

Summary of Preliminary Assessment on Structural, Fire and Electrical Safety

Name of the Factory	: ANZIR APPARELS LTD
Address of the Factory	: Somsher Plaza, Depz Gate Ganakbari, Savar, Dhaka, Bangladesh.
Present Status of the Factory	: Under Operation
Structural assessment conducted by	: Alliance
Date of Structural Inspection	: 27 May 2014
Fire & Electrical assessment conducted by	: Alliance
Date of Fire & Electrical Inspection	: 24 May 2014

BASIC INFORMATION:

The present garment factory comprises of four buildings. One is of five story and other three are single story . The following general information was noted:

i.	Building Usage Type	: Garments Factory
ii.	Structural System	: RC beam column frame Building
iii.	Floor System	: RC beam supported slabs
iv.	Floor Area	: Total Area= 68,819 sq-ft. Main factory building area=51,500 sq-ft. Ancillary shed area=17,319 sq-ft.
v.	No. of Stories	: Building #1 -5 story R.C.C. main factory building, Number of level-5, Occupied Level-5 (factory is using only level-3, level- 4, level-5 of this building) • Building #2 – single story ancillary shed, Number of level-1, Occupied Level-1 • Building #3 – single story ancillary shed, Number of level-1, Occupied Level-1 • Building #4 – single story ancillary shed, Number of level-1,Occupied Level-1.
vi.	Construction Year	: Main factory building, ancillary shed (boiler room, winding, and winding store), and generator shed construction date: 2002. Other ancillary shed (washing, zippering and auto-necking) construction date: 2014.
vii.	Foundation Type	: Individual Footing
viii.	Design Drawings	: Not available
ix.	Soil investigation Report	: Available
x.	Construction Materials	: Reinforced concrete (brick ships)
xi.	Generator	: Ground floor (Ancillary)

RECOMMENDATIONS FOR CORRECTIVE ACTION:

The recommendations of corrective action for Structural, Fire and Electrical Safety comprises in Short Term, Mid Term and Long Term basis.

The recommendations for Structural Safety corrective actions are:

Immediate : NA

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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. Under guidance from a qualified structural engineer arrange Detail Engineering Assessment of the structure.
- ii. Have a qualified structural engineer provide further testing and analysis of distress, settlement, shifting, or cracking in walls and provide a remediation plan to correct noted issues.
- iii. Adequately anchor and brace all non-structural elements to resist earthquake forces to comply with the BNBC and Alliance Standard. Especially the existing brick masonry should be replaced with braced reinforced parapet. Additionally a guardrail or other means of fall protection should be provided to access this roof area by factory or maintenance personnel.
- 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. 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.
- vi. 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. The finished goods at third level should not be stacked more than five feet above the floor.
- vii. Engage a qualified structural engineer to confirm satisfactory structural performance of the buildings under wind loading.
- viii. Have a qualified structural engineer complete further analysis of the structure and develop a remediation plan if required.
- ix. Redistribute floor loads to comply with the Floor Loading Plans.
- x. Have a qualified structural engineer prepare credible as-built documents based on the requirements of Part 8 Section 8.19 of the Alliance Standard.
- xi. Under guidance from a qualified structural engineer, address all areas of needed maintenance by correcting the identified issues.
- xii. Have a qualified structural engineer assess the durability aspects as suggested in Alliance Standard Part 7 Section 7.2 and take appropriate remedial measures. Take at least four 4" cores from the

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columns as per alliance standard to determine the compressive strength.

- xiii. Provide Certificates of Occupancy for review.
- xiv. Have a qualified structural engineer develop Floor Loading Plans per the requirements of Part 8 Section 8.20.5.3
- xv. Have a qualified structural engineer prepare load plans including the information required in Section 8.20 of the Alliance Standard.
- xvi. Provide signage or the appropriate markings at all areas used for storage to indicate the acceptable loading limits detailed in the Load Plan.
- xvii. Have a qualified structural engineer provide further analysis of the identified cracks to determine the appropriate course of corrective action.
- xviii. Repair the exterior façade system to prevent water intrusion.

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

The recommendations for Fire Safety corrective actions are:

Immediate (3 to 6 Days)	Keep means of egress (Exit path, Aisles, Stair ways, Corridor) free of storage (Alliance standard: 6.3.9).
Short Term (3 Weeks)	Remove all hasps, locks, slide bolts, or other locking devices at the noted locations. Alliance Standards Part 6 Section 6.8 Doors and Gates.
Mid Term (6 Weeks)	<p>The occupant load shall be posted for every assembly and production floor in a facility in a conspicuous space near the main exit or exit access doorway (Alliance Standards Part 6 Section 6.4.4 Posting of Occupant Load).</p> <p>Develop an emergency evacuation plan which includes all components required by the Alliance Standards and communicate the plan to all employees (Alliance Standards Part 13 Section 13.1 Fire Safety Director).</p> <p>Post emergency egress maps at the entrance to each exit stair or main point of egress (Alliance Standards Part 13 Section 13.4 Evacuation Plan).</p> <p>Training programs need to be implemented and documented in accordance with the Alliance Safety Training Curriculum (Alliance Standards Part 13).</p> <p>Develop a testing and maintenance program that ensures the operation of all exist signs is 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 (Alliance Standards Part 10 Section 10.12 Illumination of Exit Signs and Means Of Escape Lighting).</p>

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	<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 (Alliance Standard Part 10 Section 10.12 Illumination of Exit Signs and Means of Escape).</p> <p>Complete fire department pre-planning activities with the local Fire Service and Civil Defense (Alliance Standards Part 13 Section 13.1 Fire Safety Director).</p> <p>Install required identification signs at the noted locations. Signage and installation must comply with NFPA 14 (Reference NFPA 14 Chapter 6).</p> <p>Install signage adjacent to each stair door indicating the stair name and the floor level at the noted locations in English and Bengali (Alliance Standard Part 6 Section 6.9 Stairs).</p> <p>Collect Occupancy Certificates for the factory building.</p>
Long Term (6 Months)	<p>Make aisles marking with proper direction and with minimum 36 in. width. Keep aisles free of obstruction and higher occupancy loads will require a greater width to accommodate the increased load (Alliance Standard Part 6 Section 6.5 Egress Width).</p> <p>Arrange required (25%) number of people (trained and certified) in fire fighting, first aid, and rescue training by the appropriate authority accordance with the Alliance Safety Training Curriculum (Alliance standards part 13).</p> <p>Install a standpipe system at required locations (class-I standpipe hose connection provisions for Fire Service & Civil defense at each staircase on each level and class-II hose connections at required location on each level) designed by a qualified fire protection engineer (Alliance standard 5.4.2).</p> <p>1. Provide minimum 1.5 hr fire rated door for all exit enclosures. 2. Provide minimum 1.5 hr fire rated door or close with minimum 2 hr fire rated wall of this opening. Consult a qualified fire protection engineer to design the required rated separation wall/ doors. (Reference Alliance Standards Part 4 Sections 4.5, 4.6).</p> <p>Install dedicated fire pump according to Alliance Standard and NFPA 20 with minimum pressure of 450 kPa (65 psi) at the hydraulically most remote hose connection. Also install a stored water supply (tank) per NFPA 22 of adequate capacity to support demands (Alliance standards: 5.5.1).</p> <p>Pull stations at each egress points, smoke detectors in air handling equipment, visual and audible devices should be spaced appropriately based on occupancy type. Reference NFPA 72.</p> <p>Close all the openings with rated construction and provide</p>

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	<p>minimum 1 hr fire rated door for this ware house. Also consult a qualified fire protection engineer to design the required rated construction barriers/ doors. (Reference Alliance Standards Part 4 Sections 4.5, 4.6).</p> <p>Provide side-hinged swinging type doors in all means of egress (Alliance Standards Part 6 Section 6.8 Doors and Gates).</p> <p>Install fire extinguishers at locations and heights based on hazard type per BNBC Part 4 and NFPA 10. Extinguishers shall be placed so that maximum travel distance to the nearest unit shall not exceed 30 m (100 ft). Alliance standard: 5.6</p> <p>1. Close all the openings of carton store with minimum 2 hr fire rated wall and a 1.5 hr fire rated door or remove the store from this the production floor. 2. Provide minimum 2 hr fire rated construction wall to separate the child care room, doctor room and store room and also provide minimum 1.5 hr fire rated door for the ware house store. 3. Provide minimum 1 hr fire rated construction wall to separate the boiler room and winding section. Consult a qualified fire protection engineer to design the required rated construction barriers/ doors. (Reference Alliance Standards Part 4 Sections 4.5, 4.6).</p> <p>Repair or replace damages/ leakages of piping at the noted locations. Repairs and replacements must comply with NFPA 14 and NFPA 25 (NFPA 25 Chapter 6 Standpipe and Hose Systems).</p> <p>Install an automatic fire alarm and detection system so that it will cover the entire floor area (detectors properly spaced in accordance with NFPA 72). Set up a fire alarm and detection system central station monitoring service (central control panel) or direct connection to the Fire Service and Civil Defense. Also a person shall be assigned to contact the fire department in the event of fire alarm activation (Alliance Standard Part 5 Section 5.7.5 Monitoring).</p> <p>Install proper racks and shelves for storing properly and make separation from stack to stack, stack to wall and stack to roof according to Alliance standards.</p> <p>Fire department (Siamese) inlet connections shall be provided 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.</p> <p>Establish an inspection, testing, and maintenance program for all fire extinguishers. Program must comply with the requirements of NFPA 10 (Alliance standard: 13.10.3).</p> <p>Install appropriate means of illumination at the noted locations. The source of illumination shall provide not less</p>
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	<p>than 50 lux at the illuminated surface with a contrast of not less than 0.5. Approved self-luminous signs, which provide evenly illuminated letters having a minimum luminance of 0.2cd/m², may also be used (Alliance Standards Part 6 Section 6.7 Egress Illumination and Part 10 Section 10.12 Illumination of Exit Signs and Means Of Escape).</p> <p>Provide handrails on both sides of each stairway. Intermediate handrails shall be provided when the stair width exceeds 2.2 m (87 in.). Mount handrails height in between 30 in. to 44 in. (Alliance Standard Part 6 Section 6.9 Stairs and 6.12 Handrails and Guards).</p> <p>Install Illuminated exit signs at entrances to exits and along the path of egress anywhere the continuation of egress is not obvious or there is a change in the direction of the path of travel (Alliance Standard Part 6 Section 6.11 Exit Signs).</p> <p>Provide parapets or guards with a minimum height of 1067 mm (42 in.) in all occupied roof. Alliance Standard Part 6 Section 12 Handrails and Guards.</p> <p>Provide a properly sloped and beveled walking surface at the noted location (Alliance Standard Part 6 Section 6.3.4 Walking Surfaces).</p> <p>Establish an inspection, maintenance, and testing program for the standpipe and hose system. Program must comply with the requirements of NFPA 25.</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 out the required duties (Alliance Standards Part 13 Section 13.1 Fire Safety Director).</p> <p>According to Alliance Standard, Part-9, Section-9.1.7, develop a hot work permit program. The program must comply with the requirements of NFPA 51B. In general, this program should address process of request and approval authorities, necessary checks prior approval, standby fire watch and firefighting equipment, sounding of alarm procedure, duration and expiry of permit and re-approval procedure etc.</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.) (Alliance Standards Part 13 Section 13.6 Housekeeping).</p>
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The recommendations for Electrical Safety corrective actions are:

<p>Immediate (3 to 6 Days)</p>	<p>Ensure the generator room clean and free of dirt, debris, and improperly stored materials.</p> <p>Ensure distribution boards free of dirt and debris.</p> <p>Need to determine the cause of overheating, overloading, or signs of burning and take proper action.</p>
<p>Short Term (3 Weeks)</p>	<p>Ensure proper identification of emergency power switchboards, distribution boards, and circuits.</p> <p>Provide two separate points earthing (grounding) provided for generator.</p>
<p>Mid Term (6 Weeks)</p>	<p>Provide adequate and graded cover on cable trenches.</p> <p>Provide clearance of at least 1 m (39 in) in front of distribution boards.</p> <p>Ensure distribution boards are metal enclosed with a dead front construction.</p> <p>Provide mechanical guards for electrical equipment where necessary.</p> <p>Install meters and other electrical devices (Ammeter, Voltmeter etc) on panels.</p> <p>Install phase separators between terminal connections. Verify phase separators are installed at all locations (MCCB).</p> <p>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 dimension). Display panel schedules posted on panels' door (inner side).</p> <p>Have a qualified electrical engineer develop an as-built single line diagram, detailing key components and the capacity of the electrical system.</p> <p>Provide earthing of equipment at required locations and connect to required number of electrodes.</p>
<p>Long Term (6 Months)</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>Check all cable and circuit breakers in order to identify all higher rated circuit breakers. The rated current of a protective device (MCB, MCCB, fuse) must not exceed the current carrying capacity of any conductor in the circuit.</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</p>

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	<p>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>
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