

## Summary of Preliminary Assessment on Structural, Fire and Electrical Safety

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Name of the Factory	: <b>Zon Ron Sweaters Ltd</b>
Address of the Factory	: Navana Tower (10th floor), 45 Gulshan South Avenue, Gulshan, Dhaka, Bangladesh
Present Status of the Factory	: <b>Under Operation</b>
Structural assessment conducted by	: Alliance
Date of Structural & Electrical Inspection	: 28 May 2014
Fire & Electrical assessment conducted by	: Alliance
Date of Fire Inspection	: 28 May 2014

### **BASIC INFORMATION:**

The present garment factory is a six storied RCC building. The following general information was noted:

- i. Building Usage Type : Garments Factory.
- ii. Structural System : 6 storied RCC beam column frame structure (MRF).
- iii. Floor System : Beam Supported slab.
- iv. Floor Area : 159516 sft.
- v. No. of Stories : 6 storied
- vi. Construction Year : 2002-2003.
- vii. Foundation Type : Sigle spread footing and some combined footing.
- viii. Design Drawings : Available
- ix. Soil investigation Report : Available
- x. Construction Materials : Reinforced Concrete (Stone 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. 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.

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Mid Term (6 Weeks)

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- i. Have a qualified structural engineer provide further testing and analysis of cracking in walls and provide a remediation plan to correct noted issues.
  - ii. 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.
  - iii. 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.
  - iv. The Construction Practices and Safety requirements of Section 9 of the Alliance Standard should be followed during all construction activities.
  - v. Under guidance from a qualified structural engineer, address all areas of needed maintenance by correcting the identified issues. For the exposed reinforcing bars, the exposed portions of the bars are not suitable for construction and should be removed.
  - vi. Adequately anchor and brace all non-structural elements to resist earthquake forces to comply with the BNBC and Alliance Standard.
  - vii. Provide Certificates of Occupancy for review.
  - 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

: Repair the exterior façade system to prevent water intrusion

### The recommendations for Fire Safety corrective actions are:

Immediate	NA
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.

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Mid Term (6 Weeks)	<p>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 lights are tested on a monthly basis. Functional testing of battery powered signs is provided for a minimum 90 min once per year (Alliance Standard Part 10 Section 10.12 Illumination of Exit Signs and Means Of Escape).</p> <p>Develop a testing and maintenance program that ensures the emergency power for 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.</p> <p>Provide the occupant load signage for every assembly and production floor in a facility in a conspicuous space near the main exit or exit access doorway for the space as per Alliance Standards Part 6 Section 6.4.4.</p> <p>Install signage adjacent to each stair door indicating the stair name and the floor level at the noted locations in English and Bengali (Alliance Standard Part 6 Section 6.9 Stairs).</p> <p>Complete fire department pre-planning activities with the local Fire Service and Civil Defense (Alliance Standards Part 13 Section 13.1 Fire Safety Director).</p> <p>Collect a valid Boiler License as per Boiler Act, 1923.</p> <p>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.</p>
Long Term (6 Months)	<p>As the building exceeds 75 ft. above the ground level, provide automatic sprinkler protection throughout the building in accordance with the Alliance Standard.</p> <p>Arrange more training program for fire safety awareness as per Alliance standard part 13 and take feedback from the worker for their better understanding. 25 % of worker should be trained for fire fighting.</p> <p>Make aisles marking with proper direction and with minimum 36 in. width. Keep aisles free of obstruction and higher occupancy loads will require a greater width to</p>

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	<p>accommodate the increased load (Alliance Standard Part 6 Section 6.5 Egress Width).</p> <p>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.). Connect devices to 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.</p> <p>Install dedicated fire pump according to Alliance Standard and NFPA 20 with minimum pressure of 450 kPa (65 psi) at the hydraulically most remote hose connection. Also install a stored water supply (tank) per NFPA 22 of adequate capacity to support demands (Alliance standards: 5.5.1).</p> <p>Provide 2 hr. fire-resistive rated construction barriers at exit enclosures. Provide 1.5 hour rated opening protection (fire door and window, penetration sill) in all openings which are connected to stair case. Consult a qualified fire protection engineer to design the required rated construction barriers as per Alliance Standards- 4.5.4.1, 4.6, 4.5.7 Shafts. 4.5.7.1 &amp; BNBC Part 4 Section 2.5.</p> <p>Provide 2 hr fire-resistive rated construction barriers at lift core. Consult a qualified fire protection engineer to design the required rated construction barriers (as per Alliance Standards Part 4 Section 4.5.7.1 through 4.5.7).</p> <p>Provide side-hinged swinging type doors in all means of egress (Alliance Standards Part 6 Section 6.8 Doors and Gates).</p> <p>Separate Oil transfer area, HT switch gear, LT panel and Generators area by minimum 2 hrs fire rated construction wall with 1.5 hr fire rated doors. Provide minimum 2 hrs fire rated wall with 12 ft height or 1.5 hr fire rated windows and door to protect egress way which is running in front of Generator room. Also consult a qualified fire protection engineer to design the required rated construction barrier (Alliance Standards- 3.4.2.1.5, 4.5, 4.6 &amp; BNBC Part 4).</p> <p>Install standpipe system at required locations. Standpipe system must comply with NFPA 14.</p>
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	<p>i) Provide 1 hr. fire rated construction barriers to separate the child care and medical room from production area and remove all storage area which is in front of child care and medical room at 1st floor of this building. ii) Provide minimum 1 hr fire-resistive rated construction to protect the boiler room's opening (window) and penetration at ground floor. iii) Provide fire rated door (45 min.) at Fabric Store. Consult a qualified fire protection engineer to design the required rated construction barrier (Alliance Standards- 3.4.2.1.5, 4.5, 4.6 &amp; BNBC Part 4).</p> <p>Install an automatic fire alarm and detection system so that it will cover the entire floor area (detectors properly spaced in accordance with NFPA 72 and in all separate rooms). Set up a fire alarm and detection system central station monitoring service (central control panel) or direct connection to the Fire Service and Civil Defense. Until this service can be established, have the alarms annunciate at a constantly attended location and assign a person at that location to contact the fire department in the event of fire alarm activation.</p> <p>Install fire department connections where required and in compliance with the Alliance Standard Part 5 Section 5.5.4. Connections 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. Also provide a provision to feed water from civil defense vehicle in the stand pipe system.</p> <p>Provide parapets or guards with a minimum height of 1067 mm (42 in.) in all occupied roof (Alliance Standard Part 6 Section 12 Handrails and Guards).</p> <p>Provided handrails on both sides of each stairway. Intermediate handrails shall be provided when the stair width exceeds 2.2 m (87 in.). Mount handrails height in between 30 in. to 44 in as per Alliance Standard Part 6 Section 6.9 Stairs and 6.12 Handrails and Guards.</p> <p>Stair doors may be permitted to be locked from the stair (ingress) side that prevents re-entry to the floor provided at least two floors allowing re-entry to access another exit are provided, there are not more than 4 stories intervening between re-entry floors, re-entry is allowed on the top or next to top level, re-entry doors are identified as such on the stair side, and locked doors shall be identified as to the nearest re-entry floors (Alliance Standards Part 6 Section 6.8.3.1).</p>
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	<p>Provide measures to ensure that walking surfaces, including stairway treads, are uniformly slip resistant.</p> <p>Provide a flattened elevation at the noted location (Changes in elevation of walking surfaces do not exceed 6.35 mm (1/4 in) unless provided with a beveled slope of 1 in 2 that does not exceed 12.7 mm (1/2 in) Alliance Standard Part 6 Section 6.3.4 Walking Surfaces.</p> <p>Establish an inspection, testing, and maintenance program for all fire extinguishers. Program must comply with the requirements of NFPA 10 (Alliance standard: 13.10.3).</p> <p>Establish an inspection, maintenance, and testing program for the standpipe and hose system. Program must comply with the requirements of NFPA 25 (Reference NFPA 25 Chapter 6 Standpipe and Hose Systems Table 6.1.1.2).</p> <p>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 address process of request and approval authorities, necessary checks prior approval, standby fire watch and fire fighting equipment, sounding of alarm procedure, duration and expiry of permit and re-approval procedure etc. (Alliance Standards Part 13 Section 13.4 Hot Work Permit and NFPA 51B).</p>
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### The recommendations for Electrical Safety corrective actions are:

Immediate (3 to 6 Days)	<p>Find out the cause of overheating, overloading, or signs of burning and take proper action considering replacement of cable or equipment if necessary.</p> <p>Disconnect the panel from the electrical service and clean interior components of all dust and debris. Seal all openings within the enclosure to prevent dust and debris from entering.</p>
Short Term (3 Weeks)	<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>Ensure cable joints through porcelain/PVC connectors with PIB tape wound around joint.</p> <p>Lighting and socket circuits must be separated at the noted</p>

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	<p>locations. Have a qualified electrician separate the lighting and sockets into separate circuits.</p>
Mid Term (6 Weeks)	<p>Remove multi looping of wiring/cables at circuit breakers within switchboards and/or distribution boards.</p> <p>Provide adequate cover on the cable trenches by non inflammable materials.</p> <p>Provide dedicated neutral for each circuit.</p> <p>Provide clear and permanent identification markings in all DBs, Switchboards, Sub-main boards &amp; switches as necessary.</p> <p>Install phase separators between terminal connections. Verify phase separators are installed at all remaining locations.</p>
Long Term (6 Months)	<p>Have a qualified electrical engineer design a lightning protection system according to the BNBC requirements. Have a licensed electrician install the designed system.</p> <p>Complete thermographic scans at least on a three year cycle. Thermographic scans should be completed in accordance with the Standard for Infrared Inspection of Electrical Systems &amp; Rotating Equipment and NFPA70B or a comparable standard.</p>