

Lavender Garment Limited

Mouchak, Kaliakoir, Gazipur

(24.013260, 90.302414)

11 December 2022



Buildings Information

1. Factory Building (B+G+9)
2. Shed -1 (Facilities Shed) (single storied)
3. Shed -1 (Utility Shed) (single storied)

Observations

Lack of information and mismatches in design report

2.4.1. Base Shear Check:

Earth Quake Manual Calculation: As per BNBC 2006

Site coefficient, S	1.50
Total height in meter, hn	21.81 m
Structural System Coefficient, Ct	0.073
Structure Period in second, $T=Ct(hn)^{(3/4)}$	0.83
Numerical Coefficient, $C=1.25S/T^{2/3}$	2.12
Seismic Zone Coefficient, Z	0.15
Structure Importance Coefficient, I	1.00
Response Modification Coefficient, R	9.00
Design Base Shear, V: Total seismic dead load $W=ZIC/R$	3.54%
Total seismic load W (From Model) in KN	107484.60
Design Base Shear, V in KN	3806.21
Design Base Shear, V in KN (Model)	3805.30
Model Base Shear, V in KN	3.54%

Response modification coefficient for dual system R-value has been assumed as 09 which is referred to Intermediate Moment Resisting Frame (IMRF), but no seismic detailing was provided with the report.

Moreover, ultimate bearing capacity considering lateral load should be 13.3 Ksf instead of 33 Ksf.

4.2.1. Soil Bearing Capacity:

According to soil test report (Soil test report is attached) we consider soil bearing capacity as follow. From the soil test report, we found allowable soil bearing capacity 4.0 ksf and F.S is 2.5. So ultimate bearing capacity is 10.0 Ksf. for consider lateral load we can consider 33% overstressing. **So now = 10 x**

33%=33.3 Ksf

As per recommendation retrofitting has been suggested but no retrofitting drawings were found . Building engineer is required to check the recommendation carefully and provide retrofitting drawing where necessary.

CHAPTER: 05. Conclusion & Recommendation:

As per as-built drawing and practical measurement, Existing Three Storied Garments Factory Building is a part of LAVENDER GARMENTS LTD. At KAMRANGACHALA MOUCHAK, KALIAKAIR, GAZIPUR. In the end of the re-analysis following outcomes are obtained:

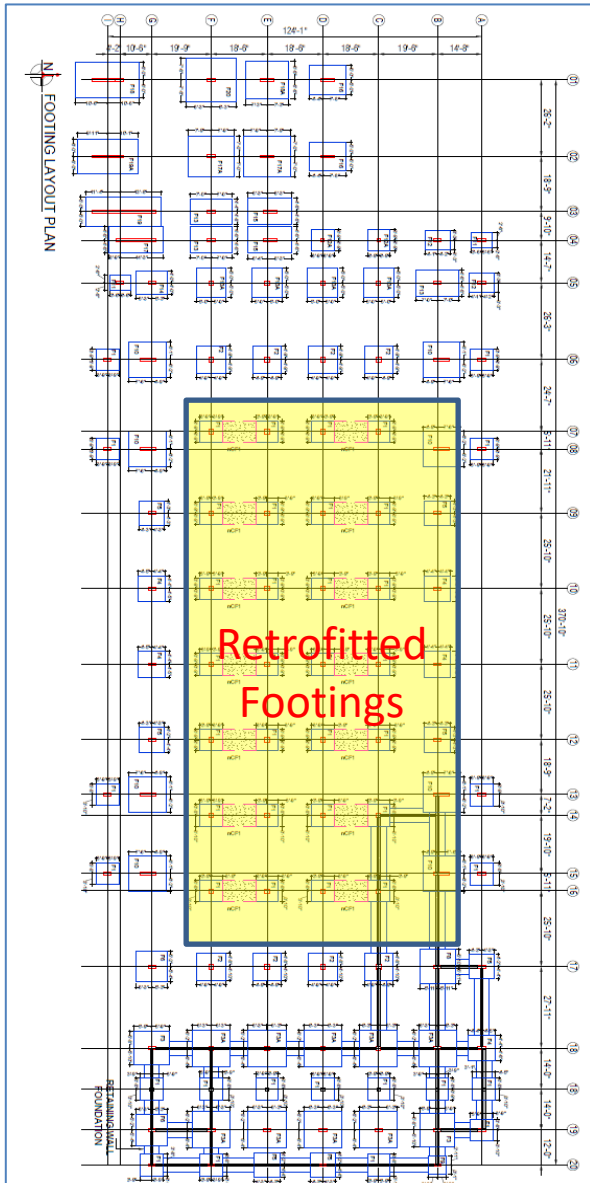
- All footings are adequate in bearing and punching shear Capacity.
- All column is safe against service and lateral load.
- All grade & floor beams are adequate.
- All Floor Slabs have adequate thickness and reinforcement.

5.1. RECOMMENDATIONS:

A proper maintenance program and a load management system are required to be implemented according to floor load plan. Retrofitting must be completed according to approved retrofitting drawing.

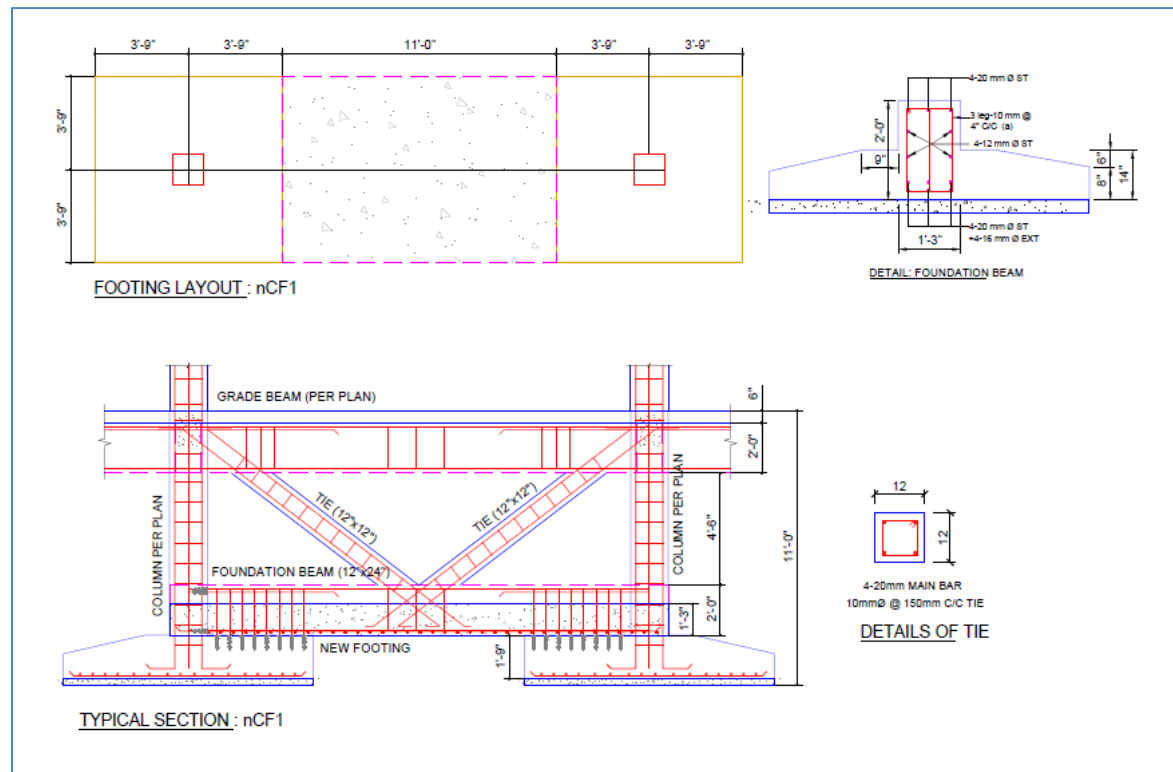
Recommendation of Design Report

**Lack of reference drawings and
lack of information in as-built drawing**



Footing Layout

Reference/construction drawings were not available for the production Building. Also, some footings have been retrofitted at middle. Only a sectional details have been provided for these footings, but no pictorial evidence or material test report was found for the retrofitted footings. The building engineer is required to provide reference drawings with proper evidence of retrofitting works.

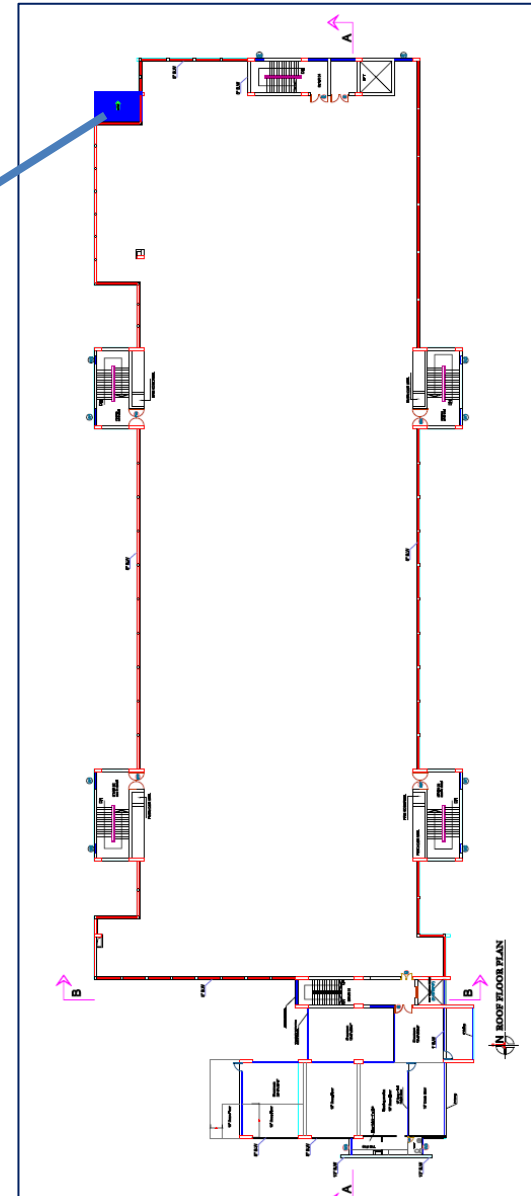


Sectional Details

A small portion of steel light roof was found on 2nd floor of Building-1 at Northeast corner. No structural details was available for the roof. The building engineer to survey the structure and prepare as-built structural drawings with clear connection details.



Undocumented Lightweight Roof



2nd floor roof layout

Observation: Building-1

**Non engineered external steel stair, apparently
inadequate member & lack of lateral stability**

Apparently inadequate member and poor connection was observed on external steel stair at the East of the Production Building. Also, discontinue landing beam was found at mid landing of the stair.



External steel stair at East



Inadequate support and discontinue beam

Building engineer is required to carry out the member adequacy & stability and implement remediation where required.

Cracks on brick wall in several location

Observation: Building-1



Cracks on brick wall in several location on 2nd floor

Hairline cracks were found on brick wall in several location on 2nd floor and ground floor. Factory engineer is required to investigate the cracks, produce investigation report showing extent of cracks and repair methodology. Building engineering is required to repair the cracks as per crack investigation report.



Cracks on brick wall on ground floor

Observation: Building-1

**Non-structural elements not
anchored or braced**

Some plastic tanks resting on the rooftop and racks on different floors are not adequately anchored or braced to resist lateral (earthquake) forces.

Adequately anchor and brace all non-structural elements (all buildings) to resist earthquake forces to comply with the BNBC.



Plastic water tank on roof



Rack on floor level

Column Susceptible to Vehicle impact

Columns on loading/unloading areas are Susceptible to Vehicle impact. The building engineer is required to take necessary action to prevent the vehicle impact in the columns.



Column at loading/unloading bay

Lack of drawings-Structural & Architectural

As-built drawings were not found for the single storied Facilities Shed. The building engineer to survey the structure and prepare as-built structural drawings with clear connection details.



Facilities Shed

Observation: Shed-1

Apparently non-engineered connection

Apparently inadequate connection was observed at the lightweight roof of the single storied Facilities Shed. The building engineer to check the connection adequacy of the lightweight roof against the uplift pressure of wind.



Facilities Shed

Lack of as-built drawing

As-built drawings were not found for the single storied Utility Shed. The building engineer to survey the structure and prepare as-built structural drawings with clear connection details.



Utility Shed

Lack of lateral stability system



Lack of compression member along long direction of the shed

The building engineer is required to prepare the as-built drawing and check the lateral stability system of the steel shed.

Problems Observed

Building-1:

Item 01: Lack of information and mismatches in design report.

Item 02: Lack of reference drawings and lack of information in as-built drawing.

Item 03: Non engineered external steel stair, apparently inadequate member & lack of lateral stability.

Item 04: Cracks on brick wall in several location.

Item 05: Non-structural elements not anchored or braced.

Item 06: Column Susceptible to Vehicle impact.

Shed-1:

Item 07: Lack of drawings-Structural & Architectural.

Item 08: Apparently non-engineered connection.

Shed-2:

Item 09: Lack of as-built drawing.

Item 10: Lack of lateral stability system.

Priority Actions

Item No.	Observation	Recommended Action Plan	Recommended Timeline
01	Lack of information and mismatches in design report. (Building-1)	Building engineer is required to review the design of the building for intermediate seismic design criteria and support system.	6-weeks
02	Lack of information and mismatches in design report. (Building-1)	Building engineer to update the design document including FEA model & design report in compliance with section 1.9.1.1 and section 1.9.1.2 as per BNBC.	6-weeks
03	Lack of information and mismatches in design report. (Building-1)	Implement the recommendations of design report.	6-months
04	Lack of reference drawings and lack of information in as-built drawing (Building-1)	Building engineer to survey the structure and prepare as-built structural drawings with clear connection details.	6-weeks
05	Lack of reference drawings and lack of information in as-built drawing (Building-1)	Building engineer is required to provide reference drawings with proper evidence of retrofitting works.	6-weeks

Item No.	Observation	Recommended Action Plan	Recommended Timeline
06	Non engineered external steel stair, apparently inadequate member & lack of lateral stability. (Building-1)	Building engineer is required to carry out member adequacy, connection adequacy & lateral stability check of the steel stair.	6-weeks
07	Non engineered external steel stair, apparently inadequate member & lack of lateral stability. (Building-1)	Replace the existing stair with a properly designed stair or implement remediation work where necessary.	6-months
08	Cracks on brick wall in several location. (Building-1)	Building engineer is required to investigate the cracks, produce investigation report showing extent of cracks and repair methodology.	6-weeks
09	Cracks on brick wall in several location. (Building-1)	Building is required to repair the cracks as per crack investigation report.	6-weeks
10	Non-structural elements not anchored or braced. (Building-1)	Building is required to anchored or braced properly all kinds of non-structural elements.	6-weeks

Item No.	Observation	Recommended Action Plan	Recommended Timeline
11	Column Susceptible to Vehicle impact. (Building-1)	Building engineer is required to take necessary action to prevent the vehicle impact in the columns.	6-weeks
12	Lack of drawings-Structural & Architectural. (Shed-1)	Building engineer is required to prepare the full set of as-built drawing in compliance with section 1.9.1.2 (part-6, BNBC).	6-weeks
13	Apparently non-engineered connection. (Shed-1)	Building engineer is required to check the connection of the steel shed for the uplift pressure of wind.	6-weeks
14	Apparently non-engineered connection. (Shed-1)	Complete implementation of remedial works if required.	6-months
15	Lack of as-built drawing. (Shed-2)	Building engineer is required to prepare the full set of as-built drawing in compliance with section 1.9.1.2 (part-6, BNBC).	6-weeks

Item No.	Observation	Recommended Action Plan	Recommended Timeline
16	Lack of lateral stability system. (Shed-2)	Building engineer is required to check the lateral stability system and suggest proper remedial actions accordingly.	6-weeks
17	Lack of lateral stability system. (Shed-2)	Carry out suggested remedial works.	6-months