

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

Name of the Factory	: The National Apparels Ltd.
Address of the Factory	: Al Haj Nurul Islam Shopping Complex Maleker Bari, National University, Gazipur.
Present Status of the Factory	: Under operation.
Structural Assessment Conducted by	: TUV
Date of Structural Inspection	: 11 July, 2015
Fire Assessment Conducted by	: TUV
Date of Fire Inspection	: 11 July, 2015
Electrical Assessment Conducted by	: TUV
Date of Electrical Inspection	: 11 July, 2015
BGMEA Membership No.	: 824

### **BASIC INFORMATION:**

The structural system of the 6 storied building was RCC beam-slab structural system from ground floor to roof floor. The following information was noted:

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| i. Building Usage Type        | : Knitwear's Factory.  |
| ii. Structural System         | : RCC beam column system.  |
| iii. Floor System             | : RCC Beam slab.   |
| iv. Floor Area                | : The typical plinth area of 6 storied RCC building is 5340 sft. Total operational area is 32,100 sft            |
| v. No. of Stories             | : 06 Storey  |
| vi. Construction Year         | : The building was constructed in a single phase, construction starting in 2010 and completing in 2012.          |
| vii. Foundation Type          | : Shallow Foundation as per structural drawings  |
| viii. Design Drawings         | : Available (Approval for eight storied from LGED, Gazipur City Authority on 9th April, 2011 for commercial use) |
| ix. Soil Investigation Report | : Available  |
| x. Construction Materials     | : Brick aggregate.   |
| xi. Generator                 | : At the plinth of 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) | : 1. Identified area above floor of A3 column not to be used for storing and need to keep empty.<br>2. Factory Engineer to review design, loads and columns stresses in area identified above.<br>3. Verify in situ concrete stresses either by 100mm dia. cores or existing cylinder strength data for A3 column.<br>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.  
2. Exposed rebar needs to be covered by lean graded concrete as per direction of building engineer.  
3. Sections of plaster finish to brick wall to be removed to investigate if dampness penetrates into the building wall.  
Investigation needed why it is occurring.

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>• The minimum clear width of the pathway should be 0.9 meter</li> <li>• Rearrange the evacuation pathway to ensure the minimum width.</li> <li>• Remove all temporary items from all escape routes, aisles and passageway.</li>   <li>• Direct route of access to required exits should be provided through stairway which is maintained free of combustibles.</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> <li>- Signage should be uniform.</li> </ul> </li>   <li>• Provide fire extinguisher at 2nd to 3rd floor and to keep the record for re filling &amp; properly tagged.</li>   <li>• Provide additional firefighting equipment like sand &amp; water buckets near exit or easily accessible area for first phase fire fighting.</li>   <li>• Combustible materials should keep away from electrical appliances and all the lighting in</li> </ul>

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	<p>storage area must have protecting covers and wiring must be in conduits.</p> <ul style="list-style-type: none"> <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><input type="checkbox"/> 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><input type="checkbox"/> 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><input type="checkbox"/> 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><input type="checkbox"/> Doors in stair should be outward opening, side-swing, self closing, non-lockable 1.5 hours fire rated doors in all stair way encloses. (Also require fire rated doors at the floor occupied by other tenants)</li> <li><input type="checkbox"/> Prepare proper plan and design for fire rated barrier for 2 hour fire rating separated corridor with 1.5 hrs fire rated door at ground floor.</li> <li><input type="checkbox"/> Prepare proper plan and design for 4 hours fire rated barriers with 2 hours fire rated doors at ground floor generator room, which located at the adjacent to final evacuation route of stair-2.</li> <li><input type="checkbox"/> Prepare proper plan and design for 2 hrs fire rated barrier with 1.5 hrs fire rated door for storage area.</li> <li><input type="checkbox"/> Seal all openings in slab with fire resistant materials having 2 hour fire rating.</li> <li><input type="checkbox"/> 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><input type="checkbox"/> Produce design and plan for automatic detection system with automatic fire alarm with control panel.(Also needs to cover the floors occupied by other tenants)</li> <li><input type="checkbox"/> Prepare proper design and plan for dedicated fire pump with alternate backup power supply.</li> <li><input type="checkbox"/> Prepare plan and design for dedicated water storage tank for firefighting operation as per RMG guideline.</li> <li><input type="checkbox"/> Update fire license / permit from issuing authority</li> <li><input type="checkbox"/> Implement to a single fire safety management system with approvals from all tenants in the factory building</li> </ul>
<p>Long Term</p>	<ul style="list-style-type: none"> <li><input type="checkbox"/> All stairway to have direct access to outside of the factory building, which requires 2 hour fire rated construction with 1.5</li> </ul>

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<p><i>(The remedial works indicated must be carried out within a period of 6 months)</i></p>	<p>hrs fire rated door at ground floor for fire separated corridor.</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Provide 4 hours fire rated barriers with 2 hours fire rated doors at ground floor generator room, which located at the adjacent to final evacuation route of stair-2.</li> <li><input type="checkbox"/> Provide 2 hrs fire rated barrier with 1.5 hrs fire rated door for storage area.</li> <li><input type="checkbox"/> Install automatic detection system with automatic fire alarm with control panel.(Also needs to cover the floors occupied by other tenants).</li> <li><input type="checkbox"/> Install dedicated fire pump with alternate backup power supply.</li> <li><input type="checkbox"/> Provide standpipe system &amp; sufficient number of hose pipe with respect to area and travel distance as per RMG guideline.</li> <li><input type="checkbox"/> Provide dedicated storage tank for firefighting operation</li> </ul>
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### ***(B): Recommendations for Electrical Safety Corrective Actions:***

<p><b>Immediate</b></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><input type="checkbox"/> Over current protection devices (Circuit breakers) should be installed at all distribution panels.</li> </ul>
<p><b>Short Term</b></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>N/A</p>
<p><b>Mid Term</b></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><input type="checkbox"/> All unwanted materials should be removed from Generator room.</li> <li><input type="checkbox"/> Provide rubber mats of adequate size in front of distribution panel DBs/SDBs.</li> <li><input type="checkbox"/> Install smoke detection and provide firefighting equipment in the generator room.</li> <li><input type="checkbox"/> 1. Exit signs should be illuminated either by lamps external to the sign or by lamps contained within the sign.</li> <li><input type="checkbox"/> 2. The source of illumination should be providing not less than 50 lux.</li> <li><input type="checkbox"/> 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><input type="checkbox"/> Provide proper clearance of 0.8 - 1.0 m in front of all DBs.</li> </ul>

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	<ul style="list-style-type: none"> <li><input type="checkbox"/> Provide cable connections with properly soldered / welded lugs at (DB/SDB)'s. Ensure that all the electrical connections are properly secured with lugs.</li> <li><input type="checkbox"/> Select conductors and MCCB/MCB with adequate sizing without exceeding permissible current carrying capacity for insulation.</li> <li><input type="checkbox"/> Provide circuit diagram /circuit list with proper current ratings and fuse size, marking for DBs, SDBs identifying end use load, voltage, number of phases.</li> <li><input type="checkbox"/> 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><input type="checkbox"/> 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><input type="checkbox"/> Provide adequate earthing to body and doors to DBs/SDBs. Ensure that all electrical panels provided with proper and separate earth potential.</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><input type="checkbox"/> 1. Provide updated SLD matching the existing installation at the factory.</li> <li>2. SLD to indicate exact positions of all points of switch boxes and other outlets.</li> <li>3. SLD to be approved by the engineer-in-charge.</li> <li><input type="checkbox"/> 1. Provide updated Electrical layout drawing prepared after proper locations of all outlets for lamps, fans, fixed and transportable appliances, motors etc.</li> <li>2. Drawings to indicate exact positions of all points of switch boxes and other outlets to match existing installation.</li> <li>3. As built drawing to be approved by the engineer-in-charge.</li> <li><input type="checkbox"/> Modify Area of generator room to meet requirements of Table 4.4, RMG Guideline; the area should be 40 m<sup>2</sup>, or relocate the generator room.</li> <li><input type="checkbox"/> Provide and maintain proper clearance in all sides of generator for ease of maintenance.</li> <li><input type="checkbox"/> 1. Design to have proper segregation of different end used loads.</li> <li>2. Wiring design to have separate and distinct sub-circuits for power and heating system.</li> <li>3. All DBs to be placed conveniently.</li> <li>4. Wiring to be neat, tidy and located near ceiling.</li> <li><input type="checkbox"/> Each circuit should have a separate neutral (use of common</li> </ul>

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	<p>neutral for more than one circuit shall not be permitted).</p> <ul style="list-style-type: none"><li><input type="checkbox"/> Seal the cable entry-exit points of (DBs/SDBs) with non-flammable materials. In addition:<ol style="list-style-type: none"><li>1. Ensure all unused holes / openings in DBs/SDBs to be blocked properly.</li></ol></li><li><input type="checkbox"/> 1. Provide the ECC to meet minimum cross-sectional area as per table 4.5.<ol style="list-style-type: none"><li>2. Ensure that connections between conductors / equipments provided to durable electrical continuity and adequate mechanical strength and protection.</li><li>3. The continuous earth connection is provided back to the main intake supply earth.</li></ol></li><li><input type="checkbox"/> 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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