

Summary of Preliminary Assessment on Structural, Fire and Electrical Safety

Name of the Factory	: Ambia Apparels Ltd.
Address of the Factory	: 7, AGRABAD C/A, Chittagong, Bangladesh
Present Status of the Factory	: Under Operation
Structural assessment conducted by	: Alliance
Date of Structural Inspection	: 10 May-2014
Fire & Electrical assessment conducted by:	Alliance
Date of Fire & Electrical Inspection	: 10 May 2014

BASIC INFORMATION:

The present garment factory is comprises of a five storied building with concrete beam and column system and a shed on the roof. The following general information was noted:

i.	Building Usage Type	: Garments Factory.
ii.	Structural System	: 6 storied Beam Column Frame systems.
iii.	Floor System	: Beam slab.
iv.	Floor Area	: 43,105 sft.
v.	No. of Stories	: Six
vi.	Construction Year	: 3 stories in 1966 and 3 stories between 2003-2006
vii.	Foundation Type	: Known
viii.	Design Drawings	: Not Available
ix.	Soil investigation Report	: Available
x.	Construction Materials	: Reinforced Concrete (brick chips).
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)	: As noted elsewhere, the portion of Level 5 in the vicinity of the false columns should be vacated immediately and proper retrofitting of the columns is to be completed under the guidance of a qualified structural engineer. Additionally, the cracking in the Level 5 beams and slabs should be investigated by the structural engineer and a remediation plan should be developed, if deemed necessary.
Short Term: (3 Weeks)	:
	i. 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.
	ii. 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.

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Mid Term (6 Weeks)

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- i. As outlined elsewhere, the cracking in the Level 5 beams and slabs should be investigated by a structural engineer and a remediation plan should be developed, if deemed necessary.
- ii. Retain structural engineer to verify source of cracks. Follow repair recommendations.
- iii. As outlined elsewhere, the cracking in the Level 5 beams and slabs should be investigated by a structural engineer and a remediation plan should be developed, if deemed necessary.
- iv. Engage qualified engineer to investigate the strength of the concrete and quantity of the steel in the columns. Concrete strength shall be assessed by taking at least 4 nos. of 4 inch diameter cores from the area of concern. If cores are to be taken from column, it is advisable to take it from an upper level where the stresses are low for practical reasons (3 inch cores may be taken from columns). In addition, UPV shall be used to have concrete strength in sufficient number of columns in the lower tiers so that a level of confidence is achieved. The calibrated results of core tests and UPV shall be used to determine a reliable value of concrete strength in columns. The size and diameter of steel rebar in most of the columns of two lowest tiers shall be authentically determined using a Ferro scanner or similar device. In order to confirm the diameter of embedded bars as obtained from Ferro scanner, the engineer may have to remove the concrete cover in one or two locations.
- v. As outlined elsewhere, the compressive strength of structural elements constructed using MCAC shall be investigated by an appropriate program of in-situ testing and representative destructive testing of core samples.
- vi. Have a qualified structural engineer prepare credible as-built documents based on the requirements of Part 8 Section 8.19 of the Alliance Standard. All elements must be evaluated and included in drawings.
- vii. Engage a qualified structural engineer to develop the required documents to confirm compliance with building code. Documents must comply with Alliance Standard Part 8 Section 8.19 and 8.20.
- viii. Existing foundation design details are necessary to compare against the recommendations of the available geotechnical report. Once those details are available, have a qualified structural engineer complete an analytical evaluation of the structural impact of the addition.
- ix. 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.
- x. Engage a qualified structural engineer to confirm and document that provisions have been made to accommodate concentrated loads such as water tanks and sign boards. If provisions have not been made, have a qualified structural engineer develop a remediation plan.
- xi. All sources of water intrusion should be rectified or repaired. Once water intrusion has been rectified, remove plaster from damage areas; treat for moisture and plaster/paint/seal.

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

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)	<p>Remove all locking devices from all egress doors and means of egress components in accordance with Alliance Standard Section 6.8. If locks are required for security reasons, utilize special door locking features complying with NFPA 101.</p> <p>It is recommended that when not in use, flammable liquids are stored in a fire rated storage cabinet.</p>
Mid Term (6 Weeks)	<p>Arrange for direct connection of the fire alarm system to a central monitoring station or Fire Service and Civil Defense. Until that time that monitoring can be set up, arrange a monitoring system using factory's own central detection system and personnel. 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 (such as a fire control room) to alert this person.</p> <p>Post emergency egress maps at the entrance to each exit stair or main point of egress as per Alliance Standards Part 13 Section 13.4 Evacuation Plan.</p> <p>Upon installation of compliant standpipe system, include required identification signs at the noted locations. Signage must comply with NFPA 14.</p> <p>Post the 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>Install signage adjacent to each stair door indicating the stair name and the floor level at the noted locations.</p>
Long Term (6 Months)	<p>Remove existing gates and unrated doors at exit enclosures. Install approved fire rated doors that are listed, permanently labeled, automatic-closing, incompatible fire rated frames with latching hardware.</p> <p>Install automatic fire alarm system including a listed fire alarm control panel. Install smoke and heat detectors 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. Include listed pull stations at all entrances to exit stairs, and at all exits. Install strobes and horns for complete notification. Automatic area smoke detectors are required throughout G2 buildings per Section 5.7.3.6. All fire alarm installations shall be submitted for review by the Alliance for review prior to commencement</p>

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	<p>of installation.</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 stairwell at each floor level including occupiable roofs.</p> <p>Protect all egress stairs with a shaft enclosure including 2-hour fire-rated construction. 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>Installation of approved standpipe (mentioned elsewhere) will require the installation of rated fire pump. Install the fire pumps in accordance with NFPA 20. Consult with a qualified fire engineer to properly design and install pump system. Arrange water storage tank(s) according to NFPA 22. Submit product data, drawings and hydraulic calculations and secure approvals before construction.</p> <p>Replace existing exit doors with side hinged swinging type doors per Alliance Standards Part 6 Section 6.8 Doors and Gates.</p> <p>All penetrations through fire rated assemblies shall be protected/sealed with a listed through penetration fire stop system tested in accordance with ASTM E814. Confirmation should be provided that any materials used can conform to standard as per Alliance Standard Section 4.7 Penetrations.</p> <p>Remove sliders/lip and concrete barriers at exit doors. Lips and barriers may not exceed 1/4 in unless provided with beveled slope.</p> <p>During installation of fire rated door assemblies assure that every door in a stair enclosure serving more than 5 stories is provided with re-entry unless it meets the requirements of Alliance Standards Part 6 Section 6.8.3.1.</p> <p>Upon installation of compliant standpipe system, fire department (Siamese) inlet connections should be installed 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.</p> <p>Separate occupancies with rated construction per Section 3.4.2.1. - Boiler should separated from other occupancies by a minimum 1 hour construction. Penetrations such as</p>
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	<p>windows must have appropriate fire rated assemblies (.75 hour).</p> <p>Generator sets should be separated by minimum 2 hour construction. Oil filled transformers for non high-rise buildings shall be separated by a minimum 2 hour fire resistive rated construction. Storage Areas shall be separated from the surrounding occupancy with a minimum 1 hour construction. In all cases it is recommended to retain a qualified fire engineer to design enclosures or install fire rated assemblies. Daycare occupancies which are accessory to other occupancies shall be located on the ground floor with a maximum travel distance of 9 m (30 ft). If located on a higher floor (such as 1st floor), direct access to an exit enclosure shall be provided.</p> <p>Install secure parapets or guards on roof with a minimum height of 1067 mm (42 in) Install guard rail at landing drops. New guards shall have a minimum height of 1067 mm (42 in.).</p> <p>Develop a hot work permit program. The program must comply with the requirements of NFPA 51B as per Alliance Standards Part 13 Section 13.4 Hot Work Permit and NFPA 51B.</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>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.). As per Alliance Standards Part 13 Section 13.6 Housekeeping.</p> <p>Establish an inspection, testing, and maintenance program for the standpipe system. Program must comply with NFPA 25.</p>
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The recommendations for Electrical Safety corrective actions are:

<p>Immediate (3 to 6 Days)</p>	<p>Clean dirt and debris from generator room. Establish a cleaning regimen for the generator room.</p> <p>Clean dust from cable trays and install fitted covers. Assure all panel boards fully close and latch as designed.</p>
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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>Establish a routine maintenance and testing program for the emergency generator. The program shall be based on all of the following:</p> <ul style="list-style-type: none"> (1) Manufacturer's recommendations (2) Manufacturer's Instruction manuals (3) Requirements of NFPA 110 Chapter 8 <p>Indoor electrical installations that are accessible to unqualified persons shall be marked with appropriate caution signs.</p>
<p>Mid Term (6 Weeks)</p>	<p>Have a qualified electrical engineer develop an as-built single line diagram detailing key components and capacity of the electrical system, including electrical equipment layout, distribution schedule, and grounding riser plan.</p> <p>Label all switchboards and/or distribution boards in the factory with capacity information. The permanent label should identify the maximum voltage present in an item of equipment or within the enclosure.</p> <p>Install phase separators on LT panel between terminal connections. Verify phase separators are installed at all remaining locations.</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>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.</p> <p>Inspect electrical switchgear and panel boards on an annual basis to ensure that the equipment is in good working condition. All inspections should be documented, including any follow-up and repair.</p>