

Summary of Preliminary Assessment on Structural, Fire and Electrical Safety

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| Name of the Factory | : COTTON TEXTILE AND APPARELS LTD. |
| Address of the Factory | : Plot -i/ 2, 3 & 4, Road # 7, section # 7, Mirpur, Dhaka |
| Dhaka Present Status of the Factory | : Under Operation |
| Structural assessment conducted by | : Accord (Full report available at bangladeshaccord.org) |
| Date of Structural Inspection | : 1 April, 2014 |
| Fire & Electrical assessment conducted by | : Accord (Full report available at bangladeshaccord.org) |
| Date of Fire & Electrical Inspection | : 29 March, 2014 |

Basic Information: The present garment factory is a commercial building with beam-column frame system. The following general information was noted:

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| i. | Building Usage Type | : Garment factory |
| ii. | Structural System | : RC beam slab, RC flat slab |
| iii. | Floor System | : Beam slab |
| iv. | Floor Area | : The building has 352.45 m.sq per floor |
| v. | No. of Stories | : 10 storied |
| vi. | Construction Year | : 1991 |
| vii. | Foundation Type | : Unavailable |
| viii. | Design Drawings | : Available (Signed in 1992 by RAJUK) |
| ix. | Soil investigation Report | : Unavailable |
| 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. Maintain the current use of the floors and don't change use or increase occupation, either of which could increase loading.
2. Factory Engineer to review design, loads and column stresses in all columns.
3. Verify insitu concrete stresses either by 100mm diameter cores or existing cylinder strength data for cores from 4 columns. Reinforcement quantities also to be confirmed.
4. A Detail Engineering Assessment of the Factory to be commenced, see attached Scope.
5. Stair –core construction works to be stopped.
6. Building Engineer to review in detail the design of the new stairs currently under construction.

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 review in detail the effect of the new stairs on the existing structure paying particular attention to the additional loading being applied to and the demolition works noted to the existing structure.

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4. This element is to be included in the Detail Engineering Assessment of the Factory. See attached Scope.
5. The building is relatively tall and narrow and primarily consists of flat slab floor plates. Lateral stability of the southern section of the building in particular is a concern.
6. Lateral Stability checks for the main building to be included as part of the Detail Engineering Assessment.
7. Building Engineer to carry out Structural Checks and calculations for the transfer structure noted.

Long Term (Within 6 Months):

1. Continue to implement floor loading plan.
2. Supervise the construction works and continue to implement the floor loading plan.
3. Implement any actions identified in the above noted checks.
4. Findings of the above structural checks to be implemented.
5. Implement any findings from the above checks.
6. Produce and actively manage a loading plan for all floor plates within the factory giving consideration to floor capacity including punching shear in flat slabs and column capacity.
7. Locations of loading noted to be surveyed and capacity of floor and roof structure to be assessed by the Building Engineer to confirm that they are designed to carry these loads.
8. Produce and actively manage a loading plan for all floor plates within the factory giving consideration to floor capacity and column capacity.
9. Building Engineer to review the building envelope (roof and façade) for water tightness. Rainwater collection system at roof level also to be reviewed.
10. Building Engineer to carry out opening up works on the cracks noted to determine the cause. Remedial works to be carried out pending the findings of the investigations.
11. The lower section of roof can be accessed via a door from the dining area. There is no edge protection to this roof.
12. Building Engineer to design a suitable edge protection scheme and oversee the construction on site.
13. Building engineer to check, collect information and produce accurate and fully complete as-built documentation. The rebar quantities in all structural elements should also be confirmed.
14. If any additions to the building structure are proposed, the Building Engineer shall provide calculations showing the structural adequacy of all columns taking into account any additions to the existing structure, the loading plans and as built structure, including in-situ concrete strength testing.

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.

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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.

Short Term (Within 3 Months):

1. Separate the generator room by a minimum 2-hr fire-rated construction. Seal and/or protected all openings to maintain the required fire separations. Seal the existing generator room entrance and provide an exterior entrance from the adjacent alley.
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 23m²

-If sprinkler protected: maximum height of 3.66m and maximum area of 93m².

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

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. Separate the electrical service room by a minimum 2-hr fire-rated construction. Seal and/or protected all openings to maintain the required fire separations.
5. Remove the exterior stairs once the new interior exit stair construction is complete.
6. Separate the boiler room by a minimum 2-hr fire-rated construction. Seal and/or protected all openings to maintain the required fire separations.
7. Provide minimum aisle widths of 36-in.
8. Remove and relocate the non-serving electric appliances to the exterior of the stairwells.
9. Provide additional exit (constructed on all floors in the same configuration that was observed during the inspection) and also provide sprinkler protection in accordance with NFPA 13.
10. Reconfigure the egress arrangement to reduce the maximum common path of travel to not more than 23 m.
11. Inspect, test and maintain the fire alarm system, and keep written records on-site, in accordance with NFPA 72.
12. 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.
13. Provide exit signs above all exits to the exterior and all doors to the exit stairs.

Mid Term (within 6 Months):

1. Provide sprinkler protection for the ground floor in accordance with NFPA 13.
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.

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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.
2. Provide automatic sprinkler protection throughout the building in accordance with NFPA 13.

The recommendations for Electrical Safety corrective actions are:

Immediate (Within 1 month):

1. Shut down the transformer and replace the silica gel or perform maintenance to remove moisture from it.
2. HT cable terminating at transformer must be firmly supported & latched on riser to avoid stress at the termination (transformer bushing).
3. Establish a routine cleaning program to keep neat and clean the transformer room. Shut the power of the transformer and clean the exterior of the transformer at scheduled period.
4. Storage in transformer room (substation) must be removed. Transformer room must be kept free from obstruction for proper operation and maintenance.
5. Cable terminating at Generator output terminal box must be supported on riser and protected up to the base-plate of the panel.
6. Remove diesel and other oil barrels from generator room.
7. Remove combustible materials from generator room.
8. Install separators between different phases of MCCB. Standard separators provided by the MCCB manufacturer must be used.
9. Panels located below stairs must be relocated to safe place for ease of access to the panel during emergency.
10. MCCB must be protected, installing it into a metallic enclosure of minimum 20 SWG thickness.
11. Cables must be protected and supported and installed through a safe route. Existing cables passing through window and ventilators must be removed immediately.
12. 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.
13. Cables connecting to bus bars inside panel must be connected firmly with cable lugs according to respective cable-size. Cable terminating to the bus bars must be fixed with proper size nuts and bolt with washers.
14. Items and materials kept near panel(s), obstructing the access to panel, must be cleared. Access to the panel for operation and maintenance must be kept clear at all time.
15. Loop connection should be removed from the MCBs. Use single cable or plug-in bus bar for MCB input to avoid loose connection.

Short Term (Within 3 Months):

1. Cables must be supported on covered cable-trays installed on floor. Cables may be laid in cable trench with covers.

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2. Cable duct must be installed. Cables supported in ducts must be arranged and easily separable for maintenance and must be covered tightly to prevent ingress of lint and dust.
3. Cables/wirings passing through ceiling must be protected and remaining gaps must be sealed with fire resistant materials.(Remove the combustible material wound around the wire).
4. Flexible PVC conduit wiring must be additionally supported on cable tray and risers installed on the wall, clamped at regular interval.

Mid Term (Within 6 months):

1. Keep the provision for adequate clearance (not less than 1 meter, preferably) around the transformer. The transformer must be installed with barrier walls between transformer and other panels. The walls must be fire resistant and should have height up to the ceiling.

Long Term (More than 6 months): NA