

Eusebio Sporting (Bangladesh) Limited

Plot # 38-47, 52-59, 59A, Sector - 03, KEPZ, North Patenga, Chattogram- 4204

(22.278578, 91.794533)

8 February 2024



1. Building Information

Building-1: Four-storied (G+3) RC building.

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

Building-3 (Store and Dining Building): Four storied(G+3) RC building.

Building-4: Six storied (G+5) RC building.

RC Emergency Exit Stair-2 of Building-4: Reinforced concrete emergency exit Stair.

Building-5: Four storied(G+3) RC building.

Building-6 (Chemical Store): Single storied RC building.

Building-7 (Substation & Generator Room-1): Single storied RC building.

Building-8 (Sub-station & Generator Room- 2): Single storied RC building.

Building-9 (Security Post): Single storied RC building.

Building-10 (Compressor Room-1): Single storied RC building.

Building-11 (Compressor Room-2): Single storied RC building.

Shed-1 (Production Shed): Single storied steel shed with mezzanine floor.

Shed-2 (Fire Pump Room): Single storied steel shed.

Shed-3 (Passageway-1): Single storied steel shed.

Shed-4 (Passageway-2): Single storied steel shed.

Shed-5 (Wastage Shed): Single storied non-engineered bamboo shed.

2. Observations

Observation 1: C-type column not considered in design report. (Building 1)

Structural Assessment Report
EUSEBIO SPORTING (BD) LTD.
Main Production Building

8 RETROFITTING

Columns are inadequate due to both gravity load and lateral load; therefore load reduction will not be an effective solution to operate garments industry operation under current loading condition. Strengthening of the structural elements is the convenient solution. Due to increase of the columns & beams size, the stiffness of the structure will increase.

8.1 Retrofitting design

- ✓ C1 type columns are designed as RC2626, C2 type columns are designed as RC3030 with thickness increment at each side.
- ✓ C type lift columns need to be replaced by new framing system (which is not considered in retrofit design) with new beam support (NB1018) as shown in retrofitting drawings.

8.2 Design consideration

For retrofitting design, live load is considered as 3.0 KN/m² (light weight working area) and 2.0 KN/m² only at toilet areas. Load combination is as per BNBC 2006.

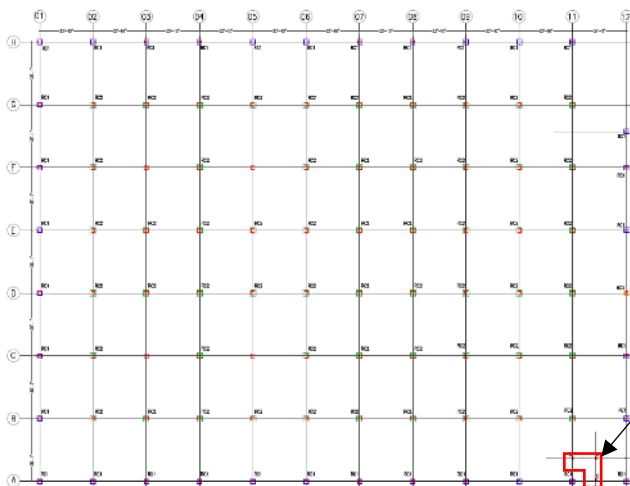
8.3 Material properties

1. Concrete compressive strength:
 - a) Column 4000 psi
 - b) For new beam of lift core 2168 psi
 - c) Pile cap 2168 psi
2. Steel yield strength:
 - a) For Column 72.5 ksi
 - b) For new beams (NB 1018) of lift core 72.5 ksi

Floor levels, Column & Beam numbers and location, which required encasement shown in the retrofitting drawings.



Recommendation of design report



Column layout

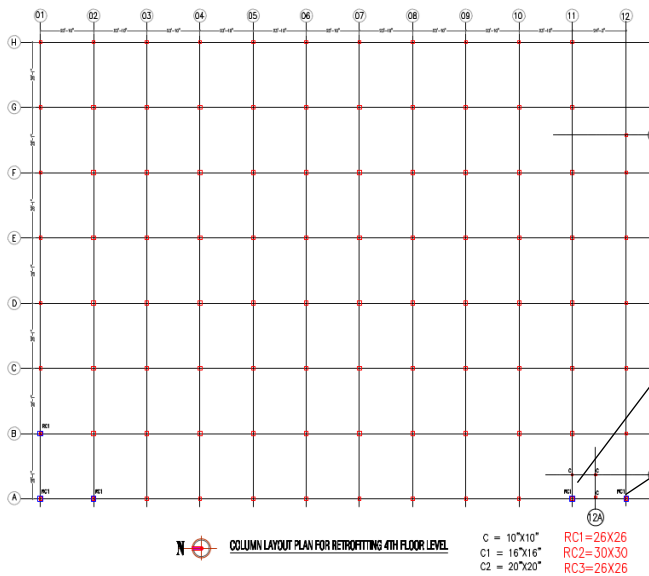
Building1

COLUMN ID	SHORT COLUMN / PIERCE	GROUND TO 1 ST FLOOR	2ND TO ABOVE FLOOR
C-0'X10	 10' X 10' cover 1 1/2"	 10' X 10' cover 1 1/2"	 10' X 10' cover 1 1/2"

C1 column schedule

Description: A set of design reports was found on site. As per recommendation of design report remediation was required for foundation, column, and beam. The factory had carried out all remedial works as per retrofitting drawing in 2017. But C type column (250x250 mm) was not considered in the design report. Also, during inspection an adequate amount of retrofitting material test report was not available. The building engineer is required to submit the design documents to the RSC for further review to justify the capacity of foundation, column, and beam & slab against the lateral & vertical loading. Also, verify the retrofitting material strength either from cylinder test report or by taking cores from retrofitted member.

Observation 2: Mismatch in retrofitting drawing and as built drawing. (Building 1)

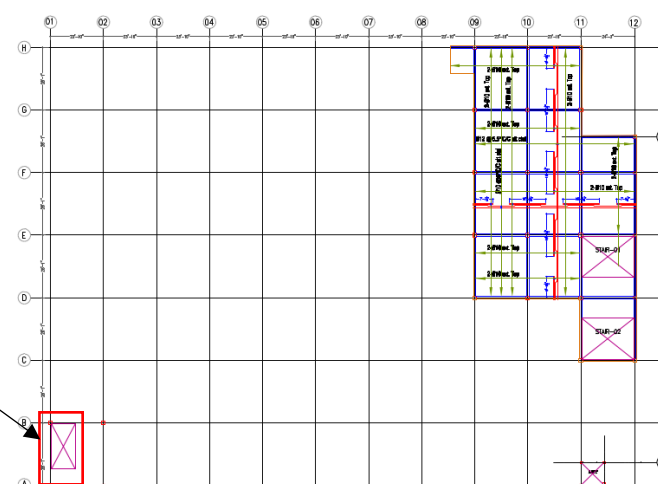


4th floor level column layout plan for retrofitting

Onsite condition



Onsite RC Overhead Water Tank



As built structural drawing slab layout

Description: During inspection a few mismatches were found in retrofitting drawing and as built drawing which are given below.

- Marked two columns were not retrofitted at 4th floor level. However, the corner column was constructed up to 3rd floor level, but other column was constructed up to 4th floor level but not retrofitted.
- Also, RC overhead water tank details were found missing in structural drawing.

The building engineer is required to survey the full structure and update the retrofitting drawing, as built drawing, and design report accordingly.

Observation-3: Dampness and brick wall crack. (Building 1)



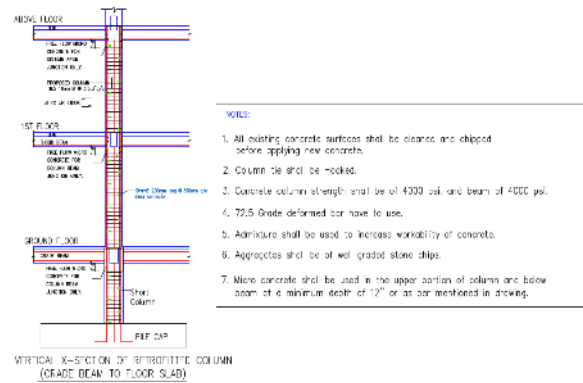
Dampness on stair roof slab



Brick wall crack at toilet zone

Description: Dampness and brick wall cracks were found at several locations. The building engineer is required to identify the reason for the dampness and crack on brick wall. Prepare an investigation report with the necessary repair method. Repair the crack as per the crack investigation report.

Observation-4: Lack of retrofitting material test report. (Building 2)



NOTES:

1. All existing concrete surfaces shall be cleaned and chipped before applying new concrete.
2. Column tie shall be Hooked.
3. Concrete column strength shall be of 4000 psi, and beam of 4000 psi.
4. 72.5 Grade deformed bar have to use.
5. Admixture shall be used to increase workability of concrete.
6. Aggregates shall be of well graded stone chips.
7. Micro concrete shall be used in the upper portion of column and below beam of a minimum depth of 12" or as mentioned in drawing.

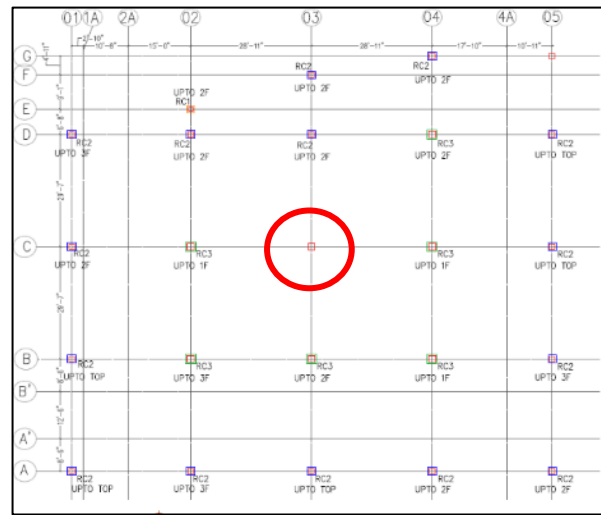
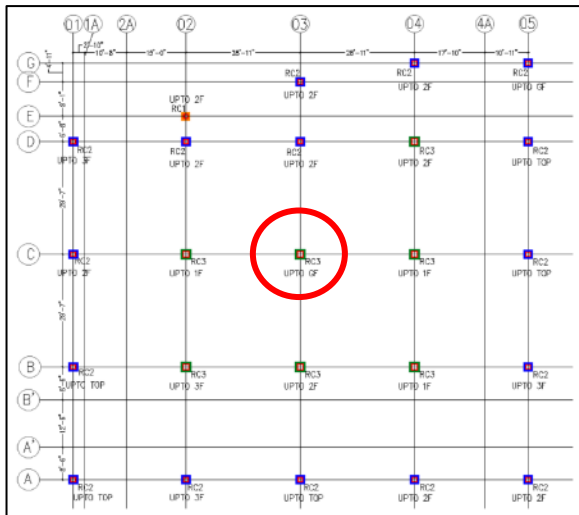
Description: A set of design reports was found on site. As per recommendation of design report remediation was required for foundation & column. The factory had carried out all remedial works as per retrofitting drawing in 2017. During inspection an adequate amount of retrofitting material test report was not available. The building engineer is required to submit the design documents to the RSC for further review to justify the capacity of foundation, column, and beam & slab against the lateral & vertical loading. Also, verify the retrofitting material strength either from cylinder test report or by taking cores from retrofitted member.

Observation 5: Dampness on column and brick wall. (Building 2)



Description: Dampness were found at several locations. The building engineer is required to identify the reason for the dampness and prepare an investigation report with the necessary repair method. Repair the dampness as per the investigation report.

Observation 6: Stress in column exceeds normal design limit. (Building-3: Store and Dining Building)

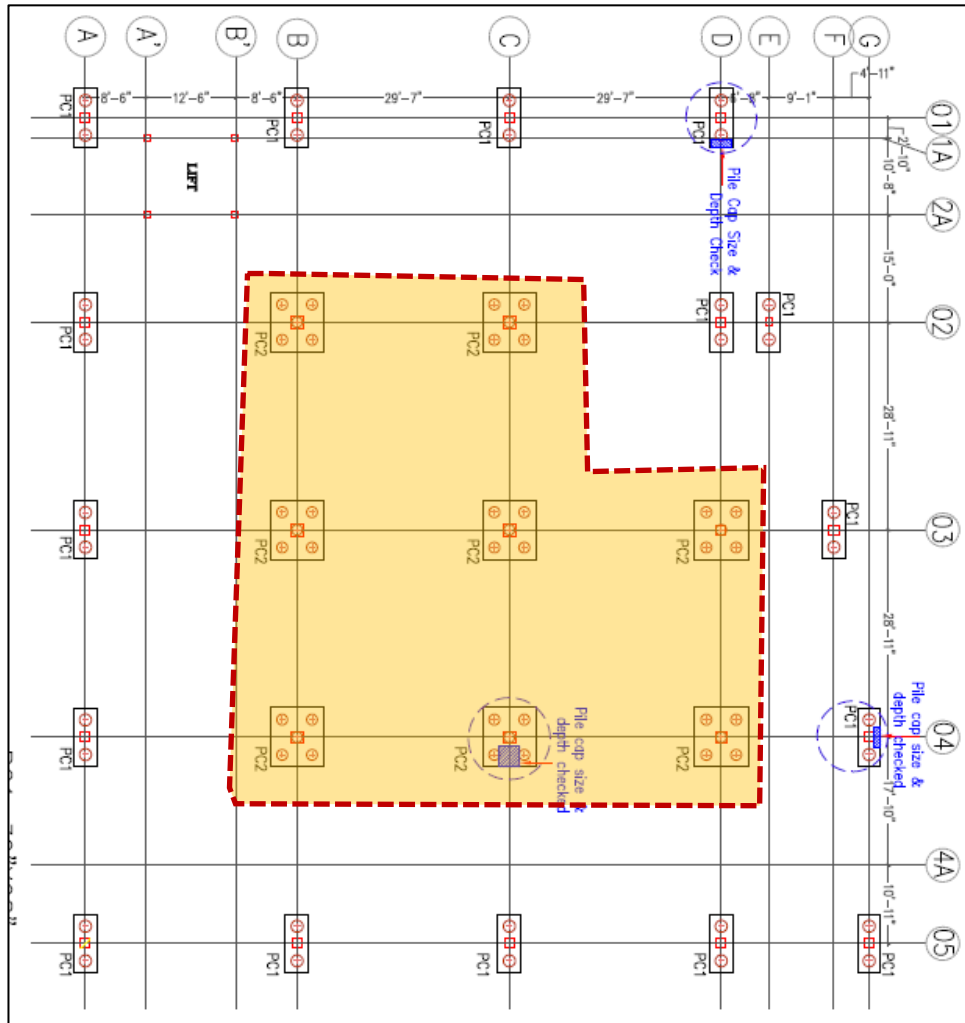


Ground floor column layout plan for retrofitting

1st floor column layout plan for retrofitting

Description: The marked column has been retrofitted only on ground floor level. The cursory calculation indicates that stress in the marked column of Grid (C-3) exceeds the normal design limit considering floor live load of 6 kPa for storage & 3 Kpa for canteen, roof live load of 1.5 kPa, and concrete strength of 13.8 MPa. The building engineer is required to review the design, loads, and column stresses for the marked columns based on in-situ material strength.

Observation 07: Stress in pile foundation exceeds normal design limit. Building-3: Store and Dining Building)



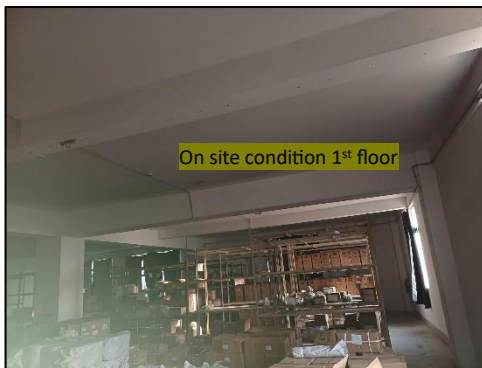
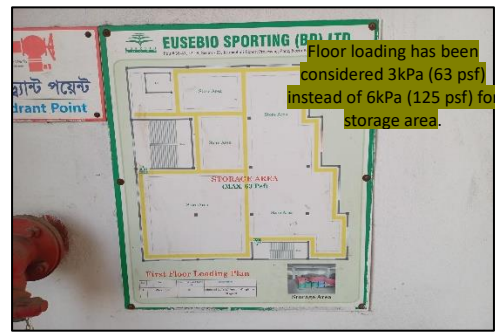
Stressed pile in foundation layout

Description: cursory calculation indicates that factor of safety (FoS) of some pile foundations is below the allowable limit considering the floor live load 6 kPa for storage, 3 kPa for cantten & 1.5 kPa for roof. Building engineer is required to review the design, loads and foundation stresses and prepare a remediation plan if required.

Observation 08: Storage live load limit does not comply with BNBC requirement. (Building-3: Store and Dining Building)

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

BNBC requirement



Description: As per BNBC, 6 kPa is required to consider as floor loading for the light storage facilities. During inspection, the load plan was found posted considering (63 psf) 3kPa at storage area. The Building Engineer is required to update the storage live load limit as per BNBC requirement, revise the structural analysis & design report accordingly.

Observation 9: Hair line Crack in existing beam at multiple locations. (Building-3: Store and Dining Building)



Hairline crack on beam at multiple location

Description: Hairline cracks were found on beams at several locations of different floors. The building engineer is required to identify the reason for the crack and prepare an investigation report. Factory is required to repair the crack as per the crack investigation report.

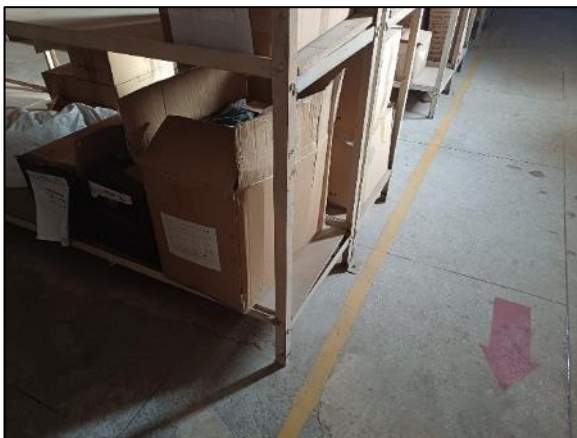
Observation 10: Apparently Inadequate Joint of retrofitted beam. (Building-3: Store and Dining Building)



Inadequate joint of beam

Description: During inspection, marked joints appeared to be inadequate. The building engineer is required to check the connections adequacy and load path and suggest suitable remedial method if required.

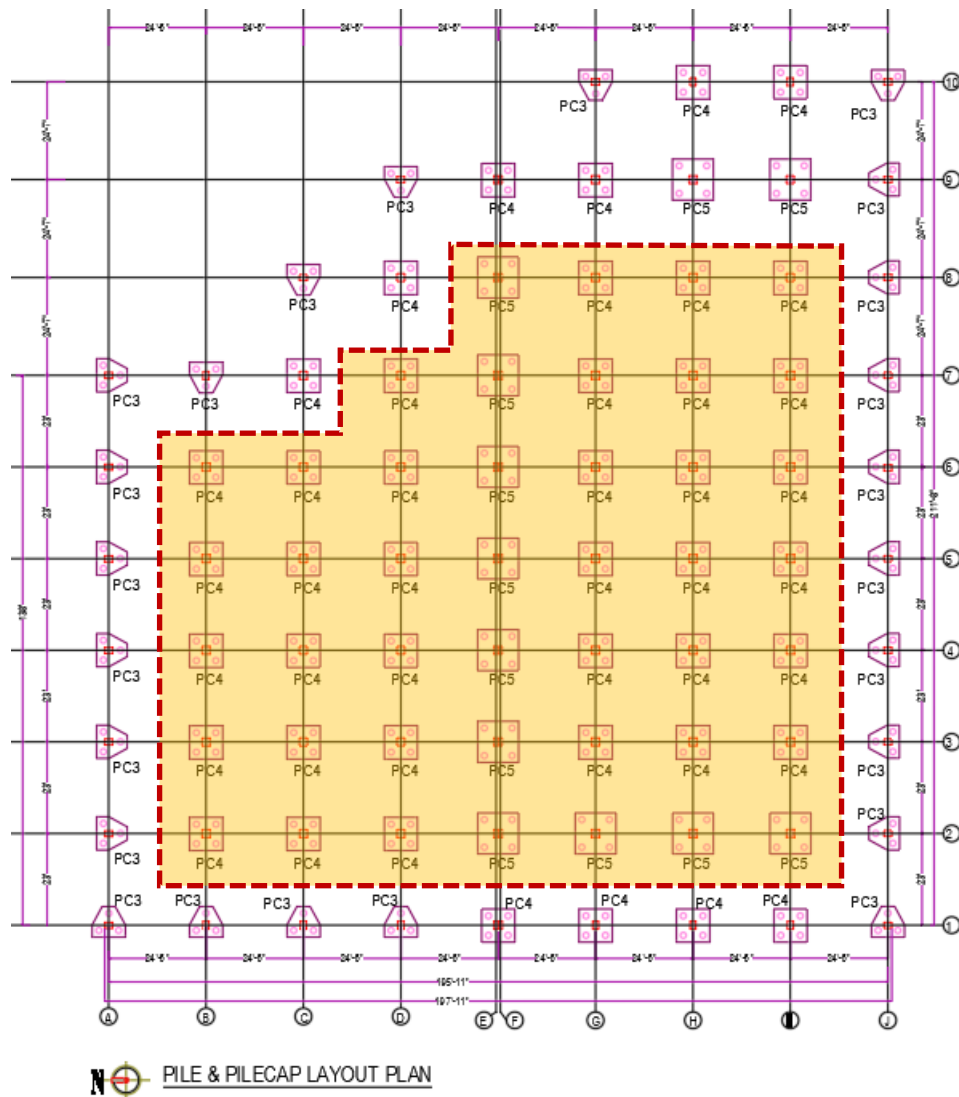
Observation 11: Storage rack without anchorage. (Building-3: Store and Dining Building)



Storage rack without anchorage

Description: Racks on different floors are not adequately anchored or braced to resist lateral (earthquake) forces. The factory is required to adequately anchor and brace all non-structural elements to resist earthquake forces to comply with the BNBC.

Observation 12: Stress in pile foundation exceeds normal design limit. (Building 04)



Stressed pile in foundation layout

Description: cursory calculation indicates that factor of safety (FoS) of some pile foundations is below the allowable limit considering the floor live load 6 kPa for 1st, 4th and 5th floor, 3 kPa for 2nd and 3rd floor, 1.5 kPa for roof, super imposed load from overhead water tank and ultimate pile capacity 142.65 Ton. Building engineer is required to review the design, loads and foundation stresses and prepare a remediation plan.

Observation 13: Lack of material test report (Building-04).

Structural Assessment Report
EUSEBIO SPORTING (BD) LTD.
(Six Storied Building-5)

3.2 Material Properties:

Table 3.2 - Material Properties Assigned in FEM Model

Name	Type	E	v	Unit Weight	Design Strengths
		kip/in ²		kip/in ³	
CONB	Concrete	2479.052	0.2	0.000087	F _c =1.9 kip/in ²
CONC	Concrete	2469.052	0.2	0.000087	F _c =1.9 kip/in ²
CONCNEW	Concrete	3600	0.2	0.000087	F _c =4 kip/in ²
RMAT	Rebar	29000	0.3	0.000284	F _y =72.5 kip/in ² , F _u =108.75 kip/in ²
STEEL	Steel	29000	0.3	0.000283	F _y =50 kip/in ² , F _u =65 kip/in ²

Description: In the design report, rebar strength is considered 500 MPa but no re-bar test report was provided. The building engineer is required to provide rebar test report for 500 MPa and update the analysis & design report if required.

Observation 14: Load plan to be revised and posted. (Building-04)



Posted load plan



Part 6
Structural Design

Live load table (BNBC part-6)

Table 6.2.3
Live Loads for Various Occupancies

BUILDING	Occupancy	Use of floor	U _L kN/m ²	U _L psf
RESIDENTIAL	1	Room, internal corridor, private stair	2.0	1.8
	2	External stair and corridor	2.0	1.8
	3	Bed room, living room, bath room, toilet, dressing room	2.0	1.8
	4	Office room	2.5	2.7
	5	Cafeteria, restaurant, kitchen, laundry, lobby, lounge, game room, dining hall, balcony	3.0	4.5
	6	Corridor, small store, staircase	4.0	4.5
EDUCATIONAL/INSTITUTIONAL/HEALTH CARE	1	Red room, dressing room, toilet, hospital ward and cabin, call blocks of jail	2.0	1.8
	2	Office room, staff room	2.5	2.7
	3	X-ray room, operating room, utility room, reading room without book storage	2.5	4.5
	4	Class room, lecture room, lounge, cafeteria, restaurant	3.0	2.7
	5	Laboratory, kitchen, laundry	3.0	4.5
	6	Ballroom, corridor, lobby, reading room with book storage, staircase	4.0	4.5
INDUSTRIAL/STORAGE/WAREHOUSE	1	Assembly area, fire escape, store room, projection room	3.0	4.5
	2	Stack room for book	6.5	7.0
	3	Assembly room: with fixed seat without fixed seat	3.0	2.7
	4	Stage and projection room	3.0	4.5
	5	Library	2.5	4.5
	6	Reading room: without book storage with book storage	4.0	4.5
ASSEMBLY	1	With fixed seats	1.0	2.7
	2	Without fixed seats	3.0	4.5
	3	Corridor, stair and passage way	3.0	4.5
	4	Assembly area, store room, fire escape, projection room	4.0	4.5
	5	Armories, boiler room and machine room including weight of machinery	7.0	4.5
	6	Airport hangar	7.0	12.0

Note: (1) U_L : Uniformly distributed load in kN/m². This load shall not be applied simultaneously with the concentrated load, P.
(2) P : A single concentrated load, in kN, assumed to act over an area of 300 mm x 300 mm unless otherwise specified in Note (3) below. Except as indicated by Note (3), these concentrated loads shall not be considered for the floor capacity of heavily distributing the load, e.g. reinforced concrete slabs.
(3) Use a distributed load of 2.4 kN/m² for each storey of rack height but not less than 6.5 kN/m².
(4) See Sec 2.3.3.2 for values, numbers, and spacing of these concentrated loads.
(5) These loads shall be applied over an area of 750 mm x 750 mm on all types of floors including reinforced concrete slabs.

Structural Assessment Report EUSEBIO SPORTING (BD) LTD. (Six Storied Building-5)

Provided Design report

4.3 Live Load

Roof Live load 21psf & Floor Live Load 42 psf has been considered for overall structure

Load consideration for Building-04

Description: In design report, live load for typical floor was considered 2 kPa and for roof 1kPa. As per BNBC- Part 6, live load for light workspace (without storage) is required to be considered minimum 3 kPa and for light storage to be considered minimum 6 kPa. Also, load plan was not posted in several floors. Therefore, building engineer is required to revise the load plan as per BNBC requirement and check the design accordingly. Also, post and implement the accepted load plan on each floor.

Observation-15: Hairline cracks on beams and horizontal hairline cracks on columns (Building-04)



Description: Hairline cracks were found on roof level beams at several locations. Also, horizontal hairline cracks were found on retrofitted columns at several locations. The building engineer is required to identify the reason for the crack and prepare an investigation report with the necessary repair method. Also, repair the cracks as per the crack investigation report.

Observation 16: Design documents need to be revised (RC Emergency Exit Stair-2 of Building-4)

Structural Design Report

EUSEBIO SPORTING (BD) LIMITED NEW STAIR

Provided Design report.

3.3 Live Load

Live load has been considered as per BNBC-2006.

1. Commercial Space : 105 psf
2. Staircases : 84 psf

BUILDING				BUILDING			
Occupancy	Use of floor	⁽¹⁾ kN/m ²	⁽²⁾ P kN	Occupancy	Use of floor	⁽¹⁾ kN/m ²	⁽²⁾ P kN
RESIDENTIAL (Occupancy - A)	One or two family dwellings	1 Room, internal corridor, private stair	2.0	BUSINESS AND MERCANTILE (Occupancy - F)	1 General office room, banking hall	3.0	9.0 ⁽¹⁾
		2 External stair and corridor	3.0		2 Laboratory, kitchen	3.0	4.5
	Hotel, hostel, boarding house, flat and apartment, bungalow	1 Bed room, living room, bath room, toilet, dressing room	2.0		3 Computer, business machine room	3.5	9.0 ⁽¹⁾
		2 Office room	2.5		4 File room, filing and storage space	6.0	4.5
		3 Cafeteria, restaurant, kitchen, laundry, lobby, lounge, game room, dining hall, balcony	3.0		5 Vaults in office and bank	5.0	4.5
		4 Corridor, retail store, staircase	4.0		6 Telephone exchange	6.0	4.5
EDUCATIONAL, INSTITUTIONAL & HEALTH-CARE (Occupancy - B, C & D)	School, college, university, hotel and medical institutions, orphanage, child care home, normal and emergency medical facilities, hospital, clinic etc.	5 Store room	5.0	Shop, market, departmental store	1 Retail store	4.0	3.6
		6 Garage, car parking floor, ramp (See Occupancy - K)	-		2 Wholesale store	6.0	13.0 ⁽²⁾
					3 Storage : light heavy	6.0	4.5
				INDUSTRIAL, STORAGE & HAZARDOUS (Occupancy - G, H & I)		12.0	14.0 ⁽²⁾
		1 Bed room, dressing room, toilet, hospital ward and cabin, cell blocks of jail	2.0		1 Light workroom without storage	3.0	2.7
		2 Office room, staff room	2.5		2 Machinery hall & circulation area	4.0	4.5
		3 X-ray room, operating room, utility room, reading room without book storage	2.5		3 Factory, workshop etc.	5.0	4.5
		4 Class room, lecture room, lounge, cafeteria, restaurant	3.0		4 Manufacturing : light heavy ice	6.0	4.5
ASSEMBLY (Occupancy - E)	Library, auditorium, cinema, lecture hall, restaurant, bar, museum, mosque, church (L1 - L4) & G.S.	5 Laboratory, kitchen, laundry	3.0		5 Printing plant : Press room Composing and unotype room Paper storage room	7.0	11.0
		6 Balcony, corridor, lobby, reading room with book storage, staircase	4.0	MISCELLANEOUS (Occupancy - J)	6 Motor room, fan room etc. including the weight of machinery	7.5	4.5
		7 Assembly area, fire escape, store room, projection room	5.0		7 Cold storage, grain storage	15.0	9.0 ⁽¹⁾
		8 Stack room for book	6.5 ⁽³⁾		8 Storage warehouses : light heavy	6.0	4.5
		1 Assembly room with fixed seat without fixed seat	3.0	All OCCUPANCIES (Occupancy - A, H, J, K) (if not specified above)	9 Foundries	20.0	12.0
		2 Stages and projection room	5.0		1 Repair workshop for all types of vehicles	5.0	9.0
		3 Library : Reading room without book storage with book storage	2.5		2 Driveway, ramp and parking for vehicles with mass > 2500 kg	5.0	- ⁽⁴⁾
		Stack room for book	4.0	Special loads and Miscellaneous live loads (if not specified above)	3 Car parking and ramp for passenger car and light vehicles having mass ≤ 2500 kg	2.5	- ⁽⁴⁾
ASSEMBLY (Occupancy - E)	Stadium, arc gallery, grand stand, museum, gymnasium (G.S.)		6.5 ⁽³⁾		1 Bed room, toilet, dressing room	2.0	1.8
		1 With fixed seats	3.0		2 Office room, staff room	2.5	2.7
		2 Without fixed seats	5.0		3 Kitchen, laundry, lounge, game room, cafeteria, restaurant	3.0	4.5
		3 Corridor, stair and passage way	5.0		4 Balcony, corridor, passage way, retail store, staircase	4.0	4.5
					5 Assembly area, store room, fire escape, projection room	5.0	4.5
					6 Devil room, drill hall	5.0	9.0
					7 Armories, boiler room and machine room including weight of machinery	7.5	4.5
					8 Airport hangars	7.0	12.0 ⁽⁵⁾

Load consideration for Building-04

Description: In the design report, live load for staircase was considered 4 kPa. As per BNBC- Part 6, live load for emergency staircase is required to be considered minimum 5 kPa. Therefore, building engineer is required to revise the design documents incorporating the live load as per BNBC requirement.

Observation 17: Lack of material test report (RC Emergency Exit Stair-2 of Building-4).

BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY (BUET)
DEPARTMENT OF CIVIL ENGINEERING
 Mobile: 01819657964, PABX: 55167100 Ext. 7226
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CONCRETE LABORATORY

BRTC
 Testing & Consultancy

BRTC No.: 1162-60145/21-22/CE; Dt: 21/4/2022
 Sent by: General Manager, Eusebio Sporting (Bangladesh) Ltd.
 Plot# 38-47, 52-60A, Sector-03, Kamapuhli EPZ, North Patenga, Chittagong.
 Ref. No.: HRIESBL/2022/31; Dt: 20/4/2022
 Project: Emergence Stair of 6-storied R.C.C. Factory Buildings (Building no.-04) of Eusebio Sporting (Bangladesh) Ltd., KEPZ, Chittagong.
 Sample: Concrete Cylinder (Aggregate Type: Stone chips)
 Location: 1st Lift, 2nd floor Column, [Mix proportion (as quoted): 1:1.5:3]
 Grid: 02/B [Admixture Added (as per letter): Not mentioned]
 Test: Compressive Strength Test of Concrete Cylinder (ASTM C39)
 Date of Test: 23/4/2022

TEST REPORT

SL No.	Date of Casting as per the letter	Specimen Designation/ Frog Mark	Specimen Area	Maximum Load	Crushing Strength	Average Crushing Strength	Mode of Failure
			(sq. in)	(lb)	(psi)		
1	28/2/2022	Column	12.18	100,847	8,280	7938 psi	Combined *
2	(54 days test)	Column	12.42	91,840	7,385	(54.7 MPa)	Combined *
3		Column	12.42	100,847	8,120	(558 kg/cm ²)	Combined *

* Combined = Mortar and Aggregate Failure

Note: Samples were received in sealed condition.

Countersigned by:

 Dr. A. B. M. Badruzzaman
 Professor
 Department of Civil Engineering
 BUET, Dhaka-1000, Bangladesh

Test Performed by:

 Ms. Snigdha Afana
 Assistant Professor
 Department of Civil Engineering
 BUET, Dhaka-1000, Bangladesh

Important Note: Samples are supplied to us have been tested in our laboratory. BRTC does not have any responsibility as to the representative character of the samples required to be tested. It is recommended that samples are sent in a secure and sealed cover/boxed container under signature of the competent authority. In order to avoid fraudulent interpretation of test results, it is recommended that all test reports are collected by only authorized person, and not by the Contractor/Supplier.

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 BUETCE 0 3 2 7 6 7 6

Structural Design Report
EUSEBIO SPORTING (BD) LIMITED NEW STAIR

2 PROPERTIES
 This chapter provides property information for materials, frame sections, shell sections, and links.

2.1 Materials properties

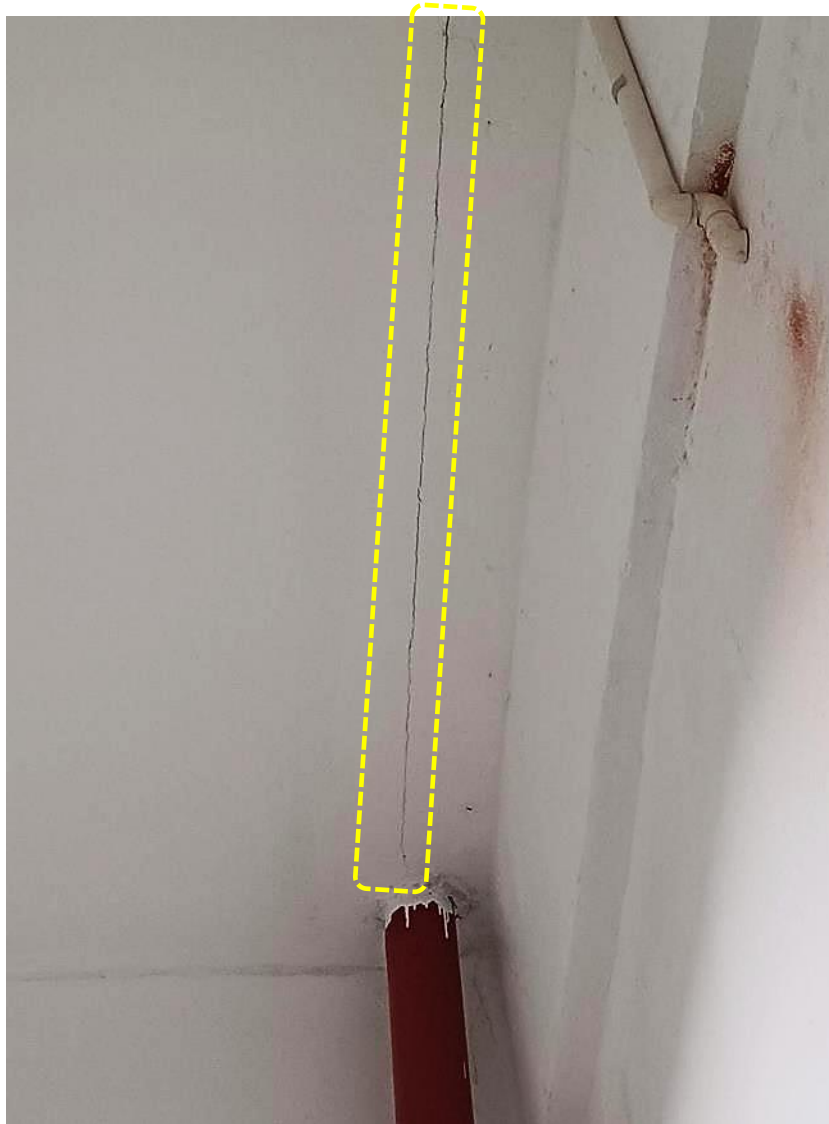
MATERIALS STRENGTH CONSIDERATION

- Concrete:**
 Compressive Strength (Cylinder) Considered as follows:
 (i) For Column, Beam & Stairs
 (ii) For Lintel, Slab etc.
- Steel:**
 Yield Strength of Steel

f'_c : 3.5 ksi
 f'_c : 3.5 ksi
 f_y : 72.5 ksi

- Description:** In the design report, rebar strength is considered 500 MPa but no rebar test report was provided. Building engineer is required to provide rebar test report for 500 MPa and update the analysis & design report if required.

Observation 18: Construction joint filled with mortar (RC Emergency Exit Stair-2 of Building-4)



Construction joint with Building-04

Description: During inspection, the construction joint between RC Emergency Exit Stair-2 and Building-04 was found filled with cement mortar. Building engineer is required to investigate for any damage due to absence of sealant and suggest & install proper filler material all over the structure & maintain it properly.

Observation 19: Storage live load limit does not comply with BNBC requirement. (Building-5)

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

BNBC requirement



On site condition 2nd floor



On site condition 3rd floor

Description: As per BNBC, 6 kPa is required to consider as floor loading for the light storage facilities. During inspection, the load plan was found posted considering (105 psf) 5kPa at storage area. The Building Engineer is required to update the storage live load limit as per BNBC requirement, revise the structural analysis & design report accordingly.

Observation 20: Crack on brick wall. (Building-5)



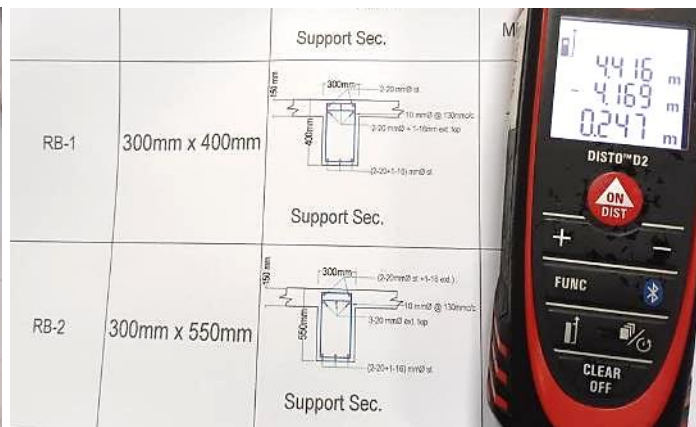
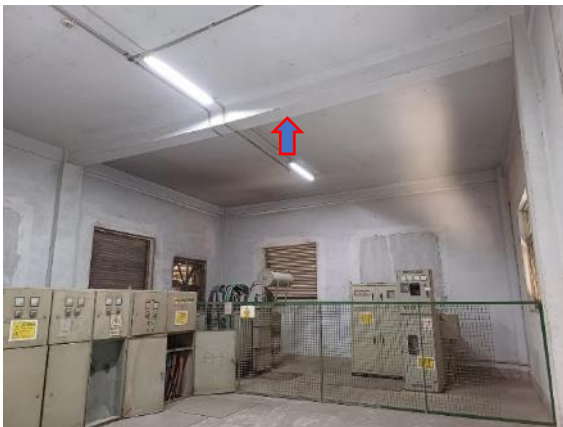
Description: Crack was found at several locations in brick wall. The building engineer is required to identify the reason for the crack in all locations of the building and prepare an investigation report with the necessary repair method. The factory is required to repair the crack as per the crack investigation report.

Observation-21: Lack of design documents (Building-6)



Description: OHWT was found on the building. As-built drawing and design documents were not available for the building.

Observation-22: Mismatch in structural drawing (Building-7)



Description: Beam size was found lower than the size shown in drawing. Down stand of beam was measured 247 mm instead of 400 mm.

Observation-23: Hairline crack on the soffit of roof beam & slab (Building-7)



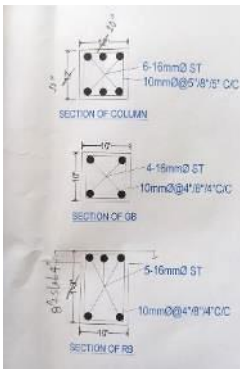
Description: Hairline cracks were found on the soffit of roof beam & slab. The building engineer is required to identify the reason for the crack and prepare an investigation report with the necessary repair method. Repair the crack as per investigation report.

Observation-24: Lack of as-built drawing (Building-8)



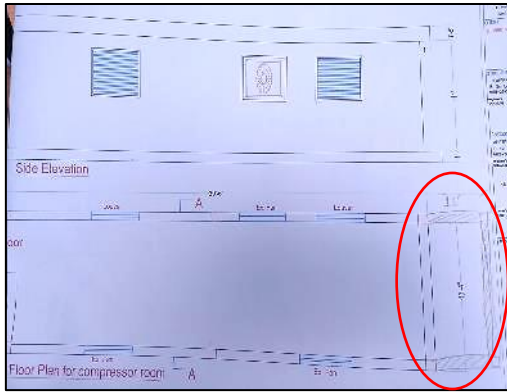
Description: As built was not available for the structure which to be prepared.

Observation-25: Mismatch between drawing and onsite condition (Building-9).



Description: The building dimensions, column and beam sizes do not match the provided drawing. The column size was measured 250 mm instead of 300 mm, down stand beam was measured 200 mm instead of 275 mm and building sizes found difference than the dimensions provided in the drawing. Update as-built drawing.

Observation-26: Horizontal expansion not reflected in the drawing. (Building-10)



Extension not shown in drawing



Extension bay

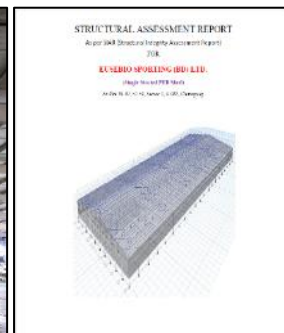
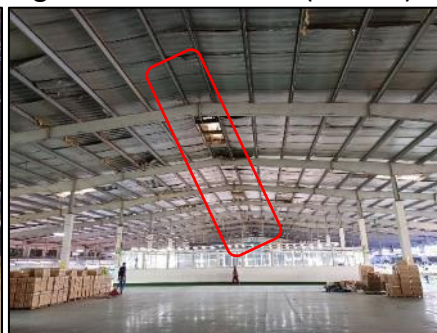
Description: Horizontal expansion of one bay was found onsite which was not reflected in the drawing. Update as-built drawing.

Observation-27: Lack of as-built drawing (Building-11)



Description: As built was not available for the structure which to be prepared. Produce as-built drawing.

Observation-28: Design check required against lateral forces. (Shed-1)



Shed-1

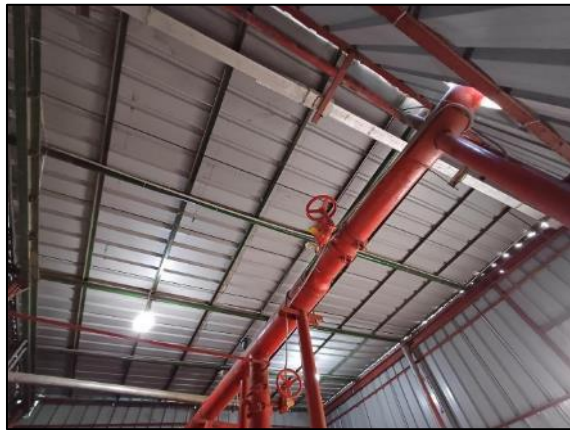
Description: There is no lateral load transfer media along the ridge and internal column line of the steel rafter. A set of design documents was available onsite which is required to be submitted to RSC for detailed review against lateral forces. Revise the design documents based on in-situ material strength and submit to the RSC for review.

Observation-29: Undocumented steel stair. (Shed-1)



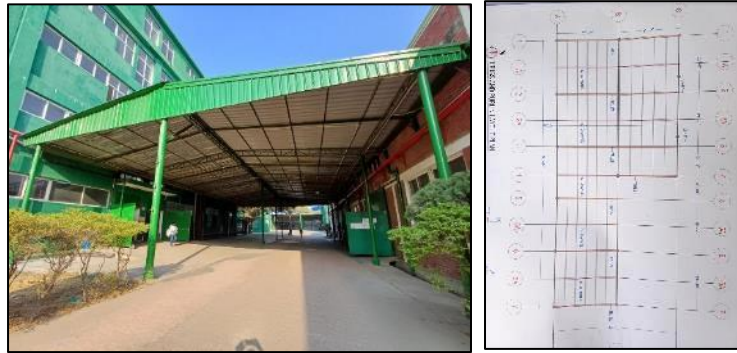
Description: Undocumented steel stair was found in south mezzanine floor have no drawing documents. Update as-built drawing.

Observation-30: Apparent lack of lateral stability. (Shed-2)



Description: The stability system of the structure is apparently inadequate. Also, the channel shaped steel rafter was found instead of MS pipe. The building engineer is required to survey the structure, prepare as-built drawings, check the stability of the structure and submit the documents to the RSC.

Observation-31: Apparently inadequate lateral stability and member sizes. (Shed-3)



Description: The roof of the shed is made by 50x50 and 38x38 mm MS angles. The member sizes of the shed are apparently inadequate, and no bracing system is provided. Also, the column layout and roof extent doesn't match with the provided drawings. The building engineer is required to survey the structure, prepare as-built drawings, check the stability of the structure, and submit the documents to the RSC.

Observation-32: Undocumented steel fire pump shed. (Shed-4)



Description: Undocumented steel shed observed between Building-2 & 3 has no drawing and design documents. The building engineer is required to survey the structure, prepare as-built drawings, check the stability of the structure, and submit the documents to the RSC.

Observation-33: Non-engineered bamboo shed. (Shed-5)



Description: Non-engineered bamboo shed was found beside Building-5. The building engineer is required to suggest necessary alternatives for the structure.

3. Action Plan

Observation	Action Plan	Timeline
Building-1		
C-type column not considered in design report. (Building 1). (Building 1)	The building engineer is required to submit the design documents to the RSC for further review to justify the capacity of foundation, column, and beam & slab against the lateral & vertical loading.	within 6 weeks
	Verify the retrofitting material strength either from cylinder test report or by taking cores from retrofitted member.	within 6 weeks
	Carry out suggested remedial works if required.	within 6 months
	Implement floor loading plan.	within 6 months
Mismatch in retrofitting drawing and as built drawing. (Building 1)	The building engineer is required to survey the full structure and update the retrofitting drawing and design report accordingly.	within 6 weeks
Dampness and brick wall crack. (Building 1)	The building engineer is required to identify the reason for the dampness and brick wall crack and prepare an investigation report with the necessary repair method and repair the dampness as per the investigation report.	within 6 months
Building-2		
Lack of retrofitting material test report. (Building 2)	The building engineer is required to submit the design documents to the RSC for further review to justify the capacity of foundation, column, and beam & slab against the lateral & vertical loading. Also, verify the retrofitting material strength either from cylinder test report or by taking cores from retrofitted member.	within 6 weeks
	Carry out suggested remedial works if required.	within 6 months
Dampness on column and brick wall. (Building 2)	The building engineer is required to identify the reason for the dampness and prepare an investigation report with the necessary repair method. Repair the dampness as per the investigation report.	within 6 months

Observation	Action Plan	Timeline
Building-3 (Store and Dining Building)		
Stress in column exceeds normal design limit. (Building-3: Store and Dining Building)	The building engineer is required to review the design, loads, and column stresses for the marked columns based on in-situ material strength.	within 6 weeks
	Carry out suggested remedial works if required.	within 6 months
Stress in pile foundation exceeds normal design limit. Building-3: Store and Dining Building)	The building engineer is required to review the design, loads and foundation stresses and prepare a remediation plan if required.	within 6 weeks
	Carry out suggested remedial works if required.	within 6 months
Storage live load limit does not comply with BNBC requirement. (Building-3: Store and Dining Building)	The Building Engineer is required to update the storage live load limit as per BNBC requirement, revise the structural analysis & design report accordingly.	within 6 weeks
	Produce and manage actively loading plans as per BNBC.	within 6 weeks
	Carry out suggested remedial works if required.	within 6 months
Hair line cracks in existing beams at multiple locations. (Building-3: Store and Dining Building)	The building engineer is required to identify the reason for the crack and prepare an investigation report with the necessary repair method.	within 6 weeks
	Implement remediation work as per crack investigation report.	within 6 months
Apparently Inadequate Joint of retrofitted beam. (Building-3: Store and Dining Building)	The building engineer is required to investigate and check the connections and load path of beams.	within 6 weeks
	Carry out suggested remedial works if required.	within 6 months
Storage rack without anchorage. (Building-3: Store and Dining Building)	The factory is required to adequately anchor and brace all non-structural elements to resist earthquake forces to comply with the BNBC.	within 6 weeks
Building-4		
Stress in pile foundation exceeds normal design limit. (Building 04)	The building engineer is required to review the design, loads and foundation stresses and prepare a remediation plan.	within 6 weeks

	Carry out suggested remedial works if required.	within 6 months
Load plan to be revised and posted. (Building-04)	Building engineer is required to revise the load plan as per BNBC requirement and check the design accordingly.	within 6 weeks
	Post and implement the accepted load plan on each floor.	within 6 weeks
Lack of material test report (Building-04).	The building engineer is required to provide rebar test report for 500 MPa and update the analysis & design report if required.	within 6 months
Hairline cracks in beams and horizontal hairline cracks in columns (Building-04)	The building engineer is required to identify the reason for the crack and prepare an investigation report with the necessary repair method.	within 6 weeks
	Repair the cracks as per the crack investigation report.	within 6 months
Design documents need to be revised (RC Emergency Exit Stair-2 of Building-4)	Building engineer is required to revise the design documents incorporating the live load as per BNBC requirement.	within 6 weeks
	Carry out suggested remedial works if required.	within 6 months
Lack of material test report (RC Emergency Exit Stair-2 of Building-4).	The building engineer is required to provide rebar test report for 500 MPa and update the analysis & design report if required.	within 6 months
Construction joint filled with mortar (RC Emergency Exit Stair-2 of Building-4)	Building engineer is required to investigate the area and fill the gap with a flexible material.	within 6 weeks
Building-5		
Storage live load limit does not comply with BNBC requirement. (Building-5)	The Building Engineer is required to update the storage live load limit as per BNBC requirement, revise the structural analysis & design report accordingly.	within 6 weeks
	Produce and manage actively loading plans as per BNBC.	within 6 weeks
	Carry out suggested remedial works if required.	within 6 months
Crack on brick wall. (Building-5)	The building engineer is required to identify the reason for the crack for all locations of the building and prepare an investigation report with the necessary repair method.	within 6 weeks
	The factory is required to repair the crack as per the crack investigation report.	within 6 months

Building-6		
Lack of design documents (Building-6)	The building engineer is required to survey the whole structure and prepare the as-built drawings and design report.	within 6 weeks
Building-7		
Mismatch in structural drawing (Building-7)	The building engineer is required to survey the whole structure and prepare the as-built drawings.	within 6 weeks
Hairline crack on the soffit of roof beam & slab (Building-7)	The building engineer is required to identify the reason for the crack and prepare an investigation report with the necessary repair method. Repair the crack as per the suggestion of crack investigation report.	within 6 weeks
Building-8		
Lack of as-built drawing (Building-8)	The building engineer is required to survey the whole structure and prepare the as built drawings as per site condition.	within 6 weeks
Building-9		
Mismatch between drawing and on-site condition (Building-9).	The building engineer is required to survey the whole structure and update the as built drawings as per site condition.	within 6 weeks
Building-10		
Horizontal extension not reflected in the drawing. (Building-10)	The building engineer is required to survey the whole structure and update the as built drawings as per site condition.	within 6 weeks
Building-11		
Lack of as-built drawing (Building-11)	The building engineer is required to survey the whole structure and update the as built drawings as per site condition.	within 6 weeks
Shed-1		
Design check required against lateral forces. (Shed-1)	Revise the design documents based on in-situ material strength and submit to the RSC for review.	within 6 weeks
	Carryout required remedial works.	within 6 months
Undocumented steel stair. (Shed-1)	The building engineer is required to survey the whole structure and update the as built drawings as per site condition.	within 6 weeks

Shed-2		
Lack lateral stability. (Shed-2)	The building engineer is required to survey the structure, prepare as-built drawings, check the stability of the structure, and submit the documents to the RSC.	within 6 weeks
	Carryout required remedial works.	within 6 months
Shed-3		
Apparently inadequate lateral stability and member sizes. (Shed-3)	The building engineer is required to survey the structure, prepare as-built drawings, check the stability of the structure, and submit the documents to the RSC.	within 6 weeks
	Carryout required remedial works.	within 6 months
Shed-4		
Undocumented steel fire pump shed. (Shed-4)	The building engineer is required to survey the structure, prepare as-built drawings, check the stability of the structure, and submit the documents to the RSC.	within 6 weeks
	Carryout required remedial works.	within 6 months
Shed-5		
Non-engineered bamboo shed. (Shed-5)	The building engineer is required to suggest necessary alternatives for the structure.	within 6 weeks
	Carryout required remedial works.	within 6 months