

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

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Name of the Factory	: Attraction Garments Ltd.
Address of the Factory	: Plot# 105(Old-360), Gazir Chat (North), Alia Madrasha Road, Ashulia, Dhaka
Present Status of the Factory	: Under operation.
Structural Assessment Conducted by	: BUET
Date of Structural Inspection	: 5 November, 2014
Fire Assessment Conducted by	: VEC
Date of Fire Inspection	: 25 May, 2015
Electrical Assessment Conducted by	: VEC
Date of Electrical Inspection	: 25 May, 2015
BGMEA Membership No.	: 4997

### **BASIC INFORMATION:**

The factory building is a seven storied RCC building with both beam column and flat plate system and flat slab system. The following information was noted:

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|-------------------------------|--|
| i. Building Usage Type        | : Garment Factory.   |
| ii. Structural System         | : RC flat plate & RCC beam column system.                        |
| iii. Floor System             | : Both two-way and flat plate floor system in different stories. |
| iv. Floor Area                | : Approx. 4320 sft/floor   |
| v. No. of Stories             | : Presently seven (as per structural drawings)                   |
| vi. Construction Year         | : Unknown  |
| vii. Foundation Type          | : Individual footing of different size.                          |
| viii. Design Drawings         | : Approval drawing available                                     |
| ix. Soil Investigation Report | : Not Available  |
| x. Construction Materials     | : Stone 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:

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| Short Term (Immediate) | : N/A  |
| Mid Term (6-weeks)     | : 1. The factory owner has been instructed to prepare and submit a load plan for vetting. Once it is submitted by the factory owner, it will be duly vetted. The factory owner should arrange displaying the approved load plan for each floor on the wall in a visible location and shall adhere to it.<br>2. The damp masonry wall should be repaired.<br>3. The consultants strongly recommend storing any type of cartoon boxes, finished products and fabrics in such a manner so that intensity of loading should not exceed 40 psf (2.0 kN/m <sup>2</sup> ) |
| Long Term (6-months)   | : N/A  |

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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>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.</p> <p>All the firefighting equipment's need to test with proper documents.</p> <p>Factory needs to have sufficient number &amp; width (0.9m) of marked aisles at 3rd floor and 4th floor of the building.</p> <p>Factory needs to have sufficient total width of marked aisles (5 mm per occupant) of the factory.</p> <p>All the means of escape i.e. aisle, exit and stair need to be free and unobstructed.</p> <p>Propagation of fire, smoke, gas or fume through the opening of fire resistive floors and walls need to be restricted by sealing such opening with an approved material which needs to have a minimum 2 hours fire resistance rating of the walls.</p> <p>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.</p> <p>Illuminated emergency light needs to be covered in all floors, exits, staircases and aisles of all the factory buildings or sheds.</p> <p>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.</p> <p>Factory needs to ensure adequate numbers of exit signs which need to be visible from any positions and comply with the following conditions:</p> <p>(a) The color and design of lettering, arrows and other symbols on exit</p>

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	<p>signs needs to be in high contrast with their background; (b) Words on the signs needs to be at least 150 mm with a stroke of not less 20 mm;</p> <p>(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.</p>
<p>Mid Term</p> <p><i>(The remedial works indicated must be carried out within a period of 6 weeks)</i></p>	<p>Factory needs to have as built drawing with proper dimensions showing all the means of escape.</p> <p>Factory Manager or Director needs to arrange fire safety training for the workers of the factory from proper authority time to time.</p> <p>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.</p> <p>Provide handrail on both sides of stairways.</p> <p>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.</p>
<p>Long Term</p> <p><i>(The remedial works indicated must be carried out within a period of 6 months)</i></p>	<p>Factory needs to have a proper pre-plan for fire department. Ensure minimum width of stair 0.9 m of stair-2.</p> <p>Factory need to provide protected paths(2 hours fire rated construction with 5.5 hours fire rated opening) of travel from the stair entrance at each floor level(2 hours rated enclosure with 5.5 hours rated opening/doors) till to reach safe refuse area.</p> <p>Storage area need to be protected with 2 hours rated construction and 1.5 hours rated opening or doors.</p> <p>Boiler and substation rooms need to have a 4 hours fire resistance wall and entry also needs to have 2 hours fire rated door.</p> <p>All the exits connecting to the staircase-1 and staircase-2 need to be protected with fire and smoke resistant enclosures and opening (1.5 hours rated enclosure and 1 hour rated door) and provide a protected route from all through the stairway to the final exits.</p> <p>Install fire lift with backup power including have 5hr fire rated &amp; auto closing fire door in 2hrs fire rated lift core with backup power &amp; having minimum capacity of 545 kgs.</p>

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	<p>The minimum fire resistance rating of the walls separating the smoke proof enclosure by providing lobby or ventilated vestibule from the area of incidence needs to be 4 hours with no openings other than those required for fire doors for exit. The fire rating of the fire doors for exit needs 2 hours.</p> <p>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.</p> <p>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.</p> <p>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.</p> <p>Install suitable public address system having communication to all floors as well as facilities to receive messages from all floors Install proper standpipe system having at least 500 mm dia of standpipe.</p> <p>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.</p> <p>Install 1 riser per 1000 m<sup>2</sup> of floor area and 38 mm diameter of hoses with variable nozzle need to be installed.</p> <p>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.</p> <p>Factory need to installed Siamese connection after installation of stand pipe system, hose system and fire pump.</p> <p>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.</p> <p>Factory needs to have dedicated fire pump with backup power system &amp; sufficient capacity for achieve required pressure in</p>
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	<p>the remote place of the factory.</p> <p>Factory needs to establish command station on the entrance lobby and equipped with detailed floor plans along with clearly demarcated locations of fire detection and fighting devices and through the panel board able to detect fire alarm from any floor. It needs to be manned with properly trained personnel having responsibility of maintenance and operating firefighting facilities within the building.</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>	<p>Ensure all unused cables remove from distribution boards and if necessary make sure cables are properly terminated.</p>
<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>Discharge the generator exhaust to the exterior of the building in a safe location.</p> <p>Provide two separate and distinct connections of earthing for each generator.</p> <p>Ensure all distribution boards (including panel door) are earthed properly using appropriate type and size of cables.</p> <p>Ensure overcurrent protection device (circuit breaker/fuse) for each circuit/branch circuit.</p> <p>Ensure distribution boards are clean and seal all openings within the enclosure to prevent dust and debris from entering.</p> <p>Provide provision for inspection of all earthing system and ensure inspection 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 and generator room. 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 generator rooms.</p> <p>Ensure distribution boards are installed in compliant locations in terms of height, access and surrounding weather.</p> <p>Install circuit breaker in proper way (metal enclosure) to ensure</p>

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	<p>safe installation.</p> <p>Provide dedicated &amp; adequate size of earthing with proper identification for each circuit 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 bus bar and avoid the use of multiple cables on outgoing side of MCB's.</p> <p>Replace wooden boxes and panels with metal clad construction enclosure for mounting circuit breakers and energy meters.</p> <p>Ensure all electrical cables are sized according to capacity of circuit breakers.</p> <p>Ensure cable joints are made in respect of conductivity, insulation and mechanical strength.</p>
<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.</p> <p>Program and record the related testing data.</p> <p>Inspect electrical panel boards on an annual basis to ensure that the equipment is in good working condition.</p> <p>Ensure overhead service connections led via roof poles or service masts having a bend at the top and installed on the outer wall.</p> <p>Ensure the generator room has adequate fire separation from the adjacent building.</p> <p>Provide adequate means of ventilation for the generator room based on the installed equipment without hampering fire rating of the room.</p> <p>Ensure distribution 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>

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	<p>Ensure each distribution board is provided with a circuit list and also ensure means of identification for cables accordingly.</p> <p>Provide adequate support or mechanical guards for rotating electrical equipment where necessary.</p> <p>Provide adequate covers on cable channels.</p> <p>Ensure stranded conductors are terminated using proper terminators (cable sockets, ferrules, sleeves or all strands at exposed end soldered together.)</p> <p>Run cable in a designated route with mechanical protection and fire sealing of floor slab and wall penetrations</p> <p>Install separate distribution boards for lighting and power circuits and mark them accordingly.</p> <p>Install lightning protection system on the building confirming requirements and adequacy of the system.</p>
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