

KSI Karnaphuli Shoes Industries Ltd.(Garments) (Extension)

Plot # G1 & G2, Korean Export Processing Zone, Anowara, Chattogram-4376

(22.235197, 91.845090)

21 September 2023



Building Information

1. **Building-14 (Steel Shed with 2 RC Block):** The structure consists of two RC buildings and one shed. RC buildings (South & North) are 3 storied (G+2) and shed is single storied prefabricated steel shed.
2. **Building-18 (Steel Shed with 2 RC Block):** The structure consists of two RC buildings and one shed. RC buildings (South & North) are 3 storied (G+2) and shed is single storied prefabricated steel shed.
3. **Building-19 (Steel Shed with 2 RC Block):** The structure consists of two RC buildings and one shed. RC buildings (South & North) are 3 storied (G+2) and shed is single storied prefab steel shed.
4. **Building-20 (Steel Shed with 2 RC Block):** The structure consists of two RC buildings and one shed. RC buildings (South & North) are 3 storied (G+2) and shed is single storied prefab steel shed.
5. **Building-21 (Steel Shed with 2 RC Block):** The structure consists of two RC buildings and one shed. RC buildings (South & North) are 3 storied (G+2) and shed is single storied prefab steel shed.
6. **4th phase Sub-station:** The structure is a single storied RC building.
7. **7th phase Sub-station:** The structure is a single storied RC building.
8. **4th phase Security & Pump Room:** The structure is a single storied RC building.
9. **7th phase Pump Room:** The structure is a single storied RC building.
10. **Security Post & Central Command Station:** The structure is a single storied RC building.

Observations

Design documents need to be updated and reviewed

Rectangular Section

Section Name

C1 400X600

Display Color

Section Notes

Modify/Show Notes...

Dimensions

Depth (t3)

457.2

Width (t2)

335.28

Material

+

CONC 3000 psi

Property Modifiers

Set Modifiers...

Section Properties...

Time Dependent Properties...

Concrete Reinforcement...

OK

Cancel

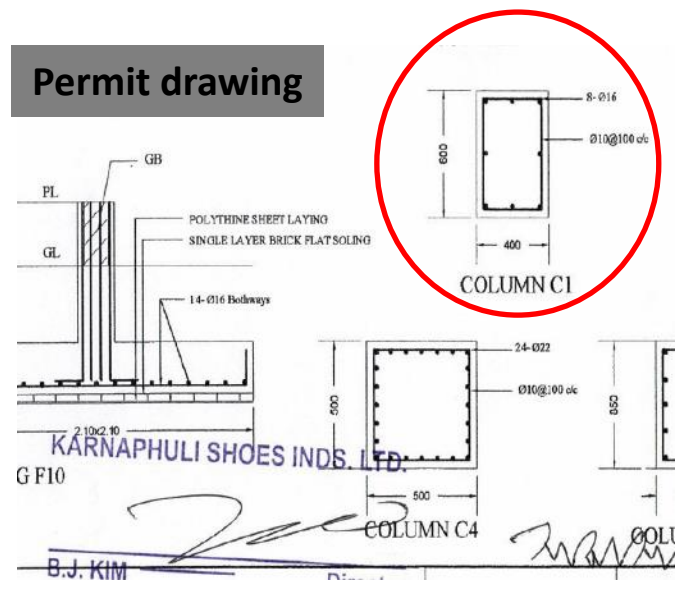
Section

Properties

Section Properties...

Time Dependent Properties...

Analysis file



Discrepancy (Column size) between analysis file and permit drawing

Reinforcement Data

Analysis file

Rebar Material

Longitudinal Bars

+

A615Gr60-1

Confinement Bars (Ties)

+

A615Gr60-1

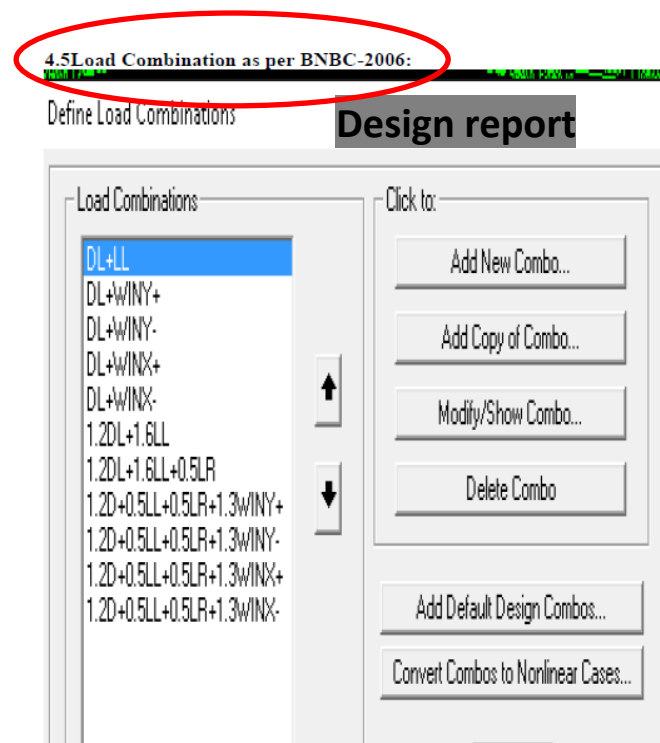
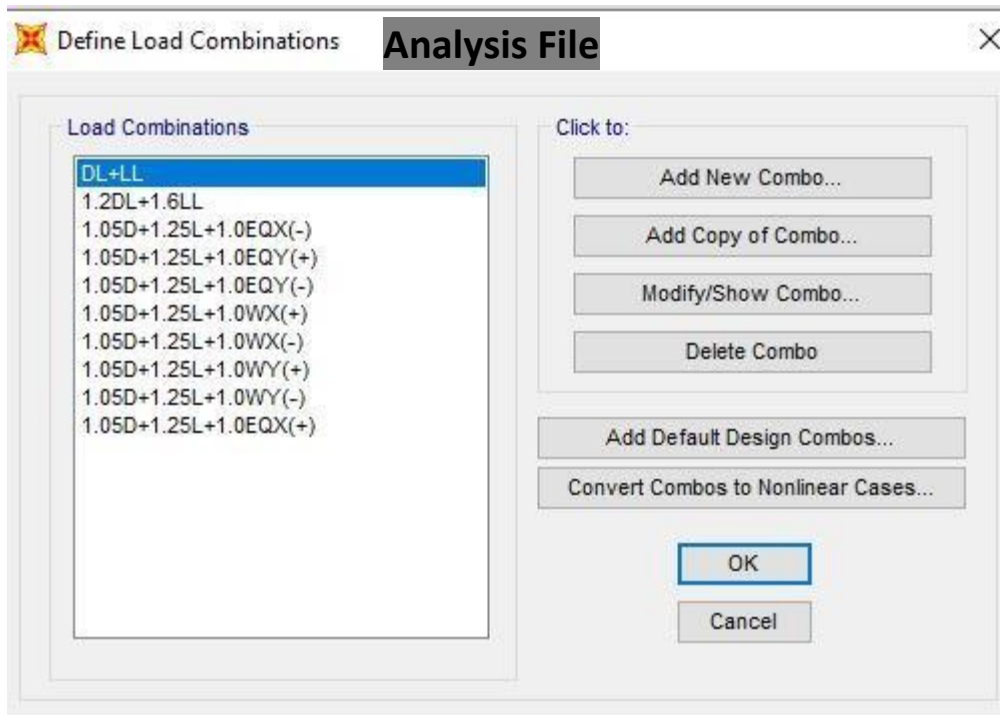
Column size in the analysis file did not match with the permit drawing. Also, rebar tensile strength is considered 72,500 psi but in analysis, 60,000 psi is assigned. Factory is required to revise the design documents and submit to RSC for further review.

Design report

	Grade Beam, Floor Beam and Slab		
2	Steel re-bar strength, $f_y = 72,500$ psi	Ref. Test Report	Ref. Test Report

Discrepancy (Material strength) between analysis file and design report

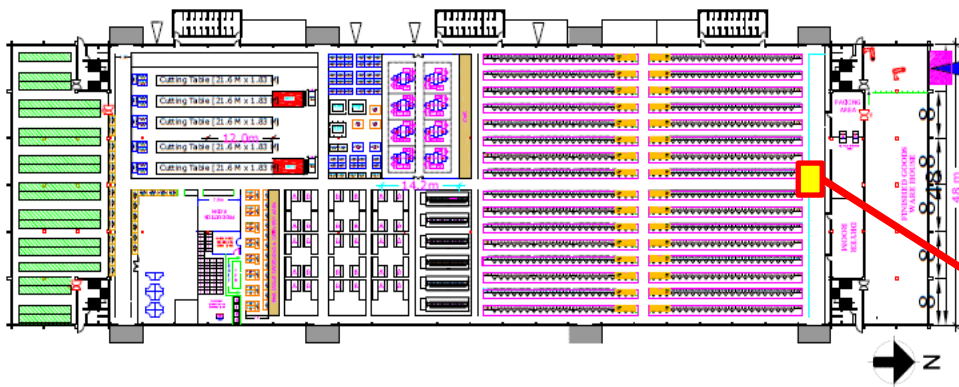
Observation: Building-14



Discrepancy in load combination between analysis file and design report

Load combination in analysis file does not match with the provided load combination (BNBC-2006) in design report. Building engineer is required to revise both analysis and design report following one design code.

Undocumented hoist lift found



Undocumented hoist lift found

During inspection, undocumented hoist lift found at the north side of Building 14. Building engineer is required to prepare both analysis and design report for the steel hoist lift and incorporate detail calculations for all lateral loads in the design report in compliance with the BNBC (section 1.9.1 of part-6).

Design documents need to be updated and reviewed

Rectangular Section

Section Name

C1 400X600

Display Color

Section Notes

Modify/Show Notes...

Dimensions

Depth (t3)

457.2

Width (t2)

335.28

Material

+

CONC 3000 psi

Property Modifiers

Set Modifiers...

Concrete Reinforcement...

OK

Cancel

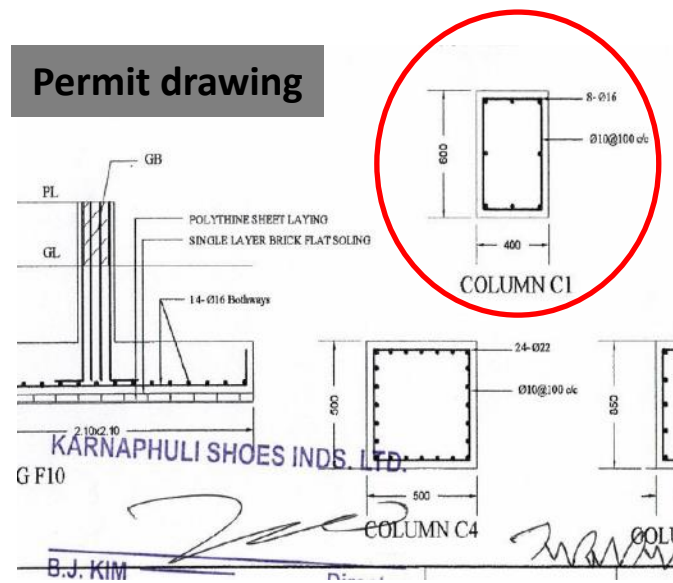
Section

Properties

Section Properties...

Time Dependent Properties...

Analysis file



Column size discrepancy between analysis file and permit drawing

Reinforcement Data

Analysis file

Rebar Material

Longitudinal Bars

+

A615Gr60-1

Confinement Bars (Ties)

+

A615Gr60-1

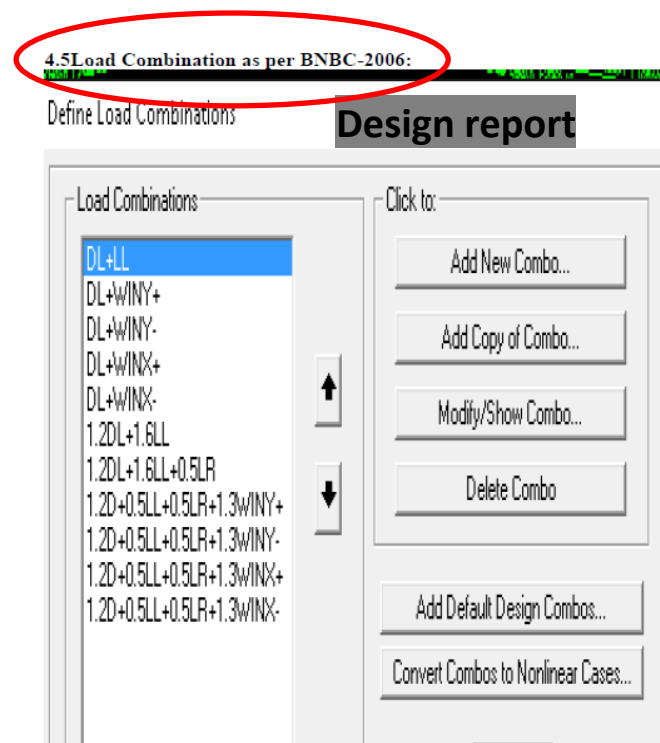
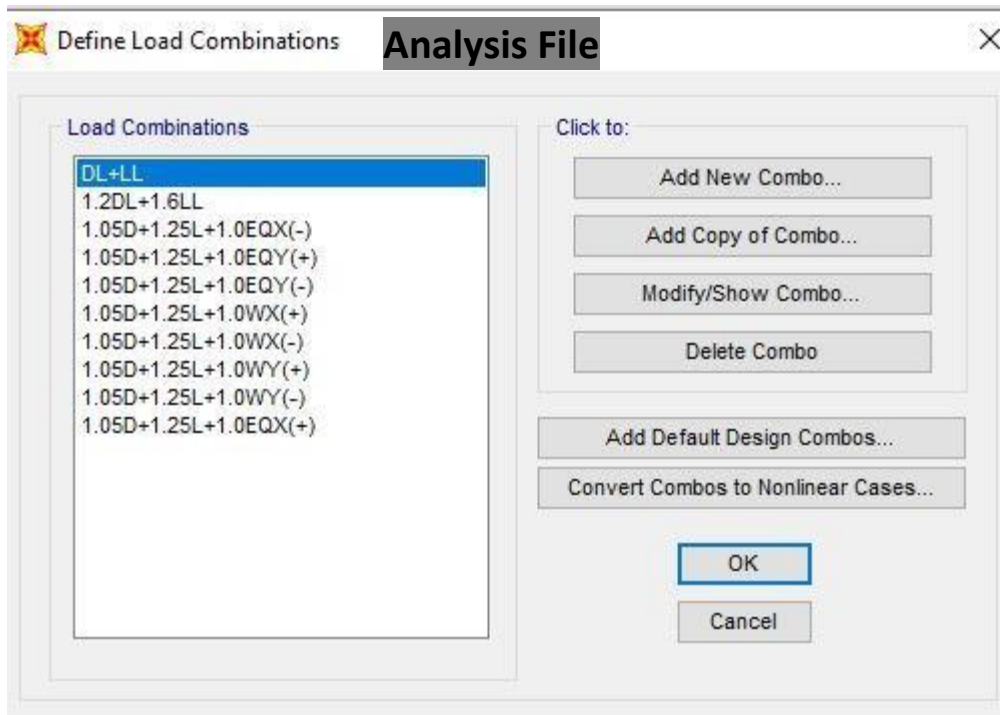
Column size in the analysis file did not match with the permit drawing. Also, rebar tensile strength is considered 72,500 psi but in analysis, 60,000 psi is assigned. Factory is required to revise the design documents and submit to RSC for further review.

Design report

	Grade Beam, Floor Beam and Slab		
2	Steel re-bar strength, $f_y = 72,500$ psi	Ref. Test Report	Ref. Test Report

Material strength discrepancy between analysis file and design report

Observation: Building-18

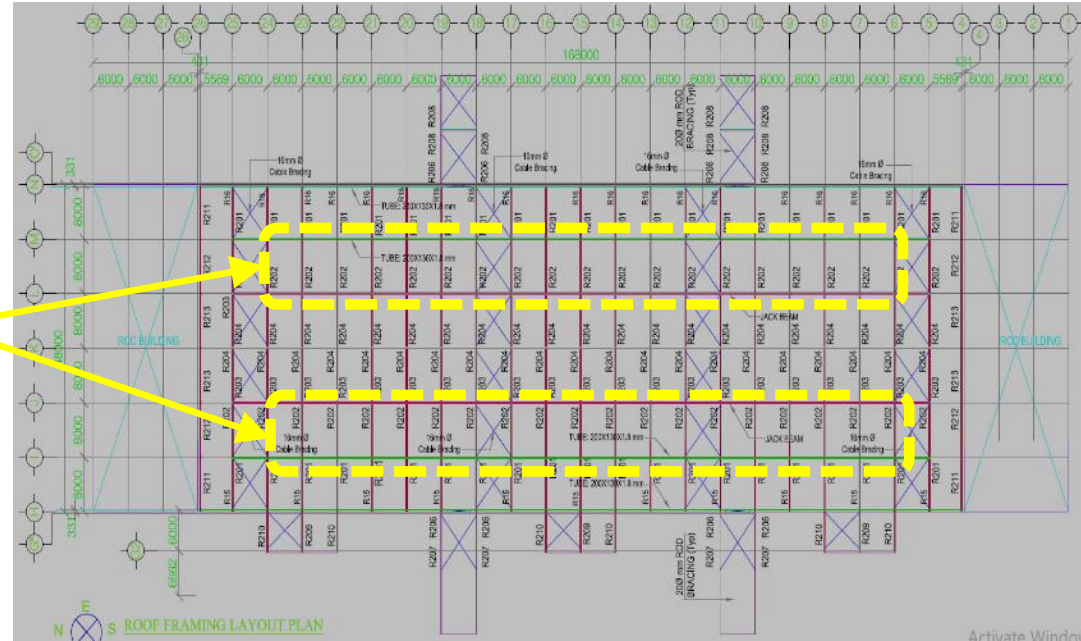


Discrepancy in load combination between analysis file and design report

Load combination in analysis file does not match with the provided load combination (BNBC-2006) in design report. Building engineer is required to revise both analysis and design report following one design code.

Observation: Building-18

Discrepancies and missing information in as-built drawing



On site bracings does not match with the bracing layout of as-built drawing

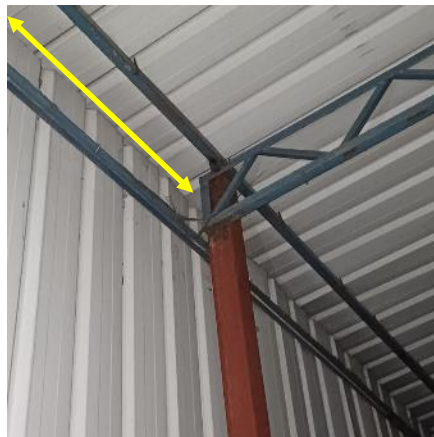
During inspection, bracings were found on site which were not shown in the bracing layout of as-built drawing. Factory engineer is required to survey the whole structure and update the as-built drawing. Also, Building engineer is required to update the design document in compliance with section 1.9.1 as per BNBC 2006.

Lack of lateral stability and inadequate connection



Lack of lateral stability in Temporary Garbage Store

Apparently inadequate connection in store room

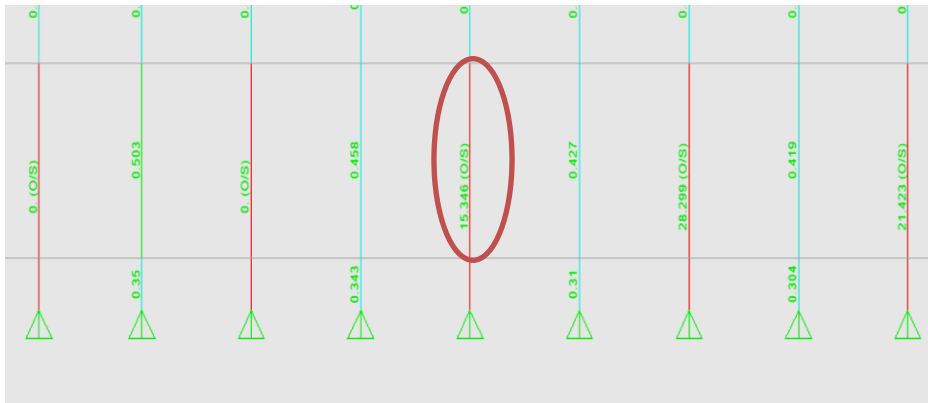


Lack of lateral stability in Material Store

Connection of steel truss members to steel columns were appeared to be inadequate. Factory engineer is required to check the connection adequacy for uplift forces as part of EA.

Also, lack of lateral stability was found in adjacent steel sheds (Temporary garbage store, store room and material store). Building engineer is required to check the lateral stability of the structures.

Design report needs to be updated



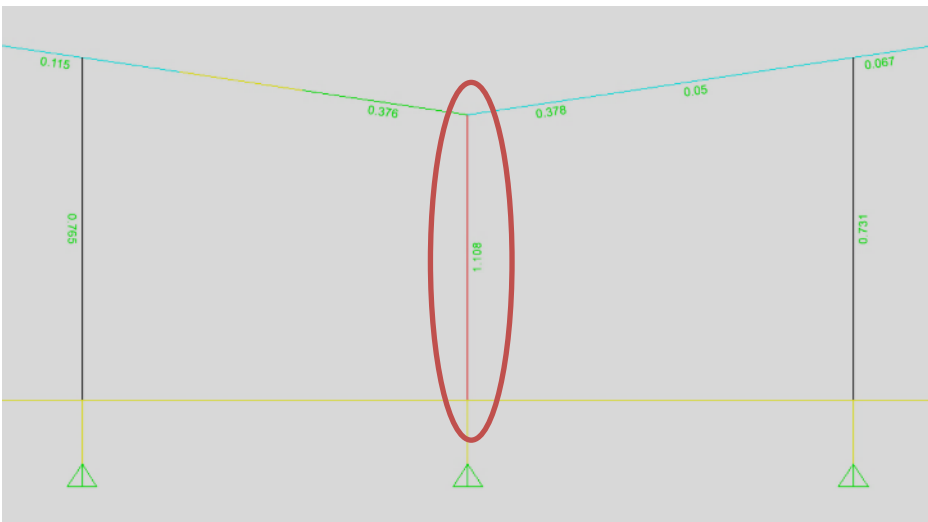
Overstress column (RCC) in FEA model

Design strength of concrete is considered 3500 Psi. in the analysis

Young's Modulus of Concrete $E_c = 5700 \times \text{square root of } f_c'$.

$$E_c = 5700 * \text{SQRT}(3500) = 3,372,165$$

Considering 57000 (stone chips)



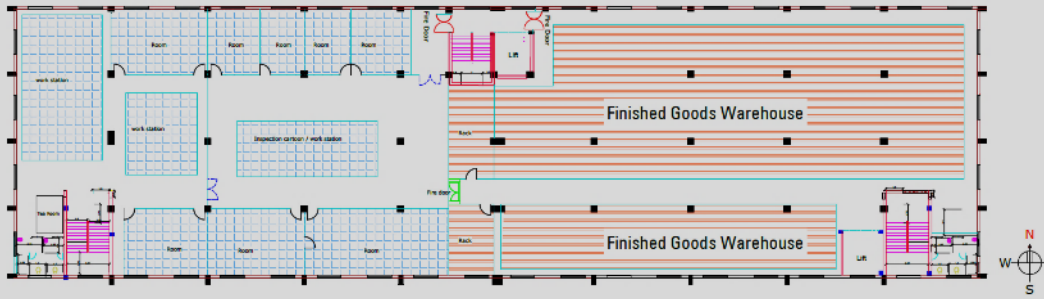
Overstress column (Steel) in FEA model

A design report was available on site which indicate stone chips was considered for concrete design. But brick chips was found on site. In FEA model RC OHWT load was not assigned and some overstressed columns were also observed both in RC and steel part. Building engineer is required to update the FEA model, design report and other requirements as per BNBC.

Load plan not comply with BNBC requirements



2nd floor (South part) load plan: Finished goods warehouse:
3 kN/m² live load



1st floor (South part) load plan: Finished goods warehouse:
3 kN/m² live load

The first and second floor of south part of the building is allotted for storage. As per BNBC, the minimum floor live load for storage is 6 kN/m² (126 psf). But the first and second floor of the building is designed for 3 kN/m² live loads. Factory engineer is required to revise the load plan and related design documents based on BNBC requirement.

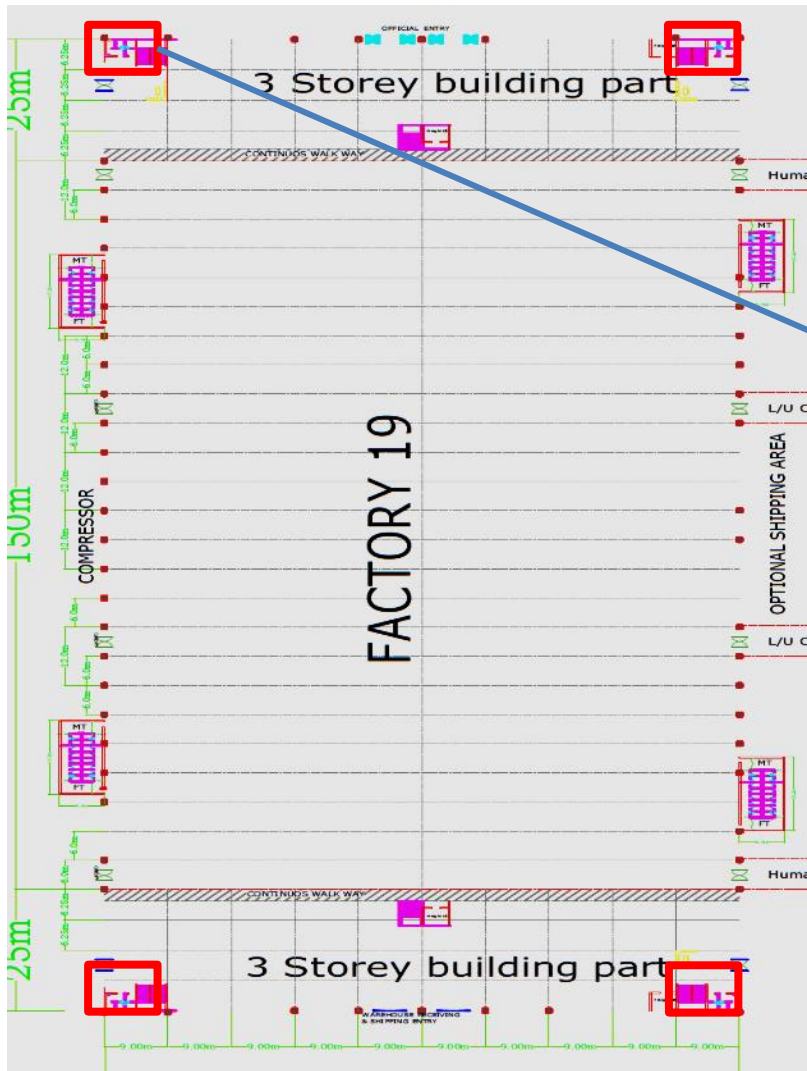


Storage on first floor

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 ⁽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

BNBC live load table

Mismatches in as built drawings



Mezzanine room (East & West)

Undocumented room at mezzanine level (ground floor) was found. Building engineer is required to survey the whole structure and prepare accurate as-built drawings.

Undocumented mezzanine level at both East & West stair (ground level) in both North and South part

Falling Hazard



Falling hazard from stair roof top



Falling hazard from stair roof top

Falling hazard observed in the stair roof top. Building engineer is required to take necessary measures to avoid possible falling hazard.

Lack of lateral stability system



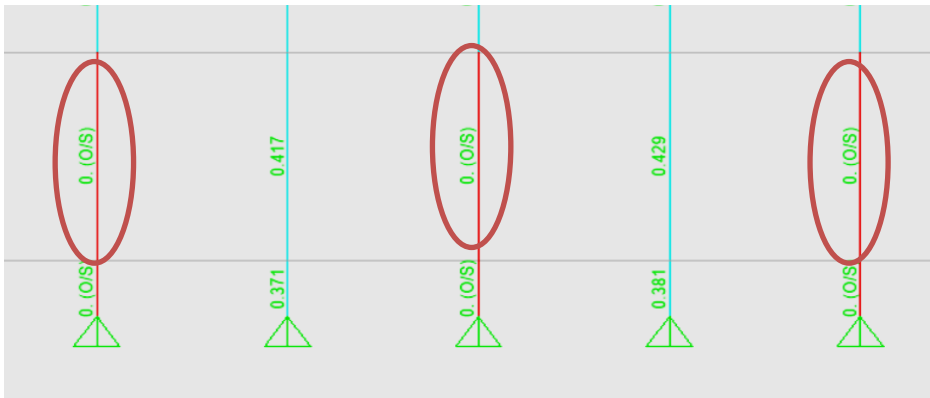
Absence of bracing system



Improper connection between steel column and pedestal

No bracing system was observed. Also, the connection between steel column and pedestal was improper. The building engineer is required carry out Engineering Assessment (EA) to check the connection & lateral stability of the structure and suggest proper remedial actions accordingly.

Design report needs to be updated



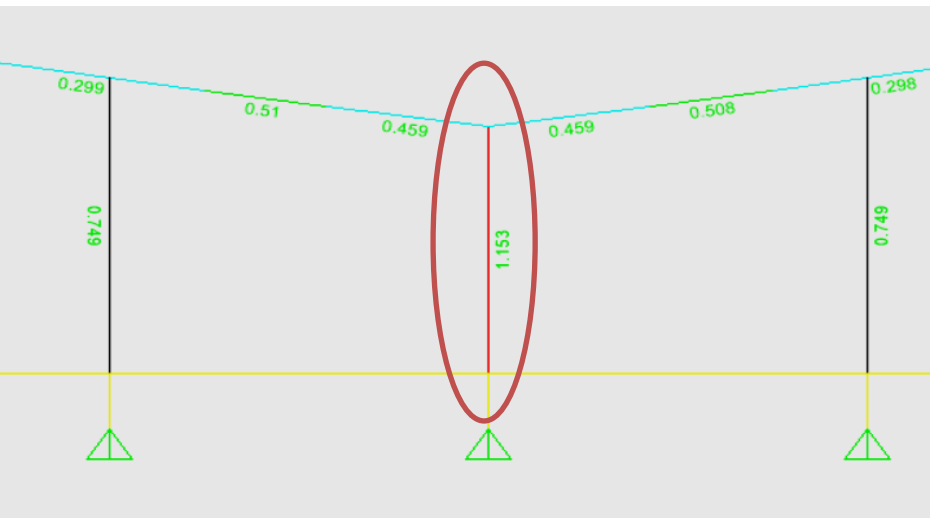
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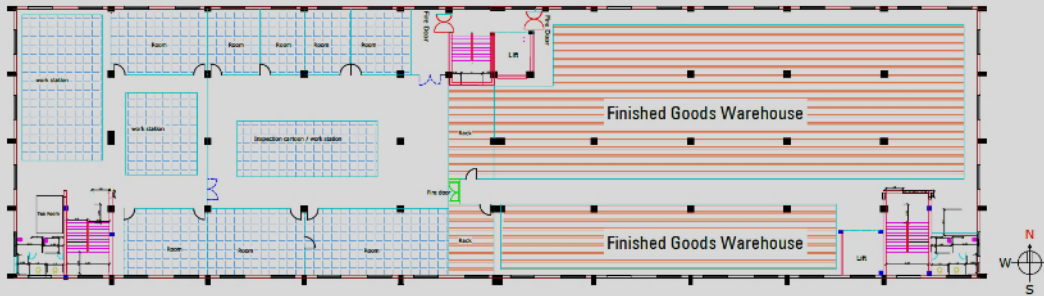
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Load plan not comply with BNBC requirements



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3 kN/m² live load



1st floor (South part) load plan: Finished goods warehouse:
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The first and second floor of south part of the building is allotted for storage. As per BNBC, the minimum floor live load for storage is 6 kN/m² (126 psf). But the first and second floor of the building is designed for 3 kN/m² live loads. Factory engineer is required to revise the load plan and related design documents based on BNBC requirement.

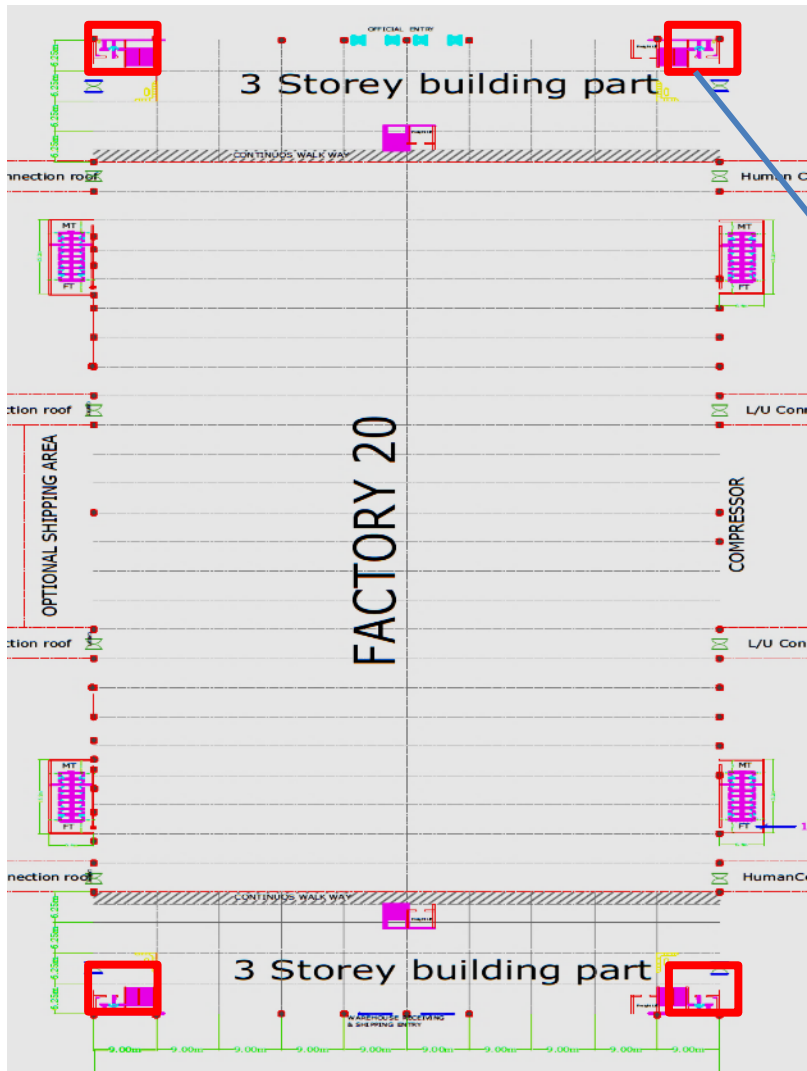


Storage on first floor

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 ⁽⁵⁾
		heavy	12.0	9.0 ⁽⁵⁾
		ice	15.0	9.0 ⁽⁵⁾
		5 Printing plant :		⁽⁵⁾
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Undocumented mezzanine level at both East & West stair (ground level) in both North and South part

Falling Hazard



Falling hazard from stair roof top



Falling hazard from stair roof top

Falling hazard observed in the stair roof top. Building engineer is required to take necessary measures to avoid possible falling hazard.

Lack of lateral stability system



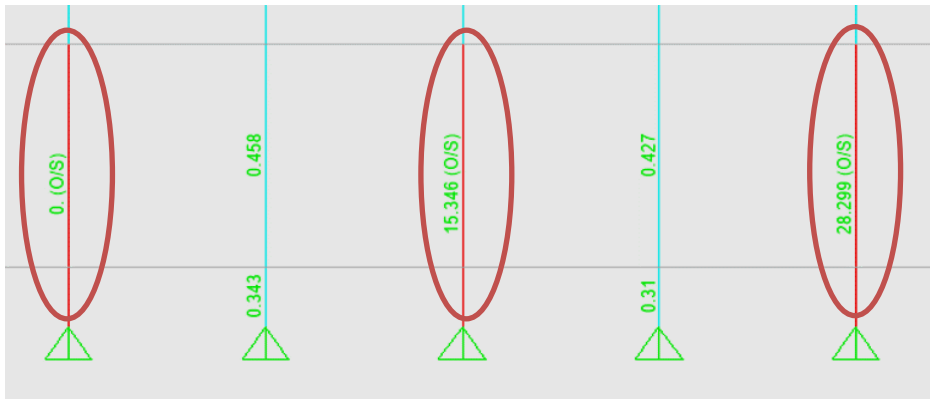
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Design report needs to be updated



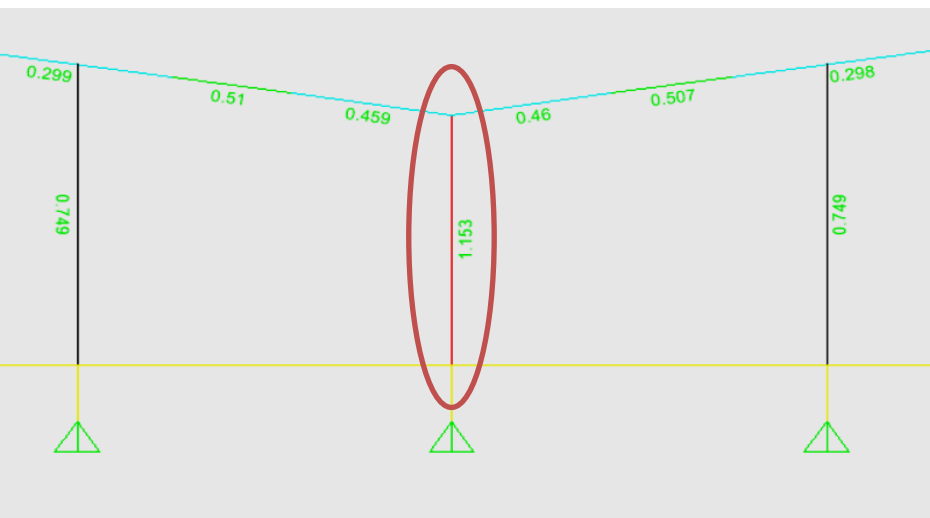
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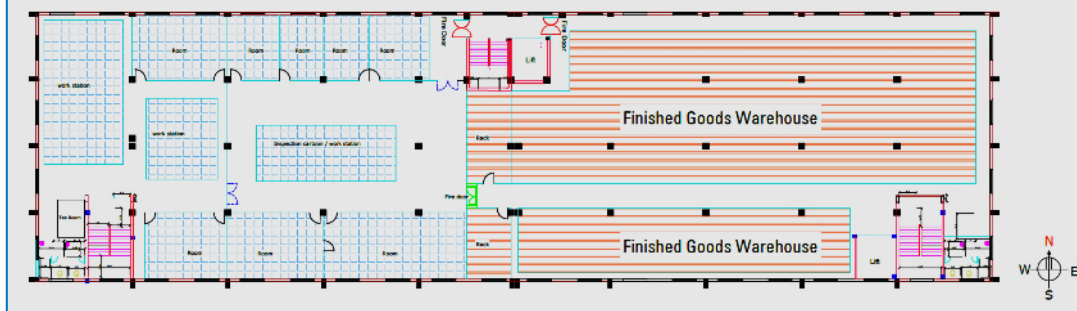
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Load plan not comply with BNBC requirements



2nd floor (South part) load plan: Finished goods warehouse:
3 kN/m² live load



1st floor (South part) load plan: Finished goods warehouse:
3 kN/m² live load

The first and second floor of south part of the building is allotted for storage. As per BNBC, the minimum floor live load for storage is 6 kN/m² (126 psf). But the first and second floor of the building is designed for 3 kN/m² live loads. Factory engineer is required to revise the load plan and related design documents based on BNBC requirement.

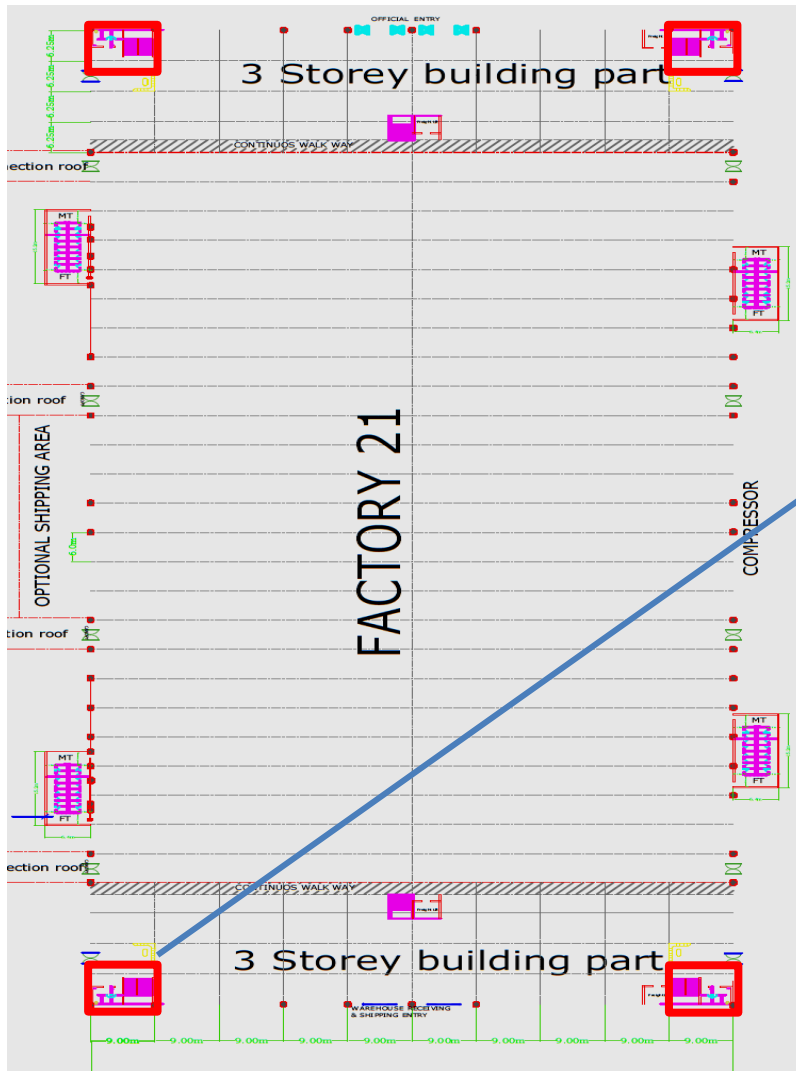


Storage on first floor

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		heavy	12.0	9.0 ⁽⁵⁾
		ice	15.0	9.0 ⁽⁵⁾
		5 Printing plant :		
		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⁾
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BNBC live load table

Mismatches in as built drawings



Mezzanine room (East & West)

Undocumented room at mezzanine level (ground floor) was found. Building engineer is required to survey the whole structure and prepare accurate as-built drawings.

Undocumented mezzanine level at both East & West stair (ground level) in both North and South part

Falling Hazard



Falling hazard from stair roof top



Falling hazard from stair roof top

Falling hazard observed in the stair roof top. Building engineer is required to take necessary measures to avoid possible falling hazard.

Lack of lateral stability system



Absence of bracing system



Improper connection between steel column and pedestal

No bracing system was observed. Also, the connection between steel column and pedestal was improper. The building engineer is required carry out Engineering Assessment (EA) to check the connection & lateral stability of the structure and suggest proper remedial actions accordingly.

Lack of design documents

Observation: 4th phase sub-station, 7th phase sub-station, 7th phase Pump Room and Security Post & Central Command Station



4th phase sub-station



7th phase sub-station



4th phase Pump Room



7th phase Pump Room



Security Post & Central
Command Station

As per BNBC, every building or structure designed shall have its design documents prepared in accordance with the provision of Section 1.9.1. During inspection, the design report was not available on site. The building engineer is required to prepare a set of design documents including a design report based on in-situ material strength and software-based analysis which shall be prepared in compliance with section 1.9.1, part-6 of BNBC.

Observation: 4th phase sub-station, 7th phase sub-station, 7th phase Pump Room, and Security Post & Central Command Station

Problems Observed

Building-14:

Item 01: Design documents need to be updated and reviewed.

Item 02: Undocumented hoist lift found.

Building-18:

Item 03: Design documents need to be updated and reviewed.

Item 04: Discrepancies and missing information in as-built drawing.

Item 05: Lack of lateral stability and inadequate connection.

Building-19:

Item 06: Design report needs to be updated.

Item 07: Load plan not comply with BNBC requirements.

Item 08: Mismatches in as built drawings.

Item 09: Falling Hazard.

Item 10: Lack of lateral stability system.

Building-20:

Item 11: Design report needs to be updated.

Item 12: Load plan not comply with BNBC requirements.

Item 13: Mismatches in as built drawings.

Item 14: Falling Hazard.

Item 15: Lack of lateral stability system.

Building-21:

Item 16: Design report needs to be updated.

Item 17: Load plan not comply with BNBC requirements.

Problems Observed

Item 18: Mismatches in as built drawings.

Item 19: Falling Hazard.

Item 20: Lack of lateral stability system.

4th phase sub-station, 7th phase sub-station, 7th phase Pump Room, and Security Post & Central Command Station :

Item 21: Lack of design documents.

Priority Actions

Item No.	Observation	Recommended Action Plan	Recommended Timeline
01	Design documents need to be updated and reviewed. (Building-14)	Factory is required to revise the design documents and submit to RSC for further review.	6-weeks
02	Design documents need to be updated and reviewed. (Building-14)	Carry out suggested remedial works.	6-months
03	Undocumented hoist lift found. (Building-14)	Building engineer is required to prepare both analysis and design report for the steel hoist lift and incorporate detail calculations for all lateral loads in the design report in compliance with the BNBC (section 1.9.1 of part-6).	6-weeks
04	Undocumented hoist lift found. (Building-14)	Carry out suggested remedial works.	6-months
05	Design documents need to be updated and reviewed. (Building-18)	Factory is required to revise the design documents and submit to RSC for further review.	6-weeks

Item No.	Observation	Recommended Action Plan	Recommended Timeline
06	Design documents need to be updated and reviewed. (Building-18)	Carry out suggested remedial works.	6-months
07	Discrepancies and missing information in as-built drawing. (Building-18)	Building engineer is required to update the design document including in compliance with section 1.9.1 as per BNBC 2006.	6-weeks
08	Discrepancies and missing information in as-built drawing. (Building-18)	Carry out suggested remedial works.	6-months
09	Lack of lateral stability and inadequate connection. (Building-18)	Building engineer is required to check the lateral stability of the structures.	6-weeks
10	Lack of lateral stability and inadequate connection. (Building-18)	Carry out suggested remedial works.	6-months

Item No.	Observation	Recommended Action Plan	Recommended Timeline
11	Design report needs to be updated. (Building-19)	Building engineer is required to update the FEA model, design report and all requirements as per BNBC.	6-weeks
12	Design report needs to be updated. (Building-19)	Implement remediation work if required.	6-months
13	Load plan not comply with BNBC requirements. (Building-19)	Factory engineer is required to revise the load plan and related design documents based on BNBC requirement.	6-weeks
14	Load plan not comply with BNBC requirements. (Building-19)	Implement the recommendations of design report. Implement floor live load plan.	6-months
15	Mismatches in as built drawings. (Building-19)	Building engineer is required to survey the whole structure and prepare accurate as-built drawings. Revise the design report based on corrected as-built drawing.	6-weeks

Item No.	Observation	Recommended Action Plan	Recommended Timeline
16	Falling Hazard. (Building-19)	Building engineer is required to take necessary measures to avoid possible falling hazard.	6-weeks
17	Lack of lateral stability system. (Building-19)	Building engineer is required to check the lateral stability of the structure and connection adequacy accordingly.	6-weeks
18	Lack of lateral stability system. (Building-19)	Carry out suggested remedial works.	6-months
19	Design report needs to be updated. (Building-20)	Building engineer is required to update the FEA model, design report and all requirements as per BNBC.	6-weeks
20	Design report needs to be updated. (Building-20)	Implement remediation work if required.	6-months

Item No.	Observation	Recommended Action Plan	Recommended Timeline
21	Load plan not comply with BNBC requirements. (Building-20)	Factory engineer is required to revise the load plan and related design documents based on BNBC requirement.	6-weeks
22	Load plan not comply with BNBC requirements. (Building-20)	Implement the recommendations of design report. Implement floor live load plan.	6-months
23	Mismatches in as built drawings. (Building-20)	Building engineer is required to survey the whole structure and prepare accurate as-built drawings. Revise the design report based on corrected as-built drawing.	6-weeks
24	Falling Hazard. (Building-20)	Building engineer is required to take necessary measures to avoid possible falling hazard.	6-weeks
25	Lack of lateral stability system. (Building-20)	Building engineer is required to check the lateral stability of the structure and connection adequacy accordingly.	6-weeks

Item No.	Observation	Recommended Action Plan	Recommended Timeline
26	Lack of lateral stability system. (Building-20)	Building engineer is required to check the lateral stability of the structure and connection adequacy accordingly.	6-weeks
27	Lack of lateral stability system. (Building-20)	Carry out suggested remedial works.	6-months
28	Design report needs to be updated. (Building-21)	Building engineer is required to update the FEA model, design report and all requirements as per BNBC.	6-weeks
29	Design report needs to be updated. (Building-21)	Implement remediation work if required.	6-months
30	Load plan not comply with BNBC requirements. (Building-21)	Factory engineer is required to revise the load plan and related design documents based on BNBC requirement.	6-weeks

Item No.	Observation	Recommended Action Plan	Recommended Timeline
31	Load plan not comply with BNBC requirements. (Building-21)	Implement the recommendations of design report. Implement floor live load plan.	6-months
32	Mismatches in as built drawings. (Building-21)	Building engineer is required to survey the whole structure and prepare accurate as-built drawings. Revise the design report based on corrected as-built drawing.	6-weeks
33	Falling Hazard. (Building-21)	Building engineer is required to take necessary measures to avoid possible falling hazard.	6-weeks
34	Lack of lateral stability system. (Building-21)	Building engineer is required to check the lateral stability of the structure and connection adequacy accordingly.	6-weeks
35	Lack of lateral stability system. (Building-21)	Carry out suggested remedial works.	6-months

Item No.	Observation	Recommended Action Plan	Recommended Timeline
36	Lack of design documents (4th phase sub-station, 7th phase sub-station, 7th phase Pump Room, and Security Post & Central Command Station)	The building engineer is required to prepare report based on in-situ material strength following BNBC (part-6, section-1.9.1)	6-weeks
37	Lack of design documents (4th phase sub-station, 7th phase sub-station, 7th phase Pump Room, and Security Post & Central Command Station)	Carry out suggested remedial works if required.	6-months

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 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 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.