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| Name of the Factory | : **ARROW JEANS (PVT) LTD** |
| Address of the Factory | : Musa Bhaban, Port Connecting Road, Saraipara, Pahartali, Chittagong, Bangladesh. |
| Present Status of the Factory | : **Under Operation** |
| Structural Assessment conducted by | : Alliance |
| Date of Structural Inspection | : 18 May 2014 |
| Fire & Electrical Assessment conducted by | : Alliance |
| Date of Fire & Electrical Inspection | : 07 May 2014 & 05 May 2014 |
| BGMEA Membership No | : 2319 |

## BASIC INFORMATION:

The Present Garment Factory is comprises of a 1 Main Buildings & 1 Ancillary Buildings. The following general information was noted:

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| i. | Building Usage Type | : Garments Factory. |
| ii. | Structural System | : The Building is RCC Frame Structure (Slabs/Beams) between Columns |
| iii. | Floor System | : RCC Beam Slab |
| iv. | Floor Area | : 27,709 Sft. |
| v. | No. of Stories | : 6 |
| vi. | Construction Year | : 1996 |
| vii. | Foundation Type | : Isolated Footing |
| 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

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

Mid Term (6 Weeks) :

i. Under guidance from a qualified structural engineer, arrange a detailed engineering assessment of the structure within 6 weeks. Concrete compressive strength should be assessed via coring.
ii. Conduct destructive testing or core samples under the direction of a qualified structural engineer.
iii. Have a qualified structural engineer complete further analysis of the structure and develop a remediation plan if required.
iv. Adequately anchor and brace all non-structural elements to resist earthquake forces to comply with the BNBC and Alliance Standard.
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 prepare a design report based on the requirements of Part 8 Section 8.19 of the Alliance Standard.
vii. Post Floor Load Plans as required by the Alliance Standard.
viii. Provide signage or the appropriate markings in all areas used for storage to indicate the acceptable loading limits, as detailed in the Load Plan.

Long Term (6 months) :

i. Under guidance from a qualified structural engineer, address all areas of needed maintenance by correcting the identified issues.

ii. Repair the exterior façade system to prevent water intrusion.

**The recommendations for Electrical Safety corrective actions are*:***

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| Immediate (3 to 6 Days) | Remove all combustible materials within the substation room.<br><br>Remove all dirt, debris, lint from the substation room surfaces. A regular cleaning program should be provided to reduce the buildup of dust and debris. |
| Short Term (3 Weeks) | Determine the cause of the leak and repair the transformer. Replenish oil reserve to appropriate levels. Only qualified personnel should complete the repair work.<br><br>Provide additional light fixtures to increase illumination levels in the substation room, as provided in the BNBC.<br><br>Provide cable joints with PVC connections with PIB tape wound around the joint.<br><br>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 |

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| | (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. |
| Mid Term (6 Weeks) | Have a qualified electrical engineer develop an as-built single line diagram detailing key components and capacity of the electrical system. Additionally, electrical/equipment layout drawings or grounding layout drawings should be developed and made available.<br><br>Develop an Insulation Resistance Measurement Program that ensures deterioration of insulation resistance will be identified quickly. Testing should be in compliance with Inter National 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.<br><br>Remove multi looping of wiring/cables at the SDB. Each MCB should service a single circuit. |
| Long Term (6 Months) | Thermographic scanning should be part of the electrical maintenance program. 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.<br><br>Separate generator and transformer by 2-hour fire rated construction.<br><br>Have a qualified electrical engineer design a lightning protection system according to the BNBC requirements. Have a licensed electrician install the designed system. |

**The recommendations for Fire Safety corrective actions are:**

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| Immediate (3 to 6 Days) | None |
| Short Term (3 Weeks) | Remove all hasps, locks, slide bolts, or other locking devices at the noted locations. Doors may be locked where the latch and lock are disengaged with one motion where the occupant load does not exceed 49 persons. Turning a door handle and disengaging a lock is considered two motions. 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. The re-entry provisions of section 6.8.3 must be met.<br><br>Remove all combustibles stored underneath the cutting tables at the noted locations. |
| Mid Term (6 Weeks) | Develop a testing and maintenance program that ensures that the operation of all exit 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 |

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| | battery powered signs shall be provided for a minimum 90 minutes once per year.<br><br>Post the occupant load for every assembly and production floor in the facility in a conspicuous space near the main exit or exit access doorway for the space.<br><br>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<br><br>Implement training in accordance with the Alliance Safety Training Curriculum, and keep record of the training with proper documentation.<br><br>Arrange for direct connection of the fire alarm system to a central monitoring station or Fire Service and Civil Defense. Until the time that monitoring can be set up, arrange a monitoring system using the 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.<br><br>Develop an emergency evacuation plan which includes all components required by the Alliance Standards, and communicate this plan to all employees. The evacuation plan shall include provisions to assist physically disabled persons, duties and responsibilities of various people and groups, interfacing between groups and fire brigade, and procedures for headcount and identification of trapped victims. A list of all employees with physical disabilities shall be kept by the Fire Service Director. The guideline can be found in the BNBC Appendix.<br><br>Fire drills are to be conducted on a quarterly basis as outlined in BNBC Part 4, Appendix A for all garment facilities. Fire drills shall be conducted under the direction of a Fire Safety Director. All other requirements for fire drills shall be conducted in accordance with BNBC Part 4, Appendix A.<br><br>Install a compliant standpipe system at required locations designed by a qualified fire protection engineer. The system should comply with the requirements of NFPA 14. Install required identification signs at the noted locations. Signage must comply with NFPA 14 Chapter 6.<br><br>Complete fire department pre-planning activities with the local Fire Service and Civil Defense.<br><br>Apply to the Chittagong development authority for issuance of Certificates of Occupancy, and pursue the matter to expedite the process.<br><br>Install signage adjacent to each stair door indicating the stair name and the floor level at the noted locations in |

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| | English and Bengali.<br><br>Obtain all necessary licenses and permits from the proper issuing authority. |
| Long Term (6 Months) | Close all openings across the span of the stairway and 10 feet on each side from the ground level to roof or 10 ft above the topmost landing.<br><br>Replace all collapsible doors and sliding gates in means of egresses with side-hinged swinging type doors of proper width and rating.<br><br>The exit point from both stairways needs to be reworked so that there is a landing on both sides of the exit door, with the door swinging in the direction of exit travel. The new swinging door location will need to be revised from the current swinging door location, and a 2-hour rating will need to be extended to the new door location.<br><br>Train and certify at least 25 percent of workers in fire fighting, first aid, and rescue by the proper authorities.<br><br>Provide opening fire protection to all unprotected openings on all the fire rated walls across the entire premises, as per Alliance Standard Part 4, Section 4.6. If these openings are not required, close them with fire rated enclosures.<br><br>Install a standpipe system at required locations designed by a qualified fire protection engineer. The system is to be compliant with the requirements of NFPA 14. The hydraulic calculations should be reviewed by the Alliance, and the review is to be completed prior to the start of work. All standpipe system installations shall be submitted for review by the Alliance prior to commencement of installation, according to 5.4.3.2.<br><br>Testing of the installation shall be conducted in accordance with NFPA 14 acceptance testing requirements. Documentation of all testing shall be submitted for review by the Alliance. Final inspection and testing of the installation shall be witnessed by the Alliance, as per clause 5.4.3.3.<br><br>Provide 2 hr fire-resistive rated construction barriers at exit enclosures. Fit outward opening, side-swinging, self-closing, non-lockable fire doors of 1.5 hr rating in all stairwell enclosures. Consult a qualified fire protection engineer to design the required rated construction barriers.<br><br>Install a pump dedicated for fire fighting or fire protection use, following the requirements of NFPA 20 as mentioned in Alliance Standard Section 5.5.1. and maintaining a minimum pressure of 4.5 bar.<br><br>Fire pump installation is to be tested for final acceptance in the presence of an Alliance representative, and a final inspection of the installation shall be conducted by the Alliance prior to final acceptance of the installation by the Alliance as per clause 5.5.5. Acceptance testing of the installation shall be in accordance with NFPA 20, 22, and 24 testing requirements. Documentation of all testing shall |

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| | be submitted to the Alliance for review prior to final acceptance by the Alliance.<br><br>Provide 1.5 hr fire protective opening assemblies in 2 hr rated exit enclosures. Exits connecting three or fewer stories shall be enclosed with a minimum 1-hr fire-resistance rating. Exits connecting four or more stories shall be enclosed with a minimum 2-hr fire-resistance rating. Exits shall be enclosed with the same fire-resistance rating as the floor penetrated, but will not need to exceed 2 hr.<br><br>Every door in required stair enclosures that serves more than 5 stories shall be provided with re-entry unless it meets the following requirements. Stair doors may be permitted to be locked from the stair (ingress) side that prevents re-entry to the floor provided at least two floors allowing re-entry to access another exit are provided, there are not more than 4 stories intervening between re-entry floors, re-entry is allowed on the top or next to top level, re-entry doors are identified as such on the stair side, and locked doors shall be identified with the nearest re-entry floors. When the discharge floor is determined to be a required re-entry floor using the above requirements, re-entry does not have to be provided back into the building on this level.<br><br>Provide fire-resistive rated construction barriers between hazard types following Table 4.4.1 of the Alliance Standard or Table 4.1.1 from BNBC Part 4. Consult a qualified fire protection engineer to design the required rated construction barrier.<br><br>Provide handrails on both side of each stairway. Provide an intermediate handrail when the stair width exceeds 2.2m (87 inch). Provide handrails at a height between the range 865 mm (34 in.) and 965 mm (38 in.).<br><br>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.<br><br>Provide an emergency power source, either by battery backup or by connecting to the emergency power system, for illuminated exit signs that comply with the Alliance standard.<br><br>Fire extinguishers are to be inspected, tested, and maintained in accordance with NFPA 10 Chapter 7.<br><br>Install appropriate means of illumination at the noted locations. The means of egress paths shall be illuminated at all times the building is occupied. Illumination shall be a minimum of 10 lux for all corridors, exit doors, and stairways. Aisles shall be provided with a minimum of 2.5 lux illumination.<br><br>Consult a structural expert to assess the condition of the structure. Repair the cracks in the slab following the expert's instructions.<br><br>Install a standpipe system at required locations designed by a qualified fire protection engineer. The system should |

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| | comply with the requirements of NFPA 14.<br><br>Install a class III standpipe system at required locations designed by a qualified fire protection engineer. The system is to be compliant with the requirements of NFPA 14. Then establish an inspection, maintenance, and testing program for the standpipe and hose system. Program must comply with the requirements of NFPA 25 Chapter 6, Table 6.1.1.2.<br><br>Develop a hot work permit program. The program must comply with the requirements of NFPA 51B. In general, this program should address the process of request and approval from authorities, necessary checks prior to approval, standby fire watch and fire fighting equipment, sounding of alarm procedure, the duration and expiry of permit and reapproval procedure, etc.<br><br>Establish written corporate and plant policies on housekeeping to ensure scheduled cleaning for floors, walls, ceilings, and 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.).<br><br>Make sure all required exit signs are illuminated continuously at all times. Exit signs may be illuminated either by lamps external to the sign or by lamps contained within the sign. The source of illumination shall provide not less 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.<br><br>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.<br><br>The duties of the Fire Safety Director shall include the following:<br><br>(1) Establish internal and external rally points and communicate these to all employees in the building.<br><br>(2) Fire department pre-planning.<br><br>(3) Conduct safety inspections as outlined in Alliance standard 13.9.<br><br>(4) Ensure all testing of fire protection equipment is conducted in accordance with Alliance standard 13.10.<br><br>Establish an inspection, maintenance, and testing program for the fire pump. The program must comply with NFPA 25. |