Summary of Preliminary Assessment on Structural, Fire and Electrical Safety

Name of the Factory	: ALLURE SWEATERS LTD.
Address of the Factory	: Kayempur, Link Road, Fatullah, Narayanganj.
Present Status of the Factory	: Under Operation
Structural Assessment Conducted by	: VERITAS Engineering & Consultant
Date of Structural Inspection	: 2015-07-05
Fire Assessment Conducted by	: VERITAS Engineering & Consultant
Date of Fire Inspection	: 2015-07-05
Electrical Assessment Conducted by	: VERITAS Engineering & Consultant
Date of Electrical Inspection	: 2015-07-05
BKMEA Membership No.	: 1782

BASIC INFORMATION: The present garment factory is using for Entire building. The following general information are noted:

i. Building Usage Type	: Garment factory
ii. Structural System	: RCC frame
iii. Floor System	: Flat plate
iv. Floor Area	: 10000 sft
v. No. of Stories	: 5 storied.
vi. Construction Year	: Year of construction is 2007 to 2009 for entire building.
vii. Foundation Type	: Unknown.
viii. Design Drawings	: Available: Approval plan Not Available: Structural drawing, material test report, Machine layout plan, floor load plan.
ix. Soil Investigation Report	: Not Available.
x. construction Materials	: Brick chips for column, Beam & slab.
xi. Generator	: Ground floor.

RECOMMENDATIONS FOR CORRECTIVE ACTION: Corrective action for structure are,

Short Term (Immediate)	: N/A
Mid Term (6-weeks)	: 1. Factory Engineer to review design loads and column stresses in the areas identified above. 2. Verify in situ concrete stresses either by cores (100mm diameter) or existing cylinder strength data for all the columns or cores from a minimum of 4 non-critical columns.
Long Term (6-months)	:1. Produce and actively manage a loading plan for all floor plates within the factory giving consideration to floor capacity and column capacity.

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

(A): Recommendations for Fire Safety corrective actions:

Immediate (*the factory should not continue to be occupied until these non-conformities have been rectified*):	• Factory needs to remove all temporary obstruction (machineries) from escape route of exit-2 for easy movement and safe discharge.
Short Term (*Actions that must be incorporated into a Fire Safety Management Plan immediately (1 ~ 2 weeks) and should be a regular activity*	• Fire drill shall be conducted quarterly (4 times a year) under the Fire Safety Plan. A record of such drills shall be kept in writing for at least 3 years for the inspection of fire brigade whenever called for. • Factory need to have proper testing plan & record of fire safety equipment. • 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. • Need to be reduced 16% of total occupant at 1st floor. • Lights in storage area needed 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 2.9 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. • All required means of exit or exit access in buildings or areas requiring more than one exit shall be signposted. The signs shall be clearly visible at all times, where necessary supplemented by directional signs.
Mid Term (*The remedial works indicated must be carried out within a period of 6 weeks)*	• Factory needs to prepare as built drawing with floor machine layout showing means of escape with proper dimension. • Fire license needs to be renewed by mentioning full coverage area. • 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 replaced by side swinging so that un-lockable doors can be opened easily in the direction of evacuation

	without the use of a key. • Factory needs to maintain minimum width of exit 0.9 m and height 2 m. • Factory needs to provide handrail on both sides of all the stairways. • Factory needs to be installed with adequate illuminated emergency lighting in floors, exits & stairs. (Escape route). • Factory need to have emergency backup power for critical fire safety system with sufficient capacity & arrangement according to NTPA Guideline.
Long Term (The remedial works indicated must be carried out within a period of 6 months)	• Fire department pre-plan needs to be developed. • Factory needs to be provided at least two exits or stairs [0.90m] and have sufficient total width of exits (4 mm per occupant) in all floors of the building. • Factory needs to ensure minimum clear width of stair 0.90 m as per minimum requirement. • Factory needs to be provided at least two stairs [0.90m] and have sufficient total width of stair (8 mm per occupant) in all floors of the building. • Final exit route-1 need to be protected (2 hour rated construction with 1.5 hour rated door) at each floor level entrance and need to be protected from working area at ground floor by 2 hours rated construction with 1.5 hours rated door/opening, also need to have a protected escape route till to reach safe refuse area. • Stair-2 need to be protected from generator room at ground floor by 4 hours rated construction with 2 hours rated doors/opening till to reach safe refuse area. • Yarn storage area need to be protected with 4 hours rated construction & 2 hours rated opening / door from the working floor (boiler room & iron section) at ground floor of the building. • Boiler: Boiler room need to be protected with 4 hours rated construction & 2 hours rated opening / door from the working floor (Iron section & yarn store) of ground floor of the building. • Generator: Generator room needs to have a 4 hours fire resistance wall and entry also needs to have 2 hours fire rated door having direct access to the road with safe refuse area. • 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. • Factory needs to install proper standpipe system with having at least 75 mm dia of riser. • Factory need 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. • 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 have dedicated fire pump with backup power system & sufficient capacity for achieve required pressure in the remote place of the factory. • Factory need to have sufficient water storage capacity to get adequate pressure to feed fire-fighting equipment and at least 1900 □ 75 = 142500 liters water storage tank.

(B): Recommendations for Electrical Safety corrective actions:

Immediate (*the factory should not continue to be occupied until these non-conformities have been rectified*):	• 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+ 40C) and take proper action.

Short Term (*Actions that must be incorporated into a Fire Safety Management Plan immediately (a week) and should be a regular activity)*	• Provide two separate and distinct connections of earthing for the generator. • Ensure all switchboards and panel boards (including panel door) are earthed properly. • Ensure overcurrent protection device (circuit breaker/fuse) for each circuit/branch circuit. • Ensure proper earthing connections at all electrical equipment. • Install earthing pit for the factory with adequate provision for inspection of the earthing system and ensure inspection is being completed and documented. • Clean interior components from dust and debris and seal all openings within the enclosure to prevent dust and debris from entering.
Mid Term (*The remedial works indicated must be carried out within a period of 6 weeks)*	• Post safety signage and install appropriate number and type of fire-fighting equipment in generator room and ensure graded rubber mats are provided in front of all panel boards. • Provide Instruction board for first aid and artificial respiration in the generator room. • Ensure switch boards and panel boards have a minimum clearance of 1 m (39 in) in front. • Provide dedicated & adequate size of earthing with proper identification for each circuit. • Rewire to ensure each incoming supply to an MCB/MCCB has a dedicated supply from bus-bar. Avoid the use of multiple cables on outgoing side of MCB's/ MCCB's. • Replace wooden bases with metal clad construction for mounting the circuit breaker, Switch control boards and socket. • Provide adequate support or mechanical guards for electrical equipment and wiring where necessary. • Ensure adequate covers on cable channel. • Ensure cable joints are made in respect of conductivity, insulation and mechanical strength. • 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+(20C-40C)} and take proper action.
Long Term (*The remedial works indicated must be carried out within a period of 6 months)*	• 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 overhead service connections to the building are led via adequate size and type of service masts. • Ensure the generator room has adequate fire separation from the production area. • Provide adequate means of ventilation for the generator room based on the installed equipment considering fire barriers. • Ensure panel 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 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.