

Summary of Preliminary Assessment on Structural, Fire and Electrical Safety

Name of the Factory	: Bengal Hurricane Dyeing & Printing (Pvt.) Ltd.
Address of the Factory	: B.K Bari, Taltoli, Mirzapur, Gazipur.
Present Status of the Factory	: Under operation.
Structural assessment conducted by	: Alliance
Date of Structural Inspection	: 02-Sep-14
Fire & Electrical assessment conducted by	: Alliance
Date of Fire & Electrical Inspection	: 02-Sep-14 and 24-Nov-14
BKMEA Membership No	: 736

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 : Main building-1 : RCC , Beam-Slab
Main building-2 : Steel Structure.
- iii. Floor System : Main building-1 : RCC slab.
Main building-2 : Deck slab.
- iv.
- v. Floor Area : 85,495 sft
- vi. No. of Stories : 1) Main building 1: 6 stories (Ground floor+5)
2) Main building 2: Single story shed with mezzanine.
- vii. Construction Year : Main building-1 : 2007 to 2009
Main building-2 : 2002 to 2003
- viii. Foundation Type : Isolated footing
- ix. Design Drawings : Available.
- x. Soil investigation Report : Available
- xi. Construction Materials : RCC brick chips.
- xii. Generator : Ground floor (Separate building)

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

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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. Have a qualified structural engineer document compliance with the seismic and wind requirements stated in the 2006 BNBC.
- ii. Have a qualified structural engineer complete an analytical evaluation of the structural impact of the addition.
- iii. 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.
- iv. 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
- v. Engage a qualified structural engineer to confirm satisfactory structural performance of the buildings under wind loading.
- vi. Adequately anchor and brace all non-structural elements to resist earthquake forces to comply with the BNBC and Alliance Standard.
- vii. Have a qualified structural engineer develop Floor Loading Plans per the requirements of Part 8 Section 8.20.5.3.
- viii. 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.
- ix. 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 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.
- ii. Apply for issuance of the Certificates of Occupancy and pursue the matter to obtain the same.

The recommendations for Electrical Safety corrective actions are:

Immediate (3 to 6 Days)	Find out cause of overheating and take proper action including replacing conductor or equipment where necessary.
Short Term (3 Weeks)	Install two separate and distinct earth connections for each generator frame with properly sized conductor with approved earth continuity. Develop and implement an electrical safety program. Include

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	<p>key topics including lock-out tag-out procedures, personal protective equipment requirements, etc. Reference NFPA 70e for example program requirements.</p> <p>Remove light fixtures without protective covers from storage areas etc. Install light fixtures with protective covers inside the general store room.</p>
Mid Term (6 Weeks)	<p>Survey all the wires and circuit breakers and identify wires rated lower than the circuit breakers serving them. Install properly rated wires sized according to the capacity of the circuit breakers. The rated current of a protective device (MCB, MCCB, fuses) shall not exceed the current carrying capacity of any conductor in the circuit.</p> <p>Remove multi looping of wiring/cables at circuit breakers within switchboards and/or distribution boards.</p> <p>Install identification/tagging describing the equipment/machine name (i.e. Pump-01) and type of conductor (i.e. L1, L2, L3, N, PE) for every protective device and cable. Maintain color-code at cables termination point and bus bar (providing colored heat 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>Install individual neutral connection, same as respective phase cable-size, for each single phase circuit.</p> <p>Have a qualified electrical engineer develop as-built electrical drawings providing detailing key components of the electrical system.</p>
Long Term (6 Months)	<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>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>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>

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The recommendations for Fire Safety corrective actions are:

Immediate (3 to 6 Days)	N/A
Short Term (3 Weeks)	Keep the means of egress doors lock free in the direction of egress under any conditions. All hasps, locks, slide bolts, and other locking devices shall be removed.
Mid Term (6 Weeks)	<p>Install a new automatic fire alarm and detection system in accordance with Alliance Standard and NFPA 72. Once installed, arrange for direct connection of the fire alarm and detection system to a central station monitoring service or the Fire Service and Civil Defence 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 Defence can be set up, a person trained to contact the Fire Service and Civil Defence in the event of fire alarm activation shall be provided. An annunciator shall be located in a constantly attended location (such as a fire control room) to alert this person.</p> <p>Develop an emergency evacuation plan which includes all components required by the Alliance Standards and communicate the plan to all employees.</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>Post the occupant loads for every assembly and production floor in the facility in a conspicuous space near the main exit or exit access doorway for the space.</p> <p>Training programs need to be implemented and documented in accordance with the Alliance Safety Training Curriculum.</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 provided for a minimum 90 min once per year.</p> <p>Complete fire department pre-planning activities with the</p>

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	<p>local Fire Service and Civil Defence.</p> <p>Provide stair designation signs at each floor entrance from the stairs to the floor in English and Bengali. Signs shall be indicating the name of the stair and the floor level. Signs shall be posted adjacent to the door.</p> <p>Apply to appropriate authority in an expeditious manner for issuance of the Certificates of Occupancy for each building and ancillary structure according to building use.</p>
<p>Long Term (6 Months)</p>	<p>All steel sliding door, steel rolling shutter and collapsible gates in the means of egress shall be replaced with required fire rated side-hinged swinging self closing type doors that swing in the direction of egress as per Alliance Standard Section 6.8. Doors shall be free from general locking arrangement.</p> <p>Evaluate the capacity and adequacy of the existing fire pump to determine if it can supply the required installation of standpipes. If necessary, Install a dedicated fire pump for the facility in accordance with NFPA 20 to supply the demands of the connected fire protection systems along with a stored source of water sufficient to meet the demands in accordance with NFPA 22. 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 installation shall be in accordance with NFPA 20, 22, and 25 testing requirements. Documentation of all testing shall be submitted to the Alliance for review prior to final acceptance by the Alliance.</p> <p>Provide 2-hour fire-resistive rated construction barriers at exit enclosures with 1.5-hour fire-rated opening protection (Door, window, etc.). The new fire rated door shall be side-hinging, swinging, with auto closure and without locking arrangement. Consult a qualified fire protection engineer to design the required rated construction barriers with opening protection.</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.). Devices should be part of an automatic fire alarm and detection system for the facility. All fire alarm installations shall be submitted for review by the Alliance prior to commencement of installation.</p> <p>Modify or install the standpipe system (class-III) to meet the requirements of Alliance Standard's Section 5.4. Consult a qualified fire protection engineer before modify or installing a new system as per NFPA 14.</p> <p>Provide 1.5 hr fire rated door for all exit enclosures. Fire door shall be of the side-hinged, swinging, self-closing type and shall swing in the direction of egress. Door shall have a minimum clear width of 1.0 m (39 in.). Consult a qualified</p>

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	<p>a fire protection engineer to design the fire rated door.</p> <p>Provide fire-resistive rated construction barriers between hazard types in accordance with Alliance Standard Sections 3.4 and 4.5. Consult a qualified fire protection engineer to design the required rated construction barrier.</p> <p>Install handrails on both sides of the stairs. A minimum height of 865 mm (34 in.) and a maximum height of 965 mm (38 in.) as measured from the leading edge of the tread need to be maintained when installing new handrails. The spacing between vertical members shall not exceed 200 mm (8 inch) up to a height of 865 mm (34 inch).</p> <p>During installing fire door, provide re-entry provisions for doors in each stair enclosure that serves more than 5 stories in accordance with the Alliance document Section 6.8.3. Re-entry floor and door shall be marked with proper signage.</p> <p>Provide parapet in every occupiable roofs with same fire rating of outer wall of the building and a minimum height of 1067 mm (42 in.).</p> <p>Provide directional signs where there is a change in the direction for the path of travel and the direction to an exit is not obvious.</p> <p>Establish an inspection, testing and maintenance program for all fire extinguishers. Program must comply with the requirements of NFPA 10. Provide and maintain proper documentation.</p> <p>Provide proper marking for Fire Department Connections.</p> <p>Establish an inspection, testing and maintenance program for the standpipe and hose system. Program need to be complying with the requirements of NFPA 25.</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.</p> <p>Develop a hot work permit program. The program must comply with the requirements of NFPA 51B.</p> <p>Establish an inspection, testing and maintenance program for the fire pump after installing the fire pump and conduct. Program needs to comply with NFPA 25. Trained the worker on proper operation of fire pump.</p>
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