Name of the Factory	:	Tricotex (Pvt) Ltd.
Address of the Factory	:	92/1, Senpara Parbata, Mirpur 10, Dhaka-1216 Bangladesh.
Present Status of the Factory	:	Under Operation.
Structural Assessment Conducted by	:	VEC
Date of Structural Inspection	:	31st January, 2015.
Fire Assessment Conducted by	:	VEC
Date of Fire Inspection	:	31st January, 2015.
Electrical Assessment Conducted by	:	VEC
Date of Electrical Inspection	:	31st January, 2015.
BGMEA Membership No.	:	3102

BASIC INFORMATION:

The assessed factory building is a 6-Storey RCC building and there is an ancillary single storied shed for generator room located east side of the main production building. The structural system of the building is RCC beam column slab frame structure in all floors. The following information was noted:

i.	Building Usage Type	:	Garment Factory.
ii.	Structural System	:	RCC beam column frame structure and partially masonry column at south & east periphery portion of the building.
iii.	Floor System	:	RCC beam slab.
iv.	Floor Area	:	Main building 16108 sft. ancillary 225 sft.
v.	No. of Stories	:	6- Storey.
vi.	Construction Year	:	1993-1994. (Building was built in one phase)
vii.	Foundation Type	:	Isolated footing foundation.
viii.	Design Drawings	:	Unavailable.
ix.	Soil Investigation Report	:	Unavailable.
x.	Construction Materials	:	Brick Aggregated (Identified by removing Plaster).
xi.	Generator	:	Located in an ancillary shed.

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) :

- Reduce live load at edge column (C/4) to 0 psf.
- A Detail Engineering Assessment of Factory to be commenced.

Mid Term (6-weeks) :

- Provide calculations showing the structural adequacy of all columns, taking into account the loading plans and all built structure.

Long Term (6-months) :

- Building engineer to check, collect information and produce accurate and complete as built documentation as soon as possible.

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 have marked aisles in all working floor according to 0.9m for one side seat and 1.0m for both side seat. • Factory needs to conduct fire drill quarterly (4 times a year) under the fire safety plan and needs to kept the written record of such drills for at least 3 years for the inspection of fire brigade whenever called for. • Factory need to have proper testing plan & record of fire safety equipment. • Lights in storage area needed 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 2.9 m 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. • Factory needs to ensure adequate numbers of exit signs which need to be visible from any positions and comply with the following conditions: (a) The color and design of lettering, arrows and other symbols on exit signs needs to be in high contrast with their background; (b) Words on the signs needs to be at least 150 mm with a stroke of not less 20 mm; (c) The source of illumination, contrast, intensity and luminance needs to be at least 50 lux, 0.5, 5.0 foot-candles and 0.2 cd/m2 respectively.
Mid Term (*The remedial works indicated must be*	• Factory needs to prepare as built drawing (Including machine layout) with proper dimensions showing

carried out within a period of 6 weeks)	means of escape. • Factory manager or director needs to arrange fire safety training for the workers of the factory from proper authority time to time. • 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. • Illuminated emergency light needs to be covered in all floors, exits, staircases and aisles. The intensity of illumination by means of escape lighting needs to be equal or more than 10 lux. The aisles need to be illuminated with escape lighting to a level of not less than 2.5 lux at floor level. • Emergency back-up power needs to be connected for critical fire safety system and not less than 30 minutes in case of failure of power supply.
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 department. • Final exit route-1(Stair-1 route) need to be protected by 2 hours rated construction with 1.5 hours fire rated door/opening at each floor level entrance including ground floor and need to be protected from working floor at ground floor by 2 hours rated construction with 1.5hours rated door/opening, also need to have the protected escape route till to reach safe refuse area. • Storage area need to be protected with 2 hours rated construction and 1.5 hours rated opening or doors. • Boiler needs to have a 4 hours fire resistance wall and entry also needs to have 2 hours fire rated door. • Stair-01 need to be protected with fire and smoke resistant enclosures and opening (2 hours rated enclosure and 1.5 hour rated door) and provide a protected route from all though the stairway to the final exits. Stair-2 need to be protected by closing all opening with 2 hours rated construction within 3m (both side) of the stair and fitted 1.5 hours rated doors/opening at each floor level entrance except ground floor. • 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 needs to install proper standpipe system with having at least 100 mm dia of riser. • Factory needs to install 1 riser per 1000 m2 of floor area and 38 mm diameter of fabric hoses with variable nozzle. • 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*):	• 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 $+40^0$C) and take proper action. • Find out cause (improper cable selection, improper protective device selection, improper termination, rusted connection, heat source etc.) of burning sign and take proper action including replacing cable or equipment where necessary.
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. • Isolate/make safe all unused cables first and then remove from distribution boards. If necessary make sure cables are properly terminated at its point of

	termination using appropriate size and type of lug. • 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.
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. • Ensure 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. • Rewire to avoid the use of multiple cables from incoming and outgoing side of MCB's. • Replace wooden panels with metal clad construction for switch controls. • Ensure all electrical cables are sized according to capacity of circuit breakers. • Ensure cable joints are made in respect of conductivity, insulation and mechanical strength. • Provide emergency power connection for life safety loads (fire alarm, fire pump, emergency lighting, exit signage, etc.). • Connect all metal in the building to the building earthing system.

	• 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+(20^0C-40^0C)} and take proper action.
Long Term (*The remedial works indicated must be carried out within a period of 6 months)*	• 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 switchgear and panel boards on an annual basis. • Ensure overhead service connections to the building are led via adequate size and type of service masts. • Ensure the generator room has adequate fire separation from the main building. • Ensure appropriate generator room size in order to properly access the generator to perform routine maintenance activities. • Replace distribution boards with metal enclosed body. • 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. • Install switchboards and/or panel boards in proper way or proper place to ensure safe installation. • Provide dedicated & adequate size of neutral with proper identification for each circuit. • Ensure each distribution board is provided with a circuit list and means of identification is obtained as per list. • Provide adequate support or mechanical guards for electrical wiring where necessary. • Use non-combustible material to make cable channel and provide adequate covers on cable channel.