Name of the Factory	:	AVRORA FASHION LTD.
Address of the Factory	:	29/B, BhaiBhai Plaza, Khilkhet, Dhaka-1229, Bangladesh.
Present Status of the Factory	:	Under Operation.
Structural Assessment Conducted by	:	VEC
Date of Structural Inspection	:	1st February, 2015
Fire Assessment Conducted by	:	VEC
Date of Fire Inspection	:	1st February, 2015
Electrical Assessment Conducted by	:	VEC
Date of Electrical Inspection	:	1st February, 2015
BKMEA Membership No.	:	1523.

BASIC INFORMATION:

The assessed factory building was a 10 Storey RCC building with a basement floor. The structural system of the building is RCC beam column frame and beam slab floor system. AVRORA FASHION LTD. is located at 6th to 9th floor and rest of the floors used by several factories. The following general information were noted:

i.	Building Usage Type	:	Garment Factory.
ii.	Structural System	:	RCC beam column frame system.
iii.	Floor System	:	RCC beam slab floor system.
iv.	Floor Area	:	Total operational floor area is 23725 sft. (6th, 7th and 8th floor each 6021 sft. and 9th floor 5662 sq. ft.)
v.	No. of Stories	:	10 Storey with a basement.
vi.	Construction Year	:	Building was built in one phases.(2000-2003)
vii.	Foundation Type	:	Mat foundation with wooden piles.
viii.	Design Drawings	:	Available: Full set of structural drawing, architectural drawing, as built drawing, soil test report Not available: floor load plan and material test report.
ix.	Soil Investigation Report	:	Available.
x.	Construction Materials	:	Stone aggregate(Column),Brick aggregate (Slab & beam)
xi.	Generator	:	At basement 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) :

- Reduce Live load in the contributory area of corner column F/4 to 20 psf from all floors.
- A Detail Engineering Assessment of Factory to be commenced,

Mid Term (6-weeks) :

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

- Detail Engineering Assessment to be completed.

Long Term (6-months) :

- 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*):	• 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 need to have proper testing plan & record of fire safety equipment. • 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 2.9m 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.
Mid Term (*The remedial works indicated must be carried out within a period of 6 weeks)*	• Factory needs to have as built drawing with proper dimensions showing all the means of escape. • The entire exit doors of staircase enclosure need to be replaced by side swinging fire rated doors so that the staircase remains free from smoke as well as the lockable doors can be opened easily in the direction of evacuation without the use of a key. • Provide handrail on both sides of 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. • Install suitable public address system having communication to all floors as well as facilities to receive messages from all floors.

Long Term (*The remedial works indicated must be carried out within a period of 6 months)*	• Factory needs to have a proper pre-plan for fire department. • The final exit-1 and final exit-2 escape routes need to have 4 hour rating for walls (enclosure) and 2 hour for door openings with the others occupancies till to reach the area of refuge. • Storage area needs to be fire protected with 2 hours rated construction & 1.5 hours rated opening or doors. • Boiler: • Factory need to protect the boiler room from the finishing section located at 6th floor of the building by 4 hours rated construction with 2 hours fire rated door/opening. • Generator and sub-station: • Generator and sub-station room needs to be fire separated with 4 hours fire rated enclosure and 2 hour rated opening having direct access from outside. • The entire exits connecting to the staircases(2 numbers staircase) need to be protected with fire and smoke resistant enclosures and opening (4 hour rated enclosure and 2 hour rated door)and provide a protected route from all though the stairway to the final exits. • Dining area and sewing section area needs to be fire protected with 2 hours rated construction & 1.5 hours rated opening or doors. • Walls enclosing the lift core shall have a fire resistance rating of 2 hours and lift car doors shall have a fire resistance rating of at least 1 hour. • Factory need to have 4 hours rating for walls (enclosure) and 2 hours for door openings fire separated & smoke proof lobby in the both of the staircase. • Factory need to have 4 hours rating for walls (enclosure) and 2 hours for door openings fire separated & smoke proof in the basement area with lobby. • 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 fire detection and alarm system in the command station at the entrance lobby of the factory premises. • Need to Install 100 mm diameter Standpipe and hose system in the factory building. • Factory need to ensure the minimum pressure for standpipes supplying a 50mm or larger hose shall be at least 300 KPa and 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 needs to have sufficient water storage capacity to get adequate pressure to feed fire-fighting equipment and at least 1900liter x 75min=142500 liters water storage tank. • Need to have fire command station to communicate with all floors at the entrance of lobby.

(B): Recommendations for Electrical Safety corrective actions:

Immediate (*the factory should not continue to be occupied until these non-conformities have been rectified*):	• Make sure all cables inside the distribution boards are properly terminated at its point of termination using appropriate size and type of lug. • Find out cause (improper cable selection, improper protective device selection, improper termination, rusted connection, heat source etc.) of burning sign and take proper action including replacing cable or equipment where necessary. • Find out the cause (improper cable/over current selection, over loading, improper lug, improper cable joints, rusted connection, insulation damage, multiple cables at single point,) of overheating (> ambient+

	40^0C) and take proper action.
Short Term (*Actions that must be incorporated into a Fire Safety Management Plan immediately (a week) and should be a regular activity*	• Provide two separate and distinct connections of earthing for each generator. • Ensure all switchboards and/or 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. • Ensure overcurrent protection device (circuit breaker/fuse) for each circuit/branch circuit. • Clean interior components from dust and debris, and 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)*	• Install appropriate number and type of fire-fighting equipment in the substation and ensure graded rubber mats are provided in front of all distribution boards. • Provide Instruction board for first aid and artificial respiration in the substation room and generator room. • Ensure in the substations room and generator room, all working place, exit light and escape light have adequate illumination level as per standard. • 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 avoid the use of multiple cables from incoming and outgoing side of MCB's. • Replace wooden boxes and panels with metal clad construction for mounting the lighting boards and switch controls. • Ensure all electrical wiring/cables are sized according to capacity of circuit breakers. • Ensure cable joints are made in respect of conductivity, insulation and mechanical strength. • Connect all metal in the building to the building earthing/grounding system.

	• Ensure Lighting fixtures are supported from the structure properly and covered where necessary. • Find out the cause (improper cable/over current selection, over loading, improper lug, improper cable joints, rusted connection, insulation damage, multiple cables at single point,) of overheating { ambient+(20^0C-40^0C)} and take proper action.
Long Term (*The remedial works indicated must be carried out within a period of 6 months)*	• Develop an electrical layout diagram detailing key components of the electrical system. • Establish a periodical Insulation and earth Resistance Measurement Program and record the related testing data. • Inspect electrical switchgear and panel boards on an annual basis to ensure that the equipment is in good working condition. • Seal the hole to prevent rain water ingress from outside. Preferably the substation should be installed on the ground, and suitable arrangements should exist to prevent the entrance of storm or flood water into the substation area. Consult with a qualified structural engineer if it is not possible to install the substation on ground floor. • Ensure the substation room has adequate fire separation from the production area/main building. • Provide adequate means of ventilation for the substation room based on the installed equipment and ensure that ventilation does not impact on fire barriers. • Ensure overhead service connections to a building are achieved via adequate service masts. • Ensure the generator room has adequate fire separation from the production area/main building. • Provide adequate means of ventilation for the generator room based on the installed equipment and ensure that ventilation does not impact on fire barrier. • Several distribution boards' are not metal. • Ensure distribution boards have no opening and all live internal components are concealed properly and all outgoing cables have minimum separation.

	• Provide dedicated & adequate size of neutral with proper identification for each circuit. • Ensure each distribution board is provided with a circuit list and means of identification is provided as per list. • Use non-combustible material to make channel and provide adequate covers on it. • Provide proper cable terminator/conductor for stranded conductors at its point of termination. • Run cable in a designated route with mechanical protection and fire sealing of floor slab and wall penetrations maintenance. • Provide readily accessible single point of disconnect for each main electrical service feed. • Install separate distribution boards for lighting and power circuits. • Install lightning protection system on the building.