Name of the Factory	:	Banga Fashion Ltd.
Address of the Factory	:	Plot# 1703-1704, Gacha, post: Gacha, Gazipur sadar, Gazipur, Dhaka.
Present Status of the Factory	:	Under Operation.
Structural Assessment Conducted by	:	ACCORD
Date of Structural Inspection	:	12th March, 2014
Fire Assessment Conducted by	:	VEC
Date of Fire Inspection	:	16th April, 2015
Electrical Assessment Conducted by	:	VEC
Date of Electrical Inspection	:	16th April, 2015
BGMEA Membership No.	:	4591

BASIC INFORMATION:

The factory building is a 6 (Six) storied Reinforced Concrete (RC) building having beam column framing system. The following information was noted:

i.	Building Usage Type	:	Garment factory.
ii.	Structural System	:	RCC beam column frame system.
iii.	Floor System	:	RCC column supported slab
iv.	Floor Area	:	Approximately 19500 sft per floor
v.	No. of Stories	:	6 Storey.
vi.	Construction Year	:	Unknown.
vii.	Foundation Type	:	Footing foundation.
viii.	Design Drawings	:	Available. (Structural design drawings are not consistent with the permit structural drawings – 4 storeys / 6 storeys.)
ix.	Soil Investigation Report	:	Available.
x.	Construction Materials	:	Unknown. (Information not available in ACCORDs report)
xi.	Generator	:	Unknown. (Information not available in ACCORDs report)

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) :

- Immediately cease all construction works.
- Reduce floor loading immediately as detailed on pages 3 and 4. Maintain current use of the floors, in remaining areas, and do not change use or increase occupation, either of which could increase loading.
- Factory Engineer to review design, loads and stresses in all columns.
- Verify insitu concrete strength either by 100mm diameter cores or existing cylinder strength data for cores from 6 columns. Verify reinforcement within as built columns.
- A Detail Engineering Assessment of Factory to be commenced, see attached Scope.
- As part of Detail Engineering Assessment, Building Engineer to commence survey of as-built structure and update drawings.

- Survey to include the verification of foundation sizes.

Mid Term (6-weeks) :

- Detail Engineering Assessment to be completed including a specific design check on the adequacy of the pad foundations and columns to carry the additional storey.
- Produce and actively manage a loading plan for all floor plates within the factory giving consideration to floor capacity and column capacity.
- Complete as-built survey and Detail Engineering Assessment.
- Produce and actively manage a loading plan for all floors within the Factory giving consideration to floor capacity and column capacity.(Refer to Item 1)
- Extent of loading within Washer and Dryer areas on 1st and 4th floors, including floor build-up, to be surveyed and capacity of floor slab to be assessed to confirm that the floor slab is designed to carry these loads.
- Produce and actively manage a loading plan for all floor plates within the factory giving consideration to floor capacity and column capacity.
- Building Engineer to review the Geotechnical (Soils) Report by comparison with the construction drawings and the size of pad foundations as constructed
- Building Engineer to confirm by calculations and records of site construction that foundation bearing is adequate -estimated bearing pressure appears to be in excess of that recommended (circa 130kN per sq m) in the Soils Report.
- Sections of plaster finish to beams to be removed to investigate if cracks penetrate the building structure.
- Produce and actively manage a loading plan for all floor plates within the factory giving consideration to floor capacity and column capacity. (Refer to Item 1)

Long Term (6-months) :

- Continue to implement load plan.
- Continue to implement load plan.
- Continue to implement load plan.
- Building Engineer to carry out design check on beams to confirm that these cracks are non-structural.
- Building Engineer to prepare Allowable Floor Loading Plans. (Refer to Item 1)
- Continue to implement load management 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*	• None.

have been rectified):	
Short Term (*Actions that must be incorporated into a Fire Safety Management Plan immediately (1 ~ 2 weeks) and should be a regular activity*	• All the firefighting equipment need to be tested with proper documents. • Lights in storage area need 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. • Fire license need to be updated for full occupied area. • All the exit doors need to be replaced by side swinging so that unlockable fire rated doors can be opened easily in the direction of evacuation without the use of a key. • Provide handrail on both sides of the stairways. • Illuminated emergency light needs to be covered in floor, exits and aisles. The intensity of illumination by means of escape lighting needs to be equal or more than 10 lux. The aisles need to be illuminated with escape lighting to a level of not less than 2.5 lux at floor level. • Emergency back-up power needs to be connected for (a) exit sign, (b) fire alarm and detection system, (c) emergency lighting, (d) automatic fire detection and alarms systems.
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. • Final exio-1and final exio-3 escape routes need to be protected by 2 hours fire rated construction with 1.5 hours rated doors/opening in each floors entrance, also need to protect from boiler room at ground floor by 4 hours fire rated construction with 2 hours fire rated doors/opening and need to provide protected paths of travel till to reach safe refuse area. • Final exit-2 escape routes need to be protected by 2 hours fire rated construction with 1.5 hours rated doors/opening in each floors entrance, also need to protect from storage area at ground floor by 2 hours fire rated construction with 1.5 hours fire rated doors/opening and need to provide protected paths of

	travel till to reach safe refuse area. • Childcare needs to be separated from accessories store with 3 hours rated construction and 3 hours rated opening or door. • Storage area needs to be protected with 2 hours rated construction & 1.5 hours rated opening or doors. • Factory needs to protect the boiler room from the final exit-1 and final exit-3 located at ground floor of the building by 4 hours rated construction with 2 hours fire rated door/opening. • The entire exits connecting to the staircase-1. 2, 3 need to be protected with fire and smoke resistant enclosures and opening (2 hours rated enclosure and 1.5 hours rated door)and provide a protected route from all though the stairway to the final exits. • 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 detection and alarm system at required location. • The Size of Standpipe should be 100 mm for standpipe and hose system for below 10 stories or building height below 33 m in accordance with the table 3.2 of NTPA guideline or BNBC 2006, Article No. 4.2.3, Page 1043. • 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 need 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 75 min=142500 liters water storage tank.

(B): Recommendations for Electrical Safety corrective actions:

Immediate (*the factory should not continue to be occupied until these non-conformities have been rectified*):	• 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*	• Ensure all distribution boards (including panel door) are earthed properly. • Ensure proper earthing connections at all electrical equipment.
Mid Term (*The remedial works indicated must be carried out within a period of 6 weeks)*	• Ensure graded rubber mats are provided in front of all distribution boards. • Fill the transformer breather with fresh Silica gel and oil cup with fresh Oil. • Provide two separate and distinct connections of earthing for each generator. • Provide dedicated & adequate size of earthing with proper identification for each circuit from the earth bus-bar of distribution boards and ensure continuous earth path is back to main building intake. • Rewire to ensure each incoming supply to an MCB has a dedicated supply from bus-bar. Avoid the use of multiple cables on outgoing side of MCB's. • Ensure all electrical cables are sized according to capacity of circuit breakers. • Ensure cable joints are made in respect of conductivity, insulation and mechanical strength. • Seal the openings remaining after wiring system passes through the elements of building construction according to the degree of fire resistance. • Connect all metal in the building to the building earthing system such as metal rebar in concrete, metal frame of building, or metal water pipe etc. • 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*	• Develop an electrical layout diagram and an as-built single line diagram detailing key components and

carried out within a period of 6 months)	capacity 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. • Ensure the substation room has adequate fire separation from the production area. • Install security measures to ensure access to the substation is restricted. • Ensure the generator room has adequate fire separation from the production area. • Ensure distribution boards have no opening and all live internal components are concealed properly. • 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. • Provide proper cable terminator/connector for stranded conductors at its point of termination. • Install separate distribution boards for lighting and power circuits. • Install lightning protection system on the building.