

Summary of Preliminary Assessment on Structural, Fire and Electrical Safety

Name of the Factory	: Armana Apparels Ltd
Address of the Factory	: 232-234 Tejgaon Industrial Area, Tejgaon, Dhaka, Bangladesh.
Present Status of the Factory	: Under Operation
Structural Assessment conducted by	: Alliance
Date of Structural Inspection	: 03 Jun 2014
Fire & Electrical Assessment conducted by	: Alliance
Date of Fire & Electrical Inspection	: 24 Apr 2013 & 02 Jun 2014
BGMEA Membership No	: 3588

BASIC INFORMATION:

The Present Garment Factory is comprises of a 1 Main Buildings & no Ancillary Buildings. The following general information was noted:

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| i. | Building Usage Type | : Garments Factory. |
| ii. | Structural System | : One-way cast-in-place reinforced concrete slabs and beams supported by cast-in-place reinforced concrete columns. |
| iii. | Floor System | : RCC Beam Slab. |
| iv. | Floor Area | : 1, 01,850Sft. |
| v. | No. of Stories | : 11 (Ground + 10 elevated levels + partially occupied roof). |
| vi. | Construction Year | : 1996 |
| vii. | Foundation Type | : Shallow spread footings. |
| viii. | Design Drawings | : Not Available. |
| ix. | Soil investigation Report | : Available |
| x. | Construction Materials | : RCC (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 : N/A.

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

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do not at any time exceed the factory floor load limits as described on the Floor Load Plans.

Mid Term (6 Weeks)

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- i. Provide additional information that verifies proper evaluation of as-built conditions used for analysis of as-built structure.
- ii. Implement load plans and reduce loaded areas to design capacity of floors.
- iii. Redistribute floor loads to comply with the Floor Loading Plans.
- iv. 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.
- v. 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.
- vi. Adequately anchor and brace all non-structural elements to resist earthquake forces to comply with the BNBC and Alliance Standard.
- vii. Have a qualified structural engineer develop Floor Loading Plans per the requirements of Part 8 Section 8.20.5.3
- viii. Have a qualified structural engineer prepare load plans including the information required in Section 8.20 of the Alliance Standard.
- ix. 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)

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- i. Apply for issuance of Certificate of Occupancy and pursue the matter.
- ii. Repair the exterior façade system to prevent water intrusion.
- iii. Provide a protective coating at the structural elements constructed with MCAC exposed to rainfall or other sources of water. Have protective coating approved by the Alliance or a qualified structural engineer.

The recommendations for Electrical Safety corrective actions are:

Immediate (3 to 6 Days)	<p>Ensure the generator room clean and free of dirt, debris, and improperly stored materials.</p> <p>Find out the cause of overheating and take proper action including replacing cable or equipment where necessary.</p>
Short Term (3 Weeks)	<p>Develop an electrical safety training program for all workers that may be exposed to electrical safety hazards.</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 (1.5.3.5) Part 53 disallows these fixtures.</p>

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	<p>Ensure proper identification of emergency power switchboards, distribution boards, and circuits.</p> <p>Ensure that wet type transformer is not leaking and have appropriate oil levels.</p> <p>Provide two separate points earthing provided for generator.</p>
Mid Term (6 Weeks)	<p>Install phase separators between terminal connections at the noted locations.</p> <p>Connect all metal in the building to the building earthing system such as metal rebar in concrete, metal frame of building, or metal water pipe.</p> <p>Have a qualified electrical engineer develop an as-built electrical layout (with indicating the position of electrical panel boards).</p> <p>Ensure overcurrent protection device (circuit breaker) for each and every loads.</p> <p>Consult with a qualified electrical engineer to ensure electrical cables are sized according to capacity of circuit breakers.</p> <p>Remove multi looping and bunching of cables at circuit breakers within distribution boards.</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>
Long Term (6 Months)	<p>Consult with an expert electrical engineer to prepare drawing for lightning protection including risk index and make sure your system is secured against lightning.</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>

The recommendations for Fire Safety corrective actions are:

Immediate (3 to 6 Days)	<p>Remove all storage from the stairwells.</p> <p>Remove all storage from beneath the cutting tables.</p>
Short Term (3 Weeks)	<p>Limit the number of occupants on the 10th Floor canteen to 296 until automatic sprinkler protection is provided throughout the building.</p> <p>Limit the number of occupants on the sewing floors to 296 until automatic sprinkler protection is provided throughout the building.</p> <p>Remove all locking devices from all egress doors and means of egress components.</p>

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Mid Term (6 Weeks)	<p>Install a new automatic fire alarm and detection system. Once installed, 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 trained to contact the Fire Service and Civil Defense in the event of fire alarm activation shall be provided. An annunciator shall be located in a constantly attended location (such as a fire control room) to alert this person.</p> <p>Post the occupant load for all assembly and production floor areas 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 in both English and Bengali.</p>
Long Term (6 Months)	<p>Replace all non-compliant doors in the means of egress with side-hinged swinging type doors.</p> <p>Provide fire-resistive rated opening or penetration protection for rated walls and assemblies. Consult a qualified fire protection engineer to design the required opening protectives or penetration systems.</p> <p>Provide automatic sprinkler protection throughout the facility. The installation of sprinkler protection should be conducted in phases. The first phase would be to protect all storage areas. Prior to installation, the system should be properly designed by a qualified fire protection engineer and plans should be submitted to the Alliance for review.</p> <p>Remove the existing sliding gates that separate the production floors from the stairs and replace them with automatic-closing, side-swinging, fire-rated doors in fire rated frames with latching panic hardware. These doors should be a minimum 39 inches (1 m) wide with a total opening of at least half the existing stair width to maintain the flow of pedestrian traffic. These doors should swing in the direction of egress from the production floor toward the stair.</p> <p>Provide 90-min. fire-rated doors at all other openings into the stair enclosures including the door from the laundry to the East stair on the Ground Floor.</p> <p>Fill in the windows on the south side of the West exit stair with 2-hr. rated construction materials to eliminate the exposure from the pharmaceutical factory to the south. This should be done on from the Ground Floor to the 7th Floor.</p> <p>Fill in the windows on the east side of the East stair with 2-hr. rated construction materials to eliminate the exposure from the buildings to the east. This should be done on from the Ground Floor to the 1st Floor.</p> <p>Provide a water supply system capable of serving the hydraulic demand for the automatic sprinkler/standpipe system as described above. This will require the installation of a fire pump and tank sized to</p>

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	<p>meet the demands in accordance with NFPA 20 and NFPA 22.</p> <p>Install initiating devices and notification appliances as required by the Alliance Standard and NFPA 72. Devices should be part of an automatic fire alarm and detection system for the facility.</p> <p>Revise the egress discharge path on the north side of the building so that occupants do not trip over the laundry equipment piping and platforms.</p> <p>Provide standpipe systems in each stairwell capable of meeting the fire protection demand for hose connections and automatic sprinkler protection. The standpipe should be sized with a minimum 6 in. supply pipe and 3 in. drain pipe. The system should be designed to provide a demand of 750 gpm at 65 psi at the top of the each standpipe riser (500 gpm for the first riser and 250 gpm for the second). This system should be installed as part of the first phase of the overall fire protection system.</p> <p>Provide a fire-rated door to separate the exit discharge of West Stair from the Ground Floor laundry facility.</p> <p>Separate the elevator equipment room from the remaining portions of the facility with 2-hour fire-rated construction. This includes providing rated fire doors at all openings.</p> <p>Provide 2-hour fire resistive rating for all vertical penetrations by providing a fire-resistive rated sealant at each floor penetration.</p> <p>Separate all material storage areas from the remaining portions of the facility with 1-hour fire-rated construction. This would include installing dampers at the openings between the Product Development and Finished Goods storage on the 1st Floor.</p> <p>Separate all hazard areas including the boiler room and elevator equipment room from the remaining portions of the facility with 1-hour fire-rated construction. This includes providing rated fire doors at all openings into these hazard areas.</p> <p>Either relocate Day Care to Ground Floor or relocate to First Floor and provide a fire rated passageway from the Day Care to the stair so that the day care occupants have direct access to a stair enclosure.</p> <p>Provide additional emergency lighting fixtures to provide a minimum lighting level of 2.5 lux for all aisles in production and storage areas.</p> <p>Revise the top step on the 5th Floor East Stair landing to remove the slope.</p> <p>Extend the ramp at the Main (West) entrance so that the ramp does not exceed a 1 in 12 slope.</p> <p>Revise the top step on the 1st Floor East Stair landing to match the step height of the adjacent steps in that run of stairs.</p> <p>Provide handrails on both sides of all exit stairs.</p> <p>Develop a hot work permit program. The program must comply with the requirements of NFPA 51B.</p>
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