

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

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Name of the Factory	: <b>Sterling Designs Ltd</b>
Address of the Factory	: Ward No-07 Biswaspara, Chandra Kaliakoir, Gazipur
Present Status of the Factory	: <b>Under operation</b>
Structural assessment conducted by	: Alliance
Date of Structural Inspection	: 21-Aug-2014
Fire & Electrical assessment conducted by	: Alliance
Date of Fire & Electrical Inspection	: 4-Jun-2014.
BGMEA Membership No	: 4256

### **BASIC INFORMATION:**

There is one building in the factory premises. The following general information was noted:

- i. Building Usage Type : Garments Factory.
- ii. Structural System : RCC Moment resisting frame structure.
- iii. Floor System : Beam Supported slab.
- iv. Floor Area : 203,356 sft
- v. No. of Stories : Six storied.
- vi. Construction Year : 2005
- vii. Foundation Type : Pile Foundation & Isolated Footing
- viii. Design Drawings : Available.
- ix. Soil investigation Report : Available
- x. Construction Materials : RCC Stone 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.
- 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. Under guidance from a qualified structural engineer arrange Detail Engineering Assessment of the structure. This assessment should include destructive core testing to validate the in-situ concrete compressive strength of structural elements.
- ii. Have a qualified structural engineer prepare credible as-built documents based on the requirements of Part 8 Section 8.19/8.20 of the Alliance Standard. The documents should be prepared for all buildings within the factory complex.
- iii. 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.
- 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 confirm satisfactory structural performance of the buildings under wind loading.
- vi. Adequately anchor and brace all non-structural elements to resist earthquake forces to comply with the BNBC and Alliance Standard.
- vii. Have a qualified structural engineer develop Floor Loading Plans per the requirements of Part 8 Section 8.20.5.3.
- viii. 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
- ix. Provide signage or the appropriate markings at all areas used for storage to indicate the acceptable loading limits detailed in the Load Plan.
- x. Have a qualified structure engineer identify the locations where a expansion joint is needed and then have a remediation plan developed.
- xi. Remove deteriorated expansion joint material and provide new approved material at the expansion joint.

### 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.

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

Immediate (3 to 6 Days)	<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, overloading, or signs of burning and take proper action.</p>
Short Term (3 Weeks)	<p>Ensure proper ventilation for generator room.</p> <p>Ensure distribution boards are metal enclosed with a dead front construction.</p> <p>Provide shielding or additional insulation for exposed wiring within 36 inches to external heat sources.</p>

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	<p>Properly support all light fixtures and provide seismic bracing.</p> <p>Install signs posted in Bengali and English, indicating the prohibition of uncovered light fixtures at all entrances to storage and other required areas.</p> <p>Provide covers for cables &amp; electrical equipment where necessary.</p>
Mid Term (6 Weeks)	<p>Provide earthing of equipment at required locations and connect to required number of electrodes.</p> <p>Connect all metal in the building to the building earthing/grounding 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 permanently marked so they will be readily identified as a component of an emergency circuit or system.</p> <p>Consult with a qualified Electrical Engineer and ensure electrical wiring and cables are sized according to capacity of circuit breakers.</p> <p>Ensure all switchboards and distribution boards are in compliant locations.</p> <p>Remove multi looping of cables at circuit breakers within switchboards.</p> <p>Ensure wiring systems are selected and erected so that no damage is caused by the ingress of water.</p> <p>Complete an analysis/test on transformers to identify harmful substances. If it contains harmful substances, replace the transformer oil.</p> <p>Ensure the means of identification is obtained by separate color coding, marking tape, tagging, or other approved means.</p> <p>Provide covers to conceal all live internal components of switchboards and distribution boards.</p> <p>Establish a periodic inspection program to ensure the electrical systems are free from damage, debris, dirt, lint, etc. Maintain records concerning inspections and follow up actions.</p> <p>Install security measures to ensure access to the substation is restricted.</p> <p>Provide two separate earthing (grounding) points for the generator.</p> <p>Install phase separators between terminal connections at the noted locations.</p> <p>Lead telecommunication or antenna cables separately to the main point of service. Power and telecommunications cables must have separate entrance.</p> <p>Complete an oil analysis on applicable transformers at appropriate intervals based on voltage and power.</p> <p>Ensure inspection, maintenance, and testing procedures of the emergency generator are being completed and documented.</p>

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<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 switchboards and 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.</p> <p>Consult with a professional electrical engineer to design &amp; install a lightning protection system, including risk index calculation and to make sure the system is secured against lightning.</p> <p>Provide grounding (earthing) for switchboards and distribution boards.</p> <p>Provide the required fire rating/protection of the substation room like fire rated door, window/ grill etc. And keep physically separated from the remainder of the building.</p> <p>Ensure the generator room is properly rated and physically separated from the remainder of the building.</p> <p>Provide capacity information labels (Maximum current rating, no of circuit breakers etc.) for switchboards and distribution boards.</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>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 NFPA 70B or a comparable standard.</p> <p>Develop and implement an electrical safety program. Include key topics such as lock-out/tag-out procedures, personal protective equipment requirements, etc. Keep records of completed training available on site.</p> <p>Provide adequate grounding (earthing) for transformer.</p>
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### The recommendations for Fire Safety corrective actions are:

<p>Immediate (3 to 6 Days)</p>	<p>Remove all combustibles stored underneath the cutting tables at the noted locations as soon as possible.</p> <p>Remove all stored materials from the stairwells at the noted locations as per Alliance Standard Part 13 Section 13.9 Safety Inspections.</p>
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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>Provide proper aisle marking (clear width minimum 36 in.) and keep aisles free of storage as per Alliance Standard part 6 section 6.5 egress width.</p> <p>Provide the occupant load signage for every assembly and production floor in that facility in a conspicuous location near the main exit or exit access doorway per Alliance Standards Part 6 Section 6.4.4.</p>
Mid Term (6 Weeks)	<p>Provide side-hinged swinging type doors in all means of egress as per Alliance Standards Part 6 Section 6.8.</p> <p>Repair or replace damaged piping system at the noted locations. Repairs and replacements must comply with NFPA 14 and NFPA 25.</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>Install signage adjacent to each stair door indicating the stair name and the floor level at the noted locations as per Alliance Standard Part 6 Section 6.9.</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.</p>
Long Term (6 Months)	<p>Provide a fire-resistive rated assembly 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 as per Alliance Standard Part 6 Section 6.3.1.2.</p> <p>Provide stair with a minimum 35 in. in clear width to comply with the total width as per 8mm/person (BNBC- Table 4.3.2). Also follow Alliance Standard Part 6 Section 6.5 Egress Width.</p> <p>Train-up sufficient number (25 %) of worker for fire fighting and emergency purposes as per Alliance Standard Part 13 Human Element Programs. Prepare supporting documents for training program and collect certificates for the Alliance review.</p> <p>Provide 2 hr. fire-resistive rated construction barriers at exit enclosures. Provide 1.5 hour rated opening protection (fire doors and windows, penetrations seal) in all openings which are connected to stair case. Consult a qualified fire protection engineer to design the required rated construction barriers as per Alliance Standards- 4.5.4.1, 4.6, 4.5.7 Shafts. 4.5.7.1 &amp; BNBC Part 4 Section 2.5.</p> <p>Provide fire-resistive rated construction barriers between floors in accordance with Alliance standard, Part-4, Section-4.4.1 and BNBC, Part-4, Table-4.1.1. Seal all the penetrations with required fire rating materials to provide sufficient fire separation.</p> <p>Provide pull stations/alarm call points at each egress location, smoke detectors in air handling equipment, visual and audible devices spaced appropriately based on occupancy type. Reference NFPA 72.</p> <p>Install standpipe system at required locations. Standpipe system must</p>

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	<p>comply with NFPA 14.</p> <p>Install a fire pump system according to NFPA 20 with a minimum pressure of 450 kPa (65 psi) at the hydraulically most remote hose connection. Also install a stored water tank per NFPA 22.</p> <p>Provide fire-resistive rated construction barriers between hazard types. Provide 2 hr. rated construction barrier and 1.5 hr rated opening protection for generator and transformer room. Consult a qualified fire protection engineer to design the required rated construction barrier as per Alliance Standards- 3.4.2.1.3, 3.4.2.1.4 &amp; BNBC Part 4 Section 2.5.</p> <p>Provide fire-resistive rated construction barriers between hazard types as per Alliance Standards- 3.4.2.1.5 &amp; BNBC Part 4. Provide 1 hr. rated construction barrier and opening protection for mentioned store room. Provide 1 hr. rated construction barrier and 0.75 hour rated opening protection for mentioned boiler room. 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 Alliance Standard Part 5 Section 5.5.4.</p> <p>Develop a testing and maintenance program that ensures the emergency power for exit signs is tested at least once per year as per Alliance Standard Part 10 Section 10.12. If battery operated signs are used, these lights are to be tested on a monthly basis. Functional testing of battery powered signs is provided for a minimum 90 min once per year.</p> <p>Develop a testing and maintenance program that ensures the operation of all egress illumination lights are verified at least once per year as per Alliance Standards Part 10 Section 10.12. 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>Provided handrails on both sides of each stairway. Intermediate handrails shall be provided when the stair width exceeds 2.2 m (87 in.). Mount handrails height in between 30 in. to 44 in as per Alliance Standard Part 6 Section 6.9 Stairs and 6.12 Handrails and Guards.</p> <p>Establish an inspection, maintenance, and testing program for the standpipe and hose system. Program must comply with the requirements of NFPA 14 and NFPA 25.</p> <p>Establish an inspection, maintenance, and testing program for the fire pump. Program must comply with NFPA 20 and NFPA 25.</p> <p>Develop a written hot work permit program. The program must comply with the requirements of NFPA 51B.</p> <p>Complete fire department pre-planning activities with the local Fire Service and Civil Defense as per Alliance Standards Part 13 Section 13.1.</p>
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