

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

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Name of the Factory	: <b>SOUTH EAST TEXTILES (PVT.) LTD</b>
Address of the Factory	: Gorai, Mirzapur, Gazipur
Present Status of the Factory	: <b>Under operation</b>
Structural assessment conducted by	: Alliance
Date of Structural Inspection	: 28-May-14
Fire & Electrical assessment conducted by	: Alliance
Date of Fire & Electrical Inspection	: 28-May-14.
BGMEA Membership No	: 5836
BKMEA Membership No	: 954

### **BASIC INFORMATION:**

There are four buildings in the factory premises. The following general information was noted:

i.	Building Usage Type	: Garments Factory.
ii.	Structural System	: Building 1: Concrete beam & monolithic RC slab system with beams spanning both directions between columns. Foundation & lateral load resisting system are moment resisting concrete frame. Building 2: Prefabricated Steel structure with moment resisting frame. Building 3: Building frame system. Concrete beam & slab system with beams spanning both directions between columns. Steel frame on 1st floor and RCC frame on upper floor. Building 4: Prefabricated Steel structure with moment resisting frame..
iii.	Floor System	: Beam Supported slab.
iv.	Floor Area	: Building 1: 105000 sf Building 2: 49800 sf Building 3: 29200 sf Building 4: 45000 sf
v.	No. of Stories	: Building 1: 7, Building 2: 3, Building 3: 2, Building 4: 3.
vi.	Construction Year	: Building 1: 2010 Building 2: 2005 Building 3: 2002 Building 4: 2013
vii.	Foundation Type	: Strap footing
viii.	Design Drawings	: Available.
ix.	Soil investigation Report	: Available
x.	Construction Materials	: RCC brick 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.

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- 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. Building 1: Engage a qualified engineer to investigate 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 engineer may have to remove the concrete cover in one or two locations.
  - ii. Building 3: The compressive strength of structural elements constructed using MCAC shall be investigated by an appropriate program of in-situ testing and representative destructive testing of core samples.
  - iii. 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
  - iv. Engage a qualified structural engineer to confirm satisfactory structural performance of the buildings under wind loading.
  - v. Adequately anchor and brace all non-structural elements to resist earthquake forces to comply with the BNBC and Alliance Standard.
  - vi. Have a qualified structural engineer develop Floor Loading Plans per the requirements of Part 8 Section 8.20.5.3.
  - vii. 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.
  - viii. 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)

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- i. Depending on the findings of the DEA, permanent remedial measures should be conducted for the safety of the building.
  - ii. Apply for issuance of the Certificates of Occupancy and pursue the matter to obtain the same.

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

Immediate (3 to 6 Days)	Light fixtures without protective covers (otherwise known as naked lights) shall not be allowed in storage areas or in any area where the Inspector of the Factories Rules (1.6.3.7) Part 53 disallows these fixtures. Install signs posted in Bengali and English, indicating this prohibition at all entrances to these areas.
Short Term (3 Weeks)	N/A
Mid Term (6 Weeks)	<p>Have a qualified electrical engineer and install 2 point grounding in generator.</p> <p>Install phase separators between all terminal connections between different phases for voltage exceeding 230 volts . 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> <p>All distribution boards shall be marked "Lighting" or "Power", as the case may be, provided a unique ID number (e.g. MDB-1) and also be marked with the voltage and number of phases of the supply. Each shall be provided with a circuit list giving diagram of each circuit which it controls and the current rating for the circuit and size of fuse element (panel schedule).</p> <p>Label all switchboards and/or distribution boards in the factory with capacity information. The permanent label should identify the maximum voltage present in an item of equipment or within the enclosure.</p> <p>Switchgear, unit substations, transformers, pull boxes, connection boxes, and other similar associated equipment shall be marked with appropriate caution signs. Entrances to rooms and other guarded locations that contain exposed live parts shall be marked with conspicuous warning signs forbidding unqualified persons to enter. Caution, warning, danger signs or labels should meet the following requirements: (1) The marking shall adequately warn of the hazard using effective words and/or colors and/or symbols. American National Standards Institute ANSI Z535.4-2011, Product Safety Signs and Labels, provides guidelines for suitable font sizes, words, colors, symbols, and location requirements for labels. (2) Shall be permanently affixed to the equipment or wiring method and shall not be hand written. Exception, portions of labels or markings that are</p>

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	variable, or that could be subject to changes, shall be permitted to be hand written and shall be legible. (3) The label shall be of sufficient durability to withstand the environment involved. ANSI Z535.4-2011, Product Safety Signs and Labels, provides guidelines for the design and durability of safety signs and labels for application to electrical equipment.
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### The recommendations for Fire Safety corrective actions are:

Immediate (3 to 6 Days)	<p>Remove all combustibles stored underneath the cutting tables at the noted locations as soon as possible.</p> <p>Remove all combustibles stored underneath the stairs.</p> <p>Keep means of egress continuously free and clear of all obstructions or impediments to full instant use in the case of fire or other emergency.</p>
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>Revise egress pathway so as not to be reduced by protrusion of sewerage cover.</p>
Mid Term (6 Weeks)	<p>Revise ramp to meet slope standard and install handrails on both sides. Alternately, replace the ramp with compliant steps.</p> <p>Arrange for direct connection of the fire alarm system to a central monitoring station or Fire Service and Civil Defense. Until that time that monitoring can be set up, arrange a monitoring system using factory's own central detection system and personnel. 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 (such as a fire control room) to alert this person.</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.</p> <p>Post emergency egress maps at the entrance to each exit stair or main point of egress as per Alliance Standards Part 13 Section 13.4 Evacuation Plan.</p> <p>Upon installation of compliant standpipe system, include required identification signs at the noted locations. Signage must comply with NFPA 14.</p> <p>Provide handrails on both sides of each stairway. Provide intermediate handrail when the stair width exceeds 2.2m (87 inch). Provide handrail of height between the range 865 mm (34 in.) and 965 mm (38 in.).</p> <p>Post the occupant loads for every assembly and production floor in a conspicuous space near the main exit or exit access doorway for the</p>

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	<p>space.</p> <p>Install signage adjacent to each stair door indicating the stair name and the floor level at the noted locations.</p>
<p>Long Term (6 Months)</p>	<p>Remove existing gates and unrated doors at exit enclosures. Install approved fire rated doors that are listed, permanently labeled, automatic-closing, incompatible fire rated frames with latching hardware.</p> <p>Install automatic fire alarm system including a listed fire alarm control panel. Install smoke and heat detectors per NFPA 72. Automatic detectors should be tied into the fire alarm system. Alarm system should initiate occupant notification upon activation of detectors in addition to the manual fire alarm stations. Include listed pull stations at all entrances to exit stairs, and at all exits. Install strobes and horns for complete notification. Automatic area smoke detectors are required throughout G2 buildings per Section 5.7.3.6. All fire alarm installations shall be submitted for review by the Alliance for review prior to commencement of installation.</p> <p>Install a standpipe system at required locations designed by a qualified fire protection engineer. The system should be compliant with the requirements of NFPA 14. The hydraulic calculations should be reviewed by Alliance.</p> <p>Building #3: Provide landing at 1st floor exit so as door doesn't/won't swing out over stairs.</p> <p>Protect all egress stairs with a shaft enclosure including 2-hour fire-rated construction. Factory will need to install fire rated door assemblies at all exits (1.5 hour rating). Fire doors assemblies shall conform to NFPA 252, BS 476 Part 22, EN 1364-1, GB 12955-2008, or IS 3614. Part II. Doors must remain in closed position or be of self-closing type. Doors may be provided with locking hardware from the ingress side provided that a panic bar is installed on any door with an occupant load exceeding 49 persons.</p> <p>Install a fire pump dedicated for fire fighting or fire protection following the requirements of NFPA 20 as identified in Alliance Standard Section 5.5.1.</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. Consult a qualified fire protection engineer to design and/or approve the required exit passageway or egress court.</p> <p>Fire pump installation is to be tested for final acceptance in presence</p>

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	<p>of Alliance representative and a final inspection of the installation shall be conducted by the Alliance representative 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 24 testing requirements.</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>Replace existing exit doors with side hinged swinging type doors per Alliance Standards Part 6 Section 6.8 Doors and Gates.</p> <p>Install Illuminated exit signs at entrances to exits and along the path of egress anywhere the continuation of egress is not obvious or there is a change in the direction of the path of travel.</p> <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.</p> <p>Building #1: Factory should either:</p> <ol style="list-style-type: none"><li>1) Appropriately seal the floor to floor penetrations with appropriate materials to meet fire rating of floors. All penetrations through fire rated assemblies shall be protected/sealed with a listed through penetration firestop system tested in accordance with ASTM E814. Confirmation should be provided that any materials used can conform to standard.</li><li>2) Convert the room into a 2- hour fire rated shaft by installing fire rated door assembly.</li></ol> <p>During installation of fire rated door assemblies assure that every door in a stair enclosure serving more than 5 stories is provided with re-entry unless it meets the requirements of Alliance Standards Part 6 Section 6.8.3.1.</p> <p>Upon installation of compliant standpipe system, fire department (Siamese) inlet connections should be installed 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 draw water from ground-level or underground water storage tanks. Connections shall match the Fire Service and Civil Defense hose thread standard. Signage for standpipe system is not in compliance with NFPA 14 Chapter 6.</p> <p>Provide an emergency power source (battery back-up or connection to emergency power system) for illuminated exit signs.</p> <p>Provide fire-resistive rated construction barriers between hazard types following Table 4.4.1 of Alliance Standard or Table 4.1.1 from BNBC Part 4. Consult a qualified fire protection engineer to design the required rated construction barrier.</p> <p>Building #1: During installation of fire rated door assemblies assure that every door in a stair enclosure serving more than 5 stories is provided with re-entry unless it meets the requirements of Alliance</p>
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	<p>Standards Part 6 Section 6.8.3.1.</p> <p>Develop a hot work permit program. The program must comply with the requirements of NFPA 51B as per Alliance Standards Part 13 Section 13.4 Hot Work Permit and NFPA 51B.</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>Establish an inspection, testing, and maintenance program for the standpipe system. Program must comply with NFPA 25.</p>
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