Name of the Factory	:	Universal Sweater Ltd.
Address of the Factory	:	145, Baizid Bostami Road, Nasirabad I/A, Chittagong.
Present Status of the Factory	:	Under Operation.
Structural Assessment Conducted by	:	TUV
Date of Structural Inspection	:	25th February, 2015
Fire Assessment Conducted by	:	TUV
Date of Fire Inspection	:	25th February, 2015
Electrical Assessment Conducted by	:	TUV
Date of Electrical Inspection	:	25th February, 2015
BGMEA Membership No.	:	3822

BASIC INFORMATION:

The assessed factory was a one five Storey RCC building with steel shed on roof top and one four Storey RCC building. The two buildings are connected by a cantilever construction joint, which makes them operating as a single building. The structural system of the factory building was RCC beam column frame structure. The following information was noted:

i.	Building Usage Type	:	Sweater Factory
ii.	Structural System	:	R.C.C. Beam Column Frame.
iii.	Floor System	:	R.C.C. Beam Slab.
iv.	Floor Area	:	The typical plinth area of Segment 2 is 9604 sft. and the typical plinth area of Segment 1 is 4131 sft.The total production floor is 64,278 sft.
v.	No. of Stories	:	Segment 1: 4 Storey Segment 2: 4 Storey
vi.	Construction Year	:	Phase 1: Construction started in 2003 Phase 2: Construction started in 2009 Phase 3: Construction started in 2011
vii.	Foundation Type	:	Shallow Foundation
viii.	Design Drawings	:	Available
ix.	Soil Investigation Report	:	Available.
x.	Construction Materials	:	Stone Aggregated .(Identified by removing Plaster)
xi.	Generator	:	Adjacent to west south corner of 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) :

i. Factory Management to remove any storage loading from column supporting floors and maintain maximum live load not greater than 25.0 psf on the working floors.

ii. Factory Engineer to review design, loads and columns stresses in area identified above.

iii. Verify in situ concrete stresses either by 100mm dia. cores for C1, C2 & C3 columns.

iv. A Detail Engineering Assessment of Factory to be commenced, see attached Scope.

Mid Term (6-weeks) :

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

ii. Detail Engineering Assessment to be completed.

iii. As-built architectural and structural drawings of the building 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 inconsistencies between the structural design and the as-built construction.

Long Term (6-months) :

i. 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*	• 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. - Illuminated 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. - Signage should be uniform • 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. • Combustible materials should keep away from electrical appliances and all the lighting in storage area

	must have protecting covers and wiring must be in conduits.
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 boiler, which located at the production area. • Provide 1.5 hours fire rated door at ground floor, fished goods area for separation for other operational area. • 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 security room. • In case of openings in slab / floors, provide vertical enclosures extending above and below such openings. Walls of such openings should have at least 2 hours fire resistance rating. • 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. • Produce design and plan for automatic detection system with automatic fire alarm. • Provide adequate nos. of smoke detectors to cover the whole factory building. • 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. • Visual alarm should be placed at the generator room. • Obtain building approval from 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 boiler, which located at the production area. • Provide 4 hour's fire rated barriers with 2 hours fire rated doors at ground floor generator room, which located at the adjacent to security room. • Install automatic detection system with automatic fire alarm. • Install dedicated fire pump with alternate backup power supply. • Provide sufficient number of hose pipe with respect to area and travel distance as per RMG guideline. • Stand pipe supplying first aid hose should have minimum pressure of 200 KPa. • 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*):	• Over current protection devices (Circuit breakers) should be installed at all distribution panels.
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 and insulated. • Relocate switchboards away from gas stoves / sinks / washing area / laundry (> 2.5 m). • 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)*	• Provide adequate illumination for substation. • All unwanted materials should be removed from substation room.

	• Provide rubber mats of adequate size in front of all distribution panels. • Install smoke detection and provide firefighting equipment in the substation and generator room. • Provide and maintain clear and legible identifications numbers & names on all incoming and outgoing circuits of HT / LT panels. • Adequate number of caution boards should be kept in the substation/ transformer room. • 1. The source of illumination should be providing not less than 50 lux. • Individual Fuse protection should be provided to every 15/20 A socket. • 1. All stranded conductors > 6mm2 to be provided with cable sockets. 2. All stranded conductors < 6 mm2, at exposed end should be soldered / crimped. • 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 lugs at DB's. Ensure that all the electrical connections are properly secured with lugs and glands. • Select conductors and MCCB/MCB with adequate sizing without exceeding permissible current carrying capacity for insulation. • Avoid looping and bunch of cable at MCCB/MCB or bus bar terminal, use individual circuit and over current device for every incoming and outgoing circuit at the distribution boards. • Provide circuit diagram /circuit list with proper current ratings and fuse size, marking for DBs identifying end use load, voltage, number of phases. • Provide cable joints of porcelain / PVC connectors with PIB tape wound around before placing the cable in the box. • Seal the cable penetrations through walls adequately

	with fire resistive elements. • 1. Provide sufficient and separate earthing for HT / LT panels in substation/transformer room 2. Provide adequate number of earth electrodes. • Provide separate earthing connection to electrical equipments. Ensure that earth potential provided for all parts of equipment / installation (other than live parts) and that continuous earth connection is provided back to the main intake supply earth. • Provide adequate earthing to body and doors to all DBs. 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)*	• 1. Provide updated SLD matching the existing installation 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. 2. Drawings to indicate exact positions of all points of switch boxes and other outlets to match existing installation. 3. As built drawing to be approved by the engineer-in-charge. • Make suitable arrangements to prevent storm water to enter substation / transformer / switch rooms. • Area of substation / transformer to meet requirements of Table 4.3 of RMG Guideline; the area should be 45 m2, or relocate the substation/ transformer room. • Maintain the minimum height of 3.6 m for the substation room. Increase the height or relocate it. • Modify Area of generator room to meet requirements of Table 4.4, RMG Guideline; the area should be 60m2, or relocate the generator room. • 1. Design to have proper segregation of different end

	used loads. 2. Wiring design to have separate and distinct sub-circuits for power and heating system. 3. All DBs to be placed conveniently. 4. Wiring to be neat, tidy and located near ceiling. • Provide calibrated Ammeters / Voltmeters at distribution boards (DBs). • 1. Wooden switchboards should be replaced by non-flammable materials. 2. Prefer switchboards made of non-flammable materials. • Each circuit should have a separate neutral (use of common neutral for more than one circuit shall not be permitted). • Seal the cable entry-exit points of DB's with non-flammable materials. In addition: 1. 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 / equipments provided to durable electrical continuity and adequate mechanical strength and protection. 3. The continuous earth connection is provided back to the main intake supply earth. • Provide adequate protection against lightning depending on the probability of a strike and acceptable risk levels at roof top of building.