

Summary of Preliminary Assessment on Structural, Fire and Electrical Safety

Name of the Factory	: Aroma Fashions Ltd.
Address of the Factory	: 92, Batali Road, Enayet Bazar, Chittagong, Bangladesh.
Present Status of the Factory	: Under Operation.
Structural Assessment Conducted by	: TÜV SÜD Bangladesh (Pvt.) Ltd.
Date of Structural Inspection	: 2015-02-22
Fire Assessment Conducted by	: VERITAS Engineering & Consultant
Date of Fire Inspection	: 2015-10-06
Electrical Assessment Conducted by	: VERITAS Engineering & Consultant
Date of Electrical Inspection	: 2015-10-06
BGMEA Membership No.	: 2722

BASIC INFORMATION:

The assessed building is a 5-storey RCC building. Clifton Garments Ltd. is located on the GF, 1st and 2nd floor of the building and resides on a rental basis. The building has an extension shed at the roof floor of the building utilized as a dining shed. The structural system of the building is beam column frame and beam slab floor system. The following general information was noted:

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| 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 | : Production area is 9,000 sq. ft.(approx.) |
| v. No. of Stories | : 5 Storey + extension shed on roof top. |
| vi. Construction Year | : 1980-1982. |
| vii. Foundation Type | : Spread footing (As per structural drawing) |
| viii. Design Drawings | : Available (Signed by Authorization Committee of the 1952 Construction Act, on 15th June, 1979). |
| ix. Soil Investigation Report | : Unavailable. |
| x. Construction Materials | : Brick aggregate. (Identified by removing plaster) |
| xi. Generator | : Separate shed approx. 50 yards from factory building. |

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:

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| Short Term (Immediate) | : None. |
| Mid Term (6-weeks) | : |
| | <ul style="list-style-type: none">• Factory Engineer to review design, loads and columns stresses in area identified above.• Verify in-situ concrete stresses by 100mm dia. cores for A7 & A9 columns.• Building engineer to verify the strength and stability and connection design of the steel shed at roof level and propose remedial action as required. |

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- Identified water tank needs to be checked by building engineer to ensure whether the particular span can carry the additional load.
- 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.
 - Continue to implement load plan.
 - Carry out any remedial actions as directed by the Building Engineer regarding non engineered connection.
 - As built drawings of steel shed to be prepared.
 - Carry out any remedial actions as directed by the Building Engineer if required regarding unapproved water tank.
 - Water proofing and proper roof drainage system need to be implemented and fixing of any leaking water tank pipes needs to be performed as directed by the guidance of building engineer.

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"> • Factory needs to conduct fire drill quarterly (4 times a year) under the fire safety plan and needs to kept the written record of such drills 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. • Factory needs to have marked aisles in all working floor according to 0.9m for one side seat and 1.0m for both side seat. • 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 2.9 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

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	<p>stack.</p> <ul style="list-style-type: none"> All required means of exit or exit access in buildings or areas requiring more than one exit shall be signposted. The signs shall be clearly visible at all times, where necessary supplemented by directional signs.
<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. Factory needs to have valid fire license with the coverage of full occupied 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 direction of evacuation without the use of a key. 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"> Fire department pre-plan needs to be developed. Final exit route-1(Stair-1 and stair-2 route) need to be protected (2 hours rated construction with 1.5 hours rated door) at each floor level entrance including ground floor and need to be protected from the generator at ground floor by 4 hours rated construction with 2 hours rated door/opening, also need to have the protected escape route till to reach safe refuse area. Storage area need to be protected with 2 hours rated construction & 1.5 hours rated opening or doors. Generator: The final exits-1 need to be protected from generator room by 4 hours rated construction with 2 hours rated doors/opening till to reach safe refuse area. 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

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	<p>protected route from all though the stairway to the final 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 75 mm dia of riser. • Factory need to ensure the minimum pressure for standpipes supplying a 50mm or larger hose shall be at least 300 Kpa. For 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 need 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:

<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 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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<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"> • Provide two separate and distinct connections of earthing for each generator. • Ensure all distribution boards (including panel door) are earthed properly. • 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.
<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 and fire-fighting equipment at generator room. Also ensure graded rubber mats are provided in front of all distribution boards. • Provide Instruction board for first aid and artificial respiration in the generator room. • Ensure distribution boards have a minimum clearance of 1 m (39 in) in front. • 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 avoid the use of multiple cables from incoming and outgoing side of MCB's/MCCB's. • Ensure all electrical cables are sized according to capacity of circuit breakers. • Provide mechanical guards for electrical equipment where necessary. • Ensure cable joints are made in respect of conductivity, insulation and mechanical strength. • Connect all metal in the building to the building earthing system.

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Long Term

(The remedial works indicated must be carried out within a period of 6 months)

- 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 the generator room has adequate fire separation from the production area.
- Provide adequate means of ventilation for the generator room based on the installed equipment considering fire barriers.
- 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.
- Install circuit breaker in proper way or proper place to ensure safe installation.
- Provide dedicated & adequate size of neutral with proper identification for each applicable circuit.
- Ensure each distribution board is provided with a circuit list and means of identification is provided as per list.
- 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.