

Oasis Fashion Ltd (Unit 2)

Kashem Complex, Gacha Road, Gazipur
(23.9366637, 90.3723368.24)

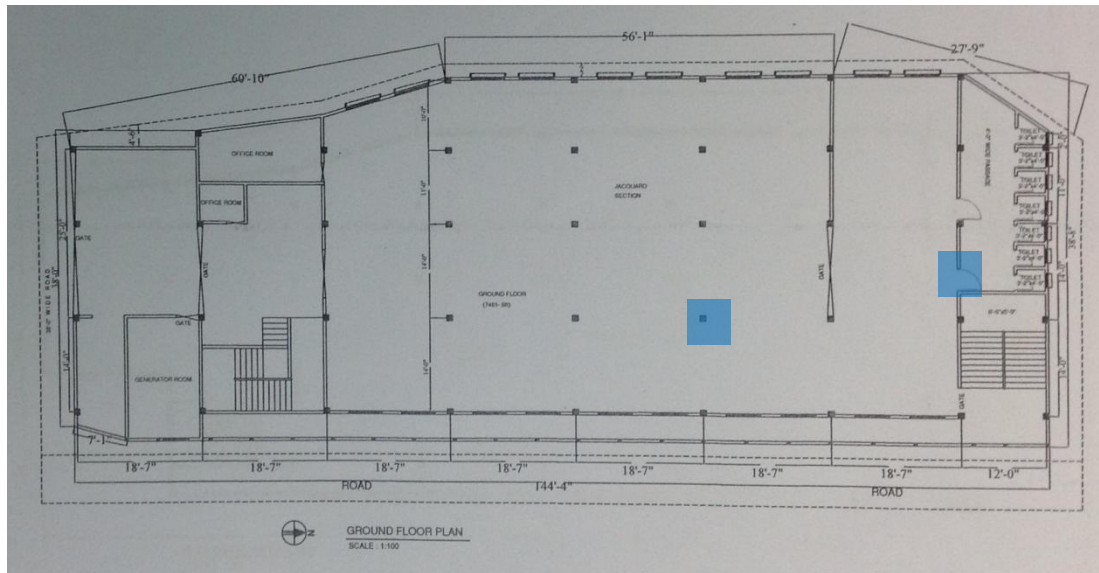
15th April 2014



Observations

Stress Levels in Columns

Cursory calculations indicate that the working stress of the columns at Ground Floor levels are at a high level. Detailed Engineering Assessment required.



Ground Floor Plan



Tested Columns

Construction of the main building began in 2006, with construction up to 6th Floor completed by 2012. A lightweight steel roof structure on RC columns, which covers approximately 50% of the floor area, was erected at Roof level in 2012, in lieu of a LGED-approved 7th storey. Brick aggregate was observed in the Ground Floor columns, in accordance with the As-built structural drawings. There is a discrepancy between the drawings and the constructed building in relation to the Ground Floor column reinforcement quantities. Grade 72 High Strength steel is called up in the structural drawings. No exposed reinforcement steel was visible for comparison.



Tested Column C/3 (Brick)



Tested Column D/5 (Brick)

Differences between actual construction and information on design drawings

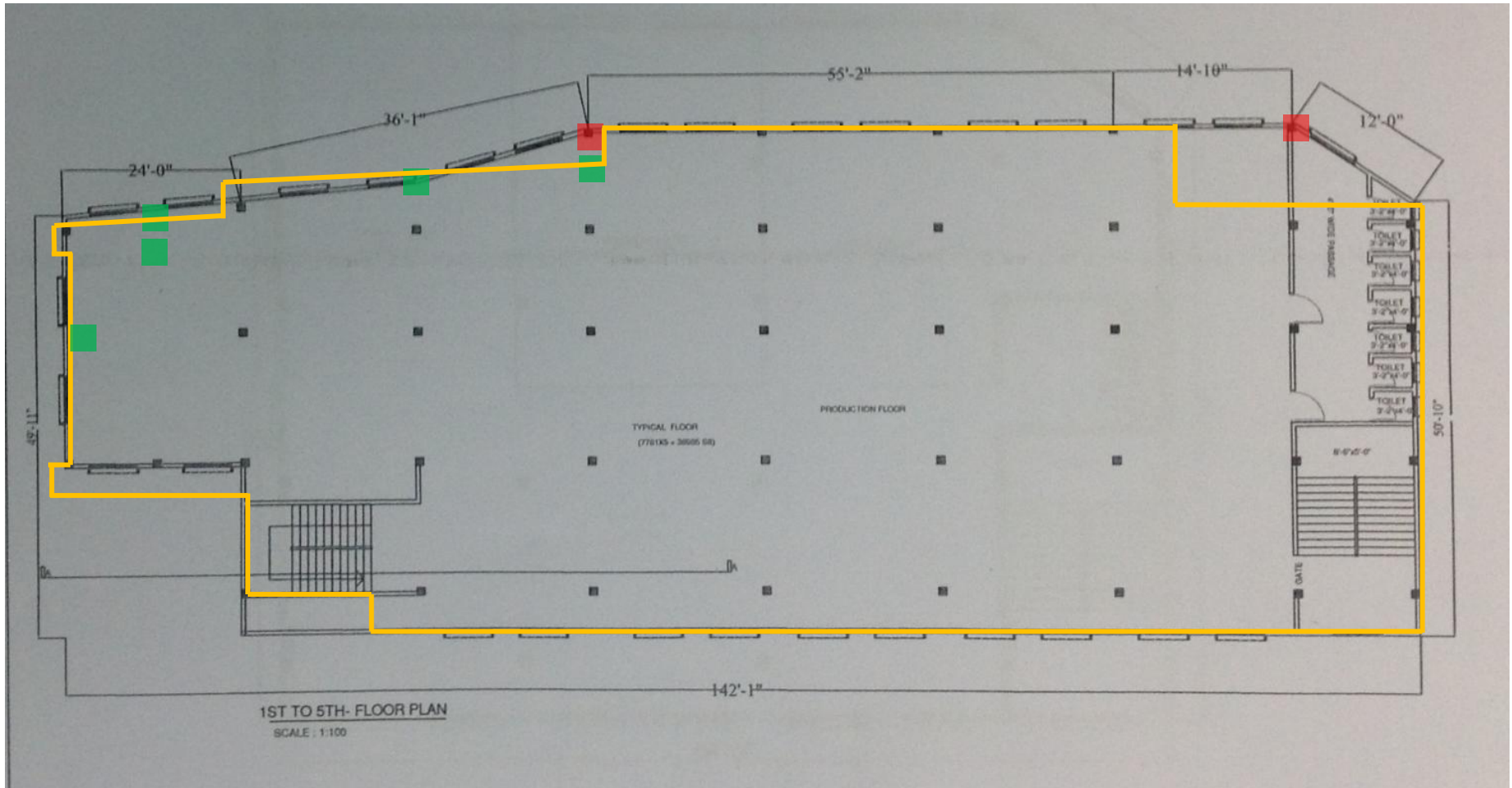
A set of As-built Structural Drawings, 2013, by Rupali Consultants, was made available for review on the day of the survey. A LGED-approved Building Permit Drawing was also made available for review. There are a number of inconsistencies between the drawings and the constructed building. A non-exhaustive list of issues include:

- Inconsistencies in construction type – the structural drawings appear to indicate simple flat slab construction, whereas flat slab with drops is observed at Ground, 1st and 2nd Floor levels (with some beam and slab observed to the South of the building), and beam and slab is observed at 3rd, 4th and 5th Floor levels;
- Inconsistencies in column / beam layout, particularly to the south of the building;
- Inconsistencies in building footprint, particularly to the south of the main building, and to Shed no. 2;
- Inconsistencies in rebar quantities;
- Slab thickness is called up as 6” in the drawings, whereas a minimum of 7” is observed;
- Banglalink Telecom tower above South stair is not called up in the drawings.

There are also a number of inconsistencies within the set of as-built drawings, including:

- The reinforcement quantity written in the schedule is different from that shown schematically;
- Grid dimensions vary from floor to floor.

Building Engineer to review and provide clarification.



Typical Floor Plan



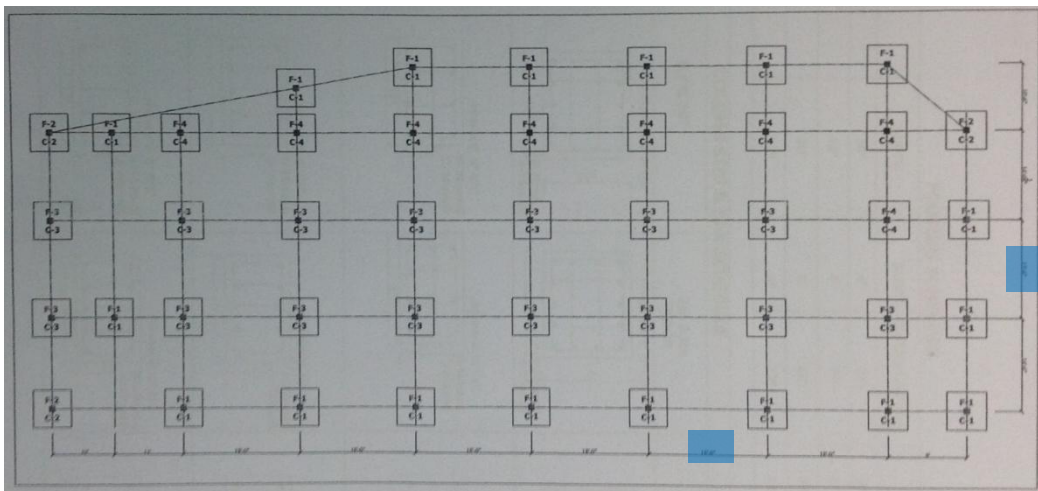
Additional Columns



Misplaced / Non-existent Columns



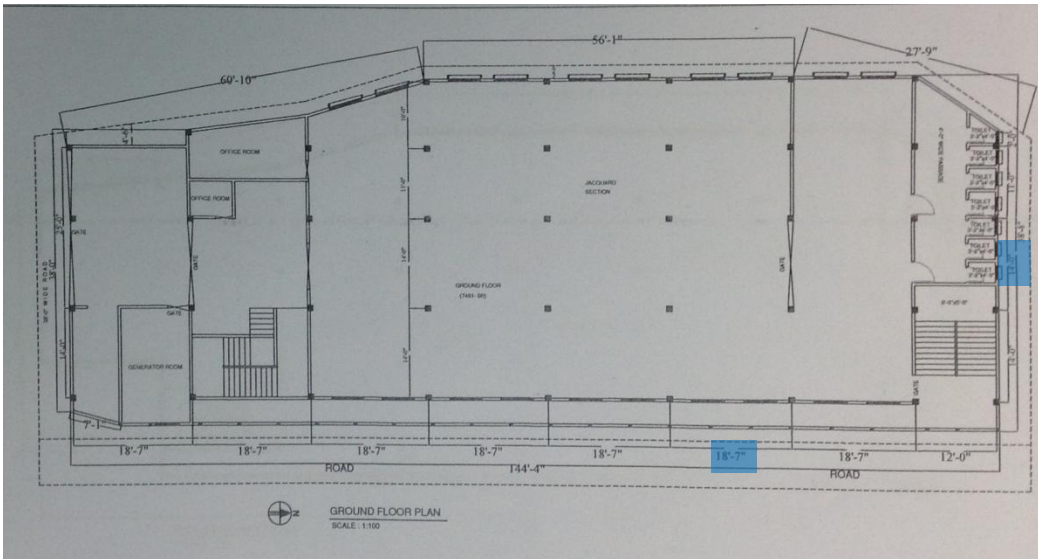
Apparent Building Footprint



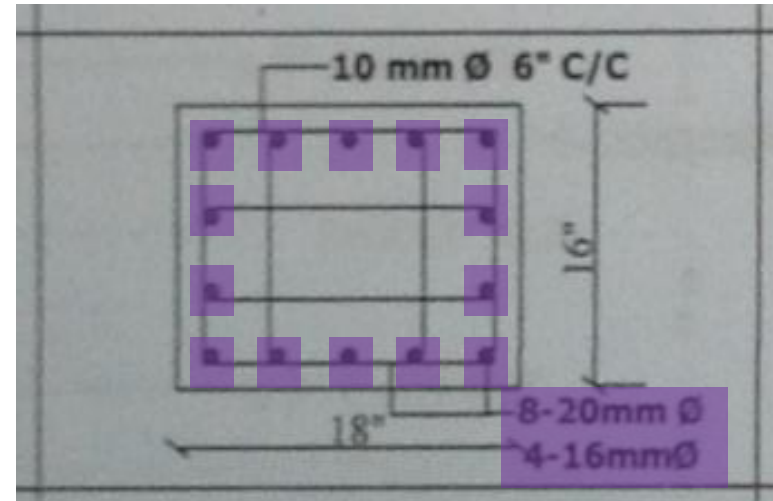
Column Layout



Inconsistencies in Grid Dimensions:
The Column Layout Plan call up a maximum grid size of 18.7" x 14.0" for an internal bay, whereas the Ground Floor Plan calls up 18.0" x 15.6" for the same bay.



Ground Floor Plan



Inconsistencies in Rebar Quantities:
The reinforcement quantity written in the schedule (8 + 4 = 12 bars) is different from that shown schematically (14 bars).



Inconsistencies in Rebar schedule

Variations in grid dimensions between floors

Lightweight steel structures do not appear to be engineered

The factory compound comprises a number of lightweight structures, namely the Dining area at 6th Floor level, and the two large sheds at ground floor level. These structures, which consist of lightweight steel-trussed roofs on RC columns, do not appear to be engineered. Building Engineer to review the design of these structures, with special emphasis on connections and bracing, and to implement any upgrade works as required.



Dining Area at 6th Floor Level



Steel Trusses to Dining Area Roof



Truss to Column Connection Detail



View of Sheds from Main Building Roof



Lightweight Steel Roof to Ground Floor Shed 1



Truss to Column Connection Detail at Entrance to Shed 2

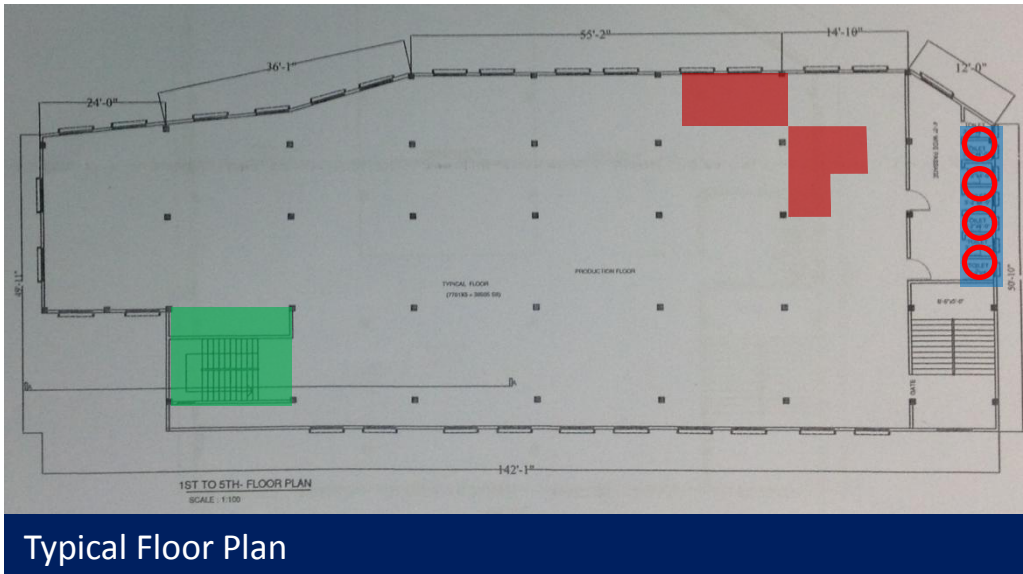
Hairline cracking to beam and slab soffits

Hairline cracking was observed to the soffit of a number of beams and slabs at 3rd, 4th and 5th Floor levels. Building Engineer to investigate to see if cracks are present in structural concrete below plaster and carry out remedial works to the structure as required.



Heavy loading

Areas of high loading were noted at the Banglalink Telecom tower above the South stairs at Roof level, the water tanks and plinths adjacent to the North stairs at Roof level, the toilet plinths to the North-West corner at all floors, and at the washing area machines and plinths at 1st Floor level. Building Engineer to check that the different slab constructions have been adequately designed to accommodate this loading.



Typical Floor Plan

- Banglalink Telecom Tower at Roof Level
- Water Tanks on 150mm Plinth (typical) at Roof Level
- Extent of Toilet Plinths to all Floors
- Extent of Washing Area Plinths to 1st Floor



Water Tanks to Roof



Telecom Tower



Toilet Plinths



Washing Area

Priority Actions

Problems Observed

ITEM 1: High column stresses

ITEM 2: Differences between drawings and constructed buildings

ITEM 3: Lightweight steel structures do not appear to be engineered

ITEM 4: Cracking to beams and slab soffits

ITEM 5: Heavy Loading

Item 1 and actions

High column stresses

Priority 1

(Immediate - Now)

- Building Engineer to review design, loads and column stresses in structure. A Detailed Engineering Assessment of Factory to be commenced – see attached scope.
- Verify insitu concrete stresses by taking 100mm diameter cores from 4 columns at ground floor level.
- Verify number and diameter of reinforcement bars in ground floor columns.

Priority 2

(within 6-weeks)

- Produce and actively manage a loading plan for all floor plates within the factory giving consideration to floor capacity and column capacity.
- Detailed Engineering Assessment to be completed.

Priority 3

(within 6-months)

- Continue to implement loading plan.

Detail Engineering Assessment

This Schedule develops a minimum level of information, Analysis and testing expected as part of a Detail Engineering Assessment.

The Building(s) have been visually assessed and it is deemed necessary that a detailed engineering assessment be carried out by a competent Engineering Team employed by the factory Owner.

This Request should be read in conjunction with the BUET developed Tripartite Guideline document for Assessment of Structural Integrity of Existing RMG Factory Buildings in Bangladesh (Tripartite Document), the latest version of this document should be referenced. This document also gives guidance on required competency of Engineering Team.

We expect that the following will be carried out:

1. Development of Full Engineering As-Built Drawings showing Structure, loading, elements, dimensions , levels, foundations and framing on Plan, Section and Elevation drawings .
2. The Engineering team are to carry out supporting calculations with a model based design check to assess the safety and serviceability of the building against loading as set out in BNBC-2006, Lower rate provisions can be applied in accordance with the Tripartite Guidelines following international engineering practice, justification for these lower rate provisions must be made.
3. A geotechnical Report describing ground conditions and commenting on foundation systems used/proposed.
4. A report on Engineering tests carried out to justify material strengths and reinforcement content in all key elements studied.
5. Detailed load plans shall be prepared for each level showing current and potential future loading with all key equipment items shown with associated loads.
6. The Engineering team will prepare an assessment report that covers the following:
 - As-Built drawings including
 - Plans at each level calling up and dimensioning all structural components
 - Cross sectional drawings showing structural beams, slabs, floor to floor heights, roof build-ups and Basic design information of the structure
 - Highlight any variation between As-built compared to the designed structure
 - Results of testing for strength and materials
 - Results of geotechnical assessment and testing/investigation
 - Details of loading, inputs and results of computer modelling
 - Commentary on adequacy/inadequacy of elements of the structure
 - Schedule of any required retrofitting required for safety or performance of Structure

Any proposals for Retrofitting to follow guidance developed in the Tripartite Document

Item 2 and actions

Differences between actual construction and information on design drawings.

Priority 1

(Immediate - Now)

- None required.

Priority 2

(within 6-weeks)

- Engage a Building Engineer to survey the structure and prepare a full set of “as-constructed” drawings.

Priority 3

(within 6-months)

- None required.

Item 3 and actions

Lightweight steel structures do not appear to be engineered.

Priority 1

(Immediate - Now)

- None required.

Priority 2

(within 6-weeks)

- Engage a Building Engineer to check the capacity of the lightweight 'warehouse' structures / connection details and 6th floor structure/connection details and make any necessary alterations.

Priority 3

(within 6-months)

- None required.

Item 4 and actions

Cracking to beams and slab soffits

Priority 1

(Immediate - Now)

- None required.

Priority 2

(within 6-weeks)

- None required.

Priority 3

(within 6-months)

- Monitor cracks to beams and slab soffit. Engage an engineer to investigate if cracks are only in the plastering.
- Engage a Building Engineer to advise on load reduction and repair and strengthening of the slab if required.

Item 5 and actions

Heavy loads.

Priority 1

(Immediate - Now)

- None required.

Priority 2

(within 6-weeks)

- Engage a Building Engineer to investigate the loading from water tanks, telecommunication tower, toilet floor build-up and washing area plinths and equipment and advise on any necessary alterations taking account of floor capacity and column capacity.

Priority 3

(within 6-months)

- Make any structural alterations as advised by Factory Engineer.