Name of the Factory	: WARN KNIT FASHION
Address of the Factory	: Chanmari, Fatullah, Narayanganj, Bangladesh.
Present Status of the Factory	: Under Operation.
Structural Assessment Conducted by	: TUV
Date of Structural Inspection	: 6th April, 2015
Fire Assessment Conducted by	: TUV
Date of Fire Inspection	: 6th April, 2015
Electrical Assessment Conducted by	: TUV
Date of Electrical Inspection	: 6th April, 2015
BKMEA Membership No.	: 1566

BASIC INFORMATION:

The assessed factory building was a 6 storey RCC building. Only 3rd and 4th floor was occupied by WARN KNIT FASHION of this building as rental basis, whose structural system is RCC beam column frame and beam slab floor system. The following general information was noted:

i.	Building Usage Type	: Garment Factory.
ii.	Structural System	: RCC beam column and flat plate frame structure.
iii.	Floor System	: RCC beam slab and flat slab floor system.
iv.	Floor Area	: The typical plinth area is 4402 sft. and total production floor is 8804sft
v.	No. of Stories	: 6-Storey
vi.	Construction Year	: 2004.
vii.	Foundation Type	: Unknown.
viii.	Design Drawings	: Unavailable.
ix.	Soil Investigation Report	: Unavailable.
x.	Construction Materials	: Brick aggregate. (In column)
xi.	Generator	: Housed at separated 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) : None.

Mid Term (6-weeks) :

- Factory Engineer to review 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 A6 & B1.
- As-built architectural and structural drawings to be prepared and submitted for approval by appropriate authority. As part of this process the building engineer will be required to make a number of checks on the structural design as described in the following recommendation.

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.
- Building Engineer needs to check existing flat slab system. Lateral system is required to ensure stability of the 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*	• Remove all temporary items from all escape routes, aisles and passageway. • - Provide aisle marking with arrow guiding and exit signage on all Evacuation pathways or provided with overhead signage fixed at ceiling level. - Exit sign should be posted above the exit door, - It should be clearly visible at all time, - Provide directional signs wherever necessary. - All exit doors should be clearly marked for easy identification. • Factory management should check alarm call points, alarm & detection system periodically and maintained the record properly. • The hose pipe performance should be checked periodically and properly tagged. • Fire drill should be conducted quarterly (4 times a year) in existing buildings as detailed under the Fire Safety Plan & should kept record properly.
Mid Term (*The remedial works indicated must be carried out within a period of 6 weeks)*	• Replace all existing exit doors on evacuation routes, exit doors with side hinged type door, which swing outward and in the direction of travel. Swinging of the door should not constrict the width of the corridor / passage below 0.9 meter. • Remove all locking device from all egress door. All exit doors should be open-able from the side they serve without the use of a key. • Provide handrails on both side of each stairway with

	height of 0.9m measured from the nose of stair to the top of the handrail. • Doors in stair should be outward opening, side-swing, self-closing, non-lockable 1.5 hours fire rated doors in all stair way encloses. • Prepare proper plan and design for 4 hours fire rated barriers with 2 hours fire rated doors at ground floor generator room, which located at the adjacent to final evacuation route. • Prepare proper plan and design for 4 hours fire rated barriers with 2 hours fire rated doors at 3rd floor boiler, which located at the adjacent to iron section. • The egress paths should be illuminated with emergency lighting with power back-up supply & illumination should be a minimum of 10 lux for all corridors & exit doors. Aisles should be provided with a minimum 2 lux. • The stairway should be illuminated with emergency lighting with power back-up supply & illumination should be a minimum of 10 lux for stairway. • Produce design and plan for automatic detection system with automatic fire alarm. • Install Manual activation call point at all exit routes • Prepare proper design and plan for dedicated fire pump with alternate backup power supply. • Prepare plan and design for dedicated water storage tank for firefighting operation. • Power backup supply should be provided for fire alarm system. • Visual alarm should be placed at the generator room. • Obtain fire license from issuing authority • Obtain building approval from issuing authority • Implement to a single fire safety management system with approvals from all tenants in the factory building. • Obtain the boiler license from the proper issuing authority. • Obtain the boiler operator license from the proper

	issuing authority.
Long Term (*The remedial works indicated must be carried out within a period of 6 months)*	• Provide 4 hour's fire rated barriers with 2 hours fire rated doors at ground floor generator room, which located at the adjacent to final evacuation route. • Provide 4 hour's fire rated barriers with 2 hours fire rated doors at 3rd floor boiler, which located at the adjacent to iron section. • Install automatic detection system with automatic fire alarm. • Install dedicated fire pump with alternate backup power supply. • Provide dedicated storage tank for firefighting operation.

(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*	• All strands cables at exposed ends should be properly soldered / crimped. • Provide cable joints of porcelain / PVC connectors with PIB tape wound around before placing the cable in the box. • Provide proper separate earthing/grounding to generator. Ensure that generator body frame to have two separate and distinct connections to the earth / ground.
Mid Term (*The remedial works indicated must be carried out within a period of 6 weeks)*	• 1. Provide updated SLD matching the existing condition at the factory. 2. SLD to indicate exact positions of all points of switch boxes and other outlets. 3. SLD to be approved by the engineer-in-charge. • 1. Provide updated Electrical layout drawing prepared after proper locations of all outlets for lamps, fans, fixed and transportable appliances, motors etc. have 2. Drawings to indicate exact positions of all points of

	switch boxes and other outlets and match to existing conditions. 3. As built drawing to be approved by the engineer-in-charge. • All unwanted materials should be removed. • Provide rubber mats in front of distribution panels. • Provide and maintain adequate number of firefighting equipment in substation/generator room. • 1. Provide and maintain at least 10 lux illumination at floor level. 2. Provide alternate / emergency backup for illuminating the exit signs for at least 30 minutes. • Individual Fuse protection should be provided to every 15/20 A socket. • Provide suitable & non-flammable protected supports and shades for hanged light fittings/fixtures. • The electrical panels to be of metal case and should be marked with "Danger 415 Volts" and identified with proper phase marking and danger signage. • Provide cable connections with properly soldered / welded of lugs. Ensure that all the electrical connections properly secured with lugs and glands. • Select conductors with adequate sizing without exceeding permissible thermal limits for insulation. • 1. Provide separate branch circuits for separately controlled installations. 2. Avoid using joint box in all final circuits. 3. Avoid temporary joints / connections. 4. Provide separate branch circuits from MCB or fuse DB for lighting / appliances >500 W load / plug receptacles. • 1. Provide circuit diagram /circuit list with proper current ratings and fuse size. Marking for DBs identifying end use, voltage, no. of phases. 2. Ensure that all DBs should have end used load, with

	circuit list / diagram and current rating. • Seal the opening of wall at wiring passing through wall/roof/floor partitions. Ensure that all cable penetrations though walls should be adequately sealed with fire resistive elements. • Provide separate earthing connection to electrical equipment. Ensure that earth potential provided for all parts of equipment / installation (other than live parts). • Provide adequate earthing to body and doors to change over switch. Ensure that all electrical panels provided with proper and separate earth potential.
Long Term (*The remedial works indicated must be carried out within a period of 6 months)*	• Provide calibrated Ammeters / Voltmeters at distribution boards (LT/MDBs). • Provide adequate capacity of standby generator on basis of loads for essential light / AC / equipment / services. • 1. Wooden switchboards / panel boards should be replaced by non-flammable materials. 2. Prefer switchboards made of non-flammable materials. • Seal the cable entry-exit points at distribution panels with non-flammable materials. 1. Ensure that MDB panels / DBs to be vermin / damp proof. 2. Ensure all unused holes / openings in DBs to be blocked properly. • 1. Provide the ECC to meet minimum cross-sectional area as per table 4.5. 2. Ensure that connections between conductors / equipment provided to durable electrical continuity and adequate mechanical strength and protection. • Provide adequate protection against lightning depending on the probability of a stroke and acceptable risk levels.