

Summary of Preliminary Assessment on Structural, Fire and Electrical Safety

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| Name of the Factory | : Rio Design Ltd |
| Address of the Factory | : Industrial Plot No. 3, Milk Vita Road, Section-7, Mirpur, Dhaka. |
| Present Status of the Factory | : Under Operation |
| Structural assessment conducted by | : Alliance |
| Date of Structural Inspection | : 03-May-14 |
| Fire & Electrical assessment conducted by | : Alliance |
| Date of Fire & Electrical Inspection | : 20-Apr-14 |

BASIC INFORMATION:

There are two buildings in the premises out of which one is main production building and one is ancillary building. The following general information was noted:

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| i. | Building Usage Type | : Garments Factory. |
| ii. | Structural System | : This is a RCC flat plate structural system. |
| iii. | Floor System | : flat slab. |
| iv. | Floor Area | : 95970 sft |
| v. | No. of Stories | : Thirteen story main production building with Single basement. |
| vi. | Construction Year | : 2001-2004. |
| vii. | Foundation Type | : Mat Foundation. |
| viii. | Design Drawings | : Available. |
| ix. | Soil investigation Report | : Available |
| x. | Construction Materials | : RCC 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.

Mid Term (6 Weeks) :

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- i. 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
- ii. Engage a qualified structural engineer to confirm satisfactory structural performance of the buildings under wind loading.
- iii. 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.
- iv. Adequately anchor and brace all non-structural elements to resist earthquake forces to comply with the BNBC and Alliance Standard.
- v. Have a qualified structural engineer develop Floor Loading Plans per the requirements of Part 8 Section 8.20.5.3.
- vi. 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.
- vii. Provide signage or the appropriate markings at all areas used for storage to indicate the acceptable loading limits detailed in the Load Plan.
- viii. Under guidance from a qualified structural engineer, address all areas of needed maintenance by correcting the identified issues.

Long Term (6 Months) :

- i. 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.
- ii. Apply for issuance of the Certificates of Occupancy and pursue the matter to obtain the same.

The recommendations for Electrical Safety corrective actions are:

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| Immediate (3 to 6 Days) | Substation room needs to keep clean and not free from dirt, lint, debris. |
| 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>Distribution boards are need to provide with physical means to prevent the installation of more over current devices than that number for which the panel board was designed, rated, and listed.</p> <p>Transformers are needed to properly ground (earthed).</p> <p>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.</p> |

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| Mid Term (6 Weeks) | <p>Periodical Insulation Resistance Measurement Program established.</p> <p>Periodic safety inspections of the electrical system components are completed.</p> <p>Provide dedicated neutral for each circuit.</p> <p>Meters and other electrical devices (Voltmeter's Selector Switch) installed on the main electrical equipment must be operational.</p> |
| Long Term (6 Months) | <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 & Rotating Equipment and NFPA70B or a comparable standard.</p> <p>Have a qualified electrical engineer design a lightning protection system according to the BNBC requirements.</p> <p>Have a licensed electrician install the designed system.</p> |

The recommendations for Fire Safety corrective actions are:

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| Immediate (3 to 6 Days) | |
| Short Term (3 Weeks) | <p>There are collapsible doors with locking arrangements at each egress location. This violates Alliance Standards.</p> |
| Term (6 Weeks) | <p>No record of training program is available on fire safety.</p> <p>Occupant loads are not posted in every production floor as per the Alliance Standard.</p> <p>Record of verifying emergency power for means of egress illumination was not found as required.</p> <p>No record of developing and communicating any emergency evacuation plan has been found. But factory authority claims that they have done this.</p> <p>Currently there is no monitoring company in Bangladesh and fire service and civil defense is not capable of monitoring.</p> <p>Fire drills are conducted quarterly in the main building only and conducted under the direction of a Fire Safety Director. This meets the requirements of Alliance Standard Part 13 Section 13.2 and BNBC Part 4 Appendix A Page 10457.</p> <p>Signage for the available standpipe system is not installed.</p> <p>Floor level signs were posted away from the floor and both Bengali and English were not used.</p> <p>Fire department pre-planning was not found.</p> <p>No occupancy certificate is available for any building in the factory premises.</p> |

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| Long Term (6 Months) | <p>One exit discharge on ground floor is open to fabric store and other exit does not discharge directly to the exterior of the building, rather it discharges to an egress court of less than 10 ft width. The walls on west side of the egress court have unprotected openings on the wall of fabric store. This violates Alliance Standards.</p> <p>Height of the highest occupiable level of the main building is 40.85 m (134 ft), therefore the whole building needs to be protected by an automatic sprinkler system.</p> <p>Southeast staircase is not fire rated. No fire door is fitted at exits of any floor of that staircase. In other staircase, fire doors are fitted without certificates. Both staircases are enclosed by walls of 6" thickness (with finishing), which is capable of providing 2 hr fire resistance.</p> <p>Height of the highest occupied floor of the main building is more than 10 m (33 ft) above grade. Standpipe systems need to be installed throughout the building where the highest occupied floor is more than 10 m (33 ft) above grade or more than 10 m (33 ft) below grade as per in Alliance Standard. Class-I standpipe with sprinkler system is required here but there is no standpipe system in the main and ancillary buildings meeting NFPA requirements. Only class-II hose connection along with hose reel and 25 mm plastic hose reel are available on each floor. Also, no approved documentation for design of standpipe system found.</p> <p>There is a dedicated pump available in the factory. Main pump: Gwynnes brand, 75hp, 2970rpm, 4.5 bar pressure & jockey pump: Allen Gwynnes brand, 4hp, 2870rpm, 4.5 bar pressure. But no approved design or hydraulic calculation is available for the fire pump, which is required.</p> <p>Document or certificate by appropriate authority for training on fire fighting, first aid and rescue is not available.</p> <p>Accessories store on 1st floor is separated from finishing section by non rated door. The walls separating the sub-store from dining area have non rated openings.</p> <p>One of the interior exit stairways terminates inside of fabric store through a non-rated exit passageway which violates the requirement of Alliance Standard. Other exit does not discharge directly to the exterior of the building, rather it discharges to an egress court of less than 10 ft width. The walls on west side of the egress court have unprotected openings on the wall of fabric store.</p> <p>The elevator opens at south-east exit enclosure which is not provided with fire doors.</p> <p>On 12th floor of main building, exit access corridor's solid</p> |
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| | <p>wall is not up to ceiling and is not 1 hour fire rated as required.</p> <p>Some of the doors in the means of egress are collapsible type. This violates Alliance Standards.</p> <p>There is one spot removing room that uses solvent with compressed air guns and solvent in aerosol on the 10th floor with glass and aluminum partitions. This room needs to be fire separated with a fire door.</p> <p>Fire department (Siamese) inlet connection is available but outlet connections are not provided.</p> <p>The main production building is thirteen stories with a single basement, but doors are not provided with re-entry. Stair doors with re-entry are required on at least 3 floors according to Alliance Standards.</p> <p>Stair-1 has handrails on both sides but stair-2 is not provided with handrails on both sides. This is not allowed as per the Alliance Standard.</p> <p>Illuminated exit signs are placed at entrances to exits along the path of egress but additional exit sign or directional signs are not provided where there is a change in direction and where the continuation of egress is not obvious. This condition fails to satisfy requirements of the Alliance Standards.</p> <p>The backup used does not provide sufficient illumination (50 lux at surface of exit sign) as required.</p> <p>Means of egress have a minimum ceiling height of 2.3 m (7 ft 6 in.) with projections from the ceiling not less than 2.03 m (6 ft 8 in.). On 12th floor, exit opening height is 6 ft 5 in.</p> <p>Inspection, maintenance, and testing procedures for the available standpipe and hose are not documented and up to date.</p> <p>Inspection, maintenance, and testing procedures for the available fire pump are not documented and up to date.</p> <p>Some exit signs do not have appropriate illumination levels and contrasting graphics as required.</p> <p>A hot-work permit program was not found, which is required as per Alliance Standards.</p> <p>A written housekeeping policy was not found, which is required as per Alliance Standards.</p> |
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