

Summary of Preliminary Assessment on Structural, Fire and Electrical Safety

Name of the Factory	: Texport Limited.
Address of the Factory	: 52, shohid Tajuddin Road, Roshulbag, Mohakhali, Dhaka
Present Status of the Factory	: Under operation.
Structural Assessment Conducted by	: BUET
Date of Structural Inspection	: 28 December, 2013
Fire Assessment Conducted by	: VEC
Date of Fire Inspection	: 28 July, 2015
Electrical Assessment Conducted by	: VEC
Date of Electrical Inspection	: 28 July, 2015
BKMEA Membership No.	: 1101

BASIC INFORMATION:

Factory consist of one number of 9-storied reinforced concrete building with two number of basement remark as building-1 and One number of 7 storied reinforced concrete building remark as building-2. The following information was noted:

- i. Building Usage Type : Mostly Garment Factory.
- ii. Structural System : RCC beam column system.
- iii. Floor System : Edge supported RCC Beam slab thickness of 125 mm.
- iv. Floor Area : 1970 m² (building-1 is 1470 m² and building-2 is 500 m²)
- v. No. of Stories : One number of 09 storied reinforced concrete building with two numbers of basement floor
- vi. Construction Year : Not Available ; probably constructed in around 1990.
- vii. Foundation Type : Raft (No information is available on foundation type below the raft)
- viii. Design Drawings : Not Available
- ix. Soil Investigation Report : Not Available
- x. Construction Materials : Reinforced Concrete.
- xi. Generator : Outside the 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) | : The factory owner has been instructed to prepare and submit a load plan for vetting. Once it is submitted by the factory owner, it will be duly vetted. The factory owner should arrange displaying the approved load plan for each floor on the wall in a visible location and shall adhere to it. |
| Mid Term (6-weeks) | : Due to high stress in some columns, a Detailed Engineering Assessment (DEA) is required to be commenced immediately and completed within 6 weeks from issue this report. |

Summary of Preliminary Assessment on Structural, Fire and Electrical Safety

As built Architectural and structural drawings of the different structural elements, foundation details to be prepared for the building. As part of this process building engineer will be required to make a number of checks on the as-built construction.

As-built architectural and structural drawings to be prepared and submitted for approval by appropriate authority. As part of this process the building engineer will be required to make a number of checks on the inconsistencies between the structural design and the as-built construction.

Coring with 4 nos. 4 in. cores (3 in. when taken from column) for the building and scanning of rebar's in the GF.

Structural analysis to ascertain safety of the structure and recommending remedial measures if required.

Long Term (6-months) : N/A

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>	<p>All the firefighting equipment's need to test with proper documents.</p> <p>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> <p>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>
<p>Mid Term</p> <p><i>(The remedial works indicated must be carried out within a period of 6 weeks)</i></p>	<p>Factory needs to prepare as built drawing with floor machine layout showing means of escape with proper dimension.</p> <p>Factory Manager or Director needs to arrange fire safety training for the workers of the factory from proper authority time to time.</p> <p>Fire license needs to be updated for full occupied area.</p>

Summary of Preliminary Assessment on Structural, Fire and Electrical Safety

	<p>The entire exit doors (collapsible and steel) 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</p> <p>Factory needs to provide handrail on both sides of all the stairways.</p> <p>Factory need to provide both side hand rail at 5th floor of the adjacent floor.</p> <p>Illuminated emergency light needs to be covered in all floors, exits, staircases and aisles of all the factory buildings or sheds. The intensity of illumination by means of escape lighting needs to be equal or more than 10 lux. The aisles need to be illuminated with escape lighting to a level of not less than 2.5 lux at floor level.</p> <p>Factory need to install sufficient capacities standby generator and connected to supply power for staircase and corridor Lighting, fire lifts, standby fire pump, pressurization fans and blowers, smoke extraction and damper systems in case of failure of normal electricity supply and must having the minimum capacity to serve for 1 hour with the NTPA requirements.</p> <p>Factory need to install suitable public address system having communication to all floors as well as facilities to receive messages from all floors.</p>
<p>Long Term</p> <p><i>(The remedial works indicated must be carried out within a period of 6 months)</i></p>	<p>Factory needs to have a proper pre-plan for fire department.</p> <p>Storage area (accessories and cartoon store) needs to be protected by 2 hours fire rated construction with 1.5 hours rated opening or doors from the finishing section of 5th floor of the factory.</p> <p>Final exit route-1 & 2 need to be protected(4 hours fire rated construction with lobby and 2 hours fire rated door) at each floor level entrance and needs to have the protected route till to reach safe refuse area.</p> <p>Final exit route-3 need to be protected(2 hours rated construction with 1.5 hours rated door) at each floor level entrance & ground floors working floor, also need to have the protected route till to reach safe refuse area.</p>

Summary of Preliminary Assessment on Structural, Fire and Electrical Safety

	<p>Factory needs have the minimum ratio of ramp with the slope 1:8 ratio.</p> <p>Boiler room needs to be fire protected by 4 hour fire resistance construction with 2 hours fire rated door/opening from the finishing section located at 5th floor of the building.</p> <p>Stair-1&2 needs to be protected by 4 hours fire rated construction with lobby and 2 hours fire rated door/opening, also provide the protected route from all through the stairway to the final exits.</p> <p>Stair-3 needs to be protected by 2 hours fire rated construction with 2 hours fire rated doors at each floor level entrance and need to have the protected route till to reach safe refuse area.</p> <p>Factory needs to protect the lift with 2 hours rated enclosure & 1hour rated auto closing fire door</p> <p>Factory need to install fire lift with backup power including having 1 hour fire rated & auto closing fire door in 2 hours fire rated lift core with backup power & having minimum capacity of 545 kgs.</p> <p>Stair-1&2 needs to be protected by 4 hours fire resistant and smoke proof lobby (4 hours rated enclosure and 2 hour rated door) at each floor entrance and provide the protected route from all through the stairway to the final exits.</p> <p>Factory needs to be protected the basement area by 4 hours fire rated lobby with 2 hours fire rated door from the others floors of the building.</p> <p>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.</p> <p>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.</p> <p>Factory needs to install control panel for centralized automatic smoke detection & fire alarm system according to NTPA Guideline</p>
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Summary of Preliminary Assessment on Structural, Fire and Electrical Safety

	<p>Factory needs to install proper standpipe system with having at least 100 mm dia of riser</p> <p>Factory need to be installed by 1 riser per 1000 sqm of floor area with at least 38 mm dia of hoses</p> <p>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.</p> <p>Factory needs to be installed with Siamese connection for to the standpipe system located outside the building and accessible to the fire department connection.</p> <p>Factory needs to have dedicated fire pump with backup power system & sufficient capacity for achieve required pressure in the remote place of the factory.</p> <p>Factory need to have sufficient water storage capacity to get adequate pressure to feed firefighting equipment and at least $1900 \times 75 = 142500$ liters water storage tank.</p> <p>Factory needs to establish command station on the entrance lobby and 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.</p> <p>It needs to be manned with properly trained personnel having responsibility of maintenance and operating firefighting facilities within the building.</p>
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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>	N/A
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Summary of Preliminary Assessment on Structural, Fire and Electrical Safety

<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>	<p>Discharge the generator exhaust in a safe location. Also ensure exhaust has been taken out through any other side except south.</p> <p>Provide two separate and distinct connections of earthing for the generator.</p> <p>Ensure all distribution boards (including panel door) are earthed properly.</p> <p>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.</p> <p>Ensure overcurrent protection device (circuit breaker/fuse) for each circuit or branch circuit.</p> <p>Ensure proper earthing connections at all electrical equipment. Clean interior components from dust and seal all openings within the enclosure to prevent dust and debris from entering.</p> <p>Provide provision for inspection of all earthing system and ensure inspection is being completed and documented.</p>
<p>Mid Term</p> <p><i>(The remedial works indicated must be carried out within a period of 6 weeks)</i></p>	<p>Ensure appropriate number and type of safety signage, fire-fighting equipment and graded rubber mats at required location.</p> <p>Provide Instruction board for first aid and artificial respiration in the generator room.</p> <p>Ensure distribution boards have a minimum clearance of 1 m (39 in) in front.</p> <p>Provide dedicated & adequate size of earthing with proper identification for each circuit and ensure continuous earth path is back to main building intake.</p> <p>Rewire to ensure each incoming supply to an MCB has a dedicated supply from busbar.</p> <p>Avoid the use of multiple cables on outgoing side of MCB's and busbar.</p> <p>Replace wooden base with metal clad construction for mounting the switch boards and fuse.</p> <p>Ensure all electrical cables are sized according to capacity of circuit breakers.</p>

Summary of Preliminary Assessment on Structural, Fire and Electrical Safety

	<p>Provide adequate mechanical guards for electrical wiring where necessary.</p> <p>Ensure cable joints are made in respect of conductivity, insulation and mechanical strength.</p> <p>Connect all metal in the building to the building grounding system.</p> <p>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>
<p>Long Term</p> <p><i>(The remedial works indicated must be carried out within a period of 6 months)</i></p>	<p>Develop an electrical layout diagram and an as-built single line diagram detailing key components and capacity of the electrical system.</p> <p>Establish a periodical Insulation and earth Resistance Measurement Program and record the related testing data.</p> <p>Inspect electrical panel boards on an annual basis. Provide adequate means of ventilation for the generator room based on the installed equipment considering fire barriers.</p> <p>Ensure appropriate generator room size in order to properly access the generator to perform routine maintenance activities.</p> <p>Replace distribution boards with metal enclosed body. Ensure distribution boards have no opening and all live internal components are concealed properly.</p> <p>Provide dedicated & adequate size of neutral with proper identification for each applicable circuit.</p> <p>Ensure each distribution board is provided with a circuit list and means of identification is provided as per list.</p> <p>Use noncombustible material to make channel and provide adequate covers on cable channel.</p> <p>Provide proper cable terminator/connector for stranded conductors at its point of termination.</p> <p>Run cable in a designated route with mechanical protection and fire sealing of floor slab and wall penetrations.</p>

Summary of Preliminary Assessment on Structural, Fire and Electrical Safety

	<p>Install separate distribution boards for lighting and power circuits.</p> <p>Provide individual fuse or miniature MCB for each 15/20A socket outlet.</p> <p>Install lightning protection system on the building.</p>
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