

Summary of Preliminary Assessment on Structural, Fire and Electrical Safety

Name of the Factory	: Apex Footwear Limited
Address of the Factory	: Mouza- Chandra,Shafipur, Kaliakoir,Gazipur, Dhaka, Bangladesh
Present Status of the Factory	: Under Operation
Structural assessment conducted by	: Alliance
Date of Structural Inspection	: 24-Mar-14
Fire & Electrical assessment conducted by:	Alliance
Date of Fire Inspection	: 24-Mar-14
Date of Electrical Inspection	: 24-Mar-14

BASIC INFORMATION:

The present garment factory complex is a RCC & Pre-Fab Steel buildings. The following general information was noted:

i.	Building Usage Type	: Garments Factory.
ii.	Structural System	: Buildings 2, & 4: Reinforced concrete frame with monolithic RC slab with beams floor. Buildings 1 & 3:RC slab with beams column frame & concrete slab on metal deck atop structural steel beams & roof Industrial tin
iii.	Floor System	: Beam Supported slab & concrete slab on metal deck
iv.	Floor Area	: Building #1 - 46739 sqf Building #2 - 74,967 sft Building #3 – 48,420 sft Building #4 – 154,578 sf Sheds #1 - 25,458 sft Sheds #4 - 65,000 sf
v.	No. of Stories	: Building #1 - 2 (practically 1 story however small part of this building is 2 storied. Out of total area 46700 sft only 1200 sft 2 story used for staff canteen) Building #2 - 1 story Building #3 – 2 story Building #4 – 6 story Sheds #1 - 1 story (Steel Prefab) Sheds #4 - 1 story (Steel Prefab)
vi.	Construction Year	: Building #1 - 1990 Building #2 - 2000 Building #3 - 2010 Building #4 - 2011 shade-1 2004 shade-4 1998
vii.	Foundation Type	: Unknown
viii.	Design Drawings	: Available
ix.	Soil investigation Report	: Available
x.	Construction Materials	: Reinforced Concrete (Stone chips) and Steel
xi.	Generator	: Ground Floor

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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. 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.

Mid Term (6 Weeks) :

- i. Have a qualified structural engineer provide further analysis and investigation of the structural deficiencies. Structural engineer shall also provide remediation documents if required.
- ii. Building 4: Engage a qualified structural engineer to assess 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.
- iii. Have a qualified structural engineer provide further testing and analysis of distress, settlement, shifting, or cracking in columns or walls and provide a remediation plan to correct noted issues.
- iv. 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
- 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.
- 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. Adequately anchor and brace all non-structural elements to resist earthquake forces to comply with the BNBC and Alliance Standard.

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- 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
- xi. Have a qualified structural engineer prepare load plans including the information required in Section 8.20 of the Alliance Standard.
- xii. 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)

- i. Provide Certificates of Occupancy for review
- ii. Necessary remedial measure subjected to core test & further analysis.

The recommendations for Fire Safety corrective actions are:

Immediate (3 to 6 Days)	Remove boxes from exit ramp in Shed #4. Storage in exit routes should be strictly prohibited. This may be part of the regular documented inspection provided by the fire safety team.
Short Term (3 Weeks)	<p>Remove all hasps, locks, slide bolts, or other locking devices all doors to exits / means of egress. If locks are required for security reasons, utilize special door locking features complying with NFPA 101.</p> <p>Construct a chemical storage room following the requirements of BNBC Part 3 Section 2.4 (2 or 4 hour rated construction depending on the total volume and classification of chemicals stored) or alternatively move chemical storage to an area separate from other occupancy types.</p> <p>As noted elsewhere, generator room should have appropriate fire rated segregation or diesel fuel stored in another (fire rated) area.</p>
Mid Term (6 Weeks)	<p>Arrange for direct connection of the fire alarm and detection system to a central station monitoring service or the Fire Service and Civil Defense 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 Defense can be set up, 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 maximum occupant load for all areas (near exit).</p> <p>Install signage adjacent to each stair door in English and Bangla indicating the stair name (each stair should have</p>

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	<p>unique name/id) and the floor level at the noted locations.</p>
<p>Long Term (6 Months)</p>	<p>Installation of approved standpipe and sprinkler system (mentioned elsewhere) will require the installation of a 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.</p> <p>Install automatic fire alarm systems in the noted locations (consult a qualified fire engineer for design and installation of detection and alarm system). NOTE: For building #4 where sprinkler system is recommended, it is not necessary to install both sprinklers and automatic alarm system.</p> <p>Install a landing at the exits noted. Landing should be at least equivalent to the door width.</p> <p>Remove all sliding or rolling doors at and within the exit stairs and along all portions of the means of egress. Replace with side-hinged swinging type doors in compliance with Standard. As noted elsewhere, exit enclosures require fire rated door assemblies (which should be side-hinged).</p> <p>Install standpipe systems in Buildings #2 & #4. All installation and design requirements outlined in BNBC Part 4 Chapter 4 for combined standpipe and automatic sprinkler systems shall be replaced by the requirements of NFPA 14 with a minimum pressure of 450 kPa (65 psi) at the hydraulically most remote hose connection. Standalone standpipe systems shall meet the local BNBC requirements with a minimum 450 kPa (65 psi) pressure at the hydraulically most remote hose connection or NFPA 14. System should be designed by a qualified fire protection engineer. Class III (65 mm and 40 mm fittings) standpipe hose connections shall be located in all required stairwells at each floor level including occupiable roofs. For buildings with sprinklers (as required for Building #4) Class II standpipe hose connections (40 mm) are not be required.</p> <p>Provide minimum 1.5-hr fire rated doors and seal all unprotected openings to separate the exit stairs from work areas and other building spaces on all floor levels in buildings 1 to 4. Ensure that the fire doors are self-closing and positive latching and that they are provided with fire exit (panic) hardware where serving production floors. Fire door assemblies shall conform to NFPA 252, BS 476 Part 22, EN 1364-1, GB 12955-2008, or IS 3614 Part II. Retain the services of qualified fire engineer to assist in specifying and installing fire rated assemblies.</p> <p>Install an automatic sprinkler system throughout Building #4 designed by a qualified fire protection engineer.</p> <p>Handrails shall be provided on both sides of each exit stairway and ramp in main buildings (1, 2 & 4) and ramps</p>

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	<p>of sheds. 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>Install Fire department (Siamese) inlet connections in the current (or newly installed) standpipe system 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 Defence hose thread standard.</p> <p>In order to meet the requirements for appropriate segregation of occupancies, the factory will need to install the following:</p> <p>Building #1 - Transformer room shall be separated by a minimum 2 hour fire restrictive rated construction. Generator sets shall be separated from all other occupancy areas by a minimum 2 hour construction.</p> <p>Shed #6: Transformer room shall be separated by a minimum 2 hour fire restrictive rated construction. Generator sets shall be separated from chemical storage areas by a minimum 2 hour construction (alternatively combustible chemicals can be stored in separated fire rated building/room).</p> <p>Building #2 - storage of combustible materials shall be separated from the surrounding occupancy (canteen) with a minimum 1 hour construction.</p> <p>Building #1 - Chemicals should be stored in room with minimum 2-hr rated construction.</p> <p>Building #2 - Synthetic Material store separated by minimum 1-hr fire-rated construction</p> <p>Shed #8 - Rejection store separated from dining by minimum 1-hr fire rated construction</p> <p>Building #4 - Finished good store separated from production by minimum 1-hr fire rated construction</p> <p>Consult a qualified fire engineer to design the fire rated assemblies for these areas.</p> <p>Install Illuminated exit signs at entrances to exits and along the path of egress in Building #4. Confirm exit signs are located at exits in all factory buildings.</p> <p>Battery power for all exit signs should be checked regularly in a systematic way with documented records available for review. Emergency power for exit signs shall be verified at least once per year. If battery-operated signs are used, these lights shall be tested on a monthly basis. Functional testing of battery powered signs shall be provided for a minimum 90 min once per year. It is recommend that equipment should be numbered, with inspections, deficiencies, and follow-up noted in a log.</p> <p>Install emergency lighting at all exits and all paths of egress</p>
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	<p>in Building #4. Confirm through testing (light meter) or other certification that all means of egress in ALL buildings will have illumination of 10 lux for all corridors, exit doors, and stairways and no less than 30 min in the event of failure of normal lighting.</p> <p>Remove or re install concrete lip at exit with beveled slope of 1 in 2 and less than 1/2 inch.</p> <p>During installation of fire rated door assemblies noted elsewhere assure that every door in a stair enclosure serving more than 4 stories (Building #4 only) is provided with re-entry unless it meets the requirements of Alliance Standards Part 6 Section 6.8.3.1. During installation of fire rated door assemblies noted elsewhere assure that every door in a stair enclosure serving more than 4 stories (Building #4 only) is provided with re-entry unless it meets the requirements of Alliance Standards Part 6 Section 6.8.3.1.</p> <p>Following installation of required standpipe systems, the 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> <p>As noted elsewhere, installation of new fire protection water supply systems (fire pumps, standpipe, and sprinklers) is recommended in noted areas. Factory must provide shop drawings and hydraulic calculations as outlined in NFPA 13, 20, 22, and 24. These drawings shall include all details as outlined in NFPA 13, 20, 22, and 24. All fire protection water supply system installations shall be submitted for review by the Alliance for review prior to commencement of installation. Testing of the installation shall be conducted in accordance with NFPA 13 acceptance testing requirements. Documentation of all testing shall be submitted for review by the Alliance. A final inspection and testing of the installation shall be witnessed by the Alliance.</p> <p>Develop a written hot work permit program. The program must comply with the requirements of NFPA 51B. Develop a maintenance and contractor safety policy that includes procedures for conducting hot work (e.g. welding). All hot work should be conducted with a proper permit and precautions must be available in case of fire (e.g. fire watch, fire extinguisher, etc.).</p>
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The recommendations for Electrical Safety corrective actions are:

Immediate (3 to 6 Days)	N/A
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<p>Short Term (3 Weeks)</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>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 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>Mid Term (6 Weeks)</p>	<p>Clear & Permanent identification marks should be printed in all DBs, Switchboards, Sub-distribution boards & switches as necessary. BNBC- Part 8 section 2.11.5.4.</p> <p>Provide electrical insulation mats in front of distribution boards, substation room etc.</p> <p>Install phase separators between terminal connections at the noted locations.</p>
<p>Long Term (6 Months)</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 fire protection engineer provide the required rating of the room and the required remediation procedures to ensure the enclosure is properly rated. Ensure the generator enclosure is sufficiently protected from the ingress of water.</p>