

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

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Name of the Factory	: Super Knitting & Dyeing Mills Ltd.
Address of the Factory	: Baizid Bostami Road, Nasirabad, Chittagong, Bangladesh.
Present Status of the Factory	: <b>Under Operation</b>
Structural assessment conducted by	: Alliance
Date of Structural Inspection	: 10-April-14
Fire & Electrical assessment conducted by	: Alliance
Date of Fire & Electrical Inspection	: 10-April-14

### **BASIC INFORMATION:**

The present garment factory comprises of one Main Building and three Ancillary Buildings. The following general information was noted:

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|-------|---------------------------|---|
| i.    | Building Usage Type       | : Garments factory  |
| ii.   | Structural System         | : RCC frame structure system with concrete beams in both directions and floor slabs between beams |
| iii.  | Floor System              | : Beam supported slab   |
| iv.   | Floor Area                | : 181,565 sft   |
| v.    | No. of Stories            | : Main Building: 5 (Ground+4+Occupied Roof)   |
| vi.   | Construction Year         | : 1993  |
| vii.  | Foundation Type           | : Pile foundation   |
| viii. | Design Drawings           | : Available   |
| ix.   | Soil investigation Report | : Available   |
| x.    | Construction Materials    | : Reinforced Concrete for RCC building  |
| xi.   | Generator                 | : Ground floor in ancillary building  |

### **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 loading limits as described on the Floor Loading Plans.

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

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Mid Term (6 Weeks)

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- i. Engage a qualified structural engineer to confirm structural performance of the structure, focusing on the items noted above.
  - ii. Have a qualified structural engineer provide further testing and analysis of cracking in columns and provide a remediation plan to correct noted issues.
  - iii. Engage a qualified structural engineer to confirm satisfactory structural performance of the buildings under wind loading.
  - iv. Have a qualified structural engineer complete an analytical evaluation of the structural impact of the addition.
  - 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 prepare credible as-built documents based on the requirements of Part 8 Section 8.19 of the Alliance Standard. These documents should include design report(s) as necessary.
  - vii. Under guidance from a qualified structural engineer, address all areas of needed maintenance by correcting the identified issues.
  - viii. Adequately anchor and brace all non-structural elements to resist earthquake forces to comply with the BNBC and Alliance Standard.
  - ix. Complete further testing on areas of deterioration and have a qualified structural engineer develop a remediation plan.
  - 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. Provide signage or the appropriate markings at all areas used for storage to indicate the acceptable loading limits detailed in the Load Plan.
  - xii. 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 the building.
  - xiii. Have a qualified structural engineer develop Floor Loading Plans as per the requirements of Part 8 Section 8.20.5.3.

Long Term (6 Months)

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- i. 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.
  - ii. Provide Certificates of Occupancy for review.

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

<p>Immediate (3 to 6 Days)</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>Find out the cause of overheating and take proper action.</p> <p>Remove all combustible materials within the substation room.</p>
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## Summary of Preliminary Assessment on Structural, Fire and Electrical Safety

	Remove all dirt, debris, lint, water, oil, and improperly stored materials from the substation room.
Short Term (3 Weeks)	
Mid Term (6 Weeks)	<p>Ensure proper identification of emergency power switchboards, distribution boards, and circuits.</p> <p>Provide adequate cable trench.</p> <p>Ensure distribution boards are metal enclosed with a dead front construction.</p> <p>Provide clearance of at least 1 m (39 in) in front of switchboards and/or distribution boards.</p> <p>Ensure the generator room properly rated.</p> <p>Provide means of ventilation for the substation room. Consult a qualified electrical engineer to determine the required ventilation rates based on the installed equipment.</p> <p>Provide capacity information labels (Maximum current rating, no of circuit breakers etc.) for Switchboards and/or distribution boards.</p> <p>As per BNBC section 2.11.5.4 ensure clear and permanent identification marks are painted in all distribution boards, switchboards, sub main boards and switches.</p> <p>Ensure the means of identification is obtained by separate color coding, marking tape, tagging, or other approved means.</p> <p>Provide adequate covers for junction boxes and other electrical devices.</p> <p>Provide two separate points earthing (grounding) provided for generator.</p> <p>Ensure electrical connections at equipment, fixtures, etc. are properly secured.</p> <p>Provide adequate supports for electrical wiring and conduit. Provide covers or blanks to conceal all live internal components of distribution boards.</p> <p>Provide Instruction board for first aid and artificial respiration in substation room.</p> <p>Ensure Signage indicating the prohibition of light fixtures without protective covers is installed at required locations.</p> <p>Post required equipment and safety signage within the room.</p> <p>Provide electrical insulation mats in front of distribution</p>

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

	<p>boards. Ensure meters and other electrical devices installed on the main electrical equipment are operational.</p>
<p>Long Term (6 Months)</p>	<p>Have a qualified electrical engineer develop an as-built single line diagram detailing key components and capacity of the electrical system.</p> <p>Ensure underground cables for electrical distribution in the premises /garden/compound of the building are encased in GI or PVC pipes and laid in earth trenches of sufficient depth as per BNBC 2.5.7.2.</p> <p>Provide emergency power connection for life safety loads (fire alarm, fire pump, elevators, emergency lighting, exit signage, etc.).</p> <p>Install lightning protection system on the building</p> <p>Ensure that wet type transformer is not leaking and have appropriate oil levels.</p> <p>Remove multi looping of wiring/cables at circuit breakers within switchboards and/or distribution boards.</p> <p>Consult with a qualified Electrical Engineer and ensure electrical wiring/cables are sized according to capacity of circuit breakers.</p> <p>Ensure switchboards and/or panel boards are not installed above gas stoves or sinks or within 2.5m of any washing unit in washing rooms or laundries.</p> <p>Arrange a report on existence/ non-existence of harmful substances in transformer. If harmful substance found, consider replacing transformers with non-harmful substances to reduce health hazards.</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>Ensure all electrical wiring/cable properly terminated at its point of termination.</p> <p>Ensure switchboards and/or distribution boards provided with physical means to prevent the installation of more over current devices than that number for which the panel board was designed, rated, and listed following NFPA 70 section 408.54.</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</p>

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

	<p>breakers, switches etc. and between each phase and earth.</p> <p>Lighting and socket circuits must be separated at the noted locations. Have a qualified electrician separate the lighting and sockets into separate circuits.</p> <p>Complete an oil analysis on applicable transformers at appropriate intervals based on voltage and power. Install phase separators between terminal connections at the noted locations.</p> <p>Provide grounding (earthing) for Switchboards and/or distribution boards as per BNBC section 2.8.1.</p> <p>Provide dedicated neutral for each circuit.</p>
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### The recommendations for Fire Safety corrective actions are:

Immediate (3 to 6 Days)	Remove all combustibles stored underneath the cutting tables at the noted locations.
Short Term (3 Weeks)	<p>Remove all hasps, locks, slide bolts, or other locking devices at the noted locations.</p> <p>According to section 6.8.2.2, doors may be locked where the latch and lock are disengaged with one motion where the occupant load does not exceed 49 persons. Turning a door handle and disengaging a lock is considered two motions.</p> <p>According to section 6.8.2.2 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>
Mid Term (6 Weeks)	<p>Develop an emergency evacuation plan which includes all components required by the Alliance Standards and communicate the plan to all employees in accordance with Alliance Standard Section 13.3.</p> <p>Develop a testing and maintenance program that ensures the operation of all egress lighting is verified at least once per year. If battery-operated lights are used these lights shall be tested on a monthly basis. Functional testing of battery powered lights shall be provided for a minimum 90 min once per year.</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>

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

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Long Term (6 Months)	<p>Replace non-compliant doors and frames in the means of egress with side-swinging doors. Replacement doors shall be a minimum width of 0.8 m (32 in), and are listed, approved, self-closing, fire rated door assemblies (door and frame) with latching panic hardware.</p> <p>Install initiating devices and notification appliances as required by the Alliance Standard and NFPA 72. This includes electrical supervision of all valves controlling fire protection systems (sprinklers, fire pumps, water supplies, etc.). Connect devices to an automatic fire alarm and detection system for the facility. All fire alarm installations shall be submitted for review by the Alliance prior to commencement of installation.</p> <p>Provide fire-resistive rated assemblies at the required exit access corridors in accordance with Alliance Standard Section 6.3.1.1. The rated assembly should be designed and/or approved by a qualified fire protection engineer.</p> <p>Install a dedicated fire pump for the facility in accordance with NFPA 20 to supply the demands of the connected fire protection systems along with a stored source of water sufficient to meet the demands in accordance with NFPA 22. 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 as per clause 5.5.5. 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 by the Alliance. The pump is to be connected to an alternative power source such as a generator. The generator is to be configured with an ATS (auto starter).</p>
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