

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

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| Name of the Factory                       | : Starlight Sweater Ltd.   |
| Address of the Factory                    | : Vogra, National University, Gazipur Sadar,<br>Gazipur-1704, Gazipur, Bangladesh. |
| Present Status of the Factory             | : <b>Under Operation</b>   |
| Structural assessment conducted by        | : Alliance   |
| Date of Structural Inspection             | : 08-June-14   |
| Fire & Electrical assessment conducted by | : Alliance   |
| Date of Fire & Electrical Inspection      | : 04-June-14   |

### **BASIC INFORMATION:**

The present garment factory comprises of one Main Building and five Ancillary Buildings. The following general information was noted:

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| i.    | Building Usage Type       | : Garments Factory   |
| ii.   | Structural System         | : The building is a Moment Resisting Frame with monolithic beam slab.  |
| iii.  | Floor System              | : Beam supported slab  |
| iv.   | Floor Area                | : 374,704 sft.   |
| v.    | No. of Stories            | : 1) Ten story RCC main production building: 10 (Grade + 9)  |
| vi.   | Construction Year         | : 1) Ten story RCC main production building: 2011, 2) Three story utility building: 2010, 3) Single story prefab boiler shed: 2011, 4) Single story prefab chemical store and compressor shed: 2011, 5) Single story guard house: 2010, 6) Single story fire command room: 2010. |
| vii.  | Foundation Type           | : combined footing foundation/mat foundation.  |
| viii. | Design Drawings           | : Available  |
| ix.   | Soil investigation Report | : Available  |
| x.    | Construction Materials    | : Reinforced Concrete for RCC building   |
| xi.   | Generator                 | : Unknown  |

### **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.
- 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 loading limits as described on the Floor Loading Plans.
- iii. Complete all the action items from the previous assessment.

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Mid Term (6 Weeks)

- i. Under guidance from a qualified structural engineer arrange core testing to validate the in-situ concrete compressive strength of the structure.
- ii. Adequately anchor and brace all non-structural elements to resist earthquake forces to comply with the BNBC and Alliance Standard.
- iii. 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.
- iv. Have a qualified structural engineer prepare a design report based on the requirements of Part 8 Section 8.19 of the Alliance Standard.
- v. Have a qualified structural engineer complete an analytical evaluation of the structural impact of the addition.
- vi. Engage a qualified structural engineer to confirm satisfactory structural performance of the buildings under wind loading.
- vii. Provide signage or the appropriate markings at all areas used for storage to indicate the acceptable loading limits detailed in the Load Plan.
- viii. Post Floor Load Plans as required by the Alliance Standard.

Long Term (6 Months)

- i. Provide a protective coating on the structural elements constructed with MCAC exposed to rainfall or other sources of water. Have the protective coating approved by the Alliance or a qualified structural engineer. Alternately, provide a 2% slope on the exposed surface to prevent the accumulation of water.
- ii. Provide Certificates of Occupancy for review.

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

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| Immediate (3 to 6 Days) | Find the causes of overheating and signs of burning and take proper action.  |
| Short Term (3 Weeks)    | Ensure wiring systems are selected and erected so that no damage is caused by the ingress of water.  |
| Mid Term (6 Weeks)      | <p>Provide an adequate cover on the cable trench.</p> <p>Ensure the generator room is properly fire rated and physically separated from the remainder of the building.</p> <p>Ensure distribution boards have a dead front construction.</p> <p>Ensure proper identification of all distribution boards and circuits.</p> <p>Ensure generator exhaust is discharged to the exterior of the building in a safe location.</p> <p>Provide capacity information labels (maximum current rating, number of circuit breakers, etc.) for distribution boards.</p> <p>Ensure the means of identification are obtained by separate color codings, marking tape, tagging or other approved</p> |

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|                      | <p>means.</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 additional light fixtures to increase illumination levels as provided in the BNBC.</p> <p>Ensure the generator room is properly illuminated.</p> <p>As per BNBC section 2.11.5.4, ensure clear and permanent identification marks are painted in all distribution boards and sub main boards.</p> <p>Ensure lighting fixtures are supported from the structure and seismic bracing is installed as required.</p> <p>Provide adequate supports for electrical wiring.</p> <p>Ensure signage indicating the prohibition of light fixtures without protective covers is installed at the required locations.</p> <p>Provide required equipment and safety signage for DB Panels and related electrical equipment.</p>   |
| Long Term (6 Months) | <p>Provide an adequate fire rating for substation room and make it separated from rest of the building.</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>Connect all metal in the building to the building earthing system, such as metal rebar in concrete, the metal frame of the building, or a metal water or gas pipe.</p> <p>Have a qualified electrical engineer develop an as-built single line diagram detailing key components and capacity of the electrical system.</p> <p>Consult with a qualified electrical engineer to ensure electrical cables are sized according to the capacity of the circuit breakers.</p> <p>Ensure an overcurrent protection device (circuit breaker) for each and every load.</p> <p>Ensure switchboards and distribution boards are provided with physical means to prevent the installation of more over current devices than the number for which the panel board was designed, following NFPA 70 section 408.54.</p> <p>Consult with your transformer manufacturing company and ensure the transformer does not contain any harmful substances by testing.</p> |

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|  | <p>Consult with an expert electrical engineer to ensure bonding between the lightning system grounding and structure grounding.</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>Develop an Insulation Resistance Measurement Program that ensures deterioration of insulation resistance will be identified quickly. Testing should be in compliance with the 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 between each phase and earth.</p> <p>Provide a dedicated neutral for each circuit.</p> <p>Lead power, telecommunication, and antenna cables separately to the main point of service. Power, telecommunication, and antenna cables must have separate entrances.</p> <p>Ensure appropriate size for generator room in order to properly access the generator to perform routine maintenance activities.</p> <p>Lighting and socket circuits must be separated at the noted location. Have a qualified electrician separate the lighting and sockets into separate circuits.</p> <p>Ensure cable joints are through porcelain/PVC connectors with PIB tape wound around the joint.</p> <p>Provide cable sockets for stranded conductors having a nominal cross-sectional area of 6 mm<sup>2</sup> or greater. For conductors below 6 mm<sup>2</sup> without cable sockets, all strands at the exposed ends are soldered together or are crimped using suitable sleeves or ferrules.</p> <p>Ensure all electrical cable is properly terminated at its point of termination.</p> <p>Complete an oil analysis on applicable transformers at appropriate intervals based on voltage and power.</p> |
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### The recommendations for Fire Safety corrective actions are:

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| Immediate (3 to 6 Days) |  |
| Short Term (3 Weeks)    | 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.   |
| Mid Term (6 Weeks)      | <p>Develop an emergency evacuation plan which includes the duties and responsibilities of various people/groups, interfacing between groups and the fire brigade, headcount and identification of trapped victims, physically disabled people and their rescue, etc., including 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 emergency power for exit signs is tested at least once per year. If battery operated signs are used, these signs are to be tested on a monthly basis. Functional testing of battery powered signs is provided for a minimum of 90 minutes, once per year.</p> |
| Long Term (6 Months)    | <p>Provide 2 hour fire-resistive rated construction barriers at exit enclosures. Fit side-swinging, self-closing, non-lockable fire doors of 1.5 hour rating in all stairwell enclosures that swing in the direction of egress. Consult a qualified fire protection engineer to design the required rated construction barriers.</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 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</p>                      |

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|  | <p>commencement of installation.</p> <p>Install standpipe system at required locations. Standpipe system must comply with NFPA 14.</p> <p>Arrange for direct connection of the fire alarm system to a central monitoring station or Fire Service and Civil Defense as per Alliance Standards. Until such time as monitoring can be set up, arrange a monitoring system using the factory's own central detection system and personnel. A person shall be assigned to contact the fire department in the event of fire alarm activation. An annunciator shall be located in a constantly attended location (such as a fire control room) to alert this person.</p> <p>Install an automatic sprinkler system throughout the building designed by a qualified fire protection engineer. The hydraulic design of the sprinkler system has to be pre-approved by CoE of Alliance. All installation and design requirements outlined in BNBC Part 4 Chapter 4 shall be replaced by the requirements of NFPA 13. Pipe schedules shall not be used to size pipes. All systems shall be hydraulically calculated to meet the NFPA design requirements.</p> |
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