

Summary of Preliminary Assessment on Structural, Fire and Electrical Safety

Name of the Factory	: A Plus Sweater Ltd.
Address of the Factory	: Sarifpur Road, (Maleker Bari), P. O. National, University, Gazipur Sadar, Gazipur, Bangladesh.
Present Status of the Factory	: Under Operation.
Structural Assessment Conducted by	: BUET
Date of Structural Inspection	: 7 September, 2014
Fire Assessment Conducted by	: VEC
Date of Fire Inspection	: 24 th May, 2015
Electrical Assessment Conducted by	: VEC
Date of Electrical Inspection	: 24 th May, 2015
BGMEA Membership No.	: 5744

BASIC INFORMATION:

The factory building is a 5 storied RCC structure and has reinforced concrete beam-column framing system structure. The following information was noted:

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| i. | Building Usage Type | : Sweater Factory |
| ii. | Structural System | : Beam-Column frame system |
| iii. | Floor System | : Edge beam supported RCC slab floor system |
| iv. | Floor Area | : Approximately 8,000 sq.ft per floor |
| v. | No. of Stories | : 5 Storey. |
| vi. | Construction Year | : In phases (GF to 2 nd floor in 2009 and 3 rd to 4 th floor 2013) |
| vii. | Foundation Type | : Isolated footing foundation. |
| viii. | Design Drawings | : Undated drawing recently constructed. |
| ix. | Soil Boring Report | : Available. |
| x. | Construction Materials | : Reinforced Concrete, brick aggregate. |
| xi. | Generator | : Outside of the building. |

RECOMMENDATIONS FOR CORRECTIVE ACTION:

The recommendations of corrective action for both Structural and Fire & Electrical Safety comprises in Short Term, Mid Term and Long Term basis.

The recommendations for **Structural Safety** corrective action are:

Short Term (Immediate) : None.

Mid Term (6-weeks) :

- Prepare and submit the load plan for all floors within three weeks for approval.

Long Term (6-months) :

- The consultant strongly recommend to construct As Build Drawing of the different structural elements and foundation details for the whole building since these are not available.
- The consultant strongly recommended storing any type of carton boxes, finishing materials, and fabrics in such manner so that intensity of loading does not exceed 42 psf. (2.0 KN/m²)

The recommendations for **Fire & Electrical Safety** corrective action are:

(A): Recommendations for Fire Safety corrective actions:

Summary of Preliminary Assessment on Structural, Fire and Electrical Safety

<p>Immediate</p> <p><i>(the factory should not continue to be occupied until these non-conformities have been rectified):</i></p>	<ul style="list-style-type: none"> • None.
<p>Short Term</p> <p><i>(Actions that must be incorporated into a Fire Safety Management Plan immediately (1 ~ 2 weeks) and should be a regular activity)</i></p>	<ul style="list-style-type: none"> • Factory authority should arrange fire safety training • Fire drill shall be conducted quarterly (4 times a year) under the Fire Safety Plan. A record of such drills shall be kept in writing for at least 3 years for the inspection of fire brigade whenever called for • Need to have documented fire-fighting equipment • Escape routes need to be free from any kind of obstruction • Lights in accessories storage area need to be installed with protective covers and conduits • Combustibles are to be managed with good housekeeping. Storage facilities with no air-conditioning duct shall be minimum 2.9m and when used as a storage facility there shall be a minimum clearance of one third the floor height from the ceiling to the top of the storage stack
<p>Mid Term</p> <p><i>(The remedial works indicated must be carried out within a period of 6 weeks)</i></p>	<ul style="list-style-type: none"> • Factory needs to have as built drawing with proper dimensions showing all the means of escape. • Factory need to have a valid fire license with covering full occupied area & clearly mention the coverage area in the license. • Factory needs to have a proper pre-plan for fire department. • All the exit doors need to be replaced by side swinging so that un-lockable doors can be opened easily in the direction of evacuation without the use of a key. • Walls of such opening shall have at least 2 hour fire resistance rating or close the opening with 2hr rated construction. • Chemical room or store needs to be fire separated with fire rated wall and door. • Ensure illuminated emergency light in floors, exit & stair.

Summary of Preliminary Assessment on Structural, Fire and Electrical Safety

	<ul style="list-style-type: none"> • Ensure emergency backup power for critical fire safety system in floors, exit & stair. • For Low-rise: An auto AFD and alarm system need to be installed. • For High rise building: The factory with shall be equipped with manually operated electrical fire alarm system and automatic fire alarm system. • Manually operated electrical alarm system shall be installed in a building with single or multiple call boxes located on each floor.
<p>Long Term</p> <p><i>(The remedial works indicated must be carried out within a period of 6 months)</i></p>	<ul style="list-style-type: none"> • The escape route need to provide protected paths of travel from the stair entrance at each floor level, all the way to the final exit to outside of the building. • Bonded ware house need to be separated with 2hours rated construction & 1.5 hours rated door. • Generator room needs to be fire separated with 4hr fire rated enclosure and 2hrs rated opening having direct access from outside. • Boiler room needs to be separated with 4 hours fire rated enclosure and 2hours rated door/opening. • All the exits connecting to the staircase-1 and 2 need to be protected with fire and smoke resistant enclosures and opening (1.5 hours rated enclosure and 1 hour rated door) and provide a protected route from all though the stairway to the final exits. • Ensure 2 hour fire rated walls and doors between office & linking section. • Each bay shall be considered as separate compartment and detectors shall be installed considering each bay an independent compartment. • Install automatic fire and smoke detection system throughout the building to cover every portion in the building. • Install proper standpipe system having at least 100 mm dia of standpipe. First aid hose system (38 mm nominal) shall be provided (Ref. Fire Service Standard # 9) in addition to Fire Aid Fire Fighting Appliances in existing high rise NTPA (20 m) buildings. In addition 50 mm or larger hose connection facility shall be provided. • Provide the required flow of 1900 liter/min and minimum pressure of 200 kPa for supplying first aid

Summary of Preliminary Assessment on Structural, Fire and Electrical Safety

	<p>hose (38 mm nominal) OR Hydraulically design the standpipe and hose system to get the required pressure.</p> <ul style="list-style-type: none"> • Factory need to installed Siamese connection after installation of stand pipe system, hose system and fire pump. • The front road width has to be 9m at least. • Install dedicated fire pump with backup power system & sufficient capacity for achieve required pressure in the remote place of the factory. Required for adequate pressure of hose. • Water reservoir need to design of required discharge quantity for fire-fighting.
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(B): Recommendations for Electrical Safety corrective actions:

<p>Immediate</p> <p><i>(the factory should not continue to be occupied until these non-conformities have been rectified):</i></p>	<ul style="list-style-type: none"> • Find out cause (improper cable selection, improper protective device selection, improper termination, rusted connection, heat source etc.) of insulation damage and take proper action including replacing cable or equipment where necessary.
<p>Short Term</p> <p><i>(Actions that must be incorporated into a Fire Safety Management Plan immediately (a week) and should be a regular activity</i></p>	<ul style="list-style-type: none"> • Ensure all distribution boards (including panel door) are earthed properly. • Remove all unused cables from distribution boards and make sure all necessary cables are properly terminated at its point of termination using appropriate size and type of lug. • Provide additional insulation for wiring exposed to external heat source to protect cable. • Ensure overcurrent protection device (circuit breaker/fuse) for each circuit/branch circuit. • Ensure proper earthing connections at all electrical equipment. • Clean interior components from dust and debris and seal all openings within the enclosure to prevent dust and debris from entering. • Provide provision for inspection of all earthing system and ensure inspection is being completed and documented.
<p>Mid Term</p> <p><i>(The remedial works indicated must be carried out within a period of 6 weeks)</i></p>	<ul style="list-style-type: none"> • Install appropriate number and type of safety signage at generator room. Also ensure graded rubber mats are provided in front of all distribution boards.

Summary of Preliminary Assessment on Structural, Fire and Electrical Safety

	<ul style="list-style-type: none"> • Provide Instruction board for first aid and artificial respiration in the generator room. • Ensure generator room has adequate illumination level as per standard. • Provide two separate and distinct connections of earthing for each generator. • Ensure distribution boards are installed in compliant locations in terms of height, access and surrounding weather. • Ensure switchboards and/or distribution boards have a minimum clearance of 1 m (39 in) in front. • Provide dedicated & adequate size of earthing with proper identification for each circuit from the earth bus bar of distribution boards and ensure continuous earth path is back to main building intake. • Rewire to avoid the use of multiple cables from incoming and outgoing side of MCB's/MCCB's. • Provide mechanical guards for electrical equipment where necessary. • Ensure cable joints are made in respect of conductivity, insulation and mechanical strength. • Connect all metal in the building to the building earthing system. • Ensure Lighting fixtures are supported from the structure properly. • Find out the cause (improper cable/over current selection, over loading, improper lug, improper cable joints, rusted connection, insulation damage, multiple cables at single point,) of overheating { ambient+(20⁰C-40⁰C)} and take proper action.
<p>Long Term</p> <p><i>(The remedial works indicated must be carried out within a period of 6 months)</i></p>	<ul style="list-style-type: none"> • Develop an electrical layout diagram and an as-built single line diagram detailing key components and capacity of the electrical system. • Establish a periodical Insulation and earth Resistance Measurement Program and record the related testing data. • Inspect electrical panel boards on an annual basis.

Summary of Preliminary Assessment on Structural, Fire and Electrical Safety

	<ul style="list-style-type: none">• Provide adequate means of ventilation for the generator room based on the installed equipment considering fire barriers.• Ensure distribution boards have no opening and all live internal components are concealed properly.• Provide dedicated & adequate size of neutral with proper identification for each applicable circuit.• Ensure each distribution board is provided with a circuit list and means of identification is provided as per list.• Provide proper cable terminator/connector for stranded conductors at its point of termination.• Install separate distribution boards for lighting and power circuits.• Provide individual fuse with suitable discrimination with backup fuse or miniature MCB for each 15/20A socket outlet.• Install lightning protection system on the building.
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