

Summary of Preliminary Assessment on Structural, Fire and Electrical Safety

Name of the Factory	: Angora Fashions Ltd.
Address of the Factory	: Khokon complex, Chaydana, PO: National University, Gazipur, Bangladesh.
Present Status of the Factory	: Under Operation.
Structural Assessment Conducted by	: VEC
Date of Structural Inspection	: 4 th February, 2015
Fire Assessment Conducted by	: VEC
Date of Fire Inspection	: 4 th February, 2015
Electrical Assessment Conducted by	: VEC
Date of Electrical Inspection	: 4 th February, 2015
BGMEA Membership No.	: 4778.

BASIC INFORMATION:

The assessed factory building was a 6 storied RCC building and 45% of roof is covered by non-engineered Corrugated Iron (CI) shed. The structural system of the factory building was RCC beam column frame and beam slab floor system for GF and 1st floor, rest of the floors were RCC flat plate slab system. The building is used by several RMG factories. The factory operates in 2nd floor to 5th floor of the building. The following general information were noted:

- i. Building Usage Type : Garment Factory.
- ii. Structural System : RCC beam column frame and flat slab.
- iii. Floor System : RCC beam slab and flat plate slab.
- iv. Floor Area : Total floor area is 73,530 sft.
- v. No. of Stories : 6 Storey.
- vi. Construction Year : 2008-2009.
- vii. Foundation Type : Isolated footing foundation.
- viii. Design Drawings : Available: Partial structural design drawing (detail sections, slab drawings and proper seal and signature are not available), as built machine layout plan
Not Available: Architectural drawing, floor load plan, material test report
- ix. Soil Investigation Report : Available.
- x. Construction Materials : Brick aggregate.
- xi. Generator : Separate Structure.

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) :

- Building engineer to check the capacity and stability of the lightweight roofs and make any necessary alterations.
- Analytical report is needed to check the capacity to support roof top water tanks and boiler. Floor load plan needs to be prepared based on analytical report.
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Long Term (6-months)

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- Results of flat plate review to be input to Loading Plan.
- Water tanks to be relocated on roof over adjacent core walls. Boiler needs to be relocated at ground floor.
- Continue to implement load plan.

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

(A): Recommendations for Fire Safety corrective actions:

<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"> • None.
<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. • All the firefighting equipment's need to test with proper documents. • 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. • Factory needs to ensure adequate numbers of exit signs which need to be visible from any positions at every floor of the building.
<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 prepare as built drawing with floor machine layout showing means of escape with proper dimension. • Fire license needs to be renewed by mentioning full coverage area. • 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

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	<p>direction of evacuation without the use of a key.</p> <ul style="list-style-type: none"> • Factory needs to provide handrail on both sides of all 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.
<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. • Final exit route-1(Stair-1 route) need to be protected by 2 hours rated construction with 1.5 hours fire rated door/opening at each floor level entrance including ground floor and need to be protected from storage area (siemen warehouse) at ground floor by lobby with 4 hours rated construction with 2 hours rated door/opening, also need to have the protected escape route till to reach safe refuse area. • Final exit route-2(Stair-2 route) need to be protected by 2 hours rated construction with 1.5 hours fire rated door/opening at each floor level entrance including ground floor and need to be protected from the market at ground floor by 2 hours rated construction with 1.5 hours rated door/opening, also need to have the protected escape route till to reach safe refuse area. • Bonded ware house and accessories storage area need to be protected with 2 hours rated construction and 1.5 hours rated opening or doors with working or production area. • Boiler room needs to be fire separated with iron and finishing section and finished goods storage area by 4 hours rated construction and 2 hours rated opening. • Generator room needs to be fire separated with 4 hours fire rated enclosure and 2 hour rated opening with openings of floors windows. • All the stairs 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

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	<p>exits.</p> <ul style="list-style-type: none"> • 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. • Factory needs to install proper standpipe system with having at least 100 mm dia of riser. • Factory need to be installed by 1 riser per 1000 sqm of floor area with at least 38 mm dia of hoses • Install 1 riser per 1000 m² of floor area & Install adequate number of hose in floor area and the minimum hose diameter is 38 mm, or 1.5" preferably fabric hose with variable nozzle to be used in both of the stairways covering the floor area. • 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 install dedicated fire pump with sufficient capacity and backup power. • Factory need to have sufficient water storage capacity to get adequate pressure to feed fire-fighting equipment and at least 1900 liter/min x 75 min = 142500 liters water storage tank.
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(B): Recommendations for Electrical Safety corrective actions:

<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"> • 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"> • Ensure all distribution boards (including panel door) are earthed properly. • Remove all unused 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.

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	<ul style="list-style-type: none"> • Ensure overcurrent protection device (circuit breaker/fuse) for each circuit and branch circuit. • Clean interior components from dust and debris and seal all openings within the enclosure to prevent dust and debris from entering. • Ensure inspection of earthing system 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"> • Install appropriate number and type of safety signage at substation and generator room. Also ensure graded and adequate sized of rubber mats are provided in front of all distribution boards. • Provide Instruction board for first aid and artificial respiration in substation room and generator room. • 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 busbar of distribution boards and ensure continuous earth path is back to main building intake. • Ensure all electrical cables are sized according to capacity of circuit breakers. • Connect all metal in the building to the building earthing system. • 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°C-40°C)} 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 switchgear and panel boards on an

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	<p>annual basis.</p> <ul style="list-style-type: none">• Ensure the substation room has adequate fire separation from the production building.• Ensure the generator room has adequate fire separation from the production building.• Ensure appropriate generator room size in order to properly access the generator to perform routine maintenance activities.• 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.• Install separate distribution boards for lighting and power circuits.• Install lightning protection system on the building.
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