Name of the Factory	: Abc Garments Ltd.
Address of the Factory	: 26, New Market, Mirpur Road, Dhaka-1205, Bangladesh
Present Status of the Factory	: Under operation.
Structural Assessment Conducted by	: VEC
Date of Structural Inspection	: 29 July, 2015
Fire Assessment Conducted by	: VEC
Date of Fire Inspection	: 29 July, 2015
Electrical Assessment Conducted by	: VEC
Date of Electrical Inspection	: 29 July, 2015
BGMEA & BKMEA Membership No.	: 60 & 1836

BASIC INFORMATION:

The factory building is a three storied RCC building with beam and column system and flat slab system. The following information was noted:

i.	Building Usage Type	: Garment Factory.
ii.	Structural System	: RCC beam column system.
iii.	Floor System	: RCC Beam slab.
iv.	Floor Area	: Floor area is (6650 sft x 5) = 33250 sft for main RCC factory building.
v.	No. of Stories	: 5-stories
vi.	Construction Year	: 1976
vii.	Foundation Type	: Isolated footing (as shown in drawing and verified with soil test recommendation)
viii.	Design Drawings	: Available documents: approval plan, structural design drawing, soil test, and machine layout plan. Not available: architectural drawing, floor loading plan and material test report.
ix.	Soil Investigation Report	: Available
x.	Construction Materials	: Brick aggregate.
xi.	Generator	: Ground Floor.

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)	: 1. A Detail Engineering Assessment of Factory to be commenced
Mid Term (6-weeks)	: 1. Detail Engineering Assessment to be completed.
	2. Produce and actively manage a loading plan for all floor plates within the factory giving consideration to floor capacity and column capacity.
	3. Building engineer to check the capacity and stability of the shed and make any necessary alterations
	4. Remedial action to be undertaken to prevent the seepage of water from pipes and other sources

Long Term (6-months) : 1. A qualified structural engineer should be involved for maintenance by correcting the identified issues of dampness.

2. Continue to implement load plan.

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

(A): Recommendations for Fire Safety Corrective Actions:

Immediate (*the factory should not continue to be occupied until these non-conformities have been rectified*):	• N/A
Short Term (*Actions that must be incorporated into a Fire Safety Management Plan immediately (1 ~ 2 weeks) and should be a regular activity*	• Factory needs to be installed with protective covers and conduits in the lighting provision of storage area. (Accessories store at 1st floor and fabric store at roof.) • Kitchen area need to be equiped with fire extinguisher & Only fixed temperature type detector. • Factory needs to close the opening between dining and fabric store by 2 hours fire rated construction at roof floor of the building. • 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. • All required means of exit or exit access in buildings or areas requiring more than one exit shall be signposted. The signs shall be clearly visible at all times, where necessary supplemented by directional signs.
Mid Term (*The remedial works indicated must be carried out within a period of 6 weeks)*	• Factory needs to prepare as built drawing with floor machine layout showing means of escape with proper dimension. • 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. • Factory needs to provide handrail on both sides of all the stairways (Stair-1&2). • Factory needs to be installed with adequate illuminated emergency lighting in floors, exits & stairs. (Escape route). • Factory need to have emergency backup power for critical fire safety system with sufficient capacity & arrangement according to NTPA Guideline
Long Term (*The remedial works indicated must be carried out within a period of 6 months)*	• Factory needs to have a proper pre-plan for fire service & civil department. • Factory needs to maintain minimum width of exit 0.9 m

	and height 2m. • Factory needs to increase the width of the mentioned external steel stair at least 0.9m & accordace to 8mm per occupants. • Final exit route-1&2(Stair-1&2 route) need to be protected (2 hours rated construction with 1.5 hours rated door) at each floor level entrance including ground floor and need to be protected from the generator at ground floor by 4 hours rated construction with 2 hours rated door/opening, also need to have the protected escape route till to reach safe refuse area. • Childcare needs to be protected by 3hours fire rated construction with same rated opening from the jute/wastage storage area located at roof of the building. • Storage area need to be protected with 2 hours rated construction & 1.5 hours rated opening or doors. • Boiler room: Boiler room need to be protected with 4 hours rated construction with 2 hours rated opening / door from the working floor (iron section) of 2nd floor of the building. • Generator room: Generator room needs to be protected by 4 hours fire rated construction with 2 hours fire rated door/opening from the market located ground floor of the building and needs to have direct access from outside. • All the staircases-1,2&3 (3 numbers staircase) needs to be protected with fire and smoke resistant enclosures and opening (2 hour rated enclosure and 1.5 hour rated door)and provide the protected route from all though the stairway to the final exits. • Factory need to install centralized and automatic fire detection & alarm system on all occupied floors, including other tenanted floors of the building as per NTPA Guideline. • The factory need to install manually operated electrical fire alarm system and automatic fire alarm system with single or multiple call boxes on all occupied floors, including other tenanted floors of the building. • Factory needs to install control panel for centralized automatic smoke detection & fire alarm system according to NTPA Guideline. • Factory need to ensure the minimum pressure for standpipes supplying a 50mm or larger hose shall be at least 300 Kpa. For standpipe supplying first aid hose (38mm nominal) may have a minimum pressure of 200

	Kpa. • Factory needs to be installed with Siamese connection for to the standpipe system located outside the building and accessible to the fire department connection. • Factory needs to have dedicated fire pump with backup power system & sufficient capacity for achieve required pressure in the remote place of the factory. • Factory need to have sufficient water storage capacity to get adequate pressure to feed fire-fighting equipment and at least 1900 □ 75 = 142500 liters water storage tank.

(B): Recommendations for Electrical Safety Corrective Actions:

Immediate (*the factory should not continue to be occupied until these non-conformities have been rectified*):	• Make sure cables are not overloaded ,properly terminated using proper lug, joints are made proper way, no rusted throughout the connection, proper cable bending, no insulation damage, single cable at single point etc. to avoid temperature rise. If necessary consult with a qualified engineer and replace cable or equipment
Short Term (*Actions that must be incorporated into a Fire Safety Management Plan immediately (a week) and should be a regular activity*	• Ensure all distribution boards (including panel door) are earthed properly using appropriate type and size of cables and the earthing cables have continuity up to main earth /earthing pit. • Ensure proper earthing connections at all electrical equipment. • Isolate the panel from the electrical service and clean interior components from dust and debris. 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
Mid Term (*The remedial works indicated must be carried out within a period of 6 weeks)*	• Install appropriate number and type of safety signage and fire-fighting equipment at generator room. Also ensure graded rubber mats are provided in front of all distribution boards. • Provide Instruction board for first aid and artificial respiration in the generator room. • Provide two separate and distinct connections of earthing for each generator. • Provide dedicated & adequate size of earthing with proper identification for each circuit and ensure continuous earth path is back to main building intake. • Replace wooden boxes and panels with metal clad

	construction for mounting the lighting boards and switch controls. • Consult with a qualified electrical engineer and ensure all electrical cables are sized according to capacity of circuit breakers. • Provide adequate support or mechanical guards for electrical equipment where necessary. • Avoid flexible cables for fixed wiring unless contained in an enclosure affording mechanical protection • Ensure cable joints are made through porcelain/PVC connectors with PIB tape wound around joint in respect of conductivity, insulation and mechanical strength. • Wiring system passes through elements of building construction such as floors, walls, roofs, ceilings, partitions or cavity barriers, the openings remaining after passage of the wiring system have to seal according to the degree of fire resistance prescribed for the respective element of building construction before penetration. • Connect all metal in the building to the building earthing/grounding system such as metal rebar in concrete, metal frame of building, or metal water pipe etc. • 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. • Make sure cables are not overloaded ,properly terminated using proper lug, joints are made proper way, no rusted throughout the connection, proper cable bending, no insulation damage, single cable at single point etc. to avoid temperature rise. If necessary consult with a qualified engineer and replace cable or equipment.
Long Term (*The remedial works indicated must be carried out within a period of 6 months)*	• Have a qualified electrical engineer to 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. Also ensure that insulation resistance of power cable and earth pit resistance are “>=5 MΩ”and “<=1Ω” respectively. • Inspect electrical panel boards on an annual basis to ensure that the equipment is in good working condition. • Ensure overhead service connections to lead via roof poles or service masts made of GI pipe at least 38 mm in

	diameter having a bend at the top and installed on the outer wall. Consult with a qualified electrical engineer before completing work. • Ensure the generator room has adequate fire separation from remainder part of the main building. • Provide adequate means of ventilation for the generator room based on the installed equipment and ensure that ventilation does not impact on fire barriers, e.g. fire dampers. • Ensure appropriate generator room size in order to properly access the generator to perform routine maintenance activities. • Ensure distribution boards have no opening and all live internal components are concealed properly. • Ensure distribution boards are installed in compliant locations in terms of height, access and surrounding weather. • Provide dedicated & adequate size of neutral with proper identification for each circuit. • Ensure each distribution board is provided with a circuit list indicating current rating of circuit and size of fuse element/ breaker. Also ensure the means of identification (separate color coding, marking tape, tagging, or other approved means) of cable is provided as per circuit list. • Provide cable sockets for stranded conductors having a nominal cross sectional area 6mm². or greater or solder together all strands at the exposed ends or are crimped using suitable sleeve or ferrules for stranded conductors having a nominal cross-sectional area less than 6mm². • Install separate distribution boards for lighting and power circuits. • Consult with an expert electrical engineer to review requirements, calculate risk index, prepare drawing etc. to make sure the building is secured against lightning. • Also ensure following as per NTPA based on the building size. • i) Air termination network vertical/horizontal conductors are appropriately spaced ii) Appropriate numbers of down conductors are installed iii) Resistance of earth conductor within limit (<=10Ω).