

# Colotex Apparels Ltd

Plot:10/1, South Salna, Joydebpur, Gazipur, Bangladesh

(24.01915N,90.38351E)

07 June 2022

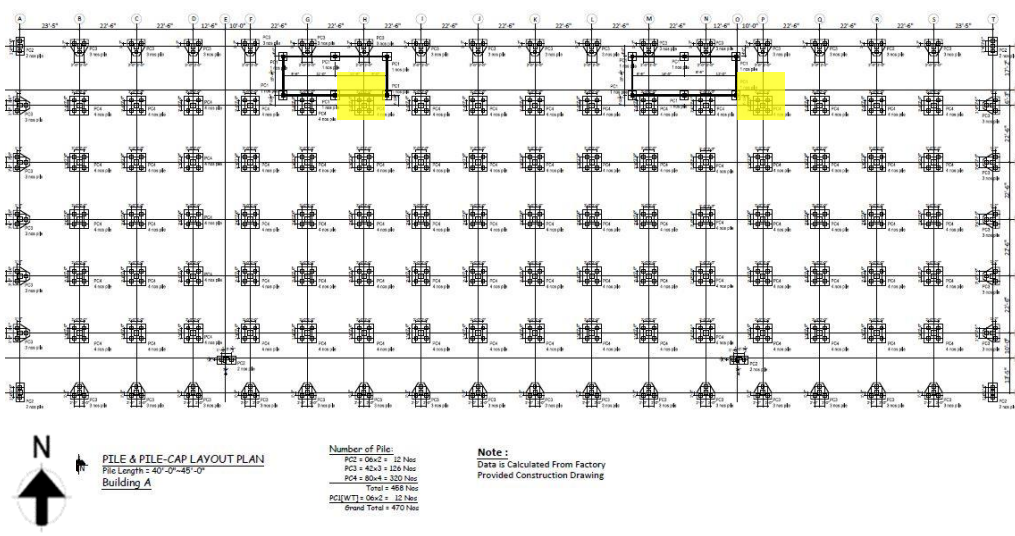


# Buildings Information

1. Building-A (G+7)
2. Ansar-Building (G+1)
3. Utility Building (single storied RCC and steel)
4. ETP Building (G+1)
5. HT- Substation Building (single storied)

# Observations

**Factor of Safety of several pile foundations are  
below the allowable limit**



Pile Layout plan



Load coming from OHT

Cursory calculation indicates that factor of safety (FoS) of some pile foundations is below the allowable limit considering the floor live load 3 kPa for typical floor, 5 kPa for stair area, 1.5 kPa for roof, super imposed load from overhead water tank and ultimate pile capacity 180 Ton. Factory engineer to required to review the design, loads and foundation stresses and prepare a remediation plan.

## 10. CONCLUSION & RECOMMENDATION

Maintained loading static axial compression test on the Service piles was carried out to determine axial load carrying capacity under the test conducted by "B.R Geotechnical Consultant". The design load for the service piles were 120,000.00 kg. The test load of 180,332.00 kg was applied to the service piles. Based on the load test results, it has been concluded that the above service piles are safe with design load 120,000.00 kg and the following ultimate load capacity of the Service piles are recommended within the vicinity of the piles.

| Service Pile No     | Size of Pile | Length of Pile | Ultimate Load Capacity |
|---------------------|--------------|----------------|------------------------|
| STP-50,( Grid/01-B) | 16"×16"      | 40'- 0"        | >180,332.00 kg         |
| STP-90, (Grid/06-D) | 16"×16"      | 40'- 0"        | >180,332.00 kg         |

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Ultimate pile capacity is mentioned as 180 Ton in pile load test report

| WSD   |          |                          |                  |                  |                  |           |
|-------|----------|--------------------------|------------------|------------------|------------------|-----------|
| JOINT | FZ (Kip) | Allowable Capacity (Kip) | Provided Pile No | Reaction on Pile | Overstress Ratio | Adequacy  |
| 101   | 990.904  | 320                      | 4                | 247.726          | 0.77414375       | Adequate. |
| 102   | 1054.751 | 320                      | 4                | 263.68775        | 0.82402422       | Adequate. |
| 103   | 1120.215 | 320                      | 4                | 280.05375        | 0.87516797       | Adequate. |
| 104   | 950.607  | 320                      | 4                | 237.65175        | 0.74266172       | Adequate. |
| 105   | 996.572  | 320                      | 4                | 249.143          | 0.77857188       | Adequate. |
| 106   | 989.713  | 320                      | 4                | 247.42825        | 0.77321328       | Adequate. |
| 107   | 1042.684 | 320                      | 4                | 260.671          | 0.81459688       | Adequate. |
| 108   | 1041.476 | 320                      | 4                | 260.369          | 0.81365313       | Adequate. |
| 109   | 584.511  | 320                      | 3                | 194.837          | 0.60886563       | Adequate. |
| 110   | 588.379  | 320                      | 3                | 196.126333       | 0.61289479       | Adequate. |
| 111   | 615.687  | 320                      | 3                | 205.229          | 0.64134063       | Adequate. |
| 112   | 621.661  | 320                      | 3                | 207.220333       | 0.64756354       | Adequate. |
| 113   | 632.455  | 320                      | 3                | 210.818333       | 0.65880729       | Adequate. |
| 114   | 579.361  | 320                      | 3                | 193.120333       | 0.60350104       | Adequate. |
| 115   | 637.936  | 320                      | 3                | 212.645333       | 0.66451667       | Adequate. |
| 116   | 670.503  | 320                      | 3                | 223.501          | 0.69844063       | Adequate. |
| 117   | 713.961  | 320                      | 3                | 237.987          | 0.74370938       | Adequate. |
| 118   | 583.606  | 320                      | 3                | 194.535333       | 0.60792292       | Adequate. |
| 119   | 568.745  | 320                      | 3                | 189.581667       | 0.59244271       | Adequate. |
| 120   | 557.759  | 320                      | 3                | 185.919667       | 0.58099896       | Adequate. |
| 121   | 563.794  | 320                      | 3                | 187.931333       | 0.58728542       | Adequate. |
| 122   | 606.663  | 320                      | 3                | 202.221          | 0.63194063       | Adequate. |

Allowable pile capacity is mentioned as 160 Ton in Structural Design Report

Ultimate pile capacity is mentioned as 180 Ton in pile load test report but allowable pile capacity is mentioned as 160 Ton in Detail Engineering Assessment report without any reference. Factory engineer is required to check the adequacy of pile foundations which meets the BNBC standard.

## Observations: Building-A

## **Material strength consideration in design report**

### Material specification:

Reinforcements Bar: Steel (BDS) used in the design of columns, slabs and beams are  $f_y = 72,500$  psi.

### Input Parameters:

Table 1: Input Parameters for Building:

|   |                                              |       |                                                     |
|---|----------------------------------------------|-------|-----------------------------------------------------|
| 1 | Yield Strength of steel                      | $f_y$ | 60000 psi for Column.<br>60000 psi for Beam & Slab. |
| 2 | Cylinder Strength of Concrete for Column     | $f_c$ | 4500 psi                                            |
|   | Beam                                         | $f_c$ | 3500 psi                                            |
| 5 | Young's Modula's of Concrete for stone chips | $E_c$ | $57000 \sqrt{f_c}$                                  |

Material strength shown in DEA report

Strength of concrete (red marked) is considered for structural elements in Detail Engineering Assessment without any test report. Besides, contradictory information provided in Detail Engineering Assessment report. Design value of rebar is shown both as 415 MPa and 500 MPa (black marked). Factory engineer is required to update the Detail Engineering Assessment report as per in-situ material test data.

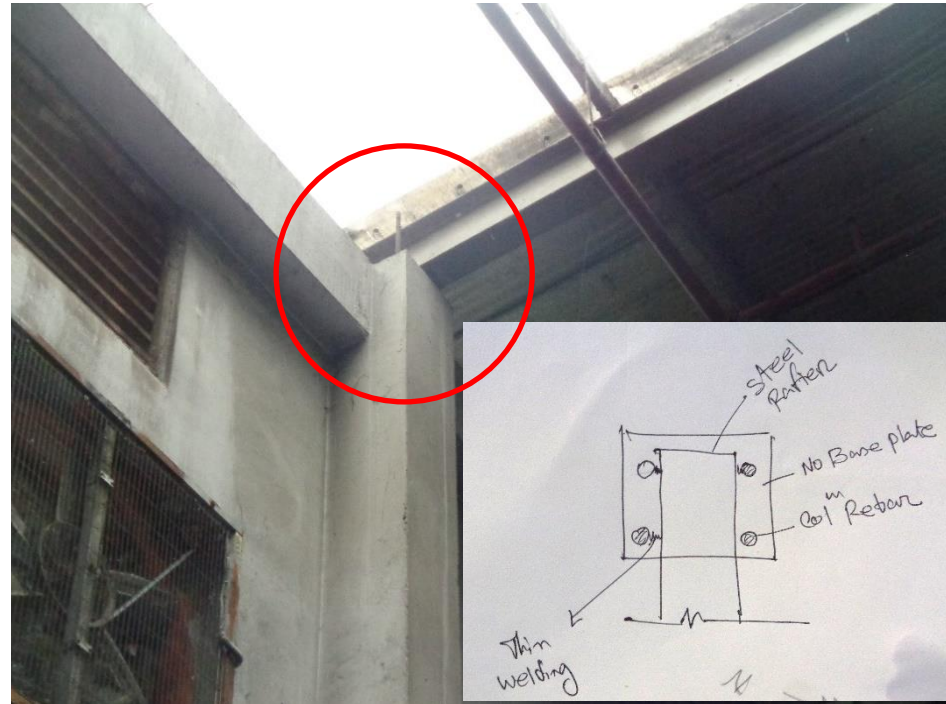
## Observations: Ansar Building



**Apparently inadequate connections**



Apparently inadequate connection: rafter connected to brick wall (extended part)



Apparently inadequate connection: No baseplate (Main part)

Connection of steel part (Main and extended part) of Utility Building was appeared to be in adequate. As part of EA, factory engineer is required to check the connection adequacy of all the connections against uplift forces.

## Observations: Utility Building

# **Absence of design documents**

**Observations: ETP Building**



ETP Building

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. At the time of inspection, design report was not available which is required to be prepared in compliance with section 1.9.1.1 (part-6, BNBC).

**Apparently in adequate steel stair**

**Observations: ETP Building**





Apparently inadequate member size



Apparently inadequate connection

Steel stair at ETP Building was appeared to be inadequate due to apparently inadequate member size and connections. Factory engineer is required to check the structural stability of the steel stair.

# Problems Observed

## **Building-A:**

Item-1: Factor of Safety of several pile foundations are below the allowable limit

## **Ansar Building:**

Item-2: Material strength consideration in design report

## **Utility Building:**

Item-3: Apparently inadequate connections

## **ETP Building**

Item-4: Absence of design documents

Item-5: Apparently inadequate steel stair

# **Priority Actions**



| Item No. | Observation                                                                             | Recommended Action Plan                                                                                            | Recommended Timeline |
|----------|-----------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------|----------------------|
| 01       | Factor of Safety of several pile foundations are below the allowable limit (Building-A) | Factory engineer is required to review the design, loads and foundation stresses for the marked area.              | 6-weeks              |
| 02       | Factor of Safety of several pile foundations are below the allowable limit (Building-A) | Actively manage floor loading plan.                                                                                | 6-weeks              |
| 03       | Factor of Safety of several pile foundations are below the allowable limit (Building-A) | Implement remediation work if required.                                                                            | 6-months             |
| 04       | Factor of Safety of several pile foundations are below the allowable limit (Building-A) | Implement load plan.                                                                                               | 6-months             |
| 05       | Material strength consideration in design report (Ansar Building)                       | Factory engineer is required to update the Detail Engineering Assessment report as per in-situ material test data. | 6-weeks              |

| Item No. | Observation                                                       | Recommended Action Plan                                                                                                    | Recommended Timeline |
|----------|-------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------|----------------------|
| 01       | Material strength consideration in design report (Ansar Building) | Carryout remedial works if required.                                                                                       | 6-months             |
| 02       | Apparently inadequate connections (Utility Building)              | As part of EA, factory engineer is required to check the connection adequacy of all the connections against uplift forces. | 6-weeks              |
| 03       | Apparently inadequate connections (Utility Building)              | Carryout remedial works if required.                                                                                       | 6-months             |
| 04       | Absence of design documents (ETP Building)                        | Factory engineer is required to prepare a design report in compliance with section 1.9.1.1 (part-6, BNBC).                 | 6-weeks              |
| 05       | Absence of design documents (ETP Building)                        | Carryout remedial works if required.                                                                                       | 6-months             |

| Item No. | Observation                                       | Recommended Action Plan                                                            | Recommended Timeline |
|----------|---------------------------------------------------|------------------------------------------------------------------------------------|----------------------|
| 01       | Apparently in adequate steel stair (ETP Building) | Factory engineer is required to check the structural stability of the steel stair. | 6-weeks              |
| 02       | Apparently in adequate steel stair (ETP Building) | Carryout remedial works if required.                                               | 6-months             |