Epcot Apparels Ltd
Epcot Jeans Ltd

Chandana, Joydebpur, Gazipur
(23.991163N, 90.394333E)
11 May 2014

ACCORD on Fire and Building Safety in Bangladesh

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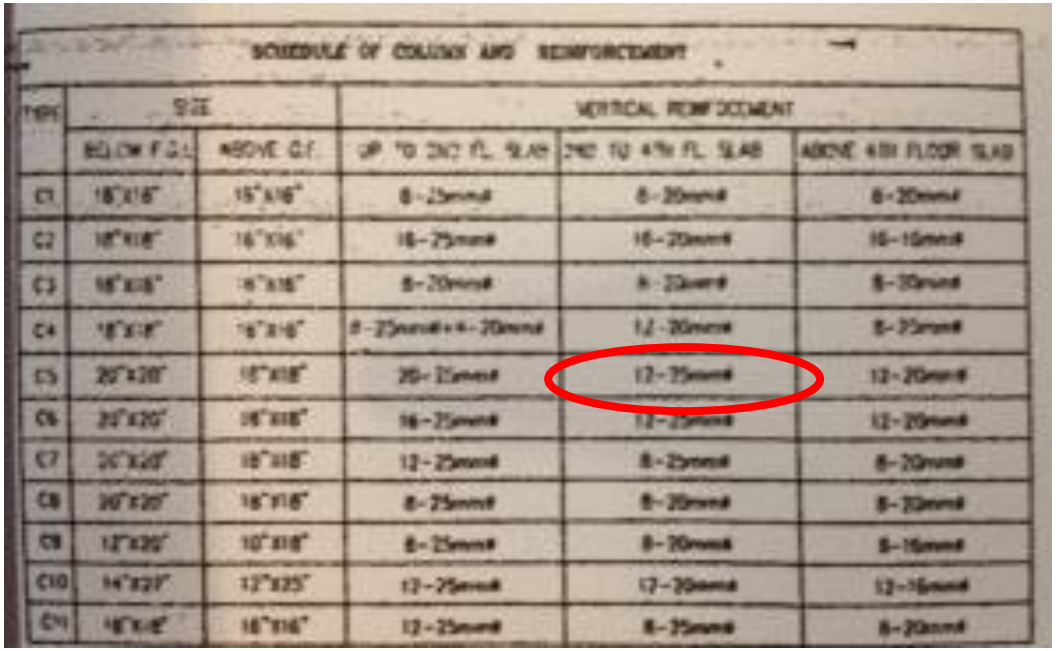
Observations

Minor discrepancies between drawings and as-built structure

At roof level the typical internal columns in the North half of the building have 12 No. 20mm dia. bars compared to 8 No. 25mm dia. bars shown on the drawing. The cross sectional areas are the same and the structural engineer noted that 25mm dia. bars were not available at the time of construction.



SCHEDULE OF COLUMN AND REINFORCEMENT

TYPE	SIZE		VERTICAL REINFORCEMENT		
	BELOW F.G.L	ABOVE G.F.	UP TO 2ND FL. SLAB	2ND TO 4TH FL. SLAB	ABOVE 4TH FLOOR SLAB
C1	18"X16"	15"X16"	8-25mm#	8-20mm#	8-20mm#
C2	18"X16"	16"X16"	16-25mm#	16-20mm#	16-16mm#
C3	18"X16"	16"X16"	8-20mm#	8-20mm#	8-20mm#
C4	18"X16"	16"X16"	8-25mm#+4-20mm#	12-20mm#	8-25mm#
C5	20"X20"	18"X18"	20-25mm#	12-25mm#	12-20mm#
C6	20"X20"	18"X18"	16-25mm#	12-25mm#	12-20mm#
C7	20"X20"	18"X18"	12-25mm#	8-25mm#	8-20mm#
C8	20"X20"	18"X18"	8-25mm#	8-20mm#	8-20mm#
C9	12"X20"	10"X18"	8-25mm#	8-20mm#	8-16mm#
C10	14"X27"	12"X25"	12-25mm#	12-20mm#	12-16mm#
C11	18"X16"	18"X16"	12-25mm#	8-25mm#	8-20mm#

Slab thickness

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Vulnerable column in loading bay

Two storey column in loading bay has no impact protection.

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Non-engineered steel shed

Dining hall appears to have been non-engineered; unclear whether the roof has adequate tie down and also if the heads of the precast internal columns are adequately restrained.

Settlement cracking of ground floor masonry walls

Frequent minor cracking to ground floor masonry walls and facades, probably due to differential settlement between assumed shallow strip footings under the walls and deeper footings under the columns.

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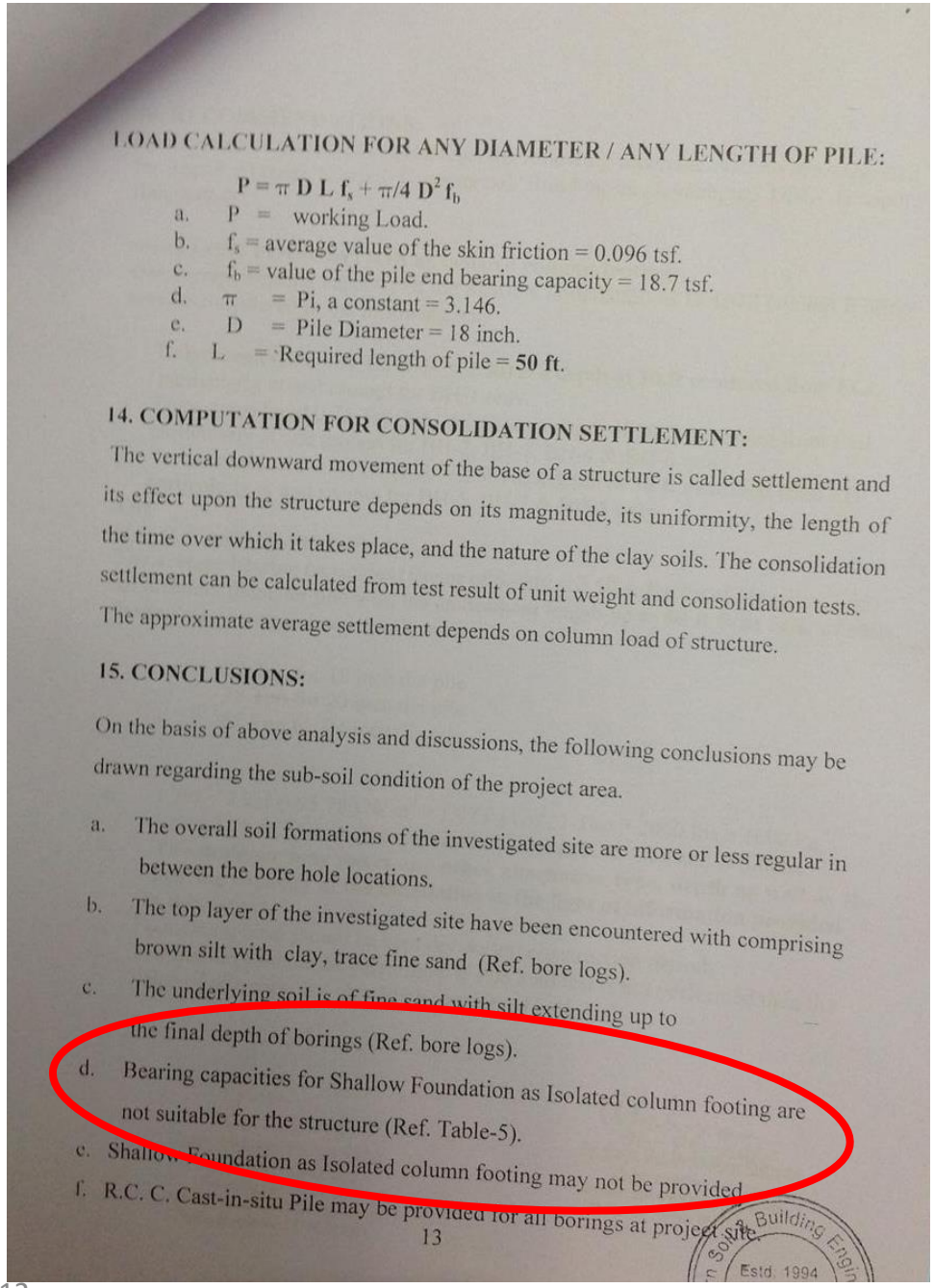
Recent soils report states that shallow foundations inadequate for a 6 storey building



LOAD CALCULATION FOR ANY DIAMETER / ANY LENGTH OF PILE:

$$P = \pi D L f_s + \pi/4 D^2 f_b$$

a. P = working Load.
b. f_s = average value of the skin friction = 0.096 tsf.
c. f_b = value of the pile end bearing capacity = 18.7 tsf.
d. π = Pi, a constant = 3.146.
e. D = Pile Diameter = 18 inch.
f. L = Required length of pile = **50 ft.**

14. COMPUTATION FOR CONSOLIDATION SETTLEMENT:

The vertical downward movement of the base of a structure is called settlement and its effect upon the structure depends on its magnitude, its uniformity, the length of the time over which it takes place, and the nature of the clay soils. The consolidation settlement can be calculated from test result of unit weight and consolidation tests. The approximate average settlement depends on column load of structure.

15. CONCLUSIONS:

On the basis of above analysis and discussions, the following conclusions may be drawn regarding the sub-soil condition of the project area.

a. The overall soil formations of the investigated site are more or less regular in between the bore hole locations.
b. The top layer of the investigated site have been encountered with comprising brown silt with clay, trace fine sand (Ref. bore logs).
c. The underlying soil is of fine sand with silt extending up to the final depth of borings (Ref. bore logs).
d. Bearing capacities for Shallow Foundation as Isolated column footing are not suitable for the structure (Ref. Table-5).
e. Shallow Foundation as Isolated column footing may not be provided.
f. R.C. C. Cast-in-situ Pile may be provided for all borings at project site.

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Estd. 1994

Structural drawings show shallow foundations except locally where there was reportedly a pond. Original soils report not available, but 2013 soils report states that shallow foundations are only adequate for a 3 storey building and that a 6 storey building would need to be piled. This conflicts with the statement made by the Structural Engineer that the foundations have been designed for a 6 storey building.

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Priority Actions

Problems Observed

ITEM 1 - Check if columns are adequate for a possible future extension to 6 storeys.
ITEM 2 - Check if foundations are adequate for a possible future extension to 6 storeys.
ITEM 3 - Check loading bay column for impact and provide protection if necessary.
ITEM 4 - Structural engineer to check connection between top of columns and steel roof to dining shed.

Item No.	Observation	Recommended Action Plan	Recommended Timeline
1	Check if columns are adequate for a possible future extension to 6 storeys	If and before any additional floors are added, Structural Engineer to review design, loads and columns stresses in columns supporting toilets and storage.	**6-months**
2	Check if columns are adequate for a possible future extension to 6 storeys	Verify insitu concrete stresses either by 4 No. 100mm diameter cores or existing cylinder strength data. Structural Engineer to define safe locations for coring.	**6-months**
3	Check if columns are adequate for a possible future extension to 6 storeys	Produce and actively manage a loading plan for all floor plates within the factory giving consideration to floor capacity.	**6-months**
4	Check if foundations are adequate for a possible future extension to 6 storeys	If and before any additional floors are added, Structural Engineer to review the 2013 soils report by comparison with the shallow as-built foundations and to determine the number of storeys which can safely be added to the building.	**6-months**
5	Check loading bay column for impact and provide protection if necessary	Check loading bay column for vehicle impact and provide protection if necessary.	**6-months**
6	Structural engineer to check connection between top of columns and steel roof to dining shed.	Structural engineer to check connection between top of columns and steel roof to dining shed.	**6-months**