

Ettade Jeans Limited

1670/2091, West Sholashahar, Building #3, Aturer Depot, Chittagong
(22.382352N, 91.827703E)
20 April 2014



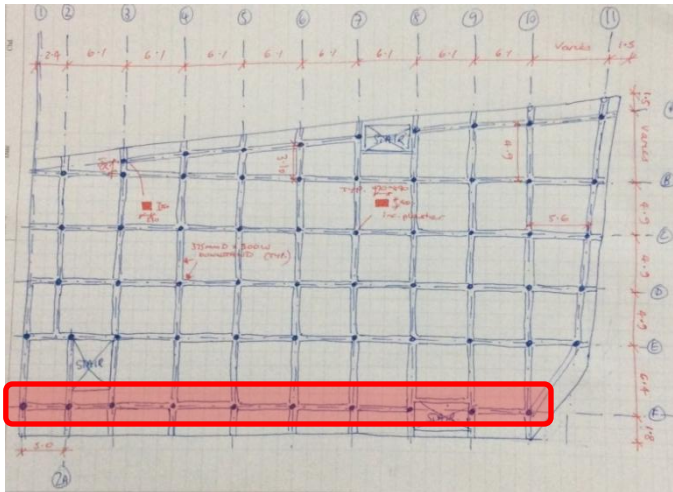
Observations

High stress in columns

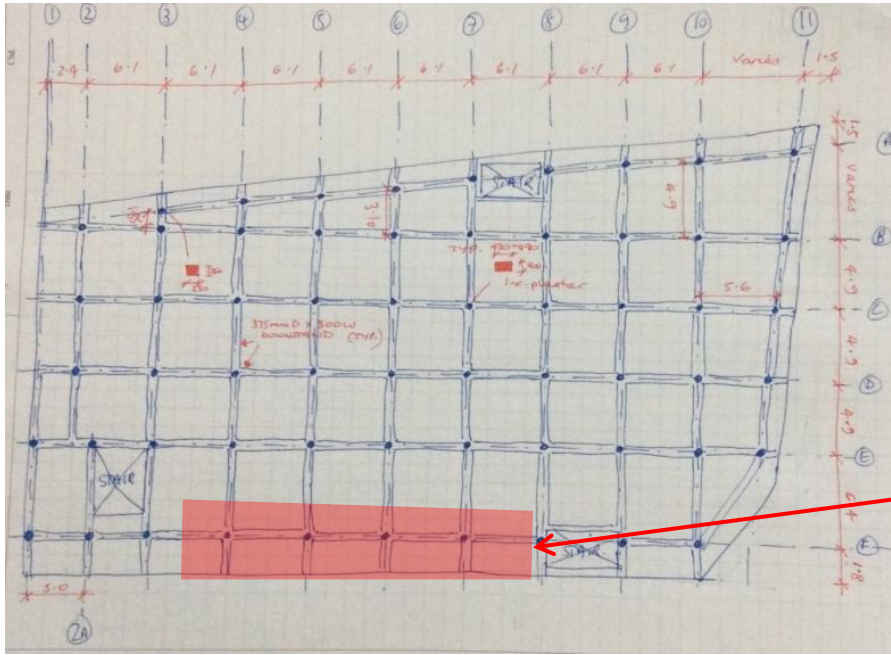
Columns support a cantilever of 1.8m carrying a brick façade.

Cursory calculations at ground floor level indicate that edge column's working stresses are at a high level.

Some columns extend below.



High stress in columns



Part of ground floor slab is suspended over a pond.

The columns and retaining wall beneath the ground floor slab were inaccessible and could not be inspected.

High stress in columns



The ground floor slab in this area is subjected to high floor loads from storage of rolled materials.

Cursory calculations under the ground floor warehouse show edge column stresses are very high.

High stress in columns



It was not possible to get close to the columns, however some vertical cracking may be apparent.

The warehouse storage should be removed and the pond should be drained immediately so that the columns and wall can be checked for signs of distress.

A qualified engineer should confirm that the ground floor columns, slabs and beams have sufficient capacity to support the loads including high storage loading at ground floor.

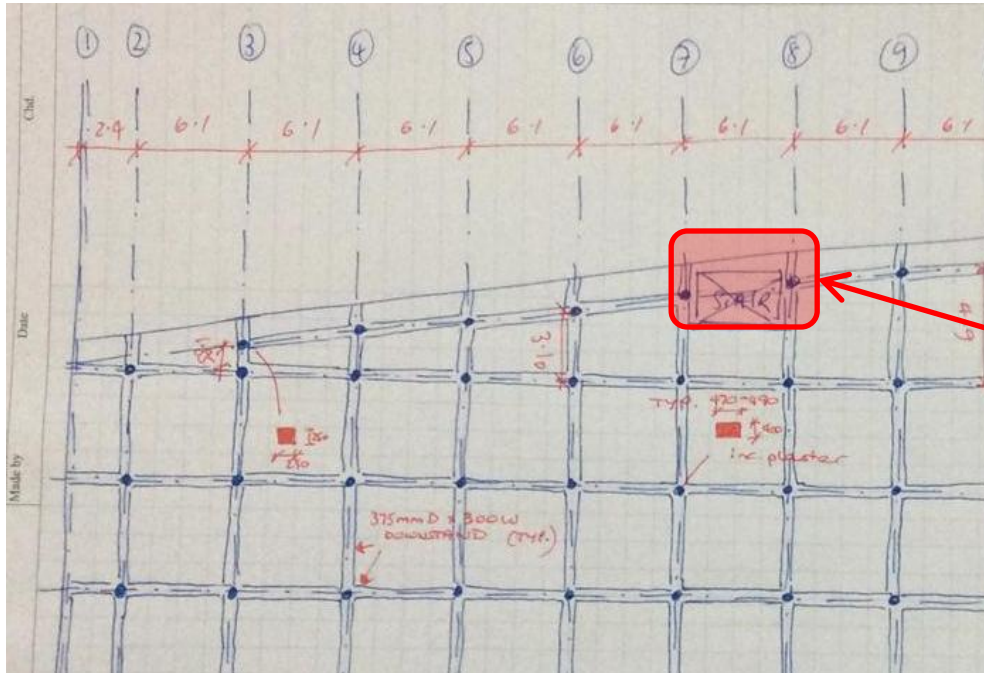
High stress in columns

High loading from water tanks on roof

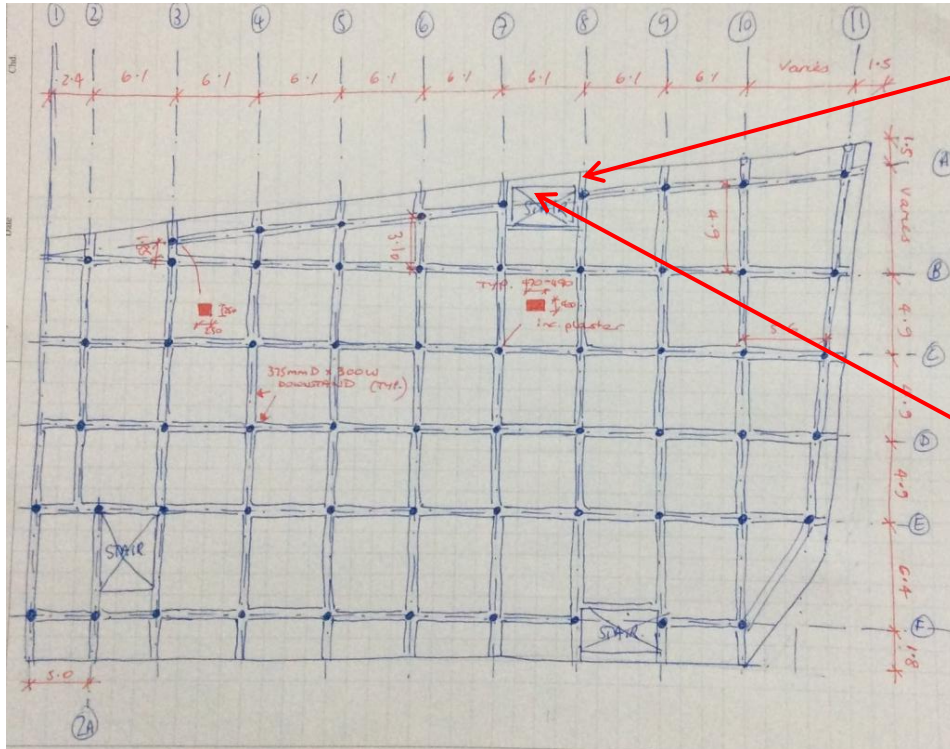
Water tanks with a total capacity of 18000l are located on the roof above the stair core.

The stair lid slab spans between masonry walls which load the cantilevering roof slab below. There are signs of distress in the cantilevering beams at fifth floor level

It was unclear if the water tanks were supported on a plinth of any kind.



Water tanks on roof



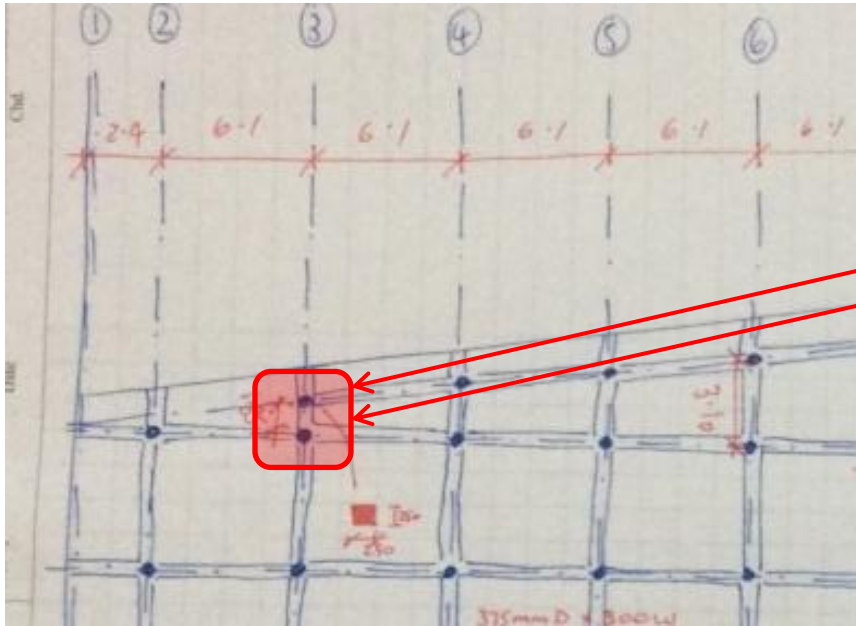
Vertical cracking to cantilevering beam observed at high level fifth floor



Horizontal and diagonal cracking observed in masonry wall directly below water tanks

Water tanks on roof

Unexpected column arrangement

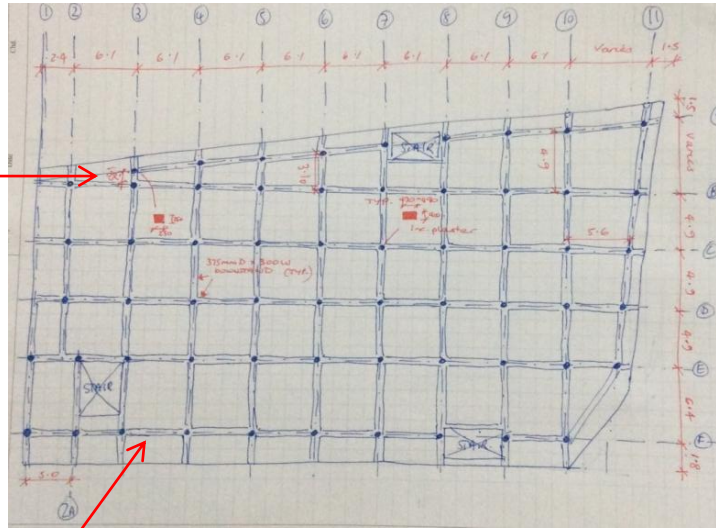


Small 250x250mm column (grid A3) located directly adjacent to typical edge column (grid B3).

Cursory calculations indicate that the stress in the small column is very high, however the adjacent column is capable of carrying the full load for both tributary areas.

Diagonal cracks in façade at ground floor

Diagonal cracking was observed in the façade at ground floor in the locations noted, this may be a sign of foundation settlement.



A trial pit should be dug to confirm the foundation type and an engineering assessment should be carried out to confirm that the foundation type is suitable for the ground conditions.



The façade cracks should be monitored for further movement by installing tell-tails. Once movements have stopped cracks should be repaired to prevent on-going maintenance issues.

Diagonal façade cracking

Flexural cracking in beams and slabs

Flexural cracking in beams was observed at all levels.

Flexural cracking was observed from the fifth floor (underside of roof slab)



Cracks to be reviewed by removing plaster, to confirm that cracks do not extend into structural concrete.

Beam Cracks

Non-Engineered Steel Roof



Roof appears not to have been designed, there is no bracing in the roof sheet plane (corrugated iron sheet acts as diaphragm and is reliant on screwed connections), intermediate trusses do not span back to vertical structure. Connections do appear to have been designed for wind uplift load case. Qualified engineer to undertake design assessment of steel roof and confirm it has capacity for vertical and horizontal loading specified in BNBC

Non Engineered Steel Roof

Water Damage & Corrosion



Leaking water pipe



Internal water damage

Water observed leaking from downpipe onto generator shed roof. Signs of staining both externally and internally.

Leaking downpipe to be repaired.



Water leak leading to structural damage

Horizontal cracking in masonry wall

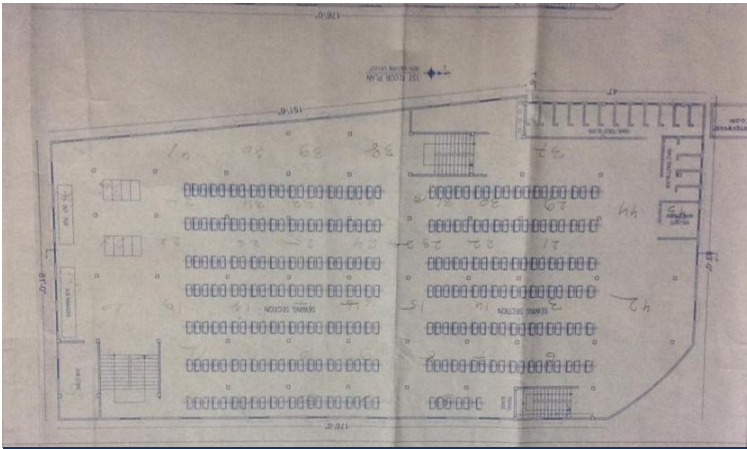
Horizontal cracks observed in masonry walls where cantilever floor beam has deflected and is now supported by masonry.

Masonry wall is now providing support to first floor slab. No structural modifications to be made to wall (e.g. openings being created for doors or windows)

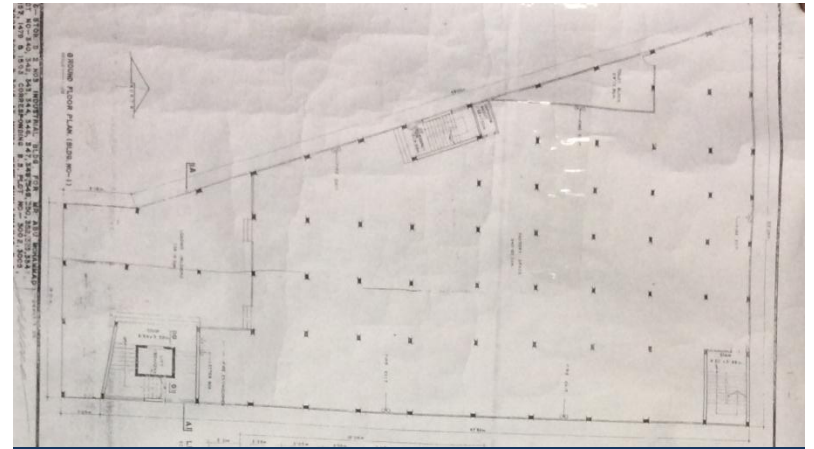


Horizontal cracks to masonry walls

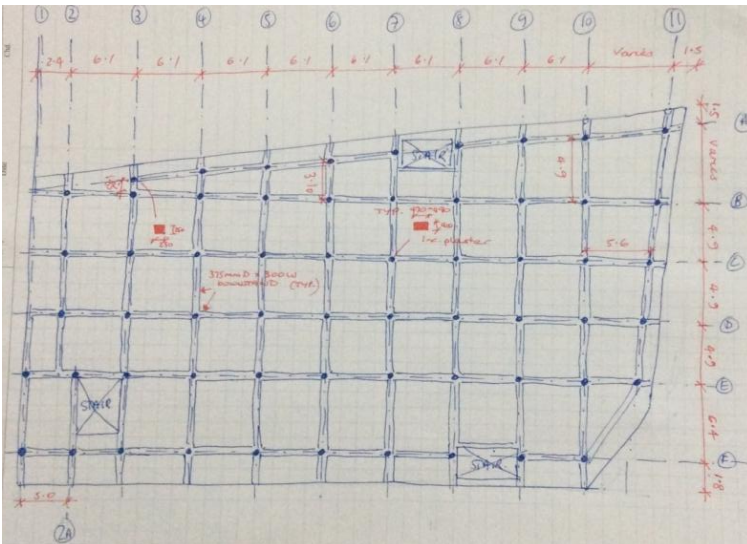
Missing and inconsistent record information



Factory layout drawing



Building permit layout drawing



Sketch of as-built structure

No drawings for the RC superstructure or substructure was available, the foundation system is unknown. The factory layout and building permit drawings do not match the as-built frame.

Engineer to develop accurate drawings showing the as-built structure.

Missing and inconsistent record information

Priority Actions

Problems Observed

ITEM 1; High stress in columns.

ITEM 2; High loading from water tanks on overrun slabs.

ITEM 3; Diagonal cracking to façade at ground floor.

ITEM 4; Hairline cracks in beams and slabs in various locations.

ITEM 5; Non engineered roof structure.

ITEM 6; Horizontal cracking in masonry wall.

ITEM 7; Damaged downpipe leaking onto generator roof causing damage to façade.

ITEM 8; Available record drawings do not match as-built structure. No drawings available for RC superstructure or current arrangement of the structure.

Item No.	Observation	Recommended Action Plan	Recommended Timeline
1	High stress in columns	Storage to be removed from the warehouse area above the pond immediately.	Immediate - Now
2	High stress in columns	The pond should be drained so that the columns and wall can be checked for signs of distress and corrosion damage.	Immediate - Now
3	High stress in columns	Building Engineer to review design, loads and columns stresses.	Immediate - Now
4	High stress in columns	Verify in-situ concrete strengths either existing cylinder strength data for ground floor columns or by taking cores (min 100mm diameter) from 4 columns	Immediate - Now
5	High stress in columns	A Detailed Engineering Assessment (DEA) is to be commenced, see attached scope	Immediate - Now
6	High stress in columns	Produce and actively manage a loading plan for all floor plates within the factory giving consideration to floor capacity and column capacity	6-weeks
7	High stress in columns	Detail Engineering Assessment to be completed	6-weeks
8	High stress in columns	Continue to implement load plan	6-months

Detailed 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 No.	Observation	Recommended Action Plan	Recommended Timeline
9	High loading from water tanks on overrun slabs	Verify that stair lid, masonry walls and horizontal structure (both slabs and beams) at fifth floor have sufficient capacity to support fully filled water tanks (and concrete plinth if applicable). If not relocate tanks to areas that building engineer stated are suitable.	6-weeks
10	High loading from water tanks on overrun slabs	As part of DEA for item 1, Building Engineer to review stress in columns that support water tanks.	6-weeks
11	High loading from water tanks on overrun slabs	Make repairs to cracked beams and slabs to prevent on-going maintenance issues.	6-months
12	Diagonal cracking to façade at ground floor.	Trial pit to be dug to confirm foundation type	6-weeks
13	Diagonal cracking to façade at ground floor.	As part of DEA for item 1, engineering assessment to be carried out to confirm that the foundation type is suitable for the ground conditions	6-weeks
14	Diagonal cracking to façade at ground floor.	Tell tails to be installed on façade cracks to monitor movements	6-weeks
15	Diagonal cracking to façade at ground floor.	Continue to monitor crack widths	6-months
16	Diagonal cracking to façade at ground floor.	Cracks to be repaired to prevent on-going maintenance issues	6-months

Item No.	Observation	Recommended Action Plan	Recommended Timeline
17	Hairline cracks in beams and slabs in various locations	Sections of plaster finish to beams to be removed to investigate if cracks penetrate the building structure.	6-weeks
18	Hairline cracks in beams and slabs in various locations	As part of DEA for item 1, Building Engineer to carry out design check on beams to confirm that these cracks are non-structural. Building Engineer to prepare Allowable Floor Loading Plans	6-weeks
19	Non engineered roof structure	Diagonal in-plane roof bracing to be installed	6-months
20	Non engineered roof structure	Building engineer to check the structures and propose remedial works	6-months

Item No.	Observation	Recommended Action Plan	Recommended Timeline
21	Horizontal cracking in masonry wall	No structural modifications to be made to wall (e.g. openings being created for doors or windows)	6-months
22	Horizontal cracking in masonry wall	Monitor cracks for change	6-months
23	Damaged downpipe leaking onto generator roof causing damage to façade	Repair water pipe	6-months
24	Available record drawings do not match as-built structure. No drawings available for RC superstructure or current arrangement of the structure	As part of DEA for item 1, building engineer to check, collect information and produce accurate and complete as-built documentation as soon as possible	6-months