Globus Garments Ltd.

Globus Garments Ltd., K.S. Complex, Mouchak, Kaliakoir, Gazipur, Bangladesh.
(+24.024055N, 90.294271E)

28th June 2014

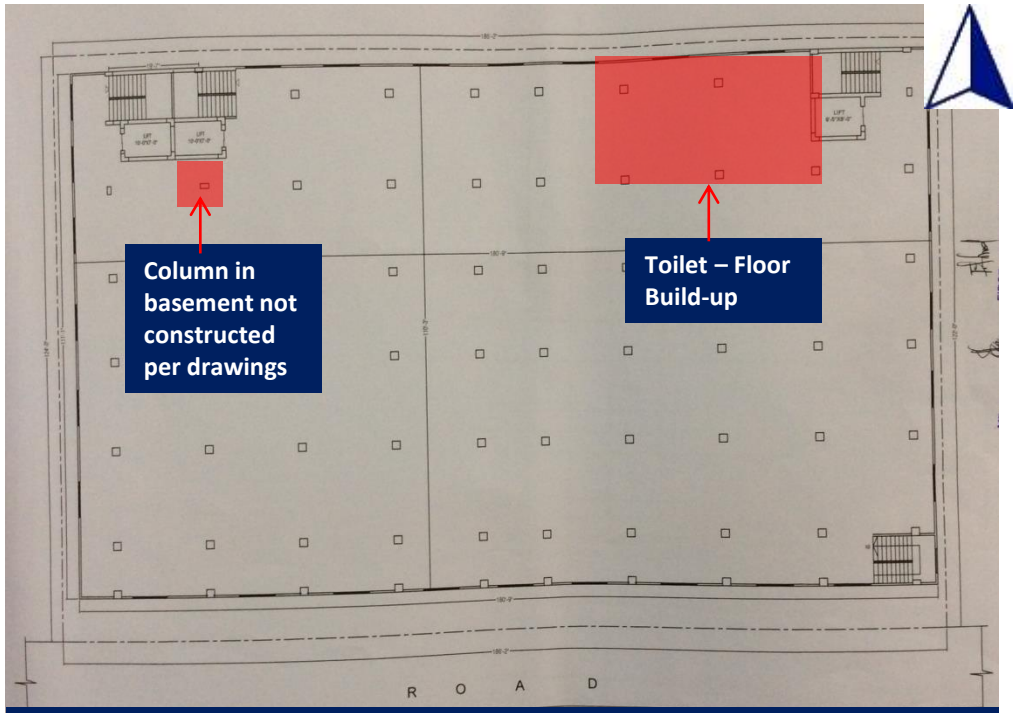
ACCORD on Fire and Building Safety in Bangladesh

ARUP

Observations

Columns in the Factory Building (Building 1) appear to be stressed in excess of normal design limits and require immediate review.

Preliminary calculations indicate that columns generally within the factory building are stressed slightly in excess of normal design limits.
Immediate concern relates to columns which support floor build-up loads in the toilet area and to a single column at the north west side of the building, within the basement, which appears not to be constructed in accordance with the drawings.



Typical Floor Plan

Tested Column – Brick Chips

Columns which appear to be highly stressed – Building Engineer to review immediately

Column Strength

ACCORD on Fire and Building Safety in Bangladesh ARUP

Design check required due to irregularities in design documentation

5

The following documents were provided for review on the day of the survey:

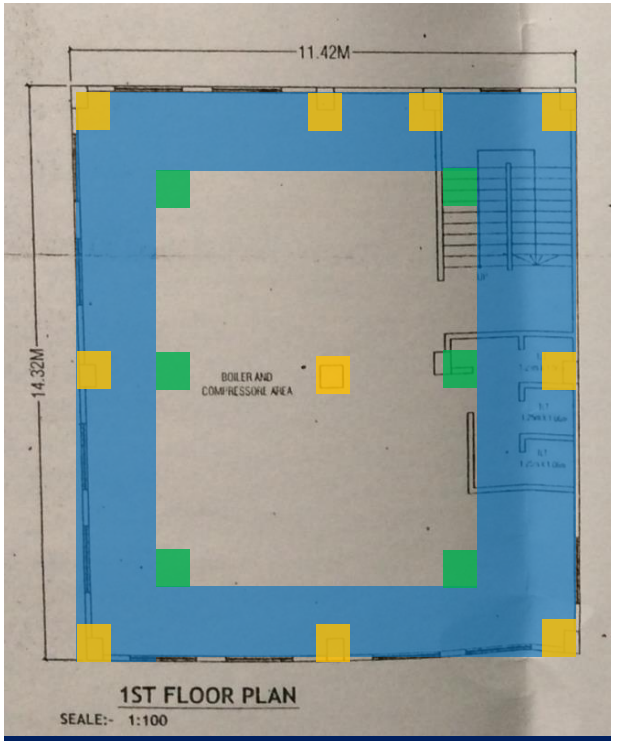
- An LGED-approved building permit drawing for the main factory building;
- An LGED-approved building permit drawing for the Utility Building;
- A set of as-built structural and architectural drawings for the main factory building;
- A set of structural drawings for the Utility Building;
- A soil investigation report for the main factory building;
- A letter of certification by the design engineer for the main factory building

There are a number of inconsistencies between documents, and irregularities between the documents and the constructed buildings. The following is a non-exhaustive list of issues:

- There is a an undersized column in the main factory building, which reduces in size at Basement level – design check required;
- The width of the beams is smaller than is called up in the drawings – design check required;
- There are irregularities in the column layout plans for both buildings – design check required;
- The soil investigation report for the main factory building recommends shallow foundations for buildings up to five storeys, and there is no soil investigation report for the Utility Building which has a permit for eight storeys. Both buildings make use of isolated pad foundations – design check required;
- Cantilevers to the Utility Building are not shown in the design drawings – design check required.

Design Documentation

Typical Floor Plan Main Factory Building



Utility Building – Permit Layout

- Undersized column at basement level
- Incorrect column locations – no column at this location
- Actual column locations
- Cantilevers not shown on drawing

Design Documentation

ACCORD on Fire and Building Safety in Bangladesh

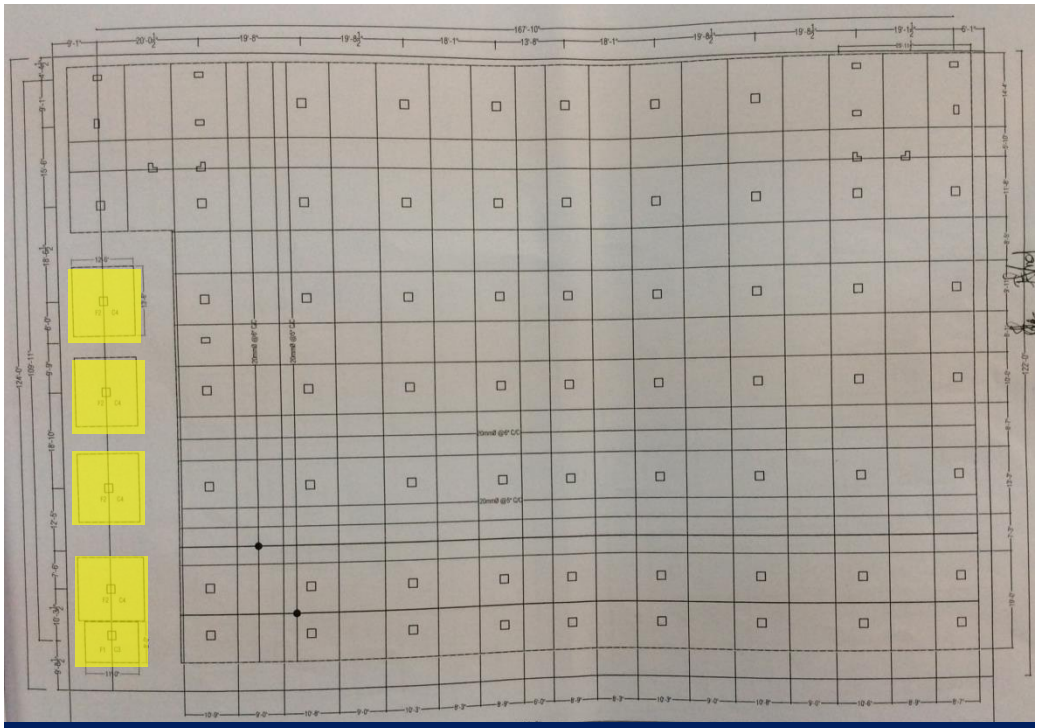
ARUP

FOUNDATION RECOMMENDATION :

In view of the above mentioned findings and discussions we may conclude and recommend as follows :

For building upto 5-storied high, It is recommended to use shallow open footing foundation may be provided at 1.50m below from EGL. Considering a bearing capacity of 14.00 ton/m^2.

Extract from soil investigation report

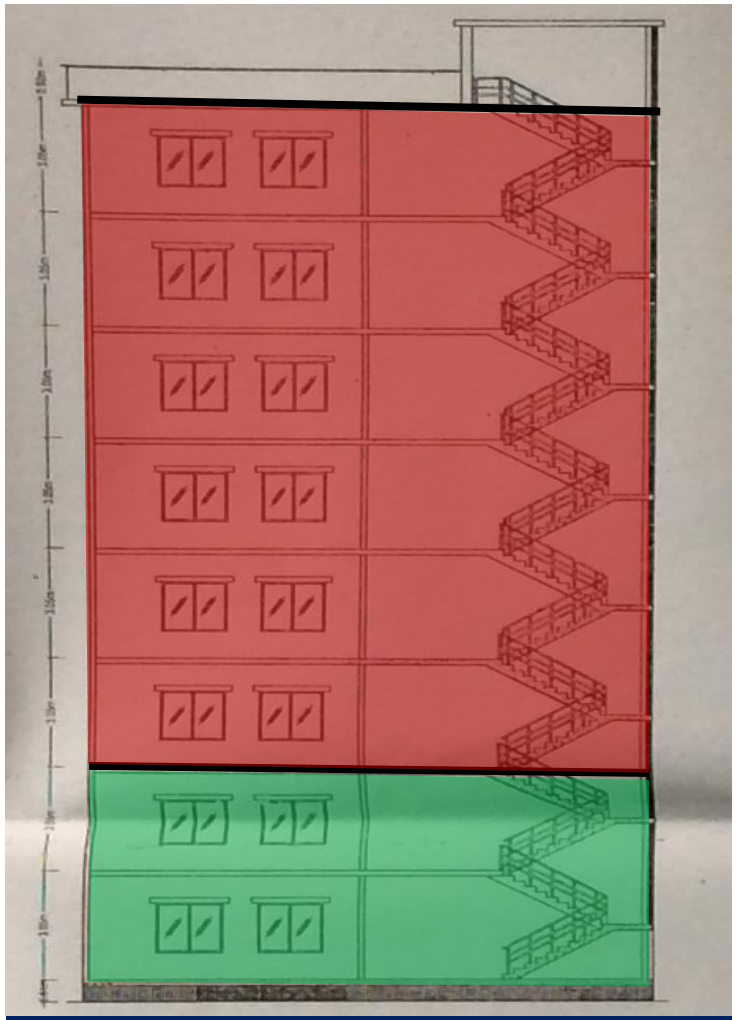


Foundation plan from structural drawings showing pad foundations – as highlighted

Design Documentation

ACCORD on Fire and Building Safety in Bangladesh ARUP

All proposed additions to the existing Utility Building (Building 2) structure are to be reviewed by the Building Engineer



Building 2 – Utility Building – Cross section

2nd - 7th Floors – Not yet constructed

Existing Ground and 1st Floors

Utility Building (Building 2) has LGED-approval for eight-storeys. There are important differences between the design drawings and the as-built structure. Building Engineer to review structural design and concrete strength within existing columns prior to construction of any further building extension above the existing two storeys.

Utility Building – Future Extension

ACCORD on Fire and Building Safety in Bangladesh ARUP

Priority Actions

Problems Observed

ITEM 1: Columns in the Factory Building (Building 1) appear to be stressed in excess of normal design limits and require immediate review.

ITEM 2: Design check required due to irregularities in design documentation

ITEM 3: All proposed additions to the existing Utility Building (Building 2) structure, including additional storeys as permitted, are to be reviewed by the Building Engineer

Item No.	Observation	Recommended Action Plan	Recommended Timeline
1	Columns in the Factory Building (Building 1) appear to be stressed in excess of normal design limits and require immediate review between Basement and 3rd floor level.	Building Engineer to review design, loads and column stresses in columns throughout the building from basement to 3rd floor. Prioritise review of columns which support floor build-up loads in the toilet area and single column at the north west side of the building, within the basement, which appears not to be constructed in accordance with the drawings.	**Immediate - Now**
2	Columns in the Factory Building (Building 1) appear to be stressed in excess of normal design limits and require immediate review between Basement and 3rd floor level.	Verify insitu concrete stresses either by 4 No 100mm diameter cores or existing cylinder strength data. Reinforcement quantities also to be confirmed.	**Immediate - Now**
3	Columns in the Factory Building (Building 1) appear to be stressed in excess of normal design limits and require immediate review between Basement and 3rd floor level.	Produce and actively manage a loading plan for all floor plates within the factory giving consideration to floor capacity and column capacity.	**6-weeks**
4	Columns in the Factory Building (Building 1) appear to be stressed in excess of normal design limits and require immediate review between Basement and 3rd floor level.	Continue to implement load plan.	**6-months**

Item No.	Observation	Recommended Action Plan	Recommended Timeline
5	Design check required due to irregularities in design documentation	Building Engineer to commence a design check to assess the safety and serviceability of the building with reference to discrepancies between the drawings and as constructed Factory Building and Utility Building.	**Immediate - Now**
6	Design check required due to irregularities in design documentation	Building Engineer to survey all areas of the buildings, collect information and prepare a full and accurate set of "as-constructed" drawings.	**6-weeks**
7	Design check required due to irregularities in design documentation	Building Engineer to complete design check on the safety and serviceability of the buildings.	**6-weeks**
8	Design check required due to irregularities in design documentation	Building Engineer to implement any actions / supervise any remedial works as identified following the design check.	**6-months**
9	All proposed additions to the existing Utility Building (Building 2) structure, including additional storeys as permitted, are to be reviewed by the Building Engineer	For all proposed additions to the Utility Building (Building 2) structure, Building Engineer to carry out a design check to assess the safety and serviceability of the building, particularly in relation to column sizes and lateral stability, taking into account the additional loads.	**6-months**
10	All proposed additions to the existing Utility Building (Building 2) structure, including additional storeys as permitted, are to be reviewed by the Building Engineer	In-situ concrete testing to be carried out as part of any future structural assessments.	**6-months**