

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

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Name of the Factory	: BORNALI COLLECTIONS
Address of the Factory	: 285 (147/3 New), Hazaribag, Godnail, Narayanganj.
Present Status of the Factory	: Under Construction.
Structural Assessment Conducted by	: ACCORD
Date of Structural Inspection	: 18 <sup>th</sup> March, 2014
Fire Assessment Conducted by	: VEC
Date of Fire Inspection	: 30 <sup>th</sup> June, 2015
Electrical Assessment Conducted by	: VEC
Date of Electrical Inspection	: 30 <sup>th</sup> June, 2015
BKMEA Membership No.	: 1908

### **BASIC INFORMATION:**

The assessed factory building is a 7 storied RCC building having beam column frame and beam slab floor system. The following general information were noted:

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	: Operational floor area of the factory is approx. 9460 sft.
v. No. of Stories	: 7- storied.
vi. Construction Year	: Unknown. (Not verified from ACCORDs report)
vii. Foundation Type	: Isolated footing foundation.
viii. Design Drawings	: Available.
ix. Soil Investigation Report	: Not verified from ACCORDs report
x. Construction Materials	: Brick Aggregate.
xi. Generator	: Housed in a separated structure.

### **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:

Short Term (Immediate)	: None.
Mid Term (6-weeks)	: None.
Long Term (6-months)	: <ul style="list-style-type: none"><li>• Building engineer to check the structures and made proposals for the reduction of loads, if required.</li><li>• Building engineer to check the structures and propose additional strengthening and bracing as required.</li><li>• Building engineer to check the structures and propose additional strengthening as required.</li><li>• Monitor cracks on beams. Engage an engineer to investigate if cracks are only in the plastering.</li><li>• Engage an engineer to advice on load reduction and repair and strengthening of the beams if required.</li></ul>

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- Building engineer to check the external wall elements and propose additional lateral restraints if required.
- Building engineer to check the structural capacity of the stanchion and make proposals for its realignment if required.
- Building engineer to check the structures and propose additional strengthening and bracing as required.
- Building engineer to check the structures and propose additional strengthening and bracing as required.

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>	<ul style="list-style-type: none"> <li>• None.</li> </ul>
<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>• None.</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>• 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 be installed with adequate illuminated emergency lighting in floors, exits &amp; stairs. (Escape route)</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 service and civil defense.</li> <li>• Final exit-1 and 2 (Stair-1 and 2 route) need to be protected (2 hours rated construction with 1.5 hours rated door) at each floor level entrance and need to be protected from others factories working floor at ground floor by 2 hours rated construction with 1.5 hours rated door/opening, also need to have a protected escape route till to reach safe refuse area.</li> <li>• All the stairs(Staircase-01 &amp; 2) 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>• Lift core need to be separated with working floor with 2 hours rated walls and 1 hours rated opening or install a fire lift.</li> <li>• Factory need to install centralized and automatic fire detection &amp; alarm system on all occupied floors,</li> </ul>

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	<p>including other tenanted floors of the building as per 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 install control panel for centralized automatic smoke detection &amp; fire alarm system according to NTPA Guideline</li> <li>• Factory needs to install proper standpipe system having at least 100mm diameter of riser according to NTPA guideline.</li> <li>• Install 1 riser per 1000 m<sup>2</sup> of floor area &amp; Install adequate number of hose in floor area and the minimum hose diameter is 38 mm, or 1.5" preferably fabric hose with variable nozzle to be used in both of the stairways covering the floor area.</li> <li>• 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 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 need to have sufficient water storage capacity to get adequate pressure to feed fire-fighting equipment and at least <math>1900 \times 75 = 142500</math> 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 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 regular activity</i></p>	<ul style="list-style-type: none"> <li>• Ensure all switchboards and/or distribution boards (including panel door) are earthed properly using appropriate type and size of cables and the earthing cables have continuity up to main earth /earthing pit.</li> <li>• Clean interior components from dust and debris and seal all openings within the enclosure to prevent dust and debris from entering.</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>• 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 in the substations room and generator room, all working place, exit light and escape light have adequate illumination level as per standard.</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             <ol style="list-style-type: none"> <li>1) Ensure each incoming supply to an MCB has a dedicated supply from bus bar.</li> <li>2) Avoid the use of multiple cables on outgoing side of MCB's.</li> </ol> </li> <li>• Ensure all electrical cables are sized according to capacity of circuit breakers.</li> <li>• Connect all metal in the building to the building earthing/grounding system such as metal rebar in concrete, metal frame of building, or metal water pipe etc.</li> <li>• Make sure cables are not overloaded ,properly terminated using proper lug, joints are made proper way, no rusted throughout the connection, proper cable bending, no insulation damage, single cable at single point etc. to avoid temperature rise. If necessary consult with a qualified engineer and replace cable or equipment.</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>• Inspect electrical switchgear and panel boards on an annual basis.</li> <li>• Provide adequate means of ventilation for the substation room based on the installed equipment considering fire barriers.</li> </ul>

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	<ul style="list-style-type: none"><li>• Provide dedicated &amp; adequate size of neutral with proper identification for each circuit.</li><li>• Calculate the number of vertical shaft required for high rise building (over six- story or 20m) based upon the floor area, and install accordingly. In addition ensure size of provided vertical shaft is not less than 200mm x 400mm for every 1500m<sup>2</sup> floor areas and shaft has enough provision for inspection and maintenance.</li><li>• Install separate distribution boards for lighting and power circuits.</li><li>• Consult with an expert electrical engineer to review requirements, calculate risk index, prepare drawing etc. to make sure the building is secured against lightning.</li></ul> <p>Also ensure following as per NTPA based on the building size.</p> <ul style="list-style-type: none"><li>i) Air termination network vertical/horizontal conductors are appropriately spaced</li><li>ii) Appropriate numbers of down conductors are installed</li><li>iii) Resistance of earth conductor within limit (<math>\leq 10\Omega</math>).</li></ul>
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