

Summary of Preliminary Assessment on Structural, Fire and Electrical Safety

Name of the Factory	: Beaumonde Apparels LTD
Address of the Factory	: 68/x Sagarica Road, Pahartali, Chittagong.
Present Status of the Factory	: Under Operation
Structural assessment conducted by	: Alliance
Date of Structural Inspection	: 11-June-14
Fire & Electrical assessment conducted by	: Alliance
Date of Fire & Electrical Inspection	: 10-June-14
BGMEA Membership No	: 2687

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 : 102663 sft
- v. No. of Stories : Seven story
- vi. Construction Year : 1997~1999
- vii. Foundation Type : Individual footing.
- viii. Design Drawings : Available.
- ix. Soil investigation Report : Available
- x. Construction Materials : RCC brick chips.
- 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. It is recommended to produce as-built drawing with structural drawings (as far as possible based on reliable testing; for example, column reinforcement can be known by ferro-scanning). Since the building is founded on timber pile (as per report of the owner representative), it is of great concern considering the durability and capacity of such pile, although till now no sign of foundation settlement is
- iii. Designate a representative as the Factory Load Manager. The Factory Owner shall ensure that at least one individual, the Factory Load

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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. Under guidance from a qualified structural engineer arrange a detail engineering assessment of the main building within 6 weeks. The compressive strength of concrete should be verified via core testing conducted under the guidance of a qualified structural engineer.
- ii. As part of the detailed assessment outlined elsewhere via the column FoS question, assign a qualified structural engineer to determine the compressive strength of the concrete by core cutting test.
- iii. 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.
- iv. 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.
- v. 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
- vi. Engage a qualified structural engineer to confirm satisfactory structural performance of the buildings under wind loading.
- vii. Adequately anchor and brace all non-structural elements to resist earthquake forces to comply with the BNBC and Alliance Standard.
- viii. Have a qualified structural engineer develop Floor Loading Plans per the requirements of Part 8 Section 8.20.5.3.
- ix. 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.
- x. Provide signage or the appropriate markings at all areas used for storage to indicate the acceptable loading limits detailed in the Load Plan.

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:

<p>Immediate (3 to 6 Days)</p>	<p>Find out cause of overheating and take proper action including replacing conductor or equipment where necessary.</p> <p>Ensure the generator room is clean and free of dirt, debris, and improperly stored materials.</p>
<p>Short Term (3 Weeks)</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>Provide two separate points earthing (grounding) provided for generator.</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 disallows these fixtures. Install signs posted in Bengali and English, indicating this prohibition at all entrances to these areas.</p>
<p>Mid Term (6 Weeks)</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>In order to avoid the effects of heat from external sources one of the following methods should be used to protect wiring systems: (1) shielding; (2) placing 900 mm (36 in.) from the source of heat; (3) local reinforcement or substitution of insulating material.</p> <p>Ensure proper ventilation for the generator room.</p> <p>Remove multi looping of wiring/cables at circuit breakers within switchboards and/or distribution boards.</p> <p>Provide earthing for distribution boards as per BNBC and include panel door.</p> <p>Provide electrical insulation mats in front of distribution boards.</p>
<p>Long Term (6 Months)</p>	<p>Have a qualified electrical engineer design a lightning protection system(including calculation of risk index) according to the BNBC requirements. Have a licensed electrician install the designed system.</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>Provide cable shaft for the whole building. Wiring and cables are arranged in shaft for ease of inspection and maintenance.</p>

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	<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 & Rotating Equipment and NFPA70B or a comparable standard.</p> <p>Inspect electrical switchgear and panel boards on an annual basis to ensure that the equipment is in good working condition.</p>
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The recommendations for Fire Safety corrective actions are:

Immediate (3 to 6 Days)	<p>Keep means of egress continuously free and clear of all obstructions or impediments to full instant use in the case of fire or other emergency.</p> <p>Remove all combustibles stored underneath the cutting tables.</p>
Short Term (3 Weeks)	<p>Remove existing gates and doors in the means of egress including all locking devices. Install doors with approved panic hardware that cannot be locked in the direction of egress under any conditions.</p> <p>Remove all stored materials in the stairwells.</p> <p>Remove hazardous kitchen from the 7th floor of the main building.</p>
Mid Term (6 Weeks)	<p>Install a centralized automatic fire alarm and smoke/heat detection system with control panel following the requirement of NFPA 72 throughout all new and existing buildings and structures.</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>Verify emergency power for egress lights at least once per year. If battery operated lights are used, test them monthly. Perform annual functional testing of battery powered lights for at least 30 minutes. Ref. 10.12.2.3.</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>

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	<p>Impart training in accordance with Alliance Safety Training Curriculum and keep record with proper documentation.</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>Post emergency egress maps or fire evacuation maps at the entrance to each exit stairway or main point of egress.</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 minutes once per year.</p> <p>Complete fire department pre-planning activities with the local Fire Service and Civil Defense.</p> <p>Install signage adjacent to each stair door indicating the stair name and the floor levels.</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. Install required identification signs at the noted locations. Signage must comply with NFPA 14 Chapter 6.</p> <p>Apply to Chittagong Development Authority (CDA) for issuance of occupancy certificate and pursue the matter to expedite.</p>
<p>Long Term (6 Months)</p>	<p>Train at least 25 percent of workers in fire fighting, first aid, and rescue by the proper authority.</p> <p>Provide opening protectives at all windows and other openings on all the fire rated walls across the entire premises. Close these openings if they are not required.</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 pipe. All systems shall be hydraulically calculated to meet the required NFPA 13 design requirements. Installation of new automatic sprinkler systems shall be required to provide shop drawings and hydraulic calculations as outlined in NFPA 13. The test and performance report of the installed system has to be submitted to Alliance for review. Final inspection and testing shall be witnessed by Alliance according to clause</p>

	<p>5.3</p> <p>Install dedicated fire pump 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 of the installation. 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.</p> <p>Provide an automatic fire alarm and detection system per the Alliance Standard. Pull stations at egress points, smoke detectors in air handling equipment, visual and audible devices must be spaced appropriately based on occupancy type in accordance with NFPA 72.</p> <p>Construct an exit passageway to provide a protected egress path from the stairs to an exterior exit discharge. Walls, floors and ceilings of the passage shall be 2 hour fire rated, equal to the stair. Ref. 6.15.3.</p> <p>Replace all collapsible, sliding, roll-down gates and shutters in means of egresses with side-hinged swinging type doors of proper width and rating.</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 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. Standalone standpipe systems shall meet the local BNBC requirements with a minimum 450 kPa (65 psi) pressure at the hydraulically most remote hose connection or NFPA 14. 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.</p> <p>Provide 2 hour fire-resistive rated construction barriers at exit enclosures. Fit outward opening, side-swinging, self-closing, non-lockable fire doors of 1.5 hr rating in all stairwell enclosures. Consult a qualified fire protection engineer to design the required rated construction barriers.</p> <p>Remove existing aisle marking and draw new marking fulfilling the minimum aisle width requirement. Relocate the machines accordingly if necessary.</p> <p>Consult a structural expert to assess the condition of the structure. Repair the crack of the slab and beam following instructions of the expert.</p> <p>Install fire department connections where required and in compliance with the Standard. Fire department outlet connections shall be provided to allow fire department pumper vehicles to draw water from ground-level or</p>
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	<p>underground water storage tanks. Connections shall match the Fire Service and Civil Defense hose thread standard.</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 appropriate means of illumination at the noted locations. Illumination shall be a minimum of 10 lux for all corridors, exit doors and stairways. Illumination for aisles shall be a minimum of 2.5 lux.</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>Provide handrails on both sides of each stairway. Provide intermediate handrail when the stair width exceeds 2.2 m (87 inch).</p> <p>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 re-entry floor using the above requirements, re-entry does not have to be provided back into the building on this level.</p> <p>Fire extinguishers are to be inspected, tested, and maintained in accordance with NFPA 10 Chapter 7.</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.</p> <p>Select fire extinguishers based on potential fire class and hazards following NFPA 10 Chapter 5. Timber, Bamboo, coal, paints and similar combustible materials shall be kept separated from each other. A minimum of two dry chemical powder (DCP) type fire extinguishers shall be provided at both open and covered locations where combustible and flammable materials are stored as per clause 9.9. In a store of inflammable and/or fire-sensitive materials a 5 kg dry powder fire extinguisher conforming to accepted standards shall be kept at an easily accessible position. For electrical equipments, carbon dioxide type extinguishers is required. Foam type extinguisher is required in boiler rooms.</p> <p>Repave the walking surface to make the slope of the surface 1 in 2 and keep change in elevation less than 1/2 inch.</p> <p>Provide an emergency power source, either by battery backup or by connecting to the emergency power system,</p>
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	<p>for compliantly illuminated exit signs.</p> <p>Provide parapets or guards for all occupied roofs of a minimum height of 1067 mm (42 in.).</p> <p>Install class I standpipe system at required locations designed by a qualified fire protection engineer. The system is to be compliant with the requirements of NFPA 14. Then establish an inspection, maintenance, and testing program for the standpipe and hose system. Program must comply with the requirements of NFPA 25 Chapter 6 Table 6.1.1.2.</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 watch and fire fighting equipment, sounding of alarm procedure, duration and expiry of permit and re-approval procedure etc.</p> <p>Make sure all required exit signs are illuminated continuously at all times. Exit signs may be illuminated either by lamps external to the sign or by lamps contained within the sign. The source of illumination shall provide not less than 50 lux at the illuminated surface with a contrast of not less than 0.5. Approved self-luminous signs which provide evenly illuminated letters having a minimum luminance of 0.2cd/m² may also be used.</p>
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