

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

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Name of the Factory	: A.B.S. GARMENTS LTD.
Address of the Factory	: Bamoil Bazar, Sharulia, Demra, Dhaka-1361
Present status of the factory	: Under Operation.
Structural Assessment Conducted by	: BUET
Date of Structural Inspection	: 2014-12-04
Fire Assessment Conducted by	: VERITAS Engineering & Consultant
Date of Fire Inspection	: 2015-04-09
Electrical Assessment Conducted by	: VERITAS Engineering & Consultant
Date of Electrical Inspection	: 2015-04-09
BKMEA Membership No.	: 976

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

i. Building Usage Type	: Garment Factory
ii. Structural System	: RC Frame building + adjacent tin shed supporting on steel pipes.
iii. Floor System	: RC beamsupported.
iv. Floor Area	: Building is about 2500 sft & tin shed is about 10,000 sft.
v. No. of Stories	: 5 stories & adjacent single story tin shed.
vi. Construction Year	: Construction year 1975-76 (according to factory representative)
vii. Foundation Type	: Not available.
viii. Design Drawings	: Not available
ix. Soil Investigation Report	: Not available.
x. construction Materials	: Brick aggregates & reinforced concrete.
xi. Generator	: Outside the building.

### **RECOMMENDATIONS FOR CORRECTIVE ACTION:**

**No critical or high risk observation was found which can pose hamper to the production or worker as well. Some non-conformity was found at the factory on the day of assessment for which mid-term and long term corrective actions have been suggested. There is no need to suspend operation in the factory.**

Short Term (Immediate) : 1. Consultant strongly recommend storing any type of cartoon boxes, finished products and fabrics in such a manner so that intensity of loading should not exceed 40 psf (2KN/m<sup>2</sup>) in any where location of the building.

Mid Term (6-weeks) : 1. 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.

2. 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.

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3. Detailed Engineering assessment (DEA) should include Coring with 4 nos. 4 in cores ( 3 in. when taken from column ) for the building and scanning of rebars in the GF.
4. Structural analysis need to ascertain ascertain for the safety of the building & recommending remediation measures if required. Then use this analysis result in the DEA.
5. Make soil investigation report again & use it in making detailed engineering assessment (DEA).

Long Term (6-months)

1. The owner or user of the building should be vigilant about development of any distress, particularly in primary structural elements of the building. If cracks appear, propagate and widen, detailed assessment and adoption of remedial measures may become necessary.
2. No horizontal and vertical extension shall be made without detail investigation and no further construction is to be carried out on this building until Detail Engineering Assessment (DEA) is completed.

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 conduct fire drill quarterly (4 times a year) under the fire safety plan and needs to keep the written record of such drills for at least 3 years for the inspection of fire brigade whenever called for.</li> <li>• Factory needs to have proper testing plan &amp; record of fire safety equipment.</li> <li>• Factory needs to have sufficient number &amp; width (0.9m) of marked aisles at ground floor of the building.</li> <li>• Factory needs to ensure unobstructed means of escape i.e. aisles, exits, stairs in all floors.</li> <li>• Lights in storage area needed to be installed with protective covers and conduits.</li> <li>• Need to install fixed temperature type detectors and portable fire extinguishers.</li> <li>• Combustibles are to be managed with good housekeeping. Storage</li> </ul>

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	<p>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> <ul style="list-style-type: none"> <li>• Ensure illuminated exit signs in floors so that it is visible from all positions.</li> </ul>
<p>Mid Term <i>(The remedial works indicated must be carried out within a period of 6 weeks)</i></p>	<ul style="list-style-type: none"> <li>• As built drawing needs to be prepared with proper dimensions showing means of escape.</li> <li>• Fire license needs to be covered full premises of the factory.</li> <li>• Factory Manager/Director needs to arrange fire safety training for the workers of the factory from proper authority time to time.</li> <li>• Factory needs to be provided at least two exits or stairs to safety discharge from upper floors as well as ground floor of the building.</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 maintain minimum width of exit 0.9 m and height 2 m.</li> <li>• Provide handrail on both sides of stairways.</li> <li>• Factory need to install adequate illuminated emergency lighting in floors, exits &amp; stairs (Escape routes)</li> <li>• Factory needs to be arranging emergency backup power for critical fire safety system (signage, fire alarm &amp; detection system, emergency lighting, AFD and Alarm systems etc.).</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>• Factory needs to have a proper pre-plan for fire department. Factory needs to be provided at least two exits or stairs and have sufficient total width of exits (4 mm per occupant) in all floors of the building.</li> <li>• Factory needs to ensure minimum width of stair either 0.9 m or 8 mm per occupant, the largest one of those.</li> <li>• Single escape is permitted for 30 persons and less than two story building. But the building is 5-storied reinforced concrete buildings. So minimum two numbers of stair required. This is not complying the RMG guide line.</li> <li>• Final exit-01 needs to be fire separated by 2 hours rated construction and 1.5 hours rated opening/ end once including ground floor need to have the protected route till to reach safe refusal area.</li> <li>• Storage area needs to be protected with 2 hours rated construction &amp;</li> </ul>

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	<p>1.5 hours rated opening or doors.</p> <ul style="list-style-type: none"><li>• Boiler and substation shall be situated on the periphery of the factory building and shall have a 4 hour fire resistance wall and 2 hour fire rated door.</li><li>• Substation room needs to have 4 hour fire rated construction and 2 hour rated fire door.</li><li>• Stair -1 need to be protected with fire and smoke resistant enclosures and opening (2 hours rated enclosure and 1.5 hour rated door) and provide protected route from all through the stairway to the final exits.</li><li>• Factory needs 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 needs to install manually operated electrical fire alarm system and automatic fire alarm system with single or multiple callboxes on all occupied floors, including other tenanted floors of the building.</li><li>• Factory needs to install control panel for zed central automatic smoke detection &amp; fire alarm system according to NTPA Guideline.</li><li>• Factory needs to install proper standpipe system with having at least 75 mm dia of riser.</li><li>• Factory need to be installed by 1 riser per 1000 sqm of floor area with at least 38 mm dia of hoses.</li><li>• Factory need to ensure the minimum pressure for standpipes supplying a 50mm or larger hose shall be at least 300 kPa ond 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 need 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 needs 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.</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 cause (improper cable selection, improper termination, rusted connection.) of burning sign and take proper action including replacing cable or equipment where necessary.</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 (&gt; ambient+ 400C) and take proper action.</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>• 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>• Ensure overcurrent protection device (circuit breaker/fuse) for each circuit/branch circuit.</li> <li>• Ensure proper earthing connections at motor and sewing machine.</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 all earthing system and ensure inspection 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 number and type of safety signage and fire-fighting equipment at substation and 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 substation room and generator room.</li> <li>• Ensure substations room and generator room have adequate illumination level as per standard.</li> <li>• Fill the transformer breather with fresh Silica gel and oil cup with fresh Oil.</li> </ul>

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	<ul style="list-style-type: none"> <li>• Provide dedicated &amp; adequate size of earthing with proper identification for each circuit and ensure continuous earth path is back to main building intake.</li> <li>• Rewire to ensure each incoming supply to an MCB has a dedicated supply from busbar.</li> <li>• Avoid the use of multiple cables on outgoing side of MCB's.</li> <li>• Replace wooden boxes with metal clad construction for mounting the switch controls.</li> <li>• Ensure all electrical cables are sized according to capacity of circuit breakers.</li> <li>• Provide adequate support or mechanical guards for sewing machine.</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+( 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 to ensure that the equipment is in good working condition</li> <li>• Ensure substation room has minimum height &amp; area as per NTPA Table-4.3 respectively.</li> <li>• Ensure the substation room has adequate fire separation from the production area.</li> <li>• Provide adequate means of ventilation for the substation room based on the installed equipment considering fire barriers.</li> <li>• Provide soak pits for transformer with large oil content as per mentioned standard.</li> <li>• Ensure all high tension cables are laid following standard cable</li> </ul>

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	<p>laying techniques.</p> <ul style="list-style-type: none"><li>• Ensure the generator room has adequate fire separation from the production area.</li><li>• Ensure appropriate generator room size in order to properly access the generator to perform routine maintenance activities.</li><li>• Replace wooden base for installing circuit breaker and provide metal enclosure.</li><li>• Ensure panel boards have no opening and all live internal components are concealed properly.</li><li>• Ensure distribution boards are installed in compliant locations in terms of height.</li><li>• Install panel board/MCCB in proper place 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>• Use noncombustible material to make channel and provide adequate covers on cable channel.</li><li>• 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.</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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