Refat Garments Ltd (Extended Building)

144, 147-148 East Narashinghapur, Ashulia, Savar, Dhaka, Bangladesh.
(23.92998N, 90.30381E)
1st June & 5th September 2021

RSC RMG SUSTAINABILITY COUNCIL

Buildings Information

1. Main Building (G+5)
2. New Child Care Building (single storied)
3. Fire Pump House (single storied)
4. Water Pump Room (single storied)
5. Fire Control Room and Folder House (single storied)
6. Compressor Building (G+1)
7. Dust Room (single storied)

Observations

Prepared Design Report to be revised.

Observation: Main Building

Live Loads
Live load has been considered in two types

a) Live load for 1st to 5th floors has been considered as 125psf; 100psf and 80psf partialportions of 2nd to 5th floor; and also 30 psf for roof.

b) Over Head Water-Tank with full of water has been considered as live load at the located places.

Wind Load:
The calculation of wind loads conforms to Sub-clause 2.4, Chapter 2, Part 6 of BNBC. The following equation will be used to calculate sustained wind pressure of various buildings.

$q_z = C_c C_1 C_2 V_b^2$

Where, q_z= Sustained Wind Pressure at height z, KN/m^2

C_c = Velocity to Pressure conversion coefficient = 47.2×10^{-6}

C_1= 1.0 (Structural importance coefficient given in Table 6. 2. 9 of BNBC)

C_2= Combined height and exposure coefficient given in Table 6. 2. 10 of BNBC.

V_b= 210 km/hr. (Basic wind speed at Dhaka, given in Table 6. 2. 8 of BNBC)

The design wind pressure $P_z$for a structure or an element of a structure at any height, z above mean ground level shall be determined from the relation:

$P_z = C_g C_p q_z$

Where, P_z= Design wind pressure at height z, KN/m^2
C_g = Gust coefficient which shall be $G_z G_h$ or G as set forth in Sec 2.4.6.6 of BNBC.
C_p=Pressure coefficient for structure or components as set forth Sec 2.4.6.7 of BNBC
Q_z=Sustained wind pressure as defined above
Method 1 (Surface Area Method) in Section 2.4.6.4, Part 6 of BNBC is adopted for the calculation of design wind loads.

Input Parameter Calculation for Leeward for Wind Load for this Project:

Wind spood 131 mph.
For Leeward direction (for X-axis)-
Ratio of L/B= 212.5 ft./194.34 ft. =1.09
External pressure coefficient C_{pe} for wall Leeward direction (for X-axis) = 0.5
[Ref. Figure -6.2.5, BNBC-2006]
For Leeward direction (for Y-axis)-
Ratio of L/B= 194.34 ft. / 212.5 ft. = 0.91
External pressure coefficient C_{pe} for wall Leeward direction (for Y-axis) = 0.59
[Ref. Figure -6.2.5, BNBC-2006]

Earthquake/ Seismic Load:

The calculation of earthquake loads conforms to Sub-clause 2.5, Chapter 2, and Part 6 of BNBC.

Dynamic Response Method (Section 2.5.7, Part 6, and BNBC) is adopted to calculate seismic lateral forces.

The total design base shear is calculated from the following equation.

$$V = \frac{ZIC}{R}W$$

Where,

Z = 0.15 (Seismic zone coefficient given in Fig. 6.2.10 of BNBC)

I =1.0 (Structural importance coefficient given in Table 6. 2. 23 in BNBC)

R = 8 (Response modification coefficient for intermediate moment resisting frame given in Table 6.2.24 of BNBC)

W =Total seismic dead load in KN.

C =Numerical coefficient given by the following relation

$$C = \frac{1.25S}{T^{2/3}}$$

Where,

S =1.5 (Site coefficient for soil characteristics as provided in Table 6.2.25 of BNBC).

E. Load Combination:

R.C Structural members will be designed to have strength not less than that required resisting the most unfavorable effect of the combinations of the factored loads shown below.

1. 1.4D
2. 1.4D + 1.7L
3. 1.05D + 1.275L + 1.275W
4. 1.05D + 1.275L + 1.4025E

(Ref. BNBC, Part 6, sec. 2.7.5)

However for foundation design (e.g., number of piles) following load combination shall be considered.

1. D + L
2. D + L + (W or E)

(Ref. BNBC, Part 6, sec. 3.7)

Where,

D = Dead Load
L = Live Load
W = Wind Load
E = Earthquake Load

Loading parameter for lateral load

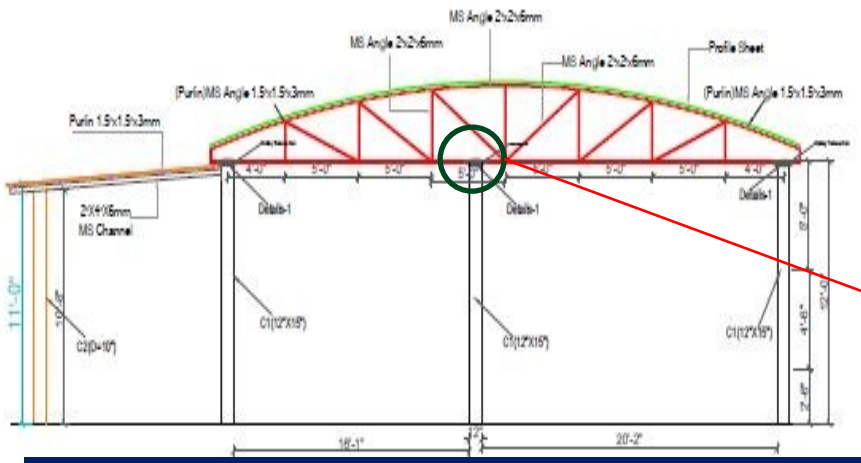
Load combinations

A Design Report is prepared including design parameters for wind and seismic loads. However, no detail calculation has been provided for wind and seismic loads. Also, all the load combinations from BNBC part-6 are not considered in Design Report. Factory engineer is required to include detailed wind and seismic load calculations/analysis output, all load combinations, stability check for all structural members and update the Design Report in compliance with the BNBC (section 1.9.1 of part-6).

Observation: Main Building

Lack of lateral stability

Poor connection details



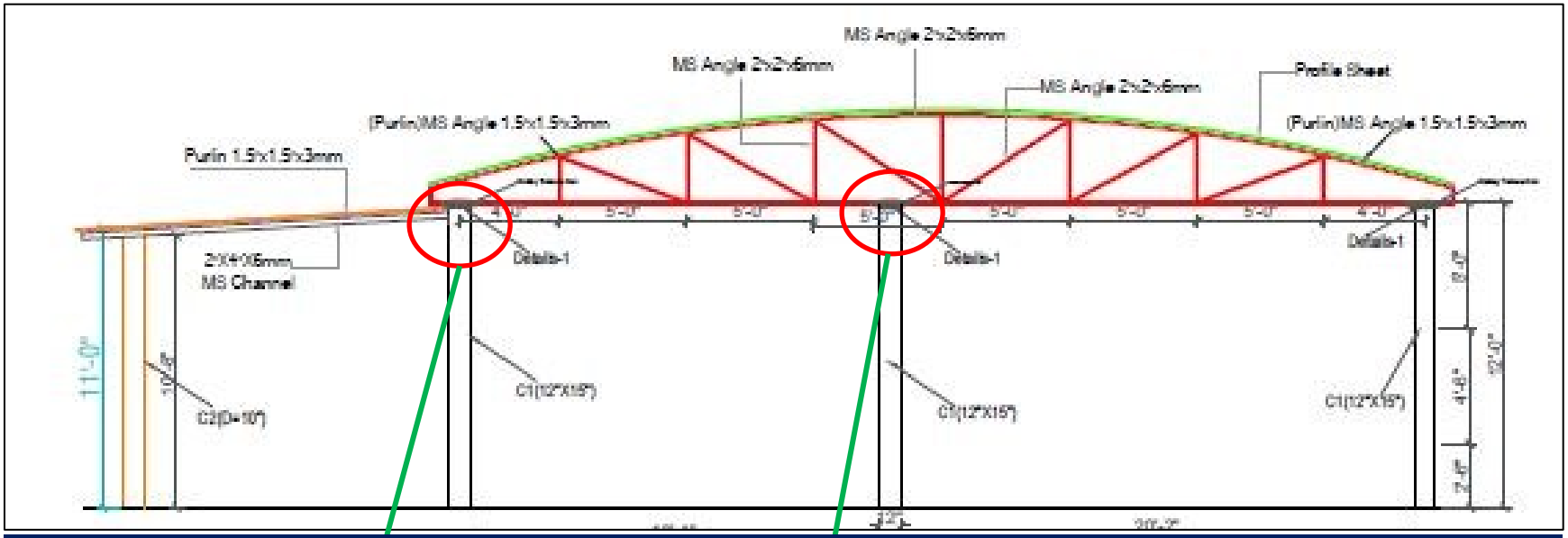
Load path not clear

The steel roof shed made of steel truss section which is supported by RC column and brick wall in both direction. No horizontal bracing members are available for lateral stability. Apparently Inadequate structural member, poor connection details found and unclear load path. Building engineer is required to check the adequacy of the steel members & connection for uplift and lateral forces otherwise replace with engineered structure.

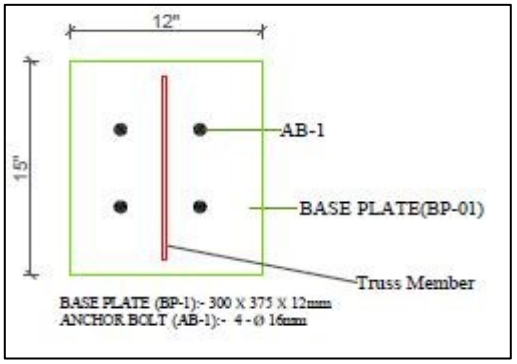
Observations: New Child Care Building

Discrepancies in as-built drawings

Observation: New Child Care Building



Sectional Detail of Truss

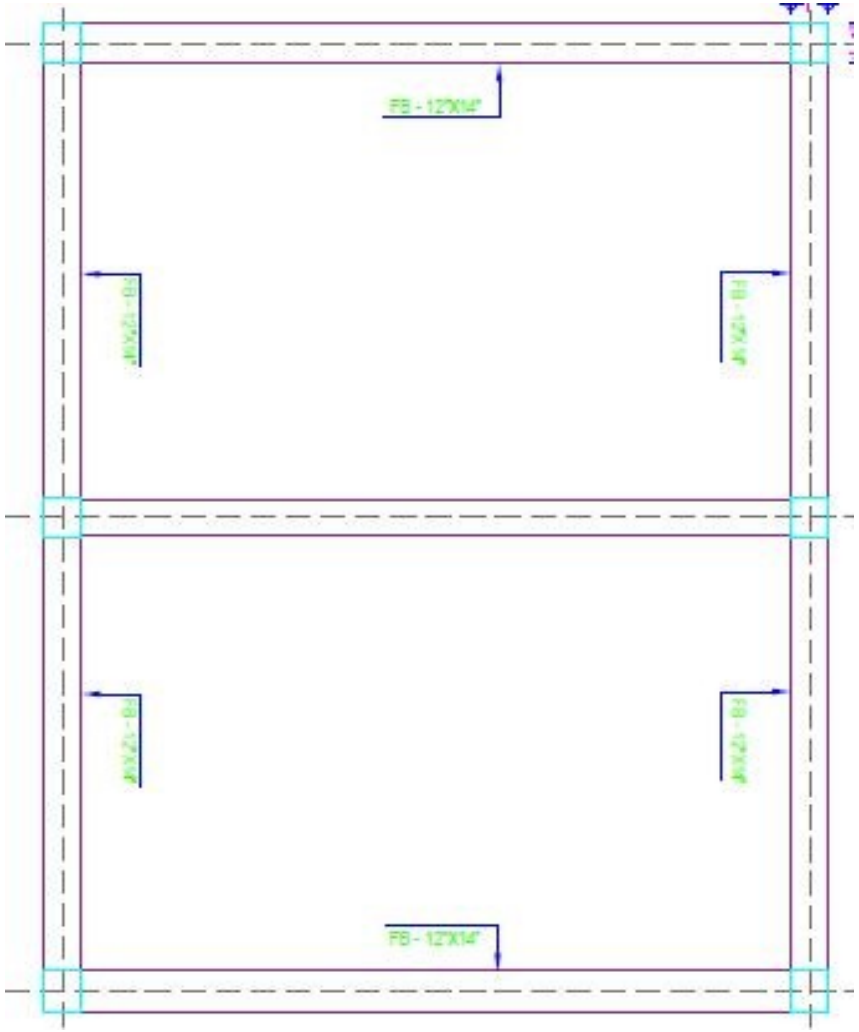


There were double angle in bottom chord which was not mentioned in as-built drawing. Also, Connection detail between column and truss was shown bolted with base plate which was found welded. C-channel was connected with brick wall not with RC column (as per provided drawing). Factory engineer to survey the structure and update as-built drawings for the structure.

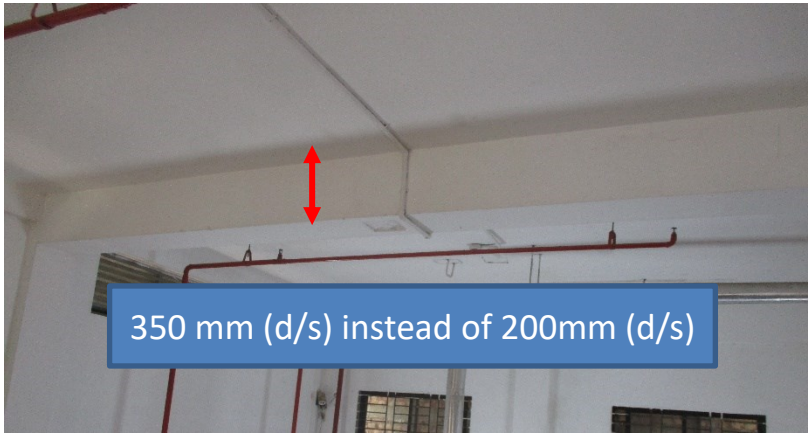
Observation: New Child Care Building

Discrepancies in as-built drawings

Observation: Fire Pump House



Beam layout



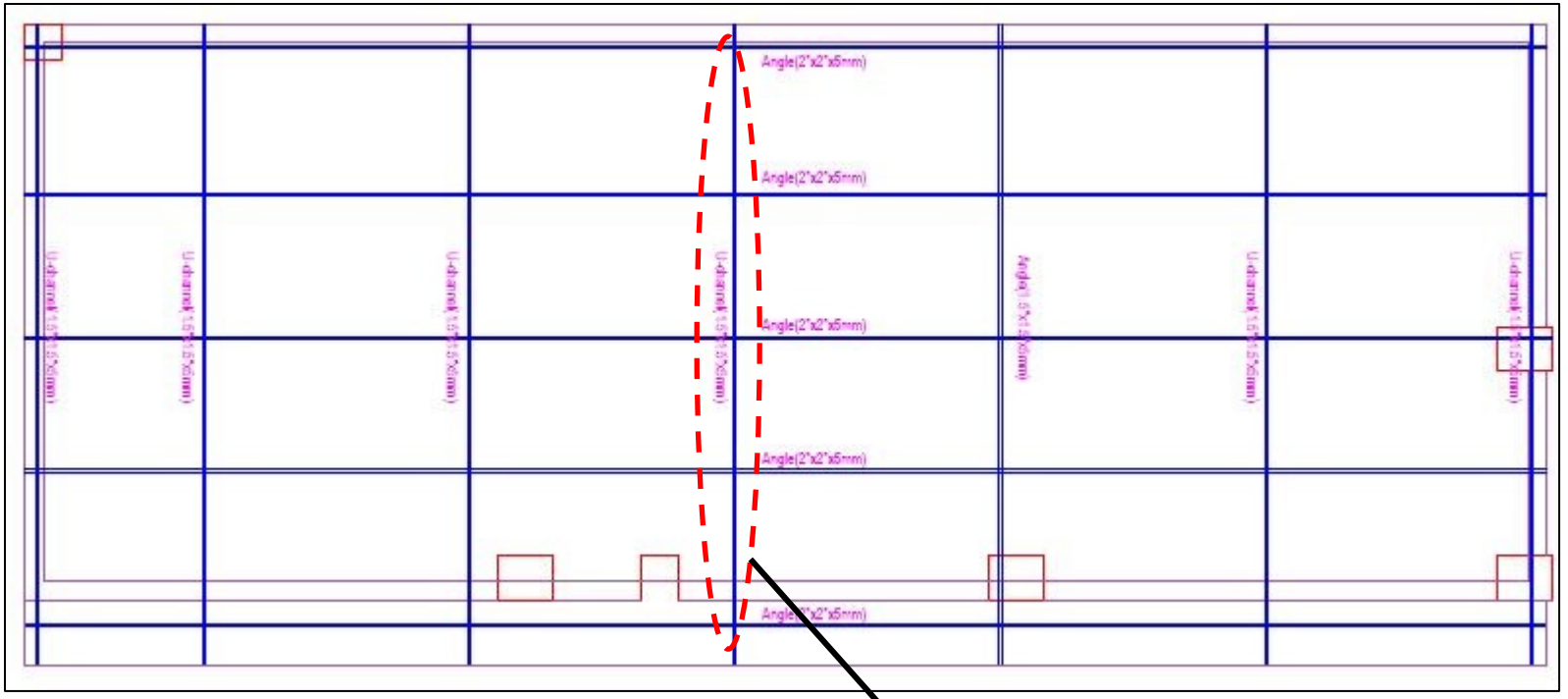
Undocumented steel stair

Beam size found 250 X 350 mm (d/s) instead of 250 X 200 mm (d/s) in transverse direction. Undocumented steel stair not mentioned in as-built drawing. Factory engineer to survey the structure and update as-built drawings for the structure.

Observation: Fire Pump House

Discrepancies in as-built drawings

Observation: Water Pump Room



Roof truss layout

C channel size was found 38x75x5 mm instead of 38x38x5 mm. Factory engineer to survey the structure and update as-built drawings for the structure.

Observation: Water Pump Room

Apparently Non-engineered shed

Observations: Water Pump Room

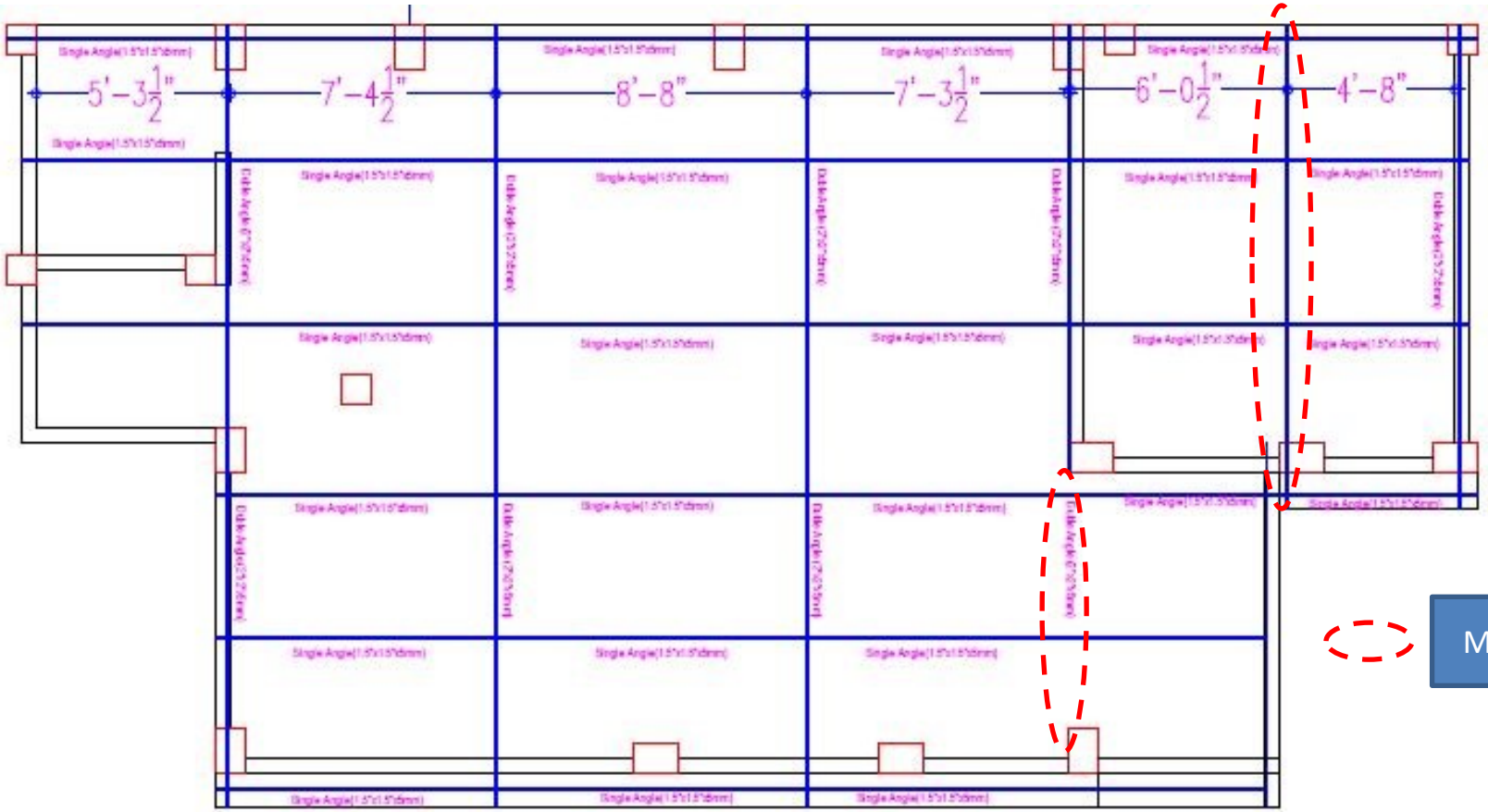
Apparently inadequate structural members

Apparently Inadequate structural member, poor connection details found. Building engineer is required to check the adequacy of the steel members & connection for uplift and lateral forces otherwise replace with engineered structure.

Observations: Water Pump Room

Discrepancies in as-built drawings

Observation: Fire Control Room & Folder House



Roof truss layout

Marked members were missing in the provided drawing. Factory engineer to survey the structure and update as-built drawings for the structure.

Observation: Fire Control Room & Folder House

Apparently Non-engineered shed

Observations: Fire Control Room & Folder House

Poor connection details

Apparently inadequate structural members

Apparently Inadequate structural member, poor connection details found. Building engineer is required to check the adequacy of the steel members & connection for uplift and lateral forces otherwise replace with engineered structure.

Observations: Fire Control Room & Folder House

Lack of design documents

Observation: Compressor Building

As per BNBC Section 1.9.1, every structure should have design documents.

There is no design documents for above mentioned structures. So, the factory engineer is required to prepare a set of design report as per BNBC part-6, section 1.9.1.1

Observation: Compressor Building

Undocumented steel stair

Observation: Compressor Building

Undocumented Steel Stair found at East corner of the compressor building. No as-built drawing was found. The factory engineer is required to prepare as-built drawing and check the structural integrity for the steel stair.

Observation: Compressor Building

Priority Actions

Problems Observed

Building-1 (Main Building):

Item-01: Prepared Design Report to be updated

New Child Care Building:

Item-02: Lack of lateral stability

Item-03: Discrepancies in as-built drawings

Fire Pump House:

Item-04: Discrepancies in as-built drawings

Water Pump Room:

Item-05: Discrepancies in as-built drawings

Item-6: Apparently Non-engineered shed

Fire Control Room & Folder House:

Item-07: Discrepancies in as-built drawings

Item-08: Apparently Non-engineered shed

Compressor Building:

Item-09: Lack of design documents

Item-10: Undocumented steel stair

Item No.	Observation	Recommended Action Plan	Recommended Timeline
01	Prepared Design Report to be updated (Main Building)	Factory engineer is required to update the Design Report in compliance with the section 1.9.1 of BNBC part-6.	6-weeks
02	Prepared Design Report to be updated (Main Building)	Implement remediation as outcome of Design Report (if required).	6-months
03	Lack of stability. (New Child Care Building)	Factory engineer is required to check the stability of the structure and prepare engineering assessment (EA) for the in compliance with section 1.9.1.1 (part-6, BNBC).	6-weeks
04	Lack of stability. (New Child Care Building)	Implement remedial work if required.	6-months

Item No.	Observation	Recommended Action Plan	Recommended Timeline
05	Discrepancies in as-built drawings. (New Child Care Building)	Factory engineer is required to survey the whole structure and prepare “as constructed” drawings (Architectural & Structural), in compliance with section 1.9.1.2 as per BNBC 2006.	6-weeks
06	Discrepancies in as-built drawings. (Fire Pump House)	Factory engineer is required to survey the whole structure and prepare “as constructed” drawings (Architectural & Structural), in compliance with section 1.9.1.2 as per BNBC 2006.	6-weeks
07	Discrepancies in as-built drawings. (Water Pump Room)	Factory engineer is required to survey the whole structure and prepare “as constructed” drawings (Architectural & Structural), in compliance with section 1.9.1.2 as per BNBC 2006.	6-weeks
08	Apparently Non-engineered shed. (Water Pump Room)	Factory engineer is required to check the adequacy of the steel members and prepare engineering assessment (EA) for the in compliance with section 1.9.1 (part-6, BNBC).	6-weeks

Item No.	Observation	Recommended Action Plan	Recommended Timeline
09	Apparently Non-engineered shed. (Water Pump Room)	Implement remedial work if required.	6-months
10	Discrepancies in as-built drawings. (Fire Control Room & Folder House)	Factory engineer is required to survey the whole structure and prepare “as constructed” drawings (Architectural & Structural), in compliance with section 1.9.1.2 as per BNBC 2006.	6-weeks
11	Apparently Non-engineered shed. (Fire Control Room & Folder House)	Factory engineer is required to check the adequacy of the steel members and prepare engineering assessment (EA) for the in compliance with section 1.9.1 (part-6, BNBC).	6-weeks
12	Apparently Non-engineered shed. (Fire Control Room & Folder House)	Implement remedial work if required.	6-months

Item No.	Observation	Recommended Action Plan	Recommended Timeline
13	Lack of design documents. (Compressor Building)	Building engineer to prepare the Design Report for the full structure, in compliance with section 1.9.1.1 as per BNBC.	6-weeks
14	Lack of design documents. (Compressor Building)	Implement remedial work if required.	6-months
15	Undocumented steel stair. (Compressor Building)	Building engineer is required prepare as-built drawings, check the structural stability for the steel stair and incorporate in design report, in compliance with section 1.9.1.1 as per BNBC.	6-weeks
16	Undocumented steel stair. (Compressor Building)	Implement remedial work if required.	6-months