

Baxter Brenton (BD) Ltd

German Chemicals Ltd

Hop Lun (BD) Ltd

Ospinter Garments Ltd

FCI (BD) Ltd

SFB #7, 1st Floor, DEPZ(Old Zone), Ganakbari, Ashulia, Savar, Dhaka - 1349
(23.94997N 90.27216E)

10th May 2014



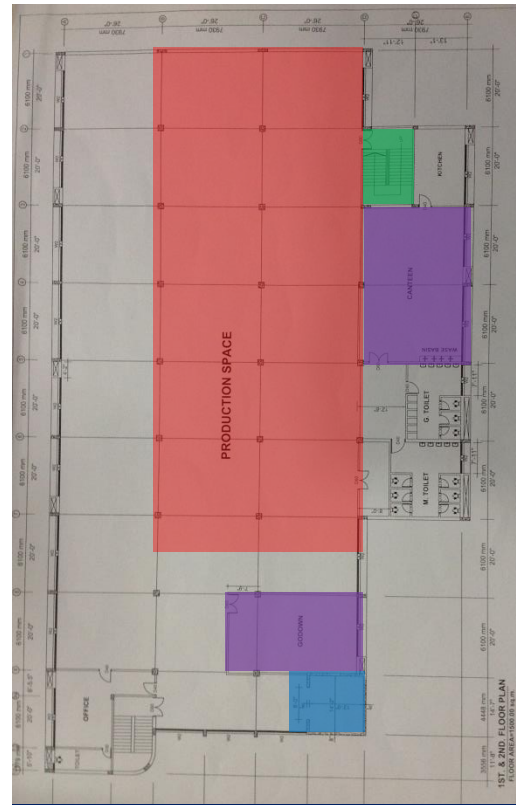
Observations

Heavy loading in both buildings, particularly Building 2, and lack of a Loading Plan

- Areas of very high loading were observed in the fabric storage area at 1st Floor level of Building 2.
- This of particular concern as extensive cracking to the top of the 1st Floor slab at the location of the beams was evident throughout the floor.
- Further areas of high loading were noted at the water tanks and storage rooms at roof level of both buildings, and the storage areas at 2nd Floor level of Building 1.
- Building Engineer to check that the different slab constructions have been adequately designed to accommodate these loadings.
- A Loading Plan for all floor plates is to be produced, implemented on the floor and actively managed.



Typical Floor Plan – Building 1



Typical Floor Plan – Building 2



Fabric Storage Area at 1st Floor level of Building 2



5000 litre water tanks at Roof Level of Building 1



2m high water tanks above stair-cores of both buildings



Storage Rooms above lift-cores of both buildings



Boxed / Cardboard Storage Area at 2nd Floor level of Building 1



Other storage areas at 1st & 2nd Floors of both buildings



ACCORD
on Fire and Building Safety in Bangladesh

ARUP



Building 2 – Stacked rolled fabric at 1st Floor level



Building 2 – Cracking of slab along beam lines at 1st Floor



Building 1 – 5000 litre water tank at Roof Level



Building 1 - Storage room above lift-core at Roof level



Building 1 – Cardboard/Boxed Goods Storage at 2nd Floor



Building 1 – Cardboard/Boxed Goods Storage at 2nd Floor



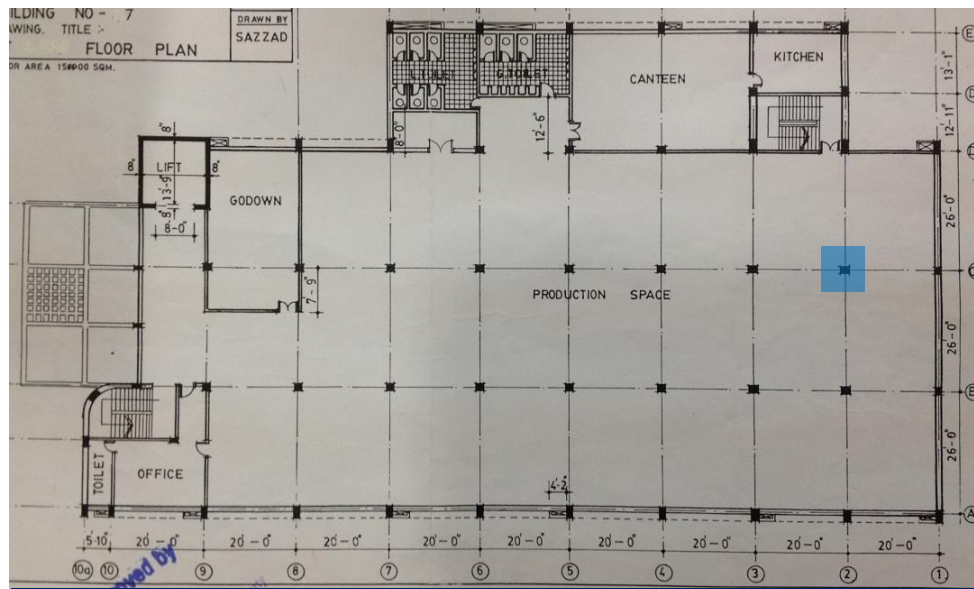
Building 2 - Storage room above lift-core at Roof level



Building 2 - Storage room in 'Canteen' area at 1st Floor

Column stress levels in both buildings

- Cursory calculations indicate that the working stresses of the columns at Ground Floor level are above normal design limits.
- Building Engineer to verify concrete stresses and in-situ concrete strength.



First Floor Plan – Building 1



Tested Column

Tested Column

Construction of Buildings 1 and 2 began in 1994, and was completed in 1996. Baxter Brenton (BD) Ltd have part-occupied the building since 2011. Both buildings are located within the Dhaka Exporting Processing Zone (DEPZ), and are approved by the Bangladesh Exporting Processing Zone Authority (BEPZA) which has the jurisdiction to approve construction within the zone. Both buildings are almost identical in layout.

- Testing of the Ground Floor columns was not possible in either building on the day of the survey, owing to the fact that these floors are currently occupied by other companies.
- Stone aggregate was observed in the 1st Floor columns of Building 1.
- The reinforcement quantities observed at 1st Floor level coincides with the values shown in the column schedule.
- High yield steel reinforcement is called up in the drawings for both buildings, and was observed at Roof level.

**Lack of documentation for the ramp and link
bridge structures, and concerns over the
connection the buildings**

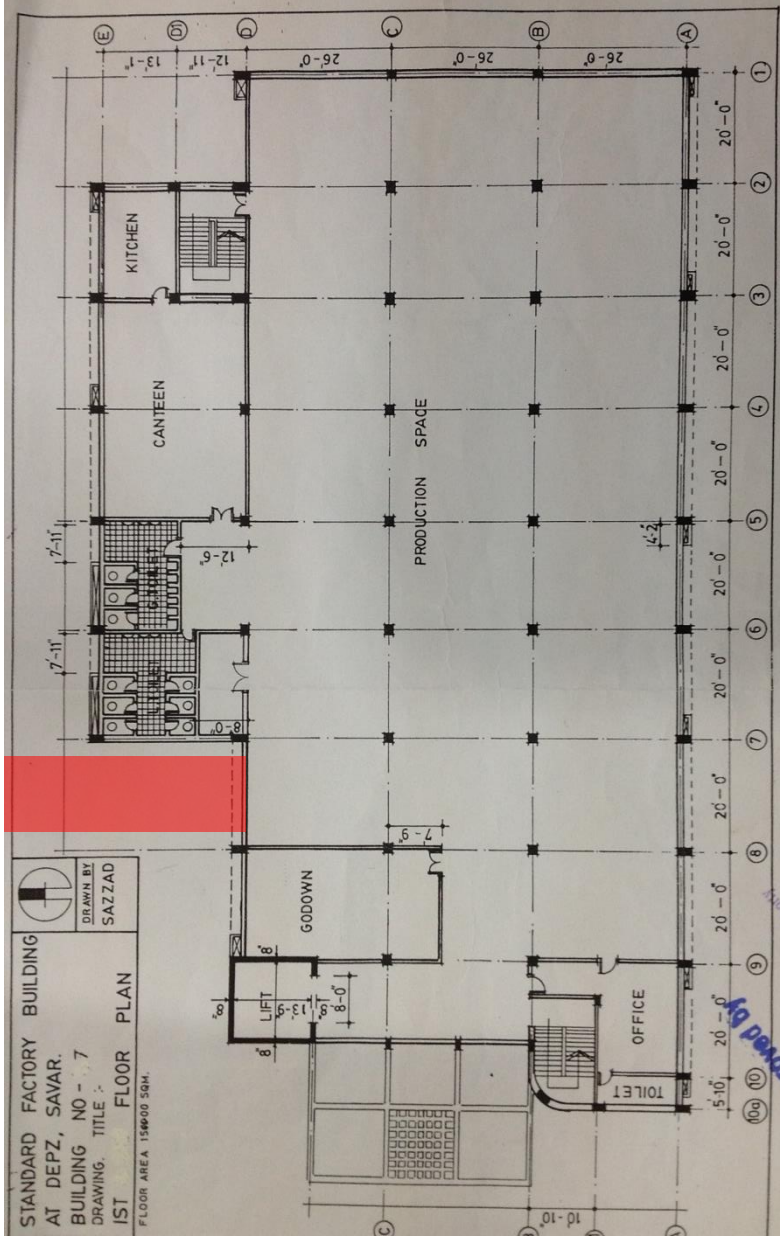
- Buildings 1 and 2 are connected to adjacent buildings by a ramp and bridge link structure, which provides elevated pedestrian and delivery access to the buildings at 1st and 2nd floor levels.
- The design of these structures, particularly the connection detail with the buildings, is not clear.
- Exposed slab and wall reinforcement in the structures was observed to run through, thereby providing connection with the building.
- Relative movement between the buildings and the structures does not appear to have been allowed for, and extensive cracking was observed.
- There were no drawings showing the structures.
- The link bridge appeared to be used as a storage area at 1st Floor level.
- Building Engineer to review the design of the ramp and bridge link structure, with special emphasis on the connection detail with the buildings, and to demonstrate that if any load is imparted to the building this has been adequately designed for.
- A full set of as-built drawings is to be provided detailing the buildings and the connecting structures.



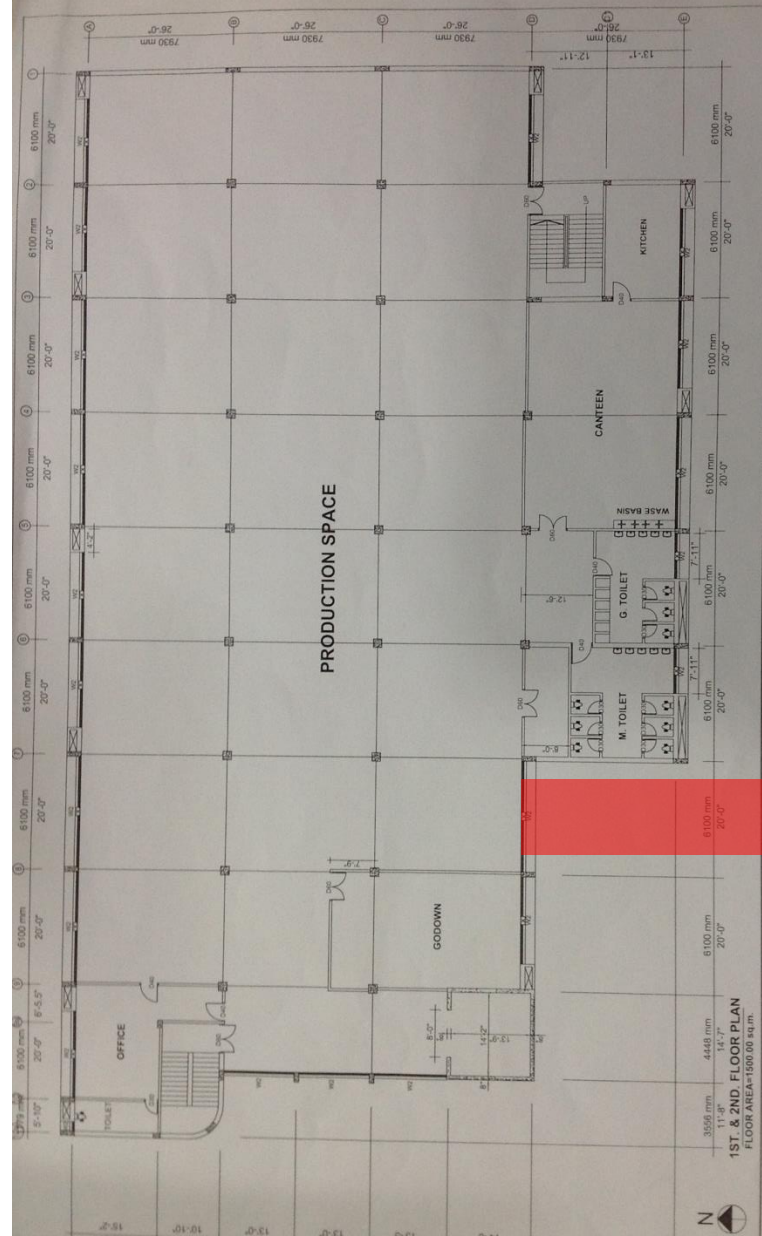
Front elevation of link bridge connected to Building 1



Back elevation of ramp and link bridge to Building 1



Building 1



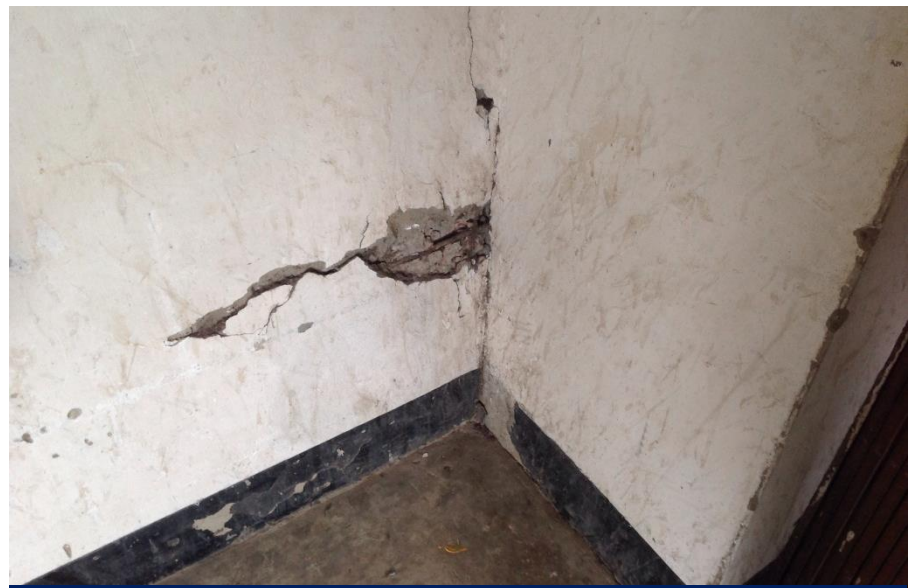
Building 2



Extent of
Walkways



View from link bridge at connection with Building 1



Apparent connection between link bridge and Building 1



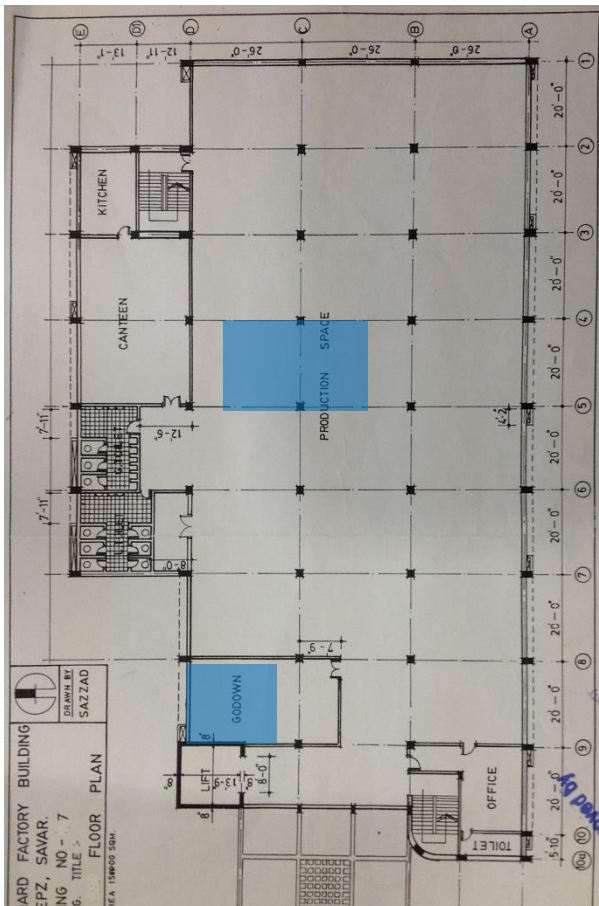
View of link bridge connection with Building 2



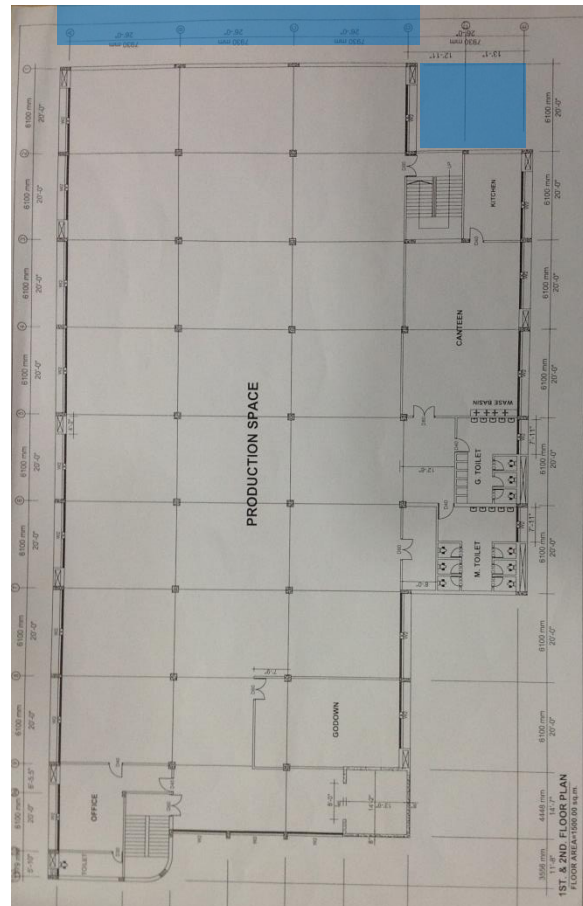
Cracking and evidence of remedial works to Building 2

Lightweight roof structures

- Included in the factories are a number of lightweight structures located on the Roof of Building 1 and at Ground Floor level around Building 2.
- These structures appear to be non-engineered.
- Building Engineer to review the design of these lightweight structures to guard against uplift and lateral instability, with particular emphasis on connections and bracing, and to implement any remedial / upgrade works as required.



Typical Floor Plan – Building 1



Typical Floor Plan – Building 2

Extent of lightweight structures



Building 1 – Lightweight Structure at Roof level



Building 1 – Lightweight structure at Roof level



Building 2 – Lightweight structure at Ground level



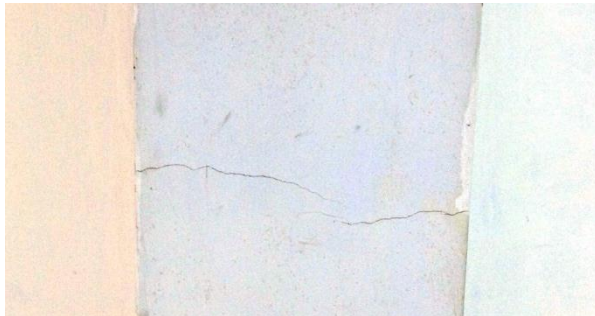
Building 2 – Lightweight structure at Ground level



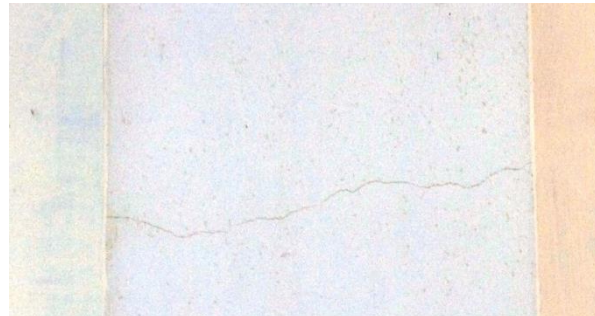
Building 2 – Lightweight structure at Ground level

Cracking to both buildings

- Cracking was observed in a number of locations throughout the buildings.
- Extensive cracking was observed on the 1st Floor slab of Building 2 at the location of the support beams, and to areas of the façade where the walkways meet both the buildings as highlighted in Observations section above.
- Hairline cracking was observed to a number of beam soffits in both buildings at all floor levels. Cracking to areas of the façade and the stair-core walls of Building 2 was also observed.
- A number of cracks have been filled and / or painted over, particularly at Ground Floor level.
- Building Engineer to investigate the cause of the cracking and to carry out remedial works to the structure as required.



Building 1 - Cracking to beam soffit



Building 1 - Cracking to beam soffit



Building 2 - Cracking to NE corner



Building 2 - Cracking to SE corner



Building 2 – Cracking to SE stair slab



Building 2 – Cracking to SE stair wall

Priority Actions

Problems Observed

1. Heavy loading in both buildings, particularly Building 2, and Lack of a Loading Plan
2. Column Stress Levels in both buildings
3. Lack of documentation for the ramp and link bridge structures and concerns over the connection the buildings
4. Lightweight roof structures
5. Cracking to both buildings

Item No.	Observation	Recommended Action Plan	Recommended Timeline
1	Heavy loading, particularly at 1st Floor level of Building 2	Building Engineer to carry out a design check for heavy loads associated with the water tanks and storage areas as indicated, and advise on any necessary alterations, taking account of floor capacity.	6-weeks
2	Heavy loading, particularly at 1st Floor level of Building 2	Building Engineer to produce a loading plan for all floor plates within the Main Factory Buildings, giving consideration to floor capacity and column capacity.	6-weeks
3	Heavy loading, particularly at 1st Floor level of Building 2	Factory Management to actively implement and manage Loading Plan with clear instructions to the staff in this regard.	6-months
4	Column Stress Levels in Main Factory Buildings	Factory Engineer to review design, loads and columns stresses in Main Factory Buildings.	6-weeks
5	Column Stress Levels in Main Factory Buildings	Verify in-situ concrete stresses either by 100mm diameter cores or existing cylinder strength data for cores from four columns.	6-weeks
6	Column Stress Levels in Main Factory Buildings	Produce and actively manage a loading plan for all floor plates within the factory, giving consideration to floor capacity and column capacity.	6-months

Item No.	Observation	Recommended Action Plan	Recommended Timeline
7	Pedestrian Walkways	Building Engineer to review the design of the walkways, with special emphasis on the connection detail with the buildings.	6-weeks
8	Pedestrian Walkways	Building Engineer to carry out a design check of the concentrated loads imposed on the main factory buildings from the walkways and confirm that the existing structure has the capacity to accommodate these loads.	6-weeks
9	Pedestrian Walkways	Building Engineer to produce a full set of as-built drawings.	6-months
10	Non-engineered lightweight steel structures	Building Engineer to check the design and capacity of the lightweight structures, with special emphasis on connections and bracing, and make any necessary alterations.	6-weeks
11	Cracking	Monitor cracks to beams, slabs, columns and facades. Building Engineer to investigate if cracking extends beyond the external render / internal plastering.	6-months
12	Cracking	Building Engineer to advise on load reduction and repair and strengthening of the structure if required.	6-months