

Summary of Preliminary Assessment on Structural, Fire and Electrical Safety

Name of the Factory	: Centex Fashions Ltd. (Building1)
Address of the Factory	: 76, Ibrahimpur, Cantonment, Dhaka, Bangladesh.
Present Status of the Factory	: Under Operation.
Structural Assessment Conducted by	: VEC
Date of Structural Inspection	: 1 st March, 2015
Fire Assessment Conducted by	: VEC
Date of Fire Inspection	: 1 st March, 2015
Electrical Assessment Conducted by	: VEC
Date of Electrical Inspection	: 1 st March, 2015
BGMEA Membership No.	: 4003

BASIC INFORMATION:

The present garment factory is a five storied RCC beam-column frame structure. Undocumented PEB shed found at roof. The following general information was noted:

i. Building Usage Type	: Garment factory.
ii. Structural System	: RCC Beam-Column Frame system.
iii. Floor System	: RCC beam slab floor system.
iv. Floor Area	: Total floor area 22365 sft.
v. No. of Stories	: Five Stories and Undocumented PEB shed found at roof.
vi. Construction Year	: 1995-1998
vii. Foundation Type	: Isolated footing foundation.
viii. Design Drawings	: Available: Structural design drawing, Architectural design drawing and soil test report. Not Available: machine layout plan, material test report and floor load
ix. Soil Investigation Report	: Available.
x. Construction Materials	: Brick Aggregate. (Identified by removing plaster)
xi. Generator	: At separate building.

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)	: <ul style="list-style-type: none">• Factory Engineer to review design, loads and columns stresses in area identified above.• Verify in situ concrete stresses either by 100mm dia. cores or existing cylinder strength data for [the identified columns] or [100mm dia. cores from 4 columns].
Long Term (6-months)	: <ul style="list-style-type: none">• Continue to implement load management plan.• Building Engineer need to survey this factory. Prepare as built structural drawing, floor load plan and prepare/update

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calculations showing the structural adequacy of the floor system taking into account the factory design imposed loading and the as built 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"> • None.
<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"> • Factory need to have proper testing plan & record of fire safety equipment. • Factory needs to have sufficient number & width of aisles (0.9 m) at every floor. • Factory needs to have sufficient total width of marked aisles (5mm per occupant) at all the production building. • Decrease the workers from 3rd and 4th floor or relocate the workers from to other floors. • Lights in storage area needed to be installed with protective covers and conduits. • Storage facilities with no air-conditioning duct shall be minimum 2.9 m 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. • Ensure adequate illuminated emergency lighting in floors, exits & stairs. • Ensure adequate exit signs in all floors so that it is visible from all positions.
<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"> • Factory needs to prepare as built drawing with floor machine layout showing means of escape with proper dimension. • 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. • Increase the width of West-North side exit leading to at least 0.9 m. • Factory needs to provide handrail on both sides of all

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	<p>the stairways.</p> <ul style="list-style-type: none"> • Factory needs to be installed with adequate illuminated emergency lighting in floors, exits & stairs. (escape route).
<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"> • Factory needs to have a proper pre-plan for fire service & civil department. • Final exit route-1 need to be protected (2 hours rated construction with 1.5 hours rated door) at each floor level entrance and need to be protected from generator at ground floor by 4 hours rated construction with 2 hours rated door/opening, also need to have protected escape route till to reach safe refuse area. • Final exit route-2 need to be protected (2 hours rated construction with 1.5 hours rated door) at each floor level entrance and need to be protected from working floor at ground floor by 2 hours rated construction with 1.5 hours rated door/opening, also need to have a 2 hours rated protected escape route till to reach safe refuse area. • Storage area needs to be protected with 2 hours rated construction & 1.5 hours rated opening or doors. • Generator, boiler and sub-station room needs to be fire separated with 4 hours fire rated enclosure and 2 hours rated opening having direct access from outside. • All the stairs need to be protected with fire and smoke resistant enclosures and opening (2 hours rated enclosure and 1.5 hour rated door)and provide a protected route from all though the stairway to the final exits. • Factory need to install centralized and automatic fire detection & alarm system on all occupied floors, including other tenanted floors of the building as per NTPA Guideline • 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. • Factory needs to install control panel for centralized automatic smoke detection & fire alarm system according to NTPA Guideline

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	<ul style="list-style-type: none"> • Need to Install 75 mm diameter standpipe and hose system in the factory building. • Install 1 riser per 1000 m² of floor area & 38 mm diameter of hoses with variable nozzle need to be installed. • Ensure the minimum pressure for standpipes supplying a 50 mm 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. • Factory needs to be installed with Siamese connection for to the standpipe system located outside the building and accessible to the fire department connection. • Factory needs to install dedicated fire pump with sufficient capacity and backup power. • Factory need to have sufficient water storage capacity to get adequate pressure to feed fire-fighting equipment and at least 1900 ltr/min x 75 min = 142500 liters water storage tank.
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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"> • Find out cause (improper cable selection, improper protective device selection, improper termination, rusted connection, heat source etc.) of burning sign/insulation damage and take proper action including replacing cable or equipment where necessary.
<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"> • Discharge the generator exhaust to the exterior of the building in a safe location. • Ensure all distribution boards (including panel door) are earthed properly. • Ensure overcurrent protection device (circuit breaker/fuse) for each circuit/branch circuit. • Clean interior components from dust and debris and seal all openings within the enclosure to prevent dust and debris from entering. • Provide provision for inspection of all earthing system and ensure inspection is being completed and documented.

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Mid Term

(The remedial works indicated must be carried out within a period of 6 weeks)

- Install appropriate number and type of safety signage and fire-fighting equipment at substation and generator room. Also ensure graded rubber mats are provided in front of all distribution boards.
- Provide Instruction board for first aid and artificial respiration in the generator room.
- Provide two separate and distinct connections of earthing for each generator.
- Ensure distribution boards have a minimum clearance of 1 m (39 in) in front.
- Provide dedicated & 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.
- Rewire to ensure each incoming supply to an MCB has a dedicated supply from busbar. Avoid the use of multiple cables on outgoing side of MCB's.
- Replace wooden boxes and panels for mounting the switch controls.
- Ensure all electrical cables are sized according to capacity of circuit breakers.
- Avoid flexible cables for fixed wiring unless contained in an enclosure affording mechanical protection
- Ensure cable joints are made in respect of conductivity, insulation and mechanical strength.
- Provide emergency power connection for life safety loads (emergency lighting, exit signage, etc.) temporarily within 6 weeks and find out a permanent solution within 6 months.
- Connect all metal in the building to the building earthing system.
- Ensure Lighting fixtures are supported from the structure properly.
- 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.

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<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">• Develop an electrical layout diagram and an as-built single line diagram detailing key components and capacity of the electrical system.• Establish a periodical Insulation and earth Resistance Measurement• Program and record the related testing data.• Inspect electrical switchgear and panel boards on an annual basis.• Ensure the generator room has adequate fire separation from the production area/main building.• Provide adequate means of ventilation for the substation room based on the installed equipment considering fire barriers.• Ensure appropriate generator room size in order to properly access the generator to perform routine maintenance activities.• Ensure distribution boards have no opening and all live internal components are concealed properly.• Provide dedicated & adequate size of neutral with proper identification for each circuit.• Ensure each distribution board is provided with a circuit list and means of identification is provided as per list.• Provide adequate support or mechanical guards for electrical equipment and wiring where necessary.• Provide proper cable terminator/connector for stranded conductors at its point of termination.• Install separate distribution boards for lighting and power circuits.• Install lightning protection system on the building.
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