

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

Name of the Factory	: CONWAY KNITWEAR LTD.
Address of the Factory	: Rashid Manson, North Hazigonj, Vokesonal Road, Pathantuli Chowrasta, Fatullah, Narayanganj Bangladesh.
Present Status of the Factory	: Under Operation.
Structural Assessment Conducted by	: TUV
Date of Structural Inspection	: 13 <sup>th</sup> July, 2015
Fire Assessment Conducted by	: TUV
Date of Fire Inspection	: 13 <sup>th</sup> July, 2015
Electrical Assessment Conducted by	: TUV
Date of Electrical Inspection	: 13 <sup>th</sup> July, 2015
BKMEA Membership No.	: 1213

### **BASIC INFORMATION:**

The surveyed building was a RCC building with varied floor nos. on different segments of the floor plinth: The west zone of the building has 5 nos. RCC floors with shed roofing at the 5th floor, the south-east portion of the building has 4 nos. RCC floors with shed roofing at the 4th floor, and the North-East portion of the building has 5 nos. RCC floors with a mobile tower at the roof top. Conway knitwear Ltd. operates on the ground floor partially and on the 2nd - 5th floors of the building completely, while the 1st floor of the building is occupied by a community center. The factory operates in the building on a rental basis. The following general information were noted:

i. Building Usage Type	: Knit Garment Factory.
ii. Structural System	: RCC beam column frame system.
iii. Floor System	: RCC beam slab floor system.
iv. Floor Area	: Total floor area is 18727 sft.
v. No. of Stories	: West Zone: GF + 4-Stories + Shed Storey (No Basement) South-East Zone: GF + 3-Stories + Shed Storey (No Basement) North-East Zone: GF + 4-Stories (No Basement)
vi. Construction Year	: Construction started in 2005.
vii. Foundation Type	: Shallow foundation ( Column Footing)
viii. Design Drawings	: Not available (only engineering drawings available but no approval)
ix. Soil Investigation Report	: Available.
x. Construction Materials	: Brick aggregate. (Identified by removing plaster)
xi. Generator	: Generator is present at ground floor of the building at south side.

### **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:

Short Term (Immediate) : None.

Mid Term (6-weeks) :

- As built architectural and engineering drawings to be prepared for entire building 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.

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Long Term (6-months) : None.

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>	<ul style="list-style-type: none"> <li>• None.</li> </ul>
<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>• Exit signage on all Evacuation pathways or provided with overhead signage fixed at ceiling level. <ul style="list-style-type: none"> <li>- It should be clearly visible at all time,</li> <li>- Provide directional signs wherever necessary.</li> <li>- Signage should be uniform</li> </ul> </li> <li>• Factory management should 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> <li>• Combustible materials should keep away from electrical sources and all the lighting in storage area must have protecting covers and wiring must be in conduits.</li> <li>• Fire drill should be conducted quarterly (4 times a year) in existing buildings as detailed under the Fire Safety Plan &amp; should kept record properly.</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>• Prepare proper plan &amp; design for exit door. - Minimum clear width should be 0.9 meter.</li> <li>• Prepare proper plan &amp; design for another staircase from 5th floor to 4th floor. - Minimum clear width should be 0.9 meter.</li> </ul>

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	<ul style="list-style-type: none"><li>• Prepare proper plan &amp; design for staircase. - Minimum clear width should be 0.9 meter.</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 needs to cover the floors occupied by other tenants)</li><li>• Prepare proper plan and design for fire rated barrier for 2 hour fire rating separated corridor with 1.5 hrs fire rated door at ground floor.</li><li>• Prepare proper plan and design for 2 hours fire rated barriers with 1.5 hours fire rated doors at ground floor fabrics store room, which located at the adjacent to main evacuation routes.</li><li>• Prepare proper plan and design for 2 hrs fire rated barrier with 1.5 hrs fire rated door for storage area.</li><li>• Prepare proper plan and design for 4 hours fire rated barriers with 2 hours fire rated door at ground floor generator and boiler room, which located at the adjacent to fabric store.</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 and control panel.(Also needs to cover the floors occupied by other tenants)</li><li>• Install Manual activation call point at all exit routes</li><li>• Automatic alarm systems must be provided throughout the factory; the alarm must be automatically triggered on detection of a fire.</li><li>• Provide adequate nos. of smoke detectors to cover the whole factory building.</li></ul>
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	<ul style="list-style-type: none"> <li>• Prepare proper design and plan for dedicated fire pump with alternate backup power supply.</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> <li>• Obtain building approval from issuing authority</li> <li>• Implement to a single fire safety management system with approvals from all tenants in the factory building.</li> <li>• Obtain the boiler license from the proper issuing authority.</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>• Install exit door as per plan and design. - Minimum clear width should be 0.9 meter.</li> <li>• Install another staircase from 5th floor to 4th floor as per plan and design. - Minimum clear width should be 0.9 meter.</li> <li>• Install staircase as per plan and design. - Minimum clear width should be 0.9 meter.</li> <li>• All stairway to have direct access to any designated refuge area which requires 2 hour fire rated construction with 1.5 hrs fire rated door at ground floor for fire separated corridor.</li> <li>• Provide 2 hours fire rated barriers with 1.5 hours fire rated doors at ground floor fabrics store room, which located at the adjacent to main evacuation routes.</li> <li>• Provide 2 hrs fire rated barrier with 1.5 hrs fire rated door for storage area.</li> <li>• Provide 4 hours fire rated barriers with 2 hours fire rated door at ground floor generator and boiler room, which located at the adjacent to fabric store.</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> </ul>

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	<ul style="list-style-type: none"> <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>	<ul style="list-style-type: none"> <li>• None.</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>• 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> <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> <li>• Provide adequate illumination for generator room.</li> <li>• All unwanted materials should be removed from Generator room.</li> <li>• Provide rubber mats of adequate size in front of all distribution panels.</li> <li>• Individual Fuse protection should be provided to every 15A socket.</li> <li>• 1. All stranded conductors &gt; 6mm<sup>2</sup> to be provided with</li> </ul>

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	<p>cable sockets.</p> <p>2. All stranded conductors &lt; 6 mm<sup>2</sup>, at exposed end should be soldered / crimped.</p> <ul style="list-style-type: none"><li>• 1. Remove all the inflammable materials from surrounding of electrical circuitry at MDBs/SDBs.</li></ul> <p>2. Ensure that all electric circuitry clean of inflammable materials.</p> <p>3. Conduct periodic maintenance and maintain the records.</p> <ul style="list-style-type: none"><li>• The electrical panels to be of metal case and should be marked with “Danger 415 Volts” and identified with proper phase marking and danger signage.</li><li>• Provide cable connections with properly soldered / welded lugs at (DB and SDB)'s. Ensure that all the electrical connections are properly secured with lugs.</li><li>• Select conductors and MCCB/MCB with adequate sizing without exceeding permissible current carrying capacity for insulation.</li><li>• Avoid 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>• Seal the cable penetrations through walls adequately with fire resistive elements.</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><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 doors to all SDBs / DBs. Ensure that all electrical panels provided with proper</li></ul>
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	and separate earth potential
<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 ventilation arrangements for indoor Generator room.</li> <li>• Provide 4 hour fire rated walls all around the generator room on ground level.</li> <li>•             <ol style="list-style-type: none"> <li>1. Design to have proper segregation of different end used loads.</li> <li>2. Wiring design to have separate and distinct sub-circuits for power and heating system.</li> <li>3. All DBs to be placed conveniently.</li> <li>4. Wiring to be neat, tidy and located near ceiling.</li> </ol> </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>•             <ol style="list-style-type: none"> <li>1. Wooden switchboards / panel boards should be replaced by non-flammable materials.</li> <li>2. Prefer switchboards made of non-flammable materials.</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>• Seal the cable entry-exit points of (DB/SDB)'s with non-flammable materials. In addition:             <ol style="list-style-type: none"> <li>1. Ensure that Switchgears to be vermin / damp proof.</li> <li>2. Ensure all unused holes / openings in DBs to be blocked properly.</li> </ol> </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 provided to durable electrical continuity</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</li> </ul>

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