

Summary of Preliminary Assessment on Structural, Fire and Electrical Safety

Name of the Factory	: ABC International
Address of the Factory	: 134 Vatulia, Nishat Nagor Ashulia main road, Turag, Kamarpara, Dhaka.
Present Status of the Factory	: Under Operation
Structural assessment conducted by	: Alliance
Date of Structural Inspection	: 9-Sep-14
Fire & Electrical assessment conducted by	: Alliance
Date of Fire & Electrical Inspection	: 19-Feb-14

BASIC INFORMATION:

The present garment factory is a 02 storied building with occupied roof. The following general information was noted:

- i. Building Usage Type : Garments Factory.
- ii. Structural System : Reinforced concrete Column-Beam moment resisting frame in some part of building and brick wall working as load bearing in rest part.
- iii. Floor System : Reinforced concrete Beam-Slab Floor supported by Column and Reinforced concrete Slab supported by brick wall for ground floor
- iv. Floor Area : 9,128 sft.
- v. No. of Stories : 02 storied with occupied roof.
- vi. Construction Year : 2007
- vii. Foundation Type : Spread Column Footing and Brick foundation...
- 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

Summary of Preliminary Assessment on Structural, Fire and Electrical Safety

do not at any time exceed the factory floor load limits as described on the Floor Load Plans.

- iii. Conduct Ferro-scanning to confirm the reinforcement and prepare as-built drawing as per construction. Also engage a competent body for detailed analysis.

Mid Term (6 Weeks)

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- i. Engage a qualified structural engineer to provide additional investigation into the areas of distress, separations, or cracking and provide a remediation plan if required.
- ii. Engage a qualified structural engineer to provide additional investigation into the areas of distress, separations, or cracking and provide a remediation plan if required.
- iii. Have a qualified structural engineer provide further analysis and testing of the noted settlement and crack issues. If required, a remediation plan shall also be provided by the qualified structural engineer.
- iv. Engage a qualified structural engineer to confirm satisfactory structural performance of the building under vertical loads and adopt remedial action accordingly.
- v. Adequately anchor and brace all non-structural elements to resist earthquake forces to comply with the BNBC and Alliance Standard.
- vi. 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.
- 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. Assign 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.
- ix. Assign a qualified structural engineer to prepare document in compliance with the seismic and wind requirements stated in the 2006 BNBC.
- x. Assign a qualified structural engineer to confirm satisfactory structural performance of the buildings under wind loading and storm surge loading. Prepare document in compliance with the requirements stated for wind loading and storm surge loading as detailed in BNBC Part 6 Section 1.5.3.
- xi. Under guidance from a qualified structural engineer, address all areas of needed maintenance by correcting the identified issues.
- xii. Engage a qualified structural engineer to confirm satisfactory structural performance of the building under lateral loads.
- xiii. Assign a qualified structural engineer assesses the durability aspects as suggested in Alliance Standard Part 7 Section 7.2 and take appropriate remedial measures.
- xiv. Assign a qualified structural engineer to prepare credible as-built documents based on the requirements of Part 8 Section 8.19 of the Alliance Standard.
- xv. Have a qualified structural engineer develop Floor Loading Plans per the requirements of Part 8 Section 8.20.5.3

Summary of Preliminary Assessment on Structural, Fire and Electrical Safety

- xvi. 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.
- xvii. Provide signage or the appropriate markings at all areas used for storage to indicate the acceptable loading limits detailed in the Load Plan.
- xviii. Under guidance from a qualified structural engineer, address all areas of needed maintenance by correcting the identified issues.

Long Term (6 Months) :

- 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. Implement proper drainage slope.
- ii. Retrofitting is recommended as per assessment
- iii. Obtain an occupancy certificate for each building and ancillary structures from the approving government authority.

The recommendations for Electrical Safety corrective actions are:

Immediate (3 to 6 Days)	Determine the cause of overheating, overloading or burning. Engage a licensed electrician or electrical contracting firm to help rectify issues. Provide light fixtures in storage areas with protective covers.
Short Term (3 Weeks)	
Mid Term (6 Weeks)	Emergency power sources should be provided for all kind of emergency loads. 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. Move embroidery machine so that there is at least 1 m clearance in front of all distribution panels for easy operation and maintenance. Access to all electrical panels must be kept obstacle free. Provide earth connection to motor frame with required sized earth cable. Provide permanent identification markings including the name of panels (i.e. DB-1, Production Floor) on a durable material sheet posted on the panel door. 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 dimensions). Display panel schedules posted on the panel door (inner side).

Summary of Preliminary Assessment on Structural, Fire and Electrical Safety

	<p>Provide identification/tagging mentioning the equipment/machines name (i.e. Sewing machine line-1 or Lighting line-2) and 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>Disconnect the panel from the electrical service and clean interior dust and debris of each panel. Fit cable glands in the base plate/top plate of each electrical panel for cable entry or exit and seal all the unused openings of the panel's enclosure to prevent the ingress of lint, dust and vermin into it. Establish a routine cleaning program to keep the panel neat and clean.</p> <p>Generator body must have two separate and distinct earth connections with 35 sq.mm conductors.</p> <p>Cover the unused openings with metal sheet and make circular holes into it, then fit required sized cable glands into the holes according to the respective cables to be passed through it.</p> <p>Provide a properly sized earthing connection to the changeover switch. Also, provide earthing connection to panel boards with flexible copper braid.</p> <p>Motor input cable laid on floor must be carried in steel pipe to protect it from physical damage due to falling objects or being stepped on by occupants.</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 posted in Bengali and English, indicating this prohibition at all entrances to these areas.</p> <p>Provide firefighting equipment(preferably ABCE type) inside the generator room.</p> <p>Install measuring devices (Ammeter and Voltmeter) and indicator lamps on all electrical panel doors for easy monitoring and safety operation.</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 length of the panel).</p>
Long Term (6 Months)	<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.</p>

Summary of Preliminary Assessment on Structural, Fire and Electrical Safety

	<p>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>Relocate the embroidery machine or the electrical panel so that easy access is available to the main switch.</p> <p>Relocate the embroidery machine or the electrical panel so that easy access is available to the main switch.</p> <p>Separate the multiple cables by using individual cables from the bus bar to MCB input or using lugs in bus bar for MCB input to avoid loose connection.</p> <p>Engage a licensed electrician or electrical contracting firm to rectify all non conforming and unsafe grounding electrical works throughout the entire complex.</p> <p>Assign a qualified engineer to design fire rated separation for the generator room. Fire barrier material shall meet the testing requirements of ASTM E 119 and NFPA 221. Provide a separate room for the generator as well.</p> <p>Select the cables and protective devices so that the rated current of a protective device shall not exceed the current carrying capacity of a conductor in the circuit.</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 & Rotating Equipment and NFPA70B or a comparable standard.</p> <p>Establish a periodic inspection program to ensure the electrical systems are free from damage, debris, dirt, lint, etc. Maintain records concerning inspections and follow up actions.</p> <p>Cables must be terminated into Circuit Breaker (MCCB) and busbar with lugs. Choose lugs/sockets respective to the cable size. The lugs must be punched with proper "Hand Puncher or Hydraulic Puncher".</p> <p>Provide individual neutral connections same as the respective phase cable size for all single-phase loads. The number of neutral connections in neutral bus bar must be same as the number of single-phase circuit breakers.</p> <p>Cables must be terminated into bus-bar (changeover pole) with lugs. Choose lugs/sockets respective to the cable size. The lugs must be punched with proper "Hand Puncher or Hydraulic Puncher".</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</p>
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Summary of Preliminary Assessment on Structural, Fire and Electrical Safety

	<p>tests shall be made between open contacts of circuit breakers, switches etc. and between each phase and earth.</p> <p>Inspect electrical switchgear and panel boards on an annual basis to ensure that the equipment is in good working condition.</p> <p>Use PVC connectors with PIB tape wound around the joint and provide a junction box with every cable joint.</p> <p>The overhead service connection must be laid through roof pole or service mast made of GI pipe at least 38mm diameter having a goose neck bend at the top and installed on the outer wall. The cable must be carried in conduit when passing through wall.</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>Establish an inspection testing and maintenance program for the Uninterruptable Power Supply (UPS) and associated components. The program must based on the following:</p> <ol style="list-style-type: none"> (1) Manufacturer's recommendations (2) Manufacturer's instruction manuals (3) Applicable codes.
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The recommendations for Fire Safety corrective actions are:

Immediate (3 to 6 Days)	
Short Term (3 Weeks)	Remove all hasps, locks, slide bolts and other locking devices from doors in the path of egress. Install panic / push bar or single action lever handle to all doors in the path of egress. All locking devices shall not restrict door operation from the direction of egress.
Mid Term (6 Weeks)	<p>Develop and execute an emergency evacuation plan which includes all necessary components required by the Alliance Standards. Provide sufficient communication and training of this plan to all employees.</p> <p>Occupant load signage should be posted for every assembly and production floor, at a conspicuous space near the main</p>

Summary of Preliminary Assessment on Structural, Fire and Electrical Safety

	<p>exit or exit access doorway for the space.</p> <p>Modify or install the standpipe system to meet the requirements of BNBC 2006, Part 4 Chapter 4 Equipment and In-built Facilities with a minimum pressure of 29 psi/200 kPa/2 Bar at the hydraulically most remote hose connection. Number of hose connection in a floor shall comply with the requirement of BNBC 2006. Once new standpipe system is installed, establish an inspection, testing and maintenance program for the standpipe and hose system. Program shall comply with the requirements of BNBC 2006, Part 4 Chapter 4 Section 4.2.7 Inspection, testing and maintenance. The system shall be maintained for safe operating conditions and tested at least once per year. Consult a qualified fire protection engineer before modify or installing a new system. Also install identification signs at required locations.</p> <p>Modify or install the standpipe system to meet the requirements of BNBC 2006, Part 4 Chapter 4 Equipment and In-built Facilities with a minimum pressure of 29 psi/200 kPa/2 Bar at the hydraulically most remote hose connection. Number of hose connection in a floor shall comply with the requirement of BNBC 2006. Once new standpipe system is installed, establish an inspection, testing and maintenance program for the standpipe and hose system. Program shall comply with the requirements of BNBC 2006, Part 4 Chapter 4 Section 4.2.7 Inspection, testing and maintenance. The system shall be maintained for safe operating conditions and tested at least once per year. Consult a qualified fire protection engineer before modify or installing a new system. Also install identification signs at required locations.</p>
Long Term (6 Months)	<p>Install side-hinged swinging type door with the necessary fire resistance rating of 1 1/2 hours including door hardware relating the specific position requirements. Position the door so it shall open in the direction of egress without obstructing other paths of egress.</p> <p>Install an automatic fire detection alarm system throughout the factory in accordance with NFPA 72; including pull stations at each exit and automatic smoke detectors spaced in accordance with NFPA 72.</p> <p>The generator shall be separated from the surrounding occupancy with a minimum 2 hour fire rated construction with 1.5 hour fire rated opening protection. This separation will need to be constructed to provide egress protection.</p>

Summary of Preliminary Assessment on Structural, Fire and Electrical Safety

	<p>Install new dedicated fire pump in accordance with BNBC 2006 Part 4 Chapter 4 Section 4.2.6 Fire pump, to supply the water demands for the fire protection systems along with a stored source of water. Once new fire pump is installed, establish an inspection, testing, and maintenance program for the fire pump. Program shall comply with the requirements of BNBC 2006 Part 4 Chapter 4 Section 4.2.7 Inspection, testing and maintenance. The system shall be maintained for safe operating conditions and tested at least once per year.</p>
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