

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

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Name of the Factory	: <b>AKH APPARELS LTD.</b>
Address of the Factory	: 128 Hemayetpur, AKH Tower, Savar, Dhaka-1340, Bangladesh
Dhaka Present Status of the Factory	: <b>Under Operation</b>
Structural assessment conducted by	: Accord (Full report available at bangladeshaccord.org)
Date of Structural Inspection	: 21 June, 2014
Fire & Electrical assessment conducted by	: Accord (Full report available at bangladeshaccord.org)
Date of Fire & Electrical Inspection	: 26 June, 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	: RC beam and column frame with 2 way spanning slab
iii.	Floor System	: Beam slab
iv.	Floor Area	: 107,000 sq.ft (6 storied) & 40,000 sq.ft. (4 storied)
v.	No. of Stories	: 6 & 4 storied
vi.	Construction Year	: 2008 & 2013
vii.	Foundation Type	: Piled foundations
viii.	Design Drawings	: Available
ix.	Soil investigation Report	: Available
x.	Construction Materials	: Stone aggregated
xi.	Generator	: Ground floor

**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):

1. Factory Engineer to review design, loads and columns stresses in all columns.
2. Verify insitu concrete strength by taking 100mm diameter cores from 4 No. basement columns. Verify reinforcement grade, diameter and number of bars in columns.
3. A Detail Engineering Assessment of Building 1 to be commenced, see attached Scope.

#### Mid Term (Within 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.
3. Building engineer to verify that column/beam/slab has sufficient capacity to support water tank as part of Detail Engineering Assessment.
4. Building engineer to provide detailed calculations that show that column/beam/slab has sufficient capacity to support cantilever load as part of Detail Engineering Assessment.
5. Building engineer to check, collect information and produce accurate and complete as-built documentation as part of Detail Engineering Assessment.

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6. Sections of plaster finish to beams to be removed to investigate if cracks penetrate the building structure.
7. Building Engineer to carry out design check on beams as part of the Detail Engineering Assessment.
8. Building engineer to check, collect information and produce accurate and complete structural drawings as part of Detail Engineering Assessment.
9. Building engineer to provide detailed calculation that show the bridges are structurally adequate as part of Detail Engineering Assessment.
10. Building engineer to check connection capacities including gusset bending and shear of bracing system and propose additional strengthening, if required.
11. Review adequacy of cable bracing in stair core.
12. Building engineer to check slab, beam and column capacity.

### Long Term (Within 6 Months):

1. Continue to implement loading plan.
2. Carry out any remedial actions as directed by the Building Engineer.
3. Implement connection strengthening and any other remedial structural works if directed by the Building Engineer.
4. Carry out remedial work to movement joint as directed by the Building Engineer.

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

#### Immediate (Within 1 month):

1. Remove locking features from all egress doors and 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 and 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 manual on/off switches from emergency lighting and exit signage units to prevent them from being switched off.

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

1. 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.
2. Separate the boiler, generator and transformer room by a minimum 2-hr fire-rated construction. Seal and protected all openings to maintain the required fire separations.

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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. Provide a minimum 2-hr fire rated shaft to separate the utility risers from each floor level.
5. Provided 2-hr fire-rated construction or provided minimum 1.5-hr fire-rated door.
6. Seal all penetrations and openings in exit stair enclosure walls to maintain the fire separation.
7. A landing shall be provided on both sides of doors used in the means of egress.
8. Inspect, test and maintain the fire alarm system, and keep written records on-site, in accordance with NFPA 72.
9. Inspect, test and maintain the fire detection 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.
11. 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.

### Mid Term (within 6 Months):

1. Modify stair to discharge directly outside or provide 2-hr fire-rated exit passageway leading directly outside (vestibules to separate any storage areas).
2. Remove single-station smoke alarms. Provide automatic smoke detection throughout the building, tied into the fire alarm system, in accordance with NFPA 72.
3. 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 public way (only include this if feasible).

### 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. Management must have clear SLD and other drawings for understanding the total Electrical system of the factory. Reportedly drawings are under preparation by consultancy firm.
2. Breather oil cup must be filled with transformer oil to required level as instructed by the manufacturer.
3. Construct a raised cable tray/duct to terminate the transformer output cables to changeover switch and provide covers made of non-combustible material to protect cables insulation from physical damage.

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4. SPNMCBs must be fixed on the MCB enclosure (DB) and enclosure should be fixed at a height of 1.8m from the finished floor level.
5. Wiring laid in cable trench must be protected in rigid conduits with bends and accessories. If flexible conduits are used for some specific reasons, it must be of industrial grade and should bear ample strength to withstand physical impacts.
6. The cable trench must be tightly covered throughout its length to avoid physical damage to the cables from falling objects. The cover must prevent the trench from falling debris, dust and lint.
7. Cables terminating from MCCB of Generator and entering the trench must be protected by providing the raised duct with cover.
8. Cables extended from BBT breaker to distribution boards in various floors must be supported on trays/risers.
9. Wires passing through the wall or slab must be through the industrial graded conduit and where ever require junction box must be provided.
10. Wires drawn through flexible PVC conduit must be replaced with industrial graded conduit and fix with saddles to prevent possible physical damages of the wiring installation.
11. Clear transparent sheet must be used to cover the bus bar of the distribution board to protect the possible physical contact of the electrician during maintenance.
12. Wherever there is a crossing of wiring, junction boxes must be provided.

### Short Term (Within 3 Months):

1. Transformer may be separated from panels by constructing barrier walls.

Mid Term (Within 6 months): NA

Long Term (More than 6 months): NA