Name of the Factory	: **TITAS SWEATER INDUSTRIES LTD.**
Address of the Factory	: Kashimpur Road, Gazipur, Bangladesh. Dhaka, Bangladesh
Present Status of the Factory	: **Under Operation**
Structural assessment conducted by	: Alliance
Date of Structural Inspection	: 28 May 2014
Fire & Electrical assessment conducted by	: Alliance
Date of Fire & Electrical Inspection	: 28 May 2014
BGMEA Membership No	: 3691

BASIC INFORMATION:

The present garment factory is comprises of a 1 Main Building 3 ancillary structure. The following general information was noted:

i.	Building Usage Type	: Garments Factory.
ii.	Structural System	: Concrete beam & monolithic slab system with beams spanning both directions between columns. Foundation & lateral load resisting system are moment resisting concrete frame.
iii.	Floor System	: Beam slab type in RCC Building 5" brick masonry infill between RCC structural frame elements
iv.	Floor Area	: 1,29,674 sft..
v.	No. of Stories	: 6.
vi.	Construction Year	: First 4 stories: 2003. Top 2 stories: 2008.
vii.	Foundation Type	: Isolated Spread Footing.
viii.	Design Drawings	: Available.
ix.	Soil investigation Report	: Available
x.	Construction Materials	: RCC (brick chips).
xi.	Generator	: Not Available

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. Based on results for central and edge columns, engage a qualified engineer to investigate 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. If cores are to be taken from column, it is advisable to take it from an upper level where the stresses are low for practical reasons 3 inch cores may be taken from columns). In addition, UPV shall be used to have concrete strength in sufficient number of columns in the lower tiers so that a level of confidence is achieved. The calibrated results of core tests and UPV shall be used to determine a reliable value of concrete strength in columns. The size and diameter of steel rebar in most of the columns of two lowest tiers shall be authentically determined using a Ferro scanner or similar device. In order to confirm the diameter of embedded bars as obtained from Ferro scanner, the engineer may have to remove the concrete cover in one or two locations.

ii. The compressive strength of structural elements constructed using MCAC shall be investigated by an appropriate program of in-situ testing and representative destructive testing of core samples.

iii. Engage a qualified structural engineer to develop the required documents to confirm compliance with building code. Documents must comply with Alliance Standard Part 8 Section 8.19 and 8.20.

iv. 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.

v. Engage a qualified structural engineer to develop the required documents to confirm compliance with seismic and wind requirements. Documents must comply with Alliance Standard Part 8 Section 8.19 and 8.20

vi. Engage a qualified structural engineer to confirm satisfactory structural performance of the buildings under wind loading. Compliance may be waived if the Factory Owner provides satisfactory evidence of a cyclone operations plan that includes full evacuation of the factory in advance of any approaching cyclone.

vii. Adequately anchor and brace all non-structural elements such as the rack systems to resist earthquake forces to comply with the BNBC and Alliance Standard.

viii. "Have a qualified structural engineer develop Floor Loading Plans per the requirements of Part 8 Section 8.20.5.3. "

ix. Have a qualified structural engineer prepare load plans including the information required in Section 8.20 of the Alliance Standard.

x. "Provide signage or the appropriate markings at all areas used for storage to indicate the acceptable loading limits detailed in the Load Plan (noted elsewhere)."

Long Term (6 months) : N/A

The recommendations for Electrical Safety corrective actions are*:*

Immediate (3 to 6 Days)	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.
Short Term (3 Weeks)	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. Permanently mark all boxes and enclosures (including transfer switches, generators, and power panels) for emergency circuits so they will be readily identified as a component of an emergency circuit or system. Provide two separate points earthing (grounding) provided for generator. Complete an oil analysis on applicable transformers at appropriate intervals based on voltage and power.
Mid Term (6 Weeks)	Install appropriately sized circuit breaker according existing wire size. Remove multi looping of wiring/cables at all distribution boards and switchboards. Provide appropriate type and quantity of fire fighting equipment inside the generator room for Safety. Install phase separators between terminal connections at the generator panel board. Provide electrical insulation mats in front of distribution boards. Service cable should be installed in covered trench as it is dangerous to be laid on the floor.
Long Term (6 Months)	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. 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.

The recommendations for Fire Safety corrective actions are:

Immediate (3 to 6 Days)	None
Short Term (3 Weeks)	Remove existing gates and doors in the means of egress including all locking devices. Install doors with approved panic hardware that cannot be locked in the direction of egress under any conditions.
Mid Term (6 Weeks)	Post maximum occupant load for all areas (near exit) as per Alliance Standards Part 6 Section 6.4.4 Posting of Occupant Load. Upon installation of automatic alarm system and accompanying alarm panel, arrange for direct connection to monitoring service or Fire Service and Civil Defense. If connection is not possible, until that time that it is, 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 to alert this person. Provide effective and understandable fire safety awareness training to all workers. Refer to Alliance Safety Training Curriculum. Install signage in compliance with NFPA 14 Chapter 6 (e.g. Hydraulic Design Information Sign, signage for FDC, etc.) Complete fire department pre-planning activities with the local Fire Service and Civil Defense. Fire department pre-planning means providing the fire department with a map/plan that accurately shows a building's floor plan, doors and other access points, hydrant locations, roof construction, alarm panel locations, utility shut-offs, contact information, and other important information required to most effectively fight a fire and evacuate the building.
Long Term (6 Months)	Remove existing gates and unrated doors in the means of egress. Install approved fire rated doors that are listed, permanently labeled, automatic- closing, in compatible fire rated frames with latching hardware. Factory will need to install fire rated door assemblies at all exits to stair enclosures (1.5 hour rating). Fire doors assemblies shall conform to NFPA 252, BS 476 Part 22, EN 1364-1, GB 12955-2008, or IS 3614. Part II. Doors must remain in closed position or be of self-closing type. 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 Install automatic fire alarm system with sufficient smoke/heat detectors as per NFPA 72. Automatic detectors should be tied into the fire alarm system. Alarm system should initiate occupant notification upon activation of detectors in addition to the manual fire alarm stations. All fire alarm installations shall be submitted for review by the Alliance for review prior to commencement of installation. Provide required fire rated construction for walls adjacent to exterior stairs. Fill any openings (windows, etc.) that are

	within 10 feet of the stairs with fire rated construction. Replace existing slider type exit doors with side hinged swinging type doors per Alliance Standards Part 6 Section 6.8 Doors and Gates. Signage for standpipe system shall be in compliance with NFPA 14 Chapter 6 (e.g. sign on Fire Department connection indicating STANDPIPE in 1 in lettering) Provide emergency lights in stairwells and at all exits. Confirm the light (by testing) is sufficient to emit 1 foot candle (10 lux) of light at any point in the building and 0.1 foot candle (1 lux) of light along the emergency exit path at floor level. Regular testing should be conducted and documented to confirm adherence to standards. Illumination shall be a minimum of 10 lux for all corridors, exit doors and stairways. Illumination for aisles shall be a minimum of 2.5 lux. Provide parapets or guards with a minimum height of 42 in. for all occupiable roof areas. 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.). As per Alliance Standards Part 13 Section 13.6 Housekeeping. 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 as per Alliance Standards Part 13 Section 13.1 Fire Safety Director. Develop a hot work permit program. The program must comply with the requirements of NFPA 51B as per Alliance Standards Part 13 Section 13.4 Hot Work Permit and NFPA 51B. Install handrails on both sides of all stairwells as per Alliance Standard part 6 Section 6.9 Stairs and 6.12 Handrails and Guards.