

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

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Name of the Factory	: <b>ABANTI COLOUR TEX LTD.</b>
Address of the Factory	: Plot-S, A-646, Shashongaon Enayetnager, Fatullah, Narayangonj
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	: 28 June, 2014
Fire & Electrical assessment conducted by	: Accord (Full report available at <a href="http://bangladeshaccord.org">bangladeshaccord.org</a> )
Date of Fire & Electrical Inspection	: 7 July, 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 slab, RC flat slab
iii.	Floor System	: Beam slab
iv.	Floor Area	: The total production floor is 36,494 sq. m
v.	No. of Stories	: 10-11 storied
vi.	Construction Year	: 2000-2012
vii.	Foundation Type	: Unavailable
viii.	Design Drawings	: Available (Pourashava Approval)
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. Structural Engineer to review design, loads and columns stresses.
2. Commence Detailed Engineering Assessment for Unit 1 and Unit 2 – see attached scope.
3. Verify insitu concrete strength either by taking 100mm dia. cores from 4 No. typical/non-critical columns or by using existing cylinder strength data if available.
4. Commence a Detailed Engineering Assessment for Unit 1 as per Item 1.
5. Structural Engineer to review design, loads and punching shear stresses in slabs.
6. Verify insitu concrete strengths (using minimum of 4 No. 100mm dia. cores taken from slabs). Verify existing reinforcement (steel grade, bar diameter and spacing) in slabs.
7. Sections of plaster finish / paint to beams and slabs to be removed to investigate if cracks penetrate the building structure.
8. Commence a Detailed Engineering Assessment as per Item 1.
9. Undertake a Detailed Engineering Assessment for Units 1 and 2 as per Item 1.

Mid Term (Within 6 Weeks):

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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. Detail Engineering Assessment to be completed.
3. Commence action on any recommendations arising from the Detailed Engineering Assessment.
4. Detailed Engineering Assessment to be completed.
5. Commence action on any recommendations arising from the Detailed Engineering Assessment.
6. Structural Engineer to specifically consider the slab and beam capacity of the ground floor, considering the actual loads applied from washing and dyeing plant as part of the Detailed Engineering Assessment.
7. Produce and actively manage a loading plan for the area above the basement, giving consideration to floor capacity and column capacity.
8. Structural Engineer to verify that column slenderness has been taken into account during design and validate as-built condition as part of the Detailed Engineering Assessment.
9. Propose (and have installed) any retrofitting or strengthening required.
10. Produce and actively manage a loading plan for all floor plates within the factory, giving consideration to floor capacity and column capacity as part of the Detailed Engineering Assessment.
11. As part of the Detailed Engineering Assessment, Structural Engineer to verify that the additional undocumented 11th floor of Unit 1A can be accommodated by the structure below.
12. Building engineer to check, collect information and produce accurate and complete as-built documentation for all buildings.

### Long Term (Within 6 Months):

1. Continue to action recommendations arising from Detailed Engineering Assessment.
2. Continue to implement loading management plans.
3. Continue to implement floor load plans.

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

#### Immediate (Within 1 month):

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 single station smoke alarms.
5. Remove manual on/off switches from emergency lighting units to prevent them from being switched off.
6. Regularly inspect all exit signage and replace/install lights as needed to illuminate signs.

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### 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. 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.

3. Separate the boiler, generator, and transformer room by a minimum 2-hr fire-rated construction. Seal and/or protected all openings to maintain the required fire separations.
4. 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.
5. Seal all penetrations and openings in exit stair enclosure walls to maintain the fire separation.
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.
8. 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. Provide sprinkler protection for discharge floor in accordance with NFPA 13.
2. Replace the single-station smoke alarms. Provide automatic smoke detection throughout the building in accordance with NFPA 72.

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

1. Provide automatic sprinkler protection throughout the building in accordance with NFPA 13.
2. 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. Phase barriers between different phases supplied by the breaker manufacturer must be installed to avoid arc flashing.

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2. Generator must be connected to earth securely at least at two points. Ensure the earthing cable size is not less than 35sq.mm. The termination must be done using cable lugs.
3. Remove all the combustible materials stored inside the Generator room.
4. Use proper sized cable lugs for each single cable and punches them by proper hand puncher or hydraulic puncher to avoid loose connection. Enlarge the earth bus-bar size according to the capacity of the panel and make more holes. Use single point (hole) of bus bar to terminate each single cable (lugs).
5. The maintenance room must be relocated. The electrical room must not be used as maintenance room.
6. Provide cable gland same as the cable size at the cable entry and exit so that the cables are not stressed on the sharp edges of the entry and exit hole of the panel board.
1. Unused gland holes in base plates cover must be sealed with proper way.
7. 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.
8. Large exhaust fans must be connected through control device such that it will not restart automatically when power is restored.
9. Multiple cables connecting at a MCCB terminal must be removed. Individual circuit breaker must be used for each load according to the respective cable-size.

### Short Term (Within 3 Months):

1. Construct a separate room for the transformer by constructing barrier (brick) walls (fire rated wall) up to the ceiling; the minimum area of the transformer room should be 10-13 sq. m (according to BNBC 2006, Section-2.6.3).
2. Cables in trench must be supported on trays inside trench and should be protected with covers with ample strength and rigidity.
3. Install separate cable tray with protective cover for HT and LT cables; Latch the HT cable properly avoiding acute bend.
4. Arching horn should be installed at the HT bushing (may consult the servicing/supplier company). Arching horn should be installed at the HT bushing (may consult the servicing/supplier company).
5. Replace silica gel and must include in routine maintenance to check and maintain. Breather oil cup must be filled with transformer oil to required level as instructed by the manufacturer.
6. Cables/wirings passing through floor must be protected/supported installing covered cable tray/raceway/rigid pipes and remaining gaps must be sealed with fire resistant materials. Cable tray/raceway shall be installed for the support of the cable throughout its length.
7. Make circular hole at the 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.
8. The extended cables, which are exposed, must be encased in a rigid conduit or a required size of cable duct/tray must be used.
9. Cables must be laid inside covered cable-tray installed on the floor or trench.

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10. Terminate each cable individually on the bus bar. Multiple cables shall not be terminated on same point of bus bar.
11. Cables shall be connected to terminals only by cable lugs according to cable size.
12. The service cables which are not securely fastened to the ladder must be fastened at regular intervals using cable ties.
13. Replace the flexible pipe with PVC pipe to support and protect the cables. Ensure the industrial graded PVC pipe is properly clamped with saddle at a regular interval.
14. Cables must be laid into a covered cable-ladder, installed on the wall to prevent any physical damages.
15. Install covered cable tray or rigid pipe for passing cables and it should be prevailed throughout the permanent wall to protect cables insulation from damage and the remaining gaps must be sealed with fire resistant materials.
16. Cables extended from BBT in flexible PVC conduit must be supported in covered cable trays.
17. Cables extended from BBT breaker to distribution boards at various floors must be supported on trays/risers or rigid pipes may be used for passing through the slab. Flexible conduit must not be used for passing through slab & long point wiring (except for special wirings).
18. The compressor power cables must be supported in cable tray/riser or the flexible PVC duct must be replaced with a rigid conduit to prevent cables from physical damage.
19. Disconnect the electric supply to the duct and provide cover made of non-combustible material preferably metal on the duct to prevent ingress of dust and debris.
20. The cable within the flexible PVC conduit may be laid in the aluminum cable duct. If the aluminum duct do not accommodate all the cables it may be replaced by a bigger cable duct.

Mid Term (Within 6 months): NA

Long Term (More than 6 months): NA