Name of the Factory : **The Civil Engineers - Sweater Unit**

Address of the Factory : Telirchala, Post- Mouchak, Kaliakore, Gazipur, Bangladesh

Present Status of the Factory : **Under Operation**

Structural assessment conducted by : Alliance

Date of Structural Inspection : 16 March 2014

Fire & Electrical assessment conducted by: Alliance

Date of Fire & Electrical Inspection : 16 June 2014

BASIC INFORMATION:

The present garment factory comprises of three main buildings in factory premise. The following general information was noted:

i.	Building Usage Type	: Garments Factory.
ii.	Structural System	: Six storied main production building: Ground floor to 3rd floor: RCC flat slab system ,4th and 5th floor: FEB Steel structure. Two storied prefab production building: FEB Steel structure, Single storied. yarn store shed: FEB Steel structure.
iii.	Floor System	: Main building: Flat slab.
iv.	Floor Area	: Six storied main production building: 62900 sft, Two storied prefab production building: 20160 sft, Single storied yarn store shed: 8000 sft
v.	No. of Stories	: Main building is six storied, Prefab production building is two storied, yarn shed is single storied.
vi.	Construction Year	: 2000
vii.	Foundation Type	: Single spread footing
viii.	Design Drawings	: Available
ix.	Soil investigation Report	: Available
x.	Construction Materials	: Reinforced Concrete (brick chips) and Mild steel.
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 : 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.

Mid Term (6 Weeks) :

i. Have a qualified structural engineer provide further analysis and investigation of the structural deficiencies. Structural engineer shall also provide remediation documents if required.

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

iii. Have a qualified structural engineer assess the durability aspects as suggested in Alliance Standard Part 7 Section 7.2 and take appropriate remedial measures.

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. Have a qualified structural engineer document compliance with the seismic and wind requirements stated in the 2006 BNBC.

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

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 Certificates of Occupancy for review.

x. 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 : NA.

The recommendations for Fire Safety corrective actions are:

Immediate	NA
Short Term (3 Weeks)	Remove all locking devices from all egress doors and means of egress components in accordance with Alliance Standard Section 6.8. If locks are required for security reasons, utilize special door locking features complying with NFPA 101. Daycare occupancies that are accessory to other occupancies shall be located on the ground floor with a maximum travel distance of 9 m (30 ft). If located on a higher floor, direct access to an exit enclosure shall be provided.

Mid Term (6 Weeks)	Arrange for direct connection of the fire alarm system to a central monitoring station or Fire Service and Civil Defense. Until that time that monitoring can be set up, arrange a monitoring system using own central detection system and personnel. A person shall be assigned to contact the fire department in the event of fire alarm activation. 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 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 as per Alliance Standard. 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 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. Impart training in accordance with Alliance Safety Training Curriculum and keep record with proper documentation. Conduct fire drills 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. Install signage adjacent to each stair door indicating the stair name and the floor level at the noted locations in Bengali and English. Complete fire department pre-planning activities with the local Fire Service and Civil Defense. Apply to Biddyut License Prodan Board for electrician license. Apply to Kalialore Upozila Porishod for issuance of occupancy certificate. 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. Install required identification signs at the noted locations. Signage must comply with NFPA 14 Chapter 6.
Long Term (6 Months)	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 hr fire-resistance rated. 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. Install standpipe system at required locations. Standpipe system must comply with NFPA 14. Replace all non-compliant doors and frames in the means of egress with doors that are listed, approved, automatic-closing, side-swinging, fire rated doors in compatible fire rated frames with latching panic hardware. Provide opening protectives at all windows and other openings on all the fire rated walls across the entire premises. Close these openings if not required. Provide fire-resistive rated assemblies at the required exit access corridors. The rated assembly should be approved and/or designed by a qualified fire protection engineer. Exit access corridors serving an occupant load exceeding 30 are to be separated by walls having a fire resistance rating of 1 hr in accordance with 4.5 unless provided with automatic sprinkler protection throughout the story or building. Window and Glass Block Assemblies are to be tested fire rating following NFPA 257. Install a pump dedicated for fire fighting or fire protection following the requirements of NFPA 20. Fire pump installation is to be tested for final acceptance in presence of Alliance and a final inspection of the installation shall be conducted by the Alliance prior to final acceptance of the installation by the Alliance. Acceptance testing of the installation shall be in accordance with NFPA 20, 22, and 24 testing requirements. Documentation of all testing shall be submitted to the Alliance for review prior to final acceptance by the Alliance. 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 fire rating requirement of the exit that is being served and shall not be less than 1 hr fire-resistance rated. Train and certify at least 25 percent of workers in fire fighting, first aid and rescue training by the proper authority. Provide fire-resistive rated construction barriers between hazard types following Table 4.4.1 of Alliance Standard or Table 4.1.1 from BNBC Part 4. Consult a qualified fire protection engineer to design the required rated construction barrier. Every door in a stair enclosure serving 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

	as to 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. Develop an emergency evacuation plan which includes duties and responsibilities of various people/groups, interfacing between groups and fire brigade, headcount and identification of trapped victims, physically disabled people and their rescue, etc. and all components required by the Alliance Standards and communicate the plan to all employees. Fire extinguishers are to be inspected, tested, and maintained in accordance with NFPA 10 Chapter 7. Repave the walking surface to make the slope of the surface 1 in 2 and keep change in elevation less than 1/2 inch. 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. Provide handrails on both side of each stairway. Provide handrail of height between the range 865 mm (34 in.) and 965 mm (38 in.). 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 sft). Limit dense deposits to 6 mm (¼ in.) and oil saturated deposits to 3.2 mm (⅛ in.). Develop a hot-work permit program. The program must comply with the requirements of NFPA 51B. Install 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. Install a pump dedicated for fire fighting or fire protection following the requirements of NFPA 20 as mentioned in Alliance Standard Section 5.5.1. Then establish an inspection, maintenance, and testing program for the fire pump. Program must comply with NFPA 25. 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. The duties of the Fire Safety Director shall include the following: (1) Establish internal and external rally points and communicate to all employees in the building. (2) Fire department pre-planning. (3) Conduct safety inspections as outlined in Alliance standard 13.9. (4) Ensure all testing of fire protection equipment is

	conducted in accordance with Alliance standard 13.10.

The recommendations for Electrical Safety corrective actions are*:*

Immediate (3 to 6 Days)	Find out cause of overheating and take proper action including replacing cable or equipment where necessary.
Short Term (3 Weeks)	Establish an inspection testing and maintenance program for the Uninterruptable Power Supply (UPS) and associated components. The program must based on the following: (1) Manufacturer's recommendations (2) Manufacturer's instruction manuals. 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. Provide two separate points earthing for generators. Need to joint cable through porcelain/PVC connectors with PIB tape wound around joint. 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 (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. Establish a routine maintenance and testing program for the emergency generator. The program shall be based on all of the following: (1) Manufacturer's recommendations (2) Manufacturer's Instruction manuals
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, including electrical equipment layout, distribution schedule, and grounding riser plan. Ensure distribution boards are metal enclosed with a dead front construction. Install distribution boards in compliant locations so that operation is not hampered due to limited access. Consult with a qualified Electrical Engineer and ensure electrical are sized according to capacity of circuit breakers. Ensure the means of identification is obtained by separate color coding, marking tape, tagging or other approved means. Provide dedicated neutral for each circuit. Power and telecommunications cables must have separate entrance.

	Provide mechanical guards for electrical equipment and wiring where necessary. Ensure Lighting fixtures are supported from the structure and seismic bracing is installed as required.
Long Term (6 Months)	Consult with a qualified electrical engineer to prepare the lighting protection system layout diagram and ensure the required numbers and appropriate spacing of vertical and horizontal conductors. Ensure the generator room properly rated and physically separated from the remainder of the building. 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.