

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

Name of the Factory	: Towel Tex Limited.
Address of the Factory	: Chandra, Kaliakoir, Gazipur, Bangladesh.
Present Status of the Factory	: Under operation.
Structural Assessment Conducted by	: TUV
Date of Structural Inspection	: 10 March, 2015
Fire Assessment Conducted by	: TUV
Date of Fire Inspection	: 10 March, 2015
Electrical Assessment Conducted by	: TUV
Date of Electrical Inspection	: 10 March, 2015
BGMEA Membership No.	: 5164

### **BASIC INFORMATION:**

The factory building is a three storied RCC building with beam and column system and flat slab system. The following information was noted:

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|-------------------------------|--|
| i. Building Usage Type        | : Textile Factory.   |
| ii. Structural System         | : Steel structure for Building 1, beam slab frame in ground floor to first floor and flat slab in 2nd floor for Building 2.  |
| iii. Floor System             | : Beam Slab (Building 1), Beam Slab and flat slab (Building 2).  |
| iv. Floor Area                | : The typical plinth area is 4815 sft. and total production floor is 9630 sft.(Building 1),The typical plinth area is 1682 sft. and total production floor is 7550 sft.(Building 2). |
| v. No. of Stories             | : Pre fabricated structure- 2 Storey, RCC Structure- 3 Storey  |
| vi. Construction Year         | : 2014, 2008   |
| vii. Foundation Type          | : Shallow Foundation   |
| viii. Design Drawings         | : Available (Approval from Kaliakoir Pouroshova on 2nd April, 2014. Both the buildings have approval for industrial use)   |
| ix. Soil Investigation Report | : Available  |
| x. Construction Materials     | : Brick aggregate.   |
| xi. Generator                 | : East side of weaving section.  |

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

The recommendations of corrective action for both Structural and Fire & Electrical Safety comprises in Short Term, Mid Term and Long Term basis.

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

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|------------------------|--|
| Short Term (Immediate) | : N/A  |
| Mid Term (6-weeks)     | : N/A  |
| Long Term (6-months)   | : 1. As built architectural and structural drawing to be prepared and submitted for approval by appropriate authorities. As part of this process the building engineer will be required to make a number of checks on the structural design as described in the following recommendations.<br><br>2. Sections of plaster finish to brick wall and column to be removed to investigate if dampness penetrates into the building |

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wall and column. Carry out any remedial actions as directed by the Building Engineer regarding dampness.

3. The connection of steel structure needs to be checked by building engineer and the bracing system is required to ensure the stability of the structure.

4. Water proofing and proper roof drainage system need to be implemented as directed by the guidance of building engineer.

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>• The minimum clear width of the pathway should be 0.9 meter</li> <li>• Provide aisle marking with arrow guiding and exit signage on all Evacuation pathways or provided with overhead signage fixed at ceiling level.</li> <li>- Illuminated exit sign should be posted above the exit door,</li> <li>- 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> <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>• Prepare proper plan and design for one more exit in Weaving shed east side to ensure the easy way to outside of building.</li> <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>• Prepare proper plan &amp; design for another staircase. - Minimum clear width should be 0.9 meter.</li> <li>• Provide handrails on both side of each stairway with height of</li> </ul>

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	<p>0.9m measured from the nose of stair to the top of the handrail.</p> <ul style="list-style-type: none"> <li>• Doors in stair should be outward opening, side-swing, self closing, non-lockable 0.75 hours fire rated doors in all stair way encloses.</li> <li>• Provide 1 hour fire rated construction at unprotected opening window, which is adjacent to external staircase.</li> <li>• Prepare proper plan and design for 4 hours fire rated barriers with 2 hours fire rated doors at chemical shed, which located at the adjacent to North-East exit of dyeing shed.</li> <li>• Prepare proper plan and design for 4 hours fire rated barriers with 2 hours fire rated door at chemical shed, which located at the adjacent to North-East exit of dyeing shed.</li> <li>• Seal all openings in walls with fire resistant materials having 4 hours fire rating.</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 minimum 2 lux.</li> <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.</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>• Power backup supply should be provided for fire alarm system.</li> <li>• Visual alarm should be placed at the generator room.</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>• Implement the plan and design for one more exit</li> <li>• Install another staircase as per plan and design. - Minimum clear width should be 0.9 meter.</li> <li>• Provide 4 hours fire rated barriers with 2 hours fire rated doors at chemical shed, which located at the adjacent to North-East exit of dyeing shed..</li> <li>• Provide 4 hours fire rated barriers with 2 hours fire rated door at chemical shed, which located at the adjacent to North-East</li> </ul>

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	<p>exit of dyeing shed.</p> <ul style="list-style-type: none"> <li>• Install automatic detection system with automatic fire alarm.</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><b>Immediate</b></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>• Provide IP degree of protection to wiring system to protect the wiring circuit from ingress of water 2. Ensure that the entire wiring network should have provisions to prevent the ingress of water in to the electrical wiring system.</li> </ul>
<p><b>Short Term</b></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>	<ul style="list-style-type: none"> <li>• All strands cables at exposed ends should be properly soldered / crimped and insulated.</li> </ul>
<p><b>Mid Term</b></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>• 1. Provide updated SLD matching the existing installation at the factory. 2. SLD to indicate exact positions of all points of switch boxes and other outlets. 3. SLD to be approved by the engineer-in-charge.</li> <li>• 1. Provide updated Electrical layout drawing prepared after proper locations of all outlets for lamps, fans, fixed and transportable appliances, motors etc. 2. Drawings to indicate exact positions of all points of switch boxes and other outlets to match existing installation. 3. As built drawing to be approved by the engineer-in-charge.</li> <li>• Install smoke detection and provide firefighting equipment in the substation and generator room.</li> <li>• Provide and maintain clear and legible identifications numbers &amp; names on all incoming and outgoing circuits of HT / LT panels.</li> <li>• Adequate number of caution boards should be kept in the substation/ transformer room.</li> <li>• 1. Exit signs should be illuminated either by lamps external to the sign or by lamps contained within the sign.</li> <li>2. The source of illumination should be providing not less than</li> </ul>

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	<p>50 lux.</p> <ul style="list-style-type: none"> <li>• Provide proper clearance of 0.8 - 1.0 m in front of all distribution panels/switchboards.</li> <li>• Provide cable connections with properly soldered / welded lugs at (LT/MDB/DB/SDB)'s. Ensure that all the electrical connections are properly secured with lugs and glands.</li> <li>• Select conductors and MCCB/MCB with adequate sizing without exceeding permissible current carrying capacity for insulation.</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 cable joints of porcelain / PVC connectors with PIB tape wound around before placing the cable in the box.</li> <li>• Seal the cable penetrations through walls adequately with fire resistive elements.</li> <li>• 1. Provide sufficient and separate earthing for HT / LT panels in substation/transformer room 2. Provide adequate number of earth electrodes.</li> <li>• Provide separate earthing connection to electrical equipments. Ensure that earth potential provided for all parts of equipment / installation (other than live parts) and that continuous earth connection is provided back to the main intake supply earth.</li> <li>• Provide adequate earthing to body and doors to all MDBs / DBs. Ensure that all electrical panels provided with proper and separate earth potential.</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 adequate clearance in all sides of main HT/LT panel boards/transformer for easy maintenance.</li> <li>• Area of substation / transformer to meet requirements of Table 4.3 of RMG Guideline; the area should be 45m<sup>2</sup>, or relocate the substation/ transformer room.</li> <li>• Provide adequate ventilation arrangements for indoor substation.</li> <li>• Provide adequate cable trenches with non-flammable covers at substation areas.</li> <li>• Modify Area of generator room to meet requirements of Table 4.4, RMG Guideline; the area should be 84m<sup>2</sup>, or relocate the generator room.</li> <li>• 1. Design to have proper segregation of different end used loads. 2. Wiring design to have separate and distinct sub-circuits for power and heating system. 3. All DBs to be placed</li> </ul>

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	<p>conveniently.</p> <p>4. Wiring to be neat, tidy and located near ceiling.</p> <ul style="list-style-type: none"><li>• Relocate the MDBs with easy access. Ensure that all MDBs / SDBs should have easy accessibility.</li><li>• Review capacity of standby generator on basis of loads for essential lighting / AC / Equipment / Services. Replace generator with larger capacity or install second generator if review indicates existing unit is too small.</li><li>• Provide and maintain easy access and proper height of switchboard / panel boards (&lt; 2m from floor level).</li><li>• Each circuit should have a separate neutral (use of common neutral for more than one circuit shall not be permitted).</li><li>• Provide the wiring in PVC conduits or in metallic GI pipes. Ensure that all electrical wiring should be covered in proper conduit pipes.</li><li>• Seal the cable entry-exit points of (LT/MDB/DB/SDB)'s with non-flammable materials. In addition: 1. Ensure that HT / LT panels / Switchgears to be vermin / damp proof. 2. Ensure all unused holes / openings in DBs to be blocked properly.</li><li>• 1. Provide the ECC to meet minimum cross-sectional area as per table 4.5. 2. Ensure that connections between conductors / equipments provided to durable electrical continuity and adequate mechanical strength and protection. 3. The continuous earth connection is provided back to the main intake supply earth.</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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