the long direction of periphery walls.

Steel Column Size: (mm):

Web- 310x6, Flange- 180x8

Web- 310x6, Flange- 175x10

Web- 320x6, Flange- 125x10

Steel Beam Size: (mm):

Primary Beam:

Web- 750X5; Flange- 200X7

Web- 525X8; Flange- 250X12

Secondary Beam Joist:

Web- 350X4; Flange- 125X6

Web- 255X4; Flange- 125X6

Steel Rafter Size (mm):

Web- 230x4, Flange- 140x6

Bracing Size (mm):

Cable : 12 mm dia cable

Connection type: Bolted.

Floor Heights:

Ground Floor: 4.15 m

3.03m (eave) & 4.78m (ridge)

Foundation type: Isolated footing (as per drawing)

Structural System: Production Building

Beam-Column frame system

Main Beam to Sub-beam connection

Wall Bracing

Connection Type Bolted

Structural System: Production Building

Portal frame system

Horizontal Bracing

Structural System: Production Building

C.S.	WEB (MM)		FLANGE (MM)	
	DEPTH	THICK.	WIDTH	THICK.
C101	312	6	180	8
C101A	310	6	180	8
C101B	312	6	180	8
C101C	315	6	180	8
C101D	310	6	175	8
C102	315	6	135	10
C102A	320	6	125	10
C103	320	6	125	10
C103A	316	6	125	10
C103B	316	6	128	10
C103C	320	6	123	10
C103D	316	6	123	10
C103E	310	6	175	10

Steel Column Schedule

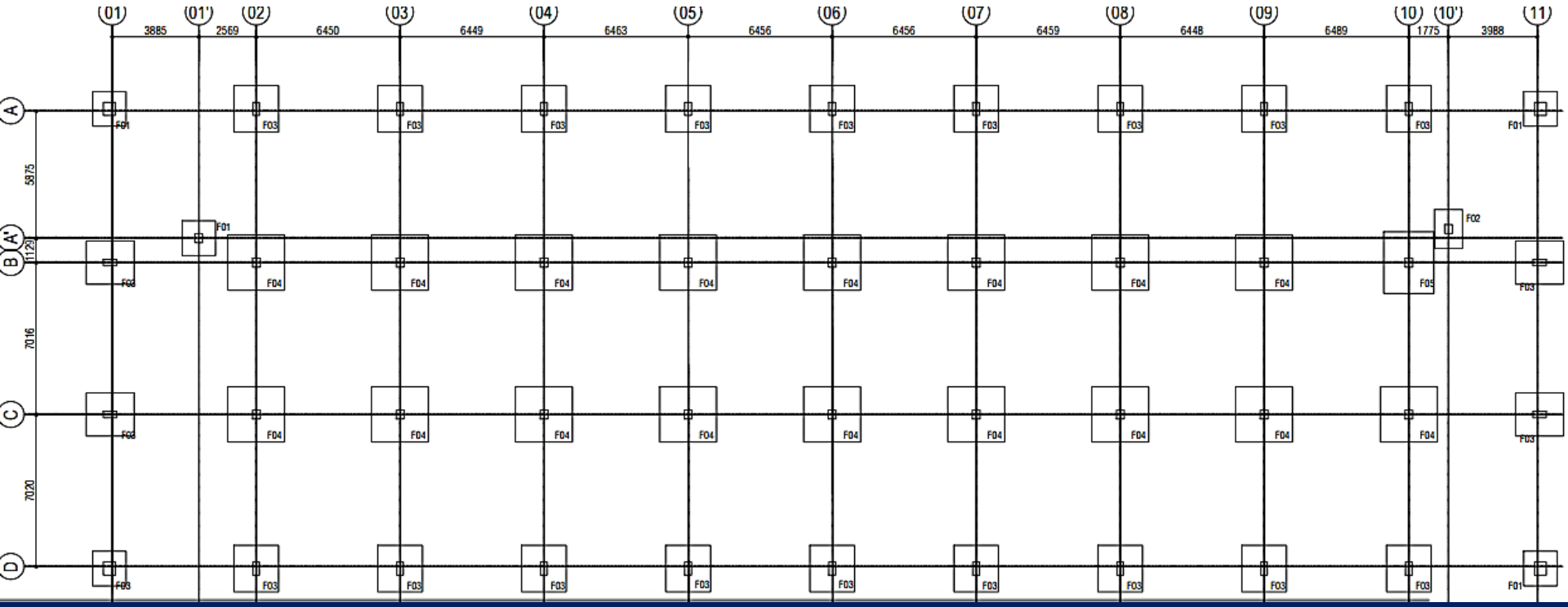
C.S.	WEB (MM)		FLANGE (MM)	
	DEPTH	THICK.	WIDTH	THICK.
MB01	525	8	250	12
MB02	520	8	250	12
MB03	525	8	250	12
MG01	350	4	140	6
MG02	350	6	135	6
J01	350	4	125	6
J02	285	4	125	6
J03	255	4	125	6
R01	230	4	140	6

Steel Beam Schedule

Compression strut

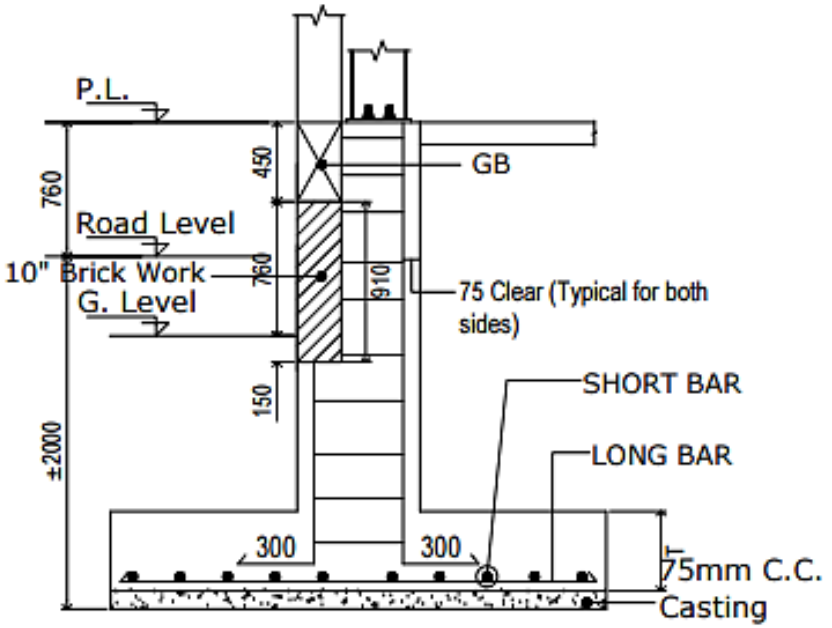
Rafter & Deck Slab

Building Extents : Production Building



Isolated Footing Schedule

Building Extents : Production Building



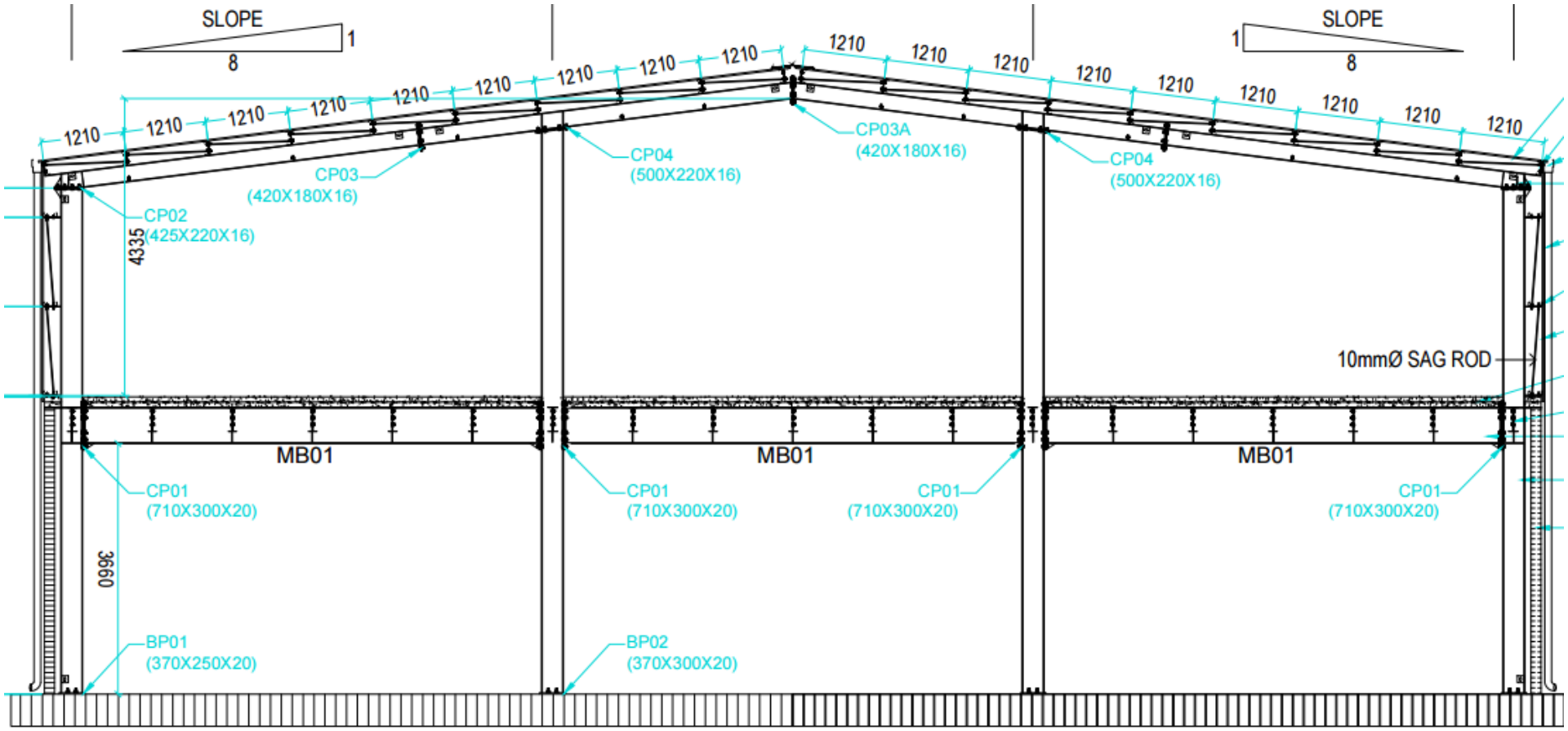
TYPICAL SECTION OF FOOTING

FOOTING SCHEDULE

TYPE	SIZE	THICKNESS	REINFORCEMENT	
			LONG BAR (BOTTOM)	SHORT BAR (BOTTOM)
F01	1500X1600	375	16Ø @ 175 C/C	16Ø @ 175 C/C
F02	1250X1800	375	16Ø @ 175 C/C	16Ø @ 175 C/C
F03	2000X2150	375	16Ø @ 175 C/C	16Ø @ 175 C/C
F04	2550X2550	375	16Ø @ 150 C/C	16Ø @ 150 C/C
F05	2250X2850	375	16Ø @ 150 C/C	16Ø @ 150 C/C

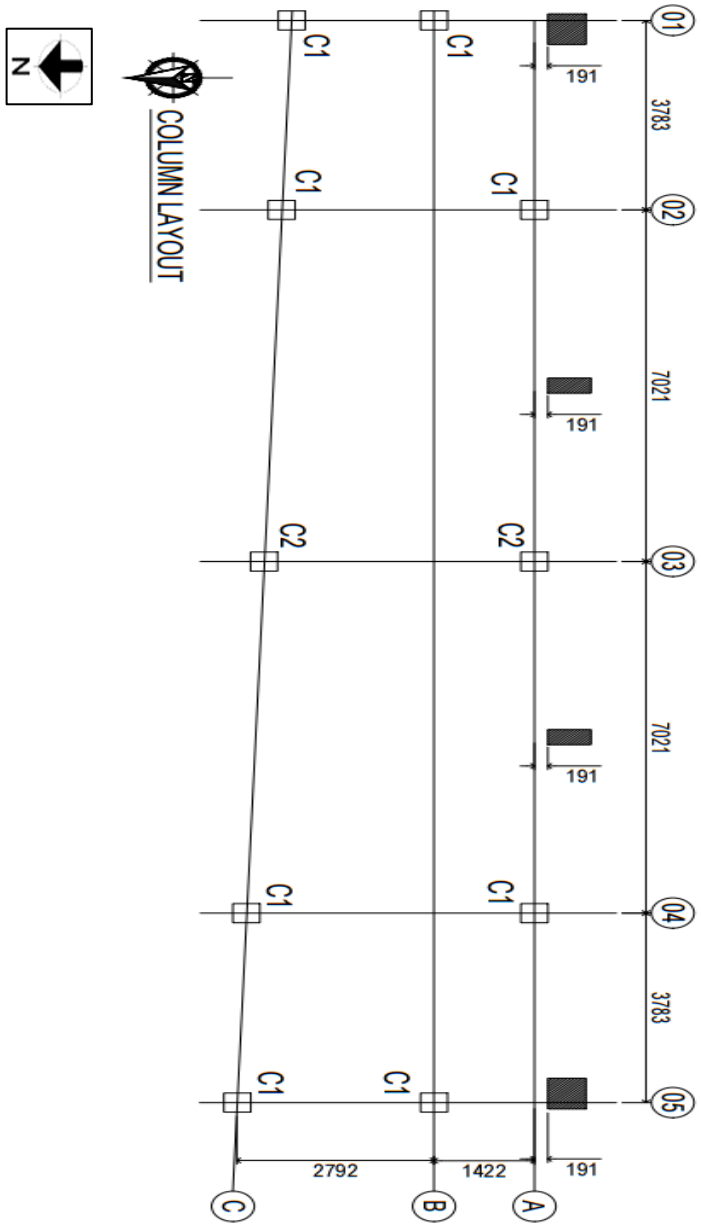
Isolated Footing Details

Building Extents : Production Building



Sectional Elevation

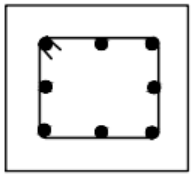
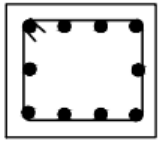
Building Extents : Production Building



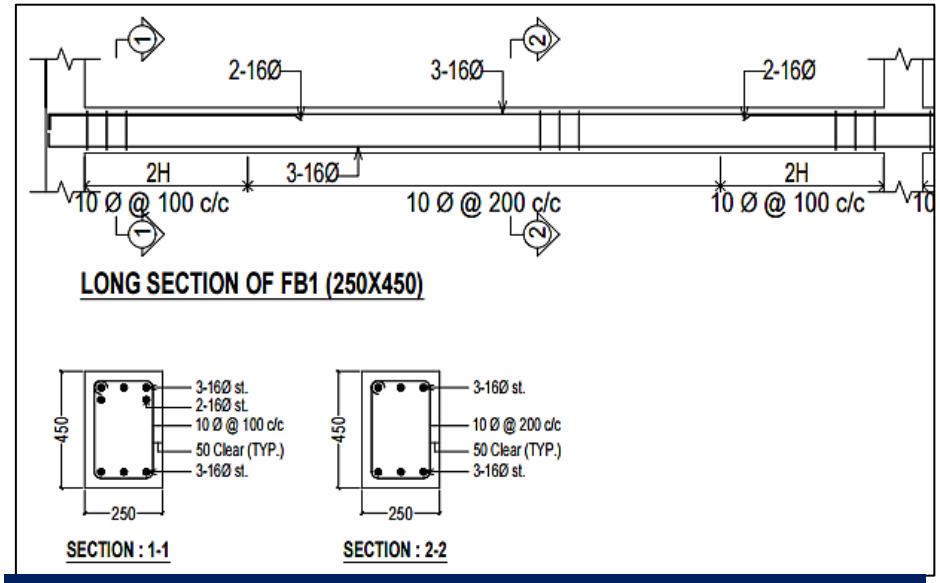
Column Layout Plan

Structural System: RC beam and column framing with two-way spanning slab.
Lateral stability: Moment resisting frame.
Maximum Grid Spacing: As shown in figure.
Column Dimension (mm): 375X375
Beam Dimension (mm):
Longitudinal: 250 (w) X 300 (d/s)
Transverse: 250 (w) X 300 (d/s)
Floor height:
Ground, floor – 4.15 m
First floor-2.44 m
Slab Thickness:
150 mm excluding finishes.
Aggregate type:
Brick chips (column)
Foundation Type:
Shallow Foundation(as per drawing)

Structural System: Utility Building

Column Type	C1	C2
GF TO ROOF	425X425  8-16mmØ	375X375  10-16mmØ

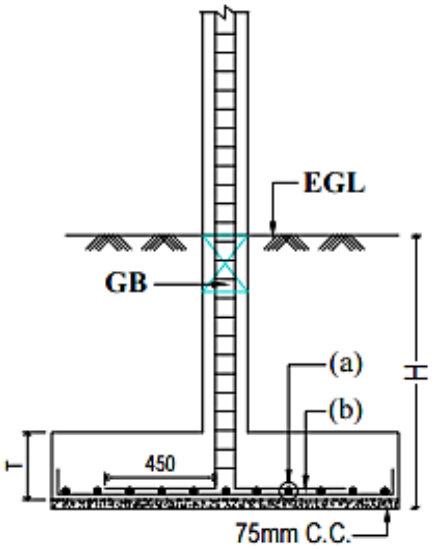
Column Schedule



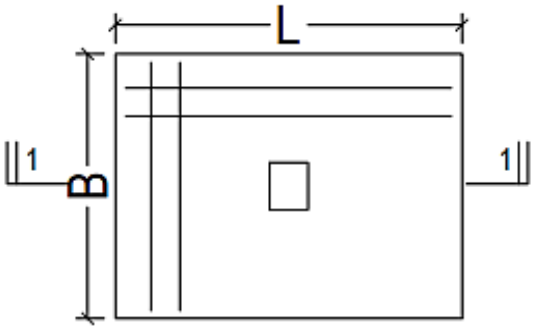
Floor Beam Details

Beam-Column Frame

Structural System: Utility Building



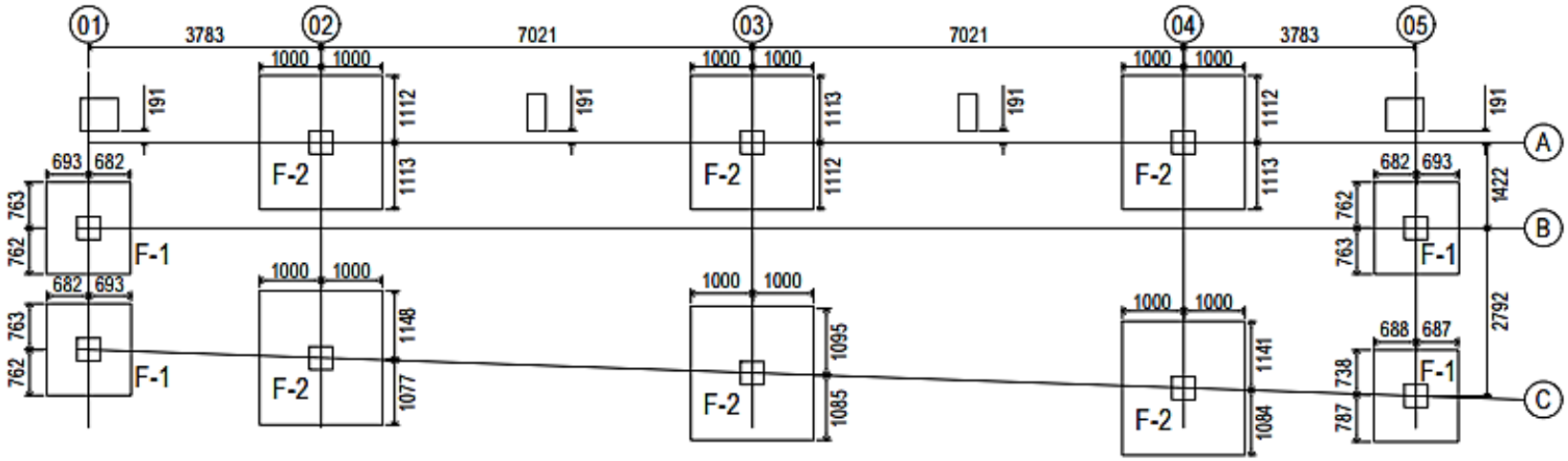
Section 1-1 of Single Footing



Plan View of Single Footing

FOOTING SCHEDULE

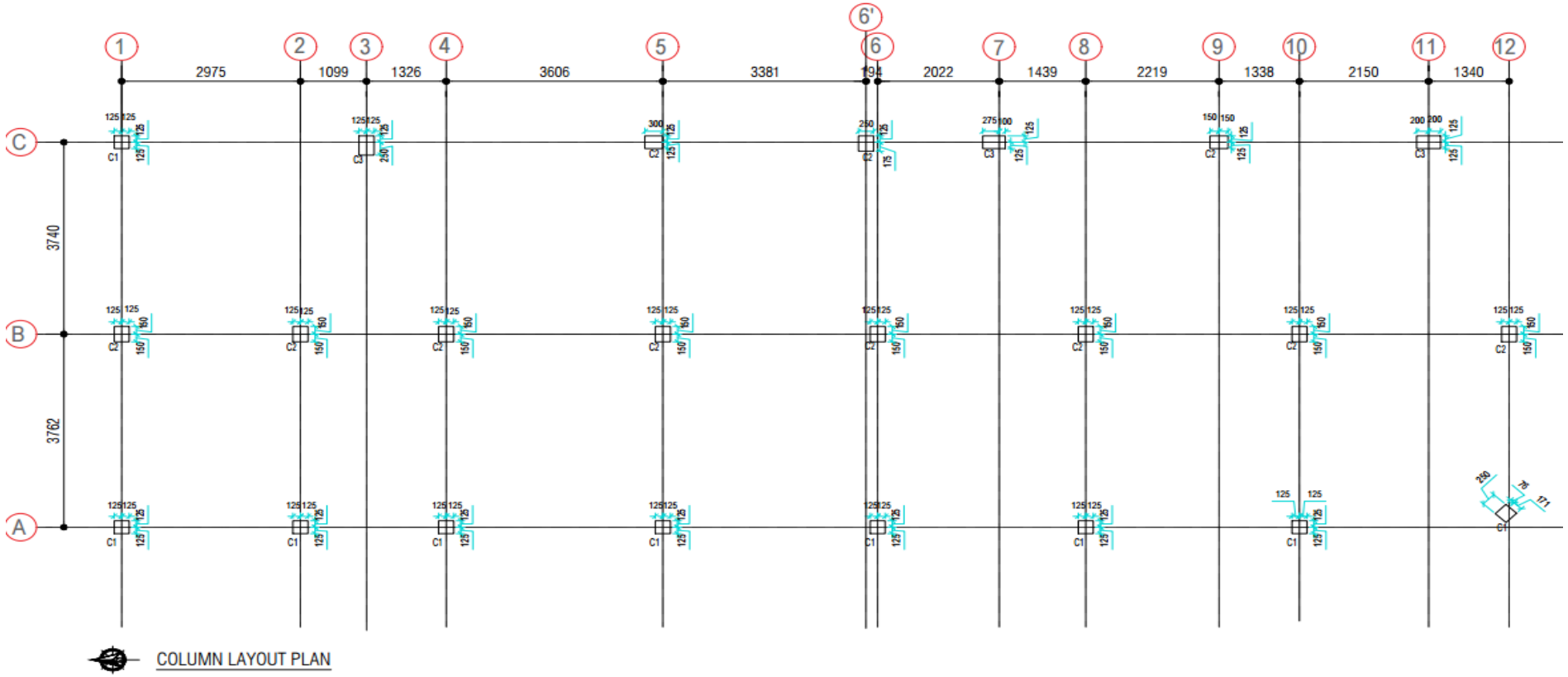
S.L	Type of Footing	L	B	T	H	(a) = As at L dir.	(b) = As at B dir.
1	F-1	1525	1375	450	1500	16mmØ @ 150mm c/c	16mmØ @ 150mm c/c
2	F-2	2225	2000	450	1500	16mmØ @ 125mm c/c	16mmØ @ 125mm c/c



FOOTING LAYOUT

Foundation Details

Structural System: Utility Building



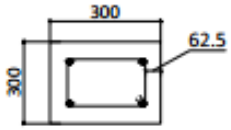
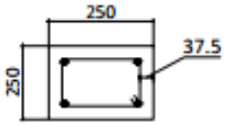
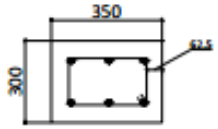
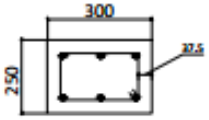
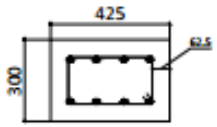
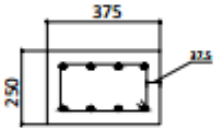
Column Layout Plan

Structural System:
RC beam and column framing with two-way spanning slab.
Lateral stability: Moment resisting frame.
Maximum Grid Spacing:
As shown in figure.

Column Dimension (mm):
C1-(250X250) C2-(250X300), C3-(250X375)
Beam Dimension (mm):
Longitudinal: 250 (w) X 125 (d/s)
Slab Thickness:
125 mm excluding finishes.

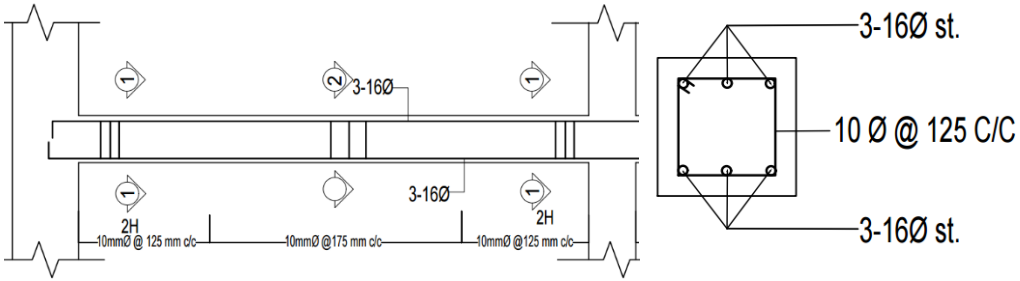
Floor Height:
Ground, floor – 2.75 m
Aggregate Type:
Brick Chips. (Columns)
Foundation Type:
Shallow Foundation (as per drawing)

Structural System: Canteen Building

Floors / Column No.	Foundation to Below GF	Ground Floor to 1st Floor
C1 (250 mm x 250mm)		
	4-16mmØ	4-16mmØ
	10mmØ@ 200 mm	10mmØ@ 200 mm
C2 (300 mmx 250 mm)		
	6-16mmØ	6-16mmØ
	10mmØ@ 200 mm	10mmØ@ 200 mm
C3 (375 mm x 250 mm)		
	8-16mmØ	8-16mmØ
	10mmØ@ 200 mm	10mmØ@ 200 mm

Column Schedule

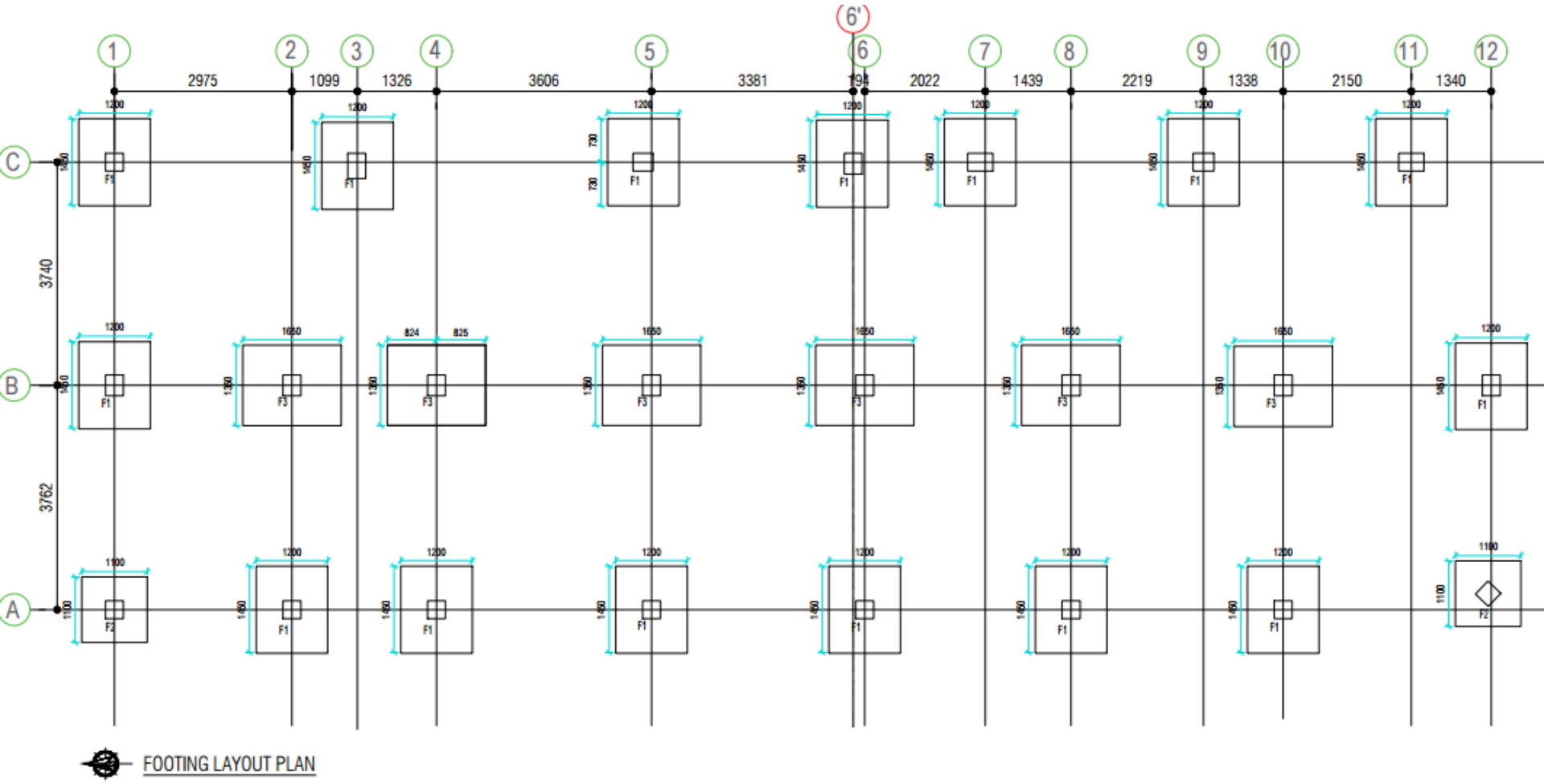
Beam-Column Framing System



Floor Beam Details

Structural System: Canteen Building

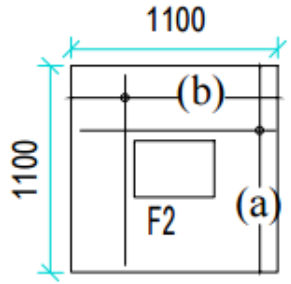
RSC RMG SUSTAINABILITY COUNCIL



Shallow Foundation Layout

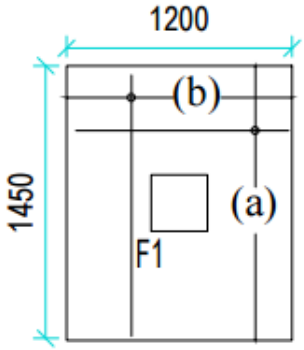
Building Extents : Canteen Building

(a)-16mmØ200 c/c at bottom

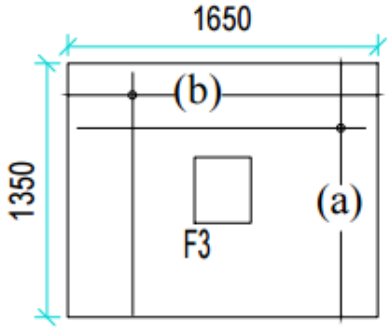


Plan View of Footing F2

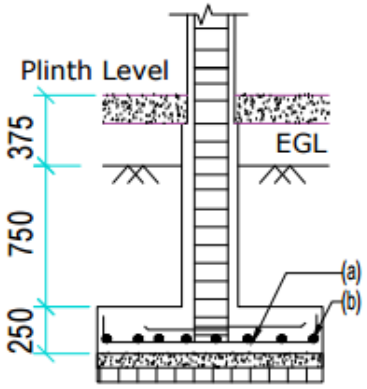
(b)-16mmØ200 c/c at bottom



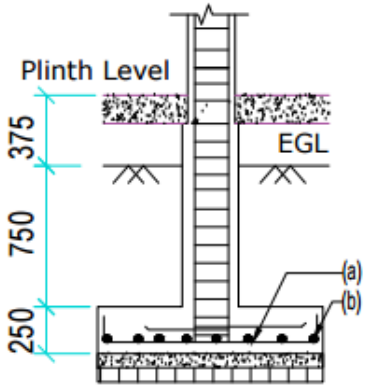
Plan View of Footing F1



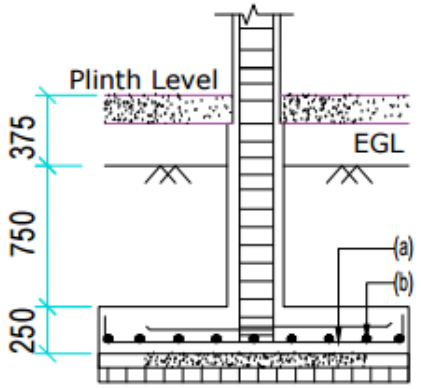
Plan View of Footing F3



Footing section of F2



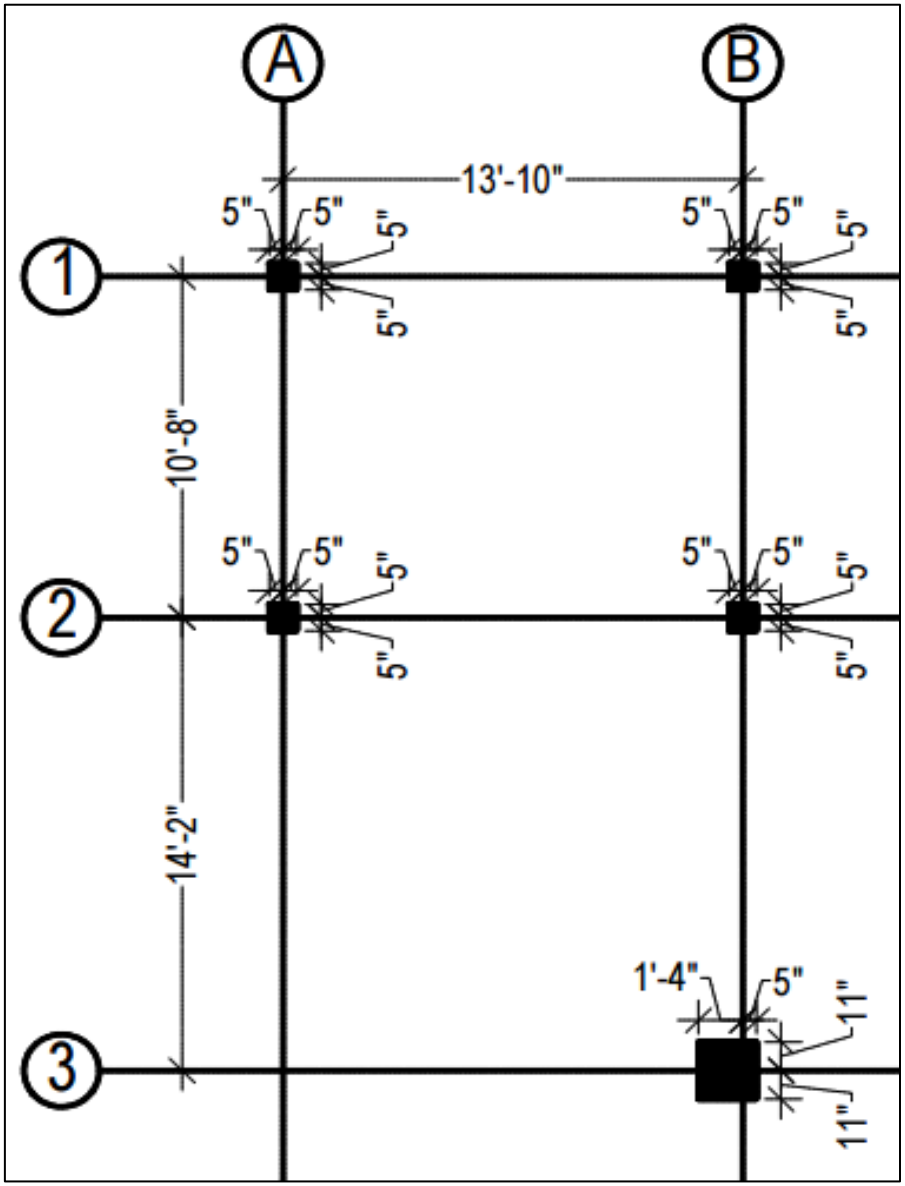
Footing section of F1



Footing section of F3

Foundation Details

Structural System: Canteen Building



Column Layout Plan

Structural System:
Ground Floor: RC beam column framing with two-way spanning slab
1st Floor: RC column framing with flat plate system.

Lateral stability:
Moment resisting frame.

Grid Spacing:
As shown in figure

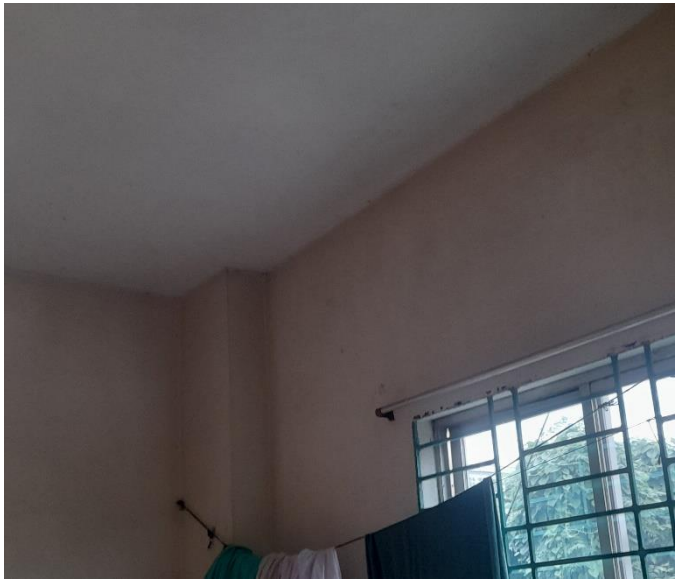
Column dimension (mm):
250X250, 525X550

Beam dimension (mm):
Longitudinal: 250 (w) X 250 (d/s)
Transverse: 250 (w) X 250 (d/s)

Slab thickness: 125mm excluding finishes

Aggregate type:
Brick chips (columns)

Structural System: Security Guard Room



Flat slab system (1st Floor)

Beam column frame (Ground Floor)

Structural System: Security Guard Room

Lack of lateral stability system

Observation: Building-1 (Production Building)

Roof & wall bracing provided

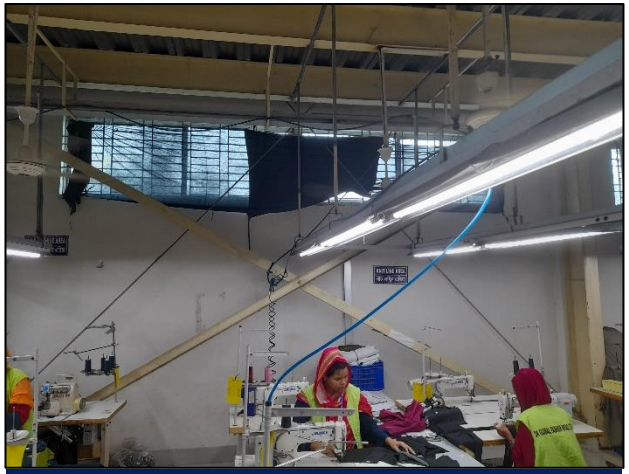
Compression strut missing in gable frame

Roof and wall bracing were provided at some location. However, compression strut was missing in gable frames to transfer the lateral load therefore lateral stability system of the shed is apparently incomplete. Building engineer is required to check the lateral stability system of the structure and suggest necessary remedial actions accordingly.

Observations: Building-1 (Production Building)

Lack of information in as-built drawing

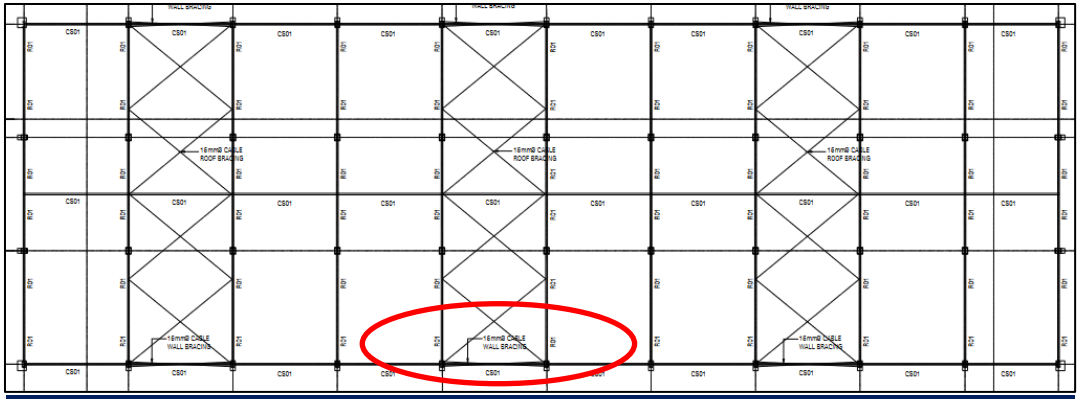
Observations: Building-1 (Production Building)



Angle bracing (Ground Floor)

Cable bracing (1st Floor)

Roof bracing



Bracing layout plan

In bracing layout plan, only horizontal and vertical cable bracing was shown. However, no information was available regarding vertical angle bracing on ground floor. In addition, elevation view and connection details of bracings were also not present in the as-built structural drawing. The building engineer is required to survey the whole structures and prepare accurate as-built drawings accordingly.

Observations: Building-1 (Production Building)

Significant gap in connection at several location

Observation:Building-1 (Production Building):

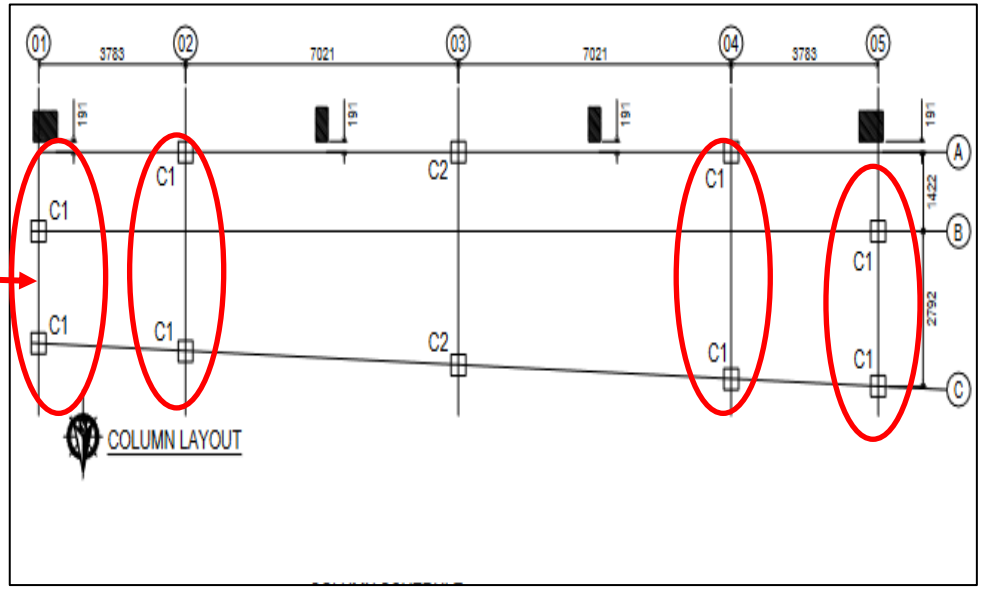
Significant gap in steel connection plates in different location

Significant gap in steel connection plates of rafter & column was found at different locations of the structure. Building engineer is required to survey the whole structure & identify the locations of the connection gaps. Factory engineer is also required to assess the reason of connection gap & provide proper remediation. Factory is required to follow recommendation of remediation suggested by the engineer.

Observation: Building-1 (Production Building):

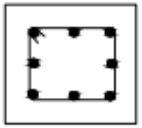
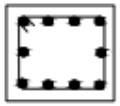
Discrepancies in as-built drawing

Observations: Building-2 (Utility Building)



C6 column was measured 450 mm instead of 500 mm

COLUMN SCHEDULE

Column Type	C1	C2
GF TO ROOF	425X425  8-16mmØ	375X375  10-16mmØ

Column schedule

In column schedule C1 column dimension was shown 425X425 mm. However, during inspection, all C1 columns were measured 375X375 mm. The building engineer is required to survey the whole structures and prepare accurate as-built drawings accordingly.

Observations: Building-2 (Utility Building)

Lack of fall protection

Observations: Canteen Building

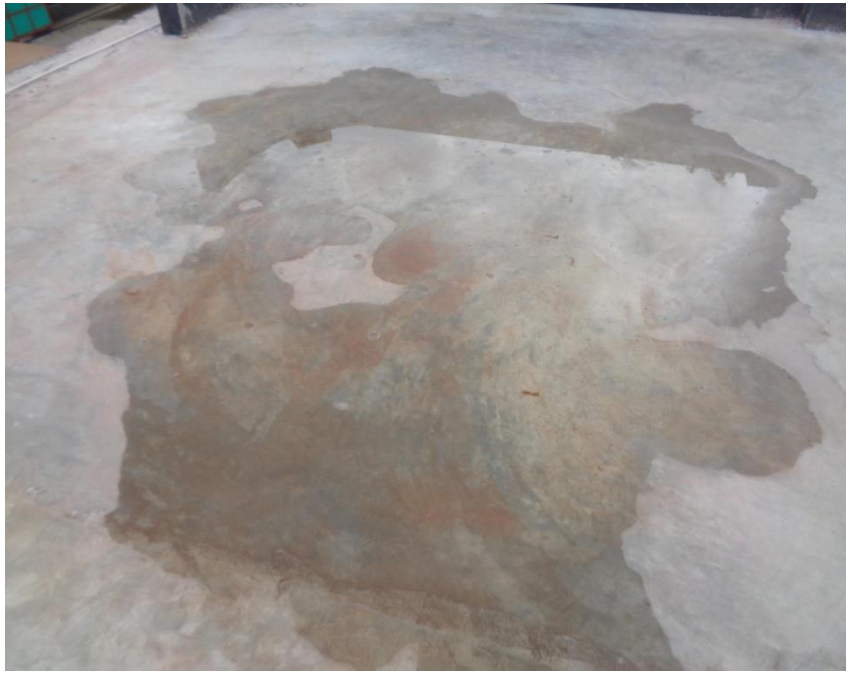
Opening at parapet wall

There were an opening area in parapet wall on canteen building roof which may cause falling hazard. The factory is required to provide adequate barrier/railing/walls on the opening area to protect possible falling hazard.

Observations: Canteen Building

Lack of water proofing at MCAC roof

Observation: Canteen Building



MCAC roof of Canteen Building

Water proofing was not applied on the roof. The roof is made of brick aggregate concrete. The building engineer is required to apply the water proofing layer on the current roof with proper slope.

Observation: Canteen Building

Lack of as-built drawings and design documents.

Observation: Security Guard Room

Inside of Security Guard Room

Security Guard Room

As per BNBC, every building or structure designed shall have its design documents prepared in accordance with the provision of Section 1.9.1. The design document shall include a design report, and a set of structural drawings, which shall be prepared in compliance with section 1.9.1.1 and section 1.9.1.2, part-6 of BNBC. At the time of inspection, no as-built drawings and design documents were available which are required to be prepared in compliance with section 1.9.1.1 (part-6, BNBC).

Observation: Security Guard Room

Crack on masonry wall

Observation: Security Guard Room

Cracks on masonry walls

Building engineer is required to investigate the cause of wall cracks and repair with a suitable method.

Observations: Security Guard Room

Apparently non engineered steel stair

Observations: Security Guard Room

Non-engineered steel stair

Both Shed-1 and Shed-2 were appeared to be non engineered due to lack of apparent load path, poor connection and apparently inadequate member size. Building engineer is required to check the connection adequacy for uplift forces as part of EA otherwise replace with engineered structure.

Observations: Security Guard Room

Tests Carried Out

Brick aggregate (Security Guard room)

Brick aggregate (Building-2)

Ferro scanning

Test Carried Out:

RSC RMG SUSTAINABILITY COUNCIL

Problems Observed

Building-1 (Production Building):

Item 01: Lack of lateral stability system.

Item 02: Lack of information in as-built drawing.

Item 03: Significant gap in connection at several location.

Building-2 (Utility Building):

Item 04: Discrepancies in as-built drawing

Canteen Building:

Item 05: Lack of fall protection.

Item 06: Lack of water proofing at MCAC roof.

Security Guard Room:

Item 07: Lack of as-built drawings and design documents.

Item 08: Cracks on masonry walls.

Item 09: Apparently non engineered steel stair

Priority Actions

Item 01 and actions

Lack of lateral stability system. (Production Building)

Priority 1 (Immediate - Now)	• Not Required.
Priority 2 (within 6-weeks)	• Building engineer is required to check the lateral stability of the structure and suggest necessary remedial actions accordingly.
Priority 3 (within 6-months)	• Implement remediation work where required.

Item 02 and actions

Lack of information in the as-built drawings. (Production Building)

Priority 1 (Immediate - Now)	• Not Required.
Priority 2 (within 6-weeks)	• The building engineer is required to survey the structure and prepare accurate as-built drawing.
Priority 3 (within 6-months)	• Not Required.

Item 03 and actions

Significant gap in connection at several location. (Production Building)

Priority 1 (Immediate - Now)	• Not Required.
Priority 2 (within 6-weeks)	• Building engineer is required to repair the gap in connections with a suitable method.
Priority 3 (within 6-months)	• Not Required.

Item 04 and actions

Discrepancies in the as-built drawings. (Utility Building)

Priority 1 (Immediate - Now)	• Not Required.
Priority 2 (within 6-weeks)	• The building engineer is required to survey the structure and prepare accurate as-built drawing.
Priority 3 (within 6-months)	• Not Required.

Item 05 and actions

Lack of fall protection (Canteen Building)

Priority 1 (Immediate - Now)	• Not Required.
Priority 2 (within 6-weeks)	• Building engineer is required to provide adequate barrier/walls on the opening area of the roof to protect possible falling hazard.
Priority 3 (within 6-months)	• Not Required.

Item 06 and actions

Lack of water proofing at MCAC roof (Canteen Building)

Priority 1 (Immediate - Now)	• Not Required
Priority 2 (within 6-weeks)	• The building engineer is required to apply the water proofing layer on the current roof with proper slope.
Priority 3 (within 6-months)	• Not Required

Item 07 and actions

Lack of as-built drawings and design documents. (Security Guard Room)

Priority 1 (Immediate - Now)	• Not Required
Priority 2 (within 6-weeks)	• Building engineer is required to prepare the design documents including a design report, and a set of structural drawings in compliance with section 1.9.1.1 and section 1.9.1.2, part-6 of BNBC and submit it to RSC for review.
Priority 3 (within 6-months)	• Carry out remedial works (if any) after reviewed by the RSC.

Item 08 and actions

Cracks on masonry wall. (Security Guard Room)

Priority 1 (Immediate - Now)	• Not Required
Priority 2 (within 6-weeks)	• Building engineer is required to investigate the cause of wall cracks and repair with a suitable method.
Priority 3 (within 6-months)	• Carry out remedial works (if any) after reviewed by the RSC.

Item 09 and actions

Apparently non engineered steel stair. (Security Guard Room)

Priority 1 (Immediate - Now)	• Not Required
Priority 2 (within 6-weeks)	• Building engineer is required to check the connection adequacy for uplift forces as part of EA otherwise replace with engineered structure.
Priority 3 (within 6-months)	• Carry out remedial works (if any) after reviewed by the RSC.

Survey Limitations and Assumptions

This report is for the private and confidential use of RSC 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 RSC.

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 generalized 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 nonstructural 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 in situ 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.