

Graphics Textiles Ltd (Extension)

Sreerampur, Kalampurm Dhamrai, Dhaka
(23.919336, 90.124829)

18th April 2022



Building information

Building-2 (Dinning Building): seven storied (G+6) reinforced concrete (RC) Building.

Building-3 (Admin Building): seven storied (G+6) reinforced concrete (RC) Building.

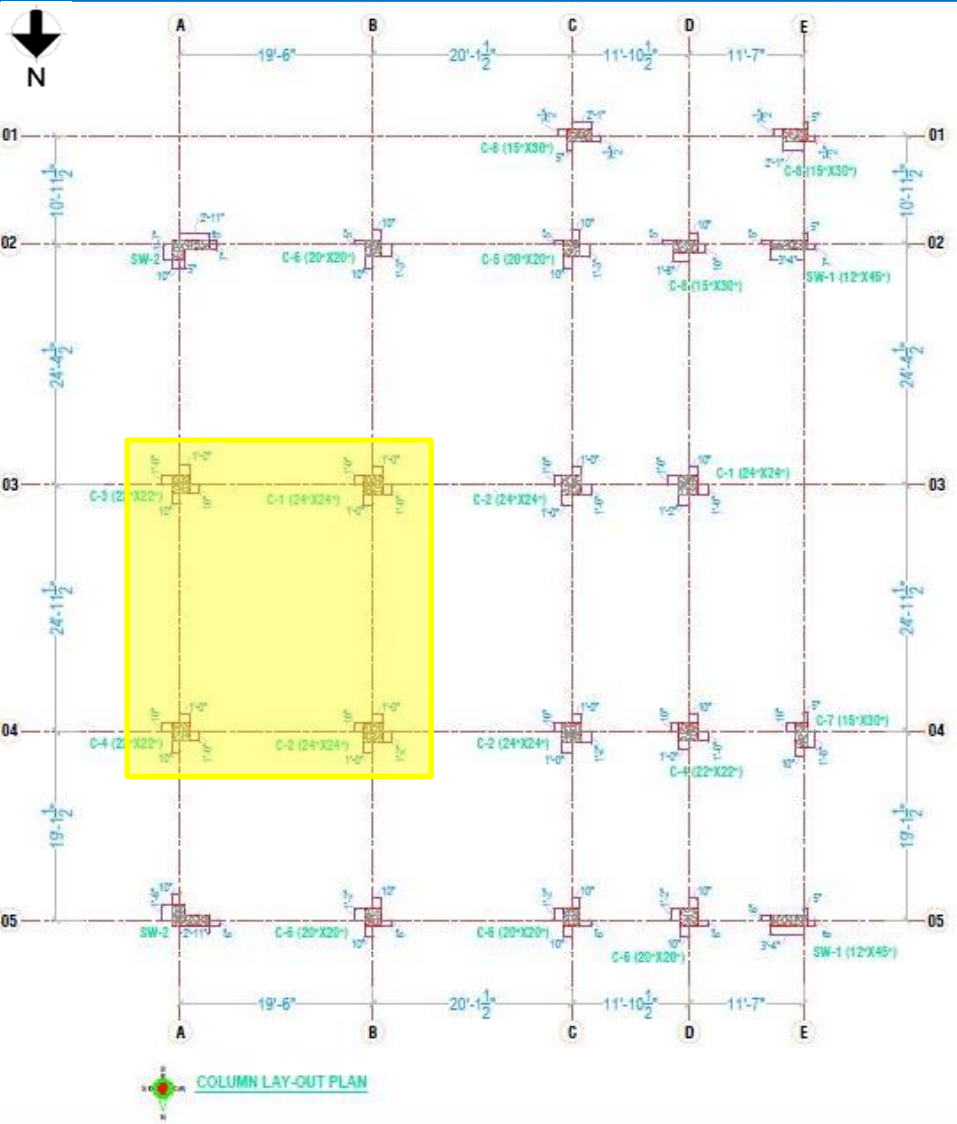
Chemical shed: single-storied truss roof shed supported by RC columns.

Jhut Boiler shed: single-storied lightweight roof shed supported by steel columns.

Gate House & RMS Room: single-storied reinforced concrete (RC) building.

Observations

Stress in column exceeds normal design limit



Stressed columns in layout (yellow marked)

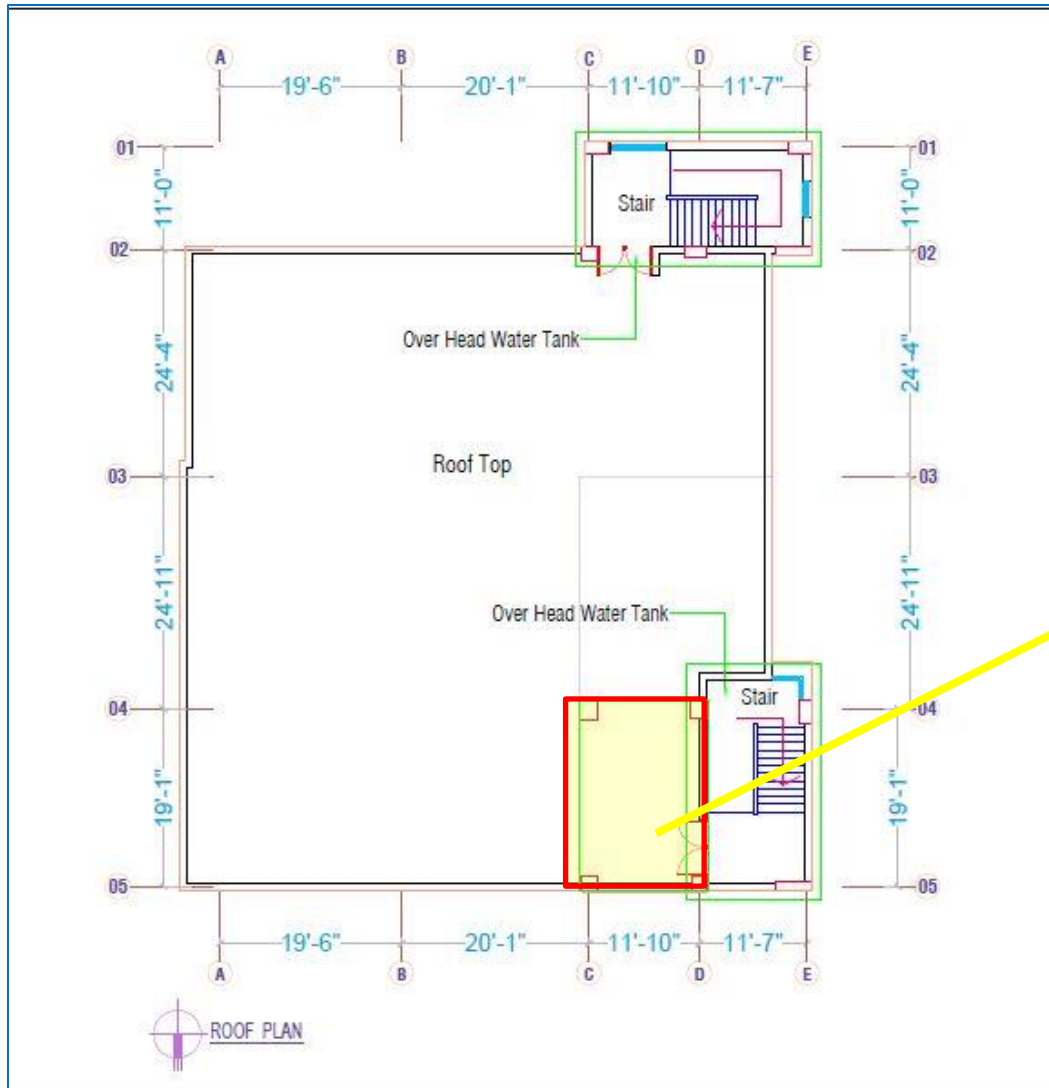


Typical stressed columns

The cursory calculation indicates that some column's stress exceeds the normal design limit considering a typical floor live load 5kPa, 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.

Verify in-situ concrete stresses by 100 mm diameter cores from a minimum of 4 columns. Produce and actively manage a loading plan for all floors considering floor and column capacity.

Lack of information in drawings



Roof layout



Additional room in front of stair

Plastic water tanks are not shown in the roof layout. Also, an additional room was found in front of the stair, and details weren't found in the structural drawings. The building engineer is to prepare an accurate as-built drawing with complete information.

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. If the tanks cannot be structurally accommodated, they should be removed.



Plastic water tank on roof



Rack on floor level

Engineering Assessment (EA) report needs to be revised.

Table 6.2.8
Basic Wind Speeds for Selected Locations in Bangladesh

Location	Basic Wind Speed (km/h)	Location	Basic Wind Speed (km/h)
Angarpota	150	Lalmonirhat	204
Bagerhat	252	Madaripur	220
Bandarban	200	Magura	208
Barguna	260	Manikganj	185
Barisal	256	Meherpur	185
Bhola	225	Moheshkhali	260
Bogra	198	Moulvibazar	168
Brahmanbaria	180	Munshiganj	184
Chandpur	160	Mymensingh	217
Chapai Nawabganj	130	Naogaon	175
Chittagong	260	Narail	222
Chuadanga	198	Narayanganj	195
Comilla	196	Narsinghdi	190
Cox's Bazar	260	Natore	198
Dahagram	150	Netrokona	210
Dhaka	210	Nilphamari	140
Dinajpur	130	Noakhali	184
Faridpur	202	Pabna	202
Feni	205	Rangpur	130

As per BNBC, wind speed for Dhaka is 210 Km/h
(130.49 mph)

Value of C_p (*Table 6.2.15)

h/B	L/B					
	0.1	0.5	0.65	1	2	Greater than or equal 3.00
Less than or equal 0.50	1.4	1.45	1.55	1.4	1.15	1.1
10	1.55	1.85	2	1.7	1.3	1.15
20	1.8	2.25	2.55	2	1.4	1.2
Greater than or equal 40.00	1.95	2.5	2.8	2.2	1.6	1.25

Height h = 99.75 ft

Length L = 101 ft

Breadth B = 48 ft

h/B = 2.08

L/B = 2.10

C_p = 1.168

In EA report, C_{pe} value calculated as 1.168

Wind Load Pattern - UBC 94

Exposure and Pressure Coefficients

☒ Exposure from Extents of Diaphragms
☐ Exposure from Shell Objects

Wind Exposure Parameters

Wind Directions and Exposure Widths Modify/Show...

Windward Coefficient, C_q
Leeward Coefficient, C_q

Wind Coefficients

Wind Speed (mph)
Exposure Type
Importance Factor

Exposure Height

Top Story
Bottom Story
☐ Include Parapet
Parapet Height ft

OK Cancel

In E-tabs software, Wind speed considered 125 mph
and Windward Coefficient considered 1.68

As per BNBC, wind speed for the Dhaka zone was required to be considered 130.49 mph but 125 mph is considered in the analysis software "E-tabs". Also, the windward coefficient in Etabs does not match the calculated value. As per the EA report, the windward coefficient is 1.168 whereas 1.68 has been considered in the E-tabs software.

The building engineer is required to revise the analysis software and engineering assessment report for actual wind parameters and submit it to RSC for review.

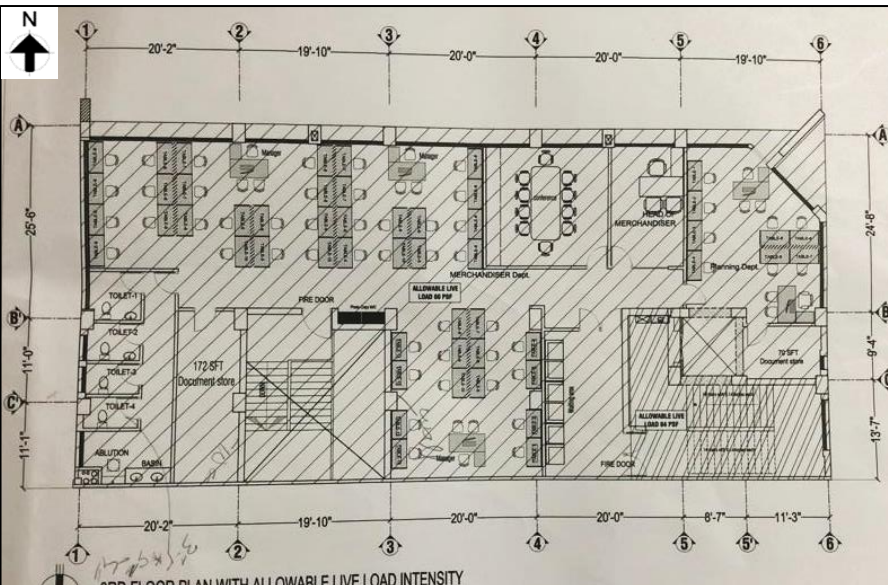


Live load input in E-tabs

Live load has been assigned 80 psf at all the floor level

Live load has been assigned 100 psf at 3rd floor

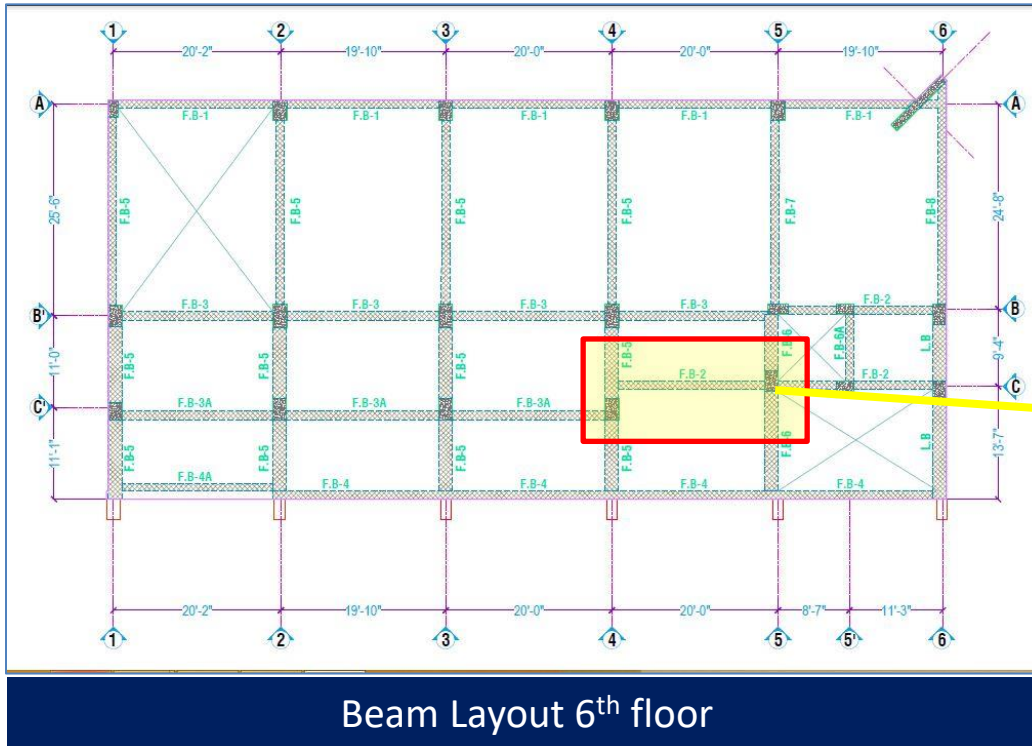
As per load plan of the building, 60 psf (3 kPa) has been shown. But in E-tabs, 80 psf (4 kPa) has been considered in all the floor level and 100 psf at 3rd floor (marked location).



3rd Floor Layout plan

As per BNBC, every building or structure designed 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. Revise the software-based analysis model, design report and load plan following BNBC requirements.

Mismatch in structural drawings



Beam layout of 5th & 6th floor didn't match fully. Mismatches are marked in the layout. The building engineer is required to revise the beam layout and prepare an accurate as-built drawing with complete information.

Inadequate connection

Observation: Building-3: Pump House



Apparently inadequate connection

Apparently Inadequate structural member, poor connection details were found. Building engineer is required to check the adequacy of the steel members & connection for uplift and lateral forces and suggest necessary remedial actions accordingly.



Lightweight roof of pump house

Lack of drawings (Structural & Architectural)

**Observation: Connection Bridge, Chemical Shed,
Jhut Boiler, Gate House & RMS Room**



Chemical Shed

Structural and architectural drawings were not available for the mentioned structures. Building engineer is required to produce as-built drawing (both structural and architectural) with complete information.



Connection Bridge



Jhut Boiler



Gate House & RMS Room

Observation: Connection Bridge, Chemical Shed, Jhut Boiler, Gate House & RMS Room

Lack of lateral stability system

Observations: Chemical Shed

Load transfer media is absent along the long direction. The building engineer is required to check the lateral stability of the structure and provide necessary alternatives.



Framing System

Apparently non-engineered connection

Observation: Jhut Boiler Shed

Apparently Inadequate structural members and poor connection details were found. The building engineer is required to check the adequacy of the steel members & connections for uplift and lateral forces and suggest proper alternatives.



Inside of Jhut Boiler



Non engineered connection

Exposed re-bar



Exposed rebar at column on the roof

Exposed column's rebar was found on the roof. All exposed rebar is to be protected from corrosion which may cause degradation of the concrete. Factory is required to take necessary measures to prevent the corrosion in exposed rebar.

Problems Observed

Building-2 (Dining Building):

Item-01: Stress in column exceeds normal design limit

Item-02: Lack of information in drawing.

Item-03: Non-structural elements not anchored or braced.

Building-3 (Admin Building):

Item-4: Engineering Assessment (EA) report needs to be revised.

Item-5: Mismatch in structural drawings.

Item-6: Inadequate connection.

Connection Bridge, Chemical Shed, Jhut Boiler, Gate House & RMS Room:

Item-07: Lack of drawings (Structural & Architectural).

Item-08: Lack of lateral stability system (Chemical Shed).

Item-09: Apparently non-engineered connection (Jhut Boiler Shed).

Item-10: Exposed re-bar (Gate House & RMS Room).

Priority Action

Item No.	Observation	Recommended Action Plan	Recommended Timeline
01	Stress in column exceeds normal design limit (Building-2)	Factory Engineer to review design, loads and columns stresses in area identified above.	6-weeks
02	Stress in column exceeds normal design limit (Building-2)	Verify in-situ concrete stresses by 100mm dia. cores from minimum of 4 columns.	6-weeks
03	Stress in column exceeds normal design limit (Building-2)	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 (Building-2)	Carry out remedial works where required	6-months

Item No.	Observation	Recommended Action Plan	Recommended Timeline
05	Stress in column exceeds normal design limit (Building-2)	Continue to implement floor loading plan.	6-months
06	Lack of information in drawing (Building-2)	Building engineer is required to prepare accurate as-built drawing in compliance with section 1.9.1.2 (part-6, BNBC).	6-weeks
07	Non-structural elements not anchored or braced (Building-2)	Adequately anchor and brace all non-structural elements (all buildings) to resist earthquake forces to comply with the BNBC.	6-weeks
08	Engineering Assessment report needs to be revised. (Building-3)	Building engineer to update the Engineering Assessment (EA) report and software analysis file in compliance with BNBC.	6-weeks

Item No.	Observation	Recommended Action Plan	Recommended Timeline
09	Engineering Assessment report needs to be revised. (Building-3)	Implement the remedial works if required	6-months
10	Mismatch in structural drawings (Building-3)	Building engineer is required to prepare the accurate as-built drawing in compliance with section 1.9.1.2 (part-6, BNBC).	6-weeks
11	Inadequate connection (Building-3: Pump House)	Factory engineer is required to check adequacy of the steel members & connection for uplift and lateral forces and suggest necessary remedial actions accordingly.	6-weeks
12	Inadequate connection (Building-3: Pump House)	Carry out suggested remedial works.	6-months
13	Lack of drawings (Structural & Architectural) (Connection Bridge, Chemical Shed, Jhut Boiler, Gate House & RMS Room)	Building engineer is required to prepare the full set of as-built drawing (both architectural & structural) in compliance with BNBC (part-6, section 1.9.1.2).	6-weeks

Item No.	Observation	Recommended Action Plan	Recommended Timeline
14	Lack of lateral stability system. (Chemical Shed)	As part of Engineering Assessment (EA), the building engineer is required to check the lateral stability of the structure and provide necessary remedial actions.	6-weeks
15	Lack of lateral stability system. (Chemical Shed)	Carry out suggested remedial works.	6-months
16	Apparently non-engineered connection (Jhut Boiler Shed)	As part of Engineering Assessment (EA), the building engineer is required to check the adequacy of the steel members & connections for uplift and lateral forces and suggest proper alternatives.	6-weeks
17	Apparently non-engineered connection (Jhut Boiler Shed)	Carry out suggested remedial works.	6-months
18	Exposed re-bar. (Gate House & RMS Room)	All exposed reinforcement is to be protected from corrosion which may cause degradation of the concrete.	6-weeks

Survey Limitations and Assumptions

This report is for the private and confidential use of Accord for whom it was prepared together with their professional advisors as appropriate. It should not be reproduced in whole or in part or relied upon by third parties for any use without the express written permission of ACCORD.

This report can be used in discussion with the supplier or factory owner as a means to rectify or address any observations made. The report is not comprehensive and is limited to what could be observed during a visual inspection of the building.

This Report is not intended to be treated as a generalised inspection and does not cover the deterioration of structural members through dampness, fungal or insect attack, nor does it deal with problems and defects of a non-structural nature. Other non structural aspects of the building such as fire safety have not been assessed in this survey.

Except as otherwise noted, drains and other services were not viewed or tested during our inspection and are therefore similarly excluded from this Report. We have not inspected any parts of the structure which are covered, unexposed or inaccessible and we are therefore unable to report that any such part of the property is free from defect.

External inspection of the façade walls has generally been carried out from ground level only by visual sighting. No opening up works were carried out (except as noted) and we rely on the Architects and Engineers drawings provided to us for our views on concealed parts of the structure and in particular foundations. Strengths of materials and components are untested and we recommend that the factory owners Building Engineer carries out in situ testing over and above those suggested to satisfy themselves with the material strengths and component details.

Recommendations, where given, are for the purpose of providing indicative advice only, are not exhaustive, relate solely to identifying key and obvious structural defects as identified in this presentation, and do not take the form of or constitute a specification for works. We take no responsibility for the works as constructed. This report does not interfere with the factory owners Building Engineers responsibility for the structural performance of this building, The Building Engineer remains fully responsible for the structural adequacy of the building.

This report does not comment in detail on the future seismic performance of the building and only highlights the fact that the building may experience significant damage or collapse in a seismic event along with many others in the Dhaka region.

The observations in this report are based on the Engineering Judgement of the lead surveyor/engineer at the time of the survey. We assume in making these observations that no covering up of faults defects, filling or plastering over cracking or significant repair work has been carried out by the building owner. Any future alteration or additional work by the building owner will void this report.