

Summary of Preliminary Assessment on Structural, Fire and Electrical Safety

Name of the Factory	: Behid apparels (Bangladesh) ltd
Address of the Factory	: Jarina Plaza, Jhazor PO: National University, Gazipur District Sadar Gazipur Dhaka Bangladesh
Present Status of the Factory	: Under Operation
Structural assessment conducted by	: Alliance
Date of Structural Inspection	: 04-May-2014
Fire & Electrical assessment conducted by:	Alliance
Date of Fire & Electrical Inspection	: 04 May 2014

BASIC INFORMATION:

The present garment factory is a five storied building with RC beam and slab system with beams spanning both directions between columns and a shed on the roof. The following general information was noted:

i.	Building Usage Type	: Garments Factory.
ii.	Structural System	: 5 storied RC Beam Column Frame systems + one shed at roof.
iii.	Floor System	: Beam Supported slab.
iv.	Floor Area	: 40,730 sft.
v.	No. of Stories	: 5 storied RCC + one shed
vi.	Construction Year	: 2007
vii.	Foundation Type	: Unknown
viii.	Design Drawings	: Not Available
ix.	Soil investigation Report	: Available
x.	Construction Materials	: Reinforced Concrete (Brick aggregate with rebar.)
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 (3 to 6 Days) :

- i. All roof top structures must be removed immediately and the roof must be kept completely empty.
- ii. Top floor (4th Floor) of the building should be vacated immediately and kept completely empty.
- iii. Operations in other floors of the building may continue provided operating live loads shall not exceed 1KN/m² (20 psf) and no storage load should be allowed except ground floor.
- iv. Toilets and masonry walls in the southern part of the building around central grid-lines (between grid-lines B-C-D as per attached figure) should be completely removed immediately.

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Short Term: (3 Weeks)

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- 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.

Mid Term (6 Weeks)

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- i. A detailed engineering assessment (DEA) should be started immediately and completed within 6 weeks under the supervision of a certified professional structural engineer
- ii. Have a qualified structural engineer prepare credible as-built documents or revise existing as-built documents based on the requirements of Part 8 Section 8.19 of the Alliance Standard.
- iii. As part of the detailed assessment outlined elsewhere, the compressive strength of columns, floor framing and shear walls constructed with MCAC shall be investigated by an appropriate program of in-situ testing and representative destructive testing of core samples.
- iv. Engage a qualified structural engineer to develop the required documents to confirm adherence to building code (including all design loads). Documents must comply with Alliance Standard Part 8 Section 8.19 and 8.20.
- v. Have a qualified structural engineer document compliance with the seismic and wind requirements stated in the 2006 BNBC.
- vi. Engage a qualified structural engineer to confirm satisfactory structural performance of the buildings under wind loading. Compliance may be waived if the Factory Owner provides satisfactory evidence of a cyclone operations plan that includes full evacuation of the factory in advance of any approaching cyclone.
- vii. Develop engineered plans to brace all non-structural elements such as storage racks and water tanks to resist earthquake forces to comply with the BNBC and Alliance Standard. Install anchor and braces as shown on approved plans.
- viii. Engage a qualified structural engineer to confirm and document that provisions have been made to accommodate concentrated loads such as water tanks and production equipment. If provisions have not been made, have a qualified structural engineer develop a remediation plan.
- ix. 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.
- x. Have a qualified structural engineer develop Floor Loading Plans per the requirements of Part 8 Section 8.20.5.3.

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- xi. 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.
- xii. Provide signage or the appropriate markings at all areas used for storage to indicate the acceptable loading limits detailed in the Load Plan (noted elsewhere).

Long Term (6 months) : Necessary remediation after DEA.

The recommendations for Fire Safety corrective actions:

Immediate (3 to 6 Days)	<p>Remove all stored materials in the stairwells at the noted locations.</p> <p>Means of egress must be full free and clear from impediments, obstructions, and stored materials immediately.</p>
Short Term (3 Weeks)	<p>Remove all hasps, locks, slide bolts, or other locking devices at the noted locations.</p> <p>Remove all combustibles stored underneath the cutting tables at the noted locations.</p>
Mid Term (6 Weeks)	<p>Occupancy certificate (mention occupancy type) for each building.</p> <p>Make aisles marking with proper direction and provide minimum clear width of 36 inch. Keep aisles free of obstruction.</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 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>Conduct fire drills on a quarterly basis as outlined in BNBC Part 4 Appendix A for all garment facilities with record keeping .These fire drills need to be conducted under the direction of a Fire Safety Director.</p> <p>Post occupant loads for every assembly and production floor in a conspicuous space near the main exit or exit access doorway for the space.</p> <p>Stair designation signs are provided at each floor entrance from the stair to the floor in English and Bengali. Signs indicate the name of the stair and the floor level. Signs are posted adjacent to the door.</p>

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	<p>Complete and document fire department pre-planning activities with the local Fire Service and Civil Defense.</p>
<p>Long Term (6 Months)</p>	<p>Install or revise existing standpipe system at required locations designed by a qualified fire protection engineer. System should include rated fire pump and Class I standpipe hose connections (65 mm) in each stairwells at each floor level including occupiable roofs.</p> <p>Factory will need to install fire rated door assemblies at all exits (1.5 hour rating). Fire doors assemblies shall conform to NFPA 252, BS 476 Part 22, EN 1364-1, GB 12955-2008, or IS 3614. Part II. Doors must remain in closed position or be of self-closing type. Doors may be provided with locking hardware from the ingress side provided that a panic bar is installed on any door with an occupant load exceeding 49 persons</p> <p>Install automatic fire alarm system with sufficient smoke/heat detectors as per NFPA 72. Automatic detectors should be tied into the fire alarm system. Alarm system should initiate occupant notification upon activation of detectors in addition to the manual fire alarm stations. All fire alarm installations shall be submitted for review by the Alliance for review prior to commencement of installation.</p> <p>Handrails shall be provided on both sides of each exit stairway and ramp. New handrails shall have 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.</p> <p>Revise electrical wiring path so as not to create a need for elevated wire cover in the egress path or otherwise change to meet Alliance standard. Remove sliding door rail (see recommendation regarding installation of side-swing doors for exit stairs).</p> <p>Upon installation of automatic alarm system and accompanying alarm panel, arrange for direct connection to monitoring service or Fire Service and Civil Defense. If connection is not possible, until that time that it is, 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 to alert this person.</p> <p>Revise electrical layout to prevent exposure to electrical plug sockets (e.g. overhead cable trays, etc). Or provide sufficient mechanical guarding to prevent contact with live electrical parts.</p> <p>Upon installation of compliant standpipe system, fire department (Siamese) inlet connections should be installed</p>

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	<p>to allow fire department pumper equipment to supplement the fire protection systems. Fire department outlet connections shall be provided to allow fire department pumper vehicles to draw water from ground-level or underground water storage tanks. Connections shall match the Fire Service and Civil Defense hose thread standard. Signage for standpipe system is not in compliance with NFPA 14 Chapter 6 (e.g. no sign on Fire Department connection indicating STANDPIPE in 1 in lettering)</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. As per Alliance Standards Part 13 Section 13.1 Fire Safety Director</p> <p>Upon installation of compliant standpipe system, include required identification signs at the noted locations. Signage must comply with NFPA 14.</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. As a general rule the maximum tolerable deposit thickness for loose fluffy lint is 13 mm (½ in.) over a maximum of 46.5 m² (500 ft²). Limit dense deposits to 6 mm (¼ in.) and oil saturated deposits to 3.2 mm (⅛ in.).</p> <p>Any newly installed standpipe system needs to be evaluated for compliance with the design pressure and flow demands of NFPA 14 or BNBC as cited in 5.4.3. Standalone standpipe systems shall be confirmed to meet the local BNBC requirements with a minimum 450 kPa (65 psi) pressure at the hydraulically most remote hose connection or NFPA 14. This testing should be documented and available for review.</p>
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The recommendations for Electrical Safety corrective actions are:

Immediate (3 to 6 Days)	Remove all combustible materials within the substation room.
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<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>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>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.</p>
<p>Mid Term (6 Weeks)</p>	<p>Install phase separators between terminal connections at the noted locations.</p> <p>Multiple connections/looping should be removed and connection should provide individually from bus bar.</p> <p>Have a qualified electrical engineer develop as-built electrical drawings providing detailing key components of the electrical system.</p>
<p>Long Term (6 Months)</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>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>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>