

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

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Name of the Factory	: <b>BEO APPARELS MANUFACTURING LTD.</b>
Address of the Factory	: Vannara, Mouchak, Kaliakoir, Gazipur, Bangladesh
Dhaka Present Status of the Factory	: <b>Under Operation</b>
Structural assessment conducted by	: Accord (Full report available at <a href="http://bangladeshaccord.org">bangladeshaccord.org</a> )
Date of Structural Inspection	: 4 May, 2014
Fire & Electrical assessment conducted by	: Accord (Full report available at <a href="http://bangladeshaccord.org">bangladeshaccord.org</a> )
Date of Fire & Electrical Inspection	: 20 May, 2014

**Basic Information:** The present garment factory is a commercial building with beam-column frame system. The following general information was noted:

- |       |                           |  |
|-------|---------------------------|--|
| i.    | Building Usage Type       | : Garment factory  |
| ii.   | Structural System         | : R.C. beam & column frame system with a 2-way slab            |
| iii.  | Floor System              | : Beam slab  |
| iv.   | Floor Area                | : Each floor has the surface area of 14,000 sq.ft.             |
| v.    | No. of Stories            | : 3 storied  |
| vi.   | Construction Year         | : 2007   |
| vii.  | Foundation Type           | : Pad foundation   |
| viii. | Design Drawings           | : Available (not dated or stamped)                             |
| ix.   | Soil investigation Report | : Available (Dated March 2001)                                 |
| x.    | Construction Materials    | : Brick aggregated   |
| xi.   | Generator                 | : Single storied utility shed on the southern side of the site |

**Recommendations for Corrective Action:** The recommendations of corrective action for both Structural and Fire & Electrical Safety are as follows:

**The recommendations for Structural Safety corrective actions are:**

Immediate (Now): NA

Mid Term (Within 6 Weeks): NA

Long Term (Within 6 Months):

1. Produce and actively manage a loading plan for all floor plates within the factory giving consideration to floor capacity and column capacity.
2. Continue to implement load management plan.
3. Building Engineer to survey as constructed building and update drawings as required.
4. Building Engineer to verify capacity and connections of the roof structures to the generator, canteen and the compressor buildings.
5. Strengthening works to the above roof structures to be completed.
6. Once construction of the 3rd floor slab (roof of 2<sup>nd</sup> floor) is complete the building envelope is to be made watertight.
7. Falls to be provided and roof slab to be protected from direct contact with water to protect the reinforcement from corrosion.

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- Capacity calculations were completed on the columns for the vertical expansion of the building and showed that the column stresses are in excess of the calculated capacity should the building be extended above 5<sup>th</sup> floor.
- Detailed engineering calculations and confirmatory testing of the concrete strength is to be completed to verify future expansion above 5<sup>th</sup> floor.
- Extensive cracking and multiple repairs to the external render are present around the building perimeter. The cracking occurs in non-structural elements but should be monitored by the building engineer to ensure that any movement in the structure has ceased.

### **The recommendations for Fire Safety corrective actions are:**

#### Immediate (Within 1 month):

- Remove locking features from all egress doors / gates. If locks are required for security reasons, utilize special door locking features complying with NFPA 101.
- Remove all storage from exit stairs and egress paths.
- Replace all gates / sliding doors along the means of egress with side-hinged, swinging egress doors. If locks are required for security reasons, utilize special door locking features complying with NFPA 101.
- Remove all single-station smoke alarms provide automatic smoke detection throughout the building in accordance with NFPA-72.
- Regularly inspect all exit signage and replace/install lights as needed to illuminate signs.
- Remove manual on/off switches from emergency lighting units to prevent them from being switched off.

#### Short Term (Within 3 Months):

- Separate the boiler from the adjacent working areas by a minimum 2-hr fire-rated construction. Seal and/or protected all openings to maintain the required fire separations.
- Provide dedicated storage rooms separated by minimum 1-hr fire-rated construction.
- Provide minimum 1.5-hr fire rated doors and seal all unprotected openings to separate the exit stairs from work areas and other building spaces on all floor levels. Ensure that the fire doors are self-closing and positive latching and that they are provided with fire exit (panic) hardware where serving production floors. If fire doors are required to be held open for functional reasons, provide automatic closing devices tied to the fire alarm system.
- Provide dedicated storage rooms separated by minimum 1-hr fire-rated construction. Where separate storage rooms may not be feasible, provide defined storage areas and limit the storage arrangement as follows:

-Maximum height of 2.4m and maximum area of 23m<sup>2</sup>

-If sprinkler protected: maximum height of 3.66m and maximum area of 93m<sup>2</sup>.

Separate areas of unenclosed combustible storage by a minimum clear distance of 3m.

- Seal all penetrations and openings in exit stair enclosure walls to maintain the fire separation.
- Modify the egress door to swing in the direction of egress travel.
- Inspect, test and maintain the fire alarm system, and keep written records on-site, in accordance with NFPA 72.

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8. Test the emergency lighting system on each floor and provide additional emergency fixtures to provide adequate illumination along the means of egress. Provide a minimum illumination of 10 lux at the floor level within exit stairs and exit discharge paths and minimum 2.5 lux along exit access aisles.
9. Provide exit signs above all exits to the exterior and all doors to the exit stairs.
10. Inspect, test and maintain the emergency lighting system in accordance with The ACCORD standard. Keep written records on-site.

### Mid Term (within 6 Months):

1. Seal all penetrations and openings to the interior of the building along the discharge path, up to a height of 10 ft., to provide a minimum 1-hr fire separation. Alternatively, provide a second remote discharge path to the adjacent road.
2. Provide 2-hr fire-rated exit passageway leading directly outside (vestibules to separate any storage areas).

### Long Term (More than 6 months):

1. Replace the fire alarm system with a new, listed addressable fire alarm system in accordance with NFPA 72.

### **The recommendations for Electrical Safety corrective actions are:**

#### Immediate (Within 1 month):

1. Battery terminals must be covered for protection.
2. Cable should be drawn in conduit hung from ceiling.
3. Cable must be drawn horizontally and/or vertically, not diagonally and be protected with conduit.
4. Unused cable entry hole must be sealed with proper material.
5. Check loose connection / capacitor and rectify.
6. Check loose connection and rectify.
7. Cut the long bolt to the proper length.
8. Install separators between different phases of MCCB. Standard separators provided by the MCCB manufacturer must be used.
9. All panel frames in the factory must be connected to earth, if not specifically designed for unearthed system.
10. Generator must be connected to earth securely at least two points.
11. Broken PVC conduits must be removed. Cables must be supported on cable ducts, trays or ladders and must be securely clamped at regular intervals.
12. Fix firmly or replace if broken.
13. Cable ducts must be cleaned regularly and covered to prevent ingress of dust and lint.
14. Any unused wire must be properly taped to prevent any unintended electrocution.

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### Short Term (Within 3 Months):

1. Where applicable, door/frame earth bonding, wire color-coding, single connection to each bus bar terminal point, proper wire termination with cable lug, should be enforced throughout the premises.
2. Cable terminating at Generator output terminal box must be supported on riser and protected. Existing cables laid on floor may be installed in cable trench or on trays.

### Mid Term (Within 6 months):

1. The actual distance from the panel DB01 to the column is only 0.5m and the panel door can only be opened up to 50 degree. This panel must be relocated.

### Long Term (More than 6 months): NA