

Summary of Preliminary Assessment on Structural, Fire and Electrical Safety

Name of the Factory	: Angel Sweater (Bd.) Ltd.
Address of the Factory	: Matail Dakinpara, Hasem Road, Jatrabari, Dhaka, Bangladesh.
Present Status of the Factory	: Under Operation
Structural assessment conducted by	: Alliance
Date of Structural Inspection	: 7-April-15
Fire & Electrical assessment conducted by	: Alliance
Date of Fire & Electrical Inspection	: 7-April-15
BGMEA Membership No	: 4555

BASIC INFORMATION:

This factory is a three storied RCC building in the factory. The following general information was noted:

i.	Building Usage Type	: Garments Factory
ii.	Structural System	: The structural system of main production building is RCC Beam-Column frame system
iii.	Floor System	: RCC Structure
iv.	Floor Area	: 23,063 SF
v.	No. of Stories	: Three story RCC building
vi.	Construction Year	: 2005-2007
vii.	Foundation Type	: foundation system is isolated
viii.	Design Drawings	: Available.
ix.	Soil investigation Report	: Available.
x.	Construction Materials	: Reinforced Concrete
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 : 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.

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- iii. Prior to further construction beyond the current 3-story configuration, the compressive strength of concrete for the columns in the main building should be verified via core testing conducted under the guidance of a qualified structural engineer. This testing should focus on determining the in-situ concrete compressive strength of structural elements.

Mid Term (6 Weeks)

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- i. 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
- ii. Have a qualified structural engineer prepare credible as-built documents based on the requirements of Part 8 Section 8.19 of the Alliance Standard.
- iii. 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.
- iv. "Engage a qualified structural engineer to confirm satisfactory structural performance of the buildings under wind loading."
- v. Adequately anchor and brace all non-structural elements to resist earthquake forces to comply with the BNBC and Alliance Standard.
- vi. Under guidance from a qualified structural engineer, address all areas of needed maintenance by correcting the identified issues.
- 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. 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. 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.
- ii. Provide Certificates of Occupancy for review.

The recommendations for Electrical Safety corrective actions are:

Immediate (3 to 6 Days)	Provide a protective cover for every lighting fixture in permanent or temporary store rooms. Remove all unnecessary materials from the Generator Room and keep the room clean.
Short Term (3 Weeks)	

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Mid Term (6 Weeks)	<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>Remove tables, machines and stored clothes from in front of distribution boards to ensure proper clearance. Relocate the distribution boards if necessary.</p> <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.</p> <p>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>Access way to the panels shall be kept clear by removing any clothes/machines/working table placed in front of panels.</p> <p>Consult a qualified engineer to design the ventilation system for the Generator Room based on installed equipment.</p> <p>Provide covered metallic cable tray for protection and support of the cables inside Generator Room.</p> <p>Disconnect the panel from the electrical service and clean interior components of all dust and debris. Seal all openings within the enclosure to prevent dust and debris from entering.</p> <p>Install an additional busbar for earthing connections and provide appropriate sized cables.</p> <p>Provide permanent identification marking mentioning name of panels (i.e. SDB-1, Sewing Floor or write the panel name of the shown picture) on a durable material sheet posted on panels door.</p> <p>Provide a capacity information label which contains the current carrying capacity and size of main cable, rated capacity of circuit breaker and the busbar (with dimension).</p> <p>Display panel schedules posted on panels door (inner side).</p> <p>Provide identification/tagging mentioning the equipment/machines name (i.e. Sewing Machine Line-1 or Lighting Line-2) and the type of conductor (i.e. L1, L2, L3, N, PE) for every cable at its termination point, or maintain the color-code at its termination point (providing colored cable-sleeves) for identification of conductor-type (i.e. Red/Yellow/blue for phase cable, Black for neutral cable, Green for earthing cable). (Labeling-cable-tie/Marker-tie can be used for cable identification).</p> <p>Provide covers or blanks to conceal all live internal components of switchboards and/or distribution boards.</p> <p>Provide indicator lamps as needed.</p> <p>Provide additional light fixtures inside the Generator Room so that a minimum of 150 lux is present inside the room.</p> <p>Provide a minimum of 1.07 m clearance on all sides of the generator for proper maintenance and inspection.</p> <p>Remove rust from inside electrical panels. Replace cable sockets, lugs, nuts and bolts as required.</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 (1.6.3.7) Part 53 disallows these fixtures. Install signs</p>
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	<p>posted in Bengali and English, indicating this prohibition at all entrances to these areas.</p> <p>Exhaust gas must be discharged at place where there is no detrimental effect to the people or passerby. Install a longer exhaust pipe (upward) to release the exhaust gas at safe location (altitude).</p> <p>Provide electrical graded rubber mats with the specifications of 650 V-protection and required area (accommodating at least two people or depending on the panels length).</p> <p>Provide proper support for the light fixtures from structure.</p> <p>Provide seismic bracing so that the fixtures do not move during an earthquake.</p> <p>Provide meters and indicator lamps where necessary using appropriate protective device.</p>
<p>Long Term (6 Months)</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>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>Provide required life safety loads (emergency light, exit signage and fire alarm) and connect them to the emergency power system according to BNBC Standard.</p> <p>Calculate and display the information of the capacity & panel-schedule of the distribution boards and then provide a physical means to prevent the installation of additional circuit breakers.</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 UPS/IPS to power life safety loads as required.</p> <p>Have a qualified electrical engineer design a lightning protection system according to the BNBC requirements.</p> <p>Have a licensed electrician install the designed system.</p> <p>Provide an individual circuit breaker for all outgoing circuits and use an individual cable for all circuit breaker inputs to avoid multi looping.</p> <p>Move the panel at least 8 feet from the washing machine to avoid any hazard that could be caused by wet surroundings.</p> <p>Provide a cable socket for all the cables terminating in the bus bar or circuit breaker according to the cable size. The rusty components must be replaced with new ones to maintain proper electrical connectivity.</p> <p>Establish a periodic inspection program to ensure the</p>

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	<p>electrical systems are free from damage, debris, dirt, lint, etc. Maintain records concerning inspections and follow up actions.</p> <p>Check all the panels for the single phase circuit that has not been provided with a dedicated neutral cable with the same size cable as the respective phase cable. All cables shall be terminated in the busbar providing an individual socket.</p> <p>Establish a routine maintenance and testing program for the emergency generator. The program shall be based on all of the following:</p> <ol style="list-style-type: none"> (1) Manufacturer's recommendations (2) Manufacturer's Instruction manuals (3) Requirements of NFPA 110 Chapter 8. <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>Provide cable joints with cable socket, with PIB tape wound around joint.</p> <p>Install phase separators between terminal connections.</p> <p>Verify phase separators are installed at all remaining locations.</p>
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The recommendations for Fire Safety corrective actions are:

Immediate (3 to 6 Days)	
Short Term (3 Weeks)	Keep the doors lock free in the direction of egress under any conditions. All hasps, locks, slide bolts and other locking devices shall be removed where provided.
Mid Term (6 Weeks)	<p>Post emergency egress map at the entrances to each exit stair or main point of egress.</p> <p>Post the occupant load for every assembly and production floor in a conspicuous space near the main exit or exit access doorway for the space.</p> <p>Conduct fire drill on a quarterly basis as outlined in BNBC Part 4 Appendix A.</p> <p>Develop a testing and maintenance program that ensures the operation of all means of egress lights are 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 performed for a minimum 90 min once per year.</p> <p>Collect all applicable permits and licenses and keep up to date including boiler license and waiver certificate from BERC.</p>

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Long Term (6 Months)	<p>Provide required fire rated doors in all exits. Fire door shall be of the side hinged, swinging, self-closing type and shall swing in the direction of egress. New doors shall have a minimum clear width of 1.0 m (39 in.). Consult a qualified fire protection engineer to design the fire rated door.</p> <p>Consult a qualified fire protection engineer to design the fire alarm system with the pull stations at egress points, centralized and addressable smoke detectors all through the building, and visual and audible devices spaced appropriately based on occupancy type. Reference NFPA 72.</p>