Name of the Factory	: **Asian Apparels Ltd (2nd, 3rd & 5th floor)**
Address of the Factory	: JBC Shopping Center 22/23 Station Road Chittagong Bangladesh
Present Status of the Factory	: **Under Operation**
Structural assessment conducted by	: Alliance
Date of Structural Inspection	: 21 Apr 2014
Fire & Electrical assessment conducted by	: Alliance
Date of Fire & Electrical Inspection	: 21 Apr 2014

BASIC INFORMATION:

The present garment factory is a seven story RC frame building. The following general information was noted:

i.	Building Usage Type	: Garment Factory Buildings
ii.	Structural System	: RC frame (beam-column framing)
iii.	Floor System	: RC Beam supported slabs
iv.	Floor Area	: Each level 9000 sq-ft. 7 levels total = 63000 sq-ft
v.	No. of Stories	: Main Factory Building (level =7, H= 72.5 ft.)
vi.	Construction Year	: 1992
vii.	Foundation Type	: Unknown
viii.	Design Drawings	: Not available
ix.	Soil investigation Report	: Newly prepared
x.	Construction Materials	: Reinforced Concrete
xi.	Generator	: Ground floor

RECOMMENDATIONS FOR CORRECTIVE ACTION:

The recommendations of corrective action for both Structural, Fire and Electrical Safety comprises in Short Term, Mid Term and Long Term basis.

The recommendations for Structural Safety corrective actions are:

Immediate : NA

Short Term (3 Weeks) : Develop a program to ensure that all live loads for which a floor or roof has been designed for will not be exceeded and appoint a factory load manager.

Mid Term (6 Weeks):

i. Ensure structural integrity following alliance standard through detail investigation with help of NDT/SDT by QSEC.
ii. Engage a qualified structural engineer to provide additional investigation into the areas of distress, separations, or cracking and provide a remediation plan if required.
iii. Have a qualified structural engineer prepare load plans including the information required in Section 8.20.5.3 of the Alliance Standard and posted in each floor desalinated areas as per standard.

iv. Provide signage or the appropriate markings at all areas used for storage to indicate the acceptable loading limits detailed in the Load Plan.
v. Have a qualified structural engineer provide further analysis of the identified cracks to determine the appropriate course of corrective action.
vi. Repair the exterior façade system to prevent water intrusion.
vii. Have a qualified structural engineer provide further testing and analysis of distress, settlement, shifting, or cracking in columns or walls and provide a remediation plan to correct noted issues.
viii. Have a qualified structural engineer provide further analysis and investigation of the structural deficiencies. Structural engineer shall also provide remediation documents if
ix. Adequately anchor and brace all non-structural elements to resist earthquake forces to comply with the BNBC and Alliance Standard. Submit plans to QAF 6 weeks from date of assessment report. Install bracing 12 weeks from approval of plans.
x. Have a qualified structural engineer assess the durability aspects as suggested in Alliance Standard Part 7 Section 7.2 including core cutting and testing is suggested to ensure concrete strength and take appropriate remedial measures. But it is important to note that the destructive core testing is only technically required if the circumstances stated in Alliance Standard section 7.2.2.1.1 are met, but that the testing is advised nonetheless.
xi. Engage a qualified structural engineer to develop the required documents to confirm the structural integrity of the buildings. Documents must comply with Alliance Standard Part 8 Section 8.19 and 8.20

Long Term : NA

The recommendations for Fire Safety corrective actions are:

Immediate	N/A
Short Term (3 Weeks)	Remove all temporary obstructions from all escape routes, aisles and passageways. Remove all combustible materials from substation/ generator room. Ensure minimum width of corridors, passageways and aisles. Ensure adequate numbers of fire drills. Ensure easy access to portable extinguishers and monitor and maintain the same at required interval as per guidelines. Provide proper directional sign and exit sign in Bangla and English as per guidelines
Mid Term (6 Weeks)	Produce proper drawing and plans to create horizontal and vertical fire-rated separation for stairways of appropriate specifications, grills, storage and assembly areas, lift lobby, offices, work areas. Also design to ensure proper separation of high risk areas (e.g., generator, boiler, transformer and substation rooms) as per guidelines.

	Remove all collapsible gates/roller shutters. Produce design drawings to demonstrate how stairways are to be made of adequate dimensions and appropriate specifications and to be converted into fire-rated enclosures equipped with fire-rated side swinging doors of required dimensions opening in the direction of travel at each floor. Produce design to install standard standpipe, hose and fire pump system. Provide design to install proper detection and alarm system. Install command station as per guidelines.
Long Term (6 Months)	Install horizontal and vertical fire-rated separation for stairways, grills, storage and assembly areas, lift lobby, offices, work areas. Ensure proper fire separation of high risk areas (e.g., generator, boiler, transformer and substation rooms) as per approved design Install fire rated enclosure and doors at exit to the stairs to prevent smoke and fire propagation as per approved design Install proper fire detection and alarm system. Provide fire rated enclosure, install self-closing fire rated door as per guidelines. Install dedicated fire pump according to Alliance Standard and NFPA 20. Also install a stored water supply (tank) per NFPA 22 of adequate capacity to support demands. Install appropriate means of illumination at the noted locations. Illumination shall be a minimum 10 lux for all corridors, exit doors, and stairways. Aisles shall be provided with a minimum 2.5 lux. Provide hand rail should be sides of each stairway. Mount hand rail height between 30 in. to 44 in. 1. Replace the door and openings with minimum 2 hr fire rated construction which is connected with the exit stair and install a 1.5 hr fire rated door for the boiler room. The boiler room is located on the 2nd floor and it is connected with exit stair. These parathion need to meet the exit stair rating requirement. 2. Install minimum 1 hr fire rated wall to separate the hazards section (store room and packing section) with 45 min fire rated doors. 3. Close this opening with same (existing) fire resistance rating construction. 4. Replace the door with fire resistance rated construction. Install fire department connections where required and in compliance with the Standard. Connection shall match the Fire Service and Civil Defense hose thread standard. It will allow fire department pumper vehicles to draw water from ground –level or underground water storage tanks. Connections shall match the Fire Service and Civil Defense hose thread standard.

	Establish an inspection, testing, and maintenance program for all fire extinguishers accordance with NFPA 10. According to Alliance Standard, Part-9, Section-9.1.7, develop a hot work permit program. The program must comply with the requirements of NFPA 51B. In general, this program should include request and approval process from appropriate management, necessary field validation that conditions are correct, stand by fire watch and fire fighting equipment, and a process to activate the alarm. The permits should indicate the duration of the work and the time and date of expiration the permit as well as a re-approval procedure. Establish an inspection, maintenance, and testing program for the standpipe and hose system. Program must comply with the requirements of NFPA 25. Install a standpipe system at required locations (class-I standpipe hose connection provisions for Fire Service & Civil defense at each the stair cases on each level and class-II hose connections at required location on each level) designed by a qualified fire protection engineer. Install minimum 2 hr fire-resistance rated construction to protect the vertical opening (stair level-3 to level-4). Also consult with a qualified fire protection engineer to design the required rated construction (Reference Alliance Standards Part 4 Section 4.5 Separation). Every floor has 2 (exit doors) stairs or emergency exits. Install each of the floor's exit doors with minimum 1.5 hrs fire rated door. 1. For level-2: Number of fire door: 1 (Fabric store). 2. For level-3: Number of fire door: 2 (both main exit doors). 3. For level-4: Number of fire door: 2 (both main exit doors). 4. For level-5: Number of fire door: 2 (both main exit doors). 5. For level-6: Number of fire door: 2 (both main exit doors). Install a fire alarm and detection system (both manual and automatic) and connect with a central control panel in compliance with the standard. Until that time that a central station monitoring service or direct connection to the Fire Service and Civil Defense can be set up, a person trained to contact the Fire Service and Civil Defense 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.

The recommendations for Electrical Safety corrective actions are*:*

Immediate (3 to 6 Days)	Need to clean the generator room of dirt, debris, and improperly stored materials. Engage at least one personnel to identify all equipment and power supply devices by label .Ensure proper identification of emergency power switchboards, distribution boards, and circuits for easily recognized.
Short Term (3 Weeks)	Connect all metal in the building to the building earthing/grounding system such as metal rebar in concrete, metal frame of building, or metal water pipe. Ensure the generator room properly rated and physically separated from the remainder of the building. The generator engine exhaust should be appropriately taken out of the building and should preferably be taken out through any other side except South. [Alliance standard 10.8.4.3] Provide earthing of equipment at required locations and connect to required number of electrodes. Refer to the BNBG for required number of electrodes. Ensure light fixtures without protective covers are not installed in storage areas or in any area where the Inspector of the Factories Rules (1.5.3.5) Part 53 disallows these fixtures.
Mid Term (6 Weeks)	Provision should be made for standby generator set to avert panic, hazard to life and property or major production loss in case of interruption of electrical power supply. The standby power supply may be a petrol engine or diesel engine or gas engine generator. [Alliance Standard 10.8.1] Ensure properly access the generator to perform operation and routine maintenance activities. Develop and implement an electrical safety program. Include key topes such as lock out tag out procedures, personal protective equipment requirements, etc. [Reference NFPA 70E for example program requirements.] Cable trenches should be covered by non flammable material or fill by sand. In present case cable routes on overhead and in hanging instead of using cable trench. So route the cable through trench.
Long Term (6 Months)	The substation room should be isolated from the rest of the building. In case of unavoidable reason it may be in the ground floor of same building and fire rated. [Reference Alliance Standard Part 10 Section 10.5.2.1 Inspection of Substation Installation] There is no service shaft for the whole factory building for

	cable raising and other uses. Inspection and maintenance of cables are not possible in such arrangement. This is a violation of Section 2.5.6.1 of BNBC-2006. Have a qualified electrical engineer design a lightning protection system according to the BNBC requirements. Have a licensed electrician install the designed system.