

# Arrival Fashion Limited (Bhaluka)

Holding-18, Mamarishpur, Mallikabari, Bhaluka, Mymensingh-2240

(24.374251, 90.361908)

20 December 2023



## 1. Building Information

**Garment Shed:** A single (G+M) storied steel shed with structurally separated mezzanine.

**Dinning Shed-1:** A single storied steel shed.

**Dinning and Canteen Shed:** A single storied prefabricated steel shed.

**Pump House:** Pump House is a single storied RC building.

**Generator Building:** The Generator Building is a single storied RC building.

**Dinning Shed-2:** Dining Shed-02 is a single storied steel shed.

**Garments Building:** Garments building is a 3 storied with a basement (B+G+2) RC building.

**Security Building:** Security Building is a single storied RC building.

**Boiler Shed:** Boiler Shed is a single storied steel shed.

**Utility Building:** The Utility Building is a single storied RC building.

**Fire Control Room:** The Fire Control Room is a single storied steel shed.

**Childcare & Medical Room:** The Childcare & Medical Room is a single storied steel shed.

**Submersible Pump Room:** Submersible Pump Room is a single storied RC building.

## 2. Observations

### Observation-1: Inconsistency in design report and FEA model (Garments Shed).

**2.1.2 CODES OF PRACTICE:**  
The structures are designed in accordance to the following Codes, Standards and technical literatures:  
Steel Structure Design Analysis: **AISC-LRFD**  
RCC Structure Design Analysis: ACI 318-11

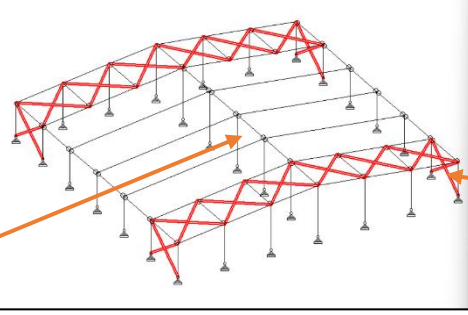
**2.1.3 DESIGN PARAMETER SUMMARY:**

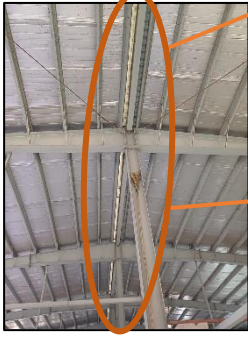
ASD design code has been used with ASD load combination.



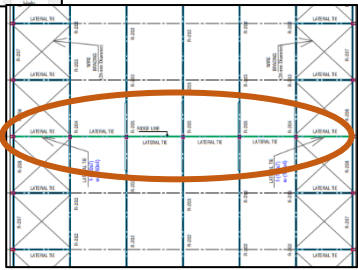
In FEA model, rod section has been assigned as vertical bracing instead of I-section.

AISC LRFD design code is used in design report.





These compression members are missing in FEA model.

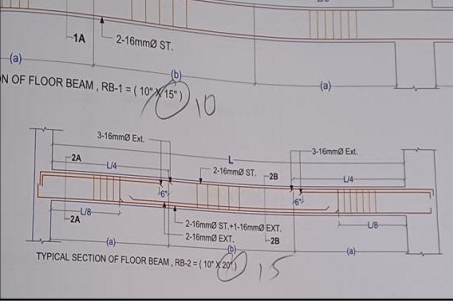


**Description:** The Garments shed has been designed in accordance with AISC LRFD as per design report. However, ASD design code with ASD load combinations was observed in FEA model. Also, inconsistency was found in horizontal compression member and vertical bracing assignment. The building engineer is required to revise the design report considering the effect of compression member and proper design code.

### Observation-2: Mismatch in as built drawings (Garments Shed).



Eave height was found 6.01m instead of 4.87m.



Mezzanine floor beam depth was found 250 mm instead of 375 mm.



Extended portion of the rafter has not shown in drawing.

**Description:** During inspection, mismatches were found between onsite condition and as-built drawing of garment shed. Extended part of the rafter was not shown in the drawing. Also, mismatches were observed in mezzanine floor beam size and eave height of the shed. The building engineer is required to survey the full structure and produce accurate as-built drawings.



**Observation-3: Loose Cable bracing (Garments Shed).**



Loose cable bracing  
were observed.



**Description:** During inspection, loose cable bracings were observed on the roof of garment shed. Factory engineer is required to tighten the loose cable bracings.

**Observation-4: Non-structural element found not anchored. (Garments Shed).**



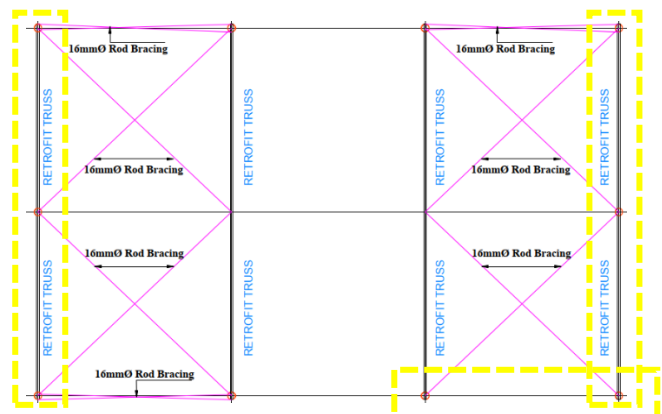
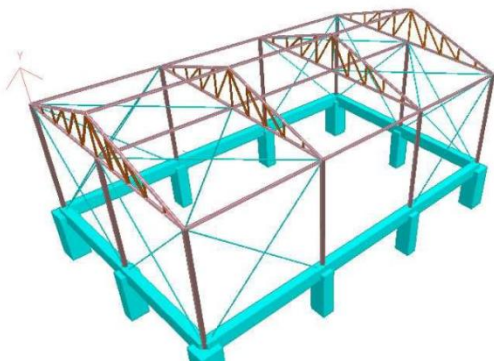
Storage Rack – not anchored



Plastic Water Tank on mezzanine roof  
not braced

**Description:** During inspection non-structural elements were found unbraced and without anchoring. Factory engineers are required to anchor all non-structural elements.

**Observation-5: Lack of Lateral Stability (Dining Shed-01)**



Wall Bracing in FEA model



Bracing Missing in side wall

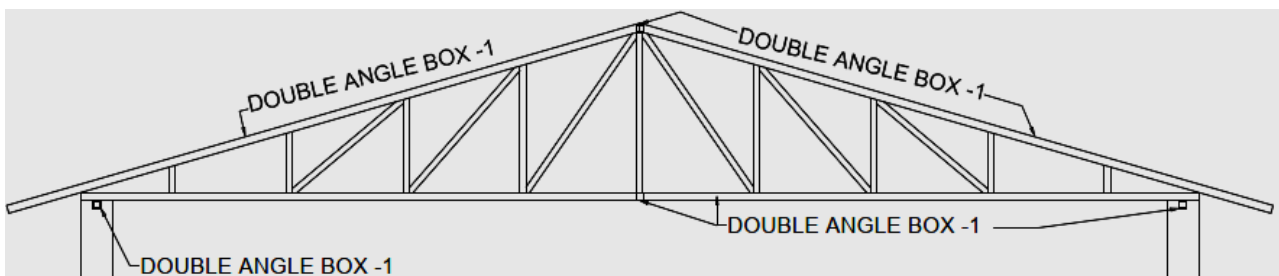
Wall Bracing not shown in marked position in Retrofitting drawing



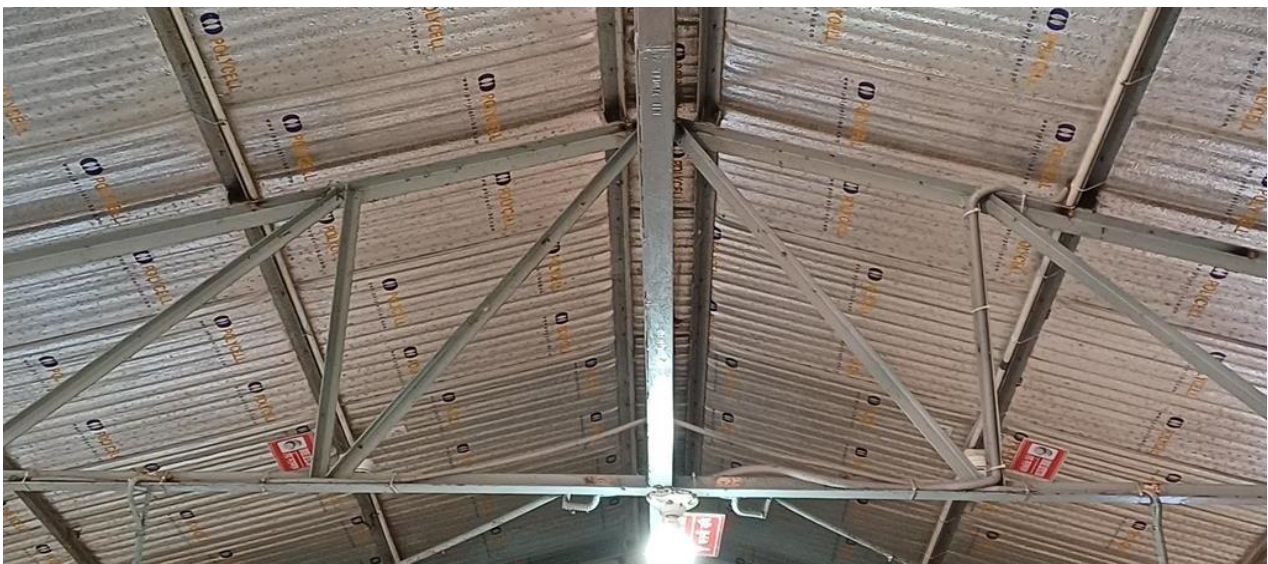
Bracing Missing in end frame

**Description:** Wall bracings were not shown in retrofitting drawings and not found in as built condition which are necessary for lateral stability of the frame. Building engineer is required to check the lateral stability of the shed considering the as built condition and submit to the RSC for review.

**Observation-6:** Incomplete retrofitting works (Dining Shed-01)



Truss Section





Top & Bottom Chord found L 50x50x5 instead of steel tube (50x50x5)

**Description:** During inspection, top & bottom chords were found L 50x50x5 instead of steel tube (50x50x5). Building engineer is required to complete the remediation works as per retrofitting drawings.

**Observation-7:** Corrosion found on exposed rebar (Generator Building).



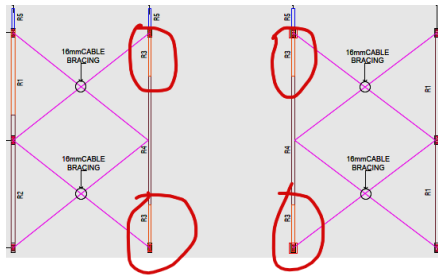
**Description:** During inspection, corrosion was observed on exposed rebar at roof level. Factory is required to repair the corrosion and apply anti-corrosive coating on exposed rebar.

**Observation-8:** Lack of lateral stability system (Dining Shed-02).



**Description:** Portal frame action was observed in the short direction. No compression strut or load transfer media was observed in long direction. Building engineer is required to check the lateral stability of shed and submit to the RSC review.

**Observation-9: Discrepancies in as built drawings (Dining Shed-02).**



| Steel Beam ID | Web (mm) | Thickness (mm) | Flange (mm) | Thickness (mm) |
|---------------|----------|----------------|-------------|----------------|
| RAFTER-1      | 295      | 4              | 150         | 5              |
| RAFTER-2      | 305      | 5              | 180         | 7              |
| RAFTER-3      | 540~265  | 5              | 130         | 7              |
| RAFTER-4      | 265      | 5              | 130         | 7              |
| RAFTER-5      | 200      | 4              | 130         | 5              |



**Description:** During inspection, the web depth of Rafter-3 was found 440 mm instead of 540 mm. Building engineer is required to survey the whole structure and update as-built drawing as per site condition.

**Observation-10: Design report needs to be updated (Garments Building).**

| 3.2 EARTHQUAKE CHARACTERISTICS         |              |        |
|----------------------------------------|--------------|--------|
| Seismic zone co-efficient, $Z$         | Table 6.2.14 | Zone-4 |
| Importance factor, $I$                 | Table 6.2.17 | 1.00   |
| $C_u$                                  | Table 6.2.20 | 0.0466 |
| $m$                                    | Table 6.2.20 | 0.9    |
| Response reduction factor, $R$         | Table 6.2.19 | 6.5    |
| System Overstrength factor, $O_h$      | Table 6.2.19 | 2.5    |
| Deflection Amplification factor, $C_d$ | Table 6.2.19 | 5      |
| Site Class                             | Table 6.2.18 | SD     |

'R' value of DUAL System as per BNBC 20

| E. DUAL SYSTEMS:<br>INTERMEDIATE MOMENT FRAMES CAPABLE OF RESISTING AT LEAST 25% OF PRESCRIBED SEISMIC FORCES (with bracing or shear wall) |     |     |   |    |    |    |
|--------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|---|----|----|----|
| 1. Special steel concentrically braced frames                                                                                              | 6   | 2.5 | 5 | NL | NL | 11 |
| 2. Special reinforced concrete shear walls                                                                                                 | 6.5 | 2.5 | 5 | NL | NL | 50 |
| 3. Ordinary reinforced masonry shear walls                                                                                                 | 3   | 3   | 3 | NL | 50 | NP |

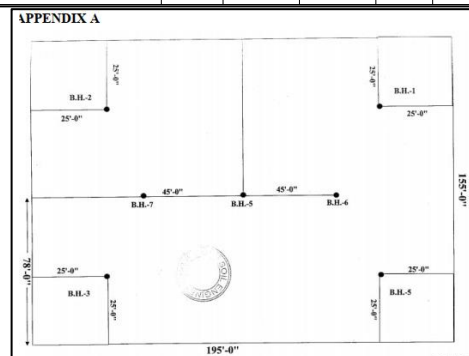
'R' value used in design report.

No calculation of 'R' or check for 'DUAL system' has given in design report.

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|                                    |        |     |
|------------------------------------|--------|-----|
| Skin Friction                      | 79.48  | Ton |
| End Bearing                        | 102.10 | Ton |
| Allowable Bearing Capacity         | 181.58 | Ton |
| SD,                                |        |     |
| Average Allowable Bearing Capacity | 168.91 | Ton |
| With Factor of Safety, F.S = 3     |        |     |

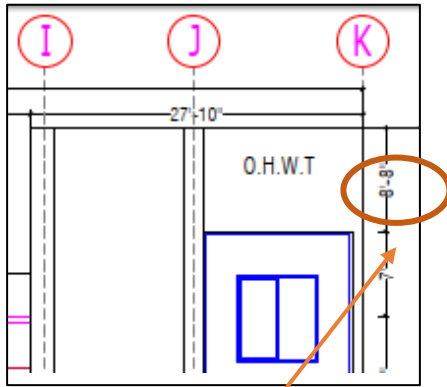
Pile capacity has been calculated from the average capacity of 5 bore hole data.



7 Bore Hole as per Bore hole layout.

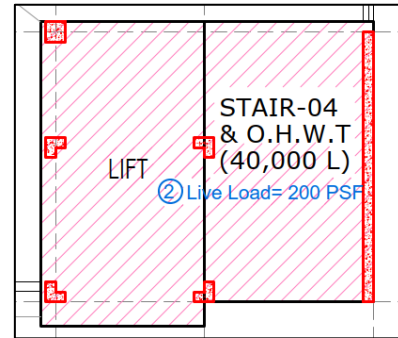
**Description:** Garments building has been designed as per BNBC 2020 and Response modification factor 'R' value was taken for DUAL system (IMRF and Special RC Shear wall). However, no calculation of 'R' or check for dual system has been provided in design report. Also, load bearing capacity of pile has been calculated from the average value of 5 Bore Hole data where 7 Bore holes were investigated. The building engineer is required to revise the design documents considering the requirements for framing system as per BNBC 2020 and appropriate calculation for pile load bearing capacity.

**Observation-11:** Load plans need to be revised (Garments Building).



Possible overloading from  
higher capacity O.H.W.T.

Equivalent Water  
height of 200 psf live  
load is 0.975 m which  
is lower than existing  
capacity (2.34m) of  
O.H.W.T.



200 psf was considered on bottom  
slab of O.H.W.T. as per load plan.

**Description:** Garments building has been designed with a live load of 200psf for overhead water tank. However, the size of the water tanks has 475psf (2.34m of water height) which can cause overloading on the structures. The building engineer is required to update the load plan for actual capacity of water tank and incorporate it in design report.

**Observation-12:** Hairline crack on basement retaining wall (Garments Building).



**Description:** During inspection, hairline cracks were observed on basement retaining wall at several locations. Factory is required to identify the reason of crack, take necessary remedial measure to repair the wall accordingly.



**Observation-13:** Lack of lateral stability system (Boiler Shed).



**Description:** Portal frame action was observed in the short direction. No compression strut or load transfer media was observed in long direction. Building engineer is required to check the lateral stability of shed and submit to the RSC review.

**Observation-14:** Corrosion on steel member (Boiler Shed).



Rafter



Column

**Description:** During inspection, corrosion was observed on several steel columns and rafters. Building engineer is required to repair the corrosion and apply anti-corrosive coating on steel members.

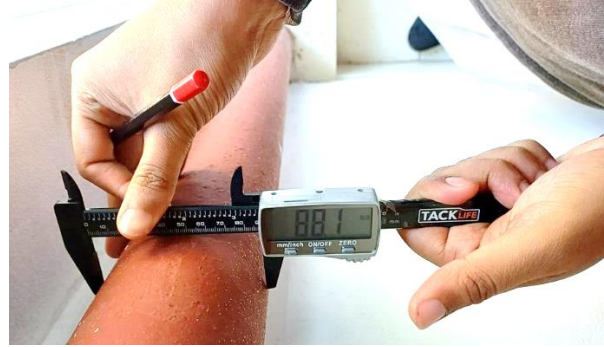
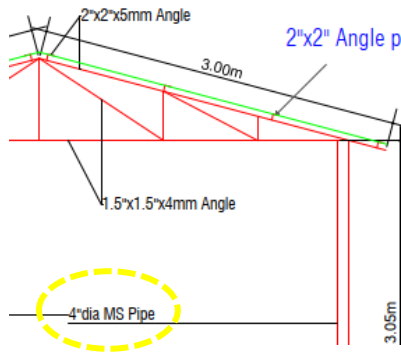
**Observation-15:** Lack of design report (Utility Building).



**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. During the inspection, the design report and as built structural drawing were not available on site.

The building engineer is required to prepare a set of design documents including as built drawings, live load plan at roof and a design report based on in-situ material strength and software-based analysis which shall be prepared in compliance with section 1.9.1, part-6 of BNBC.

**Observation-16:** Discrepancies in as built drawings (Fire Control Room).



**Description:** During inspection, diameter of steel pipe columns was found 88 mm instead of 100 mm. Building engineer is required to survey the whole structure and update as-built drawing as per site condition.

**Observation-17:** Lack of lateral stability system (Fire Control Room).



**Description:** Truss action was observed in the short direction. No compression strut or load transfer media was observed in long direction. Building engineer is required to check the lateral stability of shed and submit to the RSC review.

**Observation-18:** Lack of lateral stability system (Childcare & Medical Room).



**Description:** Truss action was observed in the short direction. No compression strut or load transfer media was observed in long direction. Building engineer is required to check the lateral stability of shed and submit to the RSC review.

### 3. Action Plan

| Observation                                                   | Action Plan                                                                                                                                                                                  | Timeline        |
|---------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|
| Inconsistency in design report and FEA model (Garments Shed). | The building engineer is required to revise the design report considering the effect of compression member and proper design code.                                                           | within 6 weeks  |
| Inconsistency in design report and FEA model (Garments Shed). | Carry out suggested remedial works if required.                                                                                                                                              | within 6 months |
| Mismatch in as built drawings (Garments Shed).                | The building engineer is required to survey the full structure and produce accurate as-built drawings.                                                                                       | within 6 weeks  |
| Loose Cable bracing (Garments Shed).                          | Factory engineer is required to tighten the loose cable bracings.                                                                                                                            | within 6 weeks  |
| Non-structural element found not anchored. (Garments Shed).   | Factory engineer is required to anchor/brace all non-structural elements.                                                                                                                    | within 6 weeks  |
| Lack of Lateral Stability (Dining Shed-01)                    | Building engineer is required to check the lateral stability of the shed considering the as built condition and submit to the RSC for review.                                                | within 6 weeks  |
| Lack of Lateral Stability (Dining Shed-01)                    | Carry out suggested remedial works if required.                                                                                                                                              | within 6 months |
| Incomplete retrofitting works (Dining Shed-01)                | Building engineer is required to complete the remediation works as per retrofitting drawings.                                                                                                | within 6 months |
| Corrosion found on exposed rebar (Generator Building).        | Factory is required to remove corrosion and apply rust proof paint on exposed rebar.                                                                                                         | within 6 weeks  |
| Lack of lateral stability system (Dining Shed-02).            | Building engineer is required to check the lateral stability of shed and submit to the RSC review.                                                                                           | within 6 weeks  |
| Lack of lateral stability system (Dining Shed-02).            | Carry out remedial work where required.                                                                                                                                                      | within 6 months |
| Discrepancies in as built drawings. (Dining Shed-02)          | The building engineer is required to survey the full structure and produce accurate as-built drawings.                                                                                       | within 6 weeks  |
| Design report needs to be updated (Garments Building).        | The building engineer is required to revise the design documents considering the requirements for framing system as per BNBC 2020 and appropriate calculation for pile load bearing capacity | within 6 months |
| Design report needs to be updated (Garments Building).        | Carry out suggested remedial works if required.                                                                                                                                              | within 6 months |
| Load plans need to be revised (Garments Building).            | The building engineer is required to update the load plan for actual capacity of water tank and incorporate it in design report.                                                             | within 6 weeks  |



|                                                                |                                                                                                                                                                    |                 |
|----------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|
| Hairline crack on basement retaining wall (Garments Building). | Building engineer is required to investigate the reason of the crack, extend of the cracks and suggest necessary remedial measure to repair the crack accordingly. | within 6 weeks  |
| Lack of lateral stability system (Boiler Shed).                | Building engineer is required to check the lateral stability of shed and submit to the RSC review.                                                                 | within 6 weeks  |
| Lack of lateral stability system (Boiler Shed).                | Carry out remedial works if required.                                                                                                                              | within 6 months |
| Corrosion on steel member (Boiler Shed).                       | Building engineer is required to repair the corrosion and apply anti-corrosive coating on steel members.                                                           | within 6 weeks  |
| Lack of Design Report. (Utility Building)                      | The building engineer is required to prepare a set of design documents BNBC sec.1.9.1 including as built drawings and submit it to the RSC for review.             | within 6 weeks  |
| Lack of Design Report. (Utility Building)                      | Carry out remedial works if required.                                                                                                                              | within 6 months |
| Discrepancies in as built drawings. (Fire Control Room)        | The building engineer is required to survey the full structure and produce accurate as-built drawings.                                                             | within 6 weeks  |
| Lack of lateral stability system (Fire Control Room).          | Building engineer is required to check the lateral stability of shed and submit to the RSC review.                                                                 | within 6 weeks  |
| Lack of lateral stability system (Fire Control Room).          | Carry out remedial work where required.                                                                                                                            | within 6 months |
| Lack of lateral stability system (Childcare & Medical Room).   | Building engineer is required to check the lateral stability of shed and submit to the RSC review.                                                                 | within 6 weeks  |
| Lack of lateral stability system (Childcare & Medical Room).   | Carry out remedial work where required.                                                                                                                            | within 6 months |