

Summary of Preliminary Assessment on Structural, Fire and Electrical Safety

Name of the Factory	: STERLING APPARELS LTD.
Address of the Factory	: Beron, Earpur Union, Ashulia, Savar, Dhaka, Bangladesh
Dhaka Present Status of the Factory	: Under Operation
Structural assessment conducted by	: Accord (Full report available at bangladeshaccord.org)
Date of Structural Inspection	: 12 March, 2014
Fire & Electrical assessment conducted by	: Accord (Full report available at bangladeshaccord.org)
Date of Fire & Electrical Inspection	: 25 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 beams with internal circular columns and square perimeter columns with two-way spanning slab
iii.	Floor System	: Beam slab
iv.	Floor Area	: Unavailable
v.	No. of Stories	: 9 storied
vi.	Construction Year	: 1998
vii.	Foundation Type	: Pad foundation
viii.	Design Drawings	: Available (Approved by Earpur Union Local Municipality in February, 2001)
ix.	Soil investigation Report	: Available (May, 1997)
x.	Construction Materials	: Brick aggregated
xi.	Generator	: Separated 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. All loads, including equipment, garments and personnel, in the area highlighted on Levels 1-7 to be removed pending verification of column capacity by the Building Engineer. Maintain Loads in all other areas.
2. Factory Engineer to review design, loads and columns stresses for all columns.
3. Verify insitu concrete stresses either by cores (min 100mm diameter) or existing cylinder strength data for all the columns or cores from a minimum of 4 non-critical columns.
4. A Detail Engineering Assessment (DEA) of Factory to be commenced, see attached Scope.
5. Reduce Cantilever loading & commence DEA as per item 1 above.
6. Reduce loading as per item 1 requirements.
7. Place temporary warning /protection (e.g. traffic cone, sand filled barrels as deemed appropriate by Building Engineer) at 1m from column faces.

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.

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2. Detail Engineering Assessment to be completed.
3. Building Engineer to carry out design check on support structure to façade to confirm adequate strength and stiffness.
4. Detail Engineering Assessment to be completed as per item 1 to take account of additional areas.
5. The Building Engineer should check the load plans and confirm that the main building structure is capable of safely supporting the additional structures, to ensure no over-loading.
6. Create controlled loading plans for all floors, designating where storage can be placed and cannot be placed taking findings of DEA and Item 1 findings into account.
7. Building engineer to design appropriate impact protection for critical column adjacent to truck access zone.
8. Building Engineer to review the Geotechnical (Soils) Report by comparison with the construction drawings and the use of pad foundations rather than piled /raft foundations as recommended within the Soils Report.
9. Building Engineer to confirm by calculations and records of site construction that foundation bearing is adequate.
10. Sections of plaster finish to walls to be removed to investigate if cracks penetrate the building structure.
11. Verify that beam/slab has sufficient capacity to support fully filled water tank.
12. Limit water to appropriate level if required.
13. Building Engineer to verify that building has an appropriate lateral stability system and submit relevant design documents.

Long Term (Within 6 Months):

1. Carry out strengthening as required.
2. Continue to implement load plan.
3. Building Engineer to prepare Allowable Floor Loading Plans.
4. Engineer to submit design for revised structures if required.
5. Building engineer to check, collect information and produce accurate and complete as-built documentation soonest.
6. Continue to assess and maintain protection.
7. Implement actions arising from DEA.

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. 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.

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Short Term (Within 3 Months):

1. Separate the boiler, generator, transformer and EMR room by a minimum 2-hr fire-rated construction. Seal and 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 and ceiling assemblies to maintain the fire separation.
4. Seal all penetrations and openings in exit stair enclosure walls to maintain the fire separation.
5. Separate the hazardous materials and flammable liquid storage room by a minimum 2- hr fire-rated construction. Seal and protected all openings to maintain the required fire separations.
6. 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.

7. Inspect, test and maintain the fire alarm system, and keep written records on-site, in accordance with NFPA 72.
8. Provide exit signs above all exits to the exterior and all doors to the exit stairs.
9. Regularly test the emergency lighting system on each floor and replace/repair lights as needed.

Mid Term (within 6 Months):

1. 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.

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. The cables must be carried and protected through steel pipe to protect it from physical damage due to falling objects and stepping of occupants.

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2. Insulate the battery terminals to avoid short circuit and clean the battery vent/plug clean to emit gas during over charging. Generator Battery must be placed on the battery stand made of noncombustible material (steel fabricated, acid proof). Establish a maintenance checklist for the generator where the checking point of exciter battery should be included.
3. Inspection is needed to identify the reason of high temperature in the cable terminal or in the cable. In case of loose connection or improper lugs and lugs punching; use good quality lugs and punches it by proper hydraulic puncher or hand puncher removing no air gaps. Tighten the screw of mounted on the MCCB pole tightly and check it's tightness by torque wrench. In case of unbalance load and overloading; calculate the connected loads then distribute the loads uniformly among three phases, select the cable according to the connected load respectively. Periodic monitoring and inspection is needed to keep the electrical system operable without any hazard.
4. Install separators between different phases of MCCB to avert flashover. Standard separators provided by the MCCB manufacturer must be used.
5. Use PVC or porcelain cable connector for joining cables and PIB tape wound around it.
6. The wooden cable duct should be replaced by metallic cable channel with protective covers. Keep 30% clearance in the cable channel for further extension and better heat dissipation. Put tags on the cable for easy identification and maintenance. Establish a routine cleaning program to keep the cable channels neat and clean.

Short Term (Within 3 Months):

1. Rearrange the HT cable to remove bend. The HT cable termination may be lowered to a position that it will remain straight throughout its whole length and its accessories should be aligned as per design.
2. Install cable tray with protective cover to route and protect the cables from physical damage due to falling objects and stepping of operational personnel during maintenance.
3. Cables entering base plates without glands leaving opening gaps around cables must be sealed with metal plates and then make circular hole into the base plate of panels to be added 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 to make the panel dust and vermin proof.
4. Cables passing through permanent walls must be protected in covered cable tray/ steel pipe /PVC pipes and supported near the panel entry; the remaining gaps after the passage of conduits must be sealed with fire resistance materials.
5. Surface and exposed wiring should be encased in rigid PVC/steel pipe throughout its length; run horizontally and vertically never at an angle and support them at regular intervals by using saddle clamp.

Mid Term (Within 6 months):

1. Construct a fire rated separate dedicated room for the transformer only providing necessary clearance around it. Assign a qualified engineer to design a required transformer room according to BNBC 2006, Section-2.6.3.
2. The wooden cable duct should be replaced by metallic cable channel with protective covers. Keep 30% clearance in the cable channel for further extension and better heat dissipation. Put tags on the cable for easy identification and maintenance. Establish a routine cleaning program to keep the cable channels neat and clean.

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Long Term (More than 6 months): NA