

Summary of Preliminary Assessment on Structural, Fire and Electrical Safety

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| Name of the Factory | : AMANA TEXTILE |
| Address of the Factory | : Amana Complex, Masdair Gorostan, Fatullah, Narayanganj, Bangladesh. |
| Present Status of the Factory | : Under Operation. |
| Structural Assessment Conducted by | : TUV |
| Date of Structural Inspection | : 5 th May, 2015 |
| Fire Assessment Conducted by | : TUV |
| Date of Fire Inspection | : 5 th May, 2015 |
| Electrical Assessment Conducted by | : TUV |
| Date of Electrical Inspection | : 5 th May, 2015 |
| BGMEA Membership No. | : 5936 |
| BKMEA Membership No. | : 110 |

BASIC INFORMATION:

The assessed building was ten storied RCC building from ground floor to roof and there is a basement floor having beam column and flat plate with supported column framing system. The following information was noted:

- i. Building Usage Type : Garment factory.
- ii. Structural System : Basement, 8th and 9th floor – Beam slab frame
GF to 7th floor - Flat Slab Frame.
- iii. Floor System : Basement, 8th and 9th floor – Beam Slab
GF to 7th floor - Flat plate floor slab
- iv. Floor Area : Total floor area is 124,360 sft. approx.
- v. No. of Stories : 10 Storey + One basement
- vi. Construction Year : 2006 to continuing.
- vii. Foundation Type : Pile foundation.
- viii. Design Drawings : Available.
- ix. Soil Investigation Report : Available.
- x. Construction Materials : Stone Chips (Identified by removing plaster)
- xi. Generator : At 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) : None.

Mid Term (6-weeks) :

- Factory Engineer to review design, loads and columns stresses in area identified above.
- Verify insitu concrete stresses either by 100mm dia. cores or existing cylinder strength data for identified columns.

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.

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- The joint of steel structure needs to be checked by building engineer and the bracing system is required to ensure the stability of the structure.

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"> • 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"> • The minimum clear width of the pathway should be 0.9 meter • Rearrange the evacuation pathway to ensure the minimum width. • Remove all temporary items from all escape routes, aisles and passageway. • Provide aisle marking with arrow guiding and exit signage on all Evacuation pathways or provided with overhead signage fixed at ceiling level. <p>Exit sign should be posted above the exit door, It should be clearly visible at all time, Provide directional signs wherever necessary.</p> <p>All exit doors should be clearly marked for easy identification.</p> <ul style="list-style-type: none"> • Factory management should be checked alarm call points, alarm & detection system periodically and maintained the record properly. • Provide fire extinguisher at Basement 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 appliances and all the lighting in 2nd floor (Yarn store) & Basement (Yarn store) must have protecting covers and wiring must be in conduits. |
| <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"> • 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 / |

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| | <p>passage below 0.9 meter.</p> <ul style="list-style-type: none">• 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 and ramp.• Doors in stair should be outward opening, side-swing, self-closing, non-lockable 2 hours fire rated doors in all stair way encloses.• 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 fire rated entry lobby.• Prepare proper plan and design for 4 hrs fire rated barrier with 2 hrs fire rated door for generator room and substation.• Prepare proper plan and design for 4 hours fire rated barriers with 2 hours fire rated doors at ground floor generator room, which located at the adjacent to final evacuation route of stair 2 and seal all openings for knitting section at corridor.• Prepare proper plan for fire separated entry lobby, 4 hours fire walls and 2 hours fire rated self-closing doors.• Prepare proper plan and design to provide 1.5 hours fire rated door at Basement (Yarn store) for separation for other operational area.• Prepare proper plan and design for 4 hours fire rated barriers with 2 hours fire rated door at 3rd and 4th floor & ground floor boiler room.• Provide smoke and heat vents on the roof / ceiling / wall at Yarn store.• 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 |
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| | <p>should be a minimum of 10 lux for stairway.</p> <ul style="list-style-type: none"> • Produce design and plan for automatic detection system with automatic fire alarm. • Provide adequate nos. of smoke detectors to cover the whole factory building. • Prepare proper design and plan for dedicated fire pump with alternate backup power supply. • Replace existing 1 inch hose pipe replace with 1.5 inch hose pipe to meet the requirement of RMG guideline. • Prepare plan and design for dedicated water storage tank for firefighting operation. • 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. • Visual alarm should be placed at the generator room. |
| <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"> • Install smoke proof fire rated entry lobby at emergency stairways to separate from the area of incidence. • Install 4 hrs fire rated barrier with 2 hrs fire rated door for generator room and substation. • Provide 4 hours fire rated barriers with 2 hours fire rated doors at ground floor generator room, which located at the adjacent to final evacuation route of stair 2 • Implement the plan for fire separation 4 hours fire walls and 2 hours fire rated self-closing doors in basement level. • Provide 4 hours fire rated barriers with 2 hours fire rated doors at 3rd and 4th floor & ground floor boiler room. • Install automatic detection system with automatic fire alarm. • Install dedicated fire pump with alternate backup power supply. |

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| | <ul style="list-style-type: none"> • 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:

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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"> • Over current protection devices (Circuit breakers) should be installed at distribution panel. |
| <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"> • None. |
| <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"> • Refill the silica gel. Ensure that accessories of transformers like breathers, vent pipe, bushels relay, silica gel must be in order at substation. • 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. • Provide and maintain clear and legible identifications numbers & names on all incoming and outgoing circuits of HT & LT panels. • Adequate number of caution boards should be kept in the substation room. • 1. Exit signs should be illuminated either by lamps external to the sign or by lamps contained within the sign. |

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| | <p>2. The source of illumination should be providing not less than 50 lux.</p> <ul style="list-style-type: none"> • 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. • Provide cable connections with properly soldered / welded lugs at (SDB)'s. Ensure that all the electrical connections are properly secured with lugs and glands. • Avoid bunch of cable at Bus bar 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 proper separate earthing/grounding to generator. Ensure that generator body frame to have two separate and distinct connections to the earth / ground. • 1. Provide sufficient and separate earthing for HT & LT panels in substation/transformer room 2. Provide adequate number of earth electrodes. • Provide adequate earthing to body and doors to all DBs. Ensure that all electrical panels provided with proper and separate earth potential. • Provide separate earthing system for lightning protector. Ensure that this earthing should be separate from other earthing system. |
| <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 |

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| | <p>after proper locations of all outlets for lamps, fans, fixed and transportable appliances, motors etc.</p> <p>2. Drawings to indicate exact positions of all points of switch boxes and other outlets to match existing installation.</p> <p>3. As built drawing to be approved by the engineer-in-charge.</p> <ul style="list-style-type: none">• Area of substation to meet requirements of Table 4.3 of RMG Guideline; the area should be 42m², or relocate the substation room.• Maintain the minimum height of 3.6 m for the substation room. Increase the height or relocate it.• Provide 4 hour fire rated door & walls all around the transformer and generator room on ground level. <ul style="list-style-type: none">• 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.• For buildings > 20m high, provide at least one vertical shaft of 200 x 400 mm for every 1500 sq.m. floor area.• Provide standby power for lifts by a self-contained generator set to be operated automatically.• Provide and maintain easy access and proper height of panel boards (< 2m from floor level).• 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 (DB/SDB)'s with non-flammable materials. In addition:<ul style="list-style-type: none">1. Ensure that DB 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 |
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| | <p>area as per table 4.5.</p> <ol style="list-style-type: none">2. Ensure that connections between conductors / equipment 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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