Columbia Apparels Ltd - Extension

228/1 Tin Sharak, Joydevpur

(23.994127, 90.404491)

6 November 2024

RSC RMG SUSTAINABILITY COUNCIL

Level 5, Shanta Forum, 187, 188/B,
Bir Uttam Mir Shawkat Sarak, Tejgaon,
Dhaka- 1208, Bangladesh
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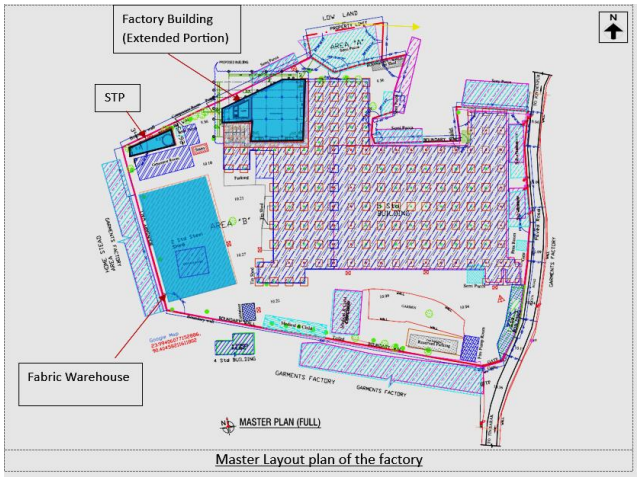
1. Building Information

1. This is a five-storied (G+4) reinforced concrete (RC) building.
2. The structure is a two-storied (G+1) prefabricated steel building.
3. This is a single-storied RC building with an underground sewage tank.

2. Observation

Observation-1: Building permit from local authority not available. (Factory Building (Extended Portion) and Fabric Warehouse)



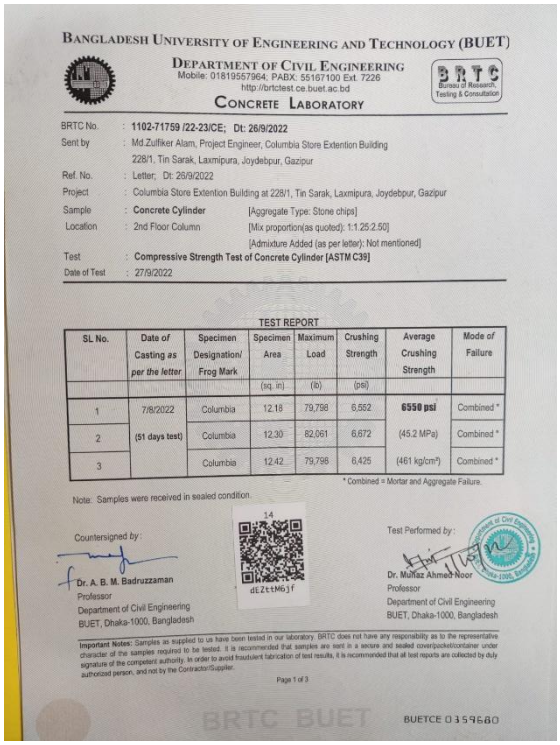
Master layout

Factory Building (Extended Portion)

Fabric Warehouse

Description: During the inspection, a building permit from the local authority was not available for the Factory Building (Extended Portion) and Fabric Warehouse. The factory authority is required to collect building permits from the local authority.

Observation-2: Inconsistencies in design report. (Factory Building (Extended Portion))



BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY (BUET)

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BRTC Bureau of Research, Testing & Consultation

CONCRETE LABORATORY

BRTC No. : 1102-71759 /22-23/CE; Dt: 26/9/2022
Sent by : Md.Zulfiker Alam, Project Engineer, Columbia Store Extention Building 228/1, Tin Sarak, Laxmipura, Joydebpur, Gazipur
Ref. No. : Letter; Dt: 26/9/2022
Project : Columbia Store Extention Building at 228/1, Tin Sarak, Laxmipura, Joydebpur, Gazipur
Sample : Concrete Cylinder [Aggregate Type: Stone chips]
Location : 2nd Floor Column [Mix proportion(as quoted): 1:1.25:2.50] [Admixture Added (as per letter): Not mentioned]
Test : Compressive Strength Test of Concrete Cylinder [ASTM C39]
Date of Test : 27/9/2022

TEST REPORT

SL No.	Date of Casting as per the letter	Specimen Designation/ Frog Mark	Specimen Area (sq. in)	Maximum Load (lb)	Crushing Strength (psi)	Average Crushing Strength	Mode of Failure
1	7/8/2022 (51 days test)	Columbia	12.18	79,798	6,552	6550 psi (45.2 MPa) (461 kg/cm²)	Combined *
2		Columbia	12.30	82,061	6,672		Combined *
3		Columbia	12.42	79,798	6,425		Combined *

* Combined = Mortar and Aggregate Failure.

Note: Samples were received in sealed condition.

Countersigned by:
Dr. A. B. M. Badruzzaman
Professor
Department of Civil Engineering
BUET, Dhaka-1000, Bangladesh

Test Performed by:
Dr. Mahfuz Ahmed Noor
Professor
Department of Civil Engineering
BUET, Dhaka-1000, Bangladesh

Important Notes: Samples as supplied to us have been tested in our laboratory. BRTC does not have any responsibility as to the representative character of the samples required to be tested. It is recommended that samples are sent in a secure and sealed cover/packet/container under signature of the competent authority. In order to avoid fraudulent fabrication of test results, it is recommended that all test reports are collected by duly authorized person, and not by the Contractor/Supplier.

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BRTC BUET

BUETCE 0359680

2.3 MATERIAL PROPERTY

As per investigation and design drawings, the following material properties has been used:

- Yield strength of Rebar, f_y = 60,000 lb/in²
- Compressive strength of column, Footing f_c' = 4,500 lb/in²
- Compressive strength of Beam, Slab, f_c' = 4,000 lb/in²
- Young's modulus of concrete, E_c = $57{,}000\sqrt{f_c'}$

5.12.2 Frequency of Testing

5.12.2.1 Samples for strength tests of each class of concrete placed each day shall be taken not less than once a day, nor less than once for each 60 m³ of concrete, nor less than once for each 250 m² surface area for slabs or walls.

5.12.2.2 On a given project, if the total volume of concrete is such that frequency of testing required by Sec 5.12.2.1 above would provide less than three strength tests for a given class of concrete, tests shall be made from at least three randomly selected batches or from each batch if three or fewer batches are used.

5.12.2.3 When the total quantity of a given class of concrete is less than 20 m³, strength tests are not required when evidence of satisfactory strength is submitted to and approved by the Engineer.

5.12.2.4 A strength test shall be the average of the strengths of at least two 150 mm by 300 mm cylinders or at least three 100 mm by 200 mm cylinders made from the same sample of concrete and tested at 28 days or at test age designated for determination of f_c'.

Description: The number of concrete cylinder test reports that didn't meet BNBC's frequency of testing requirement (section 5.12.2). The building engineer is required to verify in-situ concrete strength to confirm the design strength of 4500 and 4000 psi.

2.4.4 Earthquake Load (E)

Proper structural design of any Building structure must include loads due to earthquake shaking. Although there has been no major incident of earthquake hazard in the recent past of Bangladesh, earthquakes are not uncommon in this area. Scientific geological study of the earth crust below Bangladesh shows that Bangladesh does fall in moderate to high seismic risk zone. Statistical evidence from past major and minor earthquake incidents shows that a major earthquake is overdue in the recent times of geological scale. Therefore, it is necessary to prepare against any possible earthquake hazard. It should be kept in mind that the objective of earthquake resistance Building design is not to make a strong Building which can resist any damage due to earthquake. Instead, the earthquake-resistant design aims at minimizing the possible damage and casualty to an acceptable level.

Regarding the earthquake resistant structural design, the specific design code must be followed. For the analysis and design checking of this Building, the equivalent static force method of BNBC (2020) is followed. The main considerations for the calculation of earthquake load are given below.

For BNBC-2020,

- Zone co-efficient, Z = 0.28 (zone III, as per BNBC 2020)
- Structure importance co-efficient, I = 1.0 (Occupancy Category II, Table 6.2.17, BNBC-20)
- Response modification co-efficient for RCC, R = 8.0 (Table 6.2.19, BNBC-20)
- System Overstrength factor, Ωo = 3.0
- Deflection amplification factor, Cd= 5.5
- Site class = SC (Table 6.2.13, BNBC-20)
- Vertical component of earthquake = 0.5*2/3*Z*S*Dead Load.

Description: Response modification co-efficient, R-value considered as 8 for SMRF, but detailed calculation/justification is not provided (both beam & column) for the consideration.

Observation-3: Non-structural elements found unbraced/not anchored. (Factory Building (Extended Portion))

Unbraced racks on the floor

Description: Non-structural elements suspended from, attached to, or resting atop the structure shall be adequately anchored and braced to resist earthquake forces. Factory is required to brace/anchor all non-structural elements (storage racks).

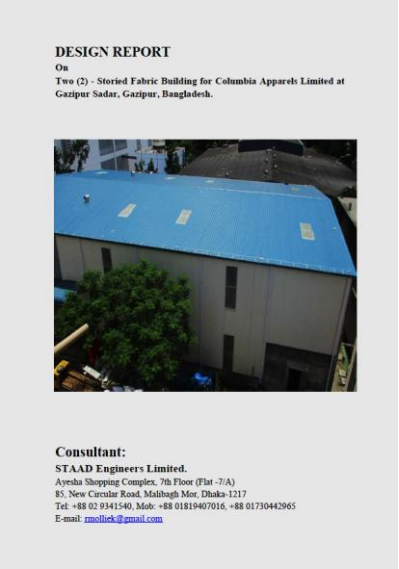
Observation-4: Falling Hazard. (Factory Building (Extended Portion) and STP)

Roof of factory building

Stair of STP

Description: Railing/parapet was not provided in the stair and roof, which may cause falling hazard. The factory is required to provide railing/barriers to avoid possible falling hazards.

Observation-5: Lack of information in the design report. (Fabric Warehouse)



DESIGN REPORT
On
Two (2) - Storied Fabric Building for Columbia Apparels Limited at Gazipur Sadar, Gazipur, Bangladesh.

Consultant:
STAAD Engineers Limited.
Ayesha Shopping Complex, 7th Floor (Flat -7/A)
85, New Circular Road, Malibagh Mor, Dhaka-1217
Tel: +88 02 9341540, Mob: +88 01819407016, +88 01730442965
E-mail: rmollick@gmail.com

Description: A design report was available for the fabric warehouse. However, the adequacy checks of different structural members (foundation, column, beam, rafter) were not provided properly (comparison of demand and capacity for each element), and the steel member connection check was not incorporated into the design report.

The building engineer is required to incorporate an adequacy check of all structural members and steel member connections in the design report in compliance with section 1.9.1 (part-6, BNBC) and submit it to the RSC for review.

Observation-6: Connection gap. (Fabric Warehouse)

Description: Connection gaps were observed in the steel joint. The building engineer is required to identify the locations and carry out suitable remedial works.

3. Action Plan:

Observation	Action Plan	Timeline
Building permit from local authority not available. (Factory Building (Extended Portion) and Fabric Warehouse)	The factory authority is required to collect building permits from the local authority.	within 6 months
Inconsistencies in design report. (Factory Building (Extended Portion))	Verify in-situ concrete stresses either by 100mm diameter cores from 4 columns or existing cylinder strength data.	within 6 weeks
	Building engineer is required to address the inconsistencies in the design report and submit revised design documents to RSC to complete the review.	within 6 weeks
	Carry out suggested remedial works if required.	within 6 months
Non-structural elements found unbraced/not anchored. (Factory Building (Extended Portion))	Factory is required to brace/anchor all non-structural elements.	within 6 weeks
Falling Hazard. (Factory Building (Extended Portion) and STP)	The factory is required to provide railing/barriers to avoid possible falling hazards.	within 6 weeks
Lack of information in the design report. (Fabric Warehouse)	Building engineer is required to incorporate an adequacy check of all structural members, and steel members connections in the design report in compliance with section 1.9.1 (part-6, BNBC)and submit it to the RSC for review.	within 6 weeks
	Carry out the suggested remedial works.	within 6 months
Connection gap. (Fabric Warehouse)	Building engineer is required to identify the locations and carry out suitable remedial works.	within 6 weeks