

## **Summary of Preliminary Assessment on Structural, Fire and Electrical Safety**

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Name of the Factory	: Bakhrabad Knitting Inds. Ltd.
Address of the Factory	: PLOT NO. 702, JAJHAR, NATIONAL UNIVERSITY, GAZIPUR
Present Status of the Factory	: Under operation
Structural Assessment Conducted by	: BUET
Date of Structural Inspection	: 2014-02-03
Fire Assessment Conducted by	: TÜV SÜD Bangladesh (Pvt.) Ltd.
Date of Fire Inspection	: 2015-03-19
Electrical Assessment Conducted by	: TÜV SÜD Bangladesh (Pvt.) Ltd.
Date of Electrical Inspection	: 2015-03-19
BGMEA Membership No.	: 4255

### **BASIC INFORMATION:**

The present Garment factory is a commercial building with beam column frame structural system. The following information was noted:

i. Building Usage Type	: Garment Factory.
ii. Structural System	: R.C.C Building.
iii. Floor System	: Primarily flat plate with 188 mm thickness.
iv. Floor Area	: Approximately 790sqm (8500sq.ft) per floor (typical grid Spacing: 6.10m x5.18m from observation)
v. No. of Stories	: Five story
vi. Construction Year	: 2004-2007
vii. Foundation Type	: Available
viii. Design Drawings	: Available
ix. Soil Investigation Report	: Available
x. Construction Materials	: Reinforced Concrete with brick chips (reported by owner)
xi. Generator	: Outside the building

### **RECOMMENDATIONS FOR CORRECTIVE ACTION:**

The recommendations for **Structural Safety** corrective action are:

Short Term (Immediate)	:
Mid Term (6-weeks)	: 1. Other than ground floor loading intensity should be strictly maintained as 30 psf (1.50 kN/m <sup>2</sup> ). 2. No modification of the structural configuration or further construction is to be carried out without detail analysis.
Long Term (6-months)	: 1. Due to concern of relative higher stress in interior columns (in combination with high slenderness) at ground floor, core resting should be conducted within 6 months from issue date of this report. 2. Core tests results should be used to evaluate the punching shear capacity of flat slab system since it appears to be under designed.

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The recommendations for **Fire & Electrical Safety** corrective action are:

**(A): Recommendations for Fire Safety corrective actions:**

<p>Immediate</p> <p><i>(the factory should not continue to be occupied until these non-conformities have been rectified):</i></p>	<p>N/A</p>
<p>Short Term</p> <p><i>(Actions that must be incorporated into a Fire Safety Management Plan immediately (1 ~ 2 weeks) and should be a regular activity</i></p>	<ul style="list-style-type: none"> <li>• Provide aisle marking with arrow guiding and exit signage on all Evacuation pathways or provided with overhead signage fixed at ceiling level. <ul style="list-style-type: none"> <li>- Illuminated exit sign should be posted above the exit door, - It should be clearly visible at all time,</li> <li>- Provide directional signs wherever necessary.</li> <li>- All exit doors should be clearly marked for easy identification.</li> <li>-Signage should be uniform.</li> </ul> </li> <li>• Factory management should be checked alarm call points, alarm &amp; detection system periodically and maintained the record properly.</li> <li>• The first aid hose and standpipe performance should be checked periodically and properly tagged.</li> </ul>
<p>Mid Term</p> <p><i>(The remedial works indicated must be carried out within a period of 6 weeks)</i></p>	<ul style="list-style-type: none"> <li>• Replace all existing exit doors on evacuation routes, exit doors with side hinged type door, which swing outward and in the direction of travel. Swinging of the door should not constrict the width of the corridor / passage below 0.9 meter.</li> <li>• Remove all locking device from all egress door. All exit doors should be open-able from the side they serve without the use of a key.</li> <li>• Provide handrails on both side of each stairway with height of 0.9m measured from the nose of stair to the top of the handrail.</li> <li>• Doors in stair should be outward opening, side-swing, self-closing, non-lockable 1.5 hours fire rated doors in all stair way encloses.(Also require fire rated door at the floor occupied by other tenants)</li> <li>• Prepare proper plan and design for 4 hours fire rated barriers with 2 hours fire rated door at 1st floor boiler room, which located at the adjacent to finishing section.</li> <li>• The egress paths should be illuminated with emergency lighting with power back-up supply &amp; illumination should be a minimum of 10 lux for all corridors &amp; exit doors. Aisles should be provided with a</li> </ul>

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	<p>minimum 2 lux.</p> <ul style="list-style-type: none"> <li>• The stairway should be illuminated with emergency lighting with power back-up supply &amp; illumination should be a minimum of 10 lux for stairway.</li> <li>• Produce design and plan for automatic detection system with automatic fire alarm and control panel.(Also needs to cover the floors occupied by other tenants).</li> <li>• Provide adequate nos. of smoke detectors to cover the whole factory building.</li> <li>• Prepare proper design and plan for dedicated fire pump with alternate backup power supply.</li> <li>• Replace existing 1 inch hose pipe with 1.5 inch hose pipe to meet the requirement of RMG guideline.</li> <li>• Prepare plan and design for dedicated water storage tank for firefighting operation as per RMG guideline.</li> <li>• Cover all units / floors in a valid fire license</li> <li>• Implement to a single fire safety management system with approvals from all tenants in the factory building.</li> </ul>
<p>Long Term</p> <p><i>(The remedial works indicated must be carried out within a period of 6 months)</i></p>	<ul style="list-style-type: none"> <li>• Provide 4 hours fire rated barriers with 2 hours fire rated door at 1st floor boiler room, which located at the adjacent to finishing section.</li> <li>• Install automatic detection system with automatic fire alarm and control panel.(Also needs to cover the floors occupied by other tenants)</li> <li>• Install dedicated fire pump with alternate backup power supply.</li> <li>• Stand pipe supplying first aid hose should have minimum pressure of 200 KPa.</li> <li>• Provide dedicated storage tank for firefighting operation.</li> </ul>

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### **(B): Recommendations for Electrical Safety corrective actions:**

<p>Immediate</p> <p><i>(the factory should not continue to be occupied until these non-conformities have been rectified):</i></p>	<ul style="list-style-type: none"> <li>Over current protection devices (Circuit breakers) should be installed at all distribution panels.</li> </ul>
<p>Short Term</p> <p><i>(Actions that must be incorporated into a Fire Safety Management Plan immediately (a week) and should be a regular activity</i></p>	<p>None</p>
<p>Mid Term</p> <p><i>(The remedial works indicated must be carried out within a period of 6 weeks)</i></p>	<ul style="list-style-type: none"> <li>Provide rubber mats of adequate size in front of all distribution panels.</li> <li>Provide and maintain clear and legible identifications numbers &amp; names on all incoming and outgoing circuits of HT / LT panels.</li> <li>Provide proper clearance of 0.8 - 1.0 m in front of all distribution panels/switchboards.</li> <li>Avoid looping and bunch of cable at MCCB/MCB or bus bar terminal, use individual circuit and over current device for every incoming and outgoing circuit at the distribution boards.</li> <li>Provide circuit diagram /circuit list with proper current ratings and fuse size, marking for DBs identifying end use load, voltage, number of phases.</li> <li>Provide proper separate earthing/grounding to generator. Ensure that generator body frame to have two separate and distinct connections to the earth / ground.</li> </ul>

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<p>Long Term</p> <p><i>(The remedial works indicated must be carried out within a period of 6 months)</i></p>	<ul style="list-style-type: none"><li>• <ol style="list-style-type: none"><li>1. Provide updated SLD matching the existing installation at the factory.</li><li>2. SLD to indicate exact positions of all points of switch boxes and other outlets.</li><li>3. SLD to be approved by the engineer-in-charge.</li></ol></li> <li>• <ol style="list-style-type: none"><li>1. Provide updated Electrical layout drawing prepared after proper locations of all outlets for lamps, fans, fixed and transportable appliances, motors etc.</li><li>2. Drawings to indicate exact positions of all points of switch boxes and other outlets to match existing installation.</li><li>3. As built drawing to be approved by the engineer-in-charge.</li></ol></li> <li>• Each circuit should have a separate neutral (use of common neutral for more than one circuit shall not be permitted).</li> <li>• <ol style="list-style-type: none"><li>1. Provide the ECC to meet minimum cross-sectional area as per table 4.5.</li><li>2. Ensure that connections between conductors / equipment's provided to durable electrical continuity and adequate mechanical strength and protection.</li><li>3. The continuous earth connection is provided back to the main intake supply earth.</li></ol></li> <li>• Provide adequate protection against lightning depending on the probability of a strike and acceptable risk levels at roof top of building.</li></ul>
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