

Shinest Apparels Ltd. (Extension)

217/1, Beribadh, Mohammadpur, Dhaka.

Geographic Coordinates: 23.769086, 90.346108

8 August 2023



Building Information:

Building-2: Four storied (G+3) building.

Building-3A: Nine storied (G+8) building.

Building-3B: Nine storied (G+8) building.

Building-4: Partially three storied (G+2) building.

Observations

Lack of lateral stability



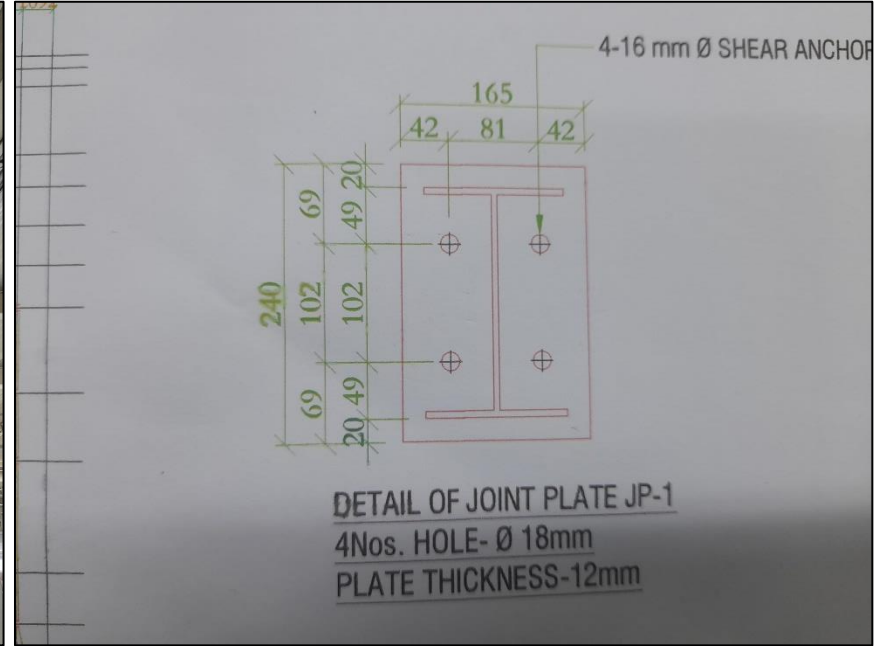
Missing compression strut along long direction

Compression struts were missing along long direction in 3rd floor. The lateral load path is incomplete in long direction. Building engineer is required to check the stability system of the structure for lateral loading and suggest necessary remedial actions where required.

Discrepancies in as-built drawing



Connection plates inserted into adjacent RC building instead of steel edge rafter



Connection details shown in structural drawing

Connection details of sub-beam with brick wall doesn't match with provided structural drawing. Building engineer is required to check the presence of edge rafter and update the as-built drawing as per onsite condition.

Apparently inadequate connection

Observations: Building-2



improper connections



Lack of continuity plate

During inspection, improper connection between different steel members was observed. In addition, lack of continuity plate in rafter-to-rafter connection was also observed.

The building engineer is required to check the connections adequacy as part of EA and repair all the steel members with proper remedial methodology.

Crack in brick walls

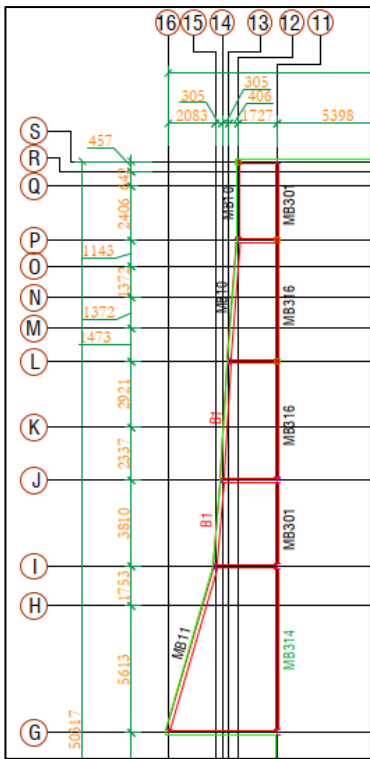


Crack observed in brick walls. The building engineer is required to identify the reason of crack and carry out suitable remedial works.

Crack in brick walls

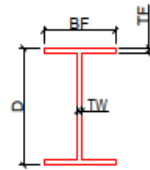
Observation: Building-2

Discrepancy between retrofitting drawing and on-site retrofitting works

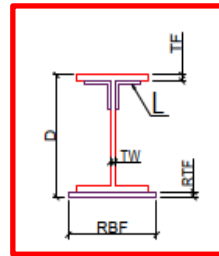


SCHEDULE OF STEEL BEAM

NAME	D (mm)	TW (mm)	BF (mm)	TF (mm)	RBF (mm)	RTF (mm)	Angle (L) (mm)
B1	260	6	150	6			
MB301	270	6	150	6			
MB314	500	6	150	8	210	20	L-75X75X20
MB316	250	6	150	6	230	8	L-50X50X8
MB10	260	5	150	6			
MB11	475	5	150	7			



Non
Retrofit



Retrofit

Retrofit drawing: Retrofitting section of beam for grid-11



Bracing on 3rd floor not shown in the retrofitting drawing

The building engineer is required to survey the structure, prepare accurate as-built drawing and revise the design report based on updated as-built drawing.



Beam of Grid-11: Not retrofitted



Vertical bracing at Grid-1-E~F near to 3rd floor stair could not identified.



Bracing on 3rd floor not shown in the retrofitting drawing

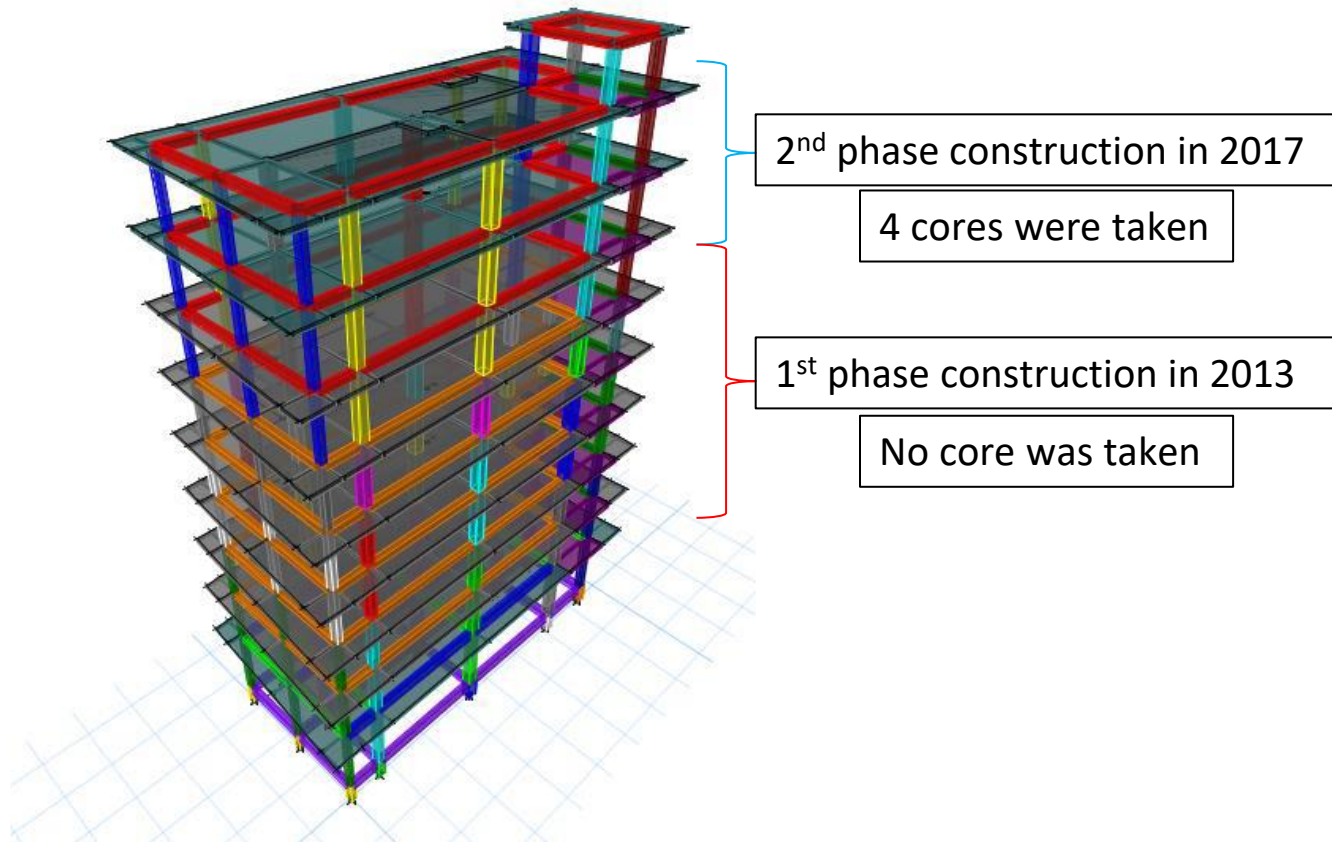


Wall bracing at Grid-1-E~F near to 3rd floor stair not found during the inspection.

Undocumented bracings of 3rd floor shall be incorporated in the drawing. Also, the presence of bracing at grid 1-E~F near stair zone to be investigated.

However, the building engineer is required to survey the structure, prepare accurate as-built drawing and revise the design report based on updated as-built drawing.

Inconsistencies in design report for material strength & additional floor loadings



The building was constructed in two phases. The first phase construction was completed in 2013 and second phase construction was completed in 2017. 4 sets of concrete core test report from the columns of second phase construction.

The building engineer is required to take another 4 cores from the column of first phase construction. And revise the design report based on in-situ material strength.

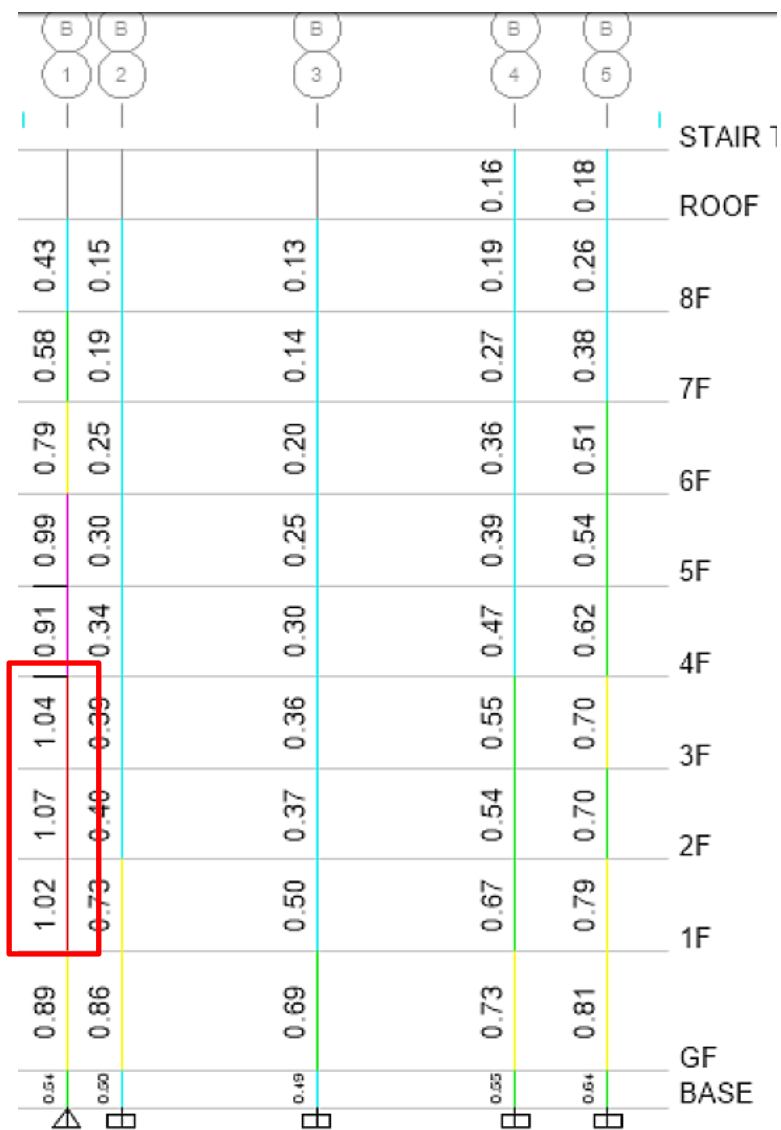


Figure 4.2.4: Condition of Column in Grid B

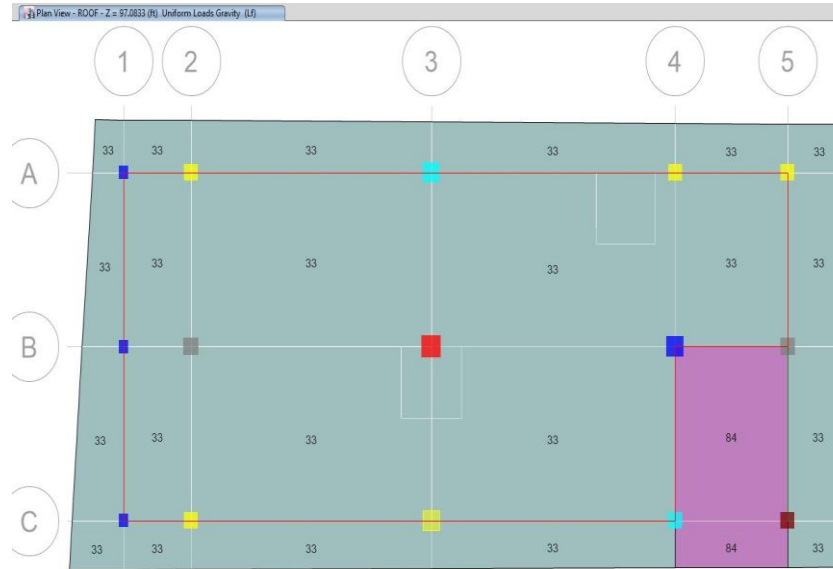
Stress ratio of column in design report

In the Design Report, RC material property considered $f_y=72.5\text{ksi}$ (500 MPa) & $f_c'=5.3\text{ksi}$ (36.6 MPa)

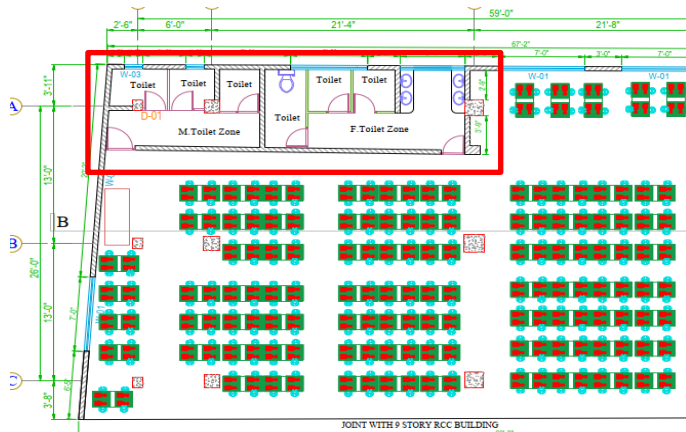
However, in the design report stress ratio of some column are exceeds normal design limit (PMM ratio > 1.00). Factory engineer is required to re-check the analysis and provide necessary alternative accordingly.



5000L water tanks on Roof



Roof load without water tank load



Toilet zone location on several floors

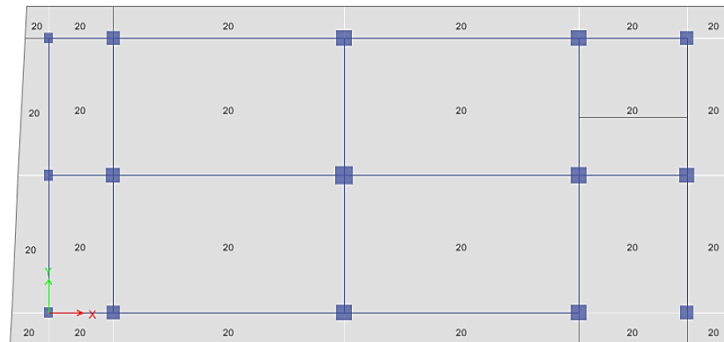


Figure 3.8.1: Applied Floor Finish in Typical Floor (20psf)

Only 1 kPa (20 psf) floor finish load considered in the model

Water tank load and toilet wall & floor built-up loads are not considered in the drawings, floor load plan and design report.

The building engineer is required to incorporate the water tank and floor built-ups in the as-built drawing & floor load plan and revise the design report accordingly.

Dampness & crack on peripheral brick wall



Dampness & crack on peripheral brick wall

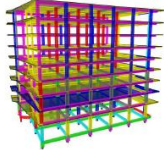
During the inspection, dampness & non-structural crack observed on the peripheral wall. Factory engineer is required to repair cracks and dampness with the suggestion of the building engineer.

Inconsistencies in the design report for floor loadings

DETAILED ENGINEERING ASSESSMENT REPORT FOR
9- STORIED RCC FACTORY BUILDING OF
NASRIN GARMENTS LTD (Extn.)

Project type: 9- Storiad RCC Building
Location: 217/1, Beni Badli, Ranchandapur, Mohammadpur, Dhaka, Bangladesh

Client: SHINEST WASHING



Assessed by

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Design report

3.4.2 Live Load

Live load is the gravity load due to non-permanent objects like machines, furniture, and human. Analysis has been carried out base on load recommended by BNBC (2006). For checking if needed reduced live load (42psf) are also used to find present condition of the structure.

42 psf (2 kPa) LL considered in the design report

The building was constructed between January 2016 and June 2017. The factory occupied the structure since July 2017.

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

As per live load table (6.2.3) of BNBC-2006

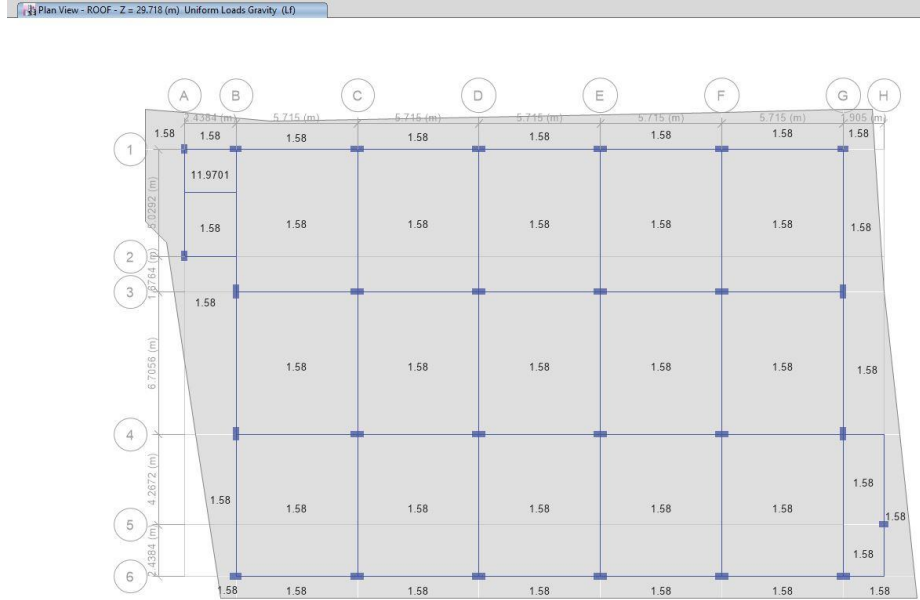
Minimum floor live load is 3 kPa.

As per BNBC-2006, the minimum floor live load for the industrial building is 3 kPa. The building engineer is required to update the floor live load as per BNBC requirement and revise the structural analysis and design report of the building accordingly. Submit the revised design documents to the RSC for review.

Observations: Building-3B (Extension)



Two water tanks and gardening on the roof



Roof load plan without tanks and gardening loads

In the design report and drawing roof live load was shown 33 psf (1.5 kPa). Two water tanks and gardening loads are not considered in the load plan and design report.

The building engineer is required to incorporate all the roof loads in drawing, load plan & design report.

Floor loading exceeds the maximum limit



Maximum floor live load 2 kPa in the posted load plan



Loading on 2nd & 3rd floor was found around 4 kPa



For storage area only 2 kPa (42 psf) floor live load is considered in the design and prepared floor load plan accordingly. But as per BNBC-2006 minimum storage live load is 6 kPa (125 psf). However, during the inspection at 2nd & 3rd floor storage live load was measured more than **3 kPa**.

The building engineer is required to revise the storage live load limit plan considering BNBC requirement and revise the structural analysis and design report accordingly.

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

As per live load table (6.2.3) of BNBC-2006 Minimum storage live load is 6 kPa.

Non-structural elements found unbraced/not anchored



Storage rack found within the building without braced/anchored

Non-structural elements suspended from, attached to, or resting atop the structure shall be adequately anchored and braced to resist earthquake forces. Factory is required to brace/anchor all non-structural elements.

Water ponding on roof



Water ponding on roof slab due to poor drainage system

Water ponding on roof slab due to poor drainage system. Aggregate of slab casting was observed as brick chips. Factory is required to improve drainage system and apply water proofing layer on roof slab.

Design report to be revised

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Design report

Irregular building shape and flat slab system

The building shape is irregular building shape and framing is column-flat slab system. Displacement check has not been incorporated in the design report. The building engineer is required to revise the design report for the lateral displacement check.

Problems Observed

Building-2:

Item 1: Discrepancies in as-built drawing.

Item 2: Lack of lateral stability system.

Item 3: Apparently inadequate connection.

Item 4: Crack in brick walls.

Item 5: Discrepancy between retrofitting drawing and on-site retrofitting works

Building-3A (9 Storied RC Building):

Item 6: Inconsistencies in design report for material strength & additional floor loadings.

Item 7: Dampness & crack on peripheral brick wall.

Building-3B (Extension):

Item 8: Inconsistencies in the design report for floor loadings.

Item 9: Floor loading exceeds the maximum limit.

Item 10: Non-structural elements found unbraced/not anchored.

Item 11: Water ponding on roof.

Building-4:

Item 12: Design report to be revised.

Priority Actions

Item No.	Observation	Recommended Action Plan	Recommended Timeline
01	Lack of lateral stability system. (Building-2)	Building engineer is required to check the lateral stability of the structure and suggest necessary remedial actions accordingly.	6-weeks
02	Lack of lateral stability system. (Building-2)	Carry out suggested remediation work if required.	6-months
03	Discrepancies in as-built drawing. (Building-2)	The building engineer is required to survey the structure and prepare accurate as-built drawings.	6-weeks
04	Apparently inadequate connection. (Building-2)	The building engineer is required to check the connection adequacy as part of EA suggest necessary remedial actions.	6-weeks
05	Apparently inadequate connection. (Building-2)	Carry out suggested remedial works where required.	6-months
06	Crack in brick walls. (Building-2)	The building engineer is required to identify the reason of crack and carry out suitable remedial works.	6-weeks
07	Discrepancy between retrofitting drawing and on-site retrofitting works. (Building-2)	The building engineer is required to survey the structure, prepare accurate as-built drawing and revise the design report based on updated as-built drawing.	6-weeks

Item No.	Observation	Recommended Action Plan	Recommended Timeline
08	Discrepancy between retrofitting drawing and on-site retrofitting works. (Building-2)	The building engineer is required to incorporate the water tank and floor built-ups in the as-built drawing & floor load plan and revise the design report accordingly.	6-months
09	Inconsistencies in design report for material strength & additional floor loadings. (Building-3A (9 Storied RC Building))	The building engineer is required to incorporate the water tank and floor built-ups in the as-built drawing & floor load plan and revise the design report accordingly.	6-weeks
10	Inconsistencies in design report for material strength & additional floor loadings. (Building-3A (9 Storied RC Building))	Carry out the remedial works if required.	6-months
11	Dampness & crack on peripheral brick wall. (Building-3A (9 Storied RC Building))	Factory is required to repair the dampness and non-structural cracks with the suggestion of the building engineer.	6-weeks
12	Inconsistencies in the design report for floor loadings. (Building-3B (Extension))	The building engineer is required to update the floor live load as per BNBC requirement and revise the structural analysis and design report of the building accordingly. Submit the revised design documents to the RSC for review.	6-weeks
13	Inconsistencies in the design report for floor loadings. (Building-3B (Extension))	The building engineer is required to incorporate all the roof loads in drawing, load plan & design report.	6-weeks

Item No.	Observation	Recommended Action Plan	Recommended Timeline
14	Inconsistencies in the design report for floor loadings. (Building-3B (Extension))	Building engineer is required to survey the structure and prepare accurate as-built drawings and submit to the RSC for review.	6-weeks
15	Inconsistencies in the design report for floor loadings. (Building-3B (Extension))	Carry out the remedial works if required.	6-months
16	Inconsistencies in the design report for floor loadings. (Building-3B (Extension))	Continue to implement floor load plan.	6-months
17	Floor loading exceeds the maximum limit. (Building-3B (Extension))	The building engineer is required to revise the storage live load plan considering BNBC requirement and revise the structural analysis and design report accordingly.	6-weeks
18	Floor loading exceeds the maximum limit. (Building-3B (Extension))	Carry out the remedial works if required.	6-months
19	Floor loading exceeds the maximum limit. (Building-3B (Extension))	Continue to implement floor live plan (post accepted floor load plan, provide necessary signage and maintain floor loading).	6-months

Item No.	Observation	Recommended Action Plan	Recommended Timeline
20	Non-structural elements found unbraced/not anchored. (Building-3B (Extension))	Factory is required to brace/anchor all non-structural elements.	6-weeks
21	Water ponding on roof. (Building-3B (Extension))	Factory is required to improve drainage system and apply water proofing layer on the roof slab.	6-weeks
22	Design report to be revised. (Building-4)	The building engineer is required to revise the design report for the slab punching and lateral displacement check.	6-weeks
23	Design report to be revised. (Building-4)	Carry out the remedial works if required.	6-months