

Summary of Preliminary Assessment on Structural, Fire and Electrical Safety

Name of the Factory	: STAR FABRICS LIMITED.
Address of the Factory	: Kashipur, Hatkhola, Narayanganj.
Present Status of the Factory	: Under operation.
Structural Assessment Conducted by	: TUV
Date of Structural Inspection	: 20 May, 2015
Fire Assessment Conducted by	: VEC
Date of Fire Inspection	: 7 September, 2015
Electrical Assessment Conducted by	: VEC
Date of Electrical Inspection	: 7 September, 2015
BKMEA Membership No.	: 116

BASIC INFORMATION:

The assessed factory building is a 5- Story RCC building. The frame system of the building is beam-column frame. The following information was noted:

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| i. Building Usage Type | : Garment Factory. |
| ii. Structural System | : RCC beam column system. |
| iii. Floor System | : RCC Beam slab. |
| iv. Floor Area | : Typical Plinth area 7715 sft & total area 38575 sft |
| v. No. of Stories | : Ground Floor + 4 Floors |
| vi. Construction Year | : 1992 |
| vii. Foundation Type | : Spread foundation on arrays of timber piles. (as per structural drawing) |
| viii. Design Drawings | : Available (RAJUK, on 05th July, 1992 as a 5-Storey factory building) |
| ix. Soil Investigation Report | : Available |
| x. Construction Materials | : Brick aggregate. |
| xi. Generator | : Situated on south side of the main building in an adjacent area having 36 sft. |

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) | : 1. Factory Management to remove any storage loading from column supporting floors and maintain maximum live load not greater than 25.0 psf on the working floors. |
| | 2. Factory Engineer to review design, loads and columns stresses in area identified above. |
| | 3. Verify in situ concrete stresses by 100mm dia. cores for D5, D6, E4, B5 and H4 columns. |
| | 4. A Detail Engineering Assessment of Factory to be commenced, see attached Scope. |

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- Mid Term (6-weeks) : 1. Produce and actively manage a loading plan for all floor plates within the factory giving consideration to floor capacity and column capacity.
2. Detail Engineering Assessment to be completed
- Long Term (6-months) : 1. 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>	<p>Factory needs to ensure unobstructed means of escape i.e. aisles, exits, stairs to discharge safely from the upper floors to outside of the building during evacuation and in an emergency or unwanted situation as well.</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>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.</p> <p>All the firefighting equipment's need to test with proper documents.</p> <p>Lights in storage area needed to be installed with protective covers and conduits</p> <p>Combustibles are to be managed with good housekeeping. Storage facilities with no air-conditioning duct need to be at least 2.9 m and when used as a storage facility there needs to have 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>Potable fire extinguisher needs to be installed as an approved type and installed as per manufacturer's instruction and placed near the path of exit travel where easily accessible.</p>
<p>Mid Term</p> <p><i>(The remedial works indicated must be carried out within a period of 6 weeks)</i></p>	<p>Need to have as built drawing with floor machine layout showing means of escape.</p> <p>Fire license needs to be updated for full occupied area.</p>

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	<p>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.</p> <p>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.</p> <p>Factory needs to provide handrail on both sides of stairways as per the requirements of NTPA guideline as well as BNBC 2006.</p> <p>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>
<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. Factory needs to maintain minimum width of exit 0.9 m and height 2 m of this factory or any existing RMG industrial buildings.</p> <p>Storage area need to be protected with 2 hours rated construction and 1.5 hours rated opening or doors. Boiler room need to be protected with 4 hours rated construction & 2 hours rated opening / door from the working floor (Finishing & Iron section) of 1st floor of the building.</p> <p>All the stairs need to be protected with fire and smoke resistant enclosures and opening (2 hours rated enclosure and 1.5 hours rated door)and provide a protected route from all though the stairway to the final exits.</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> <p>Factory need to be installed by 1 riser per 1000 sqm of floor area with at least 38 mm dia of fabric hose with variable nozzle.</p>

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	<p>Factory need to install standard standpipe, hose and fire pump system to ensure required hose pressure as per NTPA Guideline.</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 install dedicated fire pump with sufficient capacity and backup power as per NTPA Guideline.</p> <p>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.</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>	<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>Find out cause (improper cable selection, improper protective device selection, improper termination, rusted connection etc.) of burning sign/insulation damage and take proper action including replacing cable or equipment where necessary.</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+ 40°C) and take proper action.</p>
<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>Ensure all distribution boards (including panel door) are earthed properly.</p> <p>Ensure proper earthing connections at all electrical equipment. Clean interior components from dust and debris 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 graded rubber mats are provided in front of all distribution boards.</p> <p>Provide dedicated & adequate size of earthing with proper identification for each circuit from the earth busbar of</p>

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	<p>distribution boards and ensure continuous earth path is back to main building intake.</p> <p>Rewire to avoid the use of multiple cables from incoming and outgoing side of MCB's/MCCB's.</p> <p>Replace wooden bases with metal enclosure for mounting the circuit breaker and fuse.</p> <p>Ensure all electrical cables are sized according to capacity of circuit breakers.</p> <p>Provide mechanical guards for electrical equipment 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 earthing 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. Ensure overhead service connections to the building are led via adequate size and type of service masts.</p> <p>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</p>

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	<p>adequate covers on cable channel.</p> <p>Ensure surface/exposed wiring are run either horizontally or vertically with proper mechanical support and avoid wiring at an angle or hanging way with improper support.</p> <p>Provide proper cable terminator/connector for stranded conductors at its point of termination.</p> <p>Provide an emergency power generator with adequate capacity for the building.</p> <p>Install separate distribution boards for lighting and power circuits.</p> <p>Install lightning protection system on the building.</p>
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