

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

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| Name of the Factory                       | : <b>Ayesha Clothing Co. Ltd.</b>             |
| Address of the Factory                    | : Jamgara, Ashulia, Savar, Dhaka, Bangladesh. |
| Present Status of the Factory             | : <b>Under Operation</b>                      |
| Structural assessment conducted by        | : Alliance                                    |
| Date of Structural Inspection             | : 4-May-14                                    |
| Fire & Electrical assessment conducted by | : Alliance                                    |
| Date of Fire & Electrical Inspection      | : 3-May-14                                    |
| BGMEA Membership No                       | : 4072  |

### **BASIC INFORMATION:**

There are 4 buildings in the factory premises out of which one is main production building (Three seven story building jointed by expansion joint) and three are ancillary buildings. The buildings are named as: 1) Seven story RCC main production building and shed on roof, 2) Single Story utility prefabricated shed, 3) Single Story Washing Shed, 4) Single story under construction ETP. The following general information was noted:

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| i.    | Building Usage Type       | : Garments Factory  |
| ii.   | Structural System         | : Building 1 is the RCC moment resisting frame structure; however the building 2 is the edge beam supported flat slab system structure. Building-3 is a RCC moment resisting frame structure, but ground floor occupies a mezzanine floor which is constructed with steel member and not directly connected to the main structure and also top floor of this building is a PEB roofing system shed. |
| iii.  | Floor System              | : Different type floor system   |
| iv.   | Floor Area                | : 345500 SF   |
| v.    | No. of Stories            | : Seven story RCC main production building and others are single storied building   |
| vi.   | Construction Year         | : 2005-2007   |
| vii.  | Foundation Type           | : Isolated footing  |
| viii. | Design Drawings           | : Available.  |
| ix.   | Soil investigation Report | : Available.  |
| x.    | Construction Materials    | : Reinforced Concrete & steel   |
| xi.   | Generator                 | : Ground Level  |

### **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 : NA

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.

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

Mid Term (6 Weeks)

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- i. Have Under the guidance of a qualified structural engineer; arrange a detailed engineering assessment of the structure as required within 8 weeks. Conduct destructive core testing to validate the in-situ concrete compressive strength of the structural elements of building 2.
- ii. Conduct detailed structural assessment by qualified structural engineer and carry out remedial action as necessary.
- iii. Have a qualified Structural Engineer to prepare the design report and provide the full credential of the architect of record on architectural documents.
- iv. "Immediate safety issues should be applied.
- v. The management should ensure that the construction and safety practices are being adhered to as per BNBC 2006 and as per section 9 of Alliance Standard."
- vi. Have a qualified structural engineer complete further analysis of the structure and develop a remediation plan if required. Pounding effect for different structural system should be checked.
- vii. Under guidance from a qualified structural engineer, address all areas of needed maintenance by correcting the identified issues.
- viii. Under guidance from a qualified structural engineer, arrange a geotechnical investigation at close vicinity of the structure and make the report available for review.
- ix. Have a qualified structural engineer complete an analytical evaluation of the structural impact of the addition.
- x. Engage a qualified structural engineer to confirm and document that provisions have been made to accommodate these water tanks. If provisions have not been made, have a qualified structural engineer develop a remediation plan.
- xi. Engage a qualified structural engineer to confirm satisfactory structural performance of the buildings under wind loading.
- xii. Adequately anchor and brace all non-structural elements to resist earthquake forces to comply with the BNBC and Alliance Standard
- xiii. 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."
- xiv. Have a qualified structural engineer develop Floor Loading Plans per the requirements of Part 8 Section 8.20.5.3
- xv. To have a qualified structural engineer prepare load plans including the information required in Section 8.205.3 of the Alliance Standard & also posting in each panel of all floors.
- xvi. "Have a qualified structural engineer prepare a load plan for each floor and have the floors marked for designating storage area as per the developed load plan."
- xvii. Joint between building-2 and 3 must be free from blockage.

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Long Term (6 Months) :

- i. 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. Or provide 2% slope on the exposed surface to prevent accumulation of water.
- ii. Provide Certificates of Occupancy for review.
- iii. Retrofitting as per DEA recommendation.

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

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| Immediate (3 to 6 Days) | Find out the cause of overheating and take proper action.   |
| Short Term (3 Weeks)    | Install security measures to ensure access to the substation room is restricted.  |
| Mid Term (6 Weeks)      | <p>Ensure proper identification of emergency power switchboards, distribution boards, and circuits.</p> <p>Ensure the generator room is properly ventilated.</p> <p>Ensure the generator room properly rated.</p> <p>Ensure switchboards and/or distribution boards are metal enclosed with a dead front construction.</p> <p>Provide adequate cover on cable trench.</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>Install security measures to ensure access to the substation room is restricted.</p> <p>Provide capacity information labels (Maximum current rating, no of circuit breakers etc.) for switchboards and/or distribution boards.</p> <p>Provide two separate points earthing (grounding) provided for generator.</p> <p>Provide additional light fixtures to increase illumination levels provided in the BNBC.</p> |
| Long Term (6 Months)    | <p>Consult with a qualified Electrical Engineer and ensure electrical wiring/cables are sized according to capacity of circuit breakers.</p> <p>Provide adequate fire rating/protection for the substation room.</p> <p>Ensure overcurrent protection device (circuit breaker) for</p>  |

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|  | <p>each and every load.</p> <p>Install switchboards and/or distribution boards in compliant locations so that operation is not hindered due to limited access.</p> <p>Ensure switchboards and/or panel boards are not installed above gas stoves or sinks or within 2.5m of any washing unit in washing rooms or laundries.</p> <p>Ensure wiring systems are selected and erected so that no damage is caused by the ingress of water.</p> <p>Remove multi looping of wiring/cables at circuit breakers within distribution boards.</p> <p>Ensure appropriate size for generator room in order to properly access the generator to perform routine maintenance activities.</p> <p>Ensure the means of identification is obtained by separate color coding, marking tape, tagging, or other approved means.</p> <p>Ensure the air termination network vertical and horizontal conductors are appropriately spaced.</p> <p>Ensure appropriate numbers of down conductors are installed based on the building size.</p> <p>Consult with an expert engineer to have detailed designs and drawings of lightning protection system and to ensure your building is secured.</p> <p>Provide wire/cable shaft for the whole building. Ensure wiring and cables are arranged in shaft for ease of inspection and maintenance.</p> <p>Ensure distribution boards provided with physical means to prevent the installation of more over current devices than that number for which the panel board was designed, rated, and listed following NFPA 70 section 408.54.</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>Provide and identify a dedicated neutral for each circuit.</p> |
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### The recommendations for Fire Safety corrective actions are:

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| Immediate (3 to 6 Days) | Remove all combustibles stored underneath the cutting tables at the noted locations. |
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| Short Term (3 Weeks) | Remove all hasps, locks, slide bolts, or other locking devices from all sliding doors and collapsible gates.   |
| Mid Term (6 Weeks)   | <p>Develop an emergency evacuation plan which includes duties and responsibilities of various people/groups, interfacing between groups and fire brigade, headcount and identification of trapped victims, physically disabled people and their rescue, etc. and all components required by the Alliance Standards and communicate the plan to all employees. The evacuation plan shall include provisions to assist physically disabled persons. A list of all employees with physical disabilities shall be kept by the Fire Service Director.</p> <p>Post the occupant load for every assembly and production floor in a facility in a conspicuous space near the main exit or exit access doorway for the space.</p> <p>Develop a testing and maintenance program that ensures the operation of all exist lights 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>Impart training in accordance with Alliance Safety Training Curriculum and keep record with proper documentation.</p> <p>Apply to BERC for waiver certificate, to Savar Cantonment Board for building approval and to Department of Explosives, Bangladesh for license of stored flammable materials.</p> |
| Long Term (6 Months) | <p>Install a pump dedicated for fire fighting or fire protection following the requirements of NFPA 20. 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. Acceptance testing of the installation shall be in accordance with NFPA 20, 22, and 24 testing requirements. Documentation of all testing shall be submitted to the Alliance for review prior to final acceptance. This pump is to be connected to an alternative power source like a generator and the generator is to be connected with ATS (auto starter).</p> <p>Provide fire-resistive rated construction barriers between hazard types following Table 4.4.1 of Alliance Standard or</p>  |

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|  | <p>Table 4.1.1 from BNBC Part 4. Consult a qualified fire protection engineer to design the required rated construction barrier.</p> <p>Install a standpipe system at required locations designed by a qualified fire protection engineer. The system is to be compliant with the requirements of NFPA 14. The hydraulic calculations should be reviewed by Alliance prior to start of work. All standpipe system installations shall be submitted for review by the Alliance for review prior to commencement of installation. Testing of the installation shall be conducted in accordance with NFPA 14 acceptance testing requirements. Documentation of all testing shall be submitted for review by the Alliance. Final inspection and testing of the installation shall be witnessed by the Alliance as per clause 5.4.3.3.</p> <p>Install fire alarm system per NFPA 72. Include pull stations at all entrances to exit stairs, and at ground floor exits. Install strobes and horns for complete notification on all floors. Install smoke detectors that are part of the fire alarm system in locations required by Alliance standards. Provide a fire detection and alarm system control panel that will monitor the following: automatic sprinkler system water flow activation, fire pump running, smoke/heat detectors, magnetic release of fire doors upon smoke detector or sprinkler operation.</p> <p>Provide 1 hr fire protective opening assemblies in 1 hr rated exit enclosure. Provide 1.5 hr fire protective opening assemblies in 2 hr rated exit enclosure. Exits connecting three or fewer stories shall be enclosed with a minimum 1-hr fire-resistance rating. Exits connecting four or more stories shall be enclosed with a minimum 2-hr fire-resistance rating. Exits shall be enclosed with the same fire-resistance rating as the floor penetrated but will not need to exceed 2 hr. Provide fire door of required rating to access the corridor.</p> |
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