Name of the Factory	: MAHATIR KNIT FASHION
Address of the Factory	: 97, East Isdair, Fatullah, Narayanganj, Bangladesh.
Present Status of the Factory	: Not in Operation.
Structural Assessment Conducted by	: VEC
Date of Structural Inspection	: 4th July, 2015
Fire Assessment Conducted by	: VEC
Date of Fire Inspection	: 4th July, 2015
Electrical Assessment Conducted by	: VEC
Date of Electrical Inspection	: 4th July, 2015
BKMEA Membership No.	: 1894

BASIC INFORMATION:

The building is a 4- storied dual system, RCC beam column frame structure and RCC flat plate system with RCC floor slab. The following general information were noted:

i.	Building Usage Type	: Garment Factory.
ii.	Structural System	: Dual system (RCC beam column frame and RCC flat plate).
iii.	Floor System	: RCC beam slab and flat slab floor system.
iv.	Floor Area	: Total floor area is 16000 sft.
v.	No. of Stories	: 4-Storied.
vi.	Construction Year	: 1995-1996
vii.	Foundation Type	: Unknown.
viii.	Design Drawings	: Available document: Approval drawing. Not available- Structural and architectural design drawing, soil test repot, floor load plan, as built machine layout plan, materials test report.
ix.	Soil Investigation Report	: Unavailable.
x.	Construction Materials	: Brick chips (column)
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) : None.

Mid Term (6-weeks) :

- Qualified structural Engineer to be reviewed design, loads and columns stresses in area identified above.
- Verify in-situ concrete stresses either by 100mm dia. cores or existing cylinder strength data for [the identified columns] or [100mm dia. cores from 4 columns].

Long Term (6-months) :

- Produce and actively manage a loading plan for all floor plates within the factory giving consideration to floor capacity and column capacity.

- Engage a qualified structural engineer to prepare as built structural drawing, soil test report and prepare/update calculations showing the structural adequacy of the floor system taking into account the factory design imposed loading and the as built structure.

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*):	• None.
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 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. • All the firefighting equipment's need to test with proper documents. • 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. • 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. • 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. • Potable fire extinguisher needs to be installed as an approved type and installed as per manufacturer's instruction and placed near the path of exit travel where easily accessible.
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. • Factory needs to have a valid fire license with full

	occupied area. • Fire manager/Director need to have safety training from proper authority & worker of the factory should as far as possible be trained for use fire extinguisher. • 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. • Factory needs to be installed with adequate illuminated emergency lighting in floors, exits & stairs. (Escape route). • 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)*	• Fire department pre-plan needs to be developed. • Storage area need to be protected with 2 hours rated construction and 1.5 hours rated opening or doors. • Boiler room need to be protected with 4 hours rated construction & 2 hours rated opening / door from exit-2 as well as from the finishing section located at 2nd floor. • All the exits connecting to the staircases need to be protected with fire and smoke resistant enclosures and opening i.e. 2 hours rated enclosure and 1.5 hour rated door and provide a 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 needs to install proper standpipe system having

	at least 75 mm diameter of riser 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*):	• None.
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. • Provide additional insulation for wiring exposed to external heat sources to protect cable/conduit. • Provide individual fuse with suitable discrimination with backup fuse or miniature MCB for each 15/20A socket outlet. • 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)*	• Ensure graded rubber mats are in front of all distribution boards. • Ensure switchboards and 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 and ensure continuous earth path is back to main building intake. • Rewire to ensure each incoming supply to an MCB has a dedicated supply from busbar. Avoid the use of multiple cables on outgoing side of MCB's. • 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 wiring/cables are sized according to capacity of circuit breakers. • 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. • Ensure Lighting fixtures are supported from the structure properly and if flexible cords are used to support light fixture then make sure it has enough strength to carry the weight.
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 switchgear and panel boards on an annual basis to ensure that the equipment is in good working condition. • Ensure overhead service connections to a building are achieved with covered conductor and led 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. • Replace distribution boards with metal enclosed body. • 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 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 colour coding, marking tape, tagging, or other approved means) of cable is provided as per circuit list. • Provide adequate support or mechanical guards for electrical equipment and wiring where necessary. • Use non-combustible material to make channel and provide adequate covers on cable channel. • Ensure surface/exposed wiring are run either horizontally or vertically with proper mechanical support and avoid wiring at an angle or hanging way with improper support. • 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. • Provide an emergency power generator with adequate capacity for the building. • 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)