Name of the Factory	: **ZAHIN TEX INDUSTRIES LTD.**
Address of the Factory	: Bokran, Monipur, Gazipur, Bangladesh
Present Status of the Factory	: **Under Operation**
Structural assessment conducted by	: Alliance
Date of Structural Inspection	: 05 May 2014
Fire & Electrical assessment conducted by	: Alliance
Date of Fire & Electrical Inspection	: 23 Apr 2014

BASIC INFORMATION:

The present garment factory is comprises of a 2 Main Buildings 8 Ancillary Buildings. The following general information was noted:

i.	Building Usage Type	: Garments Factory.
ii.	Structural System	: Five story RCC main production building: The building is RCC flat plate system with isolated column footing. Single story winding prefabricated shed:The structure is a single storied PEB shed.with RCC column..
iii.	Floor System	: RCC flat plate system
iv.	Floor Area	: 1) Single story dining shed: 9000 sft, 2) Single story security shed: 1500 sft, 3) Single story childcare & canteen Shed: 3000 sft, 4) Single story fabric & finished goods warehouse shed: 25000 sft, 5) Single story fire hydrant room: 100 sft, 6) Single story wastage temporary tin shed: 300 sft, 7) Two story utility building: 3000 sft, 8) Single story maintenance & workshop shed: 500 sft..
v.	No. of Stories	: 1) Single story dining shed: Stories above grade: 1, Stories below grade: 0, 2) Single story security shed: Stories above grade: 1, Stories below grade: 0, 3) Single story childcare & canteen Shed: Stories above grade: 1, Stories below grade: 0, 4) Single story fabric & finished goods warehouse shed: Stories above grade: 1, Stories below grade: 0, 5) Single story fire hydrant room: Stories above grade: 1, Stories below grade: 0, 6) Single story wastage temporary tin shed: Stories above grade: 1, Stories below grade: 0, 7) Two story utility building: Stories above grade: 2, Stories below grade: 0, 8) Single story maintenance & workshop shed: Stories above grade: 1, Stories below grade: 0.
vi.	Construction Year	: Factory personnel informed the date of construction as follows: 1) Five story RCC main production building building with two occupied level on roof: Finished in 2002, 2) Single story dining shed: Finished in 2010, 3) Single story security shed: Finished in 2003, 4) Single story winding prefabricated shed: Finished in 2007, 5) Single story childcare & canteen Shed: Finished in 2010, 6) Single story fabric & finished goods warehouse shed: Finished in 2010, 7) Single story fire hydrant room: Under construction, 8) Single story wastage temporary tin shed: Finished in 2013, 9) Two story utility building: Finished in 2008, 10) Single story maintenance &workshop shed: Finished in 2010
vii.	Foundation Type	: isolated column footing.
viii.	Design Drawings	: Available.
ix.	Soil investigation Report	: Available
x.	Construction Materials	: RCC (brick chips).
xi.	Generator	: Unknown

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. 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. Conduct destructive core test to to validate in-situ concrete compressive strength of structural members as per to Alliance Assessment Protocol item D5 and D19.

ii. Have a qualified structural engineer prepare load plans including the information required in Section 8.20 of the Alliance Standard and have it posted in all required locations.

iii. Conduct destructive core test to to validate in-situ concrete compressive strength of structural members.

iv. Engage a qualified structural engineer to confirm and document that provisions have been made to accommodate these water tanks. If provisions have not been made, have a qualified structural engineer develop a remediation plan.

v. Have a qualified structural engineer complete an analytic evaluation of the structural impact of the addition.

vi. 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 Sections 8.19 and 8.20

vii. Engage a qualified structural engineer to confirm satisfactory structural performance of the buildings under wind loading.

viii. Engage a qualified structural engineer and assess Single story winding prefabricated shed building against seismic and wind load conditions. If there are any deficiencies, remediate accordingly.

ix. Have a qualified structural engineer complete further analysis of the structure and develop a remediation plan if required.

x. All the action items need to be completed under the guidance of a structural engineer.

xi. Have a qualified structural engineer prepare as-built documents based on the requirements of Part 8, Section 8.19 of the Alliance Standard.

xii. Adequately anchor and brace all non-structural elements to resist earthquake forces to comply with the BNBC and Alliance Standard.

xiii. Have a qualified structural engineer develop Floor Loading Plans for the RCC structure as per the requirements of Part 8 Section 8.20.5.3

xiv. Have a qualified structural engineer prepare load plans including the information required in Section 8.20 of the Alliance Standard and have it posted in all required locations.

xv. Have a qualified structural engineer prepare a load plan for each floor of the RCC building and have the floors marked for designated storage areas as per the developed load plan.

xvi. Remove the blockage from the expansion joint under the guidance of qualified structural engineer.

xvii. Remove the blockage from the expansion joint under the guidance of a qualified structural engineer.

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.

iii. Provide a protective coating on the structural elements constructed with MCAC exposed to rainfall or other sources of water. Have the protective coating approved by the Alliance or a qualified structural engineer, or provide 2% slope on the exposed surface to prevent the accumulation of water

iv. Apply for issuance of a Certificate of Occupancy and expedite the matter

The recommendations for Electrical Safety corrective actions are*:*

Immediate (3 to 6 Days)	NA
Short Term (3 Weeks)	All boxes and enclosures (including transfer switches, generators, and power panels) for emergency circuits shall be permanently marked so they will be readily identified as a component of an emergency circuit or system. The required marking can be by color code, the words “emergency system,” or any other method that identifies the box or enclosure as a component of the emergency system. Develop and implement an electrical safety program. Include key topics such as lock out tag out procedures, personal protective equipment requirements, etc. Keep records of

	completed training available on site. 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.
Mid Term (6 Weeks)	Provide earthing connection to all exposed-conductive parts (metal) related to/in close proximity to electrical equipment/installation and utility service such as metallic water/gas/steam pipes etc. such that all the metals remain at a substantially same potential of building earthing system. .Have a qualified Electrical Engineer develop an as-built single line diagram detailing key components and capacity of the electrical system. .Provide dedicated neutral for each circuit.
Long Term (6 Months)	Complete thermo graphic scans at least on a three year cycle. Thermo graphic scans should be completed in accordance with the Standard for Infrared Inspection of Electrical Systems & Rotating Equipment and NFPA70B or a comparable standard. Design documentation was not available to verify that the appropriate number of down conductors are installed based on the building size.

The recommendations for Fire Safety corrective actions are:

Immediate	N/A
Short Term	N/A
Mid Term (6 Weeks)	Post the occupant load for every assembly and production floor in a facility in a conspicuous space near the main exit or exit access doorway for the space. Develop a testing and maintenance program that ensures the operation of all exit signs is verified at least once per year. If battery-operated signs are used, these signs shall be tested on a monthly basis. Functional testing of battery powered signs shall be provided for a minimum of 30 minutes, once per year. Implement a training program with proper documentation in accordance with the Alliance Safety Training Curriculum on fire safety. 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 signs are to be tested on a monthly basis. Functional testing of battery powered signs is to be provided for a minimum of 90 minutes, once per year.

	Develop an emergency evacuation plan which includes all components required by the Alliance Standards and communicate the plan to all employees as required. Install NFPA 14-compliant identification signs at all required locations. Apply to appropriate authority for the issuance of occupancy certificate and expedite the matter. Complete fire department pre-planning activities with the local Fire Service and Civil Defense in accordance with Alliance Standards. Install signage adjacent to each stair door indicating the stairway name and the floor level at the noted locations.
Long Term (6 Months)	Provide a shaft enclosure of required rating by constructing the enclosure with rated material of required thickness. Protect the openings of shaft enclosure by providing rated opening protectives according to Alliance Standards. To satisfy the stair width requirement, reduce the occupant load from 2nd floor or provide additional stair. Existing stair can serve for 558 occupants only as per Alliance Standard Part 6 Section 6.5. Replace all collapsible, sliding, roll-down gates and shutters in means of egress with side-hinged, swinging-type doors that open in the direction of egress of proper width and rating. 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. Re-entry provisions must be met. Close all openings across the span of the stairway and within 10 feet of the building side from the ground level to roof or 10 feet above the topmost landing with fire-rated construction in accordance with 6.3.1.3. Install fire rated doors and windows or fill in unprotected openings with fire resistive rated assemblies. Provide 2 hour fire-resistive rated construction barriers at exit enclosures. Fit doors that open in the direction of egress, side-swinging, self-closing, non-lockable fire doors with a 1.5 hour rating in all stairwell enclosures. Consult a qualified fire protection engineer to design the required rated construction barriers. Have a qualified engineer review the pump capacity and ensure a hydraulic calculation is done which can be supported by this pump. Also, identify all other performance data and ensure conformity to NFPA requirements. If existing fire pump is not adequate for the

	required fire protection demand, provide a new fire pump. Pull stations at egress points, smoke detectors in air handling equipment, and visual and audible devices must be spaced appropriately and directly connected to the fire alarm system for automatic activation based on occupancy type in accordance with NFPA 72 requirements. At the main building, provide 1.5 hour fire protective opening assemblies in 2 hour rated exit enclosures. Construct the required rated walls and slab for the open exit passageway. Provide rated exit passageway (i.e., protected path of egress) from the exit enclosure to the public way. The rating of the exit passageway is to be equal to the fire rating requirement of the exit that is being served and shall not be less than 1 hour fire-resistance rated. Install Class-III standpipe. Obtain hydraulic calculation for the installed standpipe system. All standpipe system installations and hydraulic calculations shall be reviewed by the Alliance. Standalone standpipe systems shall meet the local BNBC requirements with a minimum of 450 kPa (65 psi) pressure at the hydraulically most remote hose connection. 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. Train and certify at least 25 percent of workers (1372 workers of total 5488 workers) in fire fighting, first aid, and rescue by the proper authority. Keep means of egress continuously free and clear of all obstructions or impediments to full instant use in the case of fire or other emergency. Remove all locks or other devices installed on a means of egress component that would prevent any occupant from having safe egress from the building or structures. Occupied roofs shall be provided with the minimum number of exits required of a story according to Alliance Standards. It should have at least 2 exits. Provide fire-resistive rated construction barriers between hazard types in accordance with Alliance Standards. Consult a qualified fire protection engineer to design the required rated construction barrier. Repave the walking surface to make the slope of the surface 1 in 2 and keep change in elevation to less than 1/2 inch. Provide 2 hour fire barrier to separate the atrium from the adjacent space. Otherwise, use glass walls and inoperable windows and follow the requirements of Alliance Standards. Install appropriate means of illumination at the noted locations. 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 0.2 cd/m2, may also be used. The means of egress 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 2.5 lux. Install handrails on both sides of the stairway in accordance with Alliance Standards. 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. Inspect, test, and maintain fire extinguishers in accordance with NFPA 10 requirements. 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. Establish a NFPA 25-compliant inspection, maintenance, and testing program for the standpipe and hose system. Establish an inspection, maintenance, and testing program for the fire pump. The program must comply with NFPA requirements. 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.). Develop a NFPA 51B-compliant hot-work permit program. In general, this program should address the process of request and approval by authorities, necessary checks prior to approval, standby fire watch and fire fighting equipment, sounding of alarm procedure, duration and expiry of permit and re-approval procedure, etc.