

# Sakura Dyeing & Garments Ltd. (9876)

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## Identified Priority 1 Concerns

None Identified.

## Identified Priority 2 Concerns

Lateral stability system in three-storey building seems insufficient, with only flat slab construction above 1<sup>st</sup> floor level and no reinforced core.

Foundations indicated on structural drawings do not reflect the requirements detailed in the Soil test Report.

## 1<sup>st</sup> Priority 2 Concern



Left, the flat slab arrangement as witnessed in the three-storey building. The stair walls were scanned for reinforcement but it was determined that these were not reinforced shear walls.

This does not seem sufficient for lateral stability of the building, and the tie-detail between perimeter beams and rigid walls (on three sides only) may be critical.

## 2nd Priority 2 Concern

### 11.0 CONCLUSION AND RECOMMENDATION

The sub-soil investigation for the construction of proposed 6 (SIX) – Storied Industrial Building at DAG NO.-C.S & S.A-118,119,R.S-232,233,KHATIAN NO.-C.S-66,S.A-60,R.S-23,123,124,J.L NO.-C.S-156,MOUZA-KHIJIRPUR,P.S-FATULLAH, DIST-NARAYANGANJ, BANGLADESH.

The sub-soil investigation for the consists of 5 (FIVE) nos. exploratory boring up to the maximum depth 50 feet from the existing ground level. The field and laboratory test results of sub-soil investigation up to the maximum depth 50 feet at BH-1, BH-2, BH-3, BH-4 & BH-5 are shown in the bore hole chart and test result sheet enclosed here with. The S.P.T. value, bearing capacity, skin-friction and end bearing capacity supplied in the page no. 10(A) & 10(B). On the basis of information available from this geotechnical, It may conclude that **DEEP Foundation** will be suitable and economy.

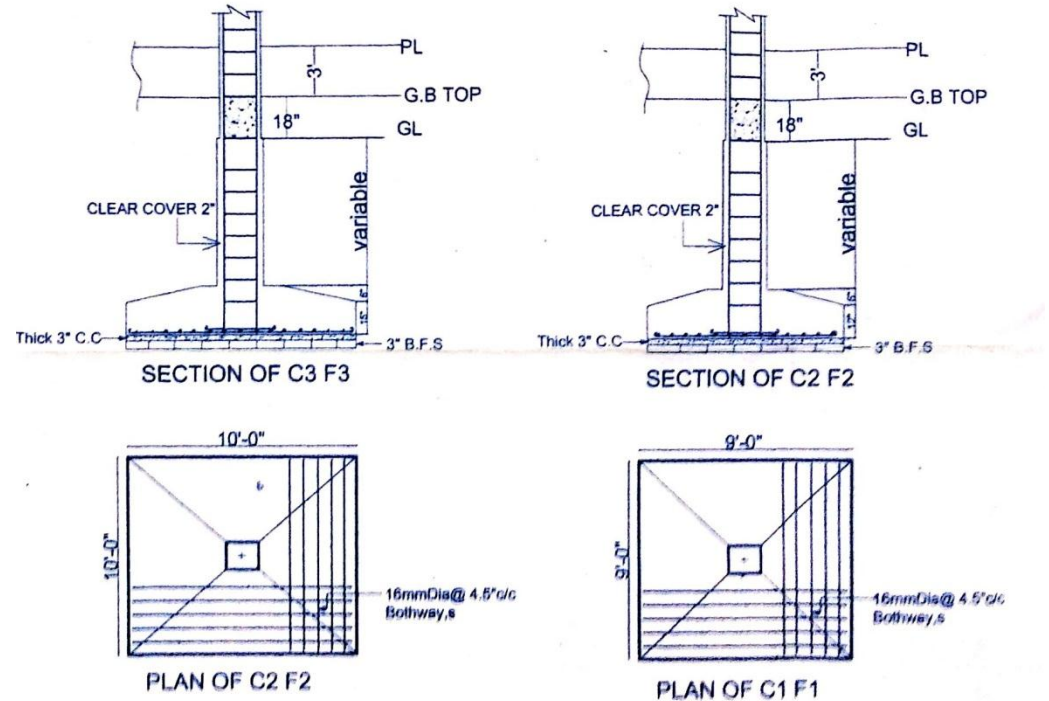
#### Deep foundation

The R.c.c. Cast in situ pile may be used with following category (Fs.=2.5)

| Length of Pile from E.G.I. | Allowable load bearing of 16" dia R.c.c. cast in situ pile. (Fs.=2.5) | Allowable load bearing of 18" dia R.c.c. cast in situ pile. (Fs.=2.5) | Allowable load bearing of 20" dia R.c.c. cast in situ pile. (Fs.=2.5) | Allowable load bearing of 24" dia R.c.c. cast in situ pile. (Fs.=2.5) |
|----------------------------|-----------------------------------------------------------------------|-----------------------------------------------------------------------|-----------------------------------------------------------------------|-----------------------------------------------------------------------|
| 45'-0"                     | 30 Ton Per Pile                                                       | 40 Ton Per Pile                                                       | 48 Ton Per Pile                                                       | 69 Ton Per Pile                                                       |
| 50'-0"                     | 35 Ton Per Pile                                                       | 50 Ton Per Pile                                                       | 58 Ton Per Pile                                                       | 86 Ton Per Pile                                                       |

11(A)

Continue.....



Left, extract from the Soil Test Report, stating that 'deep foundations' will be required. Right, structural drawings indicating pad foundations.

It must be established which type of foundations were used, and calculations provided to prove their capacity.

## Identified Priority 3 Concerns

No structural drawings seen for most of the buildings on the site. Those that were observed, for the six-storey building, had some minor discrepancies.

Suggestions were made of an upwards extension, and that foundations had the capacity for this. No drawings, design or justification for this was provided.

Ponding was observed on all concrete roof levels, with signs of water ingress inside the structure also visible in some locations.

## Identified Priority 3 Concerns Continued

Factor of Safety of  $\sim 1.86$  from column load run-down, suggesting the need for some further investigation.

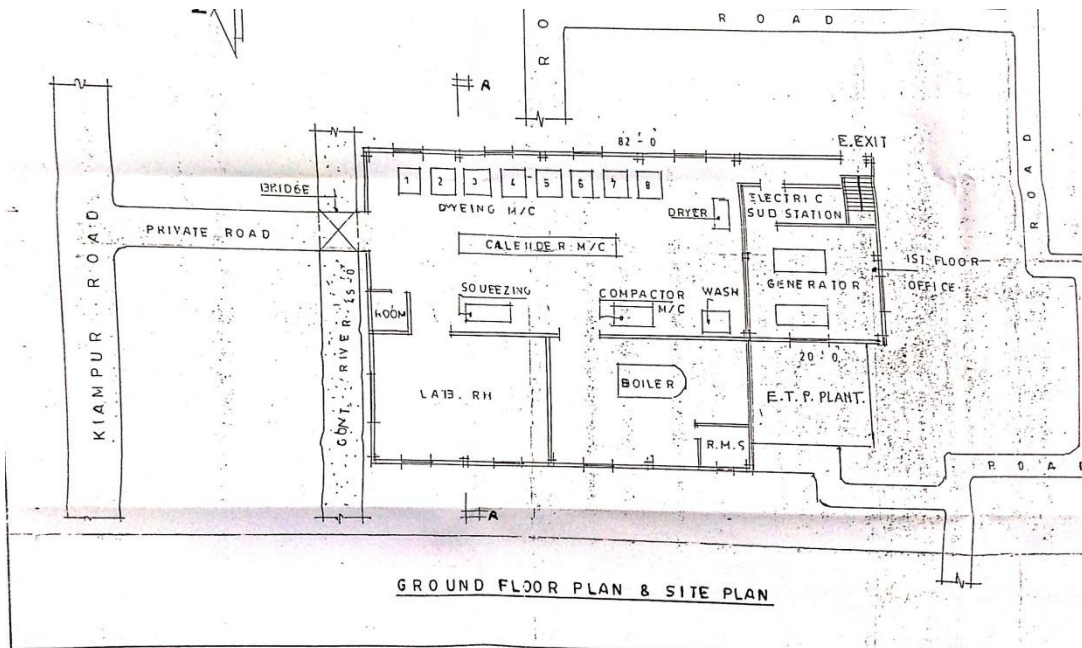


## 1<sup>st</sup> Priority 3 Concern

The column schedule to the right indicates a uniform column dimension for the full height of the building. In reality the columns were smaller at upper floor levels.

### COLUMN SCHEDULE

| SL NO | N.of.col | Sec.of.col                                                                        | Size.of.col | nos.of.col | Ground floor       | 1st floor to 2nd floor | 3rd floor to 6th floor | Remark /Note                                                              |
|-------|----------|-----------------------------------------------------------------------------------|-------------|------------|--------------------|------------------------|------------------------|---------------------------------------------------------------------------|
| 01    | C1       |  | 15" X 15"   | 21         | 12-20mmø           | 12-20mmø               | 12-20mmø               | Column covering = 2" ( Under G.B )<br>Column covering = 1.5" ( Over G.B ) |
| 02    | C2       |  | 24" X 18"   | 20         | 16-20mmø           | 16-20mmø               | 16-20mmø               | Use steel 60 Grade deformed bar<br>concrete=1:2:4                         |
| 03    | C3       |  | 15" X 10"   | 04         | 4-16mmø<br>6-20mmø | 4-16mmø<br>6-20mmø     | 4-16mmø<br>6-20mmø     |                                                                           |



The drawing to the left is an indication of the level of information received for the three-storey building and associated steel/concrete sheds.

This level of information must be improved, with full structural drawings provided for all buildings on the site.



## 2<sup>nd</sup> Priority 3 Concern



To the left is the roof level of the three-storey building, with protruding reinforcement above, as was observed on all concrete buildings.

This in itself does not raise any concerns, however it was stated that the foundations had been designed to withstand the load of a ten-storey building on the site of the existing six-storey building.

Given the questions that have already been raised about the suitability of the foundations under their existing loading conditions, it is recommended that these additional storeys are not constructed.

### 3<sup>rd</sup> Priority 3 Concern



The images to the left show instances of fairly extensive ponding on the three-storey building (left) and the ETP (right), as was also observed on the six-storey building.

To the right is the worst instance of water ingress observed within the six-storey building.

To prevent this issue from getting worse, and potentially causing damage to structural elements, a waterproofing layer should be applied to roof level of all concrete buildings.



#### 4<sup>th</sup> Priority 3 Concern

No visible signs of distress or structural damage were observed on any columns, meaning that this is not considered to be an urgent action.

Despite this, a Factor of Safety of less than 2 was calculated, meaning some further investigation is required.



Left, typical column arrangement in six-storey building. Right, slender columns supporting heavy loads from generators at 1<sup>st</sup> floor and roof level.

# Overall Stability System





Above left is the typical beam-column arrangement observed in the six-storey building, gaining stability from moment connections. Above right is the flat slab construction present above 1<sup>st</sup> floor level in the three-storey building, with no apparent lateral stiffness other than in the perimeter walls which are immediately adjacent to the column lines on three sides.



The 'Boiler Room', shown to the left, appears to have sufficient rigidity in its perimeter walls to withstand lateral loads, negating the need for diaphragm action in the roof.

We require that these items be investigated in a Detail Engineering Assessment

# Water Ingress at Roof Level



Several of the buildings on the site were steel-roofed, as shown to the left, and therefore caused no concerns. However, all concrete-roofed buildings showed signs of extensive ponding (right), and even signs of ingress within, in some locations.



# Priority Actions

## Problems Observed Summary

- ITEM 1: (Priority 2) Questionable lateral stability system in three-storey concrete building, with clarification also required for 'Dyeing Shed' and 'Boiler Room'.**
- ITEM 2: (Priority 2) Foundations indicated on structural drawings do not match the recommendations given in Soil Test Report.**
- ITEM 3: (Priority 3) Some discrepancies between structural drawings and observed site conditions, with some drawings entirely absent.**
- ITEM 4: (Priority 3) Suggestions of an upward extension but no structural design drawings seen.**
- ITEM 5: (Priority 3) Extensive ponding on all concrete roofs, with some signs of water ingress within the building.**
- ITEM 6: (Priority 3) 'Green' Priority 3 result from column load run-down, requiring some further investigation.**

| Item No. | Observation                                                                                                                                                 | Recommended Action Plan                                                                                                                                                                                                                                          | Recommended Timeline |
|----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|
| 1        | Priority 2 - Questionable lateral stability system in three-storey concrete building, with clarification also required for 'Dyeing Shed' and 'Boiler Room'. | Detailed Engineering Assessment required to determine capacity of three-storey building and adjacent 'shed' buildings against lateral loading.                                                                                                                   | 6-weeks              |
| 2        | Priority 2 - Questionable lateral stability system in three-storey concrete building, with clarification also required for 'Dyeing Shed' and 'Boiler Room'. | Any amendments to the structure deemed necessary by the DEA to be implemented under Structural Engineer's supervision.                                                                                                                                           | 6-months             |
| 3        | Priority 2 - Foundations indicated on structural drawings do not match the recommendations given in Soil Test Report.                                       | As-built drawings or Site Investigation required to determine foundations present.<br>Calculations to be carried out to determine capacity in existing case.                                                                                                     | 6-weeks              |
| 4        | Priority 2 - Foundations indicated on structural drawings do not match the recommendations given in Soil Test Report.                                       | No additional load to be added to the structure before capacity is confirmed.<br>If over-capacity, Factory Engineer to design remedial measures or load reduction to ensure building stability.                                                                  | 6-months             |
| 5        | Priority 3 - Some discrepancies between structural drawings and observed site conditions, with some drawings entirely absent.                               | Factory Engineer to survey actual site conditions and revise drawings to match.<br>Where drawings were not provided, original design drawings to be recovered or, if lost, as-built drawings to be produced.                                                     | 6-months             |
| 6        | Priority 3 - Suggestions of an upward extension but no structural design drawings seen.                                                                     | Ideally, no upward extension to be added.<br>If planned, full structural design and drawings, as well as appropriate Building Permit, to be completed prior to any works commencing.<br>Note also that a back-check of the foundations must also be carried out. | 6-months             |

| Item No. | Observation                                                                                                 | Recommended Action Plan                                                                                                                                                                                                                                                                                                                                                 | Recommended Timeline |
|----------|-------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|
| 7        | Priority 3 - Extensive ponding on all concrete roofs, with some signs of water ingress within the building. | Waterproofing membrane to be applied to all concrete roof surfaces.<br>Factory Engineer to oversee installation, to ensure that excessive load is not added to the roof structure.                                                                                                                                                                                      | 6-months             |
| 8        | Priority 3 - 'Green' Priority 3 result from column load run-down, requiring some further investigation.     | Factory Engineer to review design, loads and column stresses in internal columns of three and six-storey buildings as well as two-storey Generator Building.<br>Verify insitu concrete stresses by 100mm dia. cores.<br>Produce and actively manage a loading plan for all floor plates within the factory, giving consideration to floor capacity and column capacity. | 6-months             |