

Summary of Preliminary Assessment on Structural, Fire and Electrical Safety

Name of the Factory	: Wazhico Apparels Ltd.
Address of the Factory	: 31, N.A. Chowdhury road, Anderkilla, Chittagong.
Present Status of the Factory	: Under operation.
Structural Assessment Conducted by	: VEC
Date of Structural Inspection	: 23 August, 2015
Fire Assessment Conducted by	: VEC
Date of Fire Inspection	: 23 August, 2015
Electrical Assessment Conducted by	: VEC
Date of Electrical Inspection	: 23 August, 2015
BGMEA Membership No.	: 2847

BASIC INFORMATION:

The factory building is seven storied RCC Beam-Column frame structure, however 6th floor is non-engineered shed covering entire roof area. 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 : 26,000sft (per floor)
- v. No. of Stories : 7 storied
- vi. Construction Year : Building was constructed during 1993-1995, 2009-2010, and 2011-2012 in 03 phases. (known from factory representative)
- vii. Foundation Type : Isolated column footing.
- viii. Design Drawings : Available: Approval drawing and soil test report.
Not available- full set of structural design drawing, Architectural design drawing, floor load 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:

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| Short Term (Immediate) | : N/A |
| Mid Term (6-weeks) | : 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 its ability to withstand all wind loading pressure, suction and uplift forces. |
| Long Term (6-months) | : 1. Structural engineer to prepare full set of as built structural drawing, floor load plan and prepare/update calculations showing |

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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>	<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>Factory need to have proper testing plan & record of fire safety equipment.</p> <p>Factory needs to have sufficient number & width (0.9 m) of marked aisles.</p> <p>Lights in storage area needed to be installed with protective covers and conduits.</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>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>Factory needs to prep as built drawing with floor machine layout showing means of escape with proper dimension.</p> <p>Fire manager/Director need to have safety training from proper authority & worker of the factory should as far as possible be trained for use fire extinguisher.</p> <p>Factory needs to have valid fire license for the full occupied area.</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>

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	<p>Factory needs to provide handrail on both sides of all the stairways.</p> <p>Factory needs to be installed with adequate illuminated emergency lighting in floors, exits & stairs. (escape route).</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 service & civil department.</p> <p>Minimum width of door shall be at least 0.9 m & height shall be 2 m.</p> <p>Final exit route-1 (Stair-1 route) need to be protected by 2 hours rated construction with 1.5 hours rated door at each floor level entrance including ground floor and need to be protected from generator 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>Final exit route-2 (Stair-2 route) need to be protected by 2 hours rated construction with 1.5 hours rated door at each floor level entrance including ground floor and need to be protected from market places at ground floor by 2 hours fire rated construction with 1.5 hours fire rated door/opening, also need to have the protected escape route till to reach safe refuse area.</p> <p>Generator: Generator room need to be protected with 4 hours rated construction & 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 & 2 hours rated opening / door from the working floor (Finishing & Iron section) of 5th floor of the building. Storage area need to be protected with 2 hours rated construction and 1.5 hours rated opening or doors.</p> <p>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.</p> <p>Factory needs to install centralized and automatic fire detection & alarm system on all occupied floors, including other tenanted floors of the building as per NTPA Guideline</p>

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	<p>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.</p> <p>Factory needs to install control panel for centralized automatic smoke detection & fire alarm system according to NTPA Guideline.</p> <p>Factory needs to install proper standpipe system with having at least 100mm dia of riser.</p> <p>Install 1 riser per 1000 m2 of floor area & 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 50mm 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.</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 have dedicated fire pump with backup power system & sufficient capacity for achieve required pressure in the remote place of the factory.</p> <p>Factory needs to have sufficient water storage capacity to get adequate pressure to feed fire-fighting equipment and at least 1900ltr x 75min=142500 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>	<p>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+ 40°C) and take proper action</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>

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	<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/fuse) for each circuit/branch circuit.</p> <p>Clean interior components from dust and debris 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 generator room.</p> <p>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 room.</p> <p>Ensure in the generator room have adequate illumination level as per standard.</p> <p>Ensure distribution boards have a minimum clearance of 1 m (39 in) in front.</p> <p>Provide dedicated & adequate size of earthing with proper identification for each circuit from the earth busbar 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. Replace wooden bases with metal clad construction for mounting the circuit breaker and switch controls.</p> <p>Ensure all electrical cables are sized according to capacity of circuit breakers.</p> <p>Avoid flexible cables for fixed wiring unless contained in an enclosure affording mechanical protection.</p>

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	<p>Ensure cable joints are made in respect of conductivity, insulation and mechanical strength.</p> <p>Wiring system passes through elements of building construction such as floors, walls, roofs, ceilings, partitions or cavity barriers, the openings remaining after passage of the wiring system have to seal according to the degree of fire resistance prescribed for the respective element of building construction before penetration.</p> <p>Connect all metal in the building to the building earthing system.</p> <p>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.</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 Program and record the related testing data.</p> <p>Inspect electrical panel boards on an annual basis.</p> <p>Ensure overhead service connections to the building are led via adequate size and type of service masts.</p> <p>Ensure the generator room has adequate fire separation from the main building.</p> <p>Provide adequate means of ventilation for the generator room based on the installed equipment and ensure that ventilation does not impact on fire barriers, e.g. fire dampers</p> <p>Ensure appropriate generator room size in order to properly access the generator to perform routine maintenance activities.</p> <p>Ensure distribution boards have no opening and all live internal components are concealed properly.</p> <p>Provide dedicated & 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>

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	<p>Use noncombustible material to make channel and provide adequate covers on cable channel.</p> <p>Provide proper cable terminator/connector for stranded conductors at its point of termination.</p> <p>Install separate distribution boards for lighting and power circuits.</p> <p>Install lightning protection system on the building.</p>
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