

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

Name of the Factory	: Crossline Woven Apparels Ltd.
Address of the Factory	: S harifpur, Haricne (Left side) National University, Gazipur Sadar, Gazipur, Bangladesh.
Present Status of the Factory	: Under Operation.
Structural Assessment Conducted by	: VEC
Date of Structural Inspection	: 23 <sup>rd</sup> March, 2015
Fire Assessment Conducted by	: VEC
Date of Fire Inspection	: 23 <sup>rd</sup> March, 2015
Electrical Assessment Conducted by	: VEC
Date of Electrical Inspection	: 23 <sup>rd</sup> March, 2015
BGMEA Membership No.	: 5846

### **BASIC INFORMATION:**

The assessed factory building is a 3 storied RCC building. Structural system of the building is RCC beam column frame and beam slab floor system. Crossline Woven Apparels Ltd operates in the ground floor and 1st floor. The 2nd floor is under construction condition. The following general information was noted:

i. Building Usage Type	: Garments factory.
ii. Structural System	: RCC beam column frame system.
iii. Floor System	: RCC beam slab floor system.
iv. Floor Area	: Total floor area is 51,544 sft.
v. No. of Stories	: 3 Storey.
vi. Construction Year	: 2013-14 (phase-1, up to 1st floor), 2015 (phase-2, Constriction work going on).
vii. Foundation Type	: Isolated column footing foundation.
viii. Design Drawings	: Available: Approval plan, structural drawing, and soil test report, as built machine layout plan. Not Available- Architectural Working Drawing, material test report and floor load plan
ix. Soil Investigation Report	: Available.
x. Construction Materials	: Brick aggregate. (Identified by removing plaster)
xi. Generator	: Separate structure

### **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) : None.

Long Term (6-months) :

- Building Engineer to survey column locations and compare with structural drawings. Updated drawings to be prepared showing the correct as constructed layout.

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- Prepare/update calculations showing the structural adequacy of the floor system taking into account the factory design imposed loading and the as built structure.

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>• Lights in storage area needed to be installed with protective covers and conduits.</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> </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>• All the exit doors need to be replaced by side swinging so that un-lockable doors can be opened easily in the direction of evacuation without the use of a key.</li> <li>• Factory needs to provide handrail on both sides of all the stairways.</li> <li>• Factory needs to be installed with adequate illuminated emergency lighting in floors, exits &amp; stairs. (Escape route).</li> <li>• Emergency back-up power needs to be connected for critical fire safety system and not less than 30 minutes in case of failure of power supply.</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 department.</li> <li>• Final exit route-2(Stair-2 route) need to be protected (1 hour rated construction with 0.75 hour rated door) at each floor level entrance and need to be protected with generator and sub-station at ground floor by 4 hours rated construction with 2 hours rated door/opening, also need to have a protected escape route till to reach safe refuse area. Final exit route-3 (Stair-3 route) need to be protected (1 hour rated construction with 0.75 hour rated door) at each floor level entrance and need to be protected with boiler at ground floor by 4 hours rated construction with 2 hours rated door/opening, also need</li> </ul>

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	<p>to have a protected escape route till to reach safe refuse area.</p> <ul style="list-style-type: none"><li>• Child care room is needed to be separated from other occupancies with 3 hours fire rated construction with 3 hours fire rated door.</li><li>• Storage area need to be protected with 2 hours rated construction &amp; 1.5 hours rated opening or doors.</li><li>• Generator:  Generator room need to be protected with 4 hours rated construction &amp; 2 hours rated opening / door from stair-2 as well as from the final exit route-2 located at ground floor.  Boiler:  Boiler room need to be protected with 4 hours rated construction &amp; 2 hours rated opening / door from stair-3 as well as from the final exit route-3 and from jute go down located at ground floor.  Sub-station:  Sub-station room need to be protected with 4 hours rated construction &amp; 2 hours rated opening / door from stair-2 as well as from the final exit route-2 located at ground floor.</li></ul> <ul style="list-style-type: none"><li>• All the stairs need to be protected with fire and smoke resistant enclosures and opening (1 hour rated enclosure and 0.75 hour rated door)and provide a protected route from all though the stairway to the final exits.</li><li>• Factory needs to provide 3 hours rated construction between office and bonded ware house.</li><li>• Factory need to install centralized and automatic fire detection &amp; alarm system on all occupied floors, including other tenanted floors of the building as per NTPA Guideline.</li><li>• The factory need to install manually operated electrical fire alarm system and automatic fire alarm system with single or multiple call boxes on all occupied floors, including other tenanted floors of the building.</li></ul>
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***(B): Recommendations for Electrical Safety corrective actions:***

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<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 (a week) and should be a regular activity</i></p>	<ul style="list-style-type: none"> <li>• Ensure all panel boards (including panel door) are earthed properly.</li> <li>• Ensure overcurrent protection device (circuit breaker/fuse) for each circuit/branch circuit.</li> <li>• Ensure proper earthing connections at all electrical equipment.</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>• Provide provision for inspection of all earthing system and ensure inspection 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>• Ensure graded rubber mats are provided in front of all panel boards.</li> <li>• Provide Instruction boards for first aid and artificial respiration in substation room and generator room.</li> <li>• Ensure distribution boards are installed in compliant locations in terms of height.</li> <li>• Provide dedicated &amp; adequate size of earthing with proper identification for each circuit and ensure continuous earth path is back to main building intake.</li> <li>• Rewire to avoid the use of multiple cables from incoming and outgoing side of MCB's/MCCB's and busbar.</li> <li>• Ensure all electrical cables are sized according to capacity of circuit breakers.</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+( 20°C-40°C)} and take proper action.</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>• 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</li><li>• Program and record the related testing data.</li><li>• Inspect electrical switchgear and panel boards on an annual basis.</li><li>• Ensure the substation room has adequate fire separation from the main building.</li><li>• Ensure the generator room has adequate fire separation from the production area/main building</li><li>• Ensure panel boards have no opening and all live internal components are concealed properly.</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 and non-combustible covers on cable channel.</li><li>• Provide adequate support or mechanical guards for electrical wiring where necessary.</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>• Install lightning protection system on the building confirming its requirements and adequacy.</li></ul>
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