

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

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Name of the Factory	: ANLIMA TEXTILE LTD.
Address of the Factory	: Karnapara, Savar, Dhaka
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	: 7 December, 2013
Fire & Electrical assessment conducted by	: Accord (Full report available at bangladeshaccord.org)
Date of Fire & Electrical Inspection	: 7 December, 2013

**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 with two-way RC slab
iii.	Floor System	: Beam slab
iv.	Floor Area	: The estimated floor area is approximately 800 square meters for the 7-story factory
v.	No. of Stories	: Multi storied
vi.	Construction Year	: 1995 -2002
vii.	Foundation Type	: Unavailable
viii.	Design Drawings	: Available (signed by the Local Municipality)
ix.	Soil investigation Report	: Unavailable
x.	Construction Materials	: Unavailable
xi.	Generator	: Generators were provided in a separate structure away from the factory buildings

**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):

1. Factory Engineer to review design, loads and columns stresses in area identified above.
2. Verify insitu concrete strength either by cores or existing cylinder strength data for 4 building columns.
3. Sections of plaster finish to beams to be removed to investigate if cracks penetrate the building structure.
4. Verify that beam/slab has sufficient capacity to support fully filled water tank.
5. Commence design checking of PT beams as part of an Engineering Assessment of the PT structure.
6. Survey typical PT tendon top and bottom covers in beams to confirm that profile of cables matches the design requirements.
7. Steel roofs should be designed by the Building Engineer and, if required, upgraded to support code vertical and wind loads or they should be vacated and removed.

Long Term (Within 6 Months):

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1. Produce and actively manage a loading plan for all floor plates within the factory giving consideration to floor capacity and column capacity.
2. Building Engineer to carry out design check on beams to confirm that these cracks are non-structural.
3. Building Engineer to prepare Allowable Floor Loading Plans.
4. Steel roofs should be designed by the Building Engineer and, if required, upgraded to support code vertical and wind loads or they should be vacated and removed.
5. Building Engineer to review concrete cylinder strength records, strand extension results, as-surveyed cable profiles and grouting records for PT beams to establish if these match design requirements
6. This will be required as an input to the controlled loading plans.
7. As part of Engineering Assessment –confirm PT beams are adequate.
8. Steel roof should be designed by the Building Engineer and, if required, upgraded to support code vertical and wind loads or they should be vacated and removed.
9. Engineer to inspect structure directly above the steam source and review the efficiency of the air extract system and propose a suitable monitoring regime and protective coating if required –to ensure the integrity of the PT beams.
10. Building Engineer to create controlled loading plans for all floors within the Warehouse designating where storage can be placed and cannot be placed.
11. Building Engineer to confirm adequacy and/or remedial works required.

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

#### Immediate (Within 1 month):

1. Keep egress paths and stairs clear of storage. Provide separate room for flammable storage with minimum 2-hr fire-rated construction. Seal and/or protected all openings to maintain the required fire separations.
2. Provide additional exit stairs to the floors or restrict occupant load on each floor to the exit capacity provided.
3. Remove all storage and items that are not fire and life safety related from the exit stairs.
4. Remove all collapsible gates at exit stairs and along the means of egress. If locks are required for security reasons, utilize special door locking features complying with NFPA 101.

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

1. 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.
2. Seal all penetrations and openings in exit stair enclosure walls to maintain the fire separation.
3. Provide dedicated storage rooms separated by minimum 1- hr fire-rated construction on all production floors where transient storage is required for operations. Where separate storage rooms are not feasible, provide defined storage areas and limit the storage arrangement as follows:

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-Maximum height of 2.4 m 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.

4. Provide a minimum 2-hr fire rated shaft to separate any utility risers from each floor level. Seal all penetrations and openings in floor/ceiling assemblies to maintain the fire separation.
5. Separate each of the rooms by minimum 2-hr fire-rated construction. Seal and/or protected all openings to maintain the required fire separations.
6. Inspect, test and maintain the fire alarm system, and keep written records on-site, in accordance with NFPA 72.
7. 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. Provide minimum 2-hr fire separation between the exit stair discharge lobby and all ground floor areas including the factory floor and storage areas.
2. Replace the single-station smoke alarms with automatic smoke detectors tied into the fire alarm system. Configure the fire alarm system to initiate occupant notification upon activation of any two smoke detectors in addition to the manual fire alarm stations.

### 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): NA

### Short Term (Within 3 Months):

1. The leakage current collector must be supported without stressing it. The leakage current collector may be connected to the cable riser with nuts & bolt from which the earth connection can be extended.
2. Earth connection must be extended or terminated firmly. Earth strips with termination points (Nuts & Bolts) may be used.
3. HT cables must be firmly fixed<sup>2</sup> at the entry point (to panel) and excess gaps remaining from after cable is entered must be sealed.
4. Cables entering panels must be firmly fixed using necessary support / glands and must be in accordance to the instruction of the panel manufacturer. Generally, all cables in panels must enter from top or bottom plants.
5. Phase barriers must be installed between different phases for voltage exceeding 230 Volts.

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6. Panels must be closed and protected from dust and rats (small animals). Cables must enter through base plates and excess gaps/holes must be sealed/closed after the cables are installed.
7. Wiring inside panels must be arranged and fixed firmly to prevent damages to the wires and safety to the operation and maintenance personnel(s).
8. Cables must be firmly fixed to the cable tray/raiser and remaining opening after cable passes through walls must be closed/ sealed corresponding to the fire separation requirement.
9. Cables on floor must be supported on stray or protected in cable trenches with cover.
10. Cables entering substation must be laid in cable trenches with drainage facilities and cable supports to protect from flood or storm water.
11. Cables must be protected from weather and supported throughout its length (point of exit to the point of entry to another building). Weather resistant (UV rated) cables may be used if not covered throughout length.
12. Cables at factory floors must be protected from damages and from surrounding conditions. Steel or steel reinforced flexible conduits (industrial grade) must be used with firmly fixed ends.
13. Wiring must be protected throughout its length and must not be joined in mid-span. PVC flexible conduit selected to support and protect wiring must be industrial graded with adequate mechanical strength.
14. Long points or wirings must be protected in conduits with adequate mechanical strength. If flexible conduits are used, it may be replaced with industrial grade (steel or steel reinforced conduits).
15. Wirings must be protected and supported (fixed on walls/ceiling) at regular intervals.
16. Remaining openings after passing cables/wires or ducts must be closed with concrete slabs or sealed in accordance to the fire safety requirements of the area.
17. All live parts must be protected and should be accessible to operator/authorized persons only.

### Mid Term (Within 6 months):

1. The earth point of transformer must not be used for extending earth connection to other equipment/devices. The earth connection to other equipment/ devices or panels must be realized through earth strips installed in the transformer room.
2. All switches/devices inside control room must be installed in accordance to safety requirement and cables must be protected. Temporary wirings or electrical works must be avoided.
3. Cables connecting to motors must be terminated at the terminal box and protected. Cables termination may be maintained (redone).
4. Cable damages (minor) must meet the safety requirements and comply with the manufacturer's minimum requirement.
5. All cables must be installed inside cable trays or supported on raisers.
6. Cable trays installed must be regularly maintained so as to keep cables in it protected at all times.

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7. Cables connected to termination boxes must be checked and maintained regularly. Equipment not used must be dismantled and removed from the system.
8. Cables must be protected from physical damages and external conditions. Cables may be enclosed in industrial graded steel (steel reinforced) flexible conduit. Cables leaving cable trays must be protected from physical damages.
9. Cables must be supported to reduce stress and protect from external damages. Additional cable trays may be installed for the cables or the duct may be extended.
10. The transition from duct/raceways to other wiring systems must be protected and must be mechanically strong too prevent stress at joints.

Long Term (More than 6 months): NA