

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

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Name of the Factory	: <b>AB Mart Fashionwear Ltd.</b>
Address of the Factory	: 786 Kakil Sataish Boradawra 13/3 Purbopara Mudafa, Tongi, Gazipur, Bangladesh
Present Status of the Factory	: <b>Under Operation</b>
Structural assessment conducted by	: Alliance
Date of Structural Inspection	: 22-April-15
Fire & Electrical assessment conducted by	: Alliance
Date of Fire & Electrical Inspection	: 22-April-15
BGMEA membership No	: 4455

### **BASIC INFORMATION:**

There is one building in the factory premise which is the RCC main production building. The following general information was noted:

- i. Building Usage Type : Garments Factory.
- ii. Structural System : Ground to third floor of the building are of moment resisting frame system with monolithic beams and slabs. Fourth floor is of flat plate system. As per structural drawing, foundation of the building is on isolated column footing.
- iii. Floor System : Beam supported slab
- iv. Floor Area : 40,000 sft.
- v. No. of Stories : 5 story RCC Main Production Building.
- vi. Construction Year : 2008~2013
- vii. Foundation Type : Isolated column footing.
- viii. Design Drawings : Available.
- ix. Soil investigation Report : Available
- x. Construction Materials : For RCC buildings of all members, Brick chip aggregate has been used.
- xi. Generator : Ground floor

### **RECOMMENDATIONS FOR CORRECTIVE ACTION:**

The recommendations of corrective action for Structural, Fire and Electrical Safety comprises of Short Term, Mid Term and Long Term basis are as follows:

#### **The recommendations for Structural Safety corrective actions are:**

Immediate : N/A

Short Term: (3 Weeks) :

- i. Develop a program to ensure that all live loads for which a floor or roof has been designed for will not be exceeded. The designated Load Manager shall oversee this program and ensure it is enforced.
- ii. Designate a representative as the Factory Load Manager. The Factory Owner shall ensure that at least one individual, the Factory Load Manager who is located onsite full time at the factory, is trained in calculating operational load characteristics of the specific factory. The Factory Load Manager shall serve as an ongoing resource to RMG

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vendors and be responsible to ensure that the factory operational loads do not at any time exceed the factory floor loading limits as described on the Floor Loading Plans.

Mid Term (6 Weeks)

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- i. Engage a qualified structural engineer to provide additional investigation into the areas of cracking and provide a remediation plan if required.
- ii. Have a qualified structural engineer provide further testing and analysis of cracking in walls and provide a remediation plan to correct noted issues.
- iii. Have a qualified structural engineer complete an analytical evaluation of the structural impact of the additions.
- iv. Have a qualified structural engineer prepare credible as-built documents based on the requirements of Part 8 Section 8.19 of the Alliance Standard.
- v. Have a qualified structural engineer document compliance with the seismic and wind requirements stated in the 2006 BNBC.
- vi. Engage a qualified structural engineer to confirm satisfactory structural performance of the buildings under wind loading.
- vii. In conjunction with preparing credible as-built documents as per the requirements of Alliance Standard section 8.20, conduct ferro-scanning to validate the in-situ reinforcing configuration within structural elements.
- viii. Engage a qualified structural engineer to develop the required documents (i.e. design report) to confirm the structural integrity of the buildings. Documents must comply with Alliance Standard Part 8 Section 8.19 and 8.20.
- ix. Adequately anchor and brace all non-structural elements to resist earthquake forces to comply with the BNBC and Alliance Standard.
- x. Engage a qualified structural engineer to confirm and document that provisions have been made to accommodate concentrated loads. If provisions have not been made, have a qualified structural engineer develop a remediation plan.
- xi. Under guidance of a qualified structural engineer, address all areas of needed maintenance by correcting the identified issues.
- xii. Provide a protective coating at the structural elements constructed with MCAC exposed to rainfall or other sources of water. Have protective coating approved by the Alliance or a qualified structural engineer.
- xiii. Have a qualified structural engineer develop Floor Loading Plans per the requirements of Part 8 Section 8.20.5.3.
- xiv. Have a qualified structural engineer prepare load plans including the information required in Section 8.20 of the Alliance Standard. Once prepared post the load plans on each floor of the building as required.
- xv. Provide signage or the appropriate markings at all areas used for storage to indicate the acceptable loading limits detailed in the Load Plan.
- xvi. Have a qualified structural engineer provide further analysis of the identified cracks to determine the appropriate course of corrective action.

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- xvii. Repair the exterior façade system to prevent water intrusion.
- xviii. Provide the MIEB No. of the Engineer of Record.

Long Term (6 Months)

- i. Apply for issuance of Occupancy Certificate from concerned authority.

### The recommendations for Electrical Safety corrective actions are:

<p>Immediate (3 to 6 Days)</p>	<p>Light fixtures without protective covers (otherwise known as naked lights) shall not be allowed in storage areas or in any area where the Inspector of the Factories Rules (1.6.3.7) Part 53 disallows these fixtures. Install signs posted in Bengali and English, indicating this prohibition at all entrances to these areas.</p> <p>Find out the cause of overheating, overloading, or signs of burning and take proper action. Consider replacement of equipment immediately if necessary.</p> <p>Remove all combustible materials within the substation room.</p>
<p>Short Term (3 Weeks)</p>	<p>Ensure proper identification of emergency power switchboards, distribution boards, and circuits</p> <p>.Provide two separate points of earthing (grounding) by distinct connections for each generator.</p>
<p>Mid Term (6 Weeks)</p>	<p>Provide means of ventilation for the substation room. Consult a qualified electrical engineer to determine the required ventilation rates based on the installed equipment.</p> <p>Provide clearance of at least 1 m (39 in) in front of switchboards and/or distribution boards.</p> <p>Provide capacity information labels (Maximum current rating, no of circuit breakers etc.) for switchboards and/or distribution boards.</p>
<p>Long Term (6 Months)</p>	<p>Develop and implement an electrical safety program. Include key topics such as lock out tag out procedures, personal protective equipment requirements, etc. Reference NFPA 70e for example program requirements.</p> <p>Establish a periodic inspection program to ensure the electrical systems are free from damage, debris, dirt, lint, etc. Maintain records concerning inspections and follow up actions.</p> <p>Develop an Insulation Resistance Measurement Program that ensures deterioration of insulation resistance will be identified quickly. Testing should be in compliance with InterNational Electrical Testing Association (NETA). All transformers, switchgears etc. shall be subject to an insulation resistance measurement test to ground after installation but before any wiring is connected. Insulation tests shall be made between open contacts of circuit breakers, switches etc. and</p>

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	<p>between each phase and earth.</p> <p>Complete thermographic scans at least on a three year cycle. Thermographic scans should be completed in accordance with the Standard for Infrared Inspection of Electrical Systems &amp; Rotating Equipment and NFPA70B or a comparable standard.</p> <p>Establish an inspection testing, and maintenance program for the Uninterruptable Power Supply (UPS) and associated components. The program must based on the following:</p> <ol style="list-style-type: none"> <li>(1) Manufacturer's recommendations</li> <li>(2) Manufacturer's instruction manuals</li> <li>(3) Minimum Requirements of NFPA 111 Chapter 8</li> <li>(4) Minimum Requirements of NFPA 70B Chapter 28</li> </ol>
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### The recommendations for Fire Safety corrective actions are:

Immediate (3 to 6 Days)	<p>Remove all impediments, obstructions, and stored materials from the means of egress. Keep all elements of the means of egress (exit path, aisles, stairs, corridors, etc.) continuously free and clear of all obstructions in accordance with Alliance Standard Section 6.3.9.</p> <p>Remove all combustibles stored underneath the cutting tables in accordance with Alliance Standard Section 13.7.2.</p>
Short Term (3 Weeks)	<p>Remove all locking devices from all egress doors and means of egress components in accordance with Alliance Standard Section 6.8. If locks are required for security reasons, utilize special door locking features complying with NFPA 101.</p>
Mid Term (6 Weeks)	<p>Implement training programs and document in accordance with the Alliance Safety Training Curriculum.</p> <p>Provide Fire Department (Siamese) connections in accordance with Alliance Standard Section 5.5.4. Connections shall match the Fire Service and Civil Defence hose thread standard.</p> <p>Develop a testing and maintenance program that ensures the emergency power for all egress lighting is verified at least once per year. If battery-operated lights are used, these lights shall be tested on a monthly basis. Functional testing of battery powered lights shall be provided for a minimum 90 min once per year.</p> <p>Provide continuously illuminated exit signs per Alliance Standard Section 6.11. Signs shall be placed at all required exits and along egress paths, especially where there is a change in direction for the path of travel.</p> <p>Provide an emergency power source (battery back-up or connection to emergency power system) for illuminated exit</p>

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	<p>signs.</p> <p>Develop a testing and maintenance program that ensures the emergency power for exit signs is verified at least once per year. If battery-operated signs are used, these signs shall be tested on a monthly basis. Functional testing of battery powered signs shall be provided for a minimum 90 min once per year.</p> <p>Post the occupant load for all assembly and production floor areas in a conspicuous space near the main exit or exit access doorway for the space in accordance with Alliance Standard Section 6.4.4.</p> <p>Develop an emergency evacuation plan in accordance with the Alliance Standard and communicate the plan to all employees.</p> <p>Create and post emergency evacuation maps at the entrance to each stair or main point of egress.</p> <p>Apply to the proper authority and keep all the licenses and permits up to date.</p> <p>Install signage adjacent to each stair door indicating the stair name and the floor level in both English and Bengali.</p> <p>Smoking is prohibited in garment factory buildings or similar uses. Post "No Smoking" signs in English and Bengali at all building entrances. If the Owner designates a smoking area outside the building, information on the location of these areas shall be posted on the "No Smoking" signs.</p> <p>Complete Fire Department pre-planning activities with the local Fire Service and Civil Defence in accordance with Alliance Standard Section 13.1.1(2).</p>
<p>Long Term (6 Months)</p>	<p>Remove the compressor from the exit enclosure and relocate in a safe location. Route exits directly to the exterior or provide an exit passageway in accordance with Alliance Standard Section 6.15 or an Egress Court in accordance with Alliance Standard Section 6.17.2 for non-compliant arrangements. Consult a qualified fire protection engineer to design and/or approve the required exit passageway or egress court.</p> <p>Install fire rated doors and windows or fill in unprotected openings with fire resistive rated assemblies.</p> <p>Install standpipe system at required locations. Standpipe system must comply with NFPA 14. The hydraulic calculations should be submitted and reviewed by Alliance prior to start of work. All standpipe system installation activities shall be submitted for reviewed by the Alliance prior to commencement of installation in accordance with Section 5.4.3.2.</p> <p>Provide fire-resistive rated construction barriers and associated opening protection for exit enclosures in accordance with Alliance Standard Sections 4.5 and 4.6. Consult a qualified fire protection engineer to design the</p>

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	<p>required rated construction barrier.</p> <p>Install a dedicated fire pump for the facility in accordance with NFPA 20 to supply the demands of the connected fire protection systems along with a stored source of water sufficient to meet the demands in accordance with NFPA 22. Fire pump installation is to be tested for final acceptance in presence of Alliance and a final inspection of the installation shall be conducted by the Alliance prior to final acceptance of the installation by the Alliance as per clause 5.5.5. Acceptance testing of the installation shall be in accordance with NFPA 20, 22, and 25 testing requirements. Documentation of all testing shall be submitted to the Alliance for review prior to final acceptance by the Alliance. The pump is to be connected to an alternative power source such as a generator. The generator is to be configured with an ATS (auto starter).</p> <p>Install initiating devices and notification appliances as required by the Alliance Standard and NFPA 72. This includes electrical supervision of all valves controlling fire protection systems (sprinklers, fire pumps, water supplies, etc.). Connect devices to an automatic fire alarm and detection system for the facility. All fire alarm installations shall be submitted for review by the Alliance prior to commencement of installation.</p> <p>Replace non-compliant doors and frames in the means of egress with side-swinging doors. Replacement doors shall be a minimum width of 0.8 m (32 in), and are listed, approved, self-closing, fire rated door assemblies (door and frame) with latching panic hardware.</p> <p>Install an automatic fire alarm and detection system for the facility. System shall comply with the Alliance Standard and NFPA 72. Consult a qualified fire protection engineer and/or authorized fire alarm company to design and install the system.</p> <p>Provide proper aisles marking (clear width minimum 36 in.) and keep aisles free of storage. Relocate the machines accordingly if necessary to provide proper width. The path of egress travel along a means of egress shall not be interrupted by any obstruction. The capacity of the means of egress shall not be reduced along the path of travel.</p> <p>Route exits directly to the exterior or provide an exit passageway in accordance with Alliance Standard Section 6.15 or an Egress Court in accordance with Alliance Standard Section 6.17.2 for non-compliant arrangements. Consult a qualified fire protection engineer to design and/or approve the required exit passageway or egress court.</p> <p>Need to provide training and certification for the required number of people in firefighting, first aid, and rescue training by an appropriate authority in accordance with the Alliance Safety Training Curriculum.</p> <p>Provide fire-resistive rated construction barriers between hazard types in accordance with Alliance Standard Sections 3.4 and 4.5. Consult a qualified fire protection engineer to</p>
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	<p>design the required rated construction barrier.</p> <p>Establish an inspection, testing, and maintenance program for all fire extinguishers and prepare proper documentation. Program must comply with NFPA 10.</p> <p>Provide handrails on both sides of each stairway. Intermediate handrails shall be provided when the stair width exceeds 2.2 m (87 in.). Mount new handrail at a height consistent with existing height (between 30 in. and 44 in).</p> <p>Install emergency lighting for all paths of egress in accordance with Alliance Standard Section 6.7. Illumination needs to be a minimum of 10 lux for all corridors, exit doors and stairways. Illumination for aisles needs to be a minimum of 2.5 lux. Egress lighting shall be provided with emergency power or supplemented with battery powered lights that provide a minimum of 10 lux for not less than 30 mins in the event of failure of normal lighting.</p> <p>Install a new automatic fire alarm and detection system. Once installed, arrange for direct connection of the fire alarm and detection system to a central station monitoring service or the Fire Service and Civil Defense as per Alliance Standard Section 5.7.5. Until that time, a person trained to contact the Fire Service and Civil Defense in the event of fire alarm activation shall be provided. An annunciator shall be located in a constantly attended location (such as a fire control room) to alert this person.</p> <p>Establish an inspection, testing, and maintenance program for the standpipe system. Program must comply with NFPA 25. Any newly installed standpipe system needs to be evaluated for compliance with the design pressure and flow demands of NFPA 14 or BNBC Section 5.4.3.</p> <p>Create a Fire Safety Director position and fill the position with an individual that has sufficient training to be able to carry out the required duties in accordance with Alliance Standard Section 13.1.</p> <p>Develop a hot work permit program. The program must comply with the requirements of NFPA 51B.</p> <p>Establish written corporate and plant policies on housekeeping to ensure scheduled cleaning for floor, wall, ceiling, supply and return air ventilation systems. Promptly reschedule skipped cleanings.</p> <p>Provide a documented line of authority for authorizing a cleaning delay and rescheduling. As a general rule the maximum tolerable deposit thickness for loose fluffy lint is 13 mm (½ in.) over a maximum of 46.5 m<sup>2</sup> (500 ft<sup>2</sup>). Limit dense deposits to 6 mm (¼ in.) and oil saturated deposits to 3.2 mm (1/8 in.). Establish written corporate and plant policies on housekeeping to ensure scheduled cleaning for floor, wall, ceiling, supply and return air ventilation systems. Promptly reschedule skipped cleanings. Provide a documented line of authority for authorizing a cleaning delay and rescheduling.</p>
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