Karim Textiles Limited(Extension)

Noorbag, Kaliakor, Gazipur, Bangladesh
Geographic Coordinates: 24.019730N, 90.300313E
07 September 2023

RSC RMG SUSTAINABILITY COUNCIL

Building Information

1. **Building-3:** This structure is a nine storied (B+G+8) reinforced concrete (RC) building with one basement.

Observations

Inconsistencies in design report

Observations

The building construction was started in April 2013 and ended in November 2014. Approval from local authority from April 2013. The factory occupied the structure since December 2014. But in the design report software-based analysis load combination had been considered as NTPA which doesn't comply with BNBC part-6.
Building engineer is required to revised the prepared design report as per BNBC part-6.

ECLECTIC
architects | engineers | planners

ASSESSMENT REPORT
KARIM TEXTILES LTD. (EXTENSION)

EXECUTIVE SUMMARY

ENGINEERING ASSESSMENT REPORT OF 9-STORIED INDUSTRIAL BUILDING WITH SEMI BASEMENT REINFORCED CONCRETE BUILDING- OF KARIM TEXTILES LTD. AT NOORBAG, KALIAKOIR, GAZIPUR.

It is declaring that Engineering Assessment Report of the structure has been done based on As-Built Structural and Architectural Drawing done by **ECLECTIC LTD.** During analysis, maximum wind speed has been considered at 215 Kmph.

The stress analysis of the as built structural elements of the building has been performed by analyzing all the structural members by the finite element package ETABS 16.2.1 The load combinations and member stress adequacy formulae have been referenced from the BNBC 2006 Standards and the analyzed stress values have been found to comply with the stress limitations of the code.
Using the model and hand calculation, the key findings may be illustrated as follows:

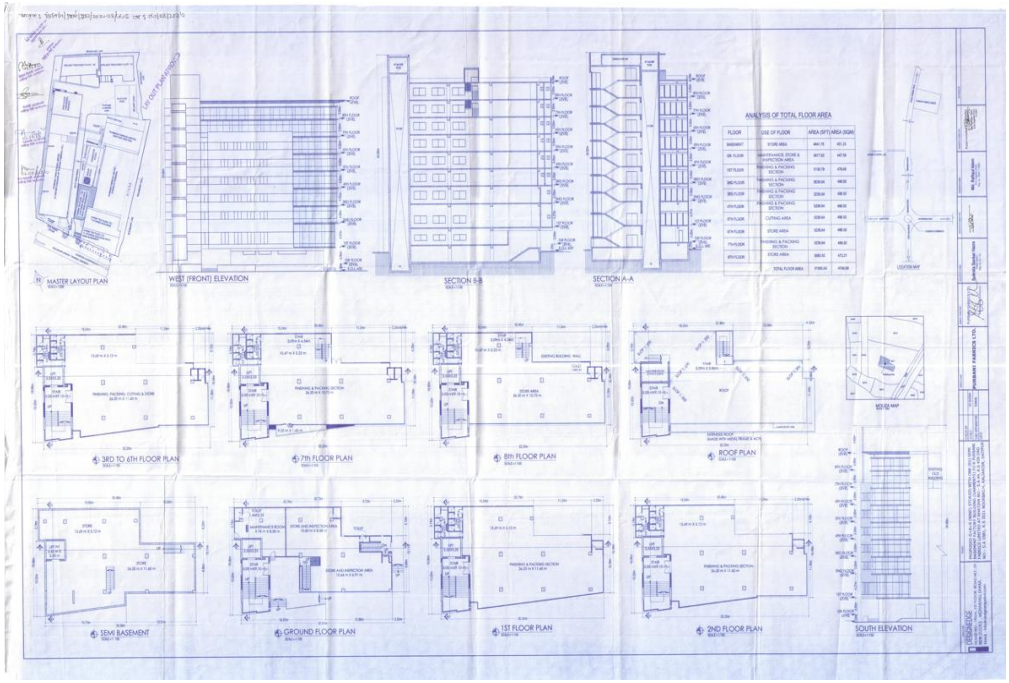
Superstructure

- Column capacity/design check using ETABS 2016 shows that, all columns adequate against dead, live, wind loads & loading combinations as per NTPA.
- All types of beam sections are found to be adequate for NTPA requirements.
- Other structural part like slab is found to be adequate in thickness.
- Deflection due to dead load and live load is found to be adequate.

Sub-structure

- Foundation analysis shows that Mat foundation is adequate to carry the prescribed column loadings with factor of safety minimum 2.5.

NTPA Load and Combination used for structural integrity

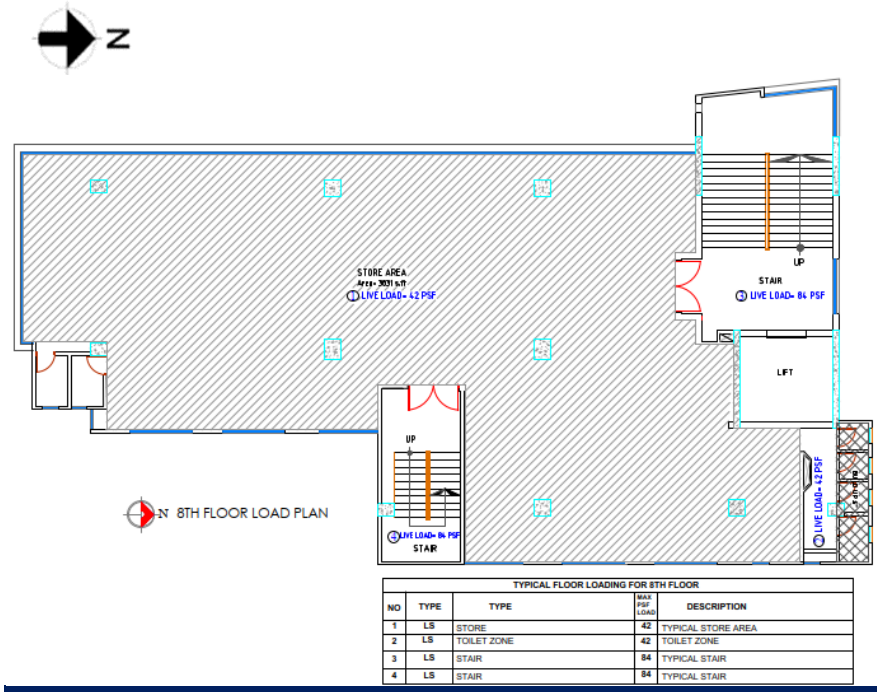


Local Authority Approval

Observation

INDUSTRIAL, STORAGE & HAZARDOUS (Occupancy - G, H & J)	Workshop, factory, warehouse	1 Light workroom without storage	3.0	2.7
		2 Machinery hall & circulation area	4.0	4.5
		3 Factory, workshop etc.	5.0	4.5
		4 Manufacturing : light	6.0	4.5
		heavy	12.0	9.0 (5)
		ice	15.0	9.0 (5)
		5 Printing plant :		(5)
		Press room	7.0	11.0
		Composing and linotype room	5.0	9.0 (5)
		Paper storage room	12.0	9.0 (5)
		6 Motor room, fan room etc. including the weight of machinery	7.5	4.5
		7 Cold storage, grain storage	15.0	9.0 (5)
		8 Storage warehouses : light	6.0	4.5 (5)
		heavy	12.0	9.0
		9 Foundries	20.0	12.0

Live load table (BNBC part-6)



Typical Live load considered as 2 KPa

Typical live load considered as 2 kPa in all floors. As per BNBC- Part 6, live load for light workroom area is required to be considered minimum 3 kPa and light storage to be considered minimum 6 kPa . Building engineer is required to revise the load plan as per BNBC requirement.

Observations

BASEMENT	41	DL+LL	1009.603
BASEMENT	48	DL+LL	101.02
BASEMENT	50	DL+LL	60.513
BASEMENT	59	DL+LL	114.685
BASEMENT	62	DL+LL	502.532
BASEMENT	64	DL+LL	866.831
BASEMENT	66	DL+LL	641.315
BASEMENT	67	DL+LL	379.454
BASEMENT	79	DL+LL	136.805

Total Load	Total Mat Area	Actual Stress	Ultimate Bearing Capacity	Factor of Safety	Compliance
8698.8 Kips	4558 square ft.	1.91 Ksf	14.623 Ksf	7.65	OK

Consultant Comments: Footing Capacity check shows that Mat foundation is adequate for bearing when factor of safety is 2.5.

Foundation area check

In the design report foundation area check were included only, but flexure and punching checks were not incorporated. Building engineer is required to incorporate all type of design check for the foundation as per the BNBC.

Observation

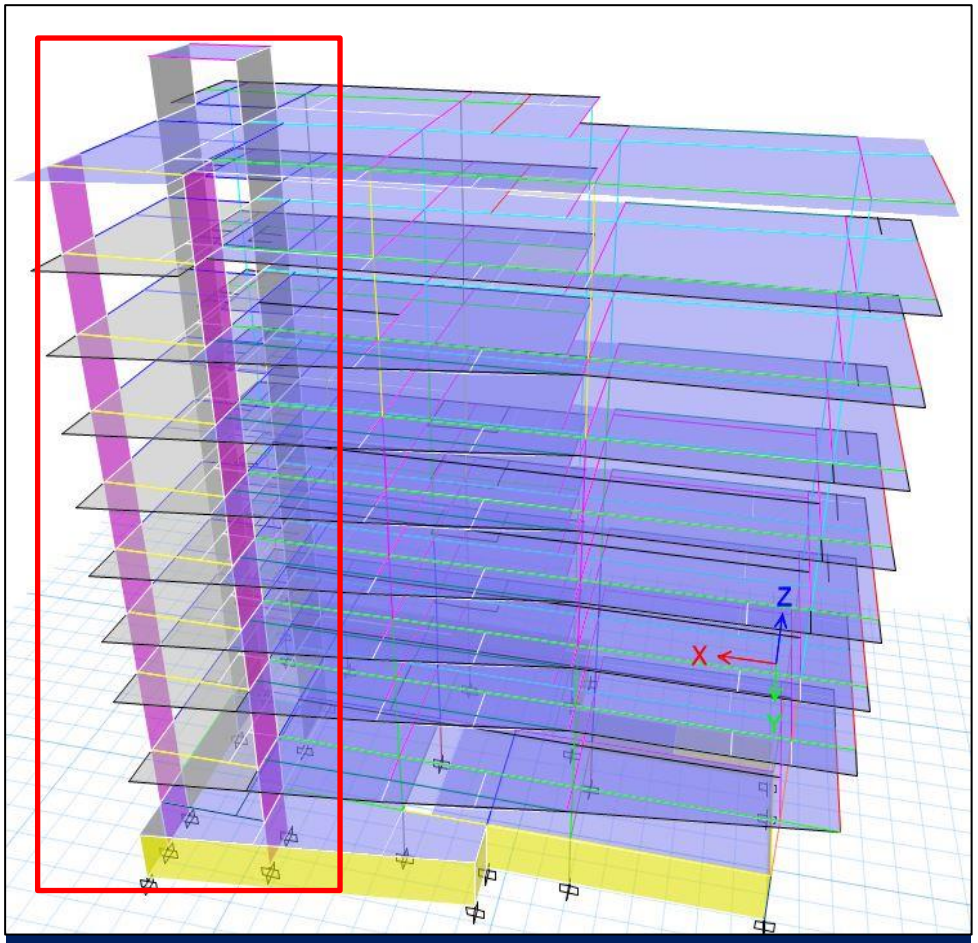
3.2 EARTHQUAKE CHARACTERISTICS

Seismic zone co-efficient, Z	Table 6.2.22	Zone-2
Structural importance co-efficient, I	Table 6.2.23	Standard Occupancy Structures 1.00
Ct	2.5.6.2 a. Method A	0.073 (MKS unit)
Response modification co-efficient, R	Table 6.2.24	IMRF=8
Site co-efficient, S	Table 6.2.25	S3 = 1.5

R=8 (IMRF) Considered in the design and analysis

IMRF had been considered in the design and analysis, but no clarification was shown according BNBC-2006 part-6 section 8.3.10. Building engineer is required to incorporate all the terms & conditions of BNBC-2006 part-6 section 8.3.10 with comparing all types of beam-column frame in the design report.

Observation

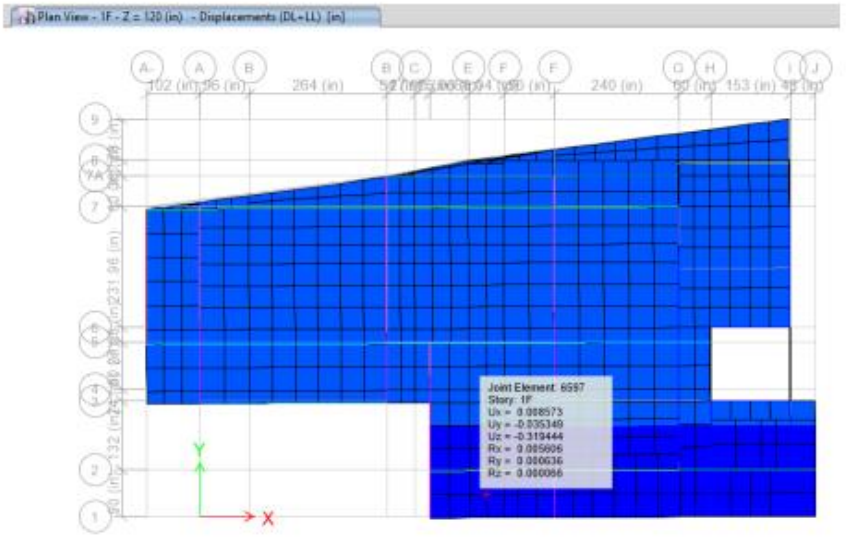


RC wall adequacy checks missing in the design report

In the design report RC wall (stair & lift) adequacy checks were not incorporated at all. Building engineer is required to incorporate all type of design check for the RC wall adequacy as per the BNBC.

Observation

4.7 DEFLECTION STUDY



Deflection contour due to service load at typical story

Deflections contour has been considered to study the maximum deflection. The deflection contour shows that the maximum vertical deflection is 0.32 inch or 8.2 mm for interior beam/slab panel for a span length. The allowable limit for simply supported for span length 20 feet of beam/slabs is L/360 = 0.67 inch. Therefore, it can be concluded that the **compliance for deflection is adequate for all beams as well as for slabs**.

Table 6.1: Maximum allowable deflection of beam
(Ref. Table 6.6.4, BNBC 2006; Paragraph 10.10.3, BNBC 2006)

Type of Member	Deflection to be Considered	Deflection Limitation
Beams &Floors not supported or attached to nonstructural elements likely to be damaged by large	Immediate deflection due to live load & dead load	L/360 (L = Clear Span)

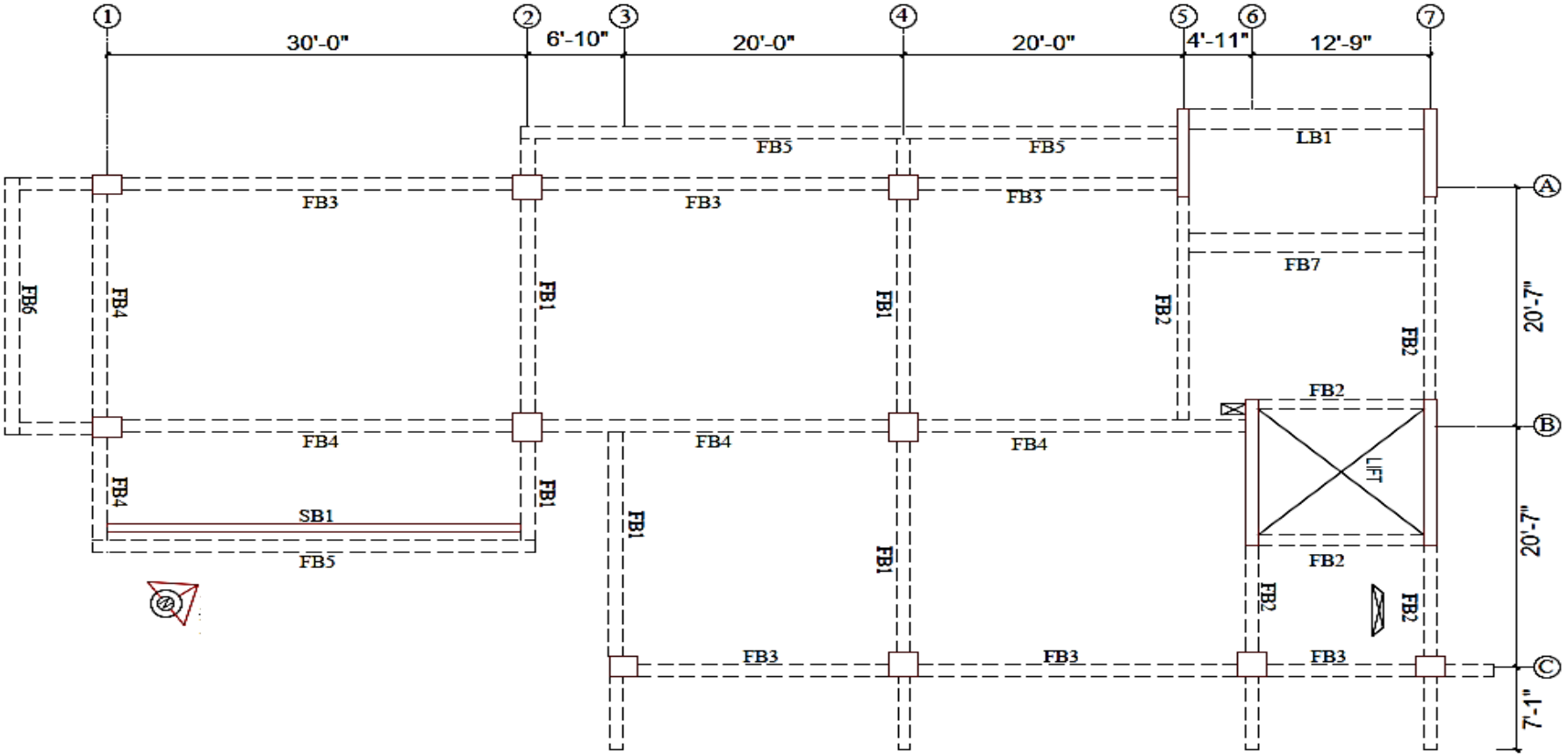
Deflection checks against gravity loading

Deflection and drift study shall be added against lateral loading also. Building engineer is required to incorporate the deflection, drift and building separation study as per BNBC-2006 part-6 section-1.5.6.

Observation

Lack of information of cantilever beams in as-built drawing

Observation



Floor Beam Layout Plan

Lack of information of cantilever beam found in the as-built drawing. Building engineer is required to provide details of cantilever beams (Dimension, Size).

Observation

Rooftop stair slab rest on brick wall

Observations

Rooftop staircase slab rested on brick wall

Rooftop staircase slab found rested on brick wall. Building engineer is required check the adequacy of the rooftop staircase structure.

Observation

Priority Actions

Problems Observed

Building-03:

Item 1: Inconsistencies in design report.

Item 2: Lack of information of cantilever beams in as-built drawing.

Item 3: Rooftop stair slab rest on brick wall.

Item No.	Observation	Recommended Action Plan	Recommended Timeline
01	Inconsistencies in design report.	Building engineer is required to prepare the design report considering BNBC 1.9.	6-weeks
02	Inconsistencies in design report	Building engineer is required to incorporate all adequacy check in the design report.	6-weeks
03	Inconsistencies in design report	Carry out the remedial works if required.	6-months
04	Lack of information of cantilever beams in as-built drawing.	Building engineer is required to survey the whole structure and update the as-built drawing.	6-weeks
05	Rooftop stair slab rest on brick wall.	Building engineer is required check the adequacy of the rooftop staircase structure.	6-weeks
06	Rooftop stair slab rest on brick wall.	Carry out the remedial works if required.	6-months