

Summary of Preliminary Assessment on Structural, Fire and Electrical Safety

Name of the Factory	: Anupom Fashion Wear Ltd.
Address of the Factory	: CB-288, Tamanna Complex, Main Road, Kochukhet, Dhaka Cant. Dhaka, Bangladesh.
Present Status of the Factory	: Under Operation.
Structural Assessment Conducted by	: BUET
Date of Structural Inspection	: 7 September, 2014
Fire Assessment Conducted by	: VEC
Date of Fire Inspection	: 23 rd April, 2015
Electrical Assessment Conducted by	: VEC
Date of Electrical Inspection	: 23 rd April, 2015
BGMEA Membership No.	: 3245

BASIC INFORMATION:

The factory building is a 6 storied RC structure and has reinforced concrete beam-column framing system structure. The following information was noted:

- i. Building Usage Type : Garment factory
- ii. Structural System : Beam-Column frame system
- iii. Floor System : Edge supported RC slabs (Thickness 5" approximately)
- iv. Floor Area : Approximately 10,000 sq.ft per floor
- v. No. of Stories : 6 stories
- vi. Construction Year : 1994, by Building Owner (as per verbal information)
- vii. Foundation Type : Shallow footing (As per previous drawing)
- viii. Design Drawings : The detail structural drawing is not available. (The previous drawing differs with actual construction)
- ix. Soil Boring Report : Available dated January, 2000.
- x. Construction Materials : Reinforced Concrete
- xi. Generator : At the 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) : Spalling of concrete from many places of 6th Floor (Roof) slab (especially in the western side open roof area) was observed. Rusts in slab reinforcements in this area are clearly visible. The users/owners should be vigilant about spalling of concrete in this area and take necessary actions in consultation with competent engineer immediately.
- Mid Term (6-weeks) : The factory owner has been instructed to prepare and submit a load plan for vetting. There is one storied tin shed structure having about 50'x40' plan area with brick walls all around. The entrance door was locked. It is being used as storage of Udayan Garments as per verbal information. The roof should be properly reconstructed and should be kept vacant.
- Long Term (6-months) : Detail Engineering Assessment (DEA) has to be completed in six months. Proper As-built drawing should be prepared.

The recommendations for **Fire & Electrical Safety** corrective action are:

(A): Recommendations for Fire Safety corrective actions:

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<p>Immediate</p> <p><i>(the factory should not continue to be occupied until these non-conformities have been rectified):</i></p>	<ul style="list-style-type: none"> • Collapsible gate need to be removed and maintaining the floor sloping to the angle up to the removal of gate.
<p>Short Term</p> <p><i>(Actions that must be incorporated into a Fire Safety Management Plan immediately (1 ~ 2 weeks) and should be a regular activity</i></p>	<ul style="list-style-type: none"> • Fire drill shall be conducted quarterly (4 times a year) under the Fire Safety Plan. A record of such drills shall be kept in writing for at least 3 years for the inspection of fire brigade whenever called for. • Factory need to have proper testing plan & record of fire safety equipment. • Ensure minimum width of aisles as follows: <ul style="list-style-type: none"> (a) Seats on both sides of the aisle 1 m (b) Seats on one side of the aisle 0.9 m • 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 2.9 m 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.
<p>Mid Term</p> <p><i>(The remedial works indicated must be carried out within a period of 6 weeks)</i></p>	<ul style="list-style-type: none"> • Factory needs to have as built drawing with floor machine layout showing means of escape with proper dimension. • Fire manager/Director need to have safety training from proper authority & worker of the factory should as far as possible be trained for use fire extinguisher. • All the exit doors need to be replaced by side swinging so that un-lockable doors can be opened easily in the direction of evacuation without the use of a key. • Provide suitable handrail on both sides of stairways. • Factory needs to be installed with adequate illuminated emergency lighting in floors, exits & stairs.(Escape route) • Factory need to emergency backup power for critical fire safety system (signage, fire alarm & detection system, emergency lighting, AFD and Alarm systems etc.)

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<p>Long Term</p> <p><i>(The remedial works indicated must be carried out within a period of 6 months)</i></p>	<ul style="list-style-type: none">• Factory needs to have a proper pre-plan for fire service & civil department.• Childcare need to be shifted in safe location or proper (3 hours) fire separation need to be developed.• Storage area need to be protected with 2 hours rated construction & 1.5 hours rated opening or doors.• Generator and boiler room needs to be fire separated with 4 hours fire rated enclosure and 2 hours rated opening having direct access from outside.• All the exits connecting to the staircases need to be protected with fire and smoke resistant enclosures and opening (2 hours rated enclosure and 1.5 hour 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 centralized automatic smoke detection & fire alarm system according to NTPA Guideline• 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 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 1900ltr x 75min=142500 liters water storage tank.
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(B): Recommendations for Electrical Safety corrective actions:

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<p>Immediate</p> <p><i>(the factory should not continue to be occupied until these non-conformities have been rectified):</i></p>	<ul style="list-style-type: none"> • Remove all temporary cables from distribution boards and make sure all necessary cables 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) 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°C) and take proper action.
<p>Short Term</p> <p><i>(Actions that must be incorporated into a Fire Safety Management Plan immediately (a week) and should be a regular activity</i></p>	<ul style="list-style-type: none"> • Discharge the generator exhaust to the exterior of the building in a safe location. • Ensure all distribution boards (including panel door) are earthed properly. • Ensure proper earthing connections at all electrical equipment. • Install earthing pit for the factory with adequate provision for inspection of the earthing system and ensure inspection is being completed and documented.
<p>Mid Term</p> <p><i>(The remedial works indicated must be carried out within a period of 6 weeks)</i></p>	<ul style="list-style-type: none"> • Ensure graded rubber mats are provided in front of all panel boards. • Provide Instruction boards for first aid and artificial respiration in the generator shed. • Ensure the generator shed has adequate illumination level as per standard. • Provide two separate and distinct connections of earthing for the generator. • Provide dedicated & adequate size of earthing with proper identification for each circuit from the earth busbar 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 busbar. • Avoid the use of multiple cables on outgoing side of MCB's. • Replace wooden boxes and bases with metal clad

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	<p>construction for mounting switch controls.</p> <ul style="list-style-type: none"> • Ensure all electrical cables are sized according to capacity of circuit breakers. • Provide adequate support or mechanical guards for electrical equipment where necessary. • Avoid flexible cable for fixed wiring unless contained in an enclosure affording mechanical protection. • Ensure cable joints are made in respect of conductivity, insulation and mechanical strength. • Connect all metal in the building to the building earthing system. • Ensure Lighting fixtures are supported from the structure properly. • 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+(20⁰C-40⁰C)} and take proper action.
<p>Long Term</p> <p><i>(The remedial works indicated must be carried out within a period of 6 months)</i></p>	<ul style="list-style-type: none"> • Develop an electrical layout diagram and an as-built single line diagram detailing key components and capacity of the electrical system. • Establish a periodical Insulation and earth Resistance Measurement Program and record the related testing data. • Inspect electrical panel boards on an annual basis. • Ensure overhead service connections to the building are led via adequate size and type of service masts. • Ensure underground cables for electrical distribution in the premises are encased in GI or PVC pipes and laid in earth trenches of sufficient depth as per mentioned standard. • Ensure the generator shed has adequate fire separation from the main building. • Provide adequate means of ventilation for the generator shed based on the installed equipment considering fire barriers. • Ensure appropriate generator shed size in order to

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	<p>properly access the generator to perform routine maintenance activities.</p> <ul style="list-style-type: none">• 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.• Use non-combustible material to make cable channel and provide adequate covers on cable channel.• 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.
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