

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

Name of the Factory	: Convince Apparels Ltd.
Address of the Factory	: Plot # 68-71, Block-Section # 2, Rupnagar, Mirpur, Dhaka, Bangladesh.
Present Status of the Factory	: Under Operation.
Structural Assessment Conducted by	: VEC
Date of Structural Inspection	: 26 <sup>th</sup> February, 2015
Fire Assessment Conducted by	: VEC
Date of Fire Inspection	: 26 <sup>th</sup> February, 2015
Electrical Assessment Conducted by	: VEC
Date of Electrical Inspection	: 26 <sup>th</sup> February, 2015
BGMEA Membership No.	: 3744

### **BASIC INFORMATION:**

The assessed factory building is a 9 storied RCC building and have a basement. Structural system of the building is RCC beam column frame and beam slab floor system in 1<sup>st</sup>, 2<sup>nd</sup> and 5<sup>th</sup> floor & rest of the floor is flat plate system. There is an additional undocumented roof truss steel shed at roof which covers 40% of the roof top. The entire building is used for two RMG industries. The Convince Apparels Ltd. is located at 1<sup>st</sup>, 4<sup>th</sup>, 5<sup>th</sup>, 6<sup>th</sup>, 7<sup>th</sup>, 8<sup>th</sup>, and steel shed over roof. Other floor areas are occupied by Zipper and Accessories Ltd. The following general information was noted:

i. Building Usage Type	: Garment factory.
ii. Structural System	: RCC beam column frame and flat plate system.
iii. Floor System	: RCC beam slab floor and flat slab floor system.
iv. Floor Area	: Total floor area is 32,140 sft (all floor).
v. No. of Stories	: 9 Storey and a basement floor
vi. Construction Year	: Building was constructed in two phase. 1st Phase was 1995-2000 (up to 3rd floor). 2nd Phase was 2000-2004 (up to 8th floor).
vii. Foundation Type	: Mat foundation.
viii. Design Drawings	: Available: Approval plan, architectural drawing, structural design drawing. Not Available- Floor load plan, Machine layout plan, material test report.
ix. Soil Investigation Report	: Available.
x. Construction Materials	: Brick aggregate. (Identified by removing plaster)
xi. Generator	: Ground floor.

### **RECOMMENDATIONS FOR CORRECTIVE ACTION:**

The recommendations of corrective action for both Structural and Fire & Electrical Safety comprises in Short Term, Mid Term and Long Term basis.

The recommendations for **Structural Safety** corrective action are:

Short Term (Immediate) : None.

Mid Term (6-weeks) :

- Factory Engineer to review design, loads and punching stresses in slabs. Verify in-situ concrete stresses either by 100mm dia. cores or existing cylinder strength data. Cores to be taken from 4 different areas of slab at different level.

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

- Building engineer to check the capacity and stability of the lightweight roofs and make any necessary alterations.
- Long Term (6-months) :
- Results of flat plate review to be input to Loading Plan. Continue to implement load management plan.
  - Carry out upgrade measures required as part of the design checks. Prepare as built structural drawings for additional structure.

The recommendations for **Fire & Electrical Safety** corrective action are:

**(A): Recommendations for Fire Safety corrective actions:**

<p>Immediate</p> <p><i>(the factory should not continue to be occupied until these non-conformities have been rectified):</i></p>	<ul style="list-style-type: none"> <li>• Factory needs to remove all temporary table and others and need to keep all means of escape unobstructed and free.</li> </ul>
<p>Short Term</p> <p><i>(Actions that must be incorporated into a Fire Safety Management Plan immediately (1 ~ 2 weeks) and should be a regular activity</i></p>	<ul style="list-style-type: none"> <li>• Factory needs to have marked aisles in all working floor according to 0.9m for one side seat and 1.0m for both side seat.</li> <li>• Lights in storage area needed to be installed with protective covers and conduits.</li> <li>• Kitchen area need to be equipped with fire extinguisher &amp; only fixed temperature type detector.</li> <li>• Walls of such opening and penetration shall have at least 2r hour fire resistance rating or close the opening with 2 hr rated construction.</li> <li>• Combustibles are to be managed with good housekeeping. Storage facilities with no air-conditioning duct shall be minimum 2.9m and when used as a storage facility there shall be a minimum clearance of one third the floor height from the ceiling to the top of the storage stack.</li> </ul>
<p>Mid Term</p> <p><i>(The remedial works indicated must be carried out within a period of 6 weeks)</i></p>	<ul style="list-style-type: none"> <li>• All the exit doors need to be replaced by side swinging so that un-lockable doors can be opened easily in the direction of evacuation without the use of a key.</li> <li>• Factory needs to provide handrail on both side of all the stairways.</li> <li>• Factory needs to be install with adequate illuminated emergency lighting in all floors, exits and stairs. (Escape route).</li> <li>• Emergency back-up power needs to be connected for critical fire safety system and not less than 60 minutes</li> </ul>

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

	<p>in case of failure of power supply.</p> <ul style="list-style-type: none"> <li>• Factory needs to install sufficient capacities standby generator and connected to supply power for stair case and corridor lighting, fire lift, stand by fire pump, pressurization fans and blowers, smoke extraction and damper system in case of failure of normal electricity supply and must having the minimum capacity to serve for 1 hr with the NTPA requirements.</li> <li>• Install suitable public address system having communication to all floors as well as facilities to receive messages from all floors.</li> </ul>
<p>Long Term</p> <p><i>(The remedial works indicated must be carried out within a period of 6 months)</i></p>	<ul style="list-style-type: none"> <li>• Fire department pre-plan needs to be developed.</li> <li>• The final exit route-1 need to be separated from another factory opening, from basement, from satire enclosure opening and from generator /boiler room as well as final exit route-2 need to be separated from another factory, from cargo lift and from wastage go down by 4 hours rating for walls (enclosure) and 2 hour for door openings with the others occupancies till to reach the area of refuge.</li> <li>• Storage area need to be protected with 2 hours rated construction &amp; 1.5 hours rated opening or doors.</li> <li>• Generator and boiler room need to separate from final exit route-1 and parking/loading area by 4hr rated wall and 2 hr rated opening and also with the other occupancies.</li> <li>• The entire exits connecting to the staircases (2numbers staircase) need to be protected with fire and smoke resistant enclosures and opening (4 hour rated enclosure and 2 hour rated door)and provide a protected route from all though the stairway to the final exits.</li> <li>• Kitchen area need to separate by 2 hr rated construction and 1.5 hr rated opening with working area, storage area and stair case. Also need to equip with fire extinguisher and detector according to NTPA guideline.</li> <li>• Factory need to install fire left with having minimum capacity of 545 kg and the lift core should have 2 hr rated enclose and 1 hr rated auto closing fire door.</li> <li>• Factory need to constructed fire separated lobby with 4hours rated wall and 2 hours rated fire door and smoke</li> </ul>

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

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	<p>proof lobby near to exit leading to staircase.</p> <ul style="list-style-type: none"><li>• Basement need to comply with the following conditions:<ul style="list-style-type: none"><li>(a) Basement staircase shall be encased and placed near the outer edge of the basement with materials of 2 hours fire resistance</li><li>(b) Communication with the basement in case of emergency shall be maintained through a lobby provided with a fire resisting self-closing door of 1 hour fire resistance.</li></ul></li><li>• Factory need to install centralized and automatic fire detection &amp; alarm system on all occupied floors, including other tenanted floors of the building as per NTPA Guideline.</li><li>• The factory need to install manually operated electrical fire alarm system and automatic fire alarm system with single or multiple call boxes on all occupied floors, including other tenanted floors of the building.</li><li>• Factory needs to install control panel for centralized automatic smoke detection &amp; fire alarm system according to NTPA Guideline.</li><li>• Factory needs to install proper stand pipe system with having at least 100mm dia of riser.</li><li>• Install 1 riser per 1000 m<sup>2</sup> of floor area &amp; Install adequate number of hose in floor area and the minimum hose diameter is 38 mm, or 1.5" preferably fabric hose with variable nozzle to be used in both of the stairways covering the floor area.</li><li>• Factory needs to ensure the minimum pressure for standpipes supplying a 50mm or larger hose shall be at least 300 Kpa. For standpipe supplying first aid hose (38mm nominal) may have a minimum pressure of 200 Kpa.</li><li>• Factory needs to be installed with Siamese connection for to the standpipe system located outside the building and accessible to the fire department connection.</li><li>• Factory needs to install dedicated fire pump with backup power system &amp; sufficient capacity for achieve required pressure in the remote place of the factory.</li></ul>
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## Summary of Preliminary Assessment on Structural, Fire and Electrical Safety

	<ul style="list-style-type: none"> <li>• Factory need to have sufficient water storage capacity to get adequate pressure to feed fire-fighting equipment and at least 1900ltr x 75min=142500 liters water storage tank.</li> <li>• Factory needs to establish command station on the entrance lobby and equipped with detailed floor plans along with clearly demarcated locations of fire detection and fighting devices and through the panel board able to detect fire alarm from any floor. It needs to be manned with properly trained personnel having responsibility of maintenance and operating firefighting facilities within the building.</li> </ul>
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### **(B): Recommendations for Electrical Safety corrective actions:**

<p>Immediate</p> <p><i>(the factory should not continue to be occupied until these non-conformities have been rectified):</i></p>	<ul style="list-style-type: none"> <li>• Remove all unused cables from distribution boards and make sure all necessary cables are properly terminated at its point of termination using appropriate size and type of lug.</li> <li>• Find out the cause (improper cable selection, improper protective device selection, improper termination, rusted connection, heat source etc.) of burning sign and take proper action including replacing cable or equipment where necessary.</li> <li>• Find out the cause (improper cable/over current selection, over loading, improper lug, improper cable joints, rusted connection, insulation damage, multiple cables at single point, ) of overheating (&gt; ambient+ 40<sup>0</sup>C) and take proper action.</li> </ul>
<p>Short Term</p> <p><i>(Actions that must be incorporated into a Fire Safety Management Plan immediately (a week) and should be a regular activity</i></p>	<ul style="list-style-type: none"> <li>• Ensure all distribution boards (including panel door) are earthed properly.</li> <li>• Ensure overcurrent protection device (circuit breaker/fuse) for each circuit/branch circuit.</li> <li>• Ensure proper earthing connections at all electrical equipment.</li> <li>• Use nonflammable shades for light fittings. Avoid using Celluloid shade under any circumstance.</li> <li>• Clean interior components from dust and debris and seal all openings within the enclosure to prevent dust and debris from entering.</li> <li>• Provide provision for inspection of all earthing system and ensure inspection is being completed and</li> </ul>

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

	documented.
<p>Mid Term</p> <p><i>(The remedial works indicated must be carried out within a period of 6 weeks)</i></p>	<ul style="list-style-type: none"> <li>• Install appropriate number and type of safety signage and fire-fighting equipment at substation room. Also ensure graded rubber mats are provided in front of all distribution boards.</li> <li>• Provide Instruction board for first aid and artificial respiration in the substation room and generator room.</li> <li>• Fill the transformer breather with fresh Silica gel.</li> <li>• Provide two separate and distinct connections of earthing for each generator.</li> <li>• Provide dedicated &amp; adequate size of earthing with proper identification for each circuit from the earth busbar of distribution boards and ensure continuous earth path is back to main building intake.</li> <li>• Rewire to ensure each incoming supply to an MCB/MCCB has a dedicated supply from busbar. Avoid the use of multiple cables on outgoing side of MCB/MCCB's.</li> <li>• Replace wooden boxes and bases with metal clad construction for mounting the circuit breakers and switch board.</li> <li>• Ensure all electrical cables are sized according to capacity of circuit breakers.</li> <li>• Avoid flexible cables for fixed wiring unless contained in an enclosure affording mechanical protection.</li> <li>• Ensure cable joints are made in respect of conductivity, insulation and mechanical strength.</li> <li>• Seal the openings remaining after wiring system passes through the elements of building construction according to the degree of fire resistance.</li> <li>• Ensure discrimination is achieved between circuit breakers used for protection of main circuit and the sub-circuits derived therefrom.</li> <li>• Connect all metal in the building to the building earthing system.</li> <li>• Ensure Lighting fixtures are supported from the structure properly.</li> </ul>

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

	<ul style="list-style-type: none"> <li>• Find out the cause (improper cable/over current selection, over loading, improper lug, improper cable joints, rusted connection, insulation damage, multiple cables at single point, ) of overheating { ambient+(20°C-40°C)} and take proper action.</li> </ul>
<p>Long Term</p> <p><i>(The remedial works indicated must be carried out within a period of 6 months)</i></p>	<ul style="list-style-type: none"> <li>• Develop an electrical layout diagram and an as-built single line diagram detailing key components and capacity of the electrical system.</li> <li>• Establish a periodical Insulation and earth Resistance Measurement Program and record the related testing data.</li> <li>• Inspect electrical panel boards on an annual basis.</li> <li>• Ensure the substation room has adequate fire separation from the main building.</li> <li>• Replace the distribution boards with metal enclosed body.</li> <li>• Ensure distribution boards have no opening and all live internal components are concealed properly.</li> <li>• Provide dedicated &amp; adequate size of neutral with proper identification for each applicable circuit.</li> <li>• Ensure each distribution board is provided with a circuit list and means of identification is provided as per list.</li> <li>• Provide adequate support or mechanical guards for electrical equipment and wiring where necessary.</li> <li>• Use non-combustible material to make channel and provide adequate covers on cable channel.</li> <li>• Provide proper cable terminator/connector for stranded conductors at its point of termination.</li> <li>• Run cable in a designated route with mechanical protection and fire sealing of floor slab and wall penetrations.</li> <li>• Install separate distribution boards for lighting and power circuits.</li> <li>• Install lightning protection system on the building.</li> </ul>