Name of the Factory	: DHAKA FAR EAST LTD.
Address of the Factory	: Salauddin Plaza, Sharifpur, National University, Gazipur, Bangladesh.
Present Status of the Factory	: Under Operation.
Structural Assessment Conducted by	: TUV
Date of Structural Inspection	: 4th April, 2015
Fire Assessment Conducted by	: TUV
Date of Fire Inspection	: 4th April, 2015
Electrical Assessment Conducted by	: TUV
Date of Electrical Inspection	: 4th April, 2015
BKMEA Membership No.	: 1801

BASIC INFORMATION:

The assessed factory building was a 5 storied RCC building with a partial tin shed on roof top supporting on RCC columns. The factory occupied the whole building. There was a partial vertical extension at north-west corner on roof top which is tin shed supported by RCC columns. The structural system of the building is RCC flat plate system. The following general information was noted:

i.	Building Usage Type	: Knitwear Factory.
ii.	Structural System	: R.C.C flat-slab structure with partially tin shed on roof top.
iii.	Floor System	: RCC Flat-Slab floor system.
iv.	Floor Area	: The typical plinth area of 5 storied RCC building is 2900 sft. Total operational area is 14,500 sft.
v.	No. of Stories	: 5 Storeys + partially tin shed on roof top.
vi.	Construction Year	: Phase-1 in 2007 and Phase-2 in 2014.
vii.	Foundation Type	: Shallow foundation considered as per structural drawings.
viii.	Design Drawings	: The building has approval from LGED (Local Government Engineering Dept.), Narayanganj, Sadar Upazzilla on 17th October, 2006 for 5 storey building as residential use and also has as build architectural drawings and structural drawings.
ix.	Soil Investigation Report	: Available but foundation type is not matched with the structural drawings.
x.	Construction Materials	: Brick Aggregate.(In column)
xi.	Generator	: South-west corner side 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) : 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 C1 column.

Long Term (6-months) :

- Factory Engineer to review design. Carry out any remedial actions as directed by the Building Engineer for punching capacity of slab.
- As built architectural and engineering drawing to be prepared and submitted for approval by appropriate authority. As part of this process building engineer will be required to make a number of checks on the as-built construction.
- Produce and actively manage a loading plan for all floor plates within the factory giving consideration to floor capacity and column capacity.

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*	• Direct route of access to required exits should be provided through stairway which is maintained free of combustibles. • 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. • Provide fire extinguisher at 3rd and 2nd floor and to keep the record for re filling & properly tagged. • The hose pipe performance should be checked periodically and properly tagged. • All the lighting in storage area must have protecting covers and wiring must be in conduits. • 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. • Install exit door as per plan and design. - Minimum clear width should be 0.9 meter. • 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 2 hrs fire rated barrier with 1.5 hrs fire rated openings from entry-1 to exit-1 building interior passage area to separate from rest of the 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 is located adjacent to final exit. • Prepare proper plan and design for 4 hours fire rated barriers with 2 hours fire rated doors at ground floor which located at the adjacent to finishing and ironing 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

	• Automatic alarm systems must be provided throughout the factory; the alarm must be automatically triggered on detection of a fire. • Prepare proper design and plan tfor 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 fire alarm should be place at Generator room. • Obtain the fire license with covered area from the proper issuing authority.
Long Term (*The remedial works indicated must be carried out within a period of 6 months)*	• Provide 2 hrs fire rated barrier with 1.5 hrs fire rated openings from entry-1 to exit-1 building interior passage area to separate from rest of the operational area. • Provide 4 hours fire rated barriers with 2 hours fire rated doors at ground floor generator room, which is located adjacent to final exit. • Provide 4 hours fire rated barriers with 2 hours fire rated doors at ground floor which located at the adjacent to finishing and ironing section • 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*	• None.

occupied until these non-conformities have been rectified):	
Short Term (*Actions that must be incorporated into a Fire Safety Management Plan immediately (a week) and should be a regular activity*	• Re-locate oil / fuel tanks away from control panels in generator room.
Mid Term (*The remedial works indicated must be carried out within a period of 6 weeks)*	• All unwanted materials should be removed from transformer / Generator 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. • 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. • 1. Remove all the inflammable materials from surrounding of electrical circuitry at MDBs/SDBs. 2. Ensure that all electric circuitry clean of inflammable materials. 3. Conduct periodic maintenance and maintain the records. • 1. Overhead service connections should be covered and meet the requirements mentioned in RMG Guidelines. 2. Provide supports for main service line complete with adequate insulation. • 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 proper clearance of 0.8 - 1.0 m in front of all distribution panels/switchboards. • Provide cable connections with properly soldered / welded lugs at (LT/MDB/DB/SDB)'s. Ensure that all the electrical connections are properly secured with lugs

	and glands. • 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. • Provide proper separate earthing/grounding to generator. Ensure that generator body frame to have two separate and distinct connections to the earth / ground. • 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 MDBs / 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.

	• Modify Area of generator room to meet requirements of Table 4.4, RMG Guideline; the area should be……m2, or relocate the generator room. • Provide and maintain proper clearance in all sides of generator for ease of maintenance. • Provide calibrated Ammeters / Voltmeters at distribution boards (LT/MDBs). • Relocate the MDBs with easy access. Ensure that all MDBs / SDBs should have easy accessibility. • Energy meters should be installed at convenient height (At least 1.5 m above ground) with proper protection. • Provide and maintain easy access and proper height of switchboard / panel boards (< 2m from floor level). • Power cables/ telecommunication cables / antenna cables should be laid separately. • 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 (LT/MDB/DB/SDB)'s with non-flammable materials. In addition: 1. Ensure that HT / LT panels / Switchgears 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's 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.