

Summary of Preliminary Assessment on Structural, Fire and Electrical Safety

Name of the Factory	: Standard Stitches Ltd - Unit 2
Address of the Factory	: Plot #10/4, Karnapara Genda Savar, Dhaka, Bangladesh
Present Status of the Factory	: Under Operation
Structural assessment conducted by	: Alliance
Date of Structural Inspection	: 26 May 2014
Fire & Electrical assessment conducted by	: Alliance
Date of Fire & Electrical Inspection	: 26 May 2014

BASIC INFORMATION:

The present garment factory is a six storied building. The following general information was noted:

- i. Building Usage Type : Garments Factory.
- ii. Structural System : Concrete beam & slab system with beams spanning both directions between columns. Foundation & lateral load resisting system is moment resisting concrete frame.
- iii. Floor System : RCC Beam Supported Slab.
- iv. Floor Area : 51284 sq ft
- v. No. of Stories : 6 storied
- vi. Construction Year : 2006 (first 4 stories), 2013 (top 2 stories)
- vii. Foundation Type : Unknown
- viii. Design Drawings : Not Available.
- ix. Soil investigation Report : Available.
- x. Construction Materials : Reinforced Concrete (brick chips).
- xi. Generator : Unknown.

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.

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Mid Term (6 Weeks)

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- i. Have a qualified structural engineer document compliance with the seismic and wind requirements stated in the 2006 BNBC.
 - ii. Engage a qualified structural engineer to confirm satisfactory structural performance of the buildings under wind loading. Compliance may be waived if the Factory Owner provides satisfactory evidence of a cyclone operations plan that includes full evacuation of the factory in advance of any approaching cyclone.
 - iii. Adequately anchor and brace all non-structural elements such as the rack systems to resist earthquake forces to comply with the BNBC and Alliance Standard.
 - iv. 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.
 - v. Engage a qualified structural engineer to confirm and document that provisions have been made to accommodate concentrated loads of the water tanks. If provisions have not been made, have a qualified structural engineer develop a remediation plan for the areas of concern.
 - vi. Have a qualified structural engineer prepare credible as-built documents based on the requirements of Part 8 Section 8.19 of the Alliance Standard. All elements must be evaluated and included in drawings.
 - vii. 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.
 - viii. 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.
 - ix. Have a qualified structural engineer develop Floor Loading Plans per the requirements of Part 8 Section 8.20.5.3.
 - x. Have a qualified structural engineer prepare load plans including the information required in Section 8.20 of the Alliance Standard. Post those plans.
 - xi. Provide signage or the appropriate markings at all areas used for storage to indicate the acceptable loading limits detailed in the Load Plan (noted elsewhere).

Long Term (6 months)

: The top surface of the structural framing elements exposed to weather must be completely sealed from water intrusion by a well maintained protective coating. Alternatively, create a positive drainage slope of at least 2% and provide drains with downspouts at low points to prevent water clogging, then the requirement for complete sealing of the top surface may be waived. All columns (for extensions) should be provided with proper protective coating if they remain exposed.

The recommendations for Fire Safety corrective actions are:

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Immediate (3 to 6 Days)	Storage in exit routes should be strictly prohibited. This may be part of the regular documented inspection provided by the fire safety team.
Short Term (3 Weeks)	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.
Mid Term (6 Weeks)	<p>Post the occupant load for every assembly and production floor in a conspicuous space near the main exit or exit access doorway for the space.</p> <p>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 90 min in the event of failure of normal lighting.</p> <p>Storage underneath the cutting tables shall be kept clear of combustibles at all times.</p> <p>Upon installation of compliant standpipe system, include required identification signs at the noted locations. Signage must comply with NFPA 14.</p> <p>Each stair should be designated with a unique identification (e.g. Stairwell 1). Signs indicate the name of the stair and the floor level. Additionally, stair signs should indicate if there is or is not roof access from the named stair.</p>
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>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>Assure no exposures in exterior walls of exit enclosures including angular exposures or unprotected openings into production areas. Fire rated window assemblies should be installed or windows in enclosure sealed with fire rated materials.</p> <p>Install or revise existing standpipe system at required locations designed by a qualified fire protection engineer. System should include rated fire pump and Class III standpipe hose connections (65 mm) in each stairwells at each floor level including occupiable roofs.</p> <p>Factory should seal the floor to floor penetrations with appropriate materials to meet fire rating of floors. Penetrations of fire resistive rated assemblies shall be protected with a listed through penetration firestop system</p>

	<p>tested in accordance with ASTM E814.</p> <p>Remove existing gates and unrated doors in the means of egress. Install approved fire rated doors that are listed, permanently labeled, automatic-closing, in compatible fire rated frames with latching hardware.</p> <p>Interior exit stairways and ramps shall terminate at an exit discharge except where terminating at an exit passageway is constructed to meet the same rating requirement as the exit that is being served and shall not be less than 1 hr fire-resistance rated construction, therefore, factory must provide a rated exit passage way between stairs and final exit discharge. This may be accomplished by providing fire rated door assembly on control room.</p> <p>Ensure all aisles meet width of 36 inches.</p> <p>Illumination shall be a minimum of 10 lux for all corridors, exit doors and stairways. Illumination for aisles shall be a minimum of 2.5 lux.</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 shall comply with NFPA 14 Chapter 6 (e.g. no sign on Fire Department connection indicating STANDPIPE in 1 in lettering).</p> <p>Install handrails on both sides of all stairwells as per Alliance Standard part 6 Section 6.9 Stairs and 6.12 Handrails and Guards.</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>Install parapets or guards with a minimum height of 1067 mm (42 in.) on occupied roof areas.</p> <p>Adjust ramp configuration to meet standard of running slope greater than 1 in 8 (12.5 percent).</p> <p>Storage Areas shall be separated from the surrounding occupancy with a minimum 1 hour construction. It is recommended to retain a qualified fire engineer to design enclosures or install fire rated assemblies.</p> <p>Revise means of egress from mezzanine so has a 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.).</p> <p>Develop a written hot work permit program. The program must comply with the requirements of NFPA 51B.</p> <p>Establish an inspection, maintenance, and testing program</p>
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	<p>for the fire pump. Program must comply with NFPA 25. Additionally, all valves controlling fire pumps shall be electrically supervised by a listed fire alarm system control unit. Individual supervisory signals shall be provided for the following conditions of the fire pump: 1) Fire Pump running 2) Fire Pump loss of power in any phase 3. Fire Pump phase reversal. Activation of a fire pump supervisory signal shall initiate a supervisory alarm at the system control panel and at the remote annunciator. All maintenance activities must be documented.</p> <p>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. Maintenance records should be kept.</p> <p>Create a Fire Safety Director position and provide sufficient training so that the individual is able to carry out the required duties.</p>
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The recommendations for Electrical Safety corrective actions are:

Immediate (3 to 6 Days)	N/A
Short Term (3 Weeks)	<p>Establish an inspection testing, and maintenance program for the Uninterruptable Power Supply (UPS) and associated components. The program must based on the following: (1) Manufacturer's recommendations (2) Manufacturer's instruction manuals.</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>Need to joint cable through porcelain/PVC connectors with PIB tape wound around joint.</p> <p>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.</p>
Mid Term (6 Weeks)	<p>Have a qualified electrical engineer develop an as-built single line diagram detailing key components and capacity of the electrical system, including electrical equipment layout, distribution schedule, and grounding riser plan.</p> <p>Remove multi looping of wiring/cables at circuit breakers within switchboards and/or distribution boards.</p> <p>Higher rated MCCB/MCB is used to protect the lower rated</p>

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	<p>cable in MDB/SDBs is a violation of section: 2.7.6.3 and 2.7.6.4 of BNBC-2006.</p> <p>Appropriate type and number of firefighting equipment must be installed inside the generator room for Safety. Install appropriate number of Class C extinguishers in the generator rooms. Refer to NFPA for the appropriate number and size of extinguishers to be available.</p> <p>Install phase separators between terminal connections at the noted locations.</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>Install phase separators between terminal connections. Verify phase separators are installed at all remaining locations.</p>
Long Term (6 Months)	<p>Consult with a qualified electrical engineer to prepare the lighting protection system layout diagram and ensure the required numbers and appropriate spacing of vertical and horizontal conductors.</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 NFPA70B or a comparable standard.</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>