

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

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Name of the Factory	: <b>Beximco Group.</b>
Address of the Factory	: Beximco Industrial Park, Sarabo, Kashimpur, Gazipur, Dhaka, Bangladesh.
Present Status of the Factory	: <b>Under Operation</b>
Structural assessment conducted by	: Alliance
Date of Structural Inspection	: 17-June-14
Fire & Electrical assessment conducted by	: Alliance
Date of Fire & Electrical Inspection	: 12-June-14

### **BASIC INFORMATION:**

There are 31 buildings in the factory premises out of which ten are main production buildings and twenty one are ancillary buildings. 1)Beximco Woven and Textile prefab shed (BTL),(2) Beximco Denim prefab shed (BDL),3) Beximco Knitting prefab shed (BKL),4) Beximco Printing prefab shed (BPL),5) CFDL and BAL-Production building,6) Esses Fashion Limited (EFL),7) International Knitwear and Apparels Limited (IKAL-U-2),8) International Knitwear and Apparels Limited (IKAL-U-2),9) New Dacca Industrial Ltd (NDIL),10) Freshtex BD pvt. Ltd.11)Turbine-1 building,12) Turbine-2 shed,13) Boiler-1 building,14) Boiler-2 building,15) Generator-1 building,16) Generator-2 shed,17) Security post -1,18) Security post- 2,19) Mosque ,20) Staff residence building,21) Officer residence building,22) Foreigner residence building,23) Guest house building,24) Corporate office shed,25) Temporary dining shed,26) Store shed,27) Finished goods store shed,28) Worker dining shed ,29) Medical & childcare shed,30) Warehouse shed,31) Dining shed (Building 20,21,22,23 were not in the audit scope). The following general information was noted:

- i. Building Usage Type : Garments Factory
- ii. Structural System : 01. NDIL: Structural system of this building is steel frame. Top floor is made of steel shed supported with RCC columns. Overall building frame is monolithic beam slab system supported with RCC columns. 03. IKAL - 1: This building is RCC column supported steel truss shed.. Regular framing. 04. IKAL - 2: This building is a RCC column supported steel truss shed. Regular framing. 05. EFL: This building is a RCC column supported steel truss shed.
- iii. Floor System : RCC beam column & slab system & Steel structure
- iv. Floor Area : 1,209,332 sft
- v. No. of Stories : 1)Beximco Woven and Textile shed:(Above grade: 1,below grade:0),2)Beximco Denim shed:(Above grade:1,below grade:0),3)Beximco Knitting shed:(Above grade:1,below grade:0),4)Beximco Printing shed:(Above grade:1,below grade:0),5)CFDL main production building:(Above grade:5,below grade:1),6)Production shed (Esses):(Above grade:1,below grade:0),7)Production shed (IKAL-1):(Above grade:1,below grade:0),8)Production shed(IKAL-2):(Above grade:1,below grade:0),9)Production shed (NDIL):(Above grade:1,below grade:0),10)Production shed(Frestex):(Above grade:1,below grade:0),11)Staff residence building:(Above grade:5 below grade:0),12)Officer residence building:(Above grade:5, below grade:0),13)Foreign resident building:(Above grade:5, below grade:0),14)Guest house building: (Above grade:3,below grade: 0),15 Dining shed (Esses):(Above grade:2, below grade:0),Remaining sixteen buildings are single story

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

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vi. Construction Year	: 1)Beximco Woven and Textile shed, Beximco printing, CFDL production building, Boiler-1 building, Turbine-1 building, Generator-1 building:2007,2)Beximco Denim shed & Knitting shed:1995, 3)Production shed(Esses), Production shed(IKAL-1), Production shed(IKAL-2), Production shed(NDIL), Production shed(Frestex):2013, 4)Turbine-2 shed, Boiler-2 building, Generator-2 shed:2008,5) Security post-1:2009,6)Security post- 2:2009,7)Mosque building:2010,8)Staff residence building:2010,9)Officer residence building:2010,10)Foreigner residence building:2010,11)Guest house building: 2012,12)Corporate office shed:2006,13)Temporary dining shed (NDIL):2012,14)Store shed(NDIL):2011,15)Finished goods store shed CFDL): 2012,16)Worker dining shed(CFDL):2012,17)Medical & childcare shed (CFDL): 2010,18)Warehouse shed (Esses):2011,19)Dining shed (Esses):2012.
vii. Foundation Type	: Isolated footing
viii. Design Drawings	: Available.
ix. Soil investigation Report	: Available.
x. Construction Materials	: Reinforced Concrete& steel
xi. Generator	: Ground Level

### **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 loading limits as described on the Floor Loading Plans.
- iii. Verify in-situ concrete stresses by 100mm dia. cores from four columns."

Mid Term (6 Weeks) :

- i. The "Engage a qualified structural engineer and carry out detail structural assessment, for CFDL only, to identify what remedial action is appropriate, which may include retrofitting. For Freshtex building, engage a qualified structural engineer to confirm the capacity of the existing mezzanine floor portion of the shed."

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

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- ii. "The recommendations suggested in the Previous Structural Assessment shall be completed.
  - 1) Building Engineer to check column locations in the main building structural drawings.
  - 2) Building engineer to check, collect information and produce accurate and complete as-built documentation as required.
- iii. Engage a qualified structural engineer to confirm satisfactory structural performance of the buildings under wind loading or submit detail design report as per BNBC 1.9.1.1.
- iv. "Have a qualified structural engineer complete further analysis of the structure and develop a remediation plan if required."
- v. For CFDL building, conduct detailed structural assessment by qualified structural engineer and carry out remedial action as necessary. As part of the detailed assessment outlined, conduct destructive core testing to validate the in-situ concrete compressive strength of structural elements.
- vi. Need to complete recommendations suggested in the Previous Structural Assessment within deadline date.
- vii. Have a qualified structural engineer prepare credible as-built documents based on the requirements of Part 8 Section 8.19 of the Alliance Standard.
- viii. Adequately anchor and brace all non-structural elements to resist earthquake forces to comply with the BNBC and Alliance Standard.
- ix. "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."
- x. For CFDL, 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.
- xi. Have a qualified structural engineer document compliance with the seismic and wind requirements stated in the 2006 BNBC.
- xii. "Complete further testing on areas of deterioration and have a qualified structural engineer develop a remediation plan."
- xiii. "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."
- xiv. "Under guidance from a qualified structural engineer, address all areas of needed maintenance by correcting the identified issues."
- xv. "For CFDL building only, remove all the blockages from expansion joints for them to be free for taking up the expansion."
- xvi. "Have a qualified structural engineer develop Floor Loading Plans per the requirements of Part 8 Section 8.20.5.3."
- xvii. 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.
- xviii. Provide signage or the appropriate markings at all areas used for storage to indicate the acceptable loading limits detailed in the Load Plan.
- xix. "Repair the exterior façade system to prevent water intrusion."

Long Term (6 Months) : Retrofitting is subjected to DEA

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

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

<p>Immediate (3 to 6 Days)</p>	<p>Remove all combustible materials within 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 disallows these fixtures.</p> <p>Find out the cause of overheating and take proper action including replacing cable or equipment where necessary.</p>
<p>Short Term (3 Weeks)</p>	
<p>Mid Term (6 Weeks)</p>	<p>Ensure distribution boards are metal enclosed with a dead front construction.</p> <p>Provide means of ventilation for the generator room. Consult a qualified electrical engineer to determine the required ventilation rates based on the installed equipment.</p> <p>Ensure proper identification of emergency power switchboards, distribution boards and circuits.</p> <p>Install distribution boards in compliant locations so that operation is not hampered due to limited access.</p> <p>Consult with an expert fire protection engineer and make sure the generator room is fire rated as per Alliance standard.</p> <p>Provide clearance of at least 1 m (39 in) in front of distribution boards.</p> <p>Ensure wiring systems are selected and erected so that no damage is caused by the ingress of water.</p>
<p>Long Term (6 Months)</p>	<p>Provide adequate fire rating for substation room and make it separated from rest of the building with an expert fire protection engineer and make sure the substation room is fire rated as per Alliance standard.</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>Have a qualified electrical engineer develop an as-built single line diagram detailing key components and capacity of the electrical system.</p> <p>Consult with a qualified Electrical Engineer and ensure electrical cables are sized according to capacity of circuit breakers.</p> <p>Change direction of such utilities, so that they are not routed through the substation room.</p> <p>Ensure underground cables for electrical distribution in the premises of the building are encased in GI or PVC pipes and laid in earth trenches of sufficient depth.</p> <p>Provide adequate cover on cable trench.</p>

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

	<p>Connect all metal in the building to the building grounding system such as metal rebar in concrete, metal frame of building and metal water pipe.</p> <p>Provide dedicated neutral for each circuit.</p> <p>Ensure distribution boards provided with physical means to prevent the installation of more over current devices than that number for which the panel board was designed, rated and listed.</p> <p>Ensure the means of identification is obtained by separate color coding, marking tape, tagging or other approved means.</p> <p>Provide cable sockets for stranded conductors having a nominal cross-sectional area 6mm<sup>2</sup> or greater. Conductors below 6 mm<sup>2</sup> without cable sockets, all strands at the exposed ends are soldered together or are crimped using suitable sleeve or ferrules.</p> <p>Provide soak pits for transformer with large oil content as per BNBC.</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>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>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)	Remove all combustibles stored underneath the cutting tables at the noted locations as soon as possible.
Short Term (3 Weeks)	
Mid Term (6 Weeks)	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.

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

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Long Term (6 Months)	<p>Provide 2 hr fire-resistive rated construction barriers at exit enclosures. Fit side-swinging, self-closing, non-lockable fire doors of 1.5 hr that opens in the direction of egress in all stairwell enclosures. Consult a qualified fire protection engineer to design the required rated construction barriers.</p> <p>Install a class III standpipe system at required locations. Standpipe system must comply with NFPA 14.</p> <p>Provide storage racks or shelves following Alliance Standard Section 5.3.6.2 and NFPA 13 Chapter 13, 14, 15, 16 and 17.</p> <p>Have a qualified engineer review the pump capacity and ensure hydraulic calculation is done which can be supported by this pump. Also, identify all other performance data and ensure conformity to NFPA 14, 20, 22 and 25 standards.</p>
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