

Summary of Preliminary Assessment on Structural, Fire and Electrical Safety

Name of the Factory	: Centex Textile and Apparels Limited
Address of the Factory	: CB 203/3, Kachukhet Puran Bazar, Cantonment, Dhaka
Present Status of the Factory	: Under Operation
Structural assessment conducted by	: Alliance
Date of Fire Inspection	: 16-Jun-14
Fire & Electrical assessment conducted by	: Alliance
Date of Structural & Electrical Inspection	: 30-Mar-14 & 16-Jun-14

BASIC INFORMATION:

The following general information was noted:

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| i. | Building Usage Type | : Garments Factory. |
| ii. | Structural System | : Part A: Monolithic RC flat slab with RC frame
Part B: Monolithic RC slab with beams, RC frame |
| iii. | Floor System | : Part A: Monolithic RC flat slab
Part B: Monolithic RC slab with beams |
| iv. | Floor Area | : 1,11,260 sft |
| v. | No. of Stories | : Part A - 6 Storied with basement and 1 tin shade on roof
Part B - 7 Storied |
| vi. | Construction Year | : (Part A): 2005, (Part B): 2011 |
| vii. | Foundation Type | : Unknown |
| viii. | Design Drawings | : Not Available |
| ix. | Soil investigation Report | : Available |
| x. | Construction Materials | : RCC |
| 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:

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| Immediate | : | N/A |
| Short Term: (3 Weeks) | : | |
| | i) | Develop engineered plans to brace all racking systems and mezzanine structure to resist earthquake forces to comply with the BNBC and Alliance Standard. Install anchor and braces as shown on approved plans. |
| | ii) | 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. |
| | 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 |

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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.

Mid Term (6 Weeks) :

- i. Engage qualified structural engineer to conduct a detailed engineering assessment (DEA) of building within 6 weeks. DEA should include assessment of the strength of the concrete and quantity of the steel in the columns. Concrete strength shall be assessed by taking at least 4 nos. of 4 inch diameter cores from the area of concern. If cores are to be taken from column, it is advisable to take it from an upper level where the stresses are low (for practical reasons 3 inch cores may be taken from columns). In addition, UPV shall be used to have concrete strength in sufficient number of columns in the lower tiers so that a level of confidence is achieved. The calibrated results of core tests and UPV shall be used to determine a reliable value of concrete strength in columns. The size and diameter of steel rebar in most of the columns of two lowest tiers shall be authentically determined using a Ferro scanner or similar device. In order to confirm the diameter of embedded bars as obtained from Ferro scanner, the Assessor may have to remove the concrete cover in one or two locations.
- ii. Have a qualified structural engineer document compliance with the seismic and wind requirements stated in the 2006 BNBC.
- 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 (also mentioned elsewhere).
- iv. 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.
- v. As part of other assessments and required drawings mentioned elsewhere, have a qualified structural engineer complete an analytical evaluation of the structural impact of the addition.
- 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 (also noted elsewhere)
- vii. Have a qualified structural engineer prepare credible as-built documents (As built structural drawing / As built architectural drawing) based on the requirements of Part 8 Section 8.19 of the Alliance Standard. Drawings should indicate all load types (dead, wind, seismic), strength, and code compliance.
- viii. Engage a qualified structural engineer to confirm satisfactory structural performance of the buildings under wind loading. Compliance may be waived if satisfactory evidence is provided of a cyclone operations plan that includes full evacuation of the factory in advance of any approaching cyclone
- ix. Provide signage or the appropriate markings at all areas used for storage to indicate the acceptable loading limits detailed in the Load Plan.

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Long Term : N/A

The recommendations for Fire Safety corrective actions are:

Immediate (3 to 6 Days)	Storage underneath the cutting tables shall be kept clear of combustibles at all time as per Alliance Standard Part 17 Section 13.7.2 Cutting tables.
Short Term (3 Weeks)	<p>Remove all locking devices form all doors to exits / means of egress. If locks are required for security reasons, utilize special door locking features complying with NFPA 101.</p> <p>Store flammable chemicals such as paint thinners in designated area away from combustible materials. If the amount of thinner exceeds 25 gallons total, it should be kept in a flammables cabinet or room with sufficient fire rated construction.</p>
Mid Term (6 Weeks)	<p>Create and post revised evacuation plans that accurately reflect the current floor plans and layout. When developing new diagrams, Sumerra recommends following the ASTM E2238 - 12 Standard Guide for Evacuation Route Diagrams. It is also recommended that Master copies of plans should be kept on file as part of your emergency action plan. Plans should be reviewed at least annually and revised as necessary.</p> <p>Post maximum occupant load for all areas (near exit)</p> <p>As noted elsewhere, factory should install automatic fire detection system. Arrange for direct connection of the fire alarm and detection system to a central station monitoring service or the Fire Service and Civil Defense as per Alliance Standard Part 5 Section 5.7.5 Monitoring. Until that time that a central station monitoring service or direct connection to the Fire Service and Civil Defense can be set up, a person shall be assigned to contact the fire department in the event of fire alarm activation. An annunciator shall be located in a constantly attended location to alert this person.</p> <p>Establish a fire safety director (mentioned elsewhere) who will be in charge of implementing the Alliance Safety Training Curriculum. Create a tracking and documentation system that allows the factory to identify who has received training and who needs initial or refresher training.</p> <p>Assure signage and labeling for all standpipe system components as per NFPA 14 Chapter 6. Including: identification of all valves with indication of what service they control, valve cabinets should be marked to include their contents, signs indicating the hydraulic design (e.g. location of most remote hose connections, design flow rate,</p>

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	inlet and outlet pressure, and design static pressure).
Long Term (6 Months)	<p>Remove all collapsible at the exit stairs and along all portions of the means of egress. Replace with side-hinged swinging type doors in compliance with Standard (see other actions regarding fire rated door assemblies).</p> <p>Install a standpipe system at required locations designed by a qualified fire protection engineer. Installation of new standpipe systems shall be required to provide shop drawings and hydraulic calculations as outlined in NFPA 14. These drawings shall include all details as outlined in NFPA 14.</p> <p>Provide minimum 1.5-hr fire rated doors and seal all unprotected openings to separate the exit stairs from work areas and other building spaces on all floor levels in building (Part A & B). Ensure that the fire doors are self-closing and positive latching and that they are provided with fire exit (panic) hardware where serving production floors. Fire doors assemblies shall conform to NFPA 252, BS 476 Part 22, EN 1364-1, GB 12955-2008, or IS 3614 Part II. Retain the services of qualified fire engineer to assist in specifying and installing fire rated assemblies.</p> <p>Installation of approved standpipe will require the installation of rated fire pump. Install the fire pumps in accordance with NFPA 20. Consult with a qualified fire engineer to properly design and install pump system.</p> <p>An automatic fire alarm and detection system shall be provided throughout all existing moderate hazard industrial occupancies per Alliance Standard 5.7.3.6. Replace the single-station smoke alarms with automatic smoke detectors tied into an automatic fire alarm system located in accordance with NFPA 72. Configure the fire alarm system to initiate occupant notification upon activation of any smoke detectors in addition to the manual fire alarm stations. Detectors should be placed in accordance with requirements of NFPA. Manual pull stations should be located near all exits (see NFPA 72 for further guidance). Automatic detection and alarm system should be coordinated with a licensed fire protection engineer and installed by qualified fire alarm contractor.</p> <p>Assure that sufficient employees are trained and certified in fire fighting, first aid, and rescue training by Fire & Civil Defense or other authority. Training certificates should be provided for review.</p> <p>Install fire rated window assemblies (3-hour) on the wall</p>

	<p>adjacent to the next door building in consultation with a qualified fire engineer.</p> <p>Rearrange areas to provide a minimum clear width of 36 in for all egress paths. Some areas may require wider paths based on occupant load.</p> <p>Consulted with qualified engineer regarding exit stair configuration. The egress route should not be reduced along the path of travel as this will cause a potential bottle neck.</p> <p>Provide fire-resistive rated assemblies at the exit access corridors on second floor. The rated assembly should be approved and/or designed by a qualified fire protection engineer.</p> <p>Install emergency lighting at all paths of egress such as exit stairs and corridors. Confirm through testing (light meter) or other certification that means of egress will have illumination of 10 lux for all corridors, exit doors, and stairways and no less than 30 min in the event of failure of normal lighting.</p> <p>During installation of fire rated door assemblies assure that every door in a stair enclosure serving more than 4 stories is provided with re-entry unless it meets the requirements of Alliance Standards Part 6 Section 6.8.3.1.</p> <p>Handrails shall be provided on both sides of each exit stairway. New handrails shall have a minimum height of 865 mm (34 in.) and a maximum height of 965 mm (38 in.) as measured from the leading edge of the tread.</p> <p>Engage a fire engineer to design the proper fire rated enclosures below:</p> <p>Substation room should be segregated from other occupancies by a minimum fire rating of two hours. All penetrations must be sealed to retain fire rating of enclosure.</p> <p>Generator sets shall be separated from all other occupancy areas by a minimum 2 hour construction. Boiler rooms shall be separated from all other occupancies by a minimum 1 hour fire rated construction. Storage areas should be separated from other occupancy (dining area) with a minimum 1 hour construction (unless the floor is provided with automatic sprinkler protection in accordance with Section 5.3 or meeting the requirements of 3.4.2.1.6)</p> <p>Install Fire department (Siamese) inlet connections in the current (or newly installed) standpipe system to allow fire department pumper equipment to supplement the fire protection systems. Fire department outlet connections shall be provided to allow fire department pumper vehicles to</p>
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	<p>draw water from ground-level or underground water storage tanks. Connections shall match the Fire Service and Civil Defense hose thread standard. As noted elsewhere, standpipe system should include Class I standpipe hose connections (65 mm) shall be located in all required stairwells.</p> <p>Repair or replace rust damaged piping at the noted locations. Repairs and replacements must comply with NFPA 14 and NFPA 25 (installation of compliant standpipe system is noted elsewhere). Also assure all existing hose reel equipment is in good working order.</p> <p>Remove obstruction in walking surface of rooftop exit. Alternatively, making the rooftop an unoccupied space would relieve the necessity to remove the obstruction.</p> <p>Following installation of required standpipe systems, the standpipe system needs to be evaluated for compliance with the design pressure and flow demands of NFPA 14 or BNBC as cited in 5.4.3. Standalone standpipe systems shall be confirmed to meet the local BNBC requirements with a minimum 450 kPa (65 psi) pressure at the hydraulically most remote hose connection or NFPA 14. This testing should be documented and available for review.</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 as per Alliance Standards Part 13 Section 13.1 Fire Safety Director.</p> <p>Although the factory may not regularly conduct any hot work operations, it is expected that contractors conducting construction or other work on the building may from time to time conduct hot work on the premises. Therefore, it would be good practice for the factory to develop a written hot work permit program. The program must comply with the requirements of NFPA 51B. Develop a maintenance and contractor safety policy that includes procedures for conducting hot work (e.g. welding). All hot work should be conducted with a proper permit and precautions must be available in case of fire (e.g. fire watch, fire extinguisher, etc.)</p>
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The recommendations for Electrical Safety corrective actions are:

Immediate	N/A
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Short Term (3 Weeks)	<p>Develop an electrical safety training program for all workers that may be exposed to electrical safety hazards.</p> <p>Install signage in all storage areas or other areas of combustibles indicating no use of light fixtures without protective covers,</p> <p>Install a sign that provides details on electrical shock first aid procedures in the generator and substation rooms. Signage should also include instructions on artificial respiration.</p>
Mid Term (6 Weeks)	<p>Clear or reorganize substation to provide sufficient clearance (1m in front of all switchboards and/or distribution boards) for maintenance.</p> <p>Install cable trenches with non-combustible covers or other support features to prevent damage to electrical cable in the substation room.</p> <p>Have a qualified electrical engineer develop an as-built single line diagram detailing key components and capacity of the electrical system. Load calculation must match drawings.</p> <p>All boxes and enclosures (including transfer switches, generators, and power panels) for emergency circuits should be permanently marked with signs that readily identify them as a component of the emergency power system. .</p>
Long Term (6 Months)	<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).</p>