Shagore Garments Ltd.
Optimum Garments Ltd.

Amir Complex, Plot 43, Sector 3, Uttara, Dhaka
(23.867624, 90.399812)
10th March 2014

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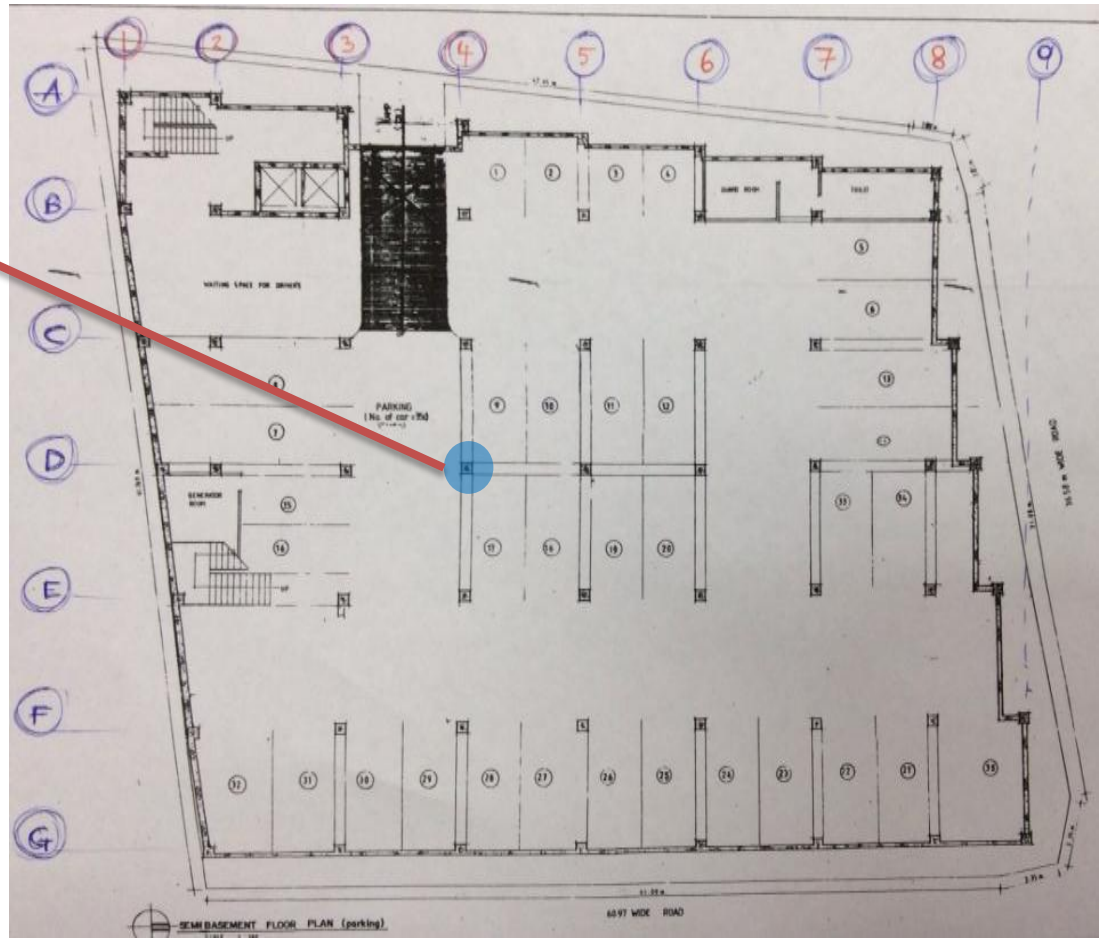
ARUP

Observations

Column Strengths

Building column tested

Stone aggregate



Design drawings are in good agreement with as-built structure. Opening up confirms aggregate type is stone throughout, and scanning on several columns indicates but cannot conclusively confirm high levels of reinforcement in agreement with drawings. Cursory calculations indicate working stress in the columns may be higher than designed for.

Column strengths

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Cracking in beams and slabs

Cracking to undersides and side of beams particularly on L7 but also on other levels. Cracks have been repainted in most locations.
Building Engineer to check cracks in beams and define a repair system, if required.

Cracking in downstand beams

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Cracking in flat slabs on underside of level 9

Cracking to tops of slabs e.g. on 6th floor

Cracking in slabs

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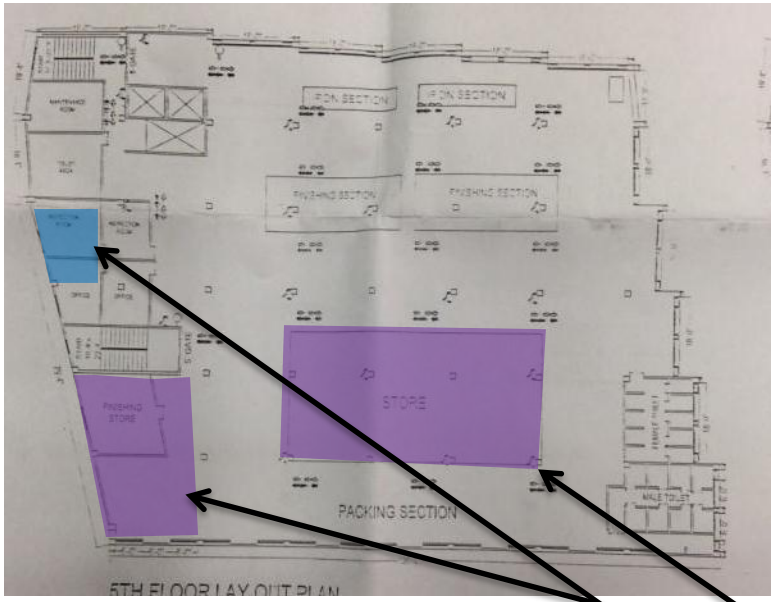
High loading in storage areas and toilets

High live loads arising from storage loads and additional tanks e.g. in kitchen area. Selected examples shown below.
Loading plans (i.e. plan and height restrictions) to be introduced to prevent future overloading – to be developed by building engineer



Storage areas in the same plan location on most levels

Some kitchen areas with additional tanks on some levels

Floor loading – storage areas

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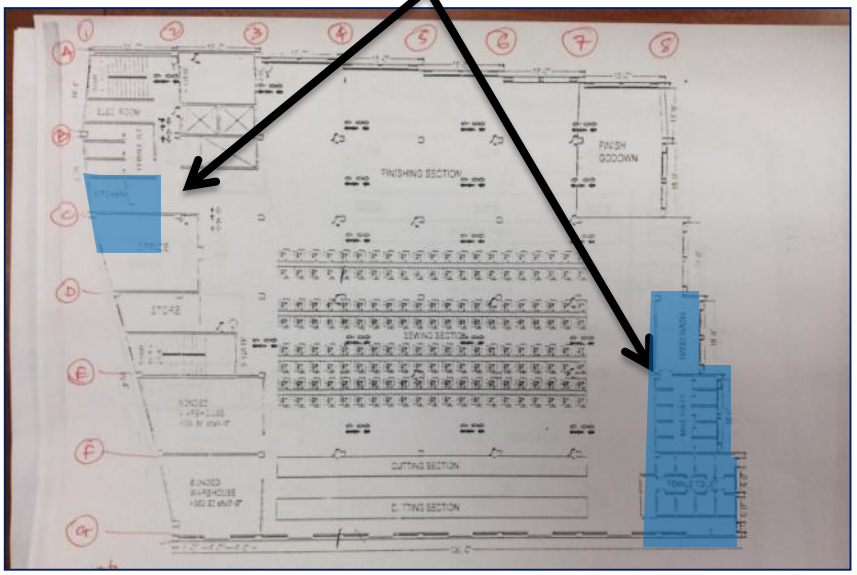
High loads arising from heavy toilet floor build-up, up to 500mm thick

Heavy toilet build-up in these locations on most floors



Floor loading – toilet areas

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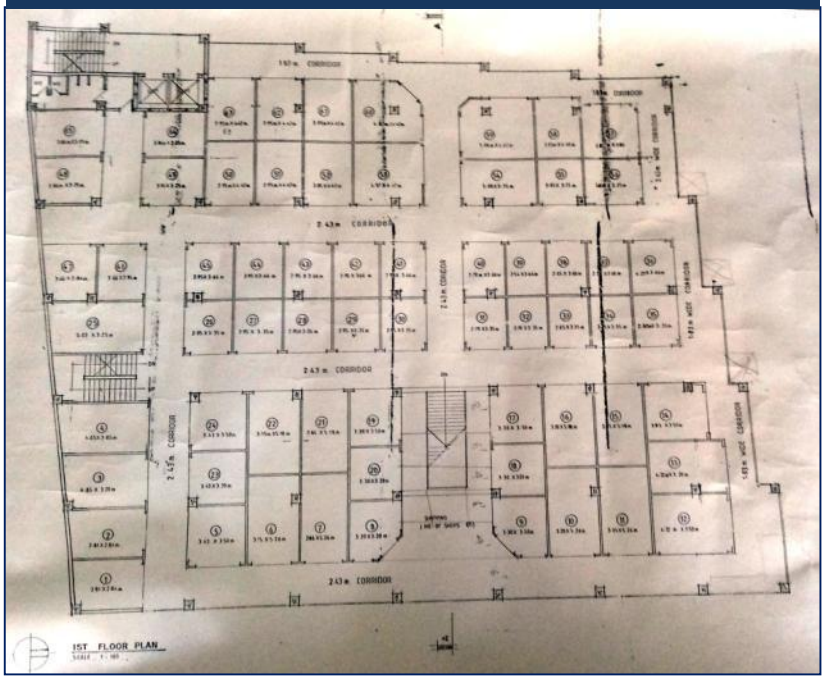
Dense layout of solid masonry partition walls throughout market area, with possibility of high storage loads once all levels fully occupied



Floor loading – market floors

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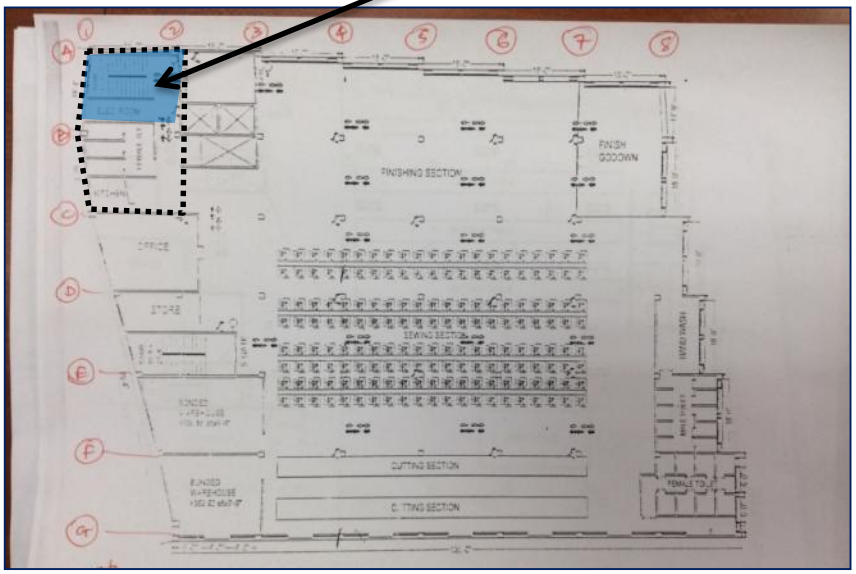
High tank loading on roof levels

Water tank height 2.3m over bay of stair core = 23kN/m²



Large concrete water tank over stair core not shown on drawings adds significant load to supporting structure

Other significant loading also arises from a group of plastic tanks at roof level

Floor loading – market floors

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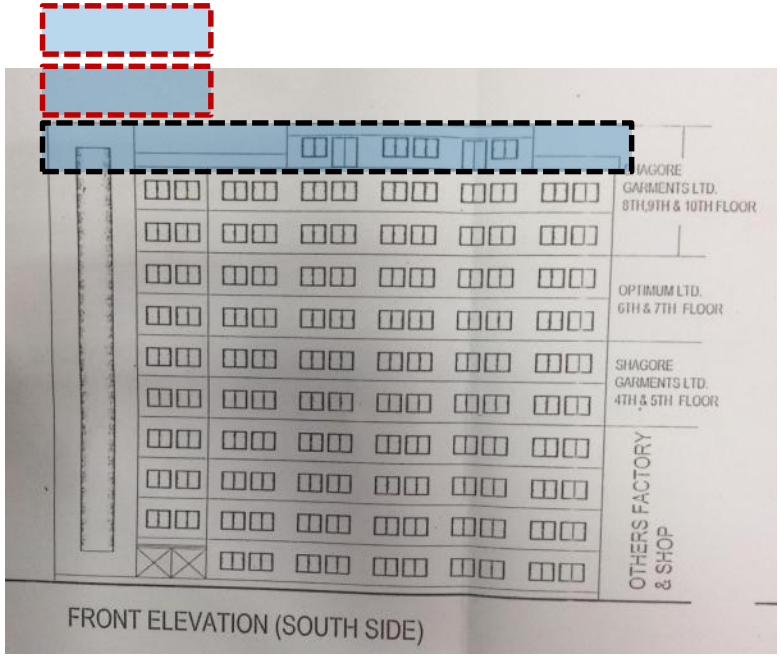
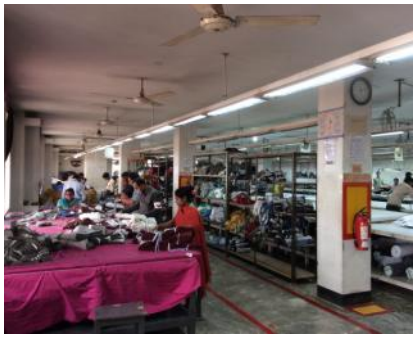
Drawings do not match structure as-built



L10 built completely rather than partially as shown on drawings and additional floor levels built above L10 in localized areas

Structure switches from beam and slab to flat slab only at L9

The drawings do not match the as built structure in several locations.
For example, additional floors have been added locally above the stair and lift cores, and the structural system changes at a higher level than the drawings indicate.



Drawings do not match as-built

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Priority Actions

Problems Observed

ITEM 1: Concrete Stress Levels in Columns
ITEM 2: Cracking in Beams supporting Levels 6,7 and 8
ITEM 3: Cracking in the soffit of Slab at Level 9
ITEM 4: Storage loading at Levels 4,5,6,7,8 and 9
ITEM 5: Loading from High Build-up in Toilet Areas
ITEM 6: Large water tank over stair core in southwest corner of building
ITEM 7: Structural drawings are not in agreement with the arrangement of the building structure

Item No.	Observation	Recommended Action Plan	Priority
1	Concrete Stress Levels in Columns	Remove loading from the area noted at levels 4,5,6,7,8 and 10 and ensure that these areas remain unoccupied. Retain the current unoccupied status of Level 3.	**Immediate-Now**
2	Concrete Stress Levels in Columns	Factory Engineer to review design, loads and columns stresses in all columns.	**Immediate-Now**
3	Concrete Stress Levels in Columns	Verify stress grade of reinforcement at Basement and Ground Floor by exposing steel in lightly loaded column. Verify insitu concrete strength either by 100mm diameter cores or existing cylinder strength data for cores from 4 columns.	**Immediate-Now**
4	Concrete Stress Levels in Columns	A Detail Engineering Assessment of Factory to be commenced, see attached Scope.	**Immediate-Now**
5	Concrete Stress Levels 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**
6	Concrete Stress Levels in Columns	Detail Engineering Assessment to be completed.	**6-weeks**
7	Concrete Stress Levels in Columns	Continue to implement load plan	**6-months**
8	Cracking in Beams supporting Levels 6,7 and 8	Engage an Engineer to investigate if cracks are only in the nominal render finish, in conjunction with the DEA	**6-weeks**
9	Cracking in Beams supporting Levels 6,7 and 9	If cracks are structurally significant, remove all items above the slab and close working areas below the affected areas . Engage an engineer to specify repairs and strengthening of the slab if necessary.	**6-weeks**

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. T his 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	Priority
10	Cracking in soffit of slab at Level 9	Engage an Engineer to investigate if cracks are only in the nominal render finish, in conjunction with the DEA	**6-weeks**
11	Cracking in soffit of slab at Level 9	If cracks are structurally significant, remove all items above the slab and close working areas below the affected areas . Engage an engineer to specify repairs and strengthening of the slab if necessary.	**6-weeks**
12	Storage loading at Levels 4,5,6,7,8 and 9	The Structural Engineer should check the capacity of the slab floors and columns against the design loading.	**6-weeks**
13	Storage loading at Levels 4,5,6,7,8 and 9	A Detail Engineering Assessment of Factory to be completed.	**6-weeks**
14	Storage loading at Levels 4,5,6,7,8 and 9	Produce and actively manage a loading plan for all floor plates within the factory giving consideration to floor capacity and column capacity.	**6-weeks**
15	Storage loading at Levels 4,5,6,7,8 and 9	Continue to implement load plan.	**6-months**

Item No.	Observation	Recommended Action Plan	Priority
16	Check on Column and Slab stresses due to high loading in toilet areas.	Building´s Engineer to ensure the structure is not loaded beyond capacity by the high loading from high build up in toilet areas.	**6-weeks**
17	Check on Column and Slab stresses due to high loading in toilet areas.	Building Engineer to create controlled loading plans for all floors.	**6-weeks**
18	Check on Column and Slab stresses due to high loading in toilet areas.	Continue to implement load plan.	**6-months**
19	Large water tank over stair core in southwest corner of building	Building´s Engineer to ensure the structure is not loaded beyond capacity by the high loading from high build up in toilet areas.	**6-weeks**
20	Large water tank over stair core in southwest corner of building	Building Engineer to create controlled loading plans for all floors.	**6-months**
21	Structural drawings are not in agreement with the arrangement of the building structure	Building engineer to carry out as built survey of the building,collect and produce accurate complete as-built drawings as part of Detail Engineering Assessment	**6-weeks**