

M.T Sweaters Ltd. Banga Fashion Ltd.

Plot # 1703-1704, Gacha, Gazipur Sadar, Dhaka
(23.93638N, 90.37576E)

12 March 2014



Executive Summary (Continued)

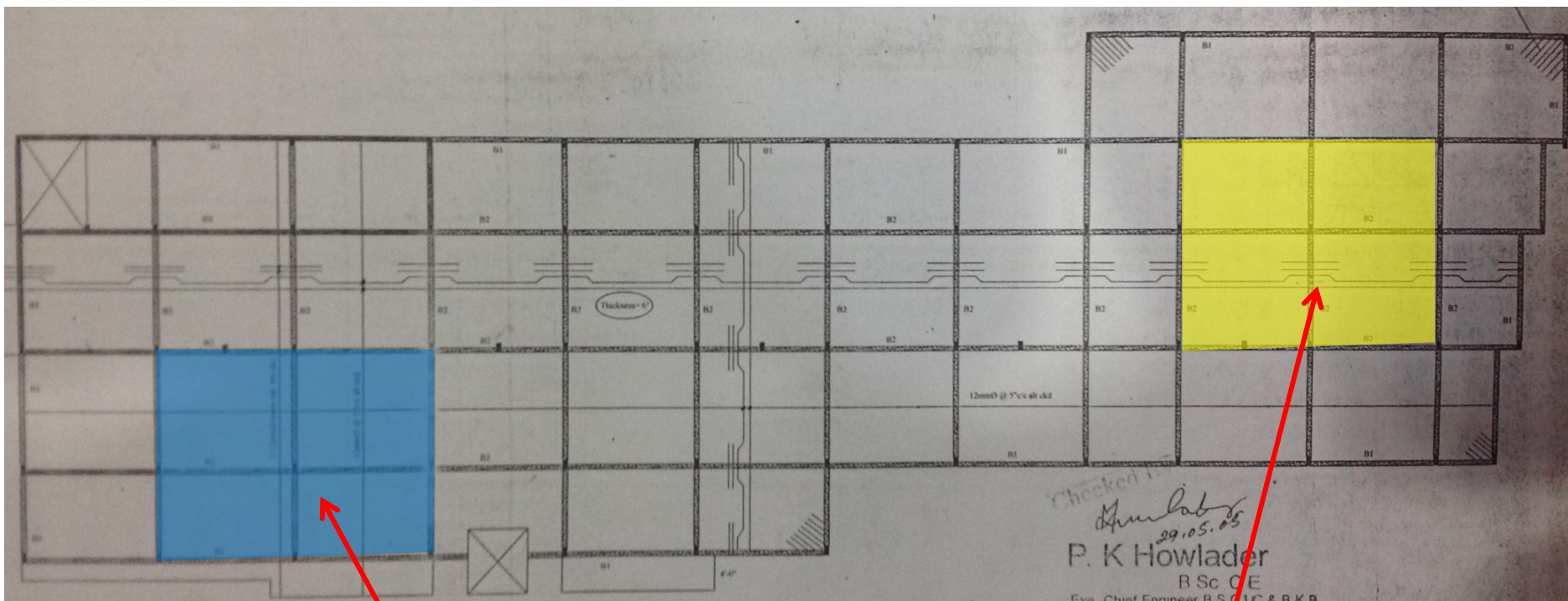
We do have important and urgent concerns in relation to the adequacy of the structural support columns. A Detail Engineering Assessment should be carried out and this needs to be addressed immediately.

The principal reasons for our concern is that columns appear to be stressed to levels that require **immediate** review and there are significant differences between the design drawings and the permit drawings/as constructed structure. We would recommend that the Detail Engineering Assessment for this building be completed **within 6 weeks** of receiving the report.

The following **immediate** actions are required to be carried out:

1. **All construction works should be halted pending confirmation by the Building Engineer that the structure, including columns and foundations, is adequate to carry these additional loads.**
2. **Loads to be reduced in the areas highlighted on the following sheet pending verification of column capacity by the Building Engineer.**
3. A Detail Engineering Assessment of the as constructed **Factory Building** is requested and this should be commenced immediately to the requirements of the scope attached and addressing the concerns as noted.

If the Building owners are not in a position to complete these actions immediately, the **Factory Building** should be re-classified as **Category Red** and evacuated.



Typical Floor Plan

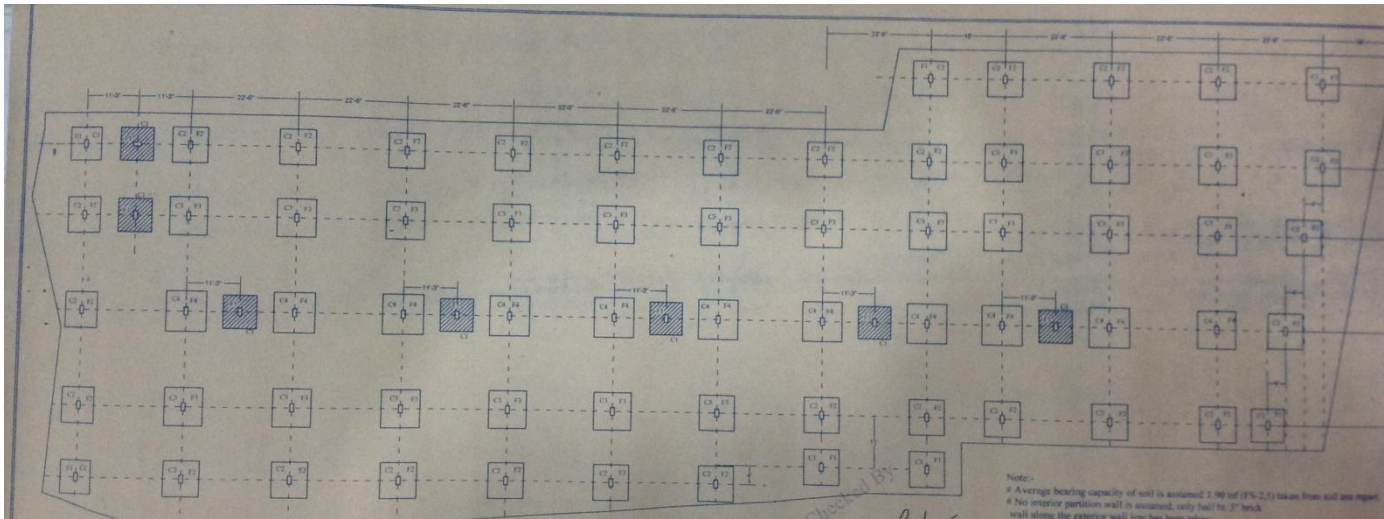
- Live loading on highlighted area to be reduced to 1.0kPa on 1st and 4th floors and area to be fully vacated on 2nd and 3rd floors.
- Loading on 5th floor not to increase from present loading

- Live loading on highlighted area between 1st and 4th floors to be reduced to 1.5kPa on 3rd floors and fully vacated on 1st floor.
- Loading on 5th and 6th floors not to increase from present loading

Immediate Action Required

Observations

**Columns appear to be stressed to levels that
require immediate review**



Refer to Pages 2 and 3 for immediate actions to limit floor loading

Cursory calculations indicate that columns are stressed to levels that require immediate review



Building Engineer is to perform detailed calculations including a Detail Engineering Assessment (See attached scope) and concrete tests to prove column size and (if required):

- Further reduce loads by vacating floors
- Reinforce columns

Specific design check to be carried out on columns at ground floor level which support roof level concrete water tank





**6th storey under construction.
Construction progressing from
north to south.**

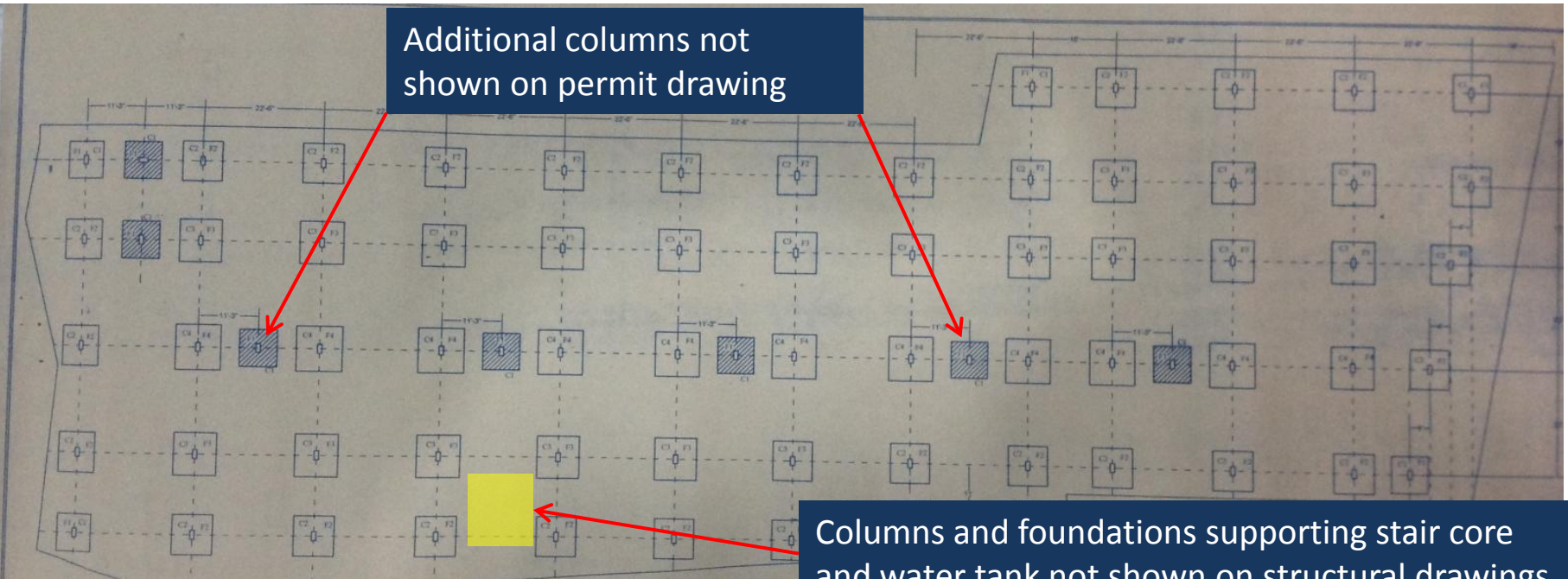


**Column design check to consider if the additional
storey can be supported by the building columns
within the design code specified parameters.**

Column Strength

Structural design drawings are not consistent with the permit structural drawings – 4 storeys / 6 storeys.

Additional columns not shown on permit drawing



Typical floor plan

Columns and foundations supporting stair core and water tank not shown on structural drawings

Permit drawings show 6 storey factory building and structural drawings are for a 4 storey factory building with additional columns which are not included on permit drawings.

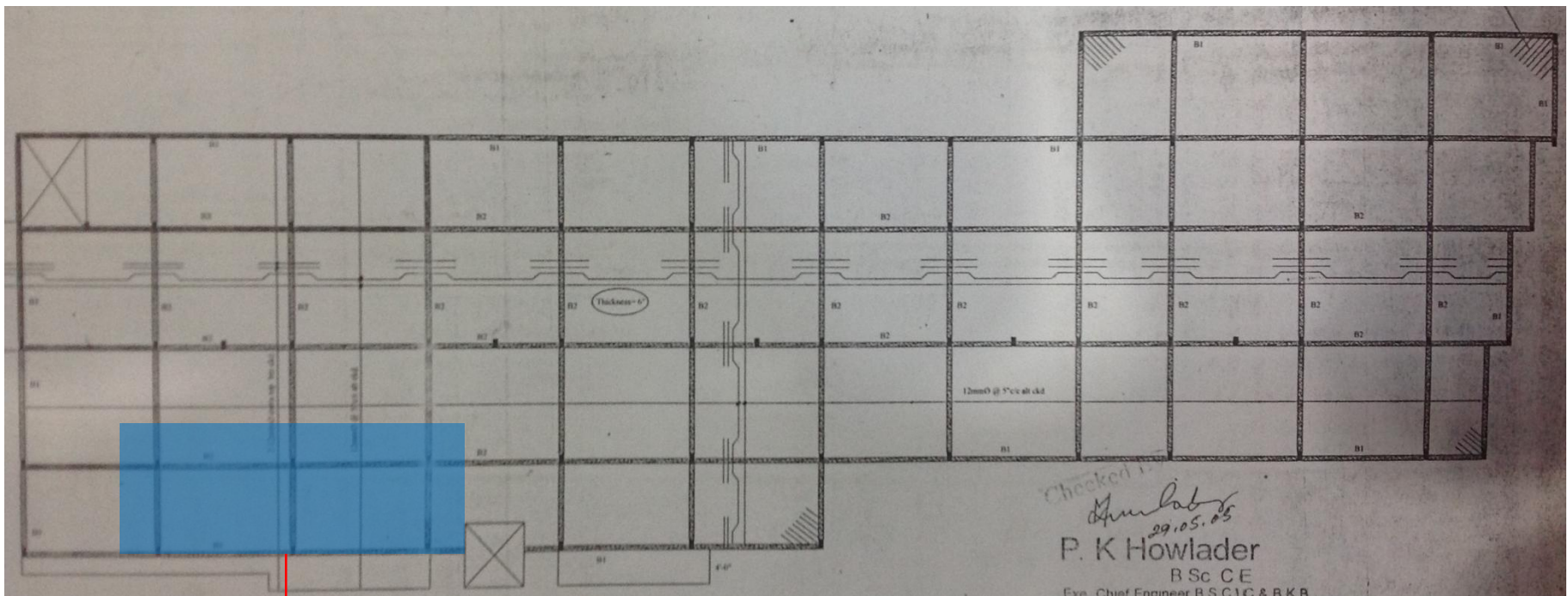
Building Engineer to survey as-built structure and update drawings



Stair Core & Water Tank

Structural/Permit drawings not consistent

Design check required for Washer and Dryer loads on 1st and 4th floors to confirm floor slab load capacity



Typical floor plan



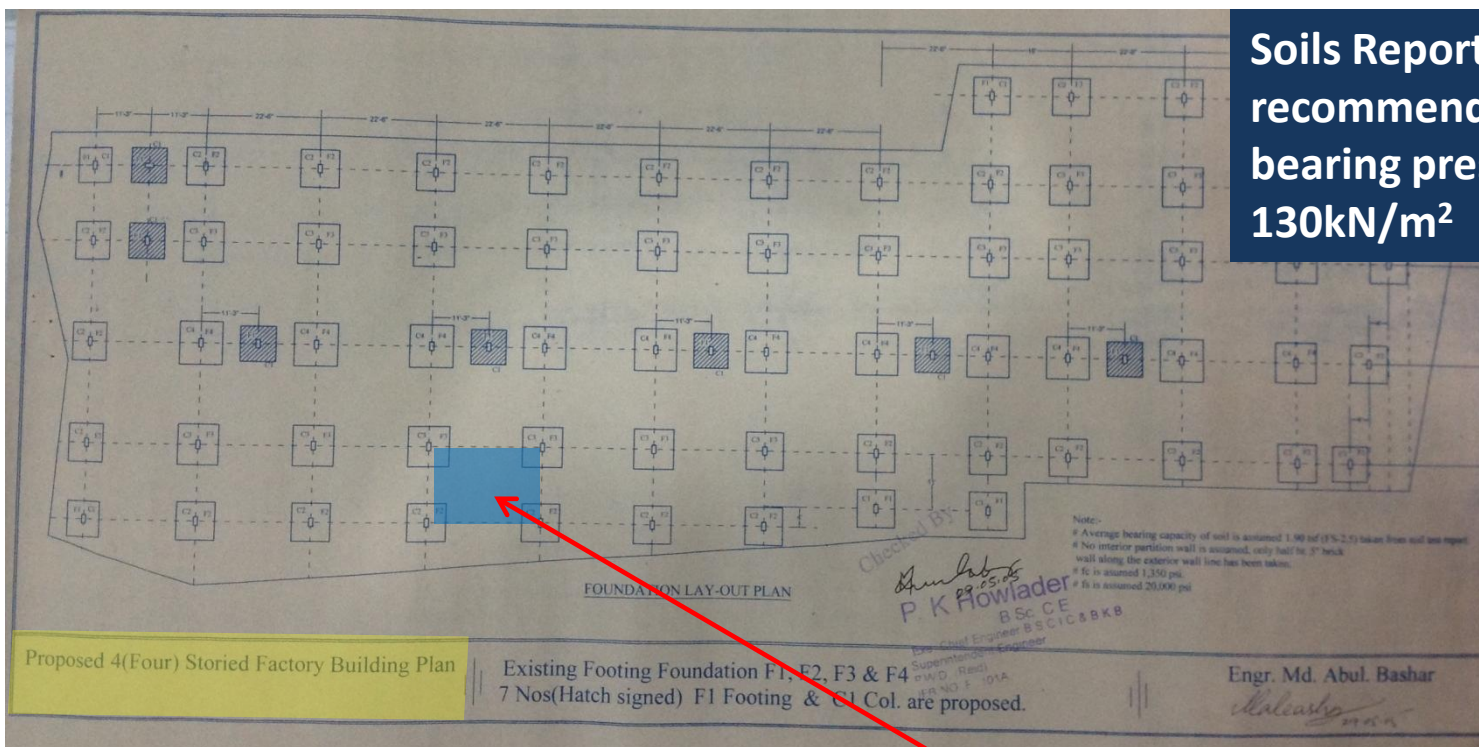
Floor build-up and equipment

180mm (max) high floor build-up in Washer & Dryer Area including equipment loads supported by concrete slab on 1st and 4th floors.

Building Engineer to check that the slab has been adequately designed and constructed to carry additional load due to floor build-up and equipment in these areas.

Estimated foundation bearing pressure in excess of Soils Report recommendation

**Soils Report 2013
recommends allowable
bearing pressure of circa
130kN/m²**



Structural Foundation Plan

Foundations shown appear to be designed for a four storey factory building (highlighted yellow). Building Engineer to confirm bearing capacity of pad footings in all areas.

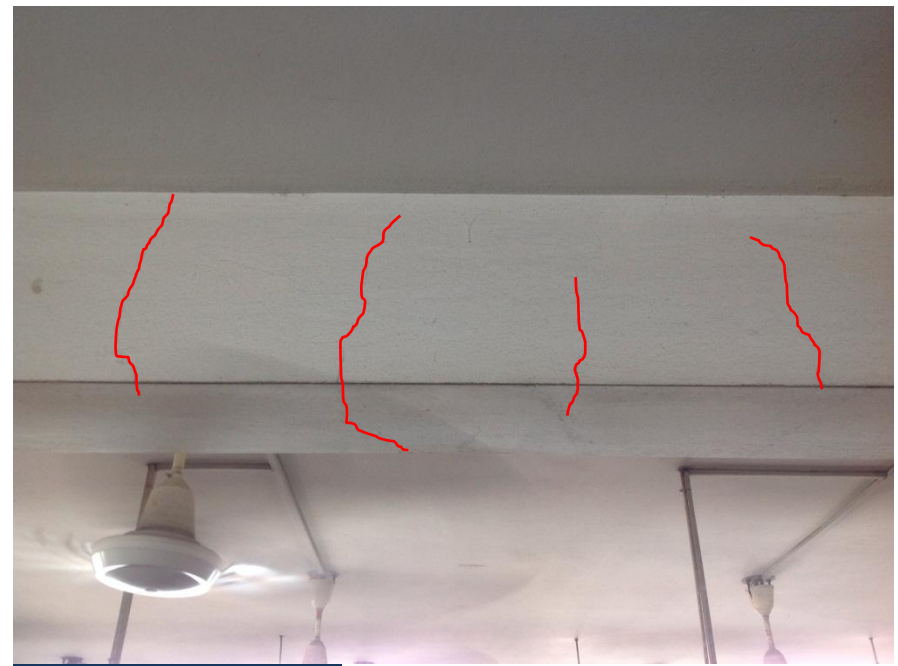
Foundation not indicated under stair core and water tank (area highlighted blue). Building Engineer to confirm presence and bearing capacity of foundation at this location

Foundation Bearing Pressure

Hairline cracking of beams on a number of floors



Beam Cracking

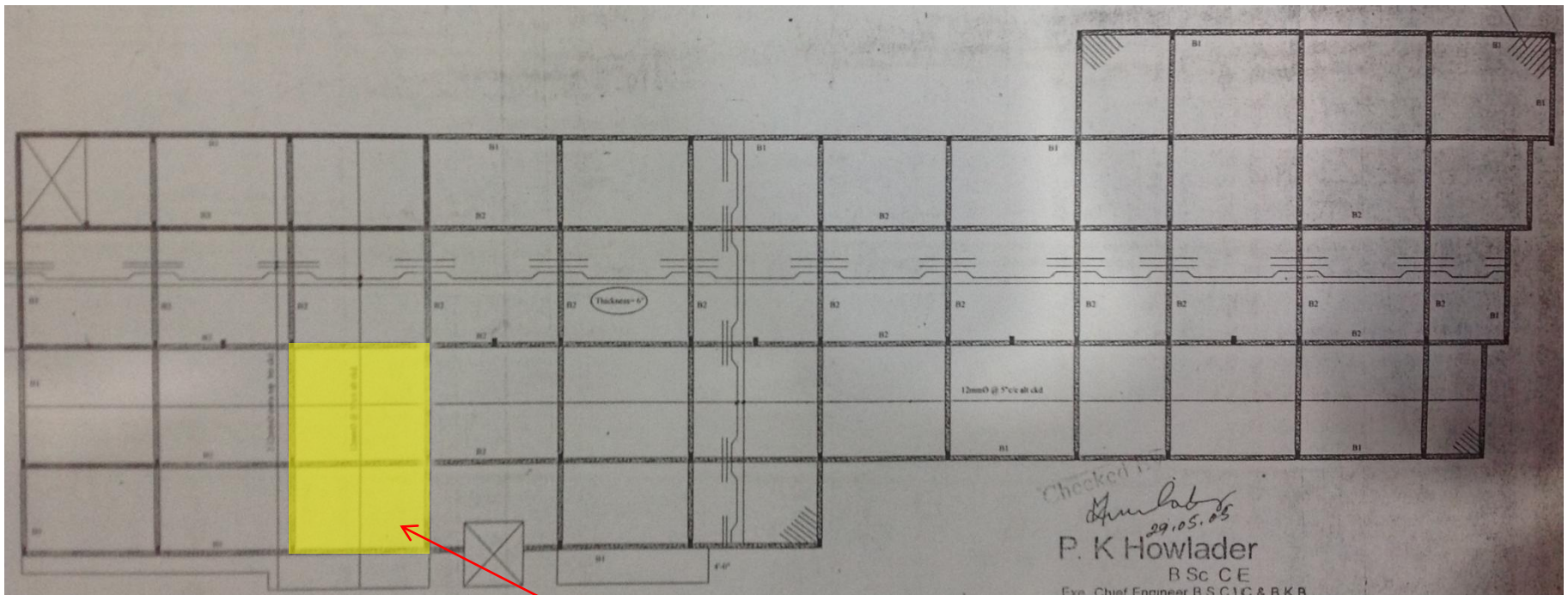


Beam Cracking

Beam and slab cracks to be reviewed on all floor levels by removing plaster to confirm that cracks do not extend into structure.

Beam Cracking

Management of storage loads in the 3rd floor Inventory Area



3rd Floor Plan

Building Engineer to prepare controlled loading plans for all floors which will designate where storage can be placed.



3rd Floor Inventory Area

Load Management

Priority Actions

Problems Observed

ITEM 1: Columns appear to be stressed to levels that require immediate review

ITEM 2: Structural design drawings which show a 4 storey building are not consistent with the permit structural drawings which show a 6 storey building.

ITEM 3: Design check required for Washer and Dryer loads on 1st and 4th floors to confirm floor slab load capacity

ITEM 4: Estimated foundation bearing pressure in excess of Soils Report recommendation

ITEM 5: Hairline cracking of beams on a number of floors

ITEM 6: Management of storage loads in the 3rd floor Inventory Area

Item No.	Observation	Recommended Action Plan	Priority
1	Columns appear to be stressed to levels that require immediate review	Immediately Cease all construction works	Immediate - Now
2	Columns appear to be stressed to levels that require immediate review	Reduce floor loading immediately as detailed on pages 3 and 4. Maintain current use of the floors, in remaining areas, and do not change use or increase occupation, either of which could increase loading.	Immediate - Now
3	Columns appear to be stressed to levels that require immediate review	Factory Engineer to review design, loads and stresses in all columns.	Immediate - Now
4	Columns appear to be stressed to levels that require immediate review	Verify insitu concrete strength either by 100mm diameter cores or existing cylinder strength data for cores from 6 columns. Verify reinforcement within as built columns.	Immediate - Now
5	Columns appear to be stressed to levels that require immediate review	A Detail Engineering Assessment of Factory to be commenced, see attached Scope.	Immediate - Now
6	Columns appear to be stressed to levels that require immediate review	Detail Engineering Assessment to be completed including a specific design check on the adequacy of the pad foundations and columns to carry the additional storey.	6-weeks
7	Columns appear to be stressed to levels that require immediate review	Produce and actively manage a loading plan for all floor plates within the factory giving consideration to floor capacity and column capacity.	6-weeks
8	Columns appear to be stressed to levels that require immediate review	Continue to implement load plan	6-months

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 Elevational 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
9	Structural design drawings which show a 4 storey building are not consistent with the permit structural drawings which show a 6 storey building.	As part of Detail Engineering Assessment, Building Engineer to commence survey of as-built structure and update drawings.	Immediate - Now
10	Structural design drawings which show a 4 storey building are not consistent with the permit structural drawings which show a 6 storey building.	Survey to include the verification of foundation sizes.	Immediate - Now
11	Structural design drawings which show a 4 storey building are not consistent with the permit structural drawings which show a 6 storey building.	Complete as-built survey and Detail Engineering Assessment	6-weeks
12	Structural design drawings which show a 4 storey building are not consistent with the permit structural drawings which show a 6 storey building.	Produce and actively manage a loading plan for all floors within the Factory giving consideration to floor capacity and column capacity.(Refer to Item 1)	6-weeks
13	Structural design drawings which show a 4 storey building are not consistent with the permit structural drawings which show a 6 storey building.	Continue to implement load plan	6-months

Item No.	Observation	Recommended Action Plan	Priority
14	Design check required for Washer and Dryer loads on 1st and 4th floors to confirm floor slab load capacity	Extent of loading within Washer and Dryer areas on 1st and 4th floors, including floor build-up, to be surveyed and capacity of floor slab to be assessed to confirm that the floor slab is designed to carry these loads.	6-weeks
15	Design check required for Washer and Dryer loads on 1st and 4th floors to confirm floor slab load capacity	Produce and actively manage a loading plan for all floor plates within the factory giving consideration to floor capacity and column capacity.	6-weeks
16	Design check required for Washer and Dryer loads on 1st and 4th floors to confirm floor slab load capacity	Continue to implement load plan.	6-months
17	Estimated foundation bearing pressure in excess of Soils Report recommendation	Building Engineer to review the Geotechnical (Soils) Report by comparison with the construction drawings and the size of pad foundations as constructed	6-weeks
18	Estimated foundation bearing pressure in excess of Soils Report recommendation	Building Engineer to confirm by calculations and records of site construction that foundation bearing is adequate - estimated bearing pressure appears to be in excess of that recommended (circa 130kN per sq m) in the Soils Report.	6-weeks

Item No.	Observation	Recommended Action Plan	Priority
19	Hairline cracking of beams on a number of floors	Sections of plaster finish to beams to be removed to investigate if cracks penetrate the building structure.	6-weeks
20	Hairline cracking of beams on a number of floors	Building Engineer to carry out design check on beams to confirm that these cracks are non-structural.	6-months
21	Hairline cracking of beams on a number of floors	Building Engineer to prepare Allowable Floor Loading Plans. (Refer to Item 1)	6-months
22	Management of storage loads in the 3rd floor Inventory Area	Produce and actively manage a loading plan for all floor plates within the factory giving consideration to floor capacity and column capacity. (Refer to Item 1)	6-weeks
23	Management of storage loads in the 3rd floor Inventory Area	Continue to implement load management plan.	6-months