AMC Knit Composite Ltd. (Extension)

5508, Baniar Chala, Bhabanipur, Gazipur Sadar ,Gazipur

(24.160098, 90.410616)

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RSC RMG SUSTAINABILITY COUNCIL

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1. Executive Summary

Production Building: is a six (G+5) storied RC building.
Utility Building: is a two (G+1) storied RC building.
Yarn Store Shed: is a single-storied steel shed.
Fire Pump Room: is a single-storied RC beam-column frame building with an underground water reservoir and fire pump room.
Security Building: is a single-storied RC beam-column frame structure.

2. Observations

Observation-01: Inconsistencies in design report. (Production Building)

- Compressive strength, f'_c = 4500 lb/in^2 for Columns
- Compressive strength, f'_c = 3500 lb/in^2 for Footings, Beams & Slabs
- Young's modulus of concrete, E_c = $57000\sqrt{f'_c}$

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, earthquake resistant design basically aims at minimizing the possible damage and casualty to an acceptable level. Regarding the earthquake resistant structural design, it essential that the specific design code is followed. For the analysis and design checking of this building, *Equivalent Static Force Method* of BNBC (2006) is followed. The main considerations for calculation of earthquake load are given below.

- Zone co-efficient, Z = 0.15 (zone 2, As Per BNBC 2006)
- Structure importance co-efficient, I = 1.00 (Standard Occupancy, Table 6.2.23, BNBC 2006)
- Where Numerical co-efficient, Ct = 0.03 in SI unit for RCC moment resisting frame.
- Response modification co-efficient, R = 8
- Site co-efficient, $S2$= 1.2 (type 2 soil as suggested in Table 6.2.25, BNBC)

Description: In the design report, the concrete strength has been considered 3500 psi and 4500 psi. However, the cylinder test reports were not available to confirm the design strength. The intermediate moment resisting frame (IMRF, R=8) was considered in the design without proper justification in the design report. The building engineer is required to verify in-situ concrete strength to confirm the design strength, recheck the design parameters and update the design documents accordingly.

Observation-02: Non-structural elements found unbraced/not anchored. (Production Building)

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-03: Column Susceptible to trolly impact. (Production Building)

Description: Columns are susceptible to trolly impact on different floor levels. Building engineer is required to take necessary action to prevent the trolley impact in the columns.

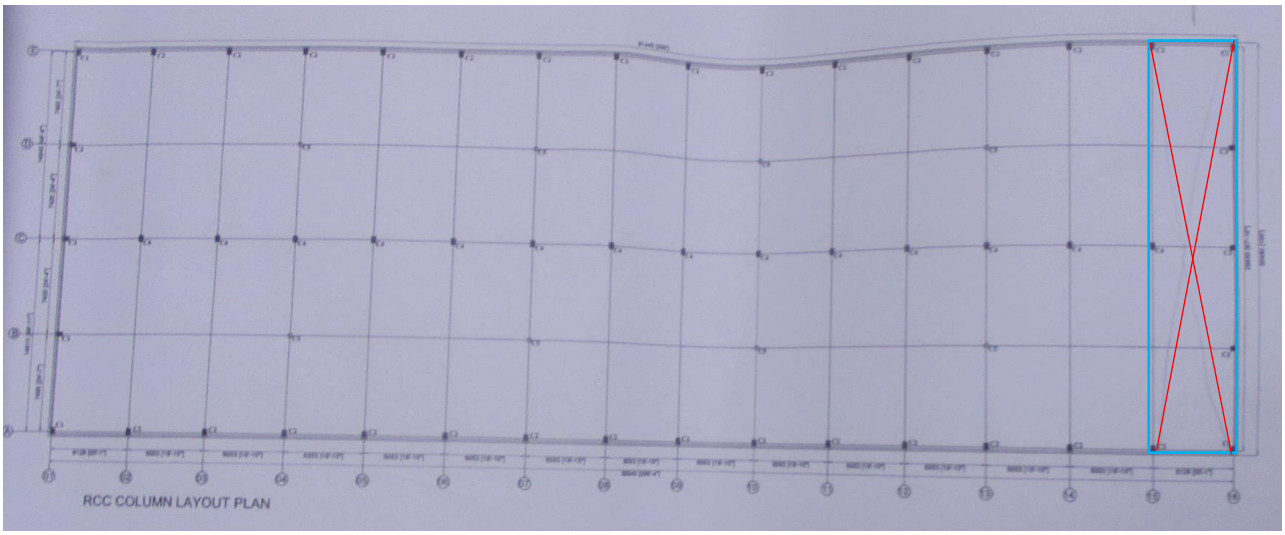
Observation-04: Building permit from local authority not available. (Yarn store shed, Utility Building, Fire Pump Room)

Description: During the inspection, a building permit from the local authority was not available for the Yarn store shed, Utility Building, and Fire Pump Room. The factory authority is required to collect building permits from the local authority for these buildings.

Observation-05: Lack of lateral stability system. (Yarn Store Shed)

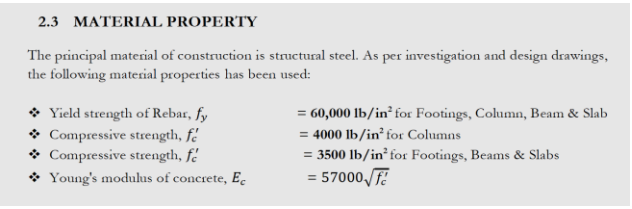
Description: Load transfer media is not provided along the long direction. Therefore, the lateral stability system of the shed is apparently incomplete.
The building engineer is required to check the stability system of the existing structure and prepare design documents (including as-built drawings, design report, and material test reports) in compliance with section 1.9.1 (part-6, BNBC).

Observation-06: Discrepancy with working drawings. (Yarn Store Shed)



Description: During the inspection, the factory provided a set of working drawings (RC part) for the Yarn store shed. But the end bay (grid 15-16) has not been constructed as per the drawing (marked area).
Building engineer is required to survey the structures and update the as-built drawings as per the actual site condition.

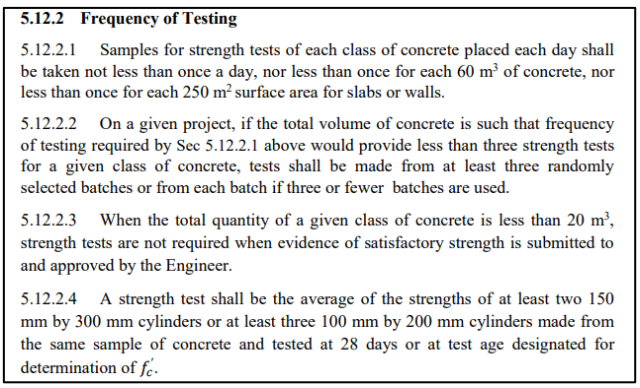
Observation-07: Inconsistencies in design report. (Utility Building)



2.3 MATERIAL PROPERTY

The principal material of construction is structural steel. As per investigation and design drawings, the following material properties has been used:

- Yield strength of Rebar, f_y = **60,000 lb/in²** for Footings, Column, Beam & Slab
- Compressive strength, f_c' = **4000 lb/in²** for Columns
- Compressive strength, f_c' = **3500 lb/in²** for Footings, Beams & Slabs
- Young's modulus of concrete, E_c = $57000\sqrt{f_c'}$



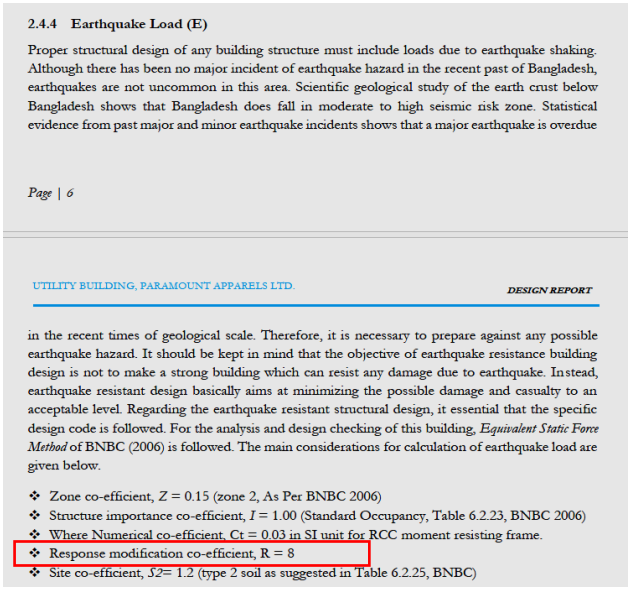
5.12.2 Frequency of Testing

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'.



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

Page | 6

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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, earthquake resistant design basically aims at minimizing the possible damage and casualty to an acceptable level. Regarding the earthquake resistant structural design, it essential that the specific design code is followed. For the analysis and design checking of this building, *Equivalent Static Force Method* of BNBC (2006) is followed. The main considerations for calculation of earthquake load are given below.

- Zone co-efficient, Z = 0.15 (zone 2, As Per BNBC 2006)
- Structure importance co-efficient, I = 1.00 (Standard Occupancy, Table 6.2.23, BNBC 2006)
- Where Numerical co-efficient, Ct = 0.03 in SI unit for RCC moment resisting frame.
- Response modification co-efficient, R = 8
- Site co-efficient, $S2$= 1.2 (type 2 soil as suggested in Table 6.2.25, BNBC)

Description: In the design report, the concrete strength has been considered 3500 psi and 4000 psi. The number of concrete cylinder test reports didn't meet BNBC's frequency of testing requirements (section 5.12.2). The building engineer is required to verify in-situ concrete strength to confirm the design strength of 3500 psi and 4000 psi. Also, the intermediate moment resisting frame (IMRF, R=8) was considered in the design without proper justification.
The building engineer is required to verify in-situ concrete strength to confirm the design strength, recheck the design parameters and update the design documents accordingly.

Observation-08: Intrusion of oil through the 1st floor slab. (Utility Building)

Description: Oil Intrusion through ceiling of 1st was observed due to oil leakage from tank. Building engineer is required to investigate the reason of intrusion in RC slab and repair the slab with proper method.

Observation-09: Lack of design documents. (Fire Pump Room)

Description: 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 sections 1.9.1.1 and 1.9.1.2 as per BNBC.
At the time of inspection, design documents (design report, structural drawings, and material test reports) were not available, which are required to be prepared in compliance with section 1.9.1 (part 6, BNBC). However, the provided as-built drawings do not indicate the site condition.

Observation-10: Lack of as-built drawing. (Security Building)

Description: The as-built drawings of the Security Building were not available on site. The building engineer is required to prepare the as-built drawing of the structure.

3. Action Plan

Serial No	Observation	Action Plan	Timeline
1	Inconsistencies in design report. (Production Building)	The building engineer is required to verify in-situ material strength (by taking cores from lower-tier columns).	within 6 weeks
2	Inconsistencies in design report. (Production Building)	The building engineer is required to address the inconsistencies in the design report and submit revised design documents to RSC for review.	within 6 weeks
3	Inconsistencies in design report. (Production Building)	Carry out the remedial work if required.	within 6 months
4	Non-structural elements found unbraced/not anchored. (Production Building)	Factory is required to brace/anchor all non-structural elements.	within 6 months
5	Column Susceptible to trolly impact. (Production Building)	Building engineer is required to take necessary action to prevent the trolley impact in the columns.	within 6 months
6	Building permits from the local authority not available. (Yarn Store Shed, Utility Building, Fire Pump Room)	Factory authority is required to collect building permits from local government authority for the building.	within 6 months
7	Lack of lateral stability system. (Yarn Store Shed)	The building engineer is required to check the stability system of the existing structure and prepare design documents (including as-built drawings, design report, and material test reports) in compliance with section 1.9.1 (part-6, BNBC).	within 6 weeks
8	Lack of lateral stability system. (Yarn Store Shed)	Carry out the suggested remedial works.	within 6 months
9	Discrepancy with working drawings. (Yarn Store Shed)	The building engineer is required to survey the whole structure and revise the as-built drawing as per actual site condition.	within 6 weeks

10	Inconsistencies in design report. (Utility Building)	The building engineer is required to verify in-situ material strength (by taking cores from lower-tier columns).	within 6 weeks
11	Inconsistencies in design report. (Utility Building)	The building engineer is required to address the inconsistencies in the design report and submit revised design documents to RSC for review.	within 6 weeks
12	Inconsistencies in design report. (Utility Building)	Carry out suggested remedial works if required.	within 6 months
13	Intrusion of oil through the 1st floor slab. (Utility Building)	The building engineer is required to investigate the reason for oil intrusion into the RC slab and repair the slab with the proper method.	within 6 weeks
14	Lack of design documents. (Fire Pump Room)	The building engineer is required to survey the structure and prepare accurate as-built drawings.	within 6 weeks
15	Lack of design documents. (Fire Pump Room)	The building engineer is required to prepare design documents (including design reports, structural drawings, and material test reports) in compliance with section 1.9.1 (part 6, BNBC).	within 6 weeks
16	Lack of design documents. (Fire Pump Room)	Carry out the suggested remedial works.	within 6 months
17	Lack of as-built drawing. (Security Building)	The building engineer is required to prepare as-built drawings.	within 6 weeks