

Summary of Preliminary Assessment on Structural, Fire and Electrical Safety

Name of the Factory	: Apollo Sewing & Garments Ltd
Address of the Factory	: 1&4 Cda C/A,Momin Road,(2rd-5th Floor), Jamal Khan Chittagong ,Bangladesh
Present Status of the Factory	: Under Operation
Structural assessment conducted by	: Alliance
Date of Structural Inspection	: 6-Apr-14
Fire & Electrical assessment conducted by	: Alliance
Date of Fire & Electrical Inspection	: 6-Apr-14

BASIC INFORMATION:

The present garment factory is only one Main Buildings. The following general information was noted:

i.	Building Usage Type	: Garments Factory.
ii.	Structural System	: RCC Beam-Column frame system with isolated column footing.
iii.	Floor System	: Beam Supported slab type in RCC Building and PEB sections used in roof top.
iv.	Floor Area	: 35,000 SF.
v.	No. of Stories	: 5 storied RCC Building and roof top shed.
vi.	Construction Year	: 1978 to 1980.
vii.	Foundation Type	: Isolated Spread Footing.
viii.	Design Drawings	: Not Available.
ix.	Soil investigation Report	: Not Available.
x.	Construction Materials	: Reinforced Concrete (brick chips).
xi.	Generator	: Ground Floor

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 : NA

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. Adequately anchor and brace all non-structural elements to resist earthquake forces to comply with the BNBC and Alliance Standard.
- iii. 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

Summary of Preliminary Assessment on Structural, Fire and Electrical Safety

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 Detail Engineering Assessment of all four buildings comprising the structure. This assessment should be conducted within 6 weeks and should include destructive core testing to validate the in-situ concrete compressive strength of structural elements.
- ii. Have a qualified structural engineer prepare credible as-built documents based on the requirements of Part 8 Section 8.19 of the Alliance Standard.
- iii. 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
- iv. Have a qualified structural engineer complete an analytical evaluation of the structural impact of the addition.
- v. Have a qualified structural engineer confirm that capacity to support the load is available. Load Plans complying with Alliance Standard Part 8 Section 8.20.4.3 should also be developed.
- vi. Engage a qualified structural engineer to confirm satisfactory structural performance of the buildings under wind loading.
- vii. Have a qualified structural engineer prepare proper design reports for confirmation of steel rebar in the columns.
- viii. Under guidance from a qualified structural engineer, address all areas of needed maintenance by correcting the identified issues.
- ix. Provide a protective coating at the structural elements constructed with MCAC exposed to rainfall or other sources of water. Have protective coating approved by the Alliance or a qualified structural engineer.
- x. Have a qualified structural engineer assess the durability aspects as suggested in Alliance standard part 7 section 7.2 and take appropriate remedial measures.
- xi. Have a qualified structural engineer develop Floor Loading Plans per the requirements of Part 8 Section 8.20.5.3
- xii. Have a qualified structural engineer prepare load plans including the information required in Section 8.20 of the Alliance Standard.
- xiii. Provide signage or the appropriate markings at all areas used for storage to indicate the acceptable loading limits detailed in the Load Plan.
- xiv. Under guidance from a qualified structural engineer arrange geo-technical investigation at close vicinity of the structure and make the report available for review.
- xv. Provide certificates of occupancy for review.

Summary of Preliminary Assessment on Structural, Fire and Electrical Safety

- Long Term (6 months) :
- i. Repair the exterior façade system to prevent water intrusion.
 - ii. Provide certificates of occupancy for review.

The recommendations for Fire Safety corrective actions are:

Immediate (3 to 6 Days)	Remove all combustibles stored underneath the cutting tables at the noted locations as soon as possible.
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.
Mid Term (6 Weeks)	<p>Provide an emergency power connection or battery backup for all illuminated exit signs. 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. It is recommended that equipment should be numbered, with inspections, deficiencies, and follow-up noted in a log.</p> <p>Develop an emergency evacuation plan which includes all components required by the Alliance Standards and communicate the plan to all employees.</p> <p>Post emergency egress maps at the entrance to each exit stair or main point of egress.</p> <p>Provide maximum occupant load signs at each assembly and production floor at a conspicuous location near the main point of egress.</p> <p>Develop a testing and maintenance program that ensures the operation of all emergency lights 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.</p> <p>Fire drills need be conducted on a quarterly basis as outlined in BNBC Part 4 Appendix A for all garment facilities with records keeping. All occupants of the building need to be participating in the fire drill. Those fire drill need to be conducted under the direction of a Fire Safety Director.</p> <p>Upon installation of the appropriate fire alarm system, a central station or fire service monitoring connection shall be established in accordance with the Alliance Standard Section 5.7.5. Until that time that a central station monitoring service or direct connection to the Fire Service and Civil Defence can be set up, a person needs to be</p>

Summary of Preliminary Assessment on Structural, Fire and Electrical Safety

	<p>assigned to contact the fire department in the event of fire alarm activation. An annunciator needs to be located in a constantly attended location to alert this person.</p> <p>Install fire department connection(s) in accordance with the Alliance document Section 5.5.4 and NFPA 20, 22, and 24. Connections shall match the Fire Service and Civil Defence hose thread standard. Consult a qualified fire protection engineer to design this requirement.</p> <p>Training programs need to be implemented and documented in accordance with the Alliance Safety Training Curriculum.</p> <p>Obtain fire license for the full facility, BEREC Waiver certificate for generator, boiler operator license, electrician license from the appropriate authority.</p> <p>Need to collect Occupancy certificate for building structure as per building use from approving authority.</p> <p>Complete and document fire department pre-planning activities with the local Fire Service and Civil Defence.</p> <p>Stair designation signs need to be provided at each floor entrance from the stairs to the floor in English and Bengali. Signs need to identify the name of the stair and the floor level. Signs shall be posted adjacent to the door.</p>
Long Term (6 Months)	<p>The noted exit access corridors need to be constructed to maintain a 1 hr fire rating with 0.75 hour protected openings in accordance with Alliance Standard Section 4.5, or provide with automatic sprinkler protection throughout the story or building as per NFPA 13. The rated assembly or sprinkler system need to be approved and/or designed by a qualified fire protection engineer.</p> <p>Replace all roll-down, collapsible, sliding gates and shutters in the means of egress with required fire rated outward opening side-hinged, swinging, self-closing type doors as per Alliance Standard Section 6.8. Maintain doors free from general locking arrangement in the direction of egress.</p> <p>Remove the collapsible gate from the noted location and provided landing with minimum width of stair-1 at ground floor of building #2.</p> <p>Terminate both stairs' discharge directly outside the building or construct exit passageways for both stairs with the same enclosure rating as the stairs. These exit passageways shall lead directly outside the building or the building needs to be provided with automatic sprinkler protection in accordance with Alliance Standard Section 6.17.3. The rated assembly or sprinkler system need to be approved and/or designed by a qualified fire protection engineer.</p> <p>Interior exit stairways and ramps need to be terminate at an exit discharge or outside the building except where terminating at an exit</p>

Summary of Preliminary Assessment on Structural, Fire and Electrical Safety

	<p>passageway is constructed to meet the same rating requirement as the exit that is being served or provide with automatic sprinkler protection throughout the building as per NFPA 13. The rated assembly or sprinkler system need to be approved and/or designed by a qualified fire protection engineer.</p> <p>Install fire rated door assemblies at all exits and at required hazardous room enclosures including the boiler room. Provide appropriate fire resistance rated opening protection and fire-stop assemblies at openings in exit enclosures and hazardous room enclosures in accordance with Alliance Standard Sections 4.6 and 4.7. Consult a qualified fire protection engineer to design the required rated opening protection.</p> <p>Install a standpipe system at required locations designed by a qualified fire protection engineer. Modify or install the standpipe System (Class-I and class- II) to meet the requirements of Alliance standard's section 5.4. Consult a qualified fire protection engineer before modify or installing a new system, along with a stored source of water sufficient to meet the demands per NFPA 22.</p> <p>Provide 2 hour fire-resistive rated construction barriers at exit enclosures with 1.5 hour fire-rated opening protection (door, window, etc.). New fire rated doors shall be side-hinged, outward swinging, with automatic closers and panic bar without locking arrangement. Consult a qualified fire protection engineer to design the required rated construction barriers with opening protection.</p> <p>Consult a qualified fire protection engineer to design the pull stations at egress points, centralized and addressable smoke detectors all through the building with properly spaced visual and audible devices based on occupancy type.</p> <p>Provide a dedicated fire pump in accordance with NFPA 20 to supply the demands of the connected fire protection systems along with a stored source of water sufficient to meet the demands per NFPA 22.</p> <p>Develop a program and documentation to get required number of people trained and certified in firefighting, first aid, and rescue training by the appropriate authority.</p> <p>Rooms used for storage of combustible materials/boiler need to be separated from the surrounding occupancy with a minimum 1 hour fire rated construction with 0.75 hour fire rated opening protection. Generator room needs to be separated from the surrounding occupancy with a minimum 2 hour fire rated construction with 1.5 hour fire rated opening protection. Consult a qualified fire protection engineer to design the required rated construction barrier.</p> <p>Provide handrails on both sides of each stair, with details and heights in accordance with the Alliance Standard Section 6.12.</p>
--	---

Summary of Preliminary Assessment on Structural, Fire and Electrical Safety

	<p>Modify the roof parapets to result in a minimum height of 1067 mm (42 in.). Parapets that are constructed on rated exterior construction shall be of the same rating the exterior wall rating in accordance with BNBC Part 3 Section 3.1.15</p> <p>Establish an inspection, testing, and maintenance program for all fire extinguishers. Program must comply with the requirements of NFPA 10.</p> <p>Modify or relocate means of egress paths at the noted locations to maintain minimum 2.3 m (7 ft 6 in.) with projection from the ceiling not less than 2.03 m (6 ft 8 in.)</p> <p>Upon installation of proper stair doors, provide every door in a stair enclosure that serves more than 5 stories with re-entry provisions in accordance with the Alliance document Section 6.8.3.</p> <p>Create a Fire Safety Director position and fill the position with an individual that has had sufficient training to be able to carry the required duties.</p> <p>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.</p> <p>As a general rule the maximum tolerable deposit thickness for loose fluffy lint is 13 mm (½ in.) over a maximum of 46.5 m² (500 ft²). Limit dense deposits to 6 mm (¼ in.) and oil saturated deposits to 3.2 mm (⅛ in.).</p> <p>Establish an inspection, maintenance, and testing program for the standpipe and hose system. Program must comply with the requirements of NFPA 25.</p> <p>Develop a hot work permit program. The program must comply with the requirements of NFPA 51B</p>
--	---

The recommendations for Electrical Safety corrective actions are:

Immediate (3 to 6 Days)	Generator room need to clean and free of dirt, debris, and improperly stored materials.
-------------------------	---

Summary of Preliminary Assessment on Structural, Fire and Electrical Safety

<p>Short Term (3 Weeks)</p>	<p>Develop and implement an electrical safety program. Include key topics such as lock out tag out procedures, personal protective equipment requirements, etc. Reference NFPA 70e for example program requirements.</p> <p>Establish a periodic inspection program to ensure the electrical systems are free from damage, debris, dirt, lint, etc. Maintain records concerning inspections and follow up actions.</p> <p>Provide protective covers for every naked light installed in areas that are used for storage.</p> <p>Install individual circuit breaker (MCCB) for every drawn circuit. The practice of “inserting multiple cable into single terminal of a breaker” must be avoided to avert loose connection. Consult a qualified electrical engineer to properly size the new overcurrent protection devices based on the capacity of the circuit. Ensure sufficient spare capacity is available within the distribution boards for the additional circuits.</p> <p>Complete further investigation to determine the cause of the overheating. Unexpected heats are typically caused by either loose connections or overloading. Consult a qualified electrical engineer to determine if the circuits are overloaded or have a qualified electrician tighten the loose terminations. Establish a periodic inspection program (thermal-scan preferably) to identify the overloading of cables and unexpected heat rise.</p>
<p>Mid Term (6 Weeks)</p>	<p>Clear & Permanent identification marks should be printed in all DBs, Switchboards, Sub-distribution boards & switches as necessary BNBC- Part 8 section 2.11.5.4.</p> <p>Keep Firefighting equipment at Generator room. Alliance standard 10.8.4.2.</p> <p>Provide electrical insulation mats in front of distribution boards, substation room etc.</p>
<p>Long Term (6 Months)</p>	<p>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.</p> <p>Have a qualified electrical engineer to design a lightning protection system according to the BNBC requirements. Have a licensed electrician to install the designed system.</p> <p>Have a qualified fire protection engineer provide the required rating of the room and the required remediation procedures to ensure the enclosure is properly rated. Ensure the generator enclosure is sufficiently protected from the ingress of water.</p>