

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

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Name of the Factory	: Sample.
Address of the Factory	: Hossain Ahmed Road (Opposite to police line ) , Tagarpar, Fatullah, Narayanganj.
Present Status of the Factory	: Under operation.
Structural Assessment Conducted by	: VEC
Date of Structural Inspection	: 25 October, 2015
Fire Assessment Conducted by	: VEC
Date of Fire Inspection	: 25 October, 2015
Electrical Assessment Conducted by	: VEC
Date of Electrical Inspection	: 25 October, 2015
BKMEA Membership No.	: 1406

### **BASIC INFORMATION:**

The factory building is a four storied RCC beam column frame structure including one basement. The factory building is RCC beam column frame system; therefore the stability of the building is apparent. 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	: 6080 sft
v. No. of Stories	: 4 Storied
vi. Construction Year	: 2013
vii. Foundation Type	: Pile Foundation
viii. Design Drawings	: Available: Structural design drawing, architectural design drawing, floor load plan, machine layout plan and soil test report. Not Available: Material test report.
ix. Soil Investigation Report	: Available
x. Construction Materials	: Stone aggregate (Column).
xi. Generator	: N/A.

### **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)	: N/A
Mid Term (6-weeks)	: N/A
Long Term (6-months)	: 1. Building Engineer to review the adequacy of the structure. Design should be checked by the building engineer to verify the lateral stability of the shed and confirm the requirement of any bracing in the long direction. 2. Install horizontal bracing at the roof system if required.

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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>	<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>	<p>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.</p> <p>All the firefighting equipment's need to test with proper documents.</p> <p>Lights in storage area needed to be installed with protective covers and conduits.</p> <p>Fire hazard areas of a building like kitchen need to be installed with portable fire extinguishers and only fixed temperature type detectors as well where sudden temperature rise may take place.</p> <p>Combustibles are to be managed with good housekeeping. Storage facilities with no air-conditioning duct need to be at least 2.9 m and when used as a storage facility there needs to have a minimum clearance of one third the floor height from the ceiling to the top of the storage stack.</p> <p>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.</p>
<p>Mid Term</p> <p><i>(The remedial works indicated must be carried out within a period of 6 weeks)</i></p>	<p>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.</p> <p>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.</p> <p>Handrails need to be provided in both sides between (a) knitting section and ground floor level (b) boiler or generator room and ground floor level.</p> <p>Factory needs to provide handrail on both sides of all the stairways.</p>
<p>Long Term</p>	<p>Factory needs to have a proper pre-plan for fire department.</p>

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<p><i>(The remedial works indicated must be carried out within a period of 6 months)</i></p>	<p>Final exit need to be protected with boiler room at ground floor by 4 hours rated construction with 2 hours rated door/opening, also need to have the protected escape route till to reach safe refuse area.</p> <p>Child care room is needed to be separated from other occupancies with 3 hours fire rated construction with 2 hours fire rated door.</p> <p>Storage area need to be protected with 2 hours rated construction and 1.5 hours rated opening or doors.</p> <p>Generator: Generator room need to be protected by 4 hours rated construction with 2 hours rated opening / door from stair-1 as well as from the final exit route-1 located at ground floor.</p> <p>Boiler: Boiler room need to be protected with 4 hours rated construction with 2 hours rated opening / door from stair-1 and boiler room at ground floor of the building.</p> <p>Sub-station: Sub-station room need to be protected with 4 hours rated construction with 2 hours rated opening / door from stair-1 and sub-station room at ground floor of the building.</p> <p>All the exits connecting to the two staircases need to be protected with 2 hours fire rated constructions and 1.5 hours rated doors.</p> <p>Centralized fire detection system needs to comply with the followings: (a) Every portion of building needs to be covered and all effectively enclosed spaces need to be considered separately based on the limits of spacing for types of detectors concerned. (b) Staircases need to be covered by detectors on each floor. (c) Each bay needs to be considered as separate compartment and detectors needs to be installed considering each bay an independent compartment. (d) Hoist, elevators and similar openings, windows, doors, ventilators and inlet ducts of an air-conditioning system needs to be covered by detector.</p> <p>Factory needs to install manually operated electrical fire alarm system with single or multiple call boxes as well as automatic fire alarm system for centralized automatic fire detection and alarm system.</p> <p>Factory needs to install control panel for centralized automatic smoke detection &amp; fire alarm system according to NTPA Guideline</p>
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	<p>Install proper standpipe system having at least 75 mm diameter of standpipe. First aid hose system (38 mm nominal) needs to be provided (Ref. Fire Service Standard # 9) in addition to first aid fire-fighting appliances in existing high rise buildings. In addition 50 mm or larger hose connection facility needs to be provided.</p> <p>Install 1 riser per 1000 m<sup>2</sup> 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.</p> <p>Factory need to 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 (38 mm nominal) may have a minimum pressure of 200 Kpa.</p> <p>Factory needs to be installed with Siamese connection for to the standpipe system located outside the building and accessible to the fire department connection.</p> <p>Factory needs to install dedicated fire pump with sufficient capacity and backup power.</p> <p>Factory needs to have sufficient water storage capacity to get adequate pressure to feed fire-fighting equipment and at least <math>1900 \times 75 = 142500</math> liters water storage tank.</p>
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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>	N/A
<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>	<p>Ensure all distribution boards (including panel door) are earthed properly.</p> <p>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.</p> <p>Ensure overcurrent protection device (circuit breaker) for each circuit/branch circuit.</p>

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	<p>Ensure proper earthing connections at all electrical equipment. Use nonflammable shades for light fittings. Avoid using Celluloid shade under any circumstance.</p> <p>Ensure inspection of all earthing system is being completed and documented.</p>
<p>Mid Term</p> <p><i>(The remedial works indicated must be carried out within a period of 6 weeks)</i></p>	<p>Install appropriate number and type of safety signage and fire-fighting equipment at substation. Also ensure graded rubber mats are provided in front of all distribution boards.</p> <p>Provide Instruction board for first aid and artificial respiration in the substation room.</p> <p>Fill the transformer breather oil cup with fresh Oil.</p> <p>Ensure distribution board is installed in compliant locations in terms of access.</p> <p>Ensure distribution board has a minimum clearance of 1 m (39 in) in front.</p> <p>Provide dedicated &amp; adequate size of earthing with proper identification for each circuit from the earth bus-bar of distribution boards and ensure continuous earth path is back to main building intake.</p> <p>Rewire to ensure each incoming supply to an MCB has a dedicated supply from busbar.</p> <p>Avoid the use of multiple cables on outgoing side of MCB's. Ensure all electrical cables are sized according to capacity of circuit breakers.</p> <p>Provide adequate support or mechanical guards for electrical equipment and wiring where necessary.</p> <p>Provide adequate covers on cable channel.</p> <p>Ensure cable joints are made in respect of conductivity, insulation and mechanical strength.</p> <p>Seal the openings remaining after wiring system passes through the elements of building construction according to the degree of fire resistance.</p> <p>Connect all metal in the building to the building earthing</p>

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	system.
<p>Long Term</p> <p><i>(The remedial works indicated must be carried out within a period of 6 months)</i></p>	<p>Develop an electrical layout diagram and an as-built single line diagram detailing key components and capacity of the electrical system.</p> <p>Establish a periodical Insulation and earth Resistance Measurement Program and record the related testing data.</p> <p>Inspect electrical switchgear and panel boards on an annual basis.</p> <p>Ensure the substation room has adequate fire separation from the remainder part of the building.</p> <p>Provide adequate means of ventilation for the substation room based on the installed equipment considering fire barriers.</p> <p>Install security measures to ensure access to the substation is restricted.</p> <p>Ensure all high tension cables are laid following standard cable laying techniques.</p> <p>Ensure panel boards have no opening and all live internal components are concealed properly.</p> <p>Provide dedicated &amp; adequate size of neutral with proper identification for each circuit.</p> <p>Ensure each distribution board is provided with a circuit list and means of identification is provided as per list.</p> <p>Provide proper cable terminator/connector for stranded conductors at its point of termination.</p> <p>Provide an emergency power generator with adequate capacity for the building.</p> <p>Install separate distribution boards for lighting and power circuits.</p> <p>Install lightning protection system on the building</p>