

## **Summary of Preliminary Assessment on Structural, Fire and Electrical Safety**

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Name of the Factory	: TAMAI KNIT FASHION LTD. (Building-3)
Address of the Factory	: 139, BSCIC Industrial area, Fatullah, Narayanganj, Bangladesh.
Present Status of the Factory	: Under Operation.
Structural Assessment Conducted by	: VEC
Date of Structural Inspection	: 29 <sup>th</sup> June, 2015
Fire Assessment Conducted by	: VEC
Date of Fire Inspection	: 29 <sup>th</sup> June, 2015
Electrical Assessment Conducted by	: VEC
Date of Electrical Inspection	: 29 <sup>th</sup> June, 2015
BKMEA Membership No.	: 1351

### **BASIC INFORMATION:**

There are three five storied RCC buildings in the factory premises. This report is prepared for Building - 3. Building-03 is five storied RCC structure which structural system is RCC beam column frame structure. The following general information was noted:

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|-------------------------------|---|
| i. Building Usage Type        | : Garment Factory.  |
| ii. Structural System         | : RCC beam column frame structure.  |
| iii. Floor System             | : RCC beam slab floor system.   |
| iv. Floor Area                | : Total floor area is 16,500 sft. (Approximate)   |
| v. No. of Stories             | : 5-Storey  |
| vi. Construction Year         | : 2005-2007.  |
| vii. Foundation Type          | : Pile foundation.  |
| viii. Design Drawings         | : Available document: Approval plan, structural drawing, Machine layout plan, soil test report.<br>Not available- Architectural drawing, floor load plan, material test report. |
| ix. Soil Investigation Report | : Available.  |
| x. Construction Materials     | : Brick aggregate. (In column)  |
| xi. Generator                 | : Housed 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:

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| Short Term (Immediate) | : | <ul style="list-style-type: none"><li>• A Detail Engineering Assessment of Factory to be commenced.</li></ul>  |
| Mid Term (6-weeks)     | : | <ul style="list-style-type: none"><li>• Factory Produce and actively manage a loading plan for all floor plates within the factory giving consideration to floor capacity and column capacity.</li><li>• Detail Engineering Assessment to be completed.</li><li>• Provide construction joint in between Building-02 &amp; Building-03.</li></ul> |

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Long Term (6-months) :

- 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>	<ul style="list-style-type: none"> <li>• None.</li> </ul>
<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"> <li>• All the firefighting equipment's need to test with proper documents.</li> <li>• 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.</li> <li>• Lights in storage area needed to be installed with protective covers and conduits.</li> <li>• 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.</li> <li>• 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.</li> </ul>
<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"> <li>• Factory needs to prepare as built drawing with floor machine layout showing means of escape with proper dimension.</li> <li>• Fire manager/Director need to have safety training from proper authority &amp; worker of the factory should as far as possible be trained for use fire extinguisher.</li> <li>• 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.</li> <li>• Factory needs to provide handrail on both sides of all the stairways.</li> <li>• Factory needs to be installed with adequate illuminated emergency lighting in floors, exits &amp; stairs. (Escape</li> </ul>

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	<p>route).</p> <ul style="list-style-type: none"> <li>• Factory need to have emergency backup power for critical fire safety system with sufficient capacity &amp; arrangement according to NTPA Guideline.</li> </ul>
<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"> <li>• Fire department pre-plan needs to be developed.</li> <li>• Factory needs to maintain minimum width of exit 0.9 m and height 2 m as per the requirement of NTPA guideline.</li> <li>• In building-01: Final exit route-1(Stair-1 route) also need to be protected (2 hours rated construction with 1.5 hours rated door) at each floor level entrance and need to be protected from knitting section at ground floor by 2 hours rated construction with 1.5 hours rated door/opening, also need to have the protected escape route till to reach safe refuse area.</li> </ul> <p>Final exit route-2(Stair-2 route) also need to be protected (2 hours rated construction with 1.5 hours rated door) at each floor level entrance and need to be protected from generator room 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.</p> <ul style="list-style-type: none"> <li>• In building-02: Final exit route-1(Stair-1 route) also need to be protected (2 hours rated construction with 1.5 hours rated door) at each floor level entrance and need to be protected from bonded ware house at ground floor by 2 hours rated construction with 1.5 hours rated door/opening, also need to have the protected escape route till to reach safe refuse area.</li> <li>• Final exit route-2(Stair-2 route) also need to be protected (2 hours rated construction with 1.5 hours rated door) at each floor level entrance and need to be protected from knitting section at ground floor by 2 hours rated construction with 1.5 hours rated door/opening, also need to have the protected escape route till to reach safe refuse area.</li> <li>• Bonded ware house located at ground floor of building-1 need to be protected from knitting and printing section with 2 hours rated construction &amp; 1.5 hours rated opening or doors.</li> <li>• Boiler room needs to be fire separated from finishing</li> </ul>

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	<p>section located at 1st floor of building-1 with 4 hours fire rated enclosure and 2 hour rated opening or doors.</p> <ul style="list-style-type: none"><li>• Generator room need to be protected by 4 hours rated construction with 2 hours rated opening / door from bonded ware house, knitting section and stair-1 as well as from the final exit route-1 located at ground floor of building-1</li><li>• All the exits connecting to the staircases need to be protected with fire and smoke resistant enclosures and opening i.e. 2 hours rated enclosure and 1.5 hour rated door and provide a protected route from all though the stairway to the final exits.</li><li>• Factory need to install centralized and automatic fire detection &amp; alarm system on all occupied floors, including other tenanted floors of the building as per NTPA Guideline.</li><li>• 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.</li><li>• Factory needs to install control panel for centralized automatic smoke detection &amp; fire alarm system according to NTPA Guideline.</li><li>• Factory needs to install proper standpipe system having at least 100mm diameter of riser according to NTPA guideline.</li><li>• Install 1 riser per 1000 m<sup>2</sup> of floor area &amp; Install adequate number of hose in floor area and the minimum hose diameter is 38 mm, or 1.5" preferably fabric hose with variable nozzle to be used in both of the stairways covering the floor area.</li><li>• 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.</li><li>• Factory needs to be installed with Siamese connection for to the standpipe system located outside the building and accessible to the fire department connection.</li><li>• Factory needs to have dedicated fire pump with backup</li></ul>
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	<p>power system &amp; sufficient capacity for achieve required pressure in the remote place of the factory.</p> <ul style="list-style-type: none"> <li>• Factory need to have sufficient water storage capacity to get adequate pressure to feed fire-fighting equipment and at least <math>1900 \times 75 = 142500</math> liters water storage tank.</li> </ul>
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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"> <li>• 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 (<math>&gt; \text{ambient} + 40^{\circ}\text{C}</math>) and take proper action.</li> </ul>
<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"> <li>• Provide two separate and distinct connections of earthing for each generator.</li> <li>• Ensure all panel boards (including panel door) are earthed properly.</li> <li>• 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.</li> <li>• Provide additional insulation for wiring exposed to external heat sources to protect cable.</li> <li>• Ensure proper earthing connections at all electrical equipment.</li> <li>• Clean interior components from dust and debris and seal all openings within the enclosure to prevent dust and debris from entering.</li> <li>• Ensure inspection of all earthing system is being completed and documented.</li> </ul>
<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"> <li>• Install appropriate type of safety signage at generator room. Also ensure graded rubber mats are provided in front of all distribution boards.</li> <li>• Provide Instruction board for first aid and artificial respiration in the generator room.</li> <li>• Ensure distribution boards have a minimum clearance of 1 m (39 in) in front.</li> <li>• Provide dedicated &amp; adequate size of earthing with</li> </ul>

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	<p>proper identification for each circuit and ensure continuous earth path is back to main building intake.</p> <ul style="list-style-type: none"> <li>• Rewire to avoid the use of multiple cables from incoming and outgoing side of MCB's/MCCB's.</li> <li>• Replace wooden box with metal clad construction for mounting switch and use metal enclosure for installation of circuit breaker.</li> <li>• Ensure all electrical cables are sized according to capacity of circuit breakers.</li> <li>• Provide adequate support or mechanical guards for electrical equipment and wiring where necessary.</li> <li>• Ensure cable joints are made in respect of conductivity, insulation and mechanical strength.</li> <li>• Connect all metal in the building to the building earthing system.</li> <li>• 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<sup>0</sup>C-40<sup>0</sup>C)} and take proper action.</li> </ul>
<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"> <li>• Develop an electrical layout diagram and an as-built single line diagram detailing key components and capacity of the electrical system.</li> <li>• Establish a periodical Insulation and earth Resistance Measurement</li> <li>• Program and record the related testing data.</li> <li>• Inspect electrical panel boards on an annual basis.</li> <li>• Ensure overhead service connections to the building are led via adequate size and type of service masts.</li> <li>• Ensure the generator room has adequate fire separation from the production area.</li> <li>• Provide adequate means of ventilation for the generator room based on the installed equipment considering fire barriers.</li> <li>• Ensure appropriate generator room size in order to properly access the generator to perform routine</li> </ul>

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	<p>maintenance activities.</p> <ul style="list-style-type: none"><li>• Replace panel boards with metal enclosed body.</li><li>• Ensure panel boards do not have opening and all live internal components are concealed properly.</li><li>• Install circuit breaker in proper way using metal enclosure to ensure safe installation.</li><li>• Provide dedicated &amp; adequate size of neutral with proper identification for each circuit.</li><li>• Ensure each distribution board is provided with a circuit list and means of identification is provided as per list.</li><li>• Provide proper cable terminator/connector for stranded conductors at its point of termination.</li><li>• Install separate distribution boards for lighting and power circuits.</li><li>• Install lightning protection system on the building.</li></ul>
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