

Summary of Preliminary Assessment on Structural, Fire and Electrical Safety

Name of the Factory	: Woolsey Knitwear Ltd.
Address of the Factory	: Zadur Char, Savar, Dhaka
Present Status of the Factory	: Under operation.
Structural Assessment Conducted by	: TUV
Date of Structural Inspection	: 11 April, 2015
Fire Assessment Conducted by	: TUV
Date of Fire Inspection	: 11 April, 2015
Electrical Assessment Conducted by	: TUV
Date of Electrical Inspection	: 11 April, 2015
BGMEA Membership No.	: 4812

BASIC INFORMATION:

The factory building is a three storied RCC building with beam and column system and flat slab system. The following information was noted:

i. Building Usage Type	: Garment factory (Sweater).
ii. Structural System	: Building 1: Ground floor: Beam-Column Frame. 1st and 2nd floors: Flat Slab - Column Frame. Shed 1: Single Storey shed with masonry walls.
iii. Floor System	: Building 1: Ground floor: Beam-Slab floor system. 1st and 2nd floors: Flat Slab floor system. Shed 1: Corrugated sheet roofing.
iv. Floor Area	: Building 1: Typical plinth area = 2500 sft Shed 1: Typical plinth area = 2950 sft Total operational area = 13,000 sft (Approx.)
v. No. of Stories	: Building 1: Ground floor + 2 – Storey + Partial Shed Shed 1: Single Storey Shed
vi. Construction Year	: Construction started in 2004
vii. Foundation Type	: Spread Foundation
viii. Design Drawings	: Not Available
ix. Soil Investigation Report	: Not Available
x. Construction Materials	: Brick aggregate.
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)	: N/A
Mid Term (6-weeks)	: 1. Factory to remove in-bond and out-bond storage from the Semi-Storey shed at the roof. 2. Factory engineer to review structural stability system of the building and suggest remedy actions. Factory engineer to also certify the allowable floor loading based on the as built slab construction.

Summary of Preliminary Assessment on Structural, Fire and Electrical Safety

3. Concrete cover of slab to be removed to investigate if crack penetrates into RCC slab.

4. As-built architectural and structural drawings of the building to be prepared and submitted for approval by appropriate authority. As part of this process the building engineer will be required to make a number of checks on the inconsistencies between the structural design and the as-built construction

Long Term (6-months)

- : 1. Carry out remedial actions as directed by the Building Engineer for lateral stability system.
2. Carry out remedial actions as directed by the Building Engineer for cracks on slab.

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"> • The minimum clear width of the pathway should be 0.9 meter • Remove all temporary items from all escape routes, aisles and passageway. • Provide aisle marking with arrow guiding and exit signage on all Evacuation pathways or provided with overhead signage fixed at ceiling level. - Exit sign should be posted above the exit door, - It should be clearly visible at all time, - Provide directional signs wherever necessary. - All exit doors should be clearly marked for easy identification. -Signage should be uniform • Factory management should check alarm call points, alarm & detection system periodically and maintained the record properly. • Provide sufficient number of fire extinguisher at all floor production area and to keep the record for re filling & properly tagged. • The hose pipe performance should be checked periodically and properly tagged.
<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"> • Replace all existing exit doors on evacuation routes, exit doors with side hinged type door, which swing outward and in the direction of travel. Swinging of the door should not constrict the width of the corridor / passage below 0.9 meter. • Remove all locking device from all egress door. All exit doors should be open-able from the side they serve without the use of a key. • Prepare proper plan & design for exit door. - Minimum clear width should be 0.9 meter.

Summary of Preliminary Assessment on Structural, Fire and Electrical Safety

	<ul style="list-style-type: none">• Prepare proper plan & design for another staircase for 3rd floor (roof top shed). - Minimum clear width should be 0.9 meter.• Prepare proper plan & design for another staircase. - Minimum clear width should be 0.9 meter.• Provide handrails on both side of each stairway with height of 0.9m measured from the nose of stair to the top of the handrail.• Doors in stair should be outward opening, side-swing, self closing, non-lockable 0.75 hour fire rated doors in all stair way encloses.• Provide 1 hour fire rated construction at unprotected opening window, which is adjacent to external staircase.• Prepare proper plan & design for discharge floor exit door. - Minimum clear width should be 0.9 meter.• Prepare proper plan and design for 4 hr fire rated barriers with 2 hr fire rated doors at ground floor generator room, which located at the adjacent to final exit.• Prepare proper plan and design for 2 hrs fire rated barrier with 1.5 hrs fire rated door for storage area.• Prepare proper plan and design for 4 hr fire rated barriers with 2 hr fire rated doors at ground floor boiler room, which located at adjacent with finishing Section .• The egress paths should be illuminated with emergency lighting with power back-up supply & illumination should be a minimum of 10 lux for all corridors & exit doors. Aisles should be provided with a minimum 2 lux.• The stairway should be illuminated with emergency lighting with power back-up supply & illumination should be a minimum of 10 lux for stairway.• Produce design and plan for automatic detection system with automatic fire alarm.• Install Manual activation call point at all exit routes.• An automatic alarm systems must be provided throughout the factory; the alarm must be automatically triggered on detection of a fire.• Prepare proper design and plan to install dedicated fire pump with alternate backup power supply.• Prepare plan and design to provide dedicated water storage tank for firefighting operation.• Power backup supply should be provided for fire alarm system.• Visual fire alarm should be place at Generator room.
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Summary of Preliminary Assessment on Structural, Fire and Electrical Safety

	<ul style="list-style-type: none"> • Obtain building approval from issuing authority • Cover all units / floors in a valid fire license • Obtain the boiler license from the proper issuing authority. • Obtain the boiler operator license from the proper issuing authority.
<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"> • Install exit door as per plan and design. - Minimum clear width should be 0.9 meter. • Install exit door as per plan and design. - Minimum clear width should be 0.9 meter. • Install another staircase for 3rd floor (roof top shed) as per plan and design. - Minimum clear width should be 0.9 meter. • Install another staircase as per plan and design. - Minimum clear width should be 0.9 meter. • Install discharge floor exit door as per plan and design. - Minimum clear width should be 0.9 meter. • Provide 4 hr fire rated barriers with 2 hr fire rated doors at ground floor generator room, which located at the adjacent to final exit. • Provide 2 hrs fire rated barrier with 1.5 hrs fire rated door for storage area. • Provide 4 hr fire rated barriers with 2 hr fire rated doors at ground floor boiler room, which located at adjacent with finishing Section . • Install automatic detection system with automatic fire alarm. • Install dedicated fire pump with alternate backup power supply. • Provide dedicated storage tank for firefighting operation

(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"> • Over current protection devices (Circuit breakers) should be installed at all distribution panels
<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"> • All strands cables at exposed ends should be properly soldered / crimped and insulated. • Provide proper separate earthing/grounding to generator. Ensure that generator body frame to have two separate and distinct connections to the earth / ground.

Summary of Preliminary Assessment on Structural, Fire and Electrical Safety

<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">• All unwanted materials should be removed from Generator room.• Provide rubber mats of adequate size in front of all distribution panels.• Install smoke detection and provide firefighting equipment in the generator room.• Provide and maintain clear and legible identifications numbers & names on all incoming and outgoing circuits of MDB panels.• 1. Exit signs should be illuminated either by lamps external to the sign or by lamps contained within the sign. 2. The source of illumination should be providing not less than 50 lux.• 1. All stranded conductors > 6mm² to be provided with cable sockets.2. All stranded conductors < 6 mm², at exposed end should be soldered / crimped.• 1. Remove all the inflammable materials from surrounding of electrical circuitry at MDBs/SDBs. 2. Ensure that all electric circuitry clean of inflammable materials. 3. Conduct periodic maintenance and maintain the records• Provide suitable & non-flammable protected supports and shades for hanged light fittings/fixtures.• 1. Wiring design should have separate and distinct sub-circuits for power and heat source. 2. Switchboards / wiring to be located away from steam / heat pipelines.• The electrical panels to be of metal case and should be marked with “Danger 415 Volts” and identified with proper phase marking and danger signage.• Provide proper clearance of 0.8 - 1.0 m in front of all distribution panels/switchboards.• Provide cable connections with properly soldered / welded lugs at (MDB/DB/SDB)'s. Ensure that all the electrical connections are properly secured with lugs and glands.• Select conductors and MCCB/MCB with adequate sizing without exceeding permissible current carrying capacity for insulation.• Avoid looping and bunch of cable at MCCB/MCB or bus bar terminal, use individual circuit and over current device for every incoming and outgoing circuit at the distribution boards.• Provide circuit diagram /circuit list with proper current ratings and fuse size, marking for DBs identifying end use load, voltage, number of phases.• Provide cable joints of porcelain / PVC connectors with PIB tape wound around before placing the cable in the box.• Seal the cable penetrations through walls adequately with fire
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Summary of Preliminary Assessment on Structural, Fire and Electrical Safety

	<p>resistive elements.</p> <ul style="list-style-type: none"> • Provide separate earthing connection to electrical equipments. Ensure that earth potential provided for all parts of equipment / installation (other than live parts) and that continuous earth connection is provided back to the main intake supply earth. • Provide adequate earthing to body and doors to all MDBs / DBs. Ensure that all electrical panels provided with proper and separate earth potential.
<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"> • 1. Provide updated SLD matching the existing installation at the factory. 2. SLD to indicate exact positions of all points of switch boxes and other outlets. 3. SLD to be approved by the engineer-in-charge. • 1. Provide updated Electrical layout drawing prepared after proper locations of all outlets for lamps, fans, fixed and transportable appliances, motors etc. 2. Drawings to indicate exact positions of all points of switch boxes and other outlets to match existing installation. 3. As built drawing to be approved by the engineer-in-charge. • Provide 4 hour fire rated walls with 2hour's fire rated door all around the generator room on ground level. • Modify Area of generator room to meet requirements of Table 4.4, RMG Guideline; the area should be 24m², or relocate the generator room. • Provide and maintain proper clearance in all sides of generator for ease of maintenance. • 1. Design to have proper segregation of different end used loads. 2. Wiring design to have separate and distinct sub-circuits for power and heating system. 3. All DBs to be placed conveniently. 4. Wiring to be neat, tidy and located near ceiling. • Provide calibrated Ammeters / Voltmeters at distribution boards (MDBs). • Review capacity of standby generator on basis of loads for essential lighting / AC / Equipment / Services. Replace generator with larger capacity or install second generator if review indicates existing unit is too small. • 1. Wooden switchboards / panel boards should be replaced by non-flammable materials. 2. Prefer switchboards made of non-flammable materials. • Power cables/ telecommunication cables should be laid separately. • Each circuit should have a separate neutral (use of common neutral for more than one circuit shall not be permitted). • Provide the wiring in PVC conduits or in metallic GI pipes. Ensure that all electrical wiring should be covered in proper conduit pipes.

Summary of Preliminary Assessment on Structural, Fire and Electrical Safety

	<ul style="list-style-type: none">• Seal the cable entry-exit points of (MDB/DB/SDB)'s with non-flammable materials. In addition:<ol style="list-style-type: none">1. Ensure that (MDB/DB/SDB)' panels / Switchgears to be vermin / damp proof.2. Ensure all unused holes / openings in DBs to be blocked properly.• 1. Provide the ECC to meet minimum cross-sectional area as per table 4.5.<ol style="list-style-type: none">2. Ensure that connections between conductors / equipments provided to durable electrical continuity and adequate mechanical strength and protection.3. The continuous earth connection is provided back to the main intake supply earth.• Provide adequate protection against lightning depending on the probability of a strike and acceptable risk levels at roof top of building.
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