Murad Apparels Ltd (Extension)

South Gouripur Ashulia,Savar,Dhaka-1341
(23.884214, 90.315284)
21-Sep-2023

RSC RMG SUSTAINABILITY COUNCIL

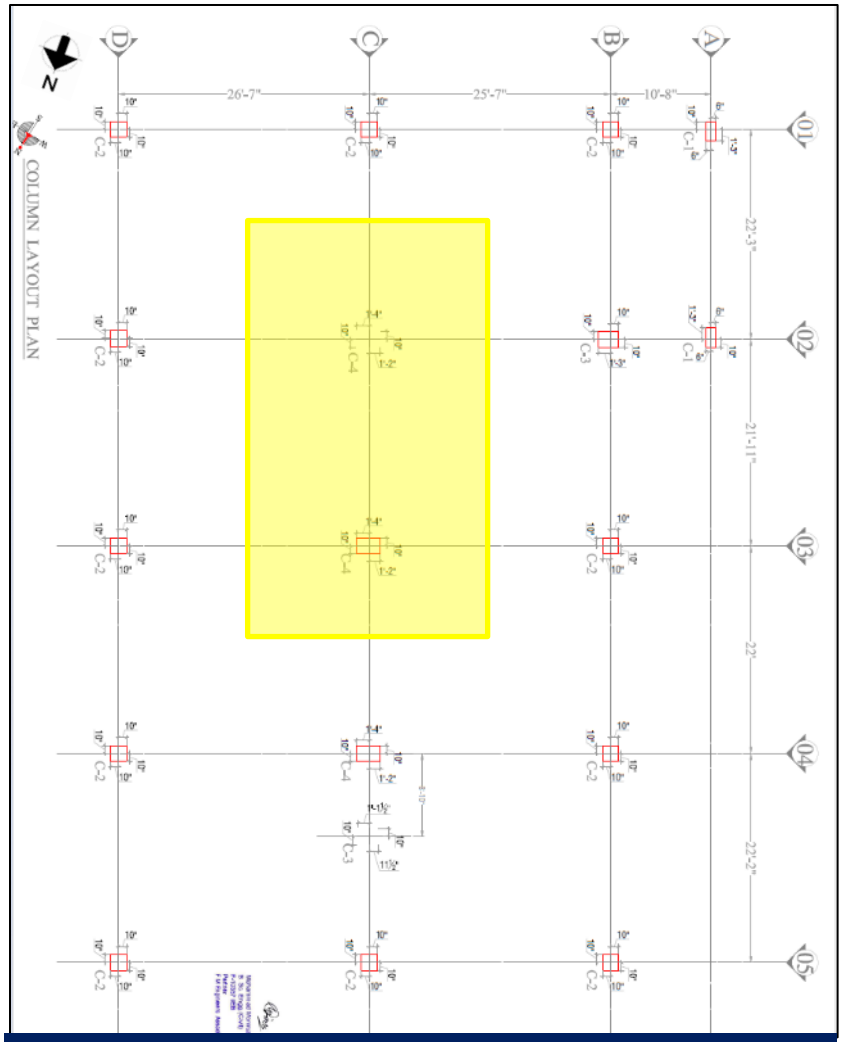
Buildings Information

1. Godown Building -1 (G+5)
2. Godown Building-2 - single storied. Proposed for four-storied (G+3)
3. RMS Room- single storied

Observations

Stress in column exceeds normal design limit

Observation: Godown Building-1



Stressed columns in layout (yellow marked)

Typical stressed columns

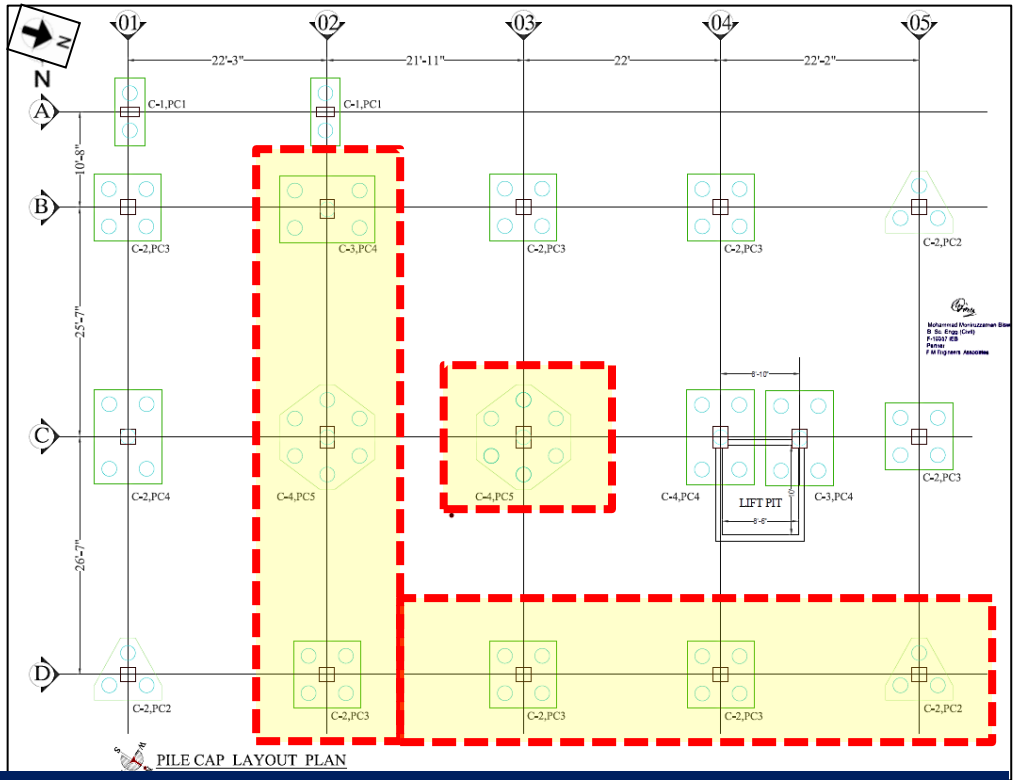
The cursory calculation indicates that column stress exceeds the normal design limit considering a typical floor live load of 6kPa, roof live load of 1.5 kPa, and concrete strength of 16.31 MPa.

The building engineer is required to review the design, loads, and column stresses for the marked columns based on in-situ material strength.

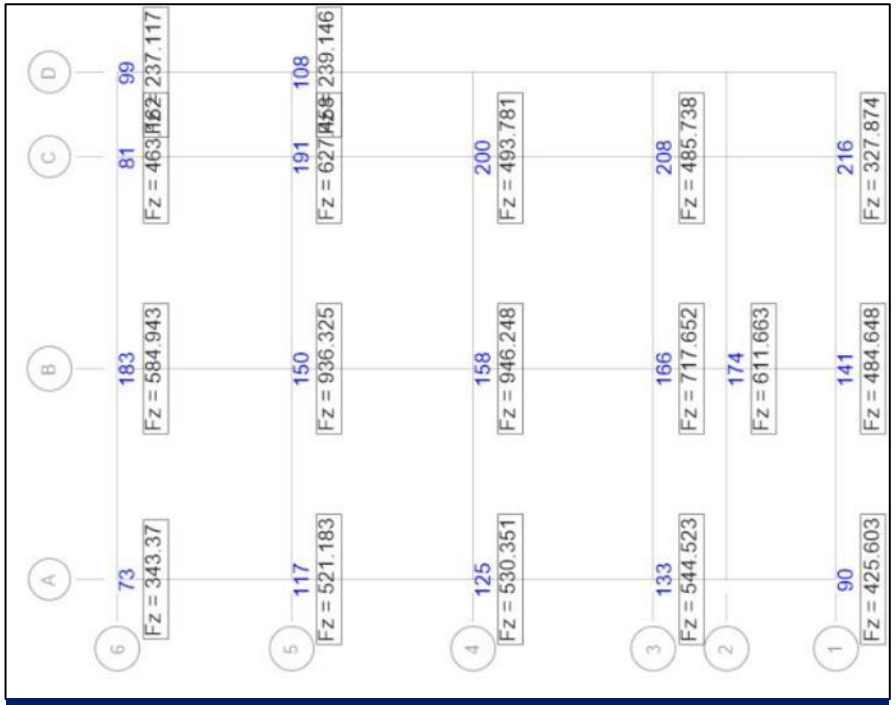
Observations: Godown Building-1

Stress in pile foundations exceed normal design limit

Observation: Godown Building-1



Pile layout plan



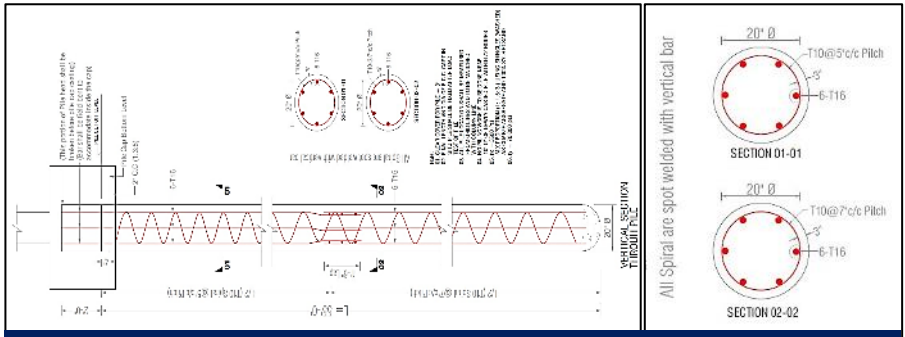
Base Joint load from E-tabs. (DL+LL)

R. C. C. CAST-IN-SITU PILE: (For all borings).

The average bearing capacities (F. S.= 2.5) of different diameter pile with the embedment length up to 55ft from EGL of each boring may be considered as follows:

- 41 Ton for 16 inch dia pile.
- 51 Ton for 18 inch dia pile.
- 62 Ton for 20 inch dia pile.

Allowable pile capacity from Soil Test report



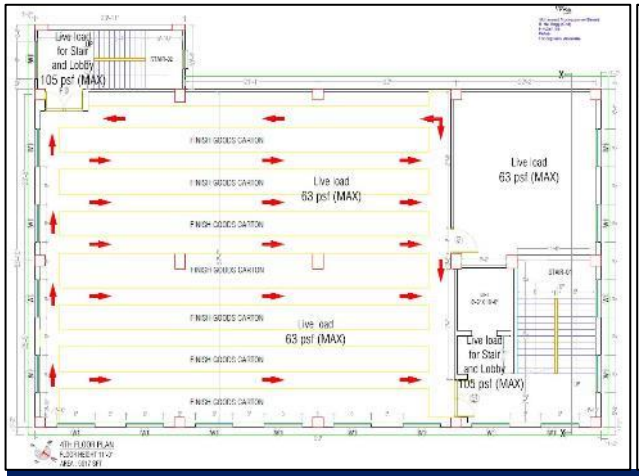
The pile length- 55ft and pile dia- 20 inch.

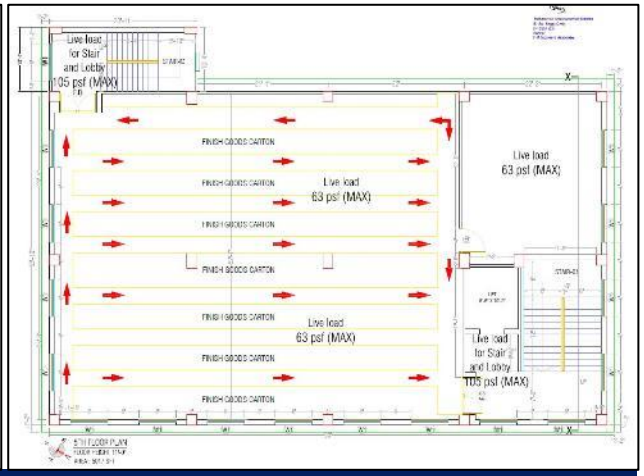
Cursory calculation indicates that Factor of Safety of some pile foundations below the allowable limit considering pile capacity from the soil test report and 6 kPa (63psf) live load on for storage. Building engineer is required to review the design load and stress in the pile foundations.

Observation: Godown Building-1

Live load consideration and assignment

Observation: Godown Building-1

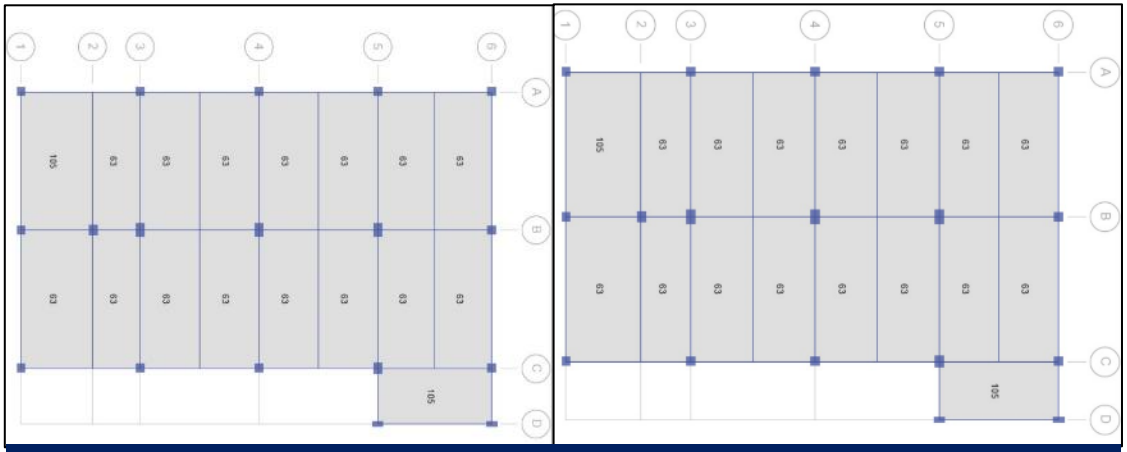




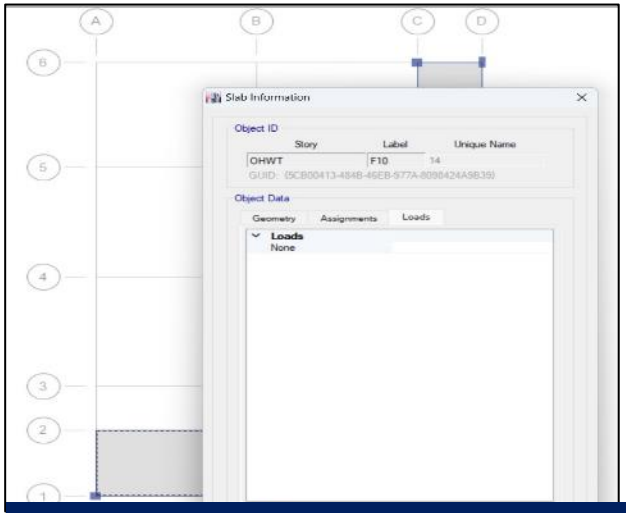
Prepared load plan for 4th and 5th floors. Floor loading has been considered 3kPa (63 psf) instead of 6kPa (125 psf) for storage areas.

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
		heavy	12.0 / 9.0 (5)
		ice	15.0 / 9.0 (5)
		5 Printing plant :	
		Press room	7.0 / 11.0 (5)
		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

Live load Table- BNBC 2006



Loading at 4th & 5th Floor loading has been assigned 3 kPa (63 psf) in FEA model instead of 6kPa (125 psf).



The stair roof top loading has not been assigned in FEA model.

As per BNBC, 6 kPa is required to consider as floor loading for the light storage facilities. During inspection, load plan was found posted considering (63 psf) 3kPa at 5th floor. Revise the software-based analysis model, Engineering Assessment (EA) report and load plan following BNBC requirements.

Observations: Godown Building-1

Non-structural elements not anchored or braced

Observation: Godown Building-1

Rack on floor level

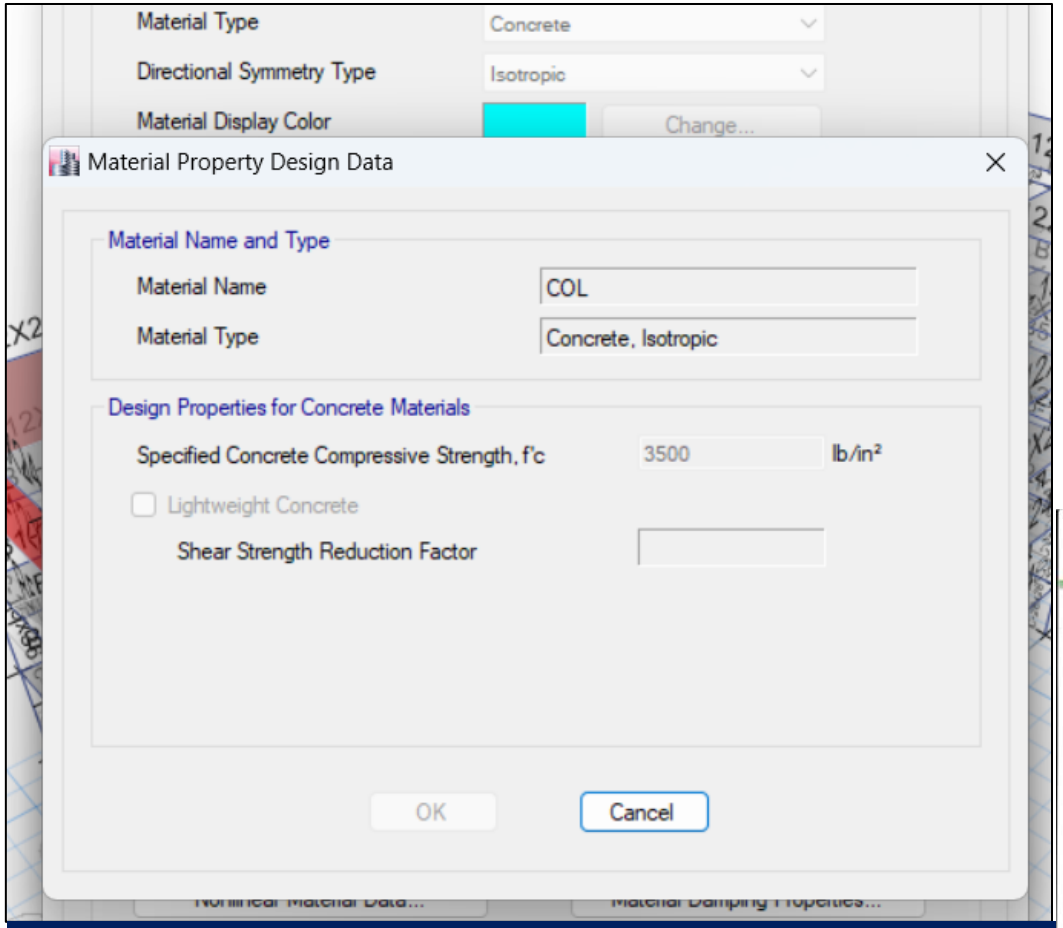
Racks on different floors are not adequately anchored or braced to resist lateral (earthquake) forces.

Building is required to adequately anchor and brace all non-structural elements to resist earthquake forces to comply with the BNBC.

Observation: Godown Building-1

Detail Engineering Assessment (DEA) needs to be performed before Future Vertical Extension

Observation : Godown Building-2

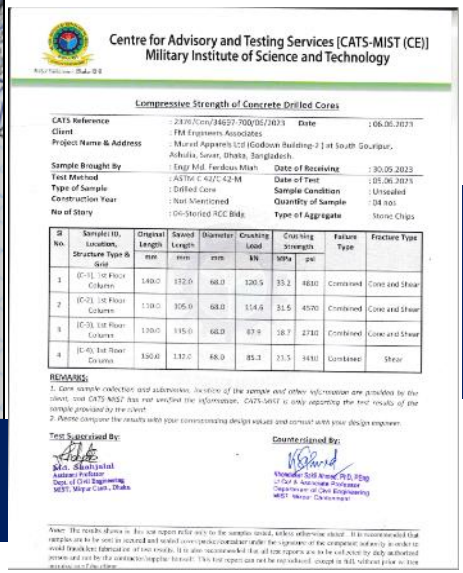


In software analysis, the concrete strength of columns considered f'c=3500 psi.

1.4 Material Specifications

Type	Capacity
RCC Column	3500 psi
RCC Beam Slab	3000 psi
Reinforcement	72,500 psi
Soil Bearing Capacity	2.5 ksf (F.S-2.5)

In report concrete strength of column has been considered f'c=3500 psi.



Centre for Advisory and Testing Services [CATS-MIST (CE)]
Military Institute of Science and Technology

Compressive Strength of Concrete Drilled Cores

Sl No.	Sample ID, Location, Structure Type & Grid	Original Length mm	Sawed Length mm	Diameter mm	Crushing Load kN	Crushing Strength MPa	Crushing Strength psi	Failure Type	Fracture Type
1	(C-1), 1st Floor Column	140.0	132.0	68.0	120.5	33.2	4810	Combined	Cone and Shear
2	(C-2), 1st Floor Column	130.0	105.0	68.0	114.6	31.5	4570	Combined	Cone and Shear
3	(C-3), 1st Floor Column	120.0	115.0	68.0	67.9	18.7	2710	Combined	Cone and Shear
4	(C-4), 1st Floor Column	130.0	132.0	68.0	85.3	23.5	3410	Combined	Shear

REMARKS:

Compressive strength of concrete cores are 4810 Psi, 4570Psi, 2710 Psi, 3410 Psi

Building engineer has taken the concrete core from the column. The equivalent concrete strength was found 2739 psi following ACI-562 and considering ACI-214 correction the equivalent concrete strength was found 3068 psi which is below the design strength 3500 psi. Building engineer is required to perform a detailed engineering assessment considering the equivalent concrete strength of the column concrete core.

Observation : Godown Building-2

Lack of edge protection

Observation: Godown Building-2

Missing railing at stair

Parapet wall missing at roof

During the inspection, Edge protection (Parapet wall/Railing) was not observed on the roof and stairs. Building is required to provide edge protection to avoid falling hazards.

Observation: Godown Building-2

Exposed re-bar at roof

Observation: Godown Building-2

Exposed rebar of Column

Exposed reinforcement was found on rooftop columns. Building engineer is required to take necessary measures to prevent corrosion in exposed rebar.

Observations: Godown Building-2

Dampness at several locations

Observation: Godown Building-2

Dampness on beam

Dampness on Wall

Dampness was found in several locations of the structure. Building engineer is required to investigate the source of dampness and take necessary measures to prevent the dampness.

Observation: Godown Building-2

Dampness at slab & wall

Observation: RMS Room

Dampness on Wall & slab

Dampness was found at the wall and slab of the RMS Room. Building engineer is required to investigate the source of dampness and take necessary measures to prevent the dampness.

Observation: RMS Room

Priority Actions

Problems Observed

Godown Building-1:

Item 01: Stress in column exceeds normal design limit.
Item 02: Stress in pile foundations exceed normal design limit.
Item 03: Live load consideration and assignment.
Item 04: Non-structural elements not anchored or braced.

Godown Building-2:

Item 05: Detail Engineering Assessment (DEA) needs to be performed before Future Vertical Extension.
Item 06: Lack of edge protection.
Item 07: Exposed re-bar at roof.
Item 08: Dampness at several locations.

RMS Room:

Item 09: Dampness at slab & wall.

Item No.	Observation	Recommended Action Plan	Recommended Timeline
01	Stress in column exceeds normal design limit (Godown Building-1)	Building Engineer to review design, loads and column stresses in the area identified above.	6-weeks
02	Stress in column exceeds normal design limit (Godown Building-1)	Verify in-situ concrete stresses by 100mm dia. cores from a minimum 4 nos from lower tier columns.	6-weeks
03	Stress in column exceeds normal design limit (Godown Building-1)	Produce and actively manage a loading plan for all floor plates considering floor and column capacity.	6-weeks
04	Stress in column exceeds normal design limit (Godown Building-1)	Carry out remedial works where required.	6-months
05	Stress in column exceeds normal design limit (Godown Building-1)	Continue to implement floor loading plan.	6-months

Item No.	Observation	Recommended Action Plan	Recommended Timeline
06	Stress in pile foundations exceed normal design limit (Godown Building-1)	Building engineer is required to review the design load and adequacy of the pile foundations and suggest necessary remedial actions accordingly.	6-weeks
07	Stress in pile foundations exceed normal design limit (Godown Building-1)	Carry out suggested remedial works where necessary.	6-months
08	Live load consideration and assignment. (Godown Building-1)	Building engineer to revise the Engineering Assessment (EA) 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
09	Live load consideration and assignment. (Godown Building-1)	Produce and actively manage a loading plan for all floor plates within the factory, considering floor, column and foundation capacity.	6-weeks
10	Live load consideration and assignment. (Godown Building-1)	Continue to implement loading plan.	6-months

Item No.	Observation	Recommended Action Plan	Recommended Timeline
11	Non-structural elements not anchored or braced (Godown Building-1)	Building engineer is required to adequately anchor and brace all non-structural elements to resist earthquake forces to comply with the BNBC.	6-weeks
12	Detail Engineering Assessment (DEA) needs to be performed before Future Vertical Extension (Godown Building-2)	Prior to the vertical extension, building engineer is required to produce a Detailed Engineering Assessment(DEA) of the structure according to BNBC and submit it to RSC for review.	6-weeks
13	Detail Engineering Assessment (DEA) needs to be performed before Future Vertical Extension (Godown Building-2)	Carry out recommendation as outcome of the DEA.	6-months
14	Lack of edge protection (Godown Building-2)	Building is required to provide edge protection on the roof and stair to avoid falling hazard.	6-weeks
15	Exposed re-bar at roof (Godown Building-2)	All exposed reinforcement is to be protected from corrosion which may cause degradation of the concrete.	6-weeks

Item No.	Observation	Recommended Action Plan	Recommended Timeline
16	Dampness at several locations (Godown Building-2)	Building Engineer is required to investigate the reason of dampness & apply suitable method to repair dampness.	6-weeks
17	Dampness at slab & wall (RMS Room)	Building Engineer is required to investigate the reason of dampness and carry out suitable repair of dampness.	6-weeks