Green Fibre Composite Ltd.

Baniarchala, Mohoha Bhabanipur, Gazipur Sadar, Gazipur
(24.166900, 90.418758)
13 November 2022

RSC RMG SUSTAINABILITY COUNCIL

Buildings Information

1. Security Building is two storied (G+1) reinforced concrete (RC) building.
2. Office Building is a seven storied (G+6) reinforced concrete (RC) building.
3. Production Building is a six storied (G+5) reinforced concrete (RC) building.
4. Utility Building is single(G+M) storied reinforced concrete (RC) building with a mezzanine floor.

Observations

Few beams have marginally insufficient flexural reinforcement

Observations: Production Building

13.0 CONCLUDING REMARKS WITH RECOMMENDATION

The structure was modeled using 3-D computer program ETABS package 16.2.1 and designed for all possible load combinations. The following observations have been done.

Isolated and combined footing was provided for transferring load on soil from the building. The bearing capacity of the soil has been calculated using Meyerhof's equation and minimum allowable bearing capacity was found 8.00 ksf. Foundation actual load bearing capacity was found less than the allowable soil bearing capacity. So, foundation capacity is sufficient to carry the design loads and no scope of irregular settlement. The punching shear and flexural capacity of isolated and combined footing was also found adequate.

From analysis, maximum deflection is observed 0.61" which is within the allowable limit (H/500 = 2.05 inch). Of course, this analysis is based on bare frame (without infill brick wall) and the deflection of the building will be less than that of the allowable limit due to presence of partition wall. The vertical short-term deflection has been found 0.779," which is within the allowable limit (L/240 = 0.85").

The maximum lateral drift of the structure was found 0.0018 which is not within the allowable limit ($\frac{\Delta}{h} = 0.005$). In case of torsion, the maximum value of $\frac{\Delta_{max}}{\Delta_{avg}}$ is 1.355, which is higher than the allowable limit ($\frac{\Delta_{max}}{\Delta_{avg}} < 1.2$). So, there exists torsional irregularity in the structure. To solve this issue, earthquake load is taken in orthogonal direction by incorporating 100-30 rules into the model. After this, the adequacy of beam and column is further checked if there exists any inadequacy.

After checking the soft storey calculation, it is seen that there exists soft storey effect within the structure. To mitigate this issue, seismic detailing of the structure is required and it has been showed that the building has intermediate detailing. So, this can be considered safe for the structure.

It has been found that all the RC column sizes and their reinforcement are sufficient enough to carry axial load as well as moment produced by gravity and lateral effect as their P-M-M ratio is lower than Unity. All shear walls have been checked and found to be adequate.

But a few beams have been found inadequate. In order to retrofit those beams, some columns are required to be retrofitted.

All grade beams and floor beams have been checked and found adequate.

Prepared by
Md Faridul Islam
B.Sc. Engg. (Civil), BUET, MIEB-38055

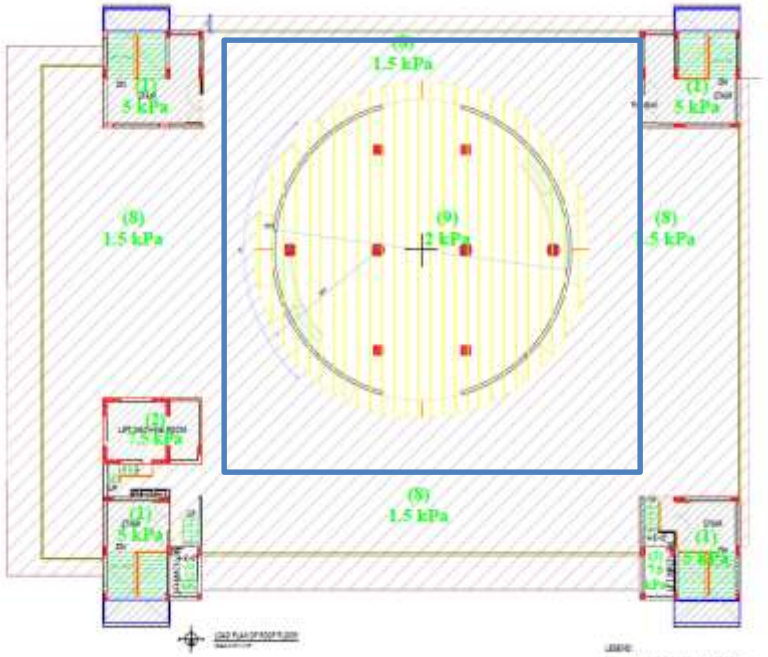
Checked by
Abu Sadat Mohammad Sayem
B.Sc. Engg. (Civil), BUET, FIEB-11948

As per the design report few beams have insufficient flexural reinforcement and strengthen works suggested for those beam. However, strength drawings were not found on site and strengthen works were not carried out. Building engineer is required to review the design of the beams.

Observations: Production Building

Implement floor load management program

Observations: Production Building



No load management program was visible. Building engineer is required to implement load management program (Display Load plan on floors, provide signage to the store areas) as per its floor loading capacity and follow the load plans for all floors of the buildings and make sure that the workers understand the loading requirements.

Helipad live loading considered 2 kPa in the load plan. Building engineer is required to follow BNBC for the helipad live load and revise the load plan accordingly.

Loads on Helicopter Landing Areas

In addition to all other applicable loads provided in this chapter, including the dead load, the minimum live load on helicopter landing or touch down areas shall be one of the loads L_1, L_2, or L_3 as given below producing the most unfavourable effect :

(i) $L_1 = W_1$ (2.6.4a)

(ii) $L_2 = kW_2$ (2.6.4b)

(iii) $L_3 = w$ (2.6.4c)

where, W_1 = Actual weight of the helicopter in kN,

W_2 = Fully loaded weight of the helicopter in kN,

ω = A distributed load of 5.0 kN/ m^2,

k = 0.75 for helicopters equipped with hydraulic-type shock absorbers, and

= 1.5 for helicopters with rigid or skid-type landing gear.

The live load, L_1, shall be applied over the actual areas of contact of landing. The load, L_2 shall be a single concentrated load including impact applied over a 300 mm x 300 mm area. The loads L_1 and L_2 may be applied anywhere within the landing area to produce the most unfavourable effects of load.

Observations: Production Building

Falling hazard on the roof

Observations: Office Building

Parapet missing on the roof. Building engineer is required to provide parapet on the roof as per code requirement to avoid falling hazard.

Observations: Office Building

Water ponding on the roof

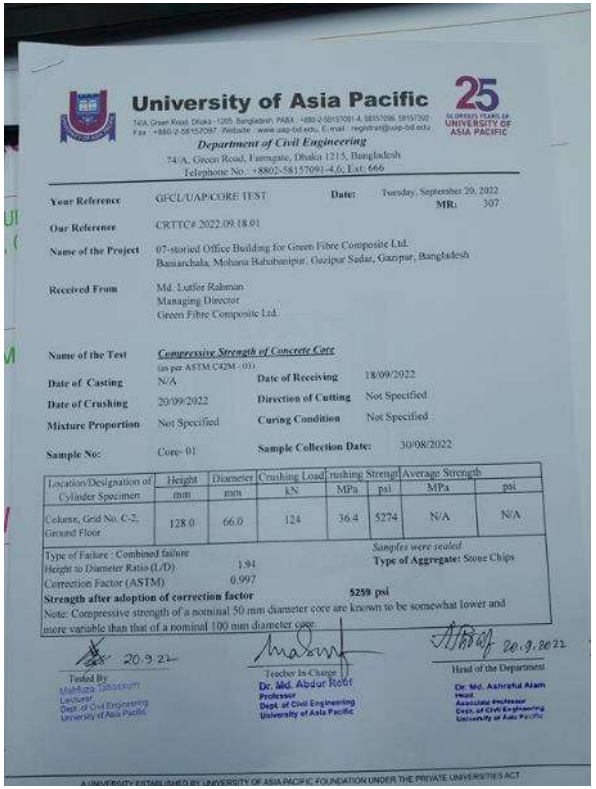
Observations: Office Building

Water ponding observed on the roof. Building engineer is required to provide water proofing layer and improve roof drainage system.

Observations: Office Building

RSC RMG SUSTAINABILITY COUNCIL

Tests carried out



University of Asia Pacific

Department of Civil Engineering
74/A, Green Road, Farmgate, Dhaka 1215, Bangladesh
Telephone No. : +8802-58157091-4,6; Ext: 666

Your Reference: GFCL/UAP/CORE TEST — Date: Tuesday, September 20, 2022 — MR: 307
Our Reference: CRTTC# 2022.09.18.01
Name of the Project: 07-storied Office Building for Green Fibre Composite Ltd. Baniarchala, Mohana Bahabanipur, Gazipur Sadar, Gazipur, Bangladesh
Received From: Md. Lutfor Rahman, Managing Director, Green Fibre Composite Ltd.

Name of the Test: Compressive Strength of Concrete Core (as per ASTM C42M - 03)
Date of Casting: N/A — Date of Receiving: 18/09/2022
Date of Crushing: 20/09/2022 — Direction of Cutting: Not Specified
Mixture Proportion: Not Specified — Curing Condition: Not Specified
Sample No: Core- 01 — Sample Collection Date: 30/08/2022

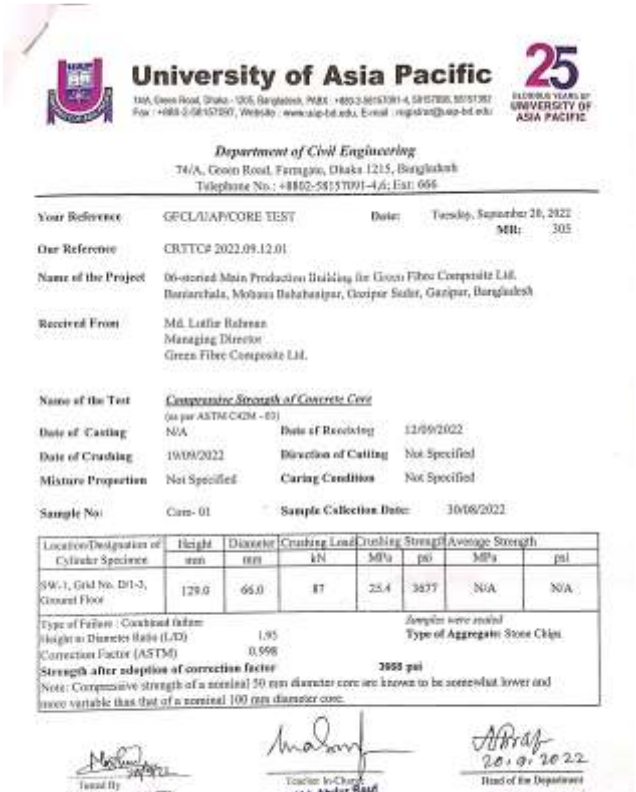
Location/Designation of Cylinder Specimen	Height mm	Diameter mm	Crushing Load kN	Crushing Strength MPa	Crushing Strength psi	Average Strength MPa	Average Strength psi
Column, Grid No. C-2, Ground Floor	128.0	66.0	124	36.4	5274	N/A	N/A

Type of Failure : Combined failure
Height to Diameter Ratio (L/D): 1.94
Correction Factor (ASTM): 0.997
Strength after adoption of correction factor: 5259 psi
Note: Compressive strength of a nominal 50 mm diameter core are known to be somewhat lower and more variable than that of a nominal 100 mm diameter core.
Samples were sealed
Type of Aggregate: Stone Chips

20.9.22
Tested By: Mahfuza Tabassum, Lecturer, Dept. of Civil Engineering, University of Asia Pacific
Teacher In-Charge: Dr. Md. Abdur Rouf, Professor, Dept. of Civil Engineering, University of Asia Pacific
20.9.2022
Head of the Department: Dr. Md. Ashraful Alam, Head, Associate Professor, Dept. of Civil Engineering, University of Asia Pacific

A UNIVERSITY ESTABLISHED BY UNIVERSITY OF ASIA PACIFIC FOUNDATION UNDER THE PRIVATE UNIVERSITIES ACT

Core rest report of Office Building- Stone Chips



University of Asia Pacific

Department of Civil Engineering
74/A, Green Road, Farmgate, Dhaka 1215, Bangladesh
Telephone No. : +8802-58157091-4,6; Ext: 666

Your Reference: GFCL/UAP/CORE TEST — Date: Tuesday, September 20, 2022 — MR: 305
Our Reference: CRTTC# 2022.09.12.01
Name of the Project: 06-storied Main Production Building for Green Fibre Composite Ltd. Baniarchala, Mohana Bahabanipur, Gazipur Sadar, Gazipur, Bangladesh
Received From: Md. Lutfor Rahman, Managing Director, Green Fibre Composite Ltd.

Name of the Test: Compressive Strength of Concrete Core (as per ASTM C42M - 03)
Date of Casting: N/A — Date of Receiving: 12/09/2022
Date of Crushing: 19/09/2022 — Direction of Cutting: Not Specified
Mixture Proportion: Not Specified — Curing Condition: Not Specified
Sample No: Core- 01 — Sample Collection Date: 30/08/2022

Location/Designation of Cylinder Specimen	Height mm	Diameter mm	Crushing Load kN	Crushing Strength MPa	Crushing Strength psi	Average Strength MPa	Average Strength psi
S/C-1, Grid No. D/1-3, Ground Floor	129.0	66.0	87	25.4	3677	N/A	N/A

Type of Failure : Combined failure
Height to Diameter Ratio (L/D): 1.95
Correction Factor (ASTM): 0.998
Strength after adoption of correction factor: 3668 psi
Note: Compressive strength of a nominal 50 mm diameter core are known to be somewhat lower and more variable than that of a nominal 100 mm diameter core.
Samples were sealed
Type of Aggregate: Stone Chips

20.9.2022
Tested By
Teacher In-Charge
Head of the Department

Core rest report of Production Building- Stone Chips

Stone aggregate (Utility Building)

Stone aggregate (Security Building)

Rebar scan to confirm rebar quantity

Tests carried out

RSC RMG SUSTAINABILITY COUNCIL

Problems Observed

Production Building

Item 1: Few beams have marginally insufficient flexural reinforcement.

Item 2: Implement floor load management program.

Office Building

Item 3: Falling hazard on the roof.

Item 4: Water ponding on the roof.

Priority Actions

Item No.	Observation	Recommended Action Plan	Recommended Timeline
01	Few beams have marginally insufficient flexural reinforcement. (Production Building).	Building engineer is required to review the design of beams.	6-weeks
02	Few beams have marginally insufficient flexural reinforcement. (Production Building).	Carry out remedial works where required.	6-months
03	Implement floor load management program. (Production Building)	Revise the floor live loading as per BNBC.	6-weeks
04	Implement floor load management program. (Production Building)	Building engineer is required to implement the floor load management system.	6-weeks
05	Falling hazard on the roof. (Office Building)	Provide parapet as per code requirement.	6-weeks

Item No.	Observation	Recommended Action Plan	Recommended Timeline
06	Water ponding on the roof. (Office Building)	Building engineer is required to provide water proofing layer and improve roof drainage system.	6-weeks