

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

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Name of the Factory	: A.S. Liza Garments Ltd.
Address of the Factory	: 1087/1 & 2, East Monipur, Mirpur, Dhaka
Present status of the factory	: Under Operation.
Structural Assessment Conducted by	: TÜV SÜD Bangladesh (Pvt.) Ltd.
Date of Structural Inspection	: 2015-10-28
Fire Assessment Conducted by	: TÜV SÜD Bangladesh (Pvt.) Ltd.
Date of Fire Inspection	: 2015-10-28
Electrical Assessment Conducted by	: TÜV SÜD Bangladesh (Pvt.) Ltd.
Date of Electrical Inspection	: 2015-10-28
BGMEA Membership No.	: 5572

### **BASIC INFORMATION: The following general information was noted:**

i. Building Usage Type	: Garment factory
ii. Structural System	: Flat Slab Frame (Building-1) Beam slab frame (Building-2)
iii. Floor System	: Flat plate floor slab (Building-1) Beam slab (Building-2)
iv. Floor Area	: Total floor area: Building-1: 18,000 sq. ft. approx. Building-2: 6,000 sq. ft. approx.
v. No. of Stories	: Building-1: 6 Storey Building-2: 2 Storey
vi. Construction Year	: Building-1: 2007 - 2008 Building-2: 2010
vii. Foundation Type	: Not identified
viii. Design Drawings	: Not available
ix. Soil Investigation Report	: Not available
x. construction Materials	: Brick aggregate was assumed
xi. Generator	: Ground floor.

**RECOMMENDATIONS FOR CORRECTIVE ACTION:** Columns were found to be highly stressed condition of building-1 due to over load and inadequate member capacity which may pose risk to operations in the factory. During the assessment, various non-conformities were found for which immediate, mid-term and long term corrective actions are recommended.

Short Term (Immediate)	: 1. No excessive storage was observed on the floors of overstressed columns but since columns are highly stressed hence not to use those floors for storage purpose as precaution until DEA not performed. 2. Factory Engineer to review design, loads and columns stresses for all columns. 3. Verify in-situ concrete stresses either by 100mm dia. cores or existing cylinder strength data from A3 columns.
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	4. A Detail Engineering Assessment of Factory to be commenced, see attached Scope.
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. 3. As built architectural and engineering drawing to be prepared for building-1 & building-2 and submitted for approval by appropriate authority. As part of this process building engineer will be required to make a number of checks on the as-built construction.
Long Term (6-months)	: 1. Continue to implement load plan. 2. Factory Engineer to review the design of slab and lateral stability system of the structure.

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>	N/A
<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>• The minimum clear width of the pathway should be 0.9 meter</li> <li>• Provide aisle marking with arrow guiding and exit signage on all Evacuation pathways or provided with overhead signage fixed at ceiling level.             <ul style="list-style-type: none"> <li>- Illuminated exit sign should be posted above the exit door,</li> <li>- It should be clearly visible at all time,</li> <li>- Provide directional signs wherever necessary.</li> <li>- All exit doors should be clearly marked for easy identification.</li> </ul> </li> </ul>

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	<ul style="list-style-type: none"> <li>- Signage should be uniform</li> <li>• Provide back-up power supply with IPS or battery for emergency lighting</li> <li>• Provide fire extinguisher at 4th floor building-1 and to keep the record for re filling &amp; properly tagged.</li> <li>• The first aid hose and standpipe performance should be checked periodically and properly tagged.</li> <li>• Fire drill should be conducted quarterly (4 times a year) in existing buildings as detailed under the Fire Safety Plan &amp; should kept record properly.</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>• 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 / passage below 0.9 meter.</li> <li>• 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.</li> <li>• Prepare proper plan &amp; design for another staircase. <ul style="list-style-type: none"> <li>- Minimum clear width should be 0.9 meter.</li> </ul> </li> <li>• Provide handrails on both side of each stairway with height of 0.9m measured from the nose of stair to the top of the handrail.</li> <li>• Doors in stair should be outward opening, side-swing, self-closing, non-lockable 1.5 hours fire rated doors in all stair way encloses in building 1.(Also require fire rated door at the floor occupied by other tenants).</li> <li>• Prepare proper plan and design for 4 hours fire rated barriers with 2 hours fire rated doors at ground floor generator room, which placed in open position.</li> <li>• Prepare proper plan and design for fire rated entry lobby 4 hrs fire rated barrier with 2 hrs fire rated door for storage area.</li> <li>• Prepare proper plan and design for 4 hours fire rated barriers with 2 hours fire rated door at 4th floor boiler room</li> <li>• The egress paths should be illuminated with emergency lighting with power back-up supply &amp; illumination should be a minimum of 10 lux for all corridors &amp; exit doors. Aisles should be provided with a minimum 2 lux.</li> <li>• The stairway should be illuminated with emergency lighting with power back-up supply &amp; illumination should be a minimum of 10 lux for stairway.</li> <li>• Produce design and plan for automatic detection system with automatic fire alarm.(Also needs to cover the floors occupied by other tenants)</li> <li>• Install Manual activation call point at all exit routes</li> <li>• Automatic alarm systems must be provided throughout the factory; the</li> </ul>

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	<p>alarm must be automatically triggered on detection of a fire.</p> <ul style="list-style-type: none"> <li>• Prepare proper design and plan for dedicated fire pump with alternate backup power supply.</li> <li>• Prepare plan and design for dedicated water storage tank for firefighting operation as per RMG guideline.</li> <li>• Update fire license / permit from issuing authority with mentioned covered area.</li> <li>• Obtain building approval from proper issuing authority.</li> <li>• Implement to a single fire safety management system with approvals from all tenants in the factory building.</li> <li>• Obtain the boiler license from the proper issuing authority.</li> <li>• Obtain the boiler operator license from the proper issuing authority.</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>• Install another staircase as per plan and design. - Minimum clear width should be 0.9 meter.</li> <li>• Provide 4 hours fire rated barriers with 2 hours fire rated doors at ground floor generator area.</li> <li>• Provide fire rated entry lobby 4 hrs fire rated barrier with 2 hrs fire rated door for storage area.</li> <li>• Provide 4 hours fire rated barriers with 2 hours fire rated door at 4th floor boiler room</li> <li>• Install automatic detection system with automatic fire alarm.(Also needs to cover the floors occupied by other tenants)</li> <li>• Install dedicated fire pump with alternate backup power supply.</li> <li>• Provide sufficient number of hose pipe with respect to area and travel distance as per RMG guideline.</li> <li>• Stand pipe supplying first aid hose should have minimum pressure of 200 KPa.</li> <li>• Provide dedicated storage tank for firefighting operation</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>	<p>N/A</p>
<p>Short Term (Actions that must be incorporated into a Fire Safety Management Plan immediately (a week) and should be a regular activity)</p>	<ul style="list-style-type: none"> <li>• All strands cables at exposed ends should be properly soldered / crimped and insulated.</li> <li>• Provide proper separate earthing/grounding to generator. Ensure that generator body frame to have two separate and distinct connections to the earth / ground.</li> <li>• 1. Disconnect the loads from cable of signs of overloading / abnormal temperature found. 2. Make necessary repairs to avoid further accidents.</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>• Provide rubber mats of adequate size in front of all distribution panels.</li> <li>• 1. Rating of change over switch should be 1.25 times rating of main incoming circuit breaker 2. Select appropriate type of change over switch as per RMG Guidelines.</li> <li>• 1. Exit signs should be illuminated either by lamps external to the sign or by lamps contained within the sign. 2. The source of illumination should be providing not less than 50 lux.</li> <li>• 1. All stranded conductors &gt; 6mm<sup>2</sup> to be provided with cable sockets. 2. All stranded conductors &lt; 6 mm<sup>2</sup>, at exposed end should be soldered / crimped.</li> <li>• Provide suitable &amp; non-flammable protected supports and shades for hanged light fittings/fixtures.</li> <li>• The electrical panels to be of metal case and should be marked with “Danger 415 Volts” and identified with proper phase marking and danger signage.</li> <li>• Provide proper clearance of 0.8 - 1.0 m in front of all distribution panels/switchboards.</li> <li>• Provide cable connections with properly soldered / welded lugs at (LT/MDB/DB/SDB)'s. Ensure that all the electrical connections are</li> </ul>

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	<p>properly secured with lugs and glands.</p> <ul style="list-style-type: none"> <li>• Select conductors and MCCB/MCB with adequate sizing without exceeding permissible current carrying capacity for insulation.</li> <li>• Avoid looping and bunch of cable at MCCB/MCB or bus bar terminal, use individual circuit and over current device for every incoming and outgoing circuit at the distribution boards.</li> <li>• Provide circuit diagram /circuit list with proper current ratings and fuse size, marking for DBs identifying end use load, voltage, number of phases.</li> <li>• Provide cable joints of porcelain / PVC connectors with PIB tape wound around before placing the cable in the box.</li> <li>• Seal the cable penetrations through walls adequately with fire resistive elements.</li> <li>• Seal the opening of wall at wiring passing through wall/roof/floor partitions. Ensure that all cable penetrations through walls should be adequately sealed with fire resistive elements.</li> <li>• Provide separate earthing connection to electrical equipment's. Ensure that earth potential provided for all parts of equipment / installation (other than live parts) and that continuous earth connection is provided back to the main intake supply earth.</li> <li>• Provide adequate earthing to body and doors to all MDBs / DBs. Ensure that all electrical panels provided with proper and separate earth potential.</li> </ul>
<p>Long Term <i>(The remedial works indicated must be carried out within a period of 6 months)</i></p>	<ul style="list-style-type: none"> <li>• 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.</li> <li>• 1. Provide updated Electrical layout drawing prepared after proper locations of all outlets for lamps, fans, fixed and transportable appliances, motors etc. 2. Drawings to indicate exact positions of all points of switch boxes and other outlets to match existing installation. 3. As built drawing to be approved by the engineer-in-charge.</li> <li>• 1. Design to have proper segregation of different end used loads. 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</li> </ul>

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	<p>located near ceiling.</p> <ul style="list-style-type: none"><li>• Provide calibrated Ammeters / Voltmeters at distribution boards (LT/MDBs).</li><li>• Relocate the MDBs with easy access. Ensure that all MDBs / SDBs should have easy accessibility.</li><li>• Review capacity of standby generator on basis of loads for essential lighting / AC / Equipment / Services. Replace generator with larger capacity or install second generator if review indicates existing unit is too small.</li><li>• Provide and maintain easy access and proper height of switchboard / panel boards (&lt; 2m from floor level).</li><li>• Each circuit should have a separate neutral (use of common neutral for more than one circuit shall not be permitted).</li><li>• Provide the wiring in PVC conduits or in metallic GI pipes. Ensure that all electrical wiring should be covered in proper conduit pipes.</li><li>• Seal the cable entry-exit points of (LT/MDB/DB/SDB)'s with non-flammable materials. In addition: 1. Ensure that HT / LT panels / Switchgears to be vermin / damp proof. 2. Ensure all unused holes / openings in DBs to be blocked properly.</li><li>• 1. Provide the ECC to meet minimum cross-sectional area as per table 4.5. 2. Ensure that connections between conductors / equipment's 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.</li><li>• Provide adequate protection against lightning depending on the probability of a strike and acceptable risk levels at roof top of building.</li></ul>
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