

Summary of Preliminary Assessment on Structural, Fire and Electrical Safety

Name of the Factory	: ARMAN FABRICS
Address of the Factory	: 71, B.B Road, Narayanganj, Bangladesh.
Present Status of the Factory	: Under Operation.
Structural Assessment Conducted by	: TUV
Date of Structural Inspection	: 25 th July, 2015
Fire Assessment Conducted by	: TUV
Date of Fire Inspection	: 25 th July, 2015
Electrical Assessment Conducted by	: TUV
Date of Electrical Inspection	: 25 th July, 2015
BKMEA Membership No.	: 693.

BASIC INFORMATION:

The assessed factory building was an 8 -Storey RCC building. One vertical extension had been found over roof top area at north side of this building. The structural system of the 8 storied building is RCC beam column frame and beam slab floor system. Arman Fabrics has occupied 3rd to 7th floors of this building on ownership basis. The following 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 system. |
| iv. Floor Area | : The typical plinth area is 5438 sft. and total 21,932 sft including all floors. |
| v. No. of Stories | : 8 storey. |
| vi. Construction Year | : 1990 (construction starting Year). |
| vii. Foundation Type | : Deep Foundation. |
| viii. Design Drawings | : Available (Approval for a 8-Storey Commercial building on 2nd February, 1989 from RAJUK). |
| ix. Soil Investigation Report | : Available. |
| x. Construction Materials | : Brick aggregate. (Identified by removing plaster) |
| xi. Generator | : At south-east side of ground floor at same 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 either by 100mm dia. cores or existing cylinder strength data for A1, A11 & A4 column. |
| Long Term (6-months) | : <ul style="list-style-type: none">• Produce and actively manage a loading plan for all floor plates within the factory giving consideration to floor capacity and column capacity. |

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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>	<p>N/A</p>
<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"> • Remove all temporary items from all escape routes, aisles and passageway. • Direct route of access to required exits should be provided through stairways which are maintained free of obstructions. • Provide aisle marking with arrow guiding and exit signage on all Evacuation pathways • Factory management should checked alarm call points, alarm & detection system periodically and maintained the record properly. • Provide fire extinguisher at 6th floor and to keep the record for re filling & properly tagged. • The first aid hose and standpipe performance should be checked periodically and properly tagged. • Combustible materials should keep away from electrical sources and all the lighting in storage area must have protecting covers and wiring must be in conduits. • Fire drill should be conducted quarterly (4 times a year) in existing buildings as detailed under the Fire Safety Plan & should kept record properly.
<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"> • Prepare proper plan and design for one more exit in opposite direction of stair exit. • Replace all existing exit doors on evacuation routes, exit doors with side hinged type door, which swing outward and in the direction of travel. Swinging of the door should not constrict the width of the corridor / passage below 0.9 meter. • Remove all locking device from all egress door. All exit doors should be open-able from the side they serve without the use of a key. • Provide handrails on both side of each stairway with

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	<p>height of 0.9m measured from the nose of stair to the top of the handrail.</p> <ul style="list-style-type: none">• Doors in stair should be outward opening, side-swing, self-closing, non-lockable 2 hours fire rated doors in all stair way encloses.(Also require fire rated door at the floor occupied by other tenants)• Prepare design for installation of fire rating smoke proof enclosure. 2 hours fire rating doors for exit should not be less than that of 4 hours fire resistance rating of the walls of the smoke proof enclosure.(Also require fire rated entry lobby at the floor occupied by other tenants)• Prepare proper plan and design for one more exit in opposite direction of stair exit.• Prepare proper plan and design for fire rated barrier for 4 hour fire rating separated corridor with 2 hrs fire rated door at ground floor.• Provide 2 hrs fire rated door to generator room at ground floor.• Prepare proper plan and design for 4 hours fire rated barriers with 2 hours fire rated door at 5th floor boiler room, which located at the adjacent to finishing section.• The egress paths should be illuminated with emergency lighting with power back-up supply & illumination should be a minimum of 10 lux for all corridors & exit doors. Aisles should be provided with a minimum 2 lux.• The stairway should be illuminated with emergency lighting with power back-up supply & illumination should be a minimum of 10 lux for stairway.• Produce design and plan for automatic detection system with automatic fire alarm and control panel.(Also needs to cover the floors occupied by other tenants)• Install Manual activation call point at all exit routes• An automatic alarm system must be provided throughout the factory; the alarm must be automatically triggered on detection of a fire.• Provide adequate nos. of smoke detectors to cover the whole factory building.
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	<ul style="list-style-type: none"> • Prepare proper design and plan for dedicated fire pump with alternate backup power supply. • Prepare plan and design for dedicated water storage tank for firefighting operation as per RMG guideline. • Prepare proper design and plan for fire lifts equipped with approved intercommunication (including two way voice communications) with the fire command station or control room on the ground floor lobby of the building. • Complete full design and plan for providing fire command station equipped with detailed floor plans along with clearly demarcated locations of fire detection and fighting devices and through the panel board able to detect fire alarm from any floor. • A suitable public address system should be provided for communicating to all floors as well as facilities to receive messages from all floors. • Power backup supply should be provided for fire alarm system. • Implement to a single fire safety management system with approvals from all tenants in the factory building. • Obtain the boiler license from the proper issuing authority. • Obtain the boiler operator license from the proper issuing authority.
<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"> • Implement the plan and design for one more exit to fulfill the maximum travel distance within 45 meter. • Install smoke proof enclosure at emergency stairways to separate from the area of incidence.(Also require fire rated entry lobby at the floor occupied by other tenants) • Implement the plan and design for one more exit to fulfill the requirement. • All stairway to have direct access to any designated refuge area which requires 4 hour fire rated wall with 2 hrs fire rated door at ground floor for fire separated corridor. • Provide 4 hours fire rated barriers with 2 hours fire rated door at 5th floor boiler room, which located at the adjacent to finishing section. • Install automatic detection system with automatic fire alarm control panel.(Also needs to cover the floors

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	<p>occupied by other tenants)</p> <ul style="list-style-type: none"> • Install dedicated fire pump with alternate backup power supply. • Stand pipe supplying first aid hose should have minimum pressure of 200 KPa. • Provide dedicated storage tank for firefighting operation • Install fire lifts equipped with approved intercommunication (including two way voice communications) with the fire command station or control room on the ground floor lobby of the building. • Provide fire command station equipped with detailed floor plans along with clearly demarcated locations of fire detection and fighting devices and through the panel board able to detect fire alarm from any floor.
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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"> • None.
<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"> • All strands cables at exposed ends should be properly soldered / crimped and insulated. • Provide proper separate earthing/grounding to generator. Ensure that generator body frame to have two separate and distinct connections to the earth / ground.
<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"> • All unwanted materials should be removed from generator room. • Provide rubber mats of adequate size in front of all distribution panels. • Install smoke detection and provide firefighting equipment in the substation and generator room. • The electrical panels to be of metal case and should be marked with “Danger 415 Volts” and identified with proper phase marking and danger signage. • Provide cable connections with properly soldered / welded lugs at Bus bar panel's. Ensure that all the electrical connections are properly secured with lugs

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	<p>and glands.</p> <ul style="list-style-type: none"> • Avoid looping and bunch of cable at bus bar & fuse terminal, use individual circuit and over current device for every incoming and outgoing circuit at the distribution boards. • Provide circuit diagram /circuit list with proper current ratings and fuse size, marking for DBs identifying end use load, voltage, number of phases. • Provide cable joints of porcelain / PVC connectors with PIB tape wound around before placing the cable in the box. • Provide adequate earthing to body and doors to all bus bar panels. Ensure that all electrical panels provided with proper and separate earth potential. •
<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"> • 1. Provide updated SLD matching the existing installation at the factory. 2. SLD to indicate exact positions of all points of switch boxes and other outlets. 3. SLD to be approved by the engineer-in-charge. • 1. Provide updated Electrical layout drawing prepared after proper locations of all outlets for lamps, fans, fixed and transportable appliances, motors etc. 2. Drawings to indicate exact positions of all points of switch boxes and other outlets to match existing installation. 3. As built drawing to be approved by the engineer-in-charge. • Provide adequate ventilation arrangements for indoor substation. • Provide 4 hour fire rated walls all around the generator room on ground level. • Provide and maintain proper clearance in all sides of generator for ease of maintenance. • 1. Design to have proper segregation of different end used loads.

	<ul style="list-style-type: none">2. Wiring design to have separate and distinct sub-circuits for power and heating system.3. All DBs to be placed conveniently.4. Wiring to be neat, tidy and located near ceiling.• 1. Remove all the inflammable materials from surrounding of electrical circuitry.2. Ensure that all electric circuitry clean of inflammable materials.3. Conduct periodic maintenance and maintain the records.• 1. Wooden switchboards / panel boards should be replaced by non-flammable materials.2. Prefer switchboards made of non-flammable materials.• Each circuit should have a separate neutral (use of common neutral for more than one circuit shall not be permitted).• Seal the cable entry-exit points of Bus bar panel's with non-flammable materials. In addition:<ul style="list-style-type: none">1. Ensure that HT / LT panels / Switchgears to be vermin / damp proof.2. Ensure all unused holes / openings in DBs to be blocked properly.• 1. Provide the ECC to meet minimum cross-sectional area as per table 4.5.2. Ensure that connections between conductors / equipment's provided to durable electrical continuity and adequate mechanical strength and protection.3. The continuous earth connection is provided back to the main intake supply earth.
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