

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

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Name of the Factory	: <b>Sinha Style wears ltd</b>
Address of the Factory	: Plot#I-3, Block-C, Section-13 Mirpur Dhaka 1216, Area-1, Dhaka Bangladesh
Present Status of the Factory	: <b>Under Operation</b>
Structural assessment conducted by	: Alliance
Date of Structural Inspection	: 02-Apr-2014
Fire & Electrical assessment conducted by:	Alliance
Date of Fire & Electrical Inspection	: 02 Apr 2014

### **BASIC INFORMATION:**

The present garment factory is a twelve storied building with one basement where basement and ground floor beam column frame system, & 1st floor to top floor flat slab. The following general information was noted:

i.	Building Usage Type	: Garments Factory.
ii.	Structural System	: Basement and Ground Floor Beam Column Frame system, 1st floor to top floor flat slab with no shear wall.
iii.	Floor System	: Combination of flat plate and beam slab system.
iv.	Floor Area	: 68,000 sft
v.	No. of Stories	: 12 (Twelve) stories plus a basement
vi.	Construction Year	: 2003-2004
vii.	Foundation Type	: Unknown
viii.	Design Drawings	: Available
ix.	Soil investigation Report	: Available
x.	Construction Materials	: Brick aggregate with 60 grade rebar.
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.

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Mid Term: (6 Weeks)

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- i. 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.
- ii. 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.
- iii. Have a qualified structural engineer complete further analysis of the structure and develop a remediation plan if required.
- iv. Under guidance from a qualified structural engineer, address all areas of needed maintenance by correcting the identified issues.
- v. 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
- vi. Have a qualified structural engineer complete an analytical evaluation of the structural impact of the addition
- vii. Assign a qualified engineer for the appropriate program of in-situ testing and representative destructive testing or core samples.
- viii. 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
- ix. Adequately anchor and brace all non-structural elements to resist earthquake forces to comply with the BNBC and Alliance Standard.
- x. 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.
- xi. Provide Certificates of Occupancy for review.
- xii. Have a qualified structural engineer develop Floor Loading Plans per the requirements of Part 8 Section 8.20.5.3
- xiii. Have a qualified structural engineer prepare load plans including the information required in Section 8.20 of the Alliance Standard.
- xiv. 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)

: 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.

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

Immediate (3 to 6 Days)	Storage underneath the cutting tables need to be kept clear of combustibles at all time.
Short Term (3 Weeks)	<p>Remove all hasps, locks, slide bolts, or other locking devices from doors as required by Alliance Standards Part 6 Section 6.8 Doors and Gates.</p> <p>Provide proper rated separation from oil tank.</p> <p>Remove the gas cylinders from factory premises.</p>
Mid Term (6 Weeks)	<p>Need to provide emergency power connection or battery backup in illuminated exit sign. 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 signs are tested on a monthly basis. Functional testing of battery powered signs is provided for a minimum 90 min once per year. It is recommended that equipment should be numbered, with inspections, deficiencies, and follow-up noted in a log.</p> <p>Need to provide emergency power connection or battery backup to egress lights. Develop a testing and maintenance program that ensures the emergency power for egress lights is tested at least once per year. If battery operated lights are used, these lights are tested on a monthly basis. Ensure functional testing of battery powered lights is provided for a minimum 90 min once per year. It is recommended that equipment should be numbered, with inspections, deficiencies, and follow-up noted in a log.</p> <p>The occupant load need to be posted for every assembly and production floor in a facility in a conspicuous space near the main exit or exit access doorway for the space.</p> <p>Need to develop an emergency evacuation plan which includes all components required by the Alliance Standards and communicate the plan to all employees.</p> <p>Centralized fire alarm and detection system need to install and the control panel of this system shall be monitored by a central station monitoring service or directly connected to the Fire Service and Civil Defense. 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>Training programs need to be implemented and documented in accordance with the Alliance Safety Training Curriculum.</p> <p>Factory needs to have a valid fire license for full premise and boiler license.</p> <p>Stair designation signs need to be provided at each floor entrance from the all stairs to the floor in English and</p>

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	<p>Bengali. Signs need to be indicating the name of the stair and the floor level. Signs shall be posted adjacent to the door.</p> <p>Need to collect Occupancy certificate for each building and ancillary structure as per building use from approving authority.</p> <p>Complete fire department pre-planning activities with the local Fire Service and Civil Defense.</p> <p>Install required identification signs at the noted locations. Signage must comply with NFPA 14.</p>
<p>Long Term (6 Months)</p>	<p>Provide a 2-hour fire-resistive rated assembly with 1.5-hour opening protection in line with the stair and extend 3.05 m (10 ft.) beyond the ends of the stair between the exterior exit stairs and the building to achieve the required separation. The rated assembly should be approved and/or designed by a qualified fire protection engineer.</p> <p>Occupied roofs need to be provided with the minimum number of exits required as a story.</p> <p>All roll-down, collapsible, sliding gates and shutters in the means of egress shall be replaced with required fire rated outward opening side-hinged swinging self-closing type doors as per Alliance standard section: 6.8. Doors will be free from general locking arrangement.</p> <p>Provide a 2 hour rated exit passageway to make interior exit stairways and ramps terminate outside the building.</p> <p>Provide a 2 hour rated exit passageway to make interior exit stairways and ramps terminate outside the building.</p> <p>Provide 2 hour fire-resistive rated construction barriers at exit enclosures with 1.5 hour fire-rated opening protection (Door, window etc.). The new fire rated door will side-hinging swinging outward opening type, with auto closure and panic bar and without locking arrangement. Minimum width of new fire rated door will 1.00m. Every door in a stair enclosure serving more than 4 stories needs to provide with re-entry provision. Doors need to be free from general locking arrangements. Consult a qualified fire protection engineer to design the required rated construction barriers with opening protection.</p> <p>Install fire rated door assemblies at all exits. Provide fire-resistive rated (0.75-hour for boiler room) opening protection (Door, Window, Hatch Cover etc.) at opening and penetration through fire rated walls and/or assembly's protection or closed the unprotected openings by fire restrictive rated barrier as per requirements. Consult a</p>

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	<p>qualified fire protection engineer to design the required rated opening protection.</p> <p>Install an automatic sprinkler system throughout the building designed by a qualified fire protection engineer.</p> <p>Install a standpipe system within the required exit stairs to meet the requirements of Alliance Standard. Consult a qualified fire protection engineer before modify or installing a new system.</p> <p>Provide a dedicated fire pump in accordance with NFPA 20 to supply the demands of water to the connected fire protection systems along with a stored source of water sufficient to meet the demands as per NFPA 22.</p> <p>Consult a qualified fire protection engineer to design an automatic fire detection and alarm system in accordance with NFPA 72. The system is to include manual pull stations at exits, smoke detectors throughout each floor, and notification devices throughout. After the building is fully sprinkle, water flow devices are required but smoke and fire detection devices are not required throughout each floor.</p> <p>Rooms used for storage of combustible materials/boiler need to be separated from the surrounding occupancy with a minimum 1 hour fire rated construction with 0.75 hour fire rated opening protection, generator room need to be separated from the surrounding occupancy with a minimum 1 hour fire rated construction with 0.75 hour fire rated opening protection . Generator room need to be separated from the surrounding occupancy with a minimum 2 hour fire rated construction with 1.5 hour fire rated opening protection. Consult a qualified fire protection engineer to design the required rated construction barrier.</p> <p>Need to install handrails on the both side of the stairs. 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 need to be maintained when installing new handrails. The spacing between vertical/horizontal members will not exceed 200 mm (8 inch).</p> <p>Install illuminated exit signs with backup power and continuous graphics 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>Establish and implement an inspection, testing, and maintenance program for all fire extinguishers. Program shall comply with the requirements of NFPA 10.</p>
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	<p>Guards need to provide at the open side of means of egress that exceed 760 mm (30 inch) above the floor or finished ground level. New guard shall have a minimum height of 1067 mm (42 inch) and the spacing of between the horizontal members are not exceed 200 mm (8 inch).</p> <p>Remove threshold or provide a stair for the change in elevation. Also need to be marked with additional signage or floor markings.</p> <p>Fire department (Siamese) inlet connections need to be provided to allow fire department pumper equipment to supplement the fire protection systems. Fire department outlet connections need to be provided to allow fire department pumper vehicles to pump water into the standpipe system and another to draft water from ground-level or underground water storage tanks. Connections need to be match the Fire Service and Civil Defense hose thread standard. Also need the ensure reservation of the required amount of water for fire-fighting. Consult a qualified fire protection engineer to design this requirement.</p> <p>Repair or replace damaged piping at the noted locations. Repairs and replacements must comply with NFPA 14 and NFPA 25.</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>Develop a hot work permit program. The program must comply with the requirements of NFPA 51B.</p> <p>Establish and implement an inspection, maintenance, and testing program for the standpipe and hose system.</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. As a general rule the maximum tolerable deposit thickness for loose fluffy lint is 13 mm (½ in.) over a maximum of 46.5 m2 (500 ft2). Limit dense deposits to 6 mm (¼ in.) and oil saturated deposits to 3.2 mm (⅛ in.).</p>
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### The recommendations for Electrical Safety corrective actions are:

<p>Immediate (3 to 6 Days)</p>	<p>Remove all improperly stored materials from in front of the distribution boards.</p> <p>Disconnect the panel from the electrical service and clean interior components of all dust and debris. Seal all openings within each enclosure to prevent dust and debris from</p>
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	<p>entering. Survey all equipment to identify additional areas which may need to be cleaned.</p>
Short Term (3 Weeks)	<p>Ensure light fixtures without protective covers are not 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>
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.</p> <p>Provide electrical graded rubber mats with the specifications of 650 V-protection and required area (accommodating at least two person or depending on the panels' length).</p> <p>Check all the cables and circuit breakers and sort out the higher rated circuit breakers. The rated current of a protective device (MCB, MCCB and fuse) must not exceed the current carrying capacity of any conductor in the circuit.</p> <p>Provide permanent identification marking mentioning name of panels (i.e. SDB, Level-10) on a durable material sheet posted on panels' door.</p> <p>Provide a capacity information label which contains the current carrying capacity and size of main cable, rated capacity of circuit breaker and the bus bar (with dimension). Display panel schedules on interior side of the panel door.</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). 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>Have a qualified electrical engineer redesign a lightning protection system according to the BNBC requirements.</p> <p>Consult a qualified engineer to design ventilation system for the generator room based on installed equipment.</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>