

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

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Name of the Factory	: <b>AMS International (Sweaters) Ltd.</b>
Address of the Factory	: 34 Choydana, P.O. National University Gazipur-1704
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	: June 30, 2014
Fire & Electrical assessment conducted by:	Accord (Full report available at <a href="http://bangladeshaccord.org">bangladeshaccord.org</a> )
Date of Fire & Electrical Inspection	: March 22, 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	: Garments Factory
ii.	Structural System	: RCC beam slab, Undocumented steel
iii.	Floor System	: Beam slab
iv.	Floor Area	: Unavailable
v.	No. of Stories	: 5 Storey
vi.	Construction Year	: 2001-2003
vii.	Foundation Type	: Not applicable
viii.	Design Drawings	: Available (Undated)
ix.	Soil investigation Report	: Available (2001)
x.	Construction Materials	: Unavailable
xi.	Generator	: Single storey utility shed on the north eastern 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:**

- Immediately relocate water tanks to a suitable location (to be confirmed by Building Engineer) and vacate areas highlighted in blue at any one of 1st to 4th floors.
- Immediately prop mezzanine at ground floor around columns highlighted in red above (prop size and location to be confirmed by Building Engineer).
- Building Engineer to review design, loads and column stresses in all columns.
- Verify insitu concrete strengths either by 100mm diameter cores or existing cylinder strength data for cores from min. 4 columns.
- A Detail Engineering Assessment of Factory to be commenced, see attached Scope.

**Mid Term (Within 6 Weeks):**

- Produce and actively manage a loading plan for all floor plates within the factory, giving consideration to floor capacity and column capacity.
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- Detail Engineering Assessment to be completed.
- Building Engineer to survey and prepare as-built drawings for additional structure as part of Detail Engineering Assessment (see Item 1).
- Building Engineer to carry out design checks on additional structure as part of Detail Engineering Assessment, in particular resistance to wind uplift, given the current connection details.
- Building Engineer to carry out dimensioned as-built survey of the building.
- Collect and produce accurate complete as-built drawings as part of Detail Engineering Assessment.

### **Long Term (Within 6 Months):**

- Continue to implement load plan.
- Carry out any upgrade measures required as part of the design checks or remove structure.

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

#### **Immediate:**

1. Remove locking features from all egress doors / gates. If locks are required for security reasons, utilize special door locking features complying with NFPA 101.
2. Remove all storage from exit stairs and egress paths.
3. 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.
4. Remove all single-station smoke alarms provide automatic smoke detection throughout the building in accordance with NFPA-72.
5. Remove manual on/off switches from emergency lighting and exit signage units to prevent them from being switched off.

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

1. Separate the boiler and generator room from the adjacent working areas and discharge pathways by a minimum 2-hr fire-rated construction. Seal and/or protected all openings to maintain the required fire separations.
  2. Provide dedicated storage rooms separated by minimum 1-hr fire-rated construction.
  3. 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.
  4. Seal all penetrations and openings in exit stair enclosure walls to maintain the fire separation.
  5. Provide dedicated storage rooms separated by minimum 1-hr fire-rated construction. Or 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:
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maximum height of 3.66m and maximum area of 93m<sup>2</sup>.

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

6. Separate the hazardous materials / flammable liquid storage room by a minimum 2- hr fire-rated construction. Seal and/or protected all openings to maintain the required fire separations.

7. Modify the egress door to swing in the direction of egress travel.

8. Provide a minimum 2-hr fire-rated exit corridor between the day-care room and exit stair. Or Relocate day-care room to ground floor with maximum travel distance of 9m (30 ft).

9. Inspect, test and maintain the fire alarm system, and keep written records on-site, in accordance with NFPA 72.

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.

### **Long Term:**

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:**

1. Use cable covered tray/ladder (instead of using PVC pipes) for laying cables and support properly (clamped at regular interval of 600 mm). The tray shall run vertically or horizontally, shall never at angle.

2. Cables below and top of panel must be supported and arranged on cable trays or ladder or rigid pipes for passing cables and supported properly (clamped with saddle, at regular interval of 600 mm). The conduit/tray shall run vertically or horizontally, shall never at angle.

3. Keep the Batteries inside a metal casing (acid proof) and insulate its terminal by insulating material to protect it from short circuit which may occur due to falling foreign material on it.

4. Use steel pipe (instead of flexible pipes), clamped with saddle on floor, to ensure the mechanical protection of the cable laid on floor otherwise cable insulation may damage due to falling object or stepping of occupants on it.

5. Earth bus bar should be installed inside all panels with earthing connection as per BNBC (min size 14SWG, 16mm<sup>2</sup> for main conductor sizes 16-35mm<sup>2</sup> Main conductor size above 35mm<sup>2</sup>, the earth conductor must be half the main conductor).

6. Provide earth connection for body and doors of metallic distribution boards using green cables preferably braid so that the metallic door remains at zero potential all the time.

7. Provide at least 1 meter clearance in front the panels for ease of its operation and maintenance.

8. Install separators between different phases of MCCB. Standard separators provided by the MCCB manufacturer must be used.

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9. Earth connection with required sized cable should be connected to motor frame for better earth continuity to ensure the safety to operator/apparatus.

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

1. Cables must be protected and supported on tray, duct or conduits to protect against weather and possible physical damages.

2. Service cables (existing cables) may be replaced or joint shall be provided with proper connector and PIB tape wound around into a junction box.

3. Install covered cable-tray or ladder (instead of using flexible pipes) clamped or supported at regular interval in order to support and protect the main service cables.

4. Cable terminating at Generator output terminal box must be supported on cable-tray/duct and protected (instead of using flexible pipe).

5. Cable trays/ladder with proper accessories may be used to support cables (instead of using flexible pipes). Cables can be run on cable trays, ladders and raisers.

6. Make circular hole at the base plate/top plate of panels and provide cable gland according to the respective cable size for cable entry and exit so that the cables are not stressed on the sharp edges of the hole of panels. Provide covers (of noncombustible material) if any additional gap remains after installing cable glands.

7. The existing panels should be fixed with the foundation plinth (wall or floor) with nuts and bolts at an accessible height (top end of panel shall be at 2 meter max).

8. Cables below and top of panel must be carried through rigid pipes/tray and supported properly (clamped with saddle, at regular interval of 600 mm). The conduit/tray shall run vertically or horizontally, shall never at angle.

9. Protective devices should be encased in metal casing made metal sheets of 20 SWG thicknesses. The incoming and outgoing cable must be supported on ladder instead of using flexible pipes.

10. Multiple cable shall not be connected to a single terminal to avert loose connection that may induce unexpected heat.

11. Disconnect the power source of the cable laid into channel and clean dust and debris of all interior components. Establish a periodic cleaning program and maintain records of the activities. Provide cover made of noncombustible material on the channel for preventing ingress of dust and debris in future.

12. Wires joined in wiring duct must be removed and avoided. Joint shall be provided with proper connector and PIB tape wound around into a junction box.

13. The rigid pipe used for surface wiring must be continuous through-out its length and properly supported (clamped with saddle, at regular interval of 600 mm).

14. The rigid pipes/tray should be used for surface wiring instead of using flexible pipes and it should be properly supported (clamped with saddle, at regular interval of 600 mm). The pipes shall run vertically or horizontally, shall never at angle.

### **Mid Term:**

1. Install covered cable-tray or ladder clamped or supported at regular interval in order to support and protect the main service cables.

2. Cables connecting to transformer must be supported on cable-tray. Install cable tray or ladder or metallic conduit to support and protect the main service cables horizontally.

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3. Cable laid on sun-shade must be protected and laid through cable-tray or duct to prevent any physical damage to the insulation of the cable.

4. Boiler room may be extend or relocated to large area where working space is available around the boiler.

**Long Term: NA**

