

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

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| Name of the Factory                | : B. G. APPARELS LTD                       |
| Address of the Factory             | : 65/A, Nayamati, Narayangonj, Bangladesh. |
| Present Status of the Factory      | : Under Operation.                         |
| Structural Assessment Conducted by | : VEC                                      |
| Date of Structural Inspection      | : 21 <sup>st</sup> March, 2015             |
| Fire Assessment Conducted by       | : VEC                                      |
| Date of Fire Inspection            | : 21 <sup>st</sup> March, 2015             |
| Electrical Assessment Conducted by | : VEC                                      |
| Date of Electrical Inspection      | : 21 <sup>st</sup> March, 2015             |
| BKMEA Membership No.               | : 119                                      |

### **BASIC INFORMATION:**

The surveyed factory building was a 6 storey RCC building. The structural system of the building is beam column frame and beam slab floor system. The entire building is used for RMG and local T-shirt manufacturing industries. The B. G. APPARELS LTD is located on the 1<sup>st</sup> floor of the building. The following general information was noted:

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| i. Building Usage Type        | : Garment Factory.  |
| ii. Structural System         | : RCC beam column frame system.   |
| iii. Floor System             | : RCC beam slab floor system.   |
| iv. Floor Area                | : Typical Plinth area 4000 sft & total area 19000 sft.  |
| v. No. of Stories             | : 6 Storey.   |
| vi. Construction Year         | : Building was built in two phases (1993-1994 and 1996-1998).   |
| vii. Foundation Type          | : Unknown.  |
| viii. Design Drawings         | : Available-Approval Plan<br>Not Available-Structural design drawing, Architectural drawing,<br>Floor load plan and material test report. |
| ix. Soil Investigation Report | : Unavailable.  |
| x. Construction Materials     | : Brick aggregate in column.  |
| xi. Generator                 | : At ground floor of the building.  |

### **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>• Empty area near the overstressed column.</li><li>• Factory Engineer to review design, loads and columns stresses in the area identified above.</li><li>• A Detail Engineering Assessment of Factory to be commenced.</li></ul> |
| Mid Term (6-weeks)     | : | <ul style="list-style-type: none"><li>• 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 (DEA) should be completed.</li></ul>    |

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Long Term (6-months) :

- Continue to implement load plan.
- Continue to monitor for cracking on an ongoing basis and make any necessary alterations to the deflected beam.

The recommendations for **Fire & Electrical Safety** corrective action are:

**(A): Recommendations for Fire Safety corrective actions:**

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| <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>• Fire drill shall be conducted quarterly (4 times a year) under the Fire Safety Plan. A record of such drills shall be kept in writing for at least 3 years for the inspection of fire brigade whenever called for.</li> <li>• Factory need to have proper testing plan &amp; record of fire safety equipment.</li> <li>• Factory need to have minimum width of marked aisles at least 0.90m for one sided seat &amp; at least 1.0m for both sided of seats.</li> <li>• Lights in storage area needed to be installed with protective covers and conduits.</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 2.9m 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 have 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</li> </ul>  |

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|   | <p>proper authority &amp; worker of the factory should as far as possible be trained for use fire extinguisher.</p> <ul style="list-style-type: none"> <li>• The entire exit doors (collapsible) 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 need to provide handrail on both sides of each stairways.</li> <li>• Factory needs to be installed with adequate illuminated emergency lighting in floors, exits &amp; stairs.(Escape route)</li> <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>• Factory needs to have a proper pre-plan for fire department.</li> <li>• Factory need to minimum width of exit door is 0.90m and height of exit door is 2.00m</li> <li>• The final exit routes of stairs-1 need to be protected by providing 2 hour rated enclosure with 1.5 hour rated fire doors in each exit are connected with stairs-1, also need to be protected the escape route till to reach outside of the building or safe refuse area.</li> </ul> <p>The final exit routes of stairs-2 need to be protected by providing 2 hour rated enclosure with 1.5 hour rated fire doors in each exit are connected with stairs-2, also need to be protected the escape route till to reach outside of the building or safe refuse area.</p> <ul style="list-style-type: none"> <li>• Factory needs to protect the storage area(bonded warehouse) from the working floor (at 1st floor) &amp; stair-1 by providing 2 hours rated construction with 1.5 hours rated doors located at 1st floor of the building.</li> <li>• All the exits connecting to the staircase-1&amp; 2 need to be protected with fire and smoke resistant enclosures and opening (1.5 hours rated enclosure and 1 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</li> </ul> |

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|  | <p>NTPA Guideline.</p> <ul style="list-style-type: none"> <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 be installed with control panel for centralized automatic smoke detection &amp; fire alarm system according to NTPA Guideline.</li> <li>• Factory needs to install with proper standpipe system having at least 75 mm diameter of standpipe. First aid hose system (38 mm nominal) shall be provided (Ref. Fire Service Standard # 9) in addition to Fire Aid Fire Fighting Appliances in existing high rise NTPA (20 m) buildings. In addition 50 mm or larger hose connection facility shall be provided.</li> <li>• Factory need to ensure the minimum pressure for standpipes supplying a 50mm or larger hose shall be at least 300 kPa and 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 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:***

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| <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 (&gt; ambient+ 40°C) 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</i></p> | <ul style="list-style-type: none"> <li>• Discharge the generator exhaust to the exterior of the building in a safe location.</li> <li>• Provide two separate and distinct connections of</li> </ul>  |

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| <p><i>regular activity</i></p>  | <p>earthing for each generator.</p> <ul style="list-style-type: none"> <li>• Ensure all distribution boards (including panel door) are earthed properly.</li> <li>• Ensure over current protection device (circuit breaker/fuse) for each circuit/branch circuit.</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>• Ensure in the generator room, all working place, exit light and escape light have adequate illumination level as per standard.</li> <li>• Provide Instruction board for first aid and artificial respiration in generator room.</li> <li>• Ensure distribution board has a minimum clearance of 1 m (39 in) in front.</li> <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 bus bar. Avoid the use of multiple cables on outgoing side of MCB's.</li> <li>• Replace wooden boxes and panels with metal clad construction for mounting the lighting boards and switch controls.</li> <li>• Avoid flexible cables for fixed wiring unless contained in an enclosure affording mechanical protection.</li> <li>• Ensure cable joints are made through porcelain/PVC connectors with</li> <li>• PIB tape wound around joint in respect of conductivity, insulation and mechanical strength.</li> </ul> |

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|   | <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 { 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 switchgear and 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/main building.</li> <li>• Provide adequate means of ventilation for the generator room based on the installed equipment 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 indicating current rating of circuit and size of fuse element/ breaker. Also ensure the means of identification (separate color coding, marking tape, tagging, or other approved means) of cable is provided as per circuit list.</li> <li>• Use non-combustible material to make channel and provide adequate covers on cable channel. Install lightning protection system on the building.</li> </ul> |