

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

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Name of the Factory	: TULIP GARMENTS LTD.
Address of the Factory	: 52, New Elephant Road, Dhaka, 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	: 8 April, 2014
Fire & Electrical assessment conducted by	: Accord (Full report available at bangladeshaccord.org)
Date of Fire & Electrical Inspection	: 26 April, 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	: Each floor has the area of 12,800 sq ft.
v.	No. of Stories	: 6 storied
vi.	Construction Year	: 2004, Ongoing construction and factory setting
vii.	Foundation Type	: Isolated pad foundations
viii.	Design Drawings	: Available (Approved by RAJUK, October 2006)
ix.	Soil investigation Report	: Available (Prepared by 'Prime Engineers' dated June, 2013)
x.	Construction Materials	: Brick chip aggregated
xi.	Generator	: West side of the building on the 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. Limit access to steel stair until structure completed, & discuss implications.
2. Provide temporary connection to the main building structure at each concrete floor level.
3. Ensure access provided to appropriately trained and equipped construction personnel only.
4. Ensure no significant increase of loading on suspended floor levels.
5. Confirm that Build tech as built drawings and design report are the current design documents.
6. Survey existing structure to determine missing connection components.
7. Install missing components in accordance with the current design documents.

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

1. Current building engineer to confirm current design appropriate as documented. Revise documentation if necessary. Building engineer to survey existing structure and clearly describe which elements are missing at present.
2. Steel stair construction to be completed in accordance with the building engineers design documents ensuring all missing elements included.
3. Existing soil report to be reviewed by a competent geotechnical engineer.

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4. Building engineer to review existing soil report recommendations and the most recent geotechnical engineers' review comments and confirm that the as built foundations are structurally sufficient. Amend design if necessary.
5. As built structural drawings to be amended ensuring that inconsistencies between surveyed condition and Build tech as-built documents are addressed (E.g. concrete materials).
6. Repeat analysis and design using verified material strengths and as built structural arrangement (E.g. reinforcement grade, concrete compression capacity).
7. Building engineer to produce loading plans to be displayed at each floor level. Factory manager to actively manage floor usage in accordance with the loading plan.
8. Building engineer to review lateral stability of steel roof structure.
9. Building engineer to design any additional structure deemed necessary.

### Long Term (Within 6 Months):

1. Engineer to confirm finished structure has been constructed correctly before stair is opened for use by building occupants.
2. Perform additional soil testing to substantiate current design if appropriate.
3. Implement any strengthening design, ground improvement and additional building support required by the building engineer.
4. Revise drawings incorporating any additional structure deemed necessary as a result of the revised analysis and design (E.g. strengthening etc.).
5. Build additional structure / implement strengthening deemed appropriate.
6. Monitor finishes to structural elements where Build tech have observed structural cracking and signs of distress. Repair and strengthen structure as appropriate.
7. Continue to implement load plan.
8. Build additional structure as per building engineers recommendations.

### **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. 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.

#### 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.

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1. 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.
2. 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.
3. Provide a minimum 2-hr fire rated shaft to separate the utility risers from each floor level. Seal all penetrations and openings in floor/ceiling assemblies to maintain the fire separation.
4. Seal all openings in exit stair enclosure walls to maintain the fire separation.
5. Provide 2-hr fire-rated exit passageway leading directly outside (vestibules to separate any sub-station room and generator room).
6. Provide handrails on at least one side of exit stair.
7. Inspect, test and maintain the fire alarm system, and keep written records on-site, in accordance with NFPA 72.
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): NA

Long Term (More than 6 months): NA

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

Immediate (Within 1 month):

1. Pour oil in the breather oil cup. It must be filled with transformer oil to the required level as instructed by the manufacturer.
2. Remove the stored materials from the generator room and clean the generator room to avoid spreading of fire hazard. Establish a routine cleaning program to keep the generator room neat and clean.
3. Provide separate earth connection to the panel door by using earth cable (at least 14 SWG; green coloured) or earth braid with better earth continuity.
4. Install separators between different phases of MCCB to avert flashover. Standard separators provided by the MCCB manufacturer must be used.

Short Term (Within 3 Months):

1. Encase the HT cable in required sized rigid PVC pipe when passing through the rough wall. Enlarge the cable trench and latch the HT cable in it safely then provide metallic cover (checkered plate) on the trench to prevent the damage of cable insulation from falling

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objects, stepping of occupants and incident during maintenance work. Establish a routine maintenance program to keep the cable trench neat and clean.

2. Clean the dust and replace the rusty nut, bolt and washer. Encased the earth lead (bare conductor) in steel conduit laid on the floor to protect it against moisture as well as rust. Reinstall the MET in metal casing with cover; mounting height is at least 1.5 feet above the floor to protect the MET against moisture and dust. Use proper nut, bolt and washer to terminate the earth cables. Periodic maintenance and earth continuity test need to be performed for better earth continuity.
3. Install cable ladder or tray to support and arrange the cables in it safely.
4. Install a riser or tray to support the cables when entering the changeover switch to reduce cable strain on the termination point. Cable terminating at the panel must be firmly fixed with glands into base plates, to prevent damaging of cable insulation due to the sharp edge of panel at the entry.
5. 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): NA

Long Term (More than 6 months): NA