

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

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Name of the Factory	: BALLY COTTON LTD.
Address of the Factory	: A-99, Road #02, BSCIC Industrial Area, Fatullah, Narayangonj, Bangladesh
Present Status of the Factory	: Under operation.
Structural Assessment Conducted by	: VEC
Date of Structural Inspection	: 6 September, 2015
Fire Assessment Conducted by	: VEC
Date of Fire Inspection	: 6 September, 2015
Electrical Assessment Conducted by	: VEC
Date of Electrical Inspection	: 6 September, 2015
BKMEA Membership No.	: 1944

### **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:

i. Building Usage Type	: Garment Factory.
ii. Structural System	: RCC beam column system.
iii. Floor System	: RCC Beam slab.
iv. Floor Area	: Floor area is (3333.33 sft x6) = 20000sft for main RCC factory building
v. No. of Stories	: 6-stories with two additional partial floor
vi. Construction Year	: 2011
vii. Foundation Type	: Pile foundation ( as shown in drawing and verified with soil test recommendation)
viii. Design Drawings	: Available documents: approval plan, structural design drawing, soil test, and machine layout plan. Not available: architectural drawing, floor loading plan and material test report.
ix. Soil Investigation Report	: Available
x. Construction Materials	: Brick aggregate.
xi. Generator	: Ground Floor.

### **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)	: 1. Reduce live load to 20 psf from all floors of grid C/3 to D/4 in the west portion of the building. 2. A Detail Engineering Assessment of Factory to be commenced
Mid Term (6-weeks)	: 1. Produce and actively manage a loading plan for all floor plates within the factory giving consideration to floor capacity and column capacity. 2. A Detail Engineering Assessment of Factory to be completed
Long Term (6-months)	: 1. Continue to implement load plan.

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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>	<ul style="list-style-type: none"> <li>N/A</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>Factory needs to conduct fire drill quarterly (4 times a year) under the fire safety plan and needs to kept the written record of such drills for at least 3 years for the inspection of fire brigade whenever called for.</li> <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 2.9 m 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>All required means of exit or exit access in buildings or areas requiring more than one exit shall be signposted. The signs shall be clearly visible at all times, where necessary supplemented by directional signs</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>Factory needs to prepare as built drawing with floor machine layout showing means of escape with proper dimension.</li> <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 extinguisher.</li> <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></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>Fire department pre-plan needs to be developed.</li> <li>Final exit route-1(Stair-1 route) need to be protected by 2 hours rated construction with 1.5 hours rated door/opening, also need to have the protected escape route till to reach safe refuse area.</li> <li>Final exit route-2 (Stair-2 route) need to be protected 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.</li> <li>Storage area need to be protected with 2 hours rated construction &amp; 1.5 hours rated opening or doors.</li> </ul>

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	<ul style="list-style-type: none"><li>• Boiler :</li><li>• Boiler room need to be protected by 4 hours rated construction with 2 hours rated opening / door.</li><li>• Generator :</li><li>• Generator room need to be protected by 4 hours rated construction with 2 hours rated opening / door.</li><li>• All the stairs need to be protected with fire and smoke resistant enclosures and 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 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><li>• Factory needs to install control panel for centralized automatic smoke detection &amp; fire alarm system according to NTPA Guideline.</li><li>• Factory needs to install proper standpipe system with having at least 100 mm dia of riser.</li><li>• Install 1 riser per 1000 m2 of floor area &amp; Install adequate number of hose in floor area and the minimum hose diameter is 38 mm, or 1.5" preferably fabric hose with variable nozzle to be used in both of the stairways covering the floor area.</li><li>• Ensure the minimum pressure for standpipes supplying a 50 mm or larger hose shall be at least 300 Kpa. For standpipe supplying first aid hose (38mm nominal) may have a minimum pressure of 200 Kpa.</li><li>• Factory needs to be installed with Siamese connection for to the standpipe system located outside the building and accessible to the fire department connection.</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 1900 <math>\times</math> 75 = 142500 liters water storage tank.</li><li>•</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>• N/A</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 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.</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 distribution boards.</li> <li>• Provide Instruction board for first aid and artificial respiration in the generator room.</li> <li>• Provide two separate and distinct connections of earthing for generator.</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.</li> <li>• Replace wooden bases with metal clad construction for mounting the sockets.</li> <li>• Ensure all electrical cables are sized according to capacity of circuit breakers.</li> <li>• Provide adequate mechanical guards for electrical equipment.</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</li> </ul>

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	<p>to the degree of fire resistance.</p> <ul style="list-style-type: none"> <li>• Connect all metal in the building to the building earthing system.</li> <li>• Ensure Lighting fixtures are supported from the structure properly.</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>
<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 panel boards on an annual basis.</li> <li>• Ensure the generator room has adequate fire separation from the remainder part of the main building.</li> <li>• Ensure appropriate generator room size in order to properly access the generator to perform routine maintenance activities.</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 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.</li> </ul>