

Bhuyan Warmtex (Pvt) Ltd.

Kadda Nandun, Kadda Bazar, Gazipur, Dhaka.

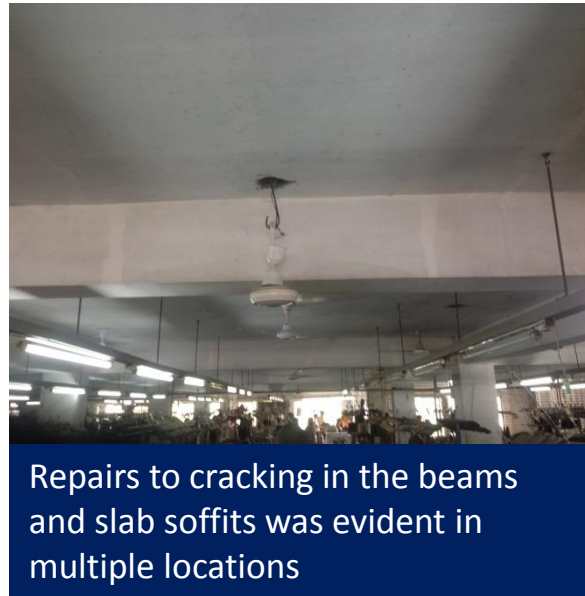
(+23.98741N, 90.34942E)

17th June 2014



Observations

Cracking to structural elements observed



Cracking was observed on a number of the structural beams and on the slab soffits of each suspended level.

Building 1 – Cracking observed

Edge protection to roof slab



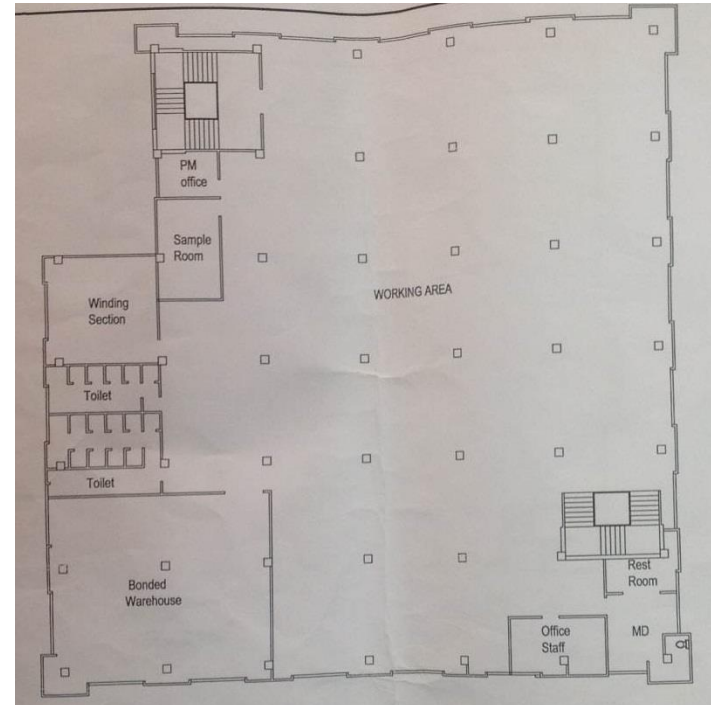
No handrail or edge protection provided at roof level and no access restrictions

No Perimeter Protection to Roof

Cursory calculations indicate columns to be stressed in excess of normal design limits



Testing of columns confirmed brick aggregate.



Building 1 – Ground floor plan

Cursory calculations indicate that working stresses exceed normal acceptable levels in columns. Building Engineer to perform detailed calculations based on “as built” dimensions and loadings. Material data from concrete tests to prove column strength.

Building 1 – Column Stresses

Localised areas of high loading



Examples of stacked material on factory floor

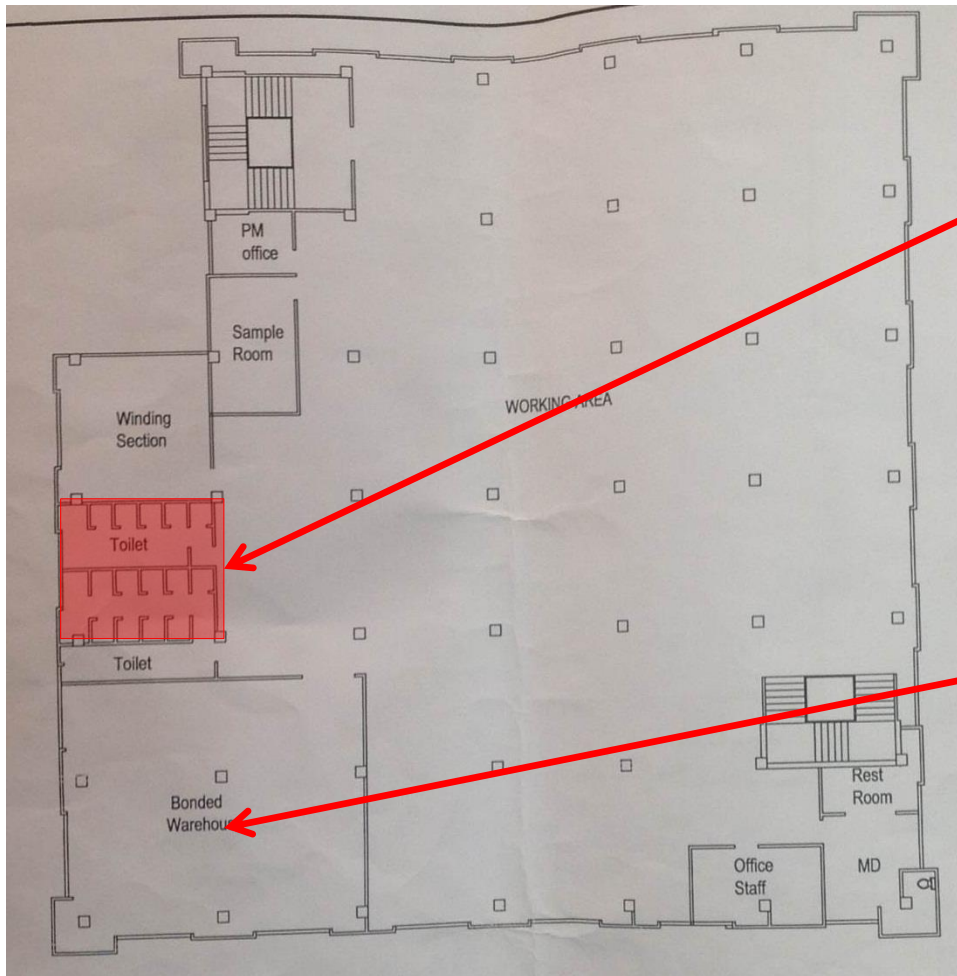


Stored material in bonded warehouse

High loads were observed in the bonded warehouse on first floor. Controlled stacking of raw material was also observed in areas outside the bonded warehouse on first floor. Building engineer to produce a loading plan for all floors giving consideration to floor and column capacity

Building 1 - Localised high loading

Inconsistencies noted between drawings and as built construction



Toilet block location on structural/architectural drawings do not match industrial permit drawings

Internal floor layout and brick partitioning not correctly represented on drawings. Bonded warehouse layout different to that shown on drawings

Drawing Discrepancies

Cracking to the ground floor slabs and masonry walls



Cracking was observed throughout the ground floor slab of Building 1. This cracking may be due to settlement of the slab. Evidence of settlement cracking was also observed in the internal brick partitions on the ground floor. Masonry above ground floor did not appear to exhibit the same degree of movement.



Slab & Wall Cracks



Building 3 cracking to ground floor slab

Cracking was observed in the ground floor slabs of the support buildings, cracking may be due to settlement. Evidence of settlement cracking was also observed in the masonry walls.

Settlement
cracking in walls
and columns



Cracking to walls of Building 2



Cracking to wall and brick
column in Guard House

Slab & Wall Cracks

Apparently non-engineered lightweight structures



Steel truss supported by slender props



Prop in childcare building



Roof over stairwell

The single storey buildings and stairwell roofs in the main factory building all had lightweight steel roofs, with the exception of the generator building. These roofs appeared to be non-engineered. The main issues observed are:

- Overall stability of the roof structures does not appear to have been considered
- Connection details between roof trusses and walls/columns appear inadequate in some locations
- Section sizes used appear to be slender
- Internal props appear slender and not adequately connected at both ends.

Building Engineer to review stability of these structures and propose strengthening works.

Roof Structures

Priority Actions

Problems Observed

- ITEM 1:** Cracking to structural elements observed
- ITEM 2:** Edge protection to roof slab
- ITEM 3:** Cursory calculations indicate columns to be stressed in excess of normal design limits
- ITEM 4:** Localised areas of high loading
- ITEM 5:** Inconsistencies noted between drawings and as build construction
- ITEM 6:** Cracking to the ground floor slabs and masonry walls
- ITEM 7:** Apparently non-engineered lightweight structures

Item No.	Observation	Recommended Action Plan	Recommended Timeline
1	Cracking to structural elements observed	Sections of render to be removed to investigate if cracks penetrate the building structure.	6-weeks
2	Cracking to structural elements observed	Building Engineer to monitor location of all cracks and ensure that, where required, remedial works are carried out.	6-months
3	Edge protection to roof slab	Handrails to be provided to roof or access to be prohibited to area.	6-weeks
4	Cursory calculations indicate columns to be stressed in excess of normal design limits.	Building Engineer to review design, loads and column stresses.	6-months
5	Cursory calculations indicate columns to be stressed in excess of normal design limits.	Verify insitu concrete stresses either by 4 no. 100mm dia. Cores or existing cylinder strength data for the columns	6-months
6	Cursory calculations indicate columns to be stressed in excess of normal design limits.	Produce and actively manage a loading plan for all floor plates within the factory giving consideration to floor capacity and column capacity.	6-months
7	Localised areas of high loading	Produce and actively manage a loading plan for all floor plates within the factory giving consideration to floor capacity and column capacity.	6-months
8	Localised areas of high loading	Continue to implement load management plan.	6-months

Item No.	Observation	Recommended Action Plan	Recommended Timeline
9	Inconsistencies noted between drawings and as built construction	Building Engineer to prepare a set of “as built” drawings.	6-months
10	Cracking in ground floor slab and masonry walls	Cracks to be monitored by factory engineer and repaired as required, should cracking continue building engineer to review and propose remedial works required.	6-months
11	Apparently non-engineered lightweight structures	Building engineer to check the capacity of non-engineered structures under horizontal and vertical loading and make any necessary alterations.	6-months