

Summary of Preliminary Assessment on Structural, Fire and Electrical Safety

Name of the Factory	: T-Design Ltd.
Address of the Factory	: Zirabo, Ashuila, Saver, Dhaka.
Present Status of the Factory	: Under Operation
Structural Assessment Conducted by	: VERITAS Engineering & Consultant
Date of Structural Inspection	: 2013-12-25
Fire Assessment Conducted by	: VERITAS Engineering & Consultant
Date of Fire Inspection	: 2015-05-04
Electrical Assessment Conducted by	: VERITAS Engineering & Consultant
Date of Electrical Inspection	: 2015-05-04
BGMEA Membership No.	: 4348

BASIC INFORMATION: The factory building is a mixed occupancy six storied RCC frame building.

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| i. Building Usage Type | : Garment Factory. |
| ii. Structural System | : Beam-Column Frame. |
| iii. Floor System | : Edge supported slab. |
| iv. Floor Area | : Approximately 24040 sft per floor |
| v. No. of Stories | : 6 storied |
| vi. Construction Year | : Upto 2nd story in 2002-03 and upper stories in 2011. |
| vii. Foundation Type | : individual shallow foundation (as per drawing). |
| viii. Design Drawings | : Available: partial structural design drawing (detail Sections, slab drawings and proper seal and Signature are not available), as built machine layout Plan
Not available: architectural drawing, floor load plan, Material test report. |
| ix. Soil Investigation Report | : Available conducted by B.D. Soil 8c Foundation Engineers in December 1999. |
| x. construction Materials | : RCC using Brick Chips as Coarse Aggregate. |
| xi. Generator | : In the ground floor. |

RECOMMENDATIONS FOR CORRECTIVE ACTION:

Short Term (Immediate) : N/A

- Mid Term (6-weeks)
1. Building engineer to check the capacity and stability of the lightweight roofs and make any necessary alterations.
 2. Analytical report is needed to check the capacity to support roof top water tanks and boiler. Floor load plan needs to be prepared based on analytical report.
 3. Floor load plan needs to be prepared based on analytical report.

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- Long Term (6-months) :1.Results of flat plate review to be input to Loading Plan.
2. Water tanks to be relocated on roof over adjacent core walls.
Boiler needs to be relocated at ground floor.
3. Continue to implement load plan.

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>	<p>N/A</p>
<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. • Lights in storage area need to be installed with protective covers and conduits. • 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. • 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 have as built drawing with proper dimensions showing all the means of escape. • Fire manager/Director need to have safety training from proper authority & worker of the factory should as far as possible be trained for use fire extinguisher. • All the exit doors need to be install side swinging so that un-lockable doors can be opened easily in the direction of evacuation without the use of a key • Provide handrail on both sides of the stairways.

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	<ul style="list-style-type: none"> • Kitchen needs to be protected from other floors and make available fixed temperature type detectors and portable extinguishers. • Factory needs to be installed with adequate illuminated emergency lighting in floors, exits & stairs.(Escape route). • Ensure emergency backup power for critical fire safety system.
<p>Long Term</p> <p>(The remedial works indicated must be carried out within a period of 6 months)</p>	<ul style="list-style-type: none"> • Factory needs to have a proper pre-plan for fire department. • At the south-west (Exit-1), escape routes need to protect from ground floor area to provide protected paths of travel (2 hours fire rated construction with 1.5 hours fire rated opening) till to reach safe refuse area. • Childcare needs to be separated from finishing section with 3 hours rated construction and 2 hours rated opening or door. • Storage area needs to be fire protected with 2 hours rated construction & 1.5 hours rated opening or doors. • Generator: Factory need to protect the generator room from the bonded warehouse, car parking & south west middle stair located at basement floor of the building by 4 hours rated construction with 2 hours fire rated door/opening. • The entire exits connecting to the staircases(2 numbers staircase) need to be protected with fire and smoke resistant enclosures and opening (2 hour rated enclosure and 1.5 hour rated door)and provide a protected route from all though the stairway to the final exits. • Needs to be fire protected with 2 hours rated construction & 1.5 hours rated opening or doors. • 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 and automatic fire detection and alarm system at required location. • Factory need to install 75mm diameter of standpipe system in the building.

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	<ul style="list-style-type: none"> • Factory needs to install 1 riser per 1000 m² of floor area & 38 mm dia of hoses with variable nozzle. • Factory need to ensure the minimum pressure for standpipes supplying a 50mm or larger hose shall be at least 300 kPa and standpipe supplying first aid hose (38mm nominal) may have a minimum pressure of 200kPa. • Factory needs to install Siamese connection after installation of stand pipe system, hose system and fire pump. • Factory needs to have dedicated fire pump with backup power system & sufficient capacity for achieve required pressure in the remote place of the factory. • Factory needs to have sufficient water storage capacity to get adequate pressure to feed fire-fighting equipment and at least 1900liter x 75min=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"> • Remove all unused cable from distribution board and make sure all necessary cables are properly terminated at its point of termination using appropriate size and type of lug. • Find out cause (improper cable selection, improper protective device selection, improper termination, rusted connection) of burning sign and insulation damage and take proper action including replacing cable where necessary.
<p>Short Term <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"> • Ensure panel door of distribution boards 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.

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	<ul style="list-style-type: none"> • Ensure inspection for all earthing system is being completed and 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"> • Install appropriate number and type of fire-fighting equipment at generator room. Also ensure graded rubber mats are provided in front of all distribution boards. • Provide Instruction boards for first aid and artificial respiration in the generator room. • Ensure distribution board is installed in compliant location in terms of height. • 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/MCCB has a dedicated supply from busbar. Avoid the use of multiple cables on outgoing side of MCB's/MCCB's. • Ensure all electrical cables are sized according to capacity of circuit breakers. • Provide adequate covers on cable channel. • 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. • Seal the openings remaining after wiring system passes through the elements of building construction according to the degree of fire resistance. • Connect all metal in the building to the building earthing system. • 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+(200C-400C)} 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 panel boards on an annual basis.• Ensure the generator room has adequate fire separation from the production area.• 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 applicable circuit.• Ensure each distribution board is provided with a circuit list and means of identification is provided as per list.• 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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