Name of the Factory	:	**SHIRT MAKERS LIMITED**
Address of the Factory	:	Kaptai Raster Matha, Kalurghat Industrial Area, Chandgaon, Chittagong, Bangladesh
Dhaka Present Status of the Factory	:	**Under Operation**
Structural assessment conducted by	:	Accord (Full report available at bangladeshaccord.org)
Date of Structural Inspection	:	18 May, 2014
Fire & Electrical assessment conducted by	:	Accord (Full report available at bangladeshaccord.org)
Date of Fire & Electrical Inspection	:	12 June, 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	: Steel roof truss, RC beam/column frame
iii.	Floor System	: Beam slab
iv.	Floor Area	: The total floor area of main factory shed is 29,000 sq.ft.
v.	No. of Stories	: Single storied
vi.	Construction Year	: 1958
vii.	Foundation Type	: Pad foundation
viii.	Design Drawings	: Available
ix.	Soil investigation Report	: Available
x.	Construction Materials	: Unavailable
xi.	Generator	: Ground floor separate shed in the south side of the building

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. Factory Engineer to review design, loads, slab/beam stresses and physical condition (i.e. corrosion) in the area identified above.
2. A Detail Engineering Assessment of Factory to be commenced immediately in particular the stability and capacity of the 1st floor slab at main building.
3. Until DEA and any necessary strengthening is completed, this floor must not be occupied.
4. Factory Engineer to review design, loads and columns stresses in area identified above.
5. A Detail Engineering Assessment of Factory to be commenced immediately in particular the stability and capacity of slab, beam and column of main building.
6. A Detail Engineering Assessment of Factory to be commenced immediately in particular the stability and capacity of main building's pad foundation.

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. A Detailed Engineering Assessment to be completed.

3. The distress found is to be suitably repaired and the cause rectified. Repair by simply re-rendering is not suitable.
4. A Detailed Engineering Assessment of this area to be carried out.
5. The distress found is recommended to be repaired.
6. Factory Engineer to survey the actual conditions and revise the drawings.
7. Factory Engineer to review design, loads and column stresses to confirm suitability for loads applied, especially for lateral and uplift loads due to BNBC wind and seismic.
8. The distress found is to be suitably repaired and the cause rectified. Repair by simply re-painting over rust is not appropriate.
9. Request that the Detail Engineering Assessment of the overall building to be carried out and in particular, stability and foundation aspects should be investigated in detail.

Long Term (Within 6 Months):

1. Continue to implement loading plan.
2. Maintain standards of quality control to ensure that all rust is removed (new attachment of rebar might be required), rust-proof paint is applied with the cover of non-shrinkable concrete/mortar where the spalling of concrete occurred so that problems do not arise in the future.
3. Maintain standards of quality control/protective measures so that problems do not arise in the future.
4. Engineer to inspect water damaged structure and propose a suitable repair.
5. Rust-proof paint to be applied for the exposed steel reinforcement.
6. Engineer to inspect water damaged structure including the exterior and propose a suitable repair.
7. For both durability and serviceability, waterproofing on the roof slab is recommended. Moreover the roof slab drainage system should be investigated.

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. 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. Regularly test the emergency lighting system on each floor and replace/repair lights as needed.
5. Provide exit signs above all exits to the exterior and all doors to the exit stairs. Provide additional exit signs along egress paths with directional arrows.

Short Term (Within 3 Months):

1. Separate the boiler, generator and transformer rooms by a minimum 2-hr fire-rated construction. Seal and/or protected all openings to maintain the required fire separations.

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 aisle widths of 36-in.

4. Inspect, test and maintain the fire alarm system, and keep written records on-site, in accordance with NFPA 72.

5. Removed and replaced installation work to be in accordance with NFPA 72

6. Inspect, test and maintain the emergency lighting system in accordance with The ACCORD standard. Keep written records on-site.

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 additional notification appliances such that the fire alarm system is audible throughout the building in accordance with NFPA 72.

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. Standard DO fuse must be used for the protection purpose. Assign an electrical engineer to reinstall the fuse.

2. HT cable dropping from 11kV pole must be protected in steel pipe of required size at least 2m from the ground level to protect from physical injury by moving objects.

3. 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.

4. Arrange periodic inspection & thermal scan to identify the overloading, loose connection, unbalanced load which may cause the excessive heat-rise and take action accordingly.

5. The existing copper bus bars terminating at the main MCCB in the panel must be disconnected. Main bus bars, distributing different circuits, must be connected to main MCCB by cables or bars designed for extensions.

6. Avoid multiple connections. Terminate individual cables at individual point of bus bar. Provide copper cable-socket, copper nut-bolt, and copper washer for termination.

7. Multiple cables connecting at a MCCBs terminal must be disconnected. Existing multiple circuits may be distributed through bus bars.

8. 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.

9. Disconnect (switch off) the panel from electrical supply and clean all the dust, debris & lint of all the internal components. Establish a routine cleaning program to keep all the panels free from dust.

10. Disconnect the power source of the cable laid into channel and clean dust and debris of all interior components. Establish a periodic cleaning program and maintain records of the activities. Provide cover made of noncombustible material on the channel for preventing ingress of dust and debris in future.

11. Use rigid PVC pipe for surface and exposed wiring through-out its length and supported properly (clamped with saddle, at regular interval of 600 mm).The conduit shall run vertically or horizontally, shall never at angle.. Flexible conduit must not be used for long point wiring (except for special wirings).

12. Install the cable tray/ladder/ duct up to the cable entry of the panel in order to support the cables. Ensure the cables are tightly latched with the ladder and provide covers made of non-combustible material preferably metallic sheet to protect the cables' insulation from any physical damage as well as prevent ingress of debris, dust and lint.

13. Existing cables or wiring drawn in flexible PVC conduit and installed outdoor must be additionally protected against weather and supported in rigid conduit or cable supports. Wiring outdoor must be protected in enclosure to protect against rain and UV (weather).

14. Use steel pipe (instead of flexible pipes),clamped with saddle on floor, to ensure the mechanical protection of the cable laid on floor otherwise cable insulation may damage due to falling object or stepping of occupants on it.

Short Term (Within 3 Months):

1. Replace the HT cable. Install a steel pipe made properly supported with pole for supporting the service cables in order to protect the cables' insulation from any physical damage.

2. Cables passing through permanent walls must be protected in steel pipes and remaining holes around the pipe must be sealed. Cables should be protected by cable trays with cover.

3. Cables connecting to transformer must be supported on ladder or riser. Install a vertical cable ladder or riser and cables must be supported on it in full length.

4. Fix the panel base securely to the foundation with appropriate fastening devices. Provide cable support for incoming and outgoing cables.

5. Block all the openings by holed metal sheet so that it can prevent ingress of dirt, debris, lint etc. Provide cable gland for every cable entry and exit hole.

6. Install separators between different phases of MCCB. Standard separators provided by the MCCB manufacturer must be used.

7. Assign an electrical engineer to determine the capacity of the installation and redesign the wirings of the panel. If the wirings and loads exceed the capacity of the panel, install additional panel. Establish a load management program for avoiding any installation exceeding its capacity in future. Install PVC wiring duct inside the panel to latch the haphazard cables inside the duct.

8. Cables shall be connected to terminals only by soldered/welded lugs according to the size of the respective cables. Proper crimping tools must be used to punch the socket.

9. Cables must be supported on cable trays. Cables may be laid in cable trench with covers.

10. Wire joints in panels must be tightly connected using terminals or sockets crimped and insulated. PIB tape and heat-shrink tubes may be used for insulation.

Mid Term (Within 6 months):

1. Transformer must be relocated to a raised floor to prevent storm water entering the transformer room. It must be mounted on foundation plinth as per standard guidelines.

2. Transformer room may be rearranged or some of the panels may be relocated to increase the room size of the transformer. The room area for the transformer should be 13 sq m according to BNBC 2006, Section-2.6.3. Make sure that the transformer room should be fire rated and separated from other occupancy. Assign an electrical engineer to rearrange the room.

3. Power transformer must be installed on the foundation plinth (wall or floor) with nuts and bolts.

Long Term (More than 6 months): NA