

Summary of Preliminary Assessment on Structural, Fire and Electrical Safety

Name of the Factory	: Starlight Knitwear Ltd.
Address of the Factory	: 2/B, Elephant Road, Dhaka, Bangladesh
Present Status of the Factory	: Under Operation
Structural assessment conducted by	: Alliance
Date of Structural Inspection	: 26 Feb 2014
Fire & Electrical assessment conducted by	: Alliance
Date of Fire & Electrical Inspection	: 07 Jul & 26 Feb 2014

BASIC INFORMATION:

The factory comprises of two buildings. 6 storied main building is with beam-column frame system and steel shed on roof top, 1 storied ancillary building is with shed. The following general information was noted:

i.	Building Usage Type	: Garments Factory
ii.	Structural System	: Concrete moment resisting frame with monolithic beams, slabs and columns. A structural steel frame roof structure has been added at the roof level.
iii.	Floor System	: RC beam supported slab
iv.	Floor Area	: Main Building: 54,757 sft Ancillary Building : 204 sft
v.	No. of Stories	: Main Building: 6 storied + Shed on roof Ancillary Building : 1 storied
vi.	Construction Year	: Main Building: 1983
vii.	Foundation Type	: Isolated column footings
viii.	Design Drawings	: Not Available
ix.	Soil investigation Report	: Not Available
x.	Construction Materials	: Reinforced concrete (Brick chips with 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 (3 to 6 Days)	:	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. Alternatively, provide a 2% slope on the exposed roof surface to prevent accumulation of water.
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.

Mid Term: (6 Weeks)

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- i. Under guidance from a qualified structural engineer arrange Detail Engineering Assessment of the structure. This assessment should be conducted within 6 weeks and should include destructive core testing to validate the in-situ concrete compressive strength.
- ii. Have a qualified structural engineer provide further testing and analysis of the identified cracking and provide a remediation plan to correct noted issues.
- iii. Engage a qualified structural engineer to confirm structural performance of the structure.
- iv. Engage a qualified structural engineer to provide additional investigation into the areas of distress, separations, or cracking and provide a remediation plan if required.
- v. Have a qualified structural engineer complete an analytical evaluation of the structural impact of the additions.
- vi. 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.
- vii. Engage a qualified structural engineer to confirm satisfactory structural performance of the buildings under wind loading. This should be reflected in a design report.
- viii. Engage a qualified structural engineer and identify the impact of the reduced number of rebar on the integrity of the structure.
- ix. 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.
- x. 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.
- xi. Have a qualified structural engineer prepare credible as-built documents based on the requirements of Part 8 Section 8.19 of the Alliance Standard.
- xii. Under guidance from a qualified structural engineer, address all areas of needed maintenance by correcting the identified issues.
- xiii. Adequately anchor and brace all non-structural elements to resist earthquake forces to comply with the BNBC and Alliance Standard.
- xiv. As part of the detailed engineering assessment (detailed elsewhere), destructive core testing should be conducted to validate the in-situ concrete compressive strength of structural elements.

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- xv. Have a qualified structural engineer develop Floor Loading Plans per the requirements of Part 8 Section 8.20.5.3.
- xvi. Have a qualified structural engineer prepare load plans including the information required in Section 8.20 of the Alliance Standard and have it posted in all required location. Floor load plans should be visibly posted on all levels of the building.
- xvii. Provide signage or the appropriate markings at all areas used for storage to indicate the acceptable loading limits detailed in the Load Plan.
- xviii. Under guidance from a qualified structural engineer arrange geotechnical investigation at close vicinity of the structure and make the report available for review. This report should include commentary regarding the as-built foundation system for the building as well as remediation recommendations, if appropriate.
- xix. Provide Certificates of Occupancy for review.

Long Term (6 Months) : Necessary remediation after DEA.

The recommendations for Fire Safety corrective actions are:

Immediate (3 to 6 Days)	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.
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. Relocate the childcare from roof or provide direct access to an exit.
Mid Term (6 Weeks)	Provide an automatic fire alarm and detection system per NFPA 72 and arrange for direct connection of the system to a central station monitoring service or 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 (such as a fire control room) to alert this person. Impart training in accordance with Alliance Safety Training Curriculum and keep record with proper documentation. Develop an emergency evacuation plan which includes duties and responsibilities of various groups, interfacing between groups and fire brigade, headcount and identification of trapped victims, physically disabled people and their rescue, etc. and all components required by the Alliance Standards and communicate the plan to all employees. The evacuation plan shall include provisions to

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	<p>assist physically disabled persons. A list of all employees with physical disabilities shall be kept by the Fire Service Director.</p> <p>Develop a testing and maintenance program that ensures the operation of all exit signs is verified at least once per year.</p> <p>Post the occupant load 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>Develop a testing and maintenance program that ensures the emergency power for exit signs is tested at least once per year.</p> <p>Apply to BERC for waiver certificate and pursue the renewal process of fire and boiler license. Expedite the matter.</p> <p>Complete fire department pre-planning activities with the local Fire Service and Civil Defense.</p> <p>Install a standpipe system and provide required signage designed by a qualified fire protection engineer. The system is to be compliant with the requirements of NFPA 14.</p> <p>Install signage adjacent to each stair door indicating the stair name at the noted locations in both English and Bengali.</p> <p>Apply to Rajuk for issuance of occupancy certificate and pursue the matter's expedition.</p>
<p>Long Term (6 Months)</p>	<p>Install a centralized automatic fire alarm and smoke/heat detection system with control panel following the requirement of NFPA 72 throughout all new and existing buildings and structures.</p> <p>Provide fire-resistant rated assemblies at the required exit access corridors. The rated assembly should be approved and designed by a qualified fire protection engineer. Exit access corridors serving an occupant load exceeding 30 are to be separated by walls having a fire resistance rating of 1 hr unless provided with automatic sprinkler protection throughout the story or building.</p> <p>Replace all collapsible, sliding, roll-down gates and shutters in means of egresses with side-hinged swinging type doors of proper width and rating.</p> <p>Provide rated exit passageway i.e. protected path of egress from the exit enclosure to the public way. The rating of the exit passageway is to be equal to fire rating requirement of the exit that is being served and shall not be less than 1 hr rated.</p> <p>Provide opening protections at all windows and other openings on all the fire rated wall across the entire premises. Close these openings if they are not required.</p>

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	<p>Install standpipe system at required locations. Standpipe system must comply with NFPA 14.</p> <p>Provide 2 hr fire-resistive rated construction barriers at exit enclosures. Fit outward opening, side-swinging, self-closing, non-lockable fire doors of 1.5 hr rating in all stairwell enclosures. Consult a qualified fire protection engineer to design the required rated construction barriers.</p> <p>Install dedicated fire pump following the requirements of NFPA 20. 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. 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.</p> <p>Provide an automatic fire alarm and detection system per the Alliance Standard. Pull stations at egress points, smoke detectors in air handling equipment, visual and audible devices must be spaced appropriately based on occupancy type in accordance with NFPA 72.</p> <p>Train and certify at least 25 percent of workers in fire fighting, first aid and rescue by the proper authority.</p> <p>Provide additional external stair to meet the requirement.</p> <p>Remodel exit points 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 fire-resistive rated construction barriers between hazard types. Consult a qualified fire protection engineer to design the required rated construction barrier.</p> <p>Install fire department connections where required and in compliance with the Standard. 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.</p> <p>Provide parapets or guards for all occupied roofs of a minimum height of 1067 mm (42 in.).</p> <p>Every door in a stair enclosure serving more than 5 stories shall be provided with re-entry door.</p> <p>Provide handrails on both sides of each stairway. Provide handrails mounted at a height between the range 865 mm (34 in.) and 965 mm (38 in.).</p> <p>Fire extinguishers are to be inspected, tested, and maintained in accordance with NFPA 10 Chapter 7.</p>
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	<p>Develop a hot-work permit program. The program must comply with the requirements of NFPA 51B.</p> <p>Install a standpipe system at required locations designed by a qualified fire protection engineer and institute an inspection, testing and maintenance program for the 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> <p>Install a pump dedicated for fire fighting or fire protection following the requirements of NFPA 20. Then establish an inspection, maintenance, and testing program for the fire pump. Program must comply with NFPA 25.</p>
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The recommendations for Electrical Safety corrective actions are:

Immediate (3 to 6 Days)	<p>Ensure the generator room clean and free of dirt, debris, and improperly stored materials.</p> <p>Find out the cause of overheating and take proper action.</p> <p>Ensure switchboards and distribution boards free of dirt and debris.</p>
Short Term (3 Weeks)	<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>Connect all metal in the building to the building earthing system such as metal rebar in concrete, metal frame of building or metal water pipe.</p> <p>Ensure emergency power switchboards, distribution boards and circuits are properly installed and identified.</p> <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>Ensure cable joints through porcelain/PVC connectors with PIB tape wound around joint.</p> <p>Ensure Signage indicating the prohibition of light fixtures without protective covers is installed at required locations.</p>

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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>Consult with a qualified Electrical Engineer and ensure electrical wiring/cables are sized according to capacity of circuit breakers.</p> <p>Remove multi looping of cables at circuit breakers within distribution boards.</p> <p>Ensure distribution boards are metal enclosed with a dead front construction.</p> <p>Ensure overcurrent protection device (circuit breaker) for each and every loads.</p> <p>Provide clearance of at least 1 m (39 in) in front of switchboards and/or distribution boards.</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>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>Inspect electrical switchgear and panel boards on an annual basis to ensure that the equipment is in good working condition.</p>