

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

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Name of the Factory	: <b>CROWN KNITWEARS LTD.</b>
Address of the Factory	: Plot 781/782, Vogra, Joydevpur, Gazipur
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	: 2 April, 2014
Fire & Electrical assessment conducted by	: Accord (Full report available at bangladeshaccord.org)
Date of Fire & Electrical Inspection	: 16 March, 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 solid slab, RC flat slab
iii. Floor System	: Beam slab
iv. Floor Area	: Unavailable
v. No. of Stories	: 7 storied
vi. Construction Year	: 2000
vii. Foundation Type	: Pad foundation
viii. Design Drawings	: Available (Dated 2000)
ix. Soil investigation Report	: Unavailable
x. Construction Materials	: Brick aggregated
xi. Generator	: On ground floor at exterior walls

**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 current use of the floors in each building and do not change use or increase occupation, either of which could increase loading.
2. Building Engineer to review design, loads and stresses in all columns.
3. A Detail Engineering Assessment of Factory 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. Loading plans to be put on each factory floor.
2. Detail Engineering Assessment to be completed.
3. Verify in-situ concrete strengths either by 100mm diameter cores or existing cylinder strength data for cores from minimum 4 no. columns.
4. Detail Engineering Assessment to be completed as per Item 1.
5. Extent of build-up loading in toilet and wash areas to be surveyed and weight of water tanks on roof to be assessed. The capacity of floor & roof slabs to be assessed to confirm if the structure is designed to carry these loads.

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6. As part of Detail Engineering Assessment required under Item 1, confirm if the slabs have sufficient capacity to support applied loading. If cracking continues through to the structural slab, confirm if the cracks are within acceptable limits for normal structural behavior.
7. Punching shear also to be assessed for the flat slab structures in the upper levels.
8. As part of the Detail Engineering Assessment of Factory required for Item 1, the change in structural system should be assessed in terms of the overall lateral stability of the building.
9. Complete Detail Engineering Assessment and identify adequacy or otherwise of the lateral stability system.
10. Building engineer to assess lightweight roof structure and confirm its ability to withstand all wind loading pressure, suctions and uplift forces.
11. Additional loading to main production building to be identified and incorporated in Detail Engineering Assessment for the building.
12. Building engineer to assess stability and condition of the roof parapets.

### Long Term (Within 6 Months):

1. Continue to implement load plan.
2. Implement strengthening measures where required.
3. Repairs and strengthening to be carried out as required by engineering assessment.

### **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. Keep egress paths and stairs clear of storage.
3. Remove all storage from exit stairs and egress paths.
4. 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.

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

1. Separate the boiler / generator / transformer rooms 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. Seal all penetrations and openings in exit stair enclosure walls to maintain the fire separation.
4. 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.

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5. Provide dedicated storage rooms separated by minimum 1-hr fire-rated construction. Where separate storage rooms are not 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.

6. Provide minimum aisle widths of 36-in.
7. Remove all storage from exit stairs and egress paths.
8. Inspect, test and maintain the fire alarm system, and keep written records on-site, in accordance with NFPA 72.

Mid Term (within 6 Months): NA

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. The cable trench must be tightly covered to avoid physical damage to the cables from falling objects. The cover must prevent the trench from falling debris, dust and lint.
2. Damaged wiring ducts must be repaired to protect wiring/cables in it.
3. Cables terminating at distribution board and installed between floor and panel base must be protected in rigid conduit or in covered ladder to protect physical damages.
4. Cables terminating at distribution boards must be supported in risers and protected throughout its length till the panel base or top plate.
5. Cables must be supported in trays or ladders and securely fixed at regular intervals.
6. Cables must be supported in conduits, ducts or trays.
7. Cables/wirings passing through permanent wall must be protected and remaining gaps must be sealed with fire resistant materials.
8. Cables in PVC conduits passing through walls must be protected and securely fixed. Damaged PVC conduits must be repaired or replaced.
9. Electrical installation behind or within wooden boards/panels must be safely installed. Existing PVC conduit wiring installed behind panel must be additionally protected (fire separation) to eliminate electrical fire hazards.
10. Main trunk lines not installed in shaft must be protected with fire separation walls or covers from the production areas.
11. Leakage current collector of the HT cable end termination must be connected to the earth.
12. Replace silica gel and must include in routine maintenance to check and maintain.

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13. Breather oil cup must be filled with transformer oil to required level as instructed by the manufacturer.
14. Transformer must be regularly cleaned and maintained as part of the routine maintenance. Care must be taken to completely disconnect the transformer from the electrical system.
15. Cables must be supported on trays, ladder or risers.
16. Surface wirings in Storage must be additionally protected and must be graded for such areas. The wires and its supports used must be fire retardant and must have ample strength. Must be securely fixed to ceiling and wall.
17. Repair the damaged wiring supports. Securely fix and protect it.
18. Wiring extended from cable tray or wiring duct must be protected and should extend through proper tray jointing or junctions.
19. Wiring in stairs must be protected and securely fixed through safe route.
20. Cable terminating at the panel must be firmly fixed with glands and at gland plates, to reduce stress at the termination point.
21. Clean regularly and protect the panel from ingress of lint and dust by closing all sides and doors.
22. Install separators between different phases of MCCB. Standard separators provided by the MCCB manufacturer must be used.
23. Multiple cables connecting at a MCCB terminal must be disconnected. Existing multiple circuits may be distributed through bus bars.
24. Every wire terminating must be installed using independent lug/terminal.
25. Existing panel door bonding by PVC insulated wires may be replaced with bonding braid as most of them are loosen due to repeated opening and closing of door.
26. Wire joints in panels must be tightly connected using terminals or sockets crimped and insulated. Heat shrink tubes may be used for insulation.
27. Earth conductors must not be spliced between terminals. All earth conductors must be terminated and extended by installing earth bus bar inside panel.
28. Panel must be closed and varmint & lint proof. Panel base must be installed.

### Short Term (Within 3 Months):

1. Cables on floor may be supported on trays installed at safe locations.
2. HT cables must be laid in cable trench and supported on cable trays. Existing cable may be protected and supported in cable trays through safe route raised at safe height.
3. Cables must be supported on cable trays and riser. Cables may be laid in cable trench with covers.
4. Gaps remaining after passing wiring supports or cables through walls, ceiling and floors must be sealed with fire resistant compound (concrete).

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5. Power cables passing through wall, ceiling or floors must not be shared with other utility lines. Power cables must be separated from other lines (facilities) passing through at safe distance.
6. Transformer may be separated from panels by constructing barrier walls.
7. Cables enclosed in flexible PVC conduit must be additionally supported as the existing conduit does not have required strength and rigidity to protect and support cables in it.
8. Wiring in flexible PVC conduit supported on existing wiring duct must be supported in additional ducts or the existing ducts may be replaced with larger size ducts.
9. Rigid PVC conduits not adequately supported and junctions not installed at crossings.
10. Replace the damaged wiring supports.
11. Wiring or cables in PVC conduit must be securely fixed for supports and protected against damage.
12. PVC conduit wiring systems must be installed in complete with accessories like junctions, joints, bends and reducers).
13. Panels must be readily accessible for operation and maintenance.
14. Wiring in PVC flexible conduit entering panels must be firmly fixed at the panel (base / Top) using socket and check nuts.
15. Wire terminating to devices inside panel must be connected firmly and wires approaching devices must be securely fastened to avoid unintentional contact with live parts.
16. Wires terminating to bus bars inside panel must be securely and independently fixed using thimble/lugs.
17. Cables and wires inside panel must be securely fixed and arranged safely.
18. Panel or electrical installation in the stairways and public areas must be avoided, as much as possible. OR must be protected (Fire separation, electric shock hazard, accidental operation, security, damages, etc.).

### Mid Term (Within 6 months):

1. PCC over concrete must be dismantled and protected on cable tray or in cable trenches.

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