Name of the Factory	: B.L. APPARELS L.T.D (Building-1)
Address of the Factory	: Baghata, Sahepratab, Narsingdi, Bangladesh.
Present Status of the Factory	: Under Operation.
Structural Assessment Conducted by	: VEC
Date of Structural Inspection	: 6th July, 2015
Fire Assessment Conducted by	: VEC
Date of Fire Inspection	: 6th July, 2015
Electrical Assessment Conducted by	: VEC
Date of Electrical Inspection	: 6th July, 2015
BKMEA Membership No.	: 1670

BASIC INFORMATION:

There are three production buildings in the factory premises. Building-1 is a five storied RCC building, Building-2 is a four storied RCC building and Building-3 is a single storied shed. This report covers for Building-1.

The present garment factory (Building-1) is a five storied dual system. RCC beam column frame structure (ground and 1st floor), RCC flat plate system (2nd to 4th floor). 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 and flat slab floor system.
iv.	Floor Area	: Total floor area is 68,000 sft. (Approximate)
v.	No. of Stories	: 5-Storied.
vi.	Construction Year	: In phase. (2009-2010 and 2014-2015)
vii.	Foundation Type	: Unknown.
viii.	Design Drawings	: Available document: As built machine layout plan. Not available- Full set of architectural and structural design drawing, soil test report, test report of construction material and floor load plan.
ix.	Soil Investigation Report	: Unavailable.
x.	Construction Materials	: Brick Aggregate (In column).
xi.	Generator	: Housed in separated structure.

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) :

- Areas of overstress should not to be used for storage.
- A Detail Engineering Assessment of Factory to be commenced.

Mid Term (6-weeks) :

- Detail Engineering Assessment to be completed.
- Engage a qualified structural engineer to prepare as built structural drawing, Floor load plan as part of DEA. Factory management should take approval from the proper authority.

Long Term (6-months) :

- Continue to implement load plan.

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 from escape route for emergency and safe evacuation.
Short Term (*Actions that must be incorporated into a Fire Safety Management Plan immediately (1 ~ 2 weeks) and should be a regular activity*	• Factory need to have proper testing plan & record of fire safety equipment. • 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. • Factory needs to have a valid fire license covering the full occupied 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 provide handrail on both sides of all the stairways. • Factory needs to be installed with adequate illuminated emergency lighting in floor, stairs & exits (Escape route). • Emergency back-up power needs to be connected for critical fire safety system and not less than 30 minutes in case of failure of power supply.
Long Term (*The remedial works indicated must be carried out within a period of 6 months)*	• Fire department pre-plan needs to be developed. • Final exit route-1(Stair-1 route) 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 production area at ground floor by 2 hours rated

	construction with 1.5 hours rated door, from boiler room of building-2 at ground floor by 4 hours rated construction with 2 hours rated door/opening, from sari making section of shed-2 at ground floor by 2 hours rated construction with 1.5 hours rated door also need to have a protected escape route till to reach safe refuse area. Exit routes from stair-3 to both the final exit- 1 and 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 dying section of shed-1 and sari making section of shed-2 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. • Generator and boiler room need to be protected with 4 hours rated construction & 2 hours rated opening / door from exit route of stair-3 as well as from the final exit route-1 (stair-1 route) located at ground floor of building-2. • All the stairs need to be protected with fire and smoke resistant enclosures and opening (2 hours rated enclosure and 1.5 hours 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 75mm dia of riser. • Factory need to be installed by 1riser per 1000sqm of floor area with at least 38mm dia of fabric hose 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 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 needs 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.

(B): Recommendations for Electrical Safety corrective actions:

Immediate (*the factory should not continue to be occupied until these non-conformities have been rectified*):	• Ensure there is no break in the neutral wire in the form of fuse unit throughout the wiring installation. • Find out cause (improper cable selection, improper termination, rusted connection etc.) of burning sign/insulation damage and take proper action including replacing cable or equipment where necessary. • 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+ 40^0C) 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*	• Ensure all distribution boards (including panel door) are earthed properly. • 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. • Clean interior components from dust and debris and seal all openings within the enclosure to prevent dust and debris from entering. • Ensure inspection of all earthing system is being completed and documented.
Mid Term	• Ensure graded rubber mats are provided in front of all

(*The remedial works indicated must be carried out within a period of 6 weeks)*	distribution boards. • Provide Instruction board for first aid and artificial respiration in the generator room. • Ensure distribution board is installed in compliant location in terms of access. • 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 avoid the use of multiple cables from incoming and outgoing side of MCB's/MCCB's. • Replace wooden base with metal clad construction for mounting the fuses and circuit breakers. • Ensure all electrical cables are sized according to capacity of circuit breakers. • Provide adequate support or mechanical guards for electrical equipment and wiring where necessary. • 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. • 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+(20^0C-40^0C)} 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 panel boards on an annual basis. • Ensure overhead service connections to the building are led via adequate size and type of service masts. • 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 adequate covers on cable channels. • 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.