

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

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Name of the Factory	: Surma Apparels Ltd.
Address of the Factory	: 4, Darussalam Road, Section -1, Mirpur, Dhaka.
Present Status of the Factory	: Under Operation
Structural Assessment Conducted by	: BUET
Date of Structural Inspection	: 2014-10-31
Fire Assessment Conducted by	: VERITAS Engineering & Consultant
Date of Fire Inspection	: 2015-04-21
Electrical Assessment Conducted by	: VERITAS Engineering & Consultant
Date of Electrical Inspection	: 2015-04-21
BGMEA Membership No.	: 1801

### **BASIC INFORMATION:**

Present usage of building as Commercial shops, restaurant and garments factory. The following general information was noted:

- i. Building Usage Type : Commercial.
- ii. Structural System : RCC beam-column frame.
- iii. Floor System : Beam slab.
- iv. Floor Area : Approximately 18,530 sft per floor.
- v. No. of Stories : 6+1 (partial)
- vi. Construction Year : Unknown
- vii. Foundation Type : Isolated column footings.
- viii. Design Drawings : Approval drawings (RAJUK) were available.
- ix. Soil Investigation Report : Not available
- x. construction Materials : Reinforced Concrete (No test report on construction materials is Available), Coarse aggregate: Brick chips.
- xi. Generator : 160 kVA located at ground floor

**RECOMMENDATIONS FOR CORRECTIVE ACTION:** The following general information was noted:

- Short Term (Immediate) : • The building needs an immediate repair and maintenance work. The deteriorated plasters and the cracks appeared must be repaired. Proper measures should be taken to eradicate dampness.
- For continued use of the building as a factory building for a longer time, a thorough structural adequacy check may be made to assess the level of safety of the building especially against earthquake loading.
  - Without detailed engineering analysis for structural adequacy, no Further vertical extension of the buildings shall be undertaken And no significant change in loading pattern of the floor, Roof, structural and non-structural members of this building shall Be made until the structural design adequacy of the

Mid Term (6-week) : N/A

Long Term (6-months) : N/A

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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"> <li>• Factory needs to have proper testing plan &amp; record for fire safety equipment.</li> <li>• Propagation of fire, smoke, gas or fume through the opening of fire resistive floors and walls need to be restricted by sealing such opening with an approved material which needs to have a minimum 2 hours fire resistance rating of the walls.</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>• Factory needs to ensure adequate numbers of exit signs which need to be visible from any positions and comply with the following conditions:             <ul style="list-style-type: none"> <li>• (a) The color and design of lettering, arrows and other symbols on exit signs needs to be in high contrast with their background; (b) Words on the signs needs to be at least 150 mm with a stroke of not less 20 mm; (c) The source of illumination, contrast, intensity and luminance needs to be at least 50 lux, 0.5, 5.0 foot-candles and 0.2 cd/m<sup>2</sup> respectively.</li> </ul> </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 have as built drawing with proper dimensions showing all the means of escape.</li> <li>• Factory needs to have valid fire license covering the full occupied area.</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> </ul>

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	<ul style="list-style-type: none"> <li>• Provide continuous guards and handrails on both sides of the stairs.</li> <li>• 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.</li> <li>• Emergency back-up power needs to be connected for (a) exit sign, (b) fire alarm and detection system, (c) emergency lighting, (d) automatic fire detection and alarms systems and not less than 30 minutes in case of failure of power supply.</li> </ul>
<p>Long Term (The remedial works indicated must be carried out within a period of 6 months)</p>	<ul style="list-style-type: none"> <li>• Factory needs to have a proper pre-plan for fire service &amp; civil department.</li> <li>• Factory needs to have sufficient width of stair (8mm per occupant and 0.90 m minimum) at all floor of the building.</li> <li>• Storage area need to be protected with 2 hours rated construction &amp; 1.5 hours rated opening or doors with other occupancy.</li> <li>• Generator room need to be protected by 4 hours fire rated construction with 2 hours fire rated doors/opening from the market and have direct access from outside.</li> <li>• All the stairs (stair-1, 2&amp;3) need to be protected with fire and smoke resistant enclosures and opening (2 hours rated enclosure and 1.5 hour rated door) and provide the protected route from all though the stairway to the final exits.</li> <li>• Factory needs to ensure 2 hours rated construction or separation between cutting section and dining area at 1st floor.</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 fire detection and alarm system in the command station at the entrance lobby of the factory premises.</li> <li>• Factory needs to install proper standpipe system with having at least 100 mm dia of riser.</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</li> </ul>

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	<p>minimum pressure of 200 Kpa.</p> <ul style="list-style-type: none"> <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 power system &amp; sufficient capacity for achieve required pressure in the remote place of the factory.</li> <li>• Factory need to have sufficient water storage capacity to get adequate pressure to feed fire-fighting equipment and at least 1900ltrx 75min=142500 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>• Ensure all electrical cables are properly terminated at its point of termination.</li> <li>• Find out cause of burning sign and insulation damage and take proper action including replacing cable or equipment where necessary.</li> </ul>
<p>Short Term <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 distribution boards (including panel door) are earthed properly.</li> <li>• Ensure overcurrent protection device (circuit breaker/fuse) for each circuit/branch circuit.</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>• Provide provision for inspection of earthing system and ensure inspection is being completed and documented.</li> </ul>

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<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>• Ensure in the generator room has adequate illumination level as per standard.</li> <li>• Install appropriate number and type of safety signage and fire-fighting equipment 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>• Provide dedicated &amp; adequate size of earthing with proper identification for each circuit.</li> <li>• Rewire to ensure single cable at busbar and circuit breaker terminal to avoid loose connection, overloading and separate controlling of each circuit/branch circuit.</li> <li>• Replace wooden bases with metal clad construction for mounting the switch controls.</li> <li>• Ensure all electrical wiring/cables are sized according to capacity of circuit breakers.</li> <li>• Ensure cable joints are made in respect of conductivity, insulation and mechanical strength.</li> <li>• Provide emergency power connection for life safety loads (fire alarm, fire pump, emergency lighting, exit signage, etc.).</li> <li>• Provide individual fuse with suitable discrimination with backup fuse or miniature MCB for each 15/20A socket outlet.</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+( 200C-400C) } 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 Program and record the related testing data.</li> <li>• Inspect electrical switchgear and panel boards on an annual basis.</li> </ul>

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	<ul style="list-style-type: none"><li>• Ensure overhead service connections to a building are achieved with covered conductor and led via roof poles or service masts made of GI pipe having a bend at the top and installed on the outer wall.</li><li>• Ensure the generator room has adequate fire separation from the production area/main building.</li><li>• Provide adequate means of ventilation for the generator room and ensure that ventilation does not impact on fire barriers, e.g. fire dampers.</li><li>• Ensure appropriate generator room size in order to properly access the generator to perform routine maintenance activities.</li><li>• Ensure distribution boards have no opening and all live internal components are concealed properly.</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 obtained as per list.</li><li>• Provide adequate covers on cable channel.</li><li>• Provide proper cable terminator/conductor for stranded conductors.</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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