

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

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Name of the Factory	: Yara West Knit Wear Ltd.
Address of the Factory	: Natun Sonakanda, Busstand Rohitpur, Keranigonj.
Present Status of the Factory	: Under Operation
Structural Assessment Conducted by	: VEC
Date of Structural Inspection	: 20 <sup>th</sup> April, 2015
Fire Assessment Conducted by	: VEC
Date of Fire Inspection	: 20 <sup>th</sup> April, 2015
Electrical Assessment Conducted by	: VEC
Date of Electrical Inspection	: 20 <sup>th</sup> April, 2015
BGMEA Membership No.	: 5820

### **BASIC INFORMATION:**

The assessed factory is a 5-storey RCC factory building with beam column frame structural system and one portion of the building is 3 storied RCC beam column frame structure with RCC slab (covers 15% of floor area). Additional 3 nos. ancillary sheds are found, one is pre-engineered building shed (under construction), and other two non-engineered shed using as cafeteria and generator. The following information was noted:

i. Building Usage Type	: Garment factory
ii. Structural System	: R.C.C. Beam Column Frame.
iii. Floor System	: Beam Slab.
iv. Floor Area	: Total floor area 38,000 Sq.ft.
v. No. of Stories	: 5 storey.
vi. Construction Year	: Building was built in one phase (2012-2013).
vii. Foundation Type	: Pile foundation.
viii. Design Drawings	: Available.
ix. Soil Investigation Report	: Unavailable.
x. Construction Materials	: Brick Aggregate
xi. Generator	: Ground floor (Separated).

### **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) :

- Building Engineer need to survey as constructed building. As built structural drawing to be prepared showing the current as constructed layout.

Long Term (6-months) :

- Continue to implement load plan.

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- ii. Update calculations showing the structural adequacy of the building structure taking into account the factory design imposed loading and the as built structure. Prepare controlled loading plans for all floors designating where storage can be placed and cannot be placed.

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>• Fire drill shall be conducted quarterly (4 times a year) under the Fire Safety Plan. A record of such drills shall be kept in writing for at least 3 years for the inspection of fire brigade whenever called for.</li> <li>• All the firefighting equipment's need to test with proper documents.</li> <li>• Factory needs to have sufficient number &amp; width of aisles (0.9 m) at every floor.</li> <li>• Combustibles are to be managed with good housekeeping. Storage facilities with no air-conditioning duct shall be minimum 2.9m and when used as a storage facility there shall be a minimum clearance of one third the floor height from the ceiling to the top of the storage stack.</li> <li>• Illuminated emergency light needs to be covered in all floors, exits, staircases and aisles of all the factory buildings or sheds. The intensity of illumination by means of escape lighting needs to be equal or more than 10 lux. The aisles need to be illuminated with escape lighting to a level of not less than 2.5 lux at floor level.</li> <li>• Factory needs to ensure adequate numbers of exit signs which need to be visible from any positions and comply with the following conditions:             <ul style="list-style-type: none"> <li>(a) The color and design of lettering, arrows and other symbols on exit signs needs to be in high contrast with their background;</li> <li>(b) Words on the signs needs to be at least 150 mm with a stroke of not less 20 mm;</li> <li>(c) The source of illumination, contrast, intensity and luminance needs to be at least 50 lux, 0.5, 5.0 foot-candles and 0.2 cd/m<sup>2</sup> respectively.</li> </ul> </li> </ul>
<p>Mid Term</p>	<ul style="list-style-type: none"> <li>• Factory needs to have as built drawing with proper</li> </ul>

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<p><i>(The remedial works indicated must be carried out within a period of 6 weeks)</i></p>	<p>dimensions showing all the means of escape.</p> <ul style="list-style-type: none"> <li>• Fire manager/Director need to have safety training from proper authority &amp; worker of the factory should as far as possible be trained for use fire equipment.</li> <li>• All the exit doors of staircase enclosure need to be replaced by side swinging fire rated doors so that the staircase remains free from smoke as well as the lockable doors can be opened easily in the direction of evacuation without the use of a key.</li> <li>• Provide handrail on both sides of all the stairways as mentioned.</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>• Factory needs to have a proper pre-plan for fire service &amp; civil department.</li> <li>• All the stairs need to be protected with fire and smoke resistant enclosures &amp; opening (2 hours rated enclosure and 1.5 hour rated door)and provide a protected route from all through the stairway to the final exits.</li> <li>• Factory needs to install manual as well as automatic fire alarm system with control panel for centralized automatic fire detection and alarm system in the command station at the entrance lobby of the factory premises.</li> <li>• The factory with shall be equipped with manually operated electrical fire alarm system and automatic fire alarm system. Manually operated electrical alarm system shall be installed in a building with single or multiple call boxes located on each floor.</li> <li>• Factory needs to install control panel for centralized automatic fire detection and alarm system in the command station at the entrance lobby of the factory premises.</li> <li>• Install proper standpipe system having at least 100 mm dia of standpipe. First aid hose system (38 mm nominal) needs to be provided (Ref. Fire Service Standard # 9) in addition to Fire Aid Fire Fighting Appliances in existing high rise NTPA (20 m) buildings. In addition 50 mm or larger hose connection facility needs to be provided.</li> <li>• Install standard standpipe and hose system as well as fire pump system to ensure required hose pressure at the highest and most remote part of the building.</li> <li>• Factory needs to have dedicated fire pump with backup power system &amp; sufficient capacity for achieve required pressure in the remote place of the factory.</li> <li>• Factory need to have sufficient water storage capacity to get adequate pressure to feed fire-fighting equipment and at least 1900ltr x 75min=142500 liters water</li> </ul>

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	storage tank.
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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>• Find out cause (improper cable selection, improper termination, rusted connection) of insulation damage and take proper action including replacing cable.</li> <li>• Find out the cause (improper cable/over current selection, over loading, improper lug, improper cable joints, rusted connection, insulation damage, multiple cables at single point, ) of overheating (&gt; ambient+ 400C) and take proper action.</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>• Provide two separate and distinct connections of earthing for the generator.</li> <li>• Ensure all distribution boards (including panel door) are earthed properly.</li> <li>• Remove all unused cables from distribution boards and make sure all necessary cables are properly terminated at its point of termination using appropriate size and type of lug.</li> <li>• Ensure overcurrent protection device (circuit breaker/fuse) for each circuit/branch circuit.</li> <li>• Ensure proper earthing connection at motor.</li> <li>• Clean interior components from dust and debris and seal all openings within the enclosure to prevent dust and debris from entering.</li> <li>• Ensure inspection of all earthing system is being completed and documented.</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>• Install appropriate number and type of safety signage and fire-fighting equipment at substation and generator room. Also ensure graded rubber mats are provided in front of all panel boards.</li> <li>• Provide Instruction board for first aid and artificial respiration in the substation room and generator room.</li> <li>• Fill the transformer breather oil cup with fresh Oil.</li> <li>• Ensure distribution boards have a minimum clearance of 1 m (39 in) in front.</li> <li>• Provide dedicated &amp; adequate size of earthing with proper identification for each circuit from the earth bus-</li> </ul>

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	<p>bar of distribution boards and ensure continuous earth path is back to main building intake.</p> <ul style="list-style-type: none"> <li>• Rewire to ensure each incoming supply to an MCB has a dedicated supply from bus-bar. Avoid the use of multiple cables on outgoing side of MCB's.</li> <li>• Replace wooden bases with metal clad construction for mounting the switch controls.</li> <li>• Ensure all electrical cables are sized according to capacity of circuit breakers.</li> <li>• Ensure cable joints are made in respect of conductivity, insulation and mechanical strength.</li> <li>• Seal the openings remaining after wiring system passes through the elements of building construction according to the degree of fire resistance.</li> <li>• Connect all metal in the building to the building earthing system.</li> <li>• Find out the cause (improper cable/over current selection, over loading, improper lug, improper cable joints, rusted connection, insulation damage, multiple cables at single point, ) of overheating { ambient+( 200C-400C)} and take proper action.</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>• Develop an electrical layout diagram and an as-built single line diagram detailing key components and capacity of the electrical system.</li> <li>• Establish a periodical Insulation and earth Resistance Measurement Program and record the related testing data.</li> <li>• Inspect electrical switchgear and panel boards on an annual basis.</li> <li>• Ensure substation room has minimum area as per NTPA Table-4.3 respectively.</li> <li>• Ensure the substation room has adequate fire separation from the factory building.</li> <li>• Provide adequate means of ventilation for the substation room based on the installed equipment considering fire barriers.</li> <li>• Ensure all high tension cables are laid following</li> </ul>

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	<p>standard cable laying techniques.</p> <ul style="list-style-type: none"><li>• Ensure panel boards have no opening and all live internal components are concealed properly.</li><li>• Install circuit breaker in proper way to ensure secure operation.</li><li>• Provide dedicated &amp; adequate size of neutral with proper identification for each circuit.</li><li>• Ensure each distribution board is provided with a circuit list and means of identification is provided as per list.</li><li>• Provide adequate covers on cable channel and cable riser.</li><li>• Ensure surface/exposed wiring are run either horizontally or vertically with proper mechanical support and avoid wiring at an angle or hanging way with improper support.</li><li>• Provide proper cable terminator/connector for stranded conductors at its point of termination.</li><li>• Install separate distribution boards for lighting and power circuits.</li><li>• Provide individual fuse with suitable discrimination with backup fuse or miniature MCB for each 15/20A socket outlet.</li><li>• Install lightning protection system on the building.</li></ul>
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