

Summary of Preliminary Assessment on Structural, Fire and Electrical Safety

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| Name of the Factory | : ZSB GARMENTS LTD. |
| Address of the Factory | : Shirir Chala, Bhager Bazar, Joydebpur, Gazipur, Bangladesh |
| Present Status of the Factory | : Under Operation |
| Structural assessment conducted by | : Alliance |
| Date of Structural Inspection | : 10 Jun 2014 |
| Fire & Electrical assessment conducted by | : Alliance |
| Date of Fire & Electrical Inspection | : 07 Jun 2014 |

BASIC INFORMATION:

The present garment factory is comprises of a 4 Main Buildings 14 Ancillary Buildings. The following general information was noted:

- i. Building Usage Type : Garments Factory.
- ii. Structural System : The building is RCC farmed structure with monolithic slab beam system. framing system is regular..
- iii. Floor System : RCC farmed structure with monolithic slab beam.
- iv. Floor Area : Total area of all buildings in the factory premises:
109588.00 sft. Building wise breakdown as follows:
1) 6 story RCC main production building: 94059.00 sft, 2) Single story prefab Knitting shed: 2816 sft, 3) Single story generator building: 950.00 sft, 4) Single story prefab yarn store shed: 5332.00 sft, 5) Single story prefab compressor shed: 70.00 sft, 6) Single story sub-station with brick wall and CI shed: 380.00 sft, 7) Single story Jhut store with brick wall and CI shed: 1152.00 sft, 8) Single unused oil store with brick wall and CI shed: 200.00 sft, 9) 3 story RCC officers rest house building: 3249 sft, 10) Single story stuff rest house with brick wall and CI shed: 840 sft, 11) Single story kitchen with brick wall and CI shed: 150 sft, 12) Single story security post with brick wall and CI shed: 390 sft
- v. No. of Stories : 1) Main production building: (Above grade: 6, below grade: 0), 2) Prefab Knitting shed: (Above grade: 1, below grade: 0), 3) Generator building: (Above grade: 1, below grade: 0), 4) Yarn store shed: (Above grade: 1, below grade: 0), 5) Prefab compressor shed: (Above grade: 1, below grade: 0), 6) Sub-station with brick wall and CI shed: (Above grade: 1, below grade: 0), 7) Jhut store with brick wall and CI shed(Above grade: 1, below grade: 0), 8) Oil store with brick wall and CI shed: (Above grade: 1, below grade: 0), 9) RCC officers rest house building: (Above grade: 1, below grade: 0), 10) Stuff rest house with brick wall and CI shed: (Above grade: 1, below grade: 0), 11) Kitchen with brick wall and CI shed: (Above grade: 1, below grade: 0), 12) Secutiry post with brick wall and CI shed: (Above grade: 1, below grade: 0).
- vi. Construction Year : Factory personnel informed the date of construction as follows: 1) Six story RCC main production building: Finished in 2012
- vii. Foundation Type : The foundation type is spread column footing..
- viii. Design Drawings : Available.
- ix. Soil investigation Report : Available
- x. Construction Materials : RCC (brick chips).
- xi. Generator : Ground Floor

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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 load limits as described on the Floor Load Plans.

Mid Term (6 Weeks) :

- i. Have a qualified structural engineer confirm that capacity to support the load is available. Load Plans complying with Alliance Standard Part 8 Section 8.20.4.3 should also be developed.
- ii. Engage a qualified structural engineer and assess the building against seismic and wind load conditions and, if there are any deficiencies, make the remediation accordingly.
- iii. Engage a qualified structural engineer to confirm satisfactory structural performance of the buildings under wind loading.
- iv. Engage a qualified structural engineer to develop the required documents to confirm the structural integrity of the buildings. Documents must comply with Alliance Standard Part 8 Section 8.19 and 8.20
- v. Have a qualified Structural Engineer prepare the design report and submit to BV for review.
- vi. "Complete all the Corrective Action Plans suggested as part of the previous assessment:
 - 1) Heavy storage loading to be controlled,
 - 2) Proper movement joint to be provided,
 - 3) Water proofing material to be applied on roof,
 - 4) Floor extension to be further approved by the Local Building Control Authority,
 - 5) Provide proof for overall stability system for sway frames,

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- 6) Cantilevered slab along the front side to be maintained with controlled loading."
- vii. 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.
 - viii. Adequately anchor and brace all non-structural elements to resist earthquake forces to comply with the BNBC and Alliance Standard.
 - ix. Have a qualified structural engineer develop Floor Loading Plans per the requirements of Part 8 Section 8.20.5.3
 - x. Have a qualified structural engineer prepare load plans including the information required in Section 8.20 of the Alliance Standard. Have it posted in all required location.
 - xi. Provide signage or the appropriate markings at all areas used for storage to indicate the acceptable loading limits detailed in the Load Plan.
 - xii. Have a qualified structural engineer provide further analysis of the identified cracks to determine the appropriate course of corrective action..

Long Term (6 months) :

- i. Repair the exterior façade system to prevent water intrusion.
- ii. 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 expose surface to prevent accumulation of water
- iii. Apply for issuance of Certificates of Occupancy and pursue the matter to obtain the same

The recommendations for Electrical Safety corrective actions are:

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| Immediate (3 to 6 Days) | NA. |
| Short Term (3 Weeks) | <p>All boxes and enclosures (including transfer switches, generators, and power panels) for emergency circuits shall be permanently marked so they will be readily identified as a component of an emergency circuit or system. The required marking can be by color code, the words "emergency system," or any other method that identifies the box or enclosure as a component of the emergency system.</p> <p>Develop and implement an electrical safety program. Include key topics such as lock out tag out procedures, personal protective equipment requirements, etc. Keep records of completed training available on site.</p> <p>Ensure light fixtures without protective covers are not installed in storage areas or in any area where the Inspector of</p> |

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| | the Factories Rules (1.5.3.5) Part 53 disallows these fixtures. |
| Mid Term (6 Weeks) | <p>Provide earthing connection to all exposed-conductive parts (metal) related to/in close proximity to electrical equipment/installation and utility service such as metallic water/gas/steam pipes etc. such that all the metals remain at a substantially same potential of building earthing system.</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>Need to separate the multiple and looping cables either using proper size of circuit breakers or connecting separately on bus bars as per requirements.</p> <p>Provide dedicated neutral for each circuit.</p> |
| Long Term (6 Months) | <p>Complete thermo graphic scans at least on a three year cycle. Thermo graphic scans should be completed in accordance with the Standard for Infrared Inspection of Electrical Systems & Rotating Equipment and NFPA70B or a comparable standard.</p> <p>Have a qualified Electrical Engineer design a lightning protection system according to the BNBC requirements. Have a licensed electrician install the designed system.</p> |

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 as soon as possible. |
| Short Term (3 Weeks) | Provide non-lockable side hinged, rated doors that swing in the direction of egress. Remove all hasps, locks, slide bolts, or other locking devices at the noted locations. According to section 6.8.2.3 doors may be provided with locking hardware from the ingress side provided that a panic bar is installed on any door with an occupant load exceeding 49 persons. The re-entry provisions of section 6.8.3 must be met. |
| Mid Term (6 Weeks) | <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 lights are tested on a monthly basis. Functional testing of battery powered signs is provided for a minimum 90 min once per year.</p> <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</p> |

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| | <p>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 of 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 30 min once per year.</p> <p>Conduct fire drills on a quarterly basis as outlined in BNBC Part 4 Appendix A for all garment facilities. Fire drills shall be conducted under the direction of a Fire Safety Director. All other requirements for fire drills shall be conducted in accordance with BNBC Part 4 Appendix A.</p> <p>Impart training in accordance with Alliance Safety Training Curriculum and keep record with proper documentation.</p> <p>Apply to appropriate authority for issuance of occupancy certificate and pursue the matter to expedite.</p> <p>Install required identification signs at the noted locations. Signage must comply with NFPA 14 Chapter 6.</p> <p>Complete fire department pre-planning activities with the local Fire Service and Civil Defense.</p> <p>Pursue the matter to expedite for boiler certificate and BERK for 744 KW power generation certificate.</p> <p>Install signage adjacent to each stair door indicating the stair name at the noted locations with English & Bengali.</p> |
| <p>Long Term (6 Months)</p> | <p>Provide 1.5 hour fire protective opening assemblies in 2 hour rated exit enclosure. Exits connecting four or more stories shall be enclosed with a minimum 2-hour fire-resistance rating. Exits shall be enclosed with the same fire-resistance rating as the floor penetrated but will not need to exceed 2 hour.</p> <p>Replace all collapsible gates in means of egresses with side-hinged swinging type doors of proper width and rating.</p> <p>Install doors that swing in the direction of egress, side-swinging, self-closing, non-lockable fire doors of 1.5 hour rating in all stairwell enclosures. Consult a qualified fire protection engineer to design the required rated construction barriers.</p> <p>Install a pump dedicated for fire fighting or fire protection following the requirements of NFPA 20 as mentioned in Alliance Standard Section 5.5.1. 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</p> |

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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 by the Alliance.

Install class III 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 and review to be completed prior to start of work. All standpipe system installations shall be submitted for review by the Alliance for review prior to commencement of installation according to 5.4.3.2. 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.

Protect the exit passageway with protective opening assemblies i.e. fire rated door of 1.5 hr rating as per section 6.15 of Alliance Standard.

Provide an automatic fire alarm and detection system per the Alliance Standard. Pull stations at egress points, smoke detectors throughout the building, visual and audible devices must be spaced appropriately and directly connected to the fire alarm system for automatic activation based on occupancy type in accordance with NFPA 72. Protect the exit passageway with protective opening assemblies i.e. fire rated door of 1.5 hr rating as per section 6.15 of Alliance Standard.

Every door in a stair enclosure serving more than 5 stories shall be provided with re-entry unless it meets the following requirements. Stair doors may be permitted to be locked from the stair (ingress) side that prevents re-entry to the floor provided at least two floors allowing re-entry to access another exit are provided, there are not more than 4 stories intervening between re-entry floors, re-entry is allowed on the top or next to top level, reentry doors are identified as such on the stair side, and locked doors shall be identified as to the nearest re-entry floors. When the discharge floor is determined to be a required reentry floor using the above requirements, re-entry does not have to be provided back into the building on this level.

Install fire department connections where required and in compliance with the Standard. According to Alliance Standard 5.5.4, Fire department (Siamese) inlet connection shall be provided to allow fire department pumper equipment to supplement the fire protection systems and outlet connections shall be provided to allow fire department pumper vehicles to draw water from ground-level or underground water storage tanks. Connections shall match the Fire Service and Civil Defense hose thread standard.

Provide fire-resistive rated construction barriers between different types occupancy with following Table 4.4.1 of

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| | <p>Alliance Standard or Table 4.1.1 from BNBC Part 4. Consult a qualified fire protection engineer to design the required rated construction barrier.</p> <p>Provide an automatic fire alarm and detection system per NFPA 72 as required by the Alliance Standard and arrange for direct connection of the system to a central station monitoring service or the Fire Service and Civil Defense as per Alliance Standard Part 5 Section 5.7.5 Monitoring. Until that time that a central station monitoring service or direct connection to the Fire Service and Civil Defense can be set up, 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>Provide handrails on both sides of each stairway. Fire extinguishers are to be inspected, tested, and maintained in accordance with NFPA 10 Chapter 7 as demanded in Alliance Standard Part 13 Section 13.10.3.</p> <p>Install Illuminated exit signs along the path of egress anywhere the continuation of egress is not obvious or there is a change in the direction of the path of travel.</p> <p>The means of egress paths shall be illuminated at all times the building is occupied. Illumination shall be a minimum of 10 lux for all corridors, exit doors, and stairways. Aisles shall be provided with a minimum 2.5 lux.</p> <p>Create a Fire Safety Director position and fill the position with an individual that has had sufficient training to be able to carry the required duties.</p> <p>The duties of the Fire Safety Director shall include the following:</p> <ol style="list-style-type: none">(1) Establish internal and external rally points and communicate to all employees in the building.(2) Fire department pre-planning.(3) Conduct safety inspections as outlined in Alliance standard 13.9.(4) Ensure all testing of fire protection equipment is conducted in accordance with Alliance standard 13.10. <p>Develop a hot work permit program. The program must comply with the requirements of NFPA 51B. In general, this program should address process of request and approval authorities, necessary checks prior approval, standby fire.</p> |
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