

Summary of Preliminary Assessment on Structural, Fire and Electrical Safety

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| Name of the Factory | : CDF Designs Ltd |
| Address of the Factory | : 348/B Tejgaon Industrial Area, Dhaka, Bangladesh. |
| Present Status of the Factory | : Under Operation |
| Structural assessment conducted by | : Alliance |
| Date of Structural Inspection | : 6-Nov-15 |
| Fire & Electrical assessment conducted by | : Alliance |
| Date of Fire & Electrical Inspection | : 12-Jan-16 & 27-Dec-15 |
| BGMEA Membership No | : 4413 |

BASIC INFORMATION:

There is one building in factory premise which is the main production building. The building is a rented one and is currently being occupied by two different factories where, first to third floor are occupied by a factory named “Jeans Care Ltd” and fourth and fifth floor are occupied by a factory named “CDF Design (BD)”. Ground floor is jointly occupied by another company and CDF Design (BD). The following general information was noted:

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| i. | Building Usage Type | : Garments Factory. |
| ii. | Structural System | : The building is a moment resisting frame structure with in filled brick masonry. No structural drawing was available on-site to have an idea on foundation system of the building. |
| iii. | Floor System | : Beam slab type in RCC Building and PEB sections used in 2 Storied Prefab Shed. |
| iv. | Floor Area | : 79,555.00 sft |
| v. | No. of Stories | : 6 [Roof of the building is partly being occupied by two steel sheds]. |
| vi. | Construction Year | : 1990-1996 |
| vii. | Foundation Type | : Isolated Spread Footing. |
| viii. | Design Drawings | : Not 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

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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. Complete all the CAPs suggested by ACCORD previously as required.
- ii. Conduct DEA as per previous assessment by ACCORD with given scope of DEA.
- iii. Engage a qualified structural engineer to provide additional investigation into the areas of cracking and provide a remediation plan if required.
- iv. Engage a qualified structural engineer to confirm structural performance of the structure.
- v. Have a qualified structural engineer provide further testing and analysis of cracking in walls and provide a remediation plan to correct noted issues.
- vi. 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.
- vii. Have a qualified structural engineer to prepare credible as-built documents based on the requirements of Part 8 Section 8.19 of the Alliance Standard.
- viii. Engage a qualified structural engineer to confirm satisfactory structural performance of the buildings under wind loading.
- ix. Have a qualified structural engineer complete further analysis of the sheds and develop a remediation plan, if required.
- x. Make the core test report available along with the DEA report. Or else conduct destructive core test to validate the in-situ concrete compressive strength of structural elements while conducting DEA as some columns still show over-stressed.
- xi. Have a qualified structural engineer complete an analytical evaluation of the structural impact of the additions.
- xii. 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.
- xiii. Make the report available if DEA has already been done. Availability of the report will increase the credibility of the retrofit scheme. OR else conduct DEA as per suggestion of previous assessment report.
- xiv. Adequately anchor and brace all non-structural elements to resist earthquake forces to comply with the BNBC and Alliance Standard.
- xv. Further maintenance has to be done before extensive corrosion takes place.
- xvi. Before conducting DEA the floor live loads should not exceed the suggested Load Plan by NTC panel. New load plans have to be prepared by following proper procedure (i.e DEA). Once prepared post the load plans on each level of the building as required.

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- xvii. 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 (6 months) :

- i. Under guidance from a qualified structural engineer, address all areas of needed maintenance by correcting the identified issues.
- ii. Repair the exterior façade system to prevent water intrusion.
- iii. Apply for issuance of Occupancy Certificate from concerned authority.
- iv. 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.

The recommendations for Electrical Safety corrective actions are:

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| <p>Immediate (3 to 6 Days)</p> | <p>Keep the generator room clean and remove improperly stored materials.</p> <p>Determine the cause of burning and take proper action. Consider replacement of cable or switchgear, if required.</p> <p>Disconnect the panel from the electrical service and clean interior components from all dust and debris. Seal all openings within the enclosure to prevent dust and debris from entering.</p> |
| <p>Short Term (3 Weeks)</p> | <p>Provide protective covers on light fixtures installed in storage areas or in any area where the Inspector of the Factories Rules (1.5.3.5) Part 53 disallows these fixtures.</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>Provide properly sized earthing which connects the door with the distribution board.</p> <p>Provide permanent identification marking by painting or metal engraving sheet.</p> |
| <p>Mid Term (6 Weeks)</p> | <p>Have a qualified electrical engineer develop as-built electrical drawings providing detailing key components of the electrical system.</p> <p>Provide earthing of equipment at required locations and connect to required number of electrodes.</p> <p>Consult with a qualified Electrical Engineer and ensure electrical wiring/cables are sized according to capacity of circuit breakers.</p> <p>Remove all looping from circuit breaker/bus bar terminal. Provide single cable at circuit breaker/bus bar terminal.</p> <p>Connect all metal in the building to the building earthing/grounding system in accordance with BNBC Part 8 Section 2.8 Earthing</p> |

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| | <p>requirement.</p> <p>Provide covers or blanks to conceal all live internal components of switchboards and distribution boards.</p> <p>Ensure meters and other electrical devices installed on the main electrical equipment are operational.</p> <p>Install phase separators between terminal connections. Verify phase separators are installed at all remaining locations.</p> <p>Provide electrical graded insulation mats in front of distribution boards.</p> |
| Long Term (6 Months) | <p>Have a qualified electrical engineer design a lightning protection system in accordance with BNBC requirements. Have a licensed electrician install the designed system.</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>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 NFPA 70B or a comparable standard.</p> |

The recommendations for Fire Safety corrective actions are:

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| Immediate (3 to 6 Days) | None |
| Short Term (3 Weeks) | <p>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.</p> <p>Reduce the occupant load and maintain not more than 320 occupants on the 4th floor, or provide an additional stair to fulfill the minimum total width requirement of stairs for the existing occupant load on 4th floor.</p> |
| Mid Term (6 Weeks) | <p>Install an automatic fire alarm and detection system for the facility. System shall comply with the Alliance Standard and NFPA 72. Consult a qualified fire protection engineer and/or authorized fire alarm company to design and install the system.</p> <p>Post the occupant load for all assembly and production floor areas in a conspicuous space near the main exit or exit access doorway for the space in accordance with Alliance Standard Section 6.4.4.</p> <p>Develop an emergency evacuation plan in accordance with the Alliance Standard and communicate the plan to all employees.</p> <p>Develop a testing and maintenance program that ensures the emergency</p> |

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| | <p>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>Install a new automatic fire alarm and detection system. Once installed, arrange for direct connection of the fire alarm and detection system to a central station monitoring service or the Fire Service and Civil Defence as per Alliance Standard Section 5.7.5. Until that time, a person trained to contact the Fire Service and Civil Defence 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.</p> <p>Create and post emergency evacuation maps at the entrance to each stair or main point of egress.</p> <p>Develop a testing and maintenance program that ensures the emergency power for exit signs is verified at least once per year. If battery-operated signs are used, these signs shall be tested on a monthly basis. Functional testing of battery powered signs shall be provided for a minimum 90 min once per year.</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> <p>Install signage adjacent to each stair door indicating the stair name and the floor level in both English and Bengali.</p> <p>Install signage at required locations and on required equipment. Signage must comply with NFPA 14.</p> <p>Expedite the process to obtain Electrician license as early as possible.</p> <p>Complete Fire Department pre-planning activities with the local Fire Service and Civil Defence in accordance with Alliance Standard Section 13.1.1(2).</p> |
| Long Term (6 Months) | <p>Replace non-compliant doors and frames in the means of egress with side-swinging doors. Replacement doors shall be a minimum width of 0.8 m (32 in), and are listed, approved, self-closing, fire rated door assemblies (door and frame) with latching panic hardware.</p> <p>Route exits directly to the exterior or provide an exit passageway in accordance with Alliance Standard Section 6.15 or an Egress Court in accordance with Alliance Standard Section 6.17.2 for non-compliant arrangements. This includes providing any associated opening protection for the passageway or court. Consult a qualified fire protection engineer to design and/or approve the required exit passageway or egress court.</p> <p>Replace non-compliant doors and frames in the means of egress with side-swinging doors. Replacement doors shall be a minimum width of 0.8 m (32 in), and are listed, approved, self-closing, fire rated door assemblies (door and frame) with latching panic hardware.</p> <p>Route exits directly to the exterior or provide an exit passageway in accordance with Alliance Standard Section 6.15 or an Egress Court in accordance with Alliance Standard Section 6.17.2 for non-compliant arrangements. This includes providing any associated opening protection for the passageway or court. Consult a qualified fire</p> |

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| | <p>protection engineer to design and/or approve the required exit passageway or egress court.</p> <p>Provide training and certification for the required number of people (25% of total workers) in fire fighting, first aid, and rescue training by an appropriate authority in accordance with the Alliance Safety Training Curriculum.</p> <p>Provide fire-resistive rated opening or penetration protection for rated walls and assemblies in accordance with Alliance Standard Sections 4.6 and 4.7. Consult a qualified fire protection engineer to design the required opening or penetration protection systems.</p> <p>Provide fire-resistive rated construction barriers and associated opening protection for exit enclosures in accordance with Alliance Standard Sections 4.5, 4.6, and 6.3.1.2. Consult a qualified fire protection engineer to design the required rated construction barrier and opening protection.</p> <p>Install a dedicated fire pump for the facility 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 in accordance with NFPA 22. Fire pump installation is to be tested for final acceptance in presence of Alliance and a final inspection of the installation shall be conducted by the Alliance prior to final acceptance of the installation by the Alliance as per clause 5.5.5. Acceptance testing of the installation shall be in accordance with NFPA 20, 22, and 25 testing requirements. Documentation of all testing shall be submitted to the Alliance for review prior to final acceptance by the Alliance. The pump is to be connected to an alternative power source such as a generator. The generator is to be configured with an ATS (auto starter).</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 or modifications shall be documented with shop drawings and submitted for review by the Alliance prior to commencement of installation.</p> <p>Install standpipe system at required locations in accordance with Alliance Standard Section 5.4 and NPFA 14. Standpipe system must comply with NFPA 14. The hydraulic calculations should be submitted and reviewed by Alliance prior to start of work. All standpipe system installation activities shall be submitted for reviewed by the Alliance prior to commencement of installation in accordance with Section 5.4.3.2.</p> <p>Revise the door arrangement so that the doors do not swing out over the stairs for compliance with Alliance Standard Section 6.8.5.</p> <p>In Accordance with Alliance Standard Section 6.9.2.2, increase the landing widths to make it equal to the width of the stairs or reduce the overall available capacity of the stairs as calculated in Section 6.5 (this may also effect the maximum occupant load of any floor or story of the building). Rework exit paths so that there is a landing on both sides of the exit door, with door swinging in the direction of exit travel.</p> <p>Provide proper aisles marking (clear width minimum 36 in.) and keep aisles free of storage. Relocate the machines accordingly if necessary to provide proper width. The path of egress travel along a means of egress</p> |
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| | <p>shall not be interrupted by any obstruction. The capacity of the means of egress shall not be reduced along the path of travel.</p> <p>Reduce the occupant load and maintain not more than 320 occupants on the 4th floor, or provide an additional stair to fulfill the minimum total width requirement of stairs for the existing occupant load on 4th floor.</p> <p>Provide handrails on both sides of each stairway. Intermediate handrails shall be provided when the stair width exceeds 2.2 m (87 in.). Mount new handrail at a height consistent with existing height (between 30 in. and 44 in).</p> <p>Provide fire-resistive rated construction barriers (with associated opening protection) between hazard types in accordance with Alliance Standard Sections 3.4 and 4.5. Consult a qualified fire protection engineer to design the required rated construction barrier.</p> <p>Provide re-entry to floor levels from the stairwells in accordance with Alliance Standard Section 6.8.3.</p> <p>Relocate the daycare occupancy from 5th floor to ground floor or 1st floor as per the requirement of Alliance Standard Section 3.4.2.1.</p> <p>Provide Fire Department (Siamese) connections in accordance with Alliance Standard Section 5.5.4. Connections shall match the Fire Service and Civil Defence hose thread standard.</p> <p>Provide parapets or guards with a minimum height of 1067 mm (42 in.) for all occupiable roof areas in accordance with Alliance Standard Section 6.12.</p> <p>Provide continuously illuminated exit signs per Alliance Standard Section 6.11. Signs shall be placed at all required exits and along egress paths, especially where there is a change in direction for the path of travel.</p> <p>Provide an emergency power source (battery back-up or connection to emergency power system) to provide compliant illumination of exit signs.</p> <p>Establish an inspection, testing, and maintenance program for all fire extinguishers and prepare proper documentation. Program must comply with NFPA 10.</p> <p>Develop a hot work permit program. The program must comply with the requirements of NFPA 51B.</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>Install proper standpipe system for the factory and establish an inspection, testing, and maintenance program for the standpipe system. Program must comply with NFPA 25. Any newly installed standpipe system needs to be evaluated for compliance with the design pressure and flow demands of NFPA 14 or BNBC Section 5.4.3.</p> |
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