Name of the Factory	: ANOWARA COTTON LTD.
Address of the Factory	: 31 Issha Khan Road, Narayanganj, Bangladesh.
Present Status of the Factory	: Under Operation.
Structural Assessment Conducted by	: TUV
Date of Structural Inspection	: 13th July, 2015.
Fire Assessment Conducted by	: TUV
Date of Fire Inspection	: 13th July, 2015.
Electrical Assessment Conducted by	: TUV
Date of Electrical Inspection	: 13th July, 2015.
BKMEA Membership No.	: 935.

BASIC INFORMATION:

The assessed factory building was a 9 -Storey RCC building including one basement and one 4 storey mixed type building was in factory premises. There was a vertical extension at western side of 9 storey building at roof top. The structural system of the 9 storied building is RCC column and flat plate system and the mixed type building is ground to 2nd floor is RCC and top floor is pre-fabricated shed. In this two buildings only 9 storey building was occupied as production area and 4 storey building was occupied as laboratory and child care. All floors of building were occupied by the assessed factory as ownership basis. The following information was noted:

i.	Building Usage Type	: Garment Factory.
ii.	Structural System	: RCC flat plate system.
iii.	Floor System	: RCC flat plate slab system.
iv.	Floor Area	: The typical plinth area is 3553.42 sft. and total production floor is 34,156.08sft
v.	No. of Stories	: GF + 7 Floors (8- Storey) + One Basement.
vi.	Construction Year	: 2003.
vii.	Foundation Type	: Deep Foundation.
viii.	Design Drawings	: Available (Approval for 9-Storey plus one basement commercial building on 2nd September, 2010 from Narayanganj, Municipality)
ix.	Soil Investigation Report	: Available.
x.	Construction Materials	: Stone aggregate. (Identified by removing plaster)
xi.	Generator	: At eastern side of ground floor of different 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 identified A1 & D4 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.
- 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*):	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*	• Rearrange the evacuation pathway to ensure the minimum width.
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 2 hours fire rated self-closing door in all stair way encloses. • Prepare design for installation of fire rating smoke proof enclosure. 2 hours fire rating doors for exit should not be less than that of 4 hours fire resistance rating of the walls of the smoke proof fire rated entry lobby at all floor with other tenants. • Prepare proper plan and design for 4 hours fire rated barriers with 2 hours fire rated doors at ground floor boiler, generator room, which located at the adjacent to stair exit-02. • Prepare proper plan for 4 hours fire walls and 2 hours

	fire rated self-closing doors in basement level. • Prepare proper plan and design for 4 hours fire rated barriers with 2 hours fire rated door at ground floor generator room, which located at the adjacent to knitting section. • Produce design and plan for automatic detection system with addressable 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. • Replace existing 1 inch hose pipe with 1.5 inch hose pipe to meet the requirement of RMG guideline. • Prepare plan and design for dedicated water storage tank for firefighting operation as per RMG guideline. • Prepare proper design and plan for fire lifts equipped with approved intercommunication (including two way voice communications) with the fire command station or control room on the ground floor lobby of the building. • Complete full design and plan for providing fire command station equipped with detailed floor plans along with clearly demarcated locations of fire detection and fighting devices and through the panel board able to detect fire alarm from any floor.
Long Term (*The remedial works indicated must be carried out within a period of 6 months)*	• Install smoke proof fire rated entry lobby at emergency stairways to separate from the area of incidence. • Provide 4 hours fire rated barriers with 2 hours fire rated doors at ground floor boiler, generator & substation room, which located at the which located at the adjacent to stair exit-02. • Implement the plan for fire separation 4 hours fire walls and 2 hours fire rated self-closing doors in basement level. • Provide 4 hours fire rated barriers with 2 hours fire rated door at ground floor generator room, which located at the adjacent to knitting section. • Install automatic detection system with addressable fire alarm. • Install dedicated fire pump with alternate backup power

	supply. • Stand pipe supplying first aid hose should have minimum pressure of 200 KPa. • Provide dedicated storage tank for firefighting operation • Install fire lifts equipped with approved intercommunication (including two way voice communications) with the fire command station or control room on the ground floor lobby of the building. • Provide fire command station equipped with detailed floor plans along with clearly demarcated locations of fire detection and fighting devices and through the panel board able to detect fire alarm from any floor.

(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*	• 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)*	• Provide rubber mats of adequate size in front of all distribution panels. • Provide and maintain clear and legible identifications numbers & names on all incoming and outgoing circuits of HT / LT panels. • 1. All stranded conductors > 6mm2 to be provided with cable sockets. 2. All stranded conductors < 6 mm2, at exposed end should be soldered / crimped. • 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 proper separate earthing/grounding to generator. Ensure that generator body frame to have two separate and distinct connections to the earth / ground.
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. • Provide adequate clearance in all sides transformer for easy maintenance. • Area of substation / transformer to meet requirements of Table 4.3 of RMG Guideline; the area should be 13m2, or relocate the transformer room. • Maintain the minimum height of 3.6 m for the substation room. Increase the height or relocate it. • Provide adequate ventilation arrangements for indoor substation. • Provide 4 hour fire rated walls and doors all around the generator room on ground level. • Modify Area of generator room to meet requirements of Table 4.4, RMG Guideline; the area should be 48m2, or relocate the generator room. • Provide standby power for lifts by a self-contained generator set to be operated automatically. • Provide and maintain easy access of switchboard /

	panel boards. • 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/ 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 / 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.