

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

Name of the Factory	: <b>B.S.A. GARMENTS INDUSTRY (PVT) LTD</b>
Address of the Factory	: 56, Gosaldanga, Doublemooring, Chittagong
Present Status of the Factory	: <b>Closed</b>
Structural assessment conducted by	: Alliance
Date of Structural Inspection	: 20-May-14
Fire & Electrical assessment conducted by	: Alliance
Date of Fire & Electrical Inspection	: 14-May-14
BGMEA Membership No	: 3243

### **BASIC INFORMATION:**

There is one building in the factory premises. The following general information was noted:

- i. Building Usage Type : Garments Factory.
- ii. Structural System : RCC Moment resisting frame structure.
- iii. Floor System : Beam Supported slab.
- iv. Floor Area : 110654 sft
- v. No. of Stories : Six storied.
- vi. Construction Year : 1986
- vii. Foundation Type : Isolated footing 7 combined footing
- viii. Design Drawings : Available.
- ix. Soil investigation Report : Available
- x. Construction Materials : RCC brick chips.
- 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 :

- i. The factory shall remain closed until an Alliance Review Panel studies the case and determines the appropriate plan of action to follow.

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

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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. Engage a qualified structural engineer and carry out structural assessment to identify what remedial action is appropriate, which may include retrofitting. Reduction of load is required before any other remedial action is undertaken based on detailed structural assessment.
- ii. Have a qualified structural engineer complete an analytical evaluation of the structural impact of the structural steel frame roof structure and the additional occupancy space at the roof level.
- iii. Engage a qualified structural engineer to confirm structural performance of the structure.
- iv. Engage a qualified structural engineer to provide additional investigation into the areas of distress, separations, or cracking and provide a remediation plan if required.
- v. 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.
- vi. Engage a qualified structural engineer to develop the required documents to confirm the structural integrity of the buildings. Documents must comply with the Alliance Standard Part 8 Sections 8.19 and 8.20
- vii. Engage a qualified structural engineer to confirm satisfactory structural performance of the buildings under wind loading.
- 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. Floor load plans should be visibly posted on all levels of all buildings.
- 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)

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- i. Depending on the findings of the DEA, permanent remedial measures should be conducted for the safety of the building.
- ii. Provide a protective coating to all structural elements that are constructed with MCAC and exposed to rainfall or other sources of water. Have the protective coating approved by the Alliance or a qualified structural engineer. In the alternative, provide a 2% slope on the exposed surfaces to prevent accumulation of water.
- iii. Apply for issuance of the Certificates of Occupancy and pursue the matter to obtain the same.

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

Immediate (3 to 6 Days)	<p>Remove all dirt, lint and improperly stored materials from the substation room.</p> <p>Ensure light fixtures without protective covers are not installed in storage areas or in any area where the Inspector of the Factories Rules (1.5.3.5) Part 53 disallows these fixtures.</p>
Short Term (3 Weeks)	<p>Find out the cause of overheating, overloading, or signs of burning and replace the cable/device.</p> <p>Ensure Signage indicating the prohibition of light fixtures without protective covers is installed at required locations.</p> <p>Mechanical guards should be provided for electrical equipment and wiring where necessary.</p> <p>Provide clearance of at least 1 m (39 in) in front of distribution boards.</p>
Mid Term (6 Weeks)	<p>Provide two separate points earthing (grounding) provided for generator. Remove multi looping of cables at circuit breakers within distribution boards.</p> <p>Ensure underground service cables are not laid in conformity with the requirements of concealed wiring</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 between each phase and earth.</p> <p>Ensure switchboards and/or distribution boards are metal enclosed with a dead front construction.</p> <p>Provide earthing of equipment at required locations and connect to required number of electrodes. Refer to the BNBG for required number of electrodes.</p> <p>Provide dedicated neutral for each circuit.</p> <p>Ensure overcurrent protection device (circuit breaker) for each and every loads.</p>

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<p>Long Term (6 Months)</p>	<p>Have a qualified electrical engineer develop as-built electrical drawings providing detailing key components of the electrical system</p> <p>Consult with a qualified Electrical Engineer and ensure electrical wiring/cables are sized according to capacity of circuit breakers.</p> <p>Connect all metal in the building to the building earthing/grounding system such as metal rebar in concrete, metal frame of building, or metal water pipe.</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> <p>Ensure underground cables for electrical service connection in the premises are engaged in GI or PVC pipes and laid in earth trenches of sufficient depth.</p> <p>Provide cable sockets for stranded conductors having a nominal cross-sectional area 6mm<sup>2</sup> or greater.</p> <p>Provide capacity information labels (Maximum current rating, no of circuit breakers etc.) for Switchboards and/or distribution boards.</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>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 electrical maintenance program that includes inspections and testing of the electrical systems.</p>
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### The recommendations for Fire Safety corrective actions are:

<p>Immediate (3 to 6 Days)</p>	<p>Remove all combustibles stored underneath the cutting tables at the noted locations as soon as possible.</p>
<p>Short Term (3 Weeks)</p>	<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> <p>Aisles are required to be always free and to have minimum</p>

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	<p>clear width of 0.9 m. Remove existing aisle, if necessary, mark and draw new marking fulfilling the minimum aisle width requirement. Relocate the machines accordingly if necessary.</p> <p>Remove aisle marking and mark aisles again so that these are not blocked by any permanent element like column. Remove movable items that are blocking aisles. Satisfy total width requirement for aisles/corridor/ramp, stairway and exit door as per BNBC Part 4 Table 4.3.2 or Alliance Standard Part 6 Section 6.5.4.</p>
Mid Term (6 Weeks)	<p>Arrange for direct connection of the fire alarm system to a central monitoring station or Fire Service and Civil Defense. Until that time that monitoring can be set up, arrange a monitoring system using 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>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>Post emergency egress maps at the entrance to each exit stair or main point of egress as per Alliance Standards Part 13 Section 13.4 Evacuation Plan.</p> <p>Upon installation of compliant standpipe system, include required identification signs at the noted locations. Signage must comply with NFPA 14.</p> <p>Provide handrails on both sides of each stairway. Provide intermediate handrail when the stair width exceeds 2.2m (87 inch). Provide handrail of height between the range 865 mm (34 in.) and 965 mm (38 in.).</p> <p>Post the occupant loads for every assembly and production floor in a conspicuous space near the main exit or exit access doorway for the space.</p> <p>Install signage adjacent to each stair door indicating the stair name and the floor level at the noted locations.</p>
Long Term (6 Months)	<p>Remove existing gates and unrated doors at exit enclosures. Install approved fire rated doors that are listed, permanently labeled, automatic-closing, incompatible fire rated frames with latching hardware.</p> <p>Install automatic fire alarm system including a listed fire alarm control panel. Install smoke and heat detectors per NFPA 72. Automatic detectors should be tied into the fire alarm system. Alarm system should initiate occupant notification upon activation of detectors in addition to the manual fire alarm stations. Include listed pull stations at all entrances to exit stairs, and at all exits. Install strobes and horns for complete notification. Automatic area smoke detectors are required throughout G2 buildings per Section</p>

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	<p>5.7.3.6. All fire alarm installations shall be submitted for review by the Alliance for review prior to commencement of installation.</p> <p>Install a standpipe system at required locations designed by a qualified fire protection engineer. The system should be compliant with the requirements of NFPA 14. The hydraulic calculations should be reviewed by Alliance.</p> <p>Protect all egress stairs with a shaft enclosure including 2-hour fire-rated construction. Factory will need to install fire rated door assemblies at all exits (1.5 hour rating). Fire doors assemblies shall conform to NFPA 252, BS 476 Part 22, EN 1364-1, GB 12955-2008, or IS 3614. Part II. Doors must remain in closed position or be of self-closing type. 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.</p> <p>Install a fire pump dedicated for fire fighting or fire protection following the requirements of NFPA 20 as identified in Alliance Standard Section 5.5.1.</p> <p>Fire pump installation is to be tested for final acceptance in presence of Alliance representative and a final inspection of the installation shall be conducted by the Alliance representative 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 24 testing requirements.</p> <p>Replace existing exit doors with side hinged swinging type doors per Alliance Standards Part 6 Section 6.8 Doors and Gates.</p> <p>Install Illuminated exit signs at entrances to exits and 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>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>All penetrations through fire rated assemblies shall be protected/sealed with a listed through penetration fire stop system tested in accordance with ASTM E814. Confirmation should be provided that any materials used can conform to standard as per Alliance Standard Section 4.7 Penetrations..</p> <p>During installation of fire rated door assemblies assure that every door in a stair enclosure serving more than 5 stories is provided with re-entry unless it meets the requirements of Alliance Standards Part 6 Section 6.8.3.1.</p> <p>Upon installation of compliant standpipe system, fire department (Siamese) inlet connections should be installed to allow fire department pumper equipment to supplement</p>
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	<p>the fire protection systems. Fire department 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. Signage for standpipe system is not in compliance with NFPA 14 Chapter 6.</p> <p>Provide fire-resistive rated construction barriers between hazard types following Table 4.4.1 of 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>Install secure parapets or guards on roof with a minimum height of 1067 mm (42 in) Install guard rail at landing drops. New guards shall have a minimum height of 1067 mm (42 in.).</p> <p>Develop a hot work permit program. The program must comply with the requirements of NFPA 51B as per Alliance Standards Part 13 Section 13.4 Hot Work Permit and NFPA 51B.</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 as per Alliance Standards Part 13 Section 13.1 Fire Safety Director.</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. 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 (⅛ in.). As per Alliance Standards Part 13 Section 13.6 Housekeeping.</p> <p>Establish an inspection, testing, and maintenance program for the standpipe system. Program must comply with NFPA 25.</p>
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