

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

---

Name of the Factory	: Running Fashion Wear Ltd.
Address of the Factory	: 686, CDA R/A Road # 20, Agrabad, Chittagong
Present Status of the Factory	: Under operation.
Structural Assessment Conducted by	: Alliance
Date of Structural Inspection	: 30 March, 2014
Fire Assessment Conducted by	: TUV
Date of Fire Inspection	: 1 August, 2015
Electrical Assessment Conducted by	: TUV
Date of Electrical Inspection	: 1 August, 2015
BGMEA Membership No.	: 1076

### **BASIC INFORMATION:**

The factory building is a three storied RCC building with beam and column system and flat slab system. The following information was noted:

- i. Building Usage Type : Garment Factory.
- ii. Structural System : RCC structure with beam column frame system. Approximately half of roof made of RCC slab and other half made of steel angles and roof sheet.
- iii. Floor System : RCC Beam slab and shed.
- iv. Floor Area : Total building = 48,000 SF. Rhythm Garments Ltd = 14,400 SF
- v. No. of Stories : 5 (Ground + 4).
- vi. Construction Year : 1985 to 1994
- vii. Foundation Type : Not mentioned in the report
- viii. Design Drawings : Not mentioned in the report
- ix. Soil Investigation Report : Available
- x. Construction Materials : Brick aggregate.
- xi. Generator : Ancillary 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) : IMMEDIATELY RESTRICT LIVE LOAD TO NO MORE THAN 20 PSF ON ALL LEVELS OF THE BUILDING. Under guidance from a qualified structural engineer arrange Detail Engineering Assessment of the structure. This assessment should include destructive testing to validate the in-situ compressive strength of concrete elements as well as the as-built reinforcing configuration.
- Have a qualified structural engineer provide further analysis and testing of the noted settlement and crack issues. If required, a remediation plan shall also be provided by the qualified structural engineer.

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

---

Mid Term (6-weeks)

Have a qualified structural engineer provide further analysis and investigation of the structural deficiencies. Structural engineer shall also provide remediation documents if required

: Have a qualified structural engineer prepare credible as-built documents based on the requirements of Part 8 Section 8.19 of the Alliance Standard.

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.

Engage a qualified structural engineer to confirm satisfactory structural performance of the buildings under wind loading.

Engage a qualified structural engineer to confirm and document that beam and slab have been designed to accommodate concentrated loads. If provisions have not been made, have a qualified structural engineer develop a remediation plan.

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

Have a qualified structural engineer complete an analytical evaluation of the structural impact of the addition

Have a qualified structural engineer assess the durability aspects as suggested in Alliance Standard Part 7 Section 7.2 and take appropriate remedial measures. This assessment should be performed in conjunction with the detailed engineering assessment (outlined elsewhere) and should include destructive core testing to validate the in-situ concrete compressive strength of structural elements. In addition, Ultrasonic Pulse Velocity (UPV) testing shall be conducted to have data regarding concrete strength in a sufficient number of columns in the lower building tier such that a reasonable level of confidence is achieved. The results from the destructive core testing and UPV testing shall be used to determine a reliable value of concrete strength for those columns in which core testing is not performed.

Under guidance from a qualified structural engineer, address all areas of needed maintenance by correcting the identified issues.

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.

Complete further testing on areas of deterioration and have a qualified structural engineer develop a remediation plan.

Develop engineered plans to brace all non-structural elements to resist earthquake forces to comply with the BNBC and Alliance Standard. Install anchor and braces as shown on approved plans.

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.

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

Long Term (6-months)

: Provide Certificates of Occupancy for review

Have a qualified structural engineer develop Floor Loading Plans per the requirements of Part 8 Section 8.20.5.3

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.

Provide signage or the appropriate markings at all areas used for storage to indicate the acceptable loading limits detailed in the Load Plan.

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 loading limits as described on the Floor Loading Plans.

The recommendations for **Fire & Electrical Safety** corrective action are:

**(A): Recommendations for Fire Safety Corrective Actions:**

<p>Immediate</p> <p><i>(the factory should not continue to be occupied until these non-conformities have been rectified):</i></p>	<p>N/A</p>
<p>Short Term</p> <p><i>(Actions that must be incorporated into a Fire Safety Management Plan immediately (1 ~ 2 weeks) and should be a regular activity</i></p>	<ul style="list-style-type: none"> <li>• The minimum clear width of the pathway should be 0.9 meter</li> <li>• Remove all temporary items from all escape routes, aisles and passageway.</li> <li>• Provide aisle marking with arrow guiding and exit signage on all Evacuation pathways or provided with overhead signage fixed at ceiling level. - Illuminated exit sign should be posted above the exit door, - It should be clearly visible at all time, - Provide directional signs wherever necessary. - All exit doors should be clearly marked for easy identification. -Signage should be uniform</li> <li>• Refill fire extinguisher and to keep the record for re filling &amp; properly tagged.</li> <li>• The first aid hose and standpipe performance should be checked periodically and properly tagged.</li> <li>• Provide additional fire fighting equipment like sand &amp; water buckets near exit or easily accessible area for first phase fire fighting.</li> <li>• Combustible materials should keep away from electrical</li> </ul>

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

	<p>source.</p> <ul style="list-style-type: none"> <li>• Fire drill should be conducted quarterly (4 times a year) in existing buildings as detailed under the Fire Safety Plan &amp; should kept record properly</li> </ul>
<p>Mid Term</p> <p><i>(The remedial works indicated must be carried out within a period of 6 weeks)</i></p>	<ul style="list-style-type: none"> <li>• Replace all existing exit doors on evacuation routes, exit doors with side hinged type door, which swing outward and in the direction of travel. Swinging of the door should not constrict the width of the corridor / passage below 0.9 meter.</li> <li>• Remove all locking device from all egress door. All exit doors should be open-able from the side they serve without the use of a key.</li> <li>• Provide handrails on both side of each stairway with height of 0.9m measured from the nose of stair to the top of the handrail.</li> <li>• Doors in stair should be outward opening, side-swing, self closing, non-lockable 1.5 hours fire rated doors in all stair way encloses. (Also require fire rated doors at the floor occupied by other tenants)</li> <li>• Prepare proper plan and design for 4 hours fire rated barriers with 2 hours fire rated doors at ground floor generator room, which located at the adjacent to final evacuation route of stair-1.</li> <li>• Prepare proper plan and design for 2 hrs fire rated barrier with 1.5 hrs fire rated door for storage area.</li> <li>• Prepare proper plan and design for 4 hours fire rated barriers with 2 hours fire rated door at 1st floor boiler room, which located at the adjacent to rest of the operational areas.</li> <li>• The egress paths should be illuminated with emergency lighting with power back-up supply &amp; illumination should be a minimum of 10 lux for all corridors &amp; exit doors. Aisles should be provided with a minimum 2 lux.</li> <li>• The stairway should be illuminated with emergency lighting with power back-up supply &amp; illumination should be a minimum of 10 lux for stairway.</li> <li>• Produce design and plan for automatic detection system with automatic fire alarm and control panel.(Also needs to cover the floors occupied by other tenants)</li> <li>• Prepare proper design and plan for dedicated fire pump with alternate backup power supply.</li> <li>• Prepare plan and design for dedicated water storage tank for firefighting operation as per RMG guideline.</li> <li>• Visual alarm should be placed at the generator room.</li> <li>• Update fire license / permit from issuing authority</li> <li>• Obtain building approval from issuing authority</li> </ul>

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

	<ul style="list-style-type: none"> <li>• Cover all units / floors in a valid fire license</li> <li>• Implement to a single fire safety management system with approvals from all tenants in the factory building.</li> <li>• Obtain the boiler license from the proper issuing authority.</li> <li>• Obtain the boiler operator license from the proper issuing authority</li> </ul>
<p>Long Term</p> <p><i>(The remedial works indicated must be carried out within a period of 6 months)</i></p>	<ul style="list-style-type: none"> <li>• Provide 4 hours fire rated barriers with 2 hours fire rated doors at ground floor generator room, which located at the adjacent to final evacuation route of stair-1.</li> <li>• Provide 2 hrs fire rated barrier with 1.5 hrs fire rated door for storage area.</li> <li>• Provide 4 hours fire rated barriers with 2 hours fire rated door at 1st floor boiler room, which located at the adjacent to rest of the operational areas.</li> <li>• Install automatic detection system with automatic fire alarm and control panel.(Also needs to cover the floors occupied by other tenants)</li> <li>• Install dedicated fire pump with alternate backup power supply.</li> <li>• Stand pipe supplying first aid hose should have minimum pressure of 200 KPa.</li> <li>• Provide dedicated storage tank for firefighting operation</li> </ul>

### **(B): Recommendations for Electrical Safety Corrective Actions:**

<p>Immediate</p> <p><i>(the factory should not continue to be occupied until these non-conformities have been rectified):</i></p>	<ul style="list-style-type: none"> <li>• Over current protection devices (Circuit breakers) should be installed at all distribution panels.</li> </ul>
<p>Short Term</p> <p><i>(Actions that must be incorporated into a Fire Safety Management Plan immediately (a week) and should be a regular activity</i></p>	<ul style="list-style-type: none"> <li>• Re-locate oil / fuel tanks away from control panels in generator room.</li> <li>• All strands cables at exposed ends should be properly soldered / crimped and insulated.</li> <li>• Provide proper separate earthing/grounding to generator. Ensure that generator body frame to have two separate and distinct connections to the earth / ground.</li> </ul>
<p>Mid Term</p> <p><i>(The remedial works indicated must be carried out within a period of 6 weeks)</i></p>	<ul style="list-style-type: none"> <li>• 1. Provide updated SLD matching the existing installation at the factory. 2. SLD to indicate exact positions of all points of switch boxes and other outlets. 3. SLD to be approved by the engineer-in-charge.</li> <li>• 1. Provide updated Electrical layout drawing prepared after</li> </ul>

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

	<p>proper locations of all outlets for lamps, fans, fixed and transportable appliances, motors etc. 2. Drawings to indicate exact positions of all points of switch boxes and other outlets to match existing installation. 3. As built drawing to be approved by the engineer-in-charge.</p> <ul style="list-style-type: none"> <li>• All unwanted materials should be removed from Generator room.</li> <li>• Provide rubber mats of adequate size in front of all distribution panels.</li> <li>• Install smoke detection and provide firefighting equipment in the generator room.</li> <li>• 1. Exit signs should be illuminated either by lamps external to the sign or by lamps contained within the sign. 2. The source of illumination should be providing not less than 50 lux.</li> <li>• Provide supports for main service line complete with adequate insulation.</li> <li>• Provide proper clearance of 0.8 - 1.0 m in front of all distribution panels/switchboards.</li> <li>• Provide cable connections with properly soldered / welded lugs at MDB. Ensure that all the electrical connections are properly secured with lugs and glands.</li> <li>• Select conductors and MCCB/MCB with adequate sizing without exceeding permissible current carrying capacity for insulation.</li> <li>• Avoid loop &amp; bunch of cable at MCCB/MCB and bus bar terminal, use individual circuit and over current device for every incoming and outgoing circuit at the distribution boards.</li> <li>• Provide circuit diagram /circuit list with proper current ratings and fuse size, marking for DBs identifying end use load, voltage, number of phases.</li> <li>• Provide cable joints of porcelain / PVC connectors with PIB tape wound around before placing the cable in the box.</li> <li>• Provide separate earthing connection to electrical equipment's. Ensure that earth potential provided for all parts of equipment / installation (other than live parts) and that continuous earth connection is provided back to the main intake supply earth.</li> <li>• Provide adequate earthing to body and doors to all DBs. Ensure that all electrical panels provided with proper and separate earth potential.</li> </ul>
<p>Long Term</p> <p><i>(The remedial works indicated must be carried out within a period of 6 months)</i></p>	<ul style="list-style-type: none"> <li>• Provide adequate ventilation arrangements for indoor generator.</li> <li>• Modify Area of generator room to meet requirements of Table 4.4, RMG Guideline; the area should be 36m<sup>2</sup>, or relocate the generator room.</li> <li>• Provide and maintain proper clearance in all sides of generator</li> </ul>

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

---

	<p>for ease of maintenance.</p> <ul style="list-style-type: none"><li>• Provide calibrated Ammeters / Voltmeters at LT panel.</li><li>• Review capacity of standby generator on basis of loads for essential lighting / AC / Equipment / Services. Replace generator with larger capacity or install second generator if review indicates existing unit is too small.</li><li>• Provide and maintain easy access and proper height of switchboard / panel boards (&lt; 2m from floor level).</li><li>• 1. Wooden switchboards / panel boards should be replaced by non-flammable materials. 2. Prefer switchboards made of non-flammable materials.</li><li>• Each circuit should have a separate neutral (use of common neutral for more than one circuit shall not be permitted).</li><li>• Provide the wiring in PVC conduits or in metallic GI pipes. Ensure that all electrical wiring should be covered in proper conduit pipes.</li><li>• Seal the cable entry-exit points of MDB with non-flammable materials. In addition: 1. Ensure that HT / LT panels / Switchgears to be vermin / damp proof. 2. Ensure all unused holes / openings in DBs to be blocked properly.</li><li>• 1. Provide the ECC to meet minimum cross-sectional area as per table 4.5. 2. Ensure that connections between conductors / equipment are provided to durable electrical continuity and adequate mechanical strength and protection. 3. The continuous earth connection is provided back to the main intake supply earth.</li><li>• Provide adequate protection against lightning depending on the probability of a strike and acceptable risk levels at roof top of building.</li></ul>
--	--