

Al-Muslim Washing Ltd. & Al-Muslim Garments Accessories Ltd.

14 No. Gedda, Karnapara, Ulail, Savar.
(23.8276, 90.2586)

24th February & 29th March 2021



Buildings Information

1. Building-1 (B+G+2)
2. Building-2 (G+3)
3. Building-3 (G+2)
4. Building-4 (G+1)
5. Shed 1 (Single Storied)
6. Shed 2 (Single Storied)
7. Shed 3 (Single Storied)
8. Shed 4 (Single Storied)
9. Shed 5 (Single Storied)
10. Shed 6 (Single Storied)
11. Shed 7 (Single Storied)
12. Shed 8 (Single Storied)
13. Shed 9 (Single Storied)
14. Shed 10 (Single Storied)

Observations

Unavailable structural design report



Building 1



Building 2



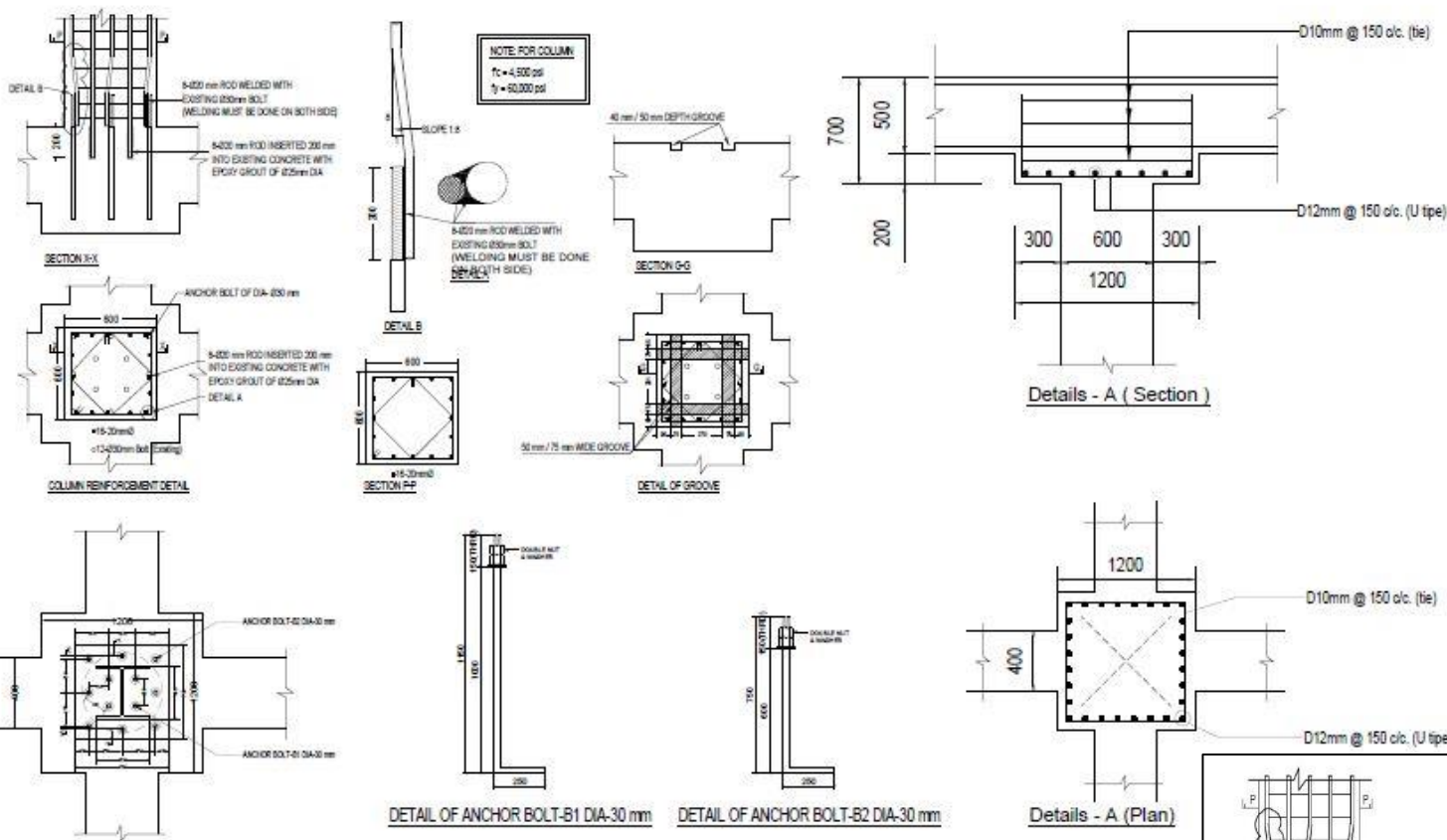
Building 3



Building 4

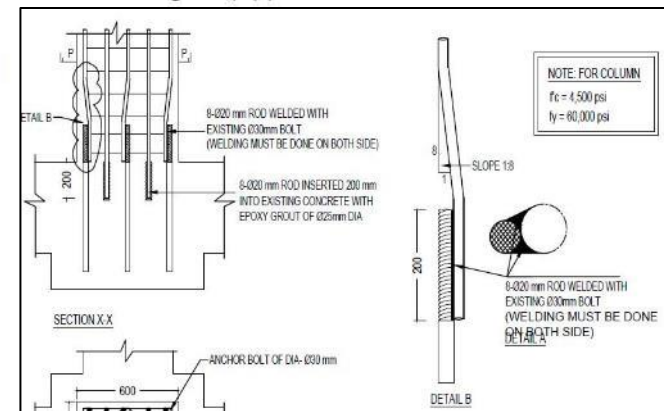
As per BNBC, building or structure shall have its design documents prepared in accordance with the provision of Section 1.9.1. The design document shall include a design report and a set of structural drawings which shall be prepared in compliance with section 1.9.1.1 and section 1.9.1.2 as per BNBC. The design report of the mentioned structures was not found which is required to be prepared in compliance with section 1.9.1.1 (part-6, BNBC).

Adequacy of the rebar anchorage need to be checked



Anchorage details of the rebar

Building was initially design for the steel shed but eventually it is constructed 4-storied RCC building. Main rebars are anchored with the royal bolts. Building engineer is required to check whether the main rebar from ground floor to top floors are sufficiently having development lengths and anchorages.



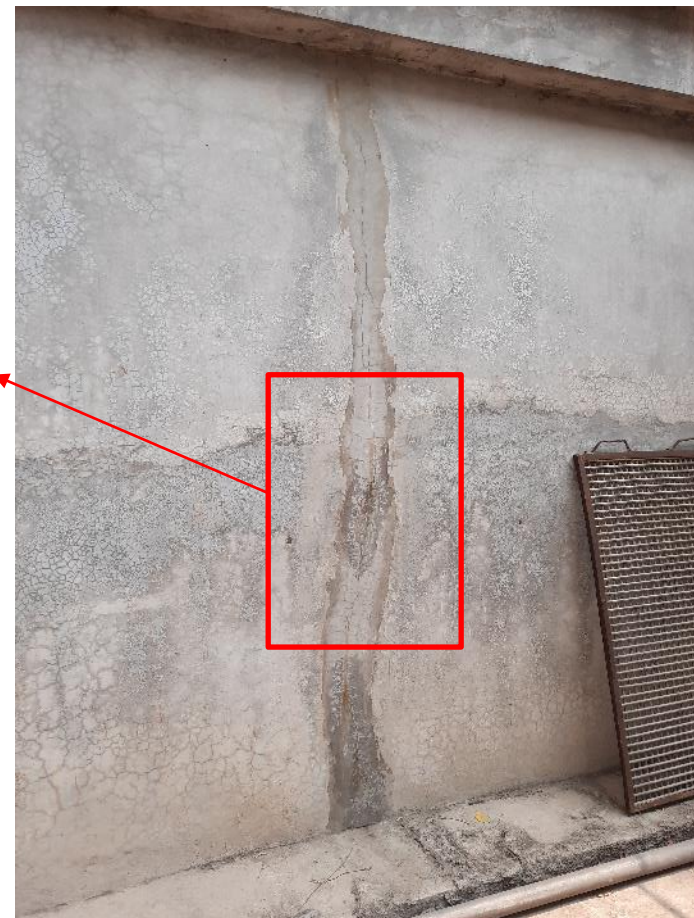
Development length of the main rebar

Water leakage & crack on the retaining wall

Observations: Building 2



Ground floor layout plan



Water seeping and formation of cracks



Formation of vertical cracks

Water seeping observed through the retaining walls. Building engineer is required to investigate the cause of the water ingress and check whether the retaining walls have sufficient structural capacity. Also check the extent & formation of the cracks.

Electrical cable hole on columns

Observations: Building 2



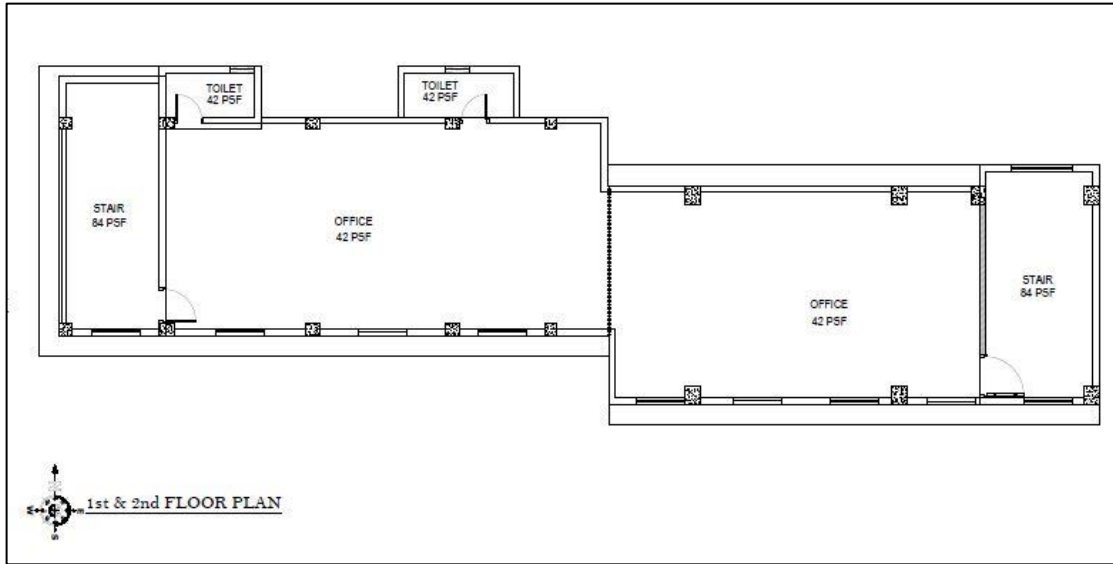
Electrical cable hole



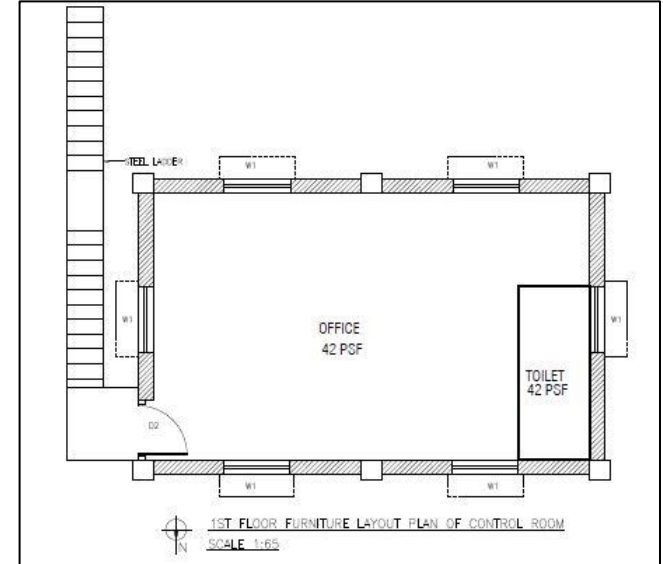
Hole of 250mm (L) X 80 mm (W) X 150 mm (T)

Electrical cables holes are made on columns. Building engineer to Investigate and report on this matter to verify the structural integrity of the columns are not compromised.

Load plan not comply BNBC



Floor load plan prepared considering 2 kPa (42 psf) for building 1



Floor load plan prepared considering 2 kPa (42 psf) for building 4

The load plan of building 1 & 4 was prepared as per the NTPA guideline. BNBC minimum floor loading not followed. Building engineer is required to prepare a load plan considering BNBC.

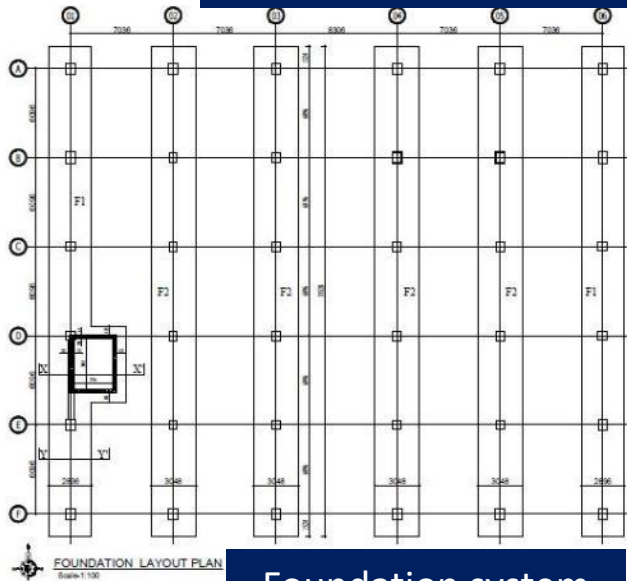
**Ground bearing capacity & foundation adequacy
to be reviewed**

Table-1: Allowable Bearing Capacity for shallow Foundation

Borehole No	Depth (m)	Cohesion, Ton/m ²	Allowable Bearing Capacity, Ton/m ²	
			Strip footing	Isolated column footing
BH-1	3.0	5.5	12.46	13.93
BH-2	3.0	3.5	7.93	8.86
BH-3	3.0	1.5	3.40	3.80
BH-4	3.0	1.5	3.40	3.80
BH-5	3.0	-	6.60	6.60
BH-6	3.0	2.0	4.53	5.06
BH-1	4.0	6.0	14.60	16.80
BH-2	4.0	3.0	7.30	8.40
BH-3	4.0	1.5	3.65	4.20
BH-4	4.0	2.0	4.86	5.60
BH-5	4.0	6.0	14.60	16.80
BH-6	4.0	2.0	4.86	5.60
BH-1	5.5	5.5	13.93	15.76
BH-2	5.5	3.0	7.60	8.60
BH-3	5.5	4.5	11.40	12.90
BH-4	5.5	8.5	21.53	24.36
BH-5	5.5	8.0	20.26	22.93
BH-6	5.5	3.0	7.60	8.60

- Notes:
1. The above values are net ones
 2. Skempton's Relation has been used for cohesive soil
Graphs were used for sandy soil
 3. B/L = 0 & B = 1.5m (assumed) for strip footing
B/L = 1 & B = 2.5m (assumed) for isolated column footing
 4. F.S. = 3
 5. Depth has been measured from EGL of Borehole

Ground bearing capacity table



Foundation system

4. LABORATORY TESTS

Samples in the disturbed and undisturbed state were taken to the laboratory for necessary tests. The following tests were performed:

- a) Grain size analysis, b) Moisture content, c) Specific Gravity, d) Atterberg limits, e) Density, f) Unconfined Compression test & g) Consolidation test.

5. EVALUATION OF BEARING CAPACITY

Bearing capacity has been determined for shallow as well as piled foundation. Also, allowable pile capacity for 500mm bored pile has been evaluated at different depths measured from EGL. The evaluated values have been provided in Table-1, Table-2 & Table-3.

6. CONCLUSION

Under this soil condition piled foundation would be required for the proposed building. We prefer bored cast in situ RCC pile. Estimated allowable capacity of such a pile of dia 500mm having tip level at 18.0m below EGL is around 60 tons per pile in compression which should be confirmed by load test results.

The designer would finally select the appropriate type, size and length of pile.

Handwritten signature

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Recommendation of geotechnical investigation report

The geotechnical investigation report recommends pile foundation. The foundation system of the building is combined footing. The ground bearing capacity for the isolated footing varies a lot for BH to BH (13.93 ton/m² to 3.8 ton/m², FS 3) in the geotechnical investigation report. If the lowest value considered the footings are found stressed above normal design limit. Building engineer is required to check the considered ground bearing capacity & foundation adequacy.

Apparently lack of lateral load resisting system



Apparently lack of lateral load resisting system was observed . Wall & roof bracings are not provided.
Building engineer is required to check the lateral load resisting system of the shed.

No-engineered extension at East side

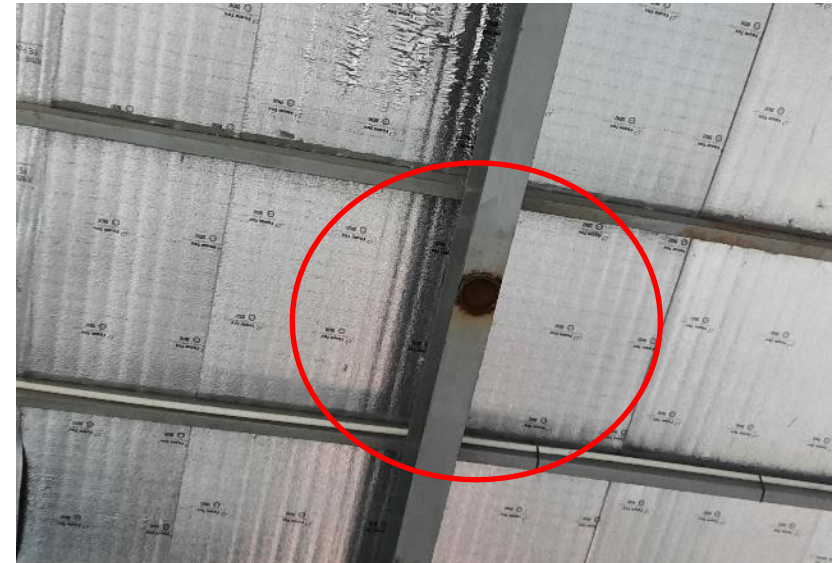


An extension of the shed was observed on the East side. The structural system of the extension is non-engineered. Building engineer is required check the structural integrity and adequacy of the non engineered extension of the shed.

Corroded purling & damaged rafter



Corroded roof purlin



Some damaged rafter observed

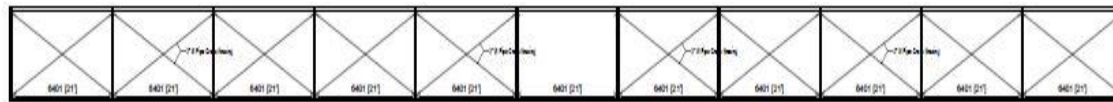
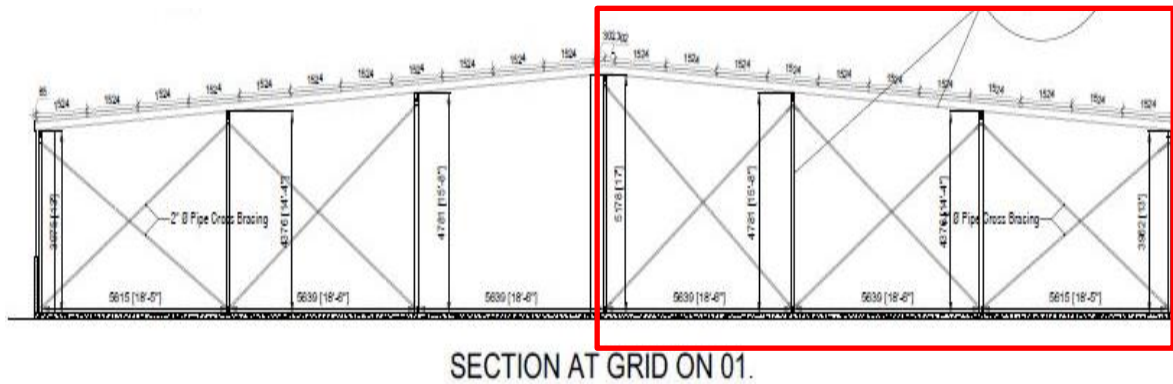
Inadequate structural member



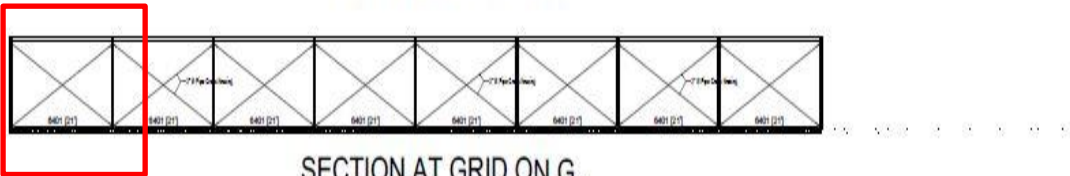
Apparently inadequate structural member observed for resisting vertical & lateral loading as per BNBC. Building engineer is required to check the lateral & vertical stability of the shed.

Steel "I" Joist Size(mm) F (100X6) W (150X4)
Rafter Size(mm) F (100X6) W (150X4)

Vertical bracing missing in several location



SECTION AT GRID ON A .



SECTION AT GRID ON G .



Vertical bracings in several location found missing.

Non-Engineered structure



Shed 3

Poor connection details



Inadequate structural members



Shed 4

Inadequate structural members

Poor connection details,
Inadequate structural members.
Apparently non-engineered shed.

Shed 6



Inadequate structural members

Shed 7



Inadequate structural members

Shed 10



Inadequate structural members

Poor connection details,
Inadequate structural members.
Apparently non-engineered shed.

Apparently lack of lateral load resisting system



Missing compression member in long direction



Cantilever portion of the shed not adequately connected

Apparently lack of lateral load resisting system was observed. Building engineer is required to check the lateral load resisting system of the shed.

Problems Observed

Building-1,2,3 & 4:

Item 1: Unavailable structural design report.

Building 2:

Item 2: Adequacy of the rebar anchorage need to be checked.

Item 3: Water leakage & crack on the retaining wall.

Item 4: Electrical cable hole on columns.

Building 1,4:

Item 5: Load plan not comply BNBC.

Building 3:

Item 6: Ground bearing capacity & foundation adequacy to be reviewed.

Shed 1:

Item 7: Apparently lack of lateral load resisting system.

Item 8: Non-engineered extension at East.

Item 9: Corroded purling & damaged rafter.

Shed 2:

Item 10: Inadequate structural member.

Item 11: Vertical bracing missing in several location.

Shed 3,4, 6,7, 10:

Item 12: Non-Engineered structure.

Shed 5:

Item 13: Apparently lack of lateral load resisting system.

Priority Actions

Item No.	Observation	Recommended Action Plan	Recommended Timeline
01	Unavailable structural design report. (Building 1, 2, 3 & 4)	Building engineer to prepare the design document including a design report and a set of structural drawings in compliance with section 1.9.1.1 and section 1.9.1.2 as per BNBC.	6-weeks
02	Unavailable structural design report. (Building 1, 2, 3 & 4)	Complete implementation of any remedial works deemed necessary by the design review.	6-months
03	Adequacy of the rebar anchorage needs to be checked. (Building 2)	Building engineer is required to check whether the main rebar from ground floor to top floors are sufficiently having development lengths and anchorages.	6-weeks
04	Water leakage & crack on the retaining wall. (Building 2)	Building engineer is required to investigate the reason of water seepage and prepare an investigation report with proper remedial actions.	6-weeks
05	Water leakage & crack on the retaining wall. (Building 2)	Check the structural adequacy of the retaining walls.	6-weeks

Item No.	Observation	Recommended Action Plan	Recommended Timeline
06	Water leakage & crack on the retaining wall. (Building 2)	Carry out remedial works where necessary.	6-months
07	Electrical cable hole on columns. (Building 2)	Building engineer to Investigate and report on this matter to verify the structural integrity of the columns are not compromised.	6-weeks
08	Electrical cable hole on columns. (Building 2)	Carry out remedial works where necessary.	6-weeks
09	Load plan not comply BNBC. (Building 1,4)	Building engineer is required to prepare live load plan as per BNBC.	6-weeks
10	Load plan not comply BNBC. (Building 1,4)	Produce and actively manage a loading plan for all floor plates within the factory Building considering floor, column and foundation capacity.	6-weeks

Item No.	Observation	Recommended Action Plan	Recommended Timeline
11	Load plan not comply BNBC. (Building 1,4)	Continue to implement floor loading plan.	6-months
12	Ground bearing capacity & foundation adequacy to be reviewed. (Building 3)	Building engineer is required to check the considered ground bearing capacity.	6-weeks
13	Ground bearing capacity & foundation adequacy to be reviewed. (Building 3)	Building engineer is required to check the adequacy of the foundation system.	6-weeks
14	Ground bearing capacity & foundation adequacy to be reviewed. (Building 3)	Carry out remedial works where necessary.	6-months
15	Apparently lack of lateral load resisting system. (Shed 1)	Building engineer is required to check the lateral load resisting system of the shed.	6-weeks

Item No.	Observation	Recommended Action Plan	Recommended Timeline
16	Apparently lack of lateral load resisting system. (Shed 1)	Carry out remedial works where necessary.	6-months
17	Non-engineered extension at East. (Shed 1)	Check the structural integrity and adequacy of the non-engineered extension of the shed.	6-weeks
18	Non-engineered extension at East. (Shed 1)	Carry out remedial works where necessary.	6-months
19	Corroded purling & damaged rafter. (Shed 1)	Remove rust from the corroded purlin and apply rust proofing.	6-weeks
20	Corroded purling & damaged rafter. (Shed 1)	Building engineer is required investigate the damage rafter and suggest a suitable repair method.	6-weeks

Item No.	Observation	Recommended Action Plan	Recommended Timeline
21	Inadequate structural member. (Shed 2)	Building engineer is required to check the adequacy of the structural members for lateral & vertical stability.	6-weeks
22	Inadequate structural member. (Shed 2)	Carry out remedial works where necessary.	6-months
23	Vertical bracing missing in several location. (Shed 2)	Install the missing bracing.	6-weeks
24	Non-Engineered structure. (Shed 3,4,6,7 & 10)	Building engineer is required to check the adequacy of the sheds for gravity and lateral forces. or Replace with the engineered sheds.	6-weeks
25	Non-Engineered structure. (Shed 3,4,6,7 & 10)	Carry out remedial works where necessary.	6-months

Item No.	Observation	Recommended Action Plan	Recommended Timeline
26	Apparently lack of lateral load resisting system. (Shed 5)	Building engineer is required to check the lateral load resisting system of the shed.	6-weeks
27	Apparently lack of lateral load resisting system. (Shed 5)	Carry out remedial works where necessary.	6-months