Name of the Factory	: **Bay Footwear Limited (Unit-2)**
Address of the Factory	: Plot # 1981-1989, Telirchala, Mouchak, Gazipur.
Present Status of the Factory	: Under Operation .
Structural assessment conducted by	: Alliance
Date of Structural Inspection	: 10-Mar-14
Fire & Electrical assessment conducted by	: Alliance
Date of Fire & Electrical Inspection	: 16-June-14

BASIC INFORMATION:

There is one building in the factory premises. The following general information was noted:

i.	Building Usage Type	: Footwear Manufacturing Factory.
ii.	Structural System	: RCC Moment resisting frame structure and PEB Structure.
iii.	Floor System	: Beam Supported slab & Concrete Casted Steel Deck.
iv.	Floor Area	: 119,090 sft of Main Building
v.	No. of Stories	: Variable.
vi.	Construction Year	: 2006 ~ 2012
vii.	Foundation Type	: Strap footing and Individual Footing.
viii.	Design Drawings	: Available.
ix.	Soil investigation Report	: Available
x.	Construction Materials	: RCC brick chips.
xi.	Generator	: Ground floor (Separate building)

RECOMMENDATIONS FOR CORRECTIVE ACTION:

The recommendations of corrective action for Structural, Fire and Electrical Safety comprises of Short Term, Mid Term and Long Term basis are as follows:

The recommendations for Structural Safety corrective actions are:

Immediate : Engage a competent body for restoration work of the settlement cracks.

Short Term: (3 Weeks) :

i. Develop a program to ensure that all live loads for which a floor or roof has been designed for will not be exceeded. The designated Load Manager shall oversee this program and ensure it is enforced.

ii. Designate a representative as the Factory Load Manager. The Factory Owner shall ensure that at least one individual, the Factory Load Manager who is located onsite full time at the factory, is trained in calculating operational load characteristics of the specific factory. The Factory Load Manager shall serve as an ongoing resource to RMG vendors and be responsible to ensure that the factory operational loads do not at any time exceed the factory floor load limits as described on the Floor Load Plans.

Mid Term (6 Weeks) :

i. Under guidance from a qualified structural engineer arrange a detail engineering assessment of the main building within 6 weeks. The compressive strength of concrete should be verified via core testing conducted under the guidance of a qualified structural engineer.
ii. Engage a QSEC to have better understanding of the strength of the concrete and quantity of the steel in the columns for Ancillary building -1. Assessment of concrete strength by coring should be done to reassess FoS.
iii. Have a qualified structural engineer complete an analytical evaluation of the structural impact of the structural steel frame roof structure and the additional occupancy space at the roof level.
iv. Engage a qualified structural engineer to confirm and document that provisions have been made to accommodate concentrated loads. If provisions have not been made, have a qualified structural engineer develop a remediation plan.
v. Engage a qualified structural engineer to develop the required documents to confirm the structural integrity of the buildings. Documents must comply with the Alliance Standard Part 8 Sections 8.19 and 8.20
vi. Engage a qualified structural engineer to confirm satisfactory structural performance of the buildings under wind loading.
vii. Adequately anchor and brace all non-structural elements to resist earthquake forces to comply with the BNBC and Alliance Standard.
viii. Have a qualified structural engineer develop Floor Loading Plans per the requirements of Part 8 Section 8.20.5.3.
ix. Have a qualified structural engineer prepare load plans including the information required in Section 8.20 of the Alliance Standard. Floor load plans should be visibly posted on all levels of all buildings.
x. Provide signage or the appropriate markings at all areas used for storage to indicate the acceptable loading limits detailed in the Load Plan.

Long Term (6 Months) :

i. Depending on the findings of the DEA, permanent remedial measures should be conducted for the safety of the building.
ii. Provide a protective coating to all structural elements that are constructed with MCAC and exposed to rainfall or other sources of water. Have the protective coating approved by the Alliance or a qualified structural engineer. In the alternative, provide a 2% slope on the exposed surfaces to prevent accumulation of water.
iii. Apply for issuance of the Certificates of Occupancy and pursue the matter to obtain the same.

The recommendations for Electrical Safety corrective actions are:

Immediate (3 to 6 Days)	Find out the cause of overheating, overloading, or signs of burning and take proper action.Ensure the generator room clean and free of dirt, debris, and improperly stored materials.

Short Term (3 Weeks)	Develop and implement an electrical safety program. Include key topes such as lock out tag out procedures, personal protective equipment requirements, etc. Provide protective covers for every naked light installed in storage area. Provide permanent identification marking mentioning name of panels. Signage indicating the prohibition of installing naked lights should be posted in required location.
Mid Term (6 Weeks)	Provide phase separators/barriers between terminals of all MCCBs. Have a qualified electrical engineer established an as-built Electrical layout drawings detailing key components and capacity of the electrical system. Consult with a qualified Electrical Engineer and ensure electrical cables are sized according to capacity of circuit breakers. Remove multi looping of cables at circuit breakers within switchboards and distribution boards. Install individual protective device (MCCB/MCB) for every branch Circuits (load). Provide identification/tagging mentioning the equipment/machines' name (i.e. Sewing machine line-1 or Lighting line-2) and type of conductor (i.e. L1,L2,L3,N,PE)for every cable at its termination point or maintain the color-code at its termination point (providing colored cable-sleeves) for identification of conductor-type (i.e. Red/Yellow/blue for phase cable, Black for neutral cable, Green for earthing cable).(Labeling-cable-tie/Marker-tie can be used for cable identification).
Long Term (6 Months)	Have a qualified electrical engineer design a lightning protection system according to the BNBC requirements. Have a licensed electrician install the designed system. Complete thermo graphic scans at least on a three year cycle. Thermo graphic scans should be completed in accordance with the Standard for Infrared Inspection of Electrical Systems & Rotating Equipment and NFPA70B or a comparable standard. Develop an Insulation Resistance Measurement Program that ensures deterioration of insulation resistance will be identified quickly. Testing should be in compliance with International Electrical Testing Association (NETA). All transformers, switchgears etc. shall be subject to an insulation resistance measurement test to ground after

	installation but before any wiring is connected. Insulation tests shall be made between open contacts of circuit breakers, switches etc. and between each phase and earth.

The recommendations for Fire Safety corrective actions are:

Immediate (3 to 6 Days)	Remove all impediments, obstructions, and stored materials from the means of egress. Keep all elements of the means of egress (exit path, aisles, stairs, corridors, etc.) continuously free and clear of all obstructions in accordance with Alliance Standard Section 6.3.9.
Short Term (3 Weeks)	Remove all locking devices from all egress doors and means of egress components in accordance with Alliance Standard Section 6.8. If locks are required for security reasons, utilize special door locking features complying with NFPA 101. 1. Daycare occupancies which are accessory to other occupancies shall be located on the ground floor with a maximum travel distance of 9 m (30 ft). If located on a higher floor, direct access to an exit enclosure shall be provided. 2. Provide guards at the open side of means of egress that exceed 760 mm (30 inch) above the floor or finished ground level. New guard shall have a minimum height of 1067 mm (42 inch) and the spacing of between the vertical members are not exceed 200 mm (8 inch)."
Mid Term (6 Weeks)	Install an automatic fire alarm and detection system for the facility. System shall comply with the Alliance Standard and NFPA 72. Consult a qualified fire protection engineer and/or authorized fire alarm company to design and install the system. Install a new automatic fire alarm and detection system. Once installed, arrange for direct connection of the fire alarm and detection system to a central station monitoring service or the Fire Service and Civil Defence as per Alliance Standard Section 5.7.5. Until that time, a person trained to contact the Fire Service and Civil Defence in the event of fire alarm activation shall be provided. An annunciator shall be located in a constantly attended location (such as a fire control room) to alert this person. Develop a testing and maintenance program that ensures the operation of all egress lighting is verified at least once per year. If battery-operated lights are used, these lights shall be tested on a monthly basis. Functional testing of battery powered lights shall be provided for a minimum 90 min once per year.

	Develop an emergency evacuation plan which includes all components required by the Alliance Standards and communicate the plan to all employees. Post the occupant loads for every assembly and production floor in a facility in a conspicuous space near the main exit or exit access doorway for the space. Develop a testing and maintenance program that ensures the emergency power for exit signs is tested at least once per year. If battery operated signs are used, these signs are tested on a monthly basis. Functional testing of battery powered signs is provided for a minimum 90 min once per year. Provide stair designation signs at each floor entrance from the all stairs to the floor in English and Bengali. Signs shall indicate the name of the stair and the floor level. Signs shall be posted adjacent to the door. Apply to appropriate authority in an expeditious manner for issuance of the Certificates of Occupancy for each building and ancillary structure according to building use. Complete fire department pre-planning activities with the local Fire Service and Civil Defence. Install required signage for the standpipe system identification at the noted locations. Signage shall be complying with NFPA 14.
Long Term (6 Months)	Provide minimum 1-hour fire-resistive rated continuous barriers at shaft enclosures with 0.75-hour fire-resistive opening protection at shaft opening(s) for Main building-1 and 2-hour fire-resistive rated continuous barriers at shaft enclosures with 1.5-hour fire-resistive opening protection at shaft opening(s) for Ancillary building-1. Consult a qualified fire protection engineer to design the required rated construction of shaft. Provide 1-hour fire-resistive rated assembly with 0.75-hour opening protection in line with the stair and extend 3.05 m (10 ft.) beyond the ends of the stair between the exterior exit stairs and the building to achieve the required separation for Main building-1 and Main building-2. Provide 2-hour fire-resistive rated assembly with 1.5-hour opening protection in line with the stair and extend 3.05 m (10 ft.) beyond the ends of the stair between the exterior exit stairs and the building to achieve the required separation for Ancillary building-1. The rated assembly shall be approved and/or designed by a qualified fire protection engineer. Replace all non-compliant doors and frames in the means of egress with sides winging doors in accordance with Alliance Standard Section 6.8. Replacement doors shall be

	listed, approved, self-closing, fire rated door assemblies (door and frame) with latching panic hardware. Interior exit stairways shall be terminate to an exit rated exit passageway or outside the building. Construct minimum 1-hour fire rated (walls, ceiling and floor) exit passageway with minimum 0.75-hour rated opening protection (door, window, etc.) from the stair at ground floor to the exterior of the building. This exit passageway shall not be used for any other purpose. Or provided with automatic sprinkler protection throughout the story or building per NFPA 13. The rated assembly or sprinkler system needs to be designed and/or approved by a qualified fire protection engineer. Interior exit stairways shall be terminate to an exit passageway or outside the building. Construct minimum 1-hour fire rated (walls, ceiling and floor) exit passageway with minimum 0.75-hour rated opening protection (door, window, etc.) from the stair at ground floor to the exterior of the building. This exit passageway shall not be used for any other purpose. Or provided with automatic sprinkler protection throughout the story or building per NFPA 13. The rated assembly or sprinkler system needs to be approved and/or designed by a qualified fire protection engineer. Provide training for the required number of people (25 % of total workers as per Fire Service and Civil Defence) certified in firefighting, first-aid, and rescue training by the appropriate authority. Provide required fire-resistive rated opening protection (Door, Window, etc.) at opening (0.75 hour for warehouse). Fire door assemblies shall conform to NFPA 252, BS 476 Part 22, EN 1364-1, GB 12955-2008, or IS 3614 Part II. Fire window shall conform to NFPA 257 or British, European, Chinese, or Indian standard for fire window tests. Assign a qualified fire protection engineer for designing the fire rated opening protection. Modify or install the standpipe System (Class-I and class-II) to meet the requirements of Alliance Standard. Standpipe system must comply with NFPA 14 for building/structure where the highest occupied floor is more than 10m (33 ft.) and BNBC Part 4 Chapter 4 for building/structure where the highest occupied floor is less than 10m (33 ft.). The hydraulic calculations should be submitted and reviewed by Alliance prior to start of work. All standpipe system installation activities shall be submitted for reviewed by the Alliance prior to commencement of installation in accordance with Section 5.4.3.2. Consult a qualified fire protection engineer before modifying or installing a new system. Stairs shall be enclosed and separated with 1-hour fire resistive rated construction and 0.75-hour opening protection or they shall be removed and floor slab shall be closed with 2-hour fire resistive rated construction. Consult a qualified fire protection engineer to design the rated

	construction barriers. Provide proper aisles marking (clear width minimum 36 in.) and keep aisles free of storage. Relocate machines accordingly if necessary to provide proper width. The path of egress travel along a means of egress shall not be interrupted by any obstruction. The capacity of the means of egress shall not be reduced along the path of travel. Provide 1-hour fire-resistance rated construction barriers at exit enclosures with 0.75-hour fire-rated opening protection (Door, window, etc.) for main building-1 and main building -2. Provide 2-hour fire-resistance rated construction barriers at exit enclosures with 1.5-hour fire-rated opening protection (Door, window, etc.) for Ancillary building-1. Fire doors shall be of the side-hinged, swinging type and shall swing in the direction of egress, auto closure and panic bar and without locking arrangement as per Alliance Standards Part 6 Section 6.8 Doors and Gates. Required total width of the fire rated door shall be calculated as per Alliance Standard Section 6.5 and minimum width of new fire rated door will 1.0 m (39 in.) as per BNBC Chapter 4 Section 3.9.3. Every door in a stair enclosure serving more than 5 stories shall be provided with re-entry provision. Consult a qualified fire protection engineer to design the required rated construction barriers with opening protection. Install a dedicated fire pump in accordance with NFPA 20 to supply the water demands for the fire protection systems along with a stored source of water to meet the demands per NFPA 22. Fire pump installation is to be tested for final acceptance in presence of Alliance and a final inspection of the installation shall be conducted by the Alliance prior to final acceptance of the installation by the Alliance as per clause 5.5.5. Acceptance testing of the installation shall be in accordance with NFPA 20, 22, and 25 testing requirements. Documentation of all testing shall be submitted to the Alliance for review prior to final acceptance by the Alliance. The pump is to be connected to an alternative power source such as a generator. The generator is to be configured with an ATS (auto starter). Install initiating devices and notification appliances as required by the Alliance Standard and NFPA 72. This includes electrical supervision of all valves controlling fire protection systems (sprinklers, fire pumps, water supplies, etc.). Devices should be part of an automatic fire alarm and detection system for the facility. All fire alarm installations shall be submitted for review by the Alliance prior to commencement of installation. Consult a qualified fire protection engineer to design the system. Rooms used for storage of combustible materials shall be separated from the surrounding occupancy with a minimum 1-hour fire rated construction with 0.75-hour fire rated opening protection. Consult a qualified fire protection engineer to design the required rated construction barrier. Provide Fire Department (Siamese) connections in accordance with Alliance Standard Section 5.5.4. Connections shall match the Fire Service and Civil Defence

	hose thread standard. Install fire extinguishers at correct locations and heights based on hazard type per BNBC Part 4 and NFPA 10. Establish an inspection, testing, and maintenance program for all fire extinguishers. Program need to comply with the requirements of NFPA 10 chapter 7. Reduce the change of elevation with beveled slope of 1 in 2 that does not exceed 12.7 mm (1/2 in). Also additional signage or floor markings are required. Ensure a minimum ceiling height in the means of egress by maintaining a minimum 2.3 m (7 ft 6 in) with projection from the ceiling not less than 2.03 m (6 ft 8 in). Install handrail on both sides of the ramp with minimum height of 865 mm (34 in.) and a maximum height of 965 mm (38 in.) as measured from the surface of ramp. The spacing between vertical members will not exceed 200 mm (8 inch). Install illuminated exit signs with backup power and continuous graphics at entrances to exits and along the path of egress anywhere the continuation of egress is not obvious or there is a change in the direction of the path of travel. Install handrails on the both side of the stairs and intermediate handrail when the width of the stair exceed 2.20 m. A minimum height of 865 mm (34 in.) and a maximum height of 965 mm (38 in.). Develop a hot work permit program. The program must comply with the requirements of NFPA 51B. Establish written corporate and plant policies on housekeeping to ensure scheduled cleaning for floor, wall, ceiling, supply and return air ventilation systems. Promptly reschedule skipped cleanings. Provide a documented line of authority for authorizing a cleaning delay and rescheduling. Establish an inspection, testing, and maintenance program for the standpipe system. Program must comply with NFPA 25. Any newly installed standpipe system needs to be evaluated for compliance with the design pressure and flow demands of NFPA 14 or BNBC Section 5.4.3.