

Summary of Preliminary Assessment on Structural, Fire and Electrical Safety

Name of the Factory	: Sun Washing Plant
Address of the Factory	: 08, Panwala Para, Agrabad, Chittagong, Bangladesh.
Present Status of the Factory	: Under Operation
Structural assessment conducted by	: Alliance
Date of Structural Inspection	: 14-November-13
Fire assessment conducted by	: Alliance
Date of Fire Inspection	: 07-February-14
Electrical assessment conducted by	: Alliance
Date of Electrical Inspection	: 23-December-13

BASIC INFORMATION:

The present garment factory comprises of one story one Main Building. The following general information was noted:

i.	Building Usage Type	: Garments Factory
ii.	Structural System	: Moment resisting frame structure based on the BNBC
iii.	Floor System	: Only roof sheet as one storied shed
iv.	Floor Area	: 22,770 sft.
v.	No. of Stories	: One story
vi.	Construction Year	: 2004
vii.	Foundation Type	: Unknown
viii.	Design Drawings	: Partially available
ix.	Soil investigation Report	: Unavailable
x.	Construction Materials	: RC materials with steel
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. Engage a qualified geotechnical firm to conduct the soil investigation to confirm foundation design is adequate.
- 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.

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Mid Term (6 Weeks)

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- i. Column shall be improved by providing additional 4-25 mm vertical rebar welded with the pipe.
 - ii. 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
 - iii. Engage a qualified structural engineer to confirm satisfactory structural performance of the buildings under wind loading.
 - iv. Have a qualified structural engineer prepare credible as-built documents based on the requirements of Part 8 Section 8.19 of the Alliance Standard.
 - v. Have a qualified structural engineer complete further analysis of the structure and develop a remediation plan if required.
 - vi. Adequately anchor and brace all non-structural elements to resist earthquake forces to comply with the BNBC and Alliance Standard.
 - vii. Complete further testing on areas of deterioration and have a qualified structural engineer develop a remediation plan.
 - viii. Have a qualified structural engineer develop Floor Loading Plans per the requirements of Part 8 Section 8.20.5.3.
 - 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. Load plans must be prepared by a qualified engineer and posted clearly on each floor and as necessary to distribute floor loads to comply with the floor loading plans as per Alliance Standard Part 8 Section 8.20.5.3

Long Term (6 Months)

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- i. Provide approved certificates of occupancy from local authority regarding the intended use of the building for industrial purposes.

The recommendations for Electrical Safety corrective actions are:

Immediate (3 to 6 Days)	<p>Remove light fixtures without protective covers from storage areas or in any area where the Inspector of the Factories Rules (1.5.3.5) Part 53 disallows these fixtures. Install compliant light fixtures with covers.</p> <p>Switchboards and/or distribution boards shall be kept clean and free from dust and debris. Establish a housekeeping program. Disconnect the panel from the electrical service and clean interior components of all dust and debris. Cover all openings within the enclosure to prevent dust and debris from entering.</p> <p>Remove all dirt, debris, lint, water, oil, and improperly stored materials from the substation room. Substation rooms shall be kept clean. Establish a housekeeping program.</p>
Short Term (3 Weeks)	
Mid Term (6 Weeks)	All boxes and enclosures (including transfer switches, generators, and power panels) for emergency circuits shall be permanently marked so they will be readily identified as

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	<p>a component of an emergency circuit or system. The required marking shall be by color code, the words “emergency system,” or any other method that identifies the box or enclosure as a component of the emergency system.</p> <p>Install metal enclosed distribution boards with dead front construction. All main switches shall be metal clad enclosed patterns or of any insulated enclosed pattern, and the switches shall be fixed at close proximity to the point of entry of supply.</p> <p>Install insulation for the cables and wiring as required. In order to avoid the effects of heat from external sources one of the following methods shall be used to protect wiring systems: (1) shielding; (2) placing 900 mm (36 in.) from the source of heat; (3) selecting a system with due regard for the additional temperature rise which may occur; (4) local reinforcement or substitution of insulating material.</p> <p>Clear identification/markings must be installed at LT, MDB and DB MCB/MCCB. Clear and permanent identification marks are required to be painted in all distribution boards, switchboards, sub main boards and switches. All distribution boards shall be marked "Lighting" or "Power" and shall be marked with the voltage and number of phases of the supply. Each shall be provided with a circuit list giving diagram of each circuit which it controls and the current rating for the circuit and size of fuse element.</p> <p>Install capacity information labels (Maximum current rating, no of circuit breakers etc.) for Switchboards and distribution boards. Capacity information labels shall describe the maximum number of protective devices that can be accommodated and describe the capacity of the box.</p> <p>Install ventilation for the substation room. Contract a qualified electrical engineer to determine the required ventilation rates based on the installed equipment. All the rooms shall be provided with partitions up to the ceiling and shall have required ventilation. Transformer rooms shall have proper ventilation and where necessary louvers at lower level and exhaust fans at higher level shall be provided at suitable locations in such a way that cross ventilation is maintained.</p> <p>Provide generator frame earthing (grounding) at two separate points.</p> <p>Install electrical insulation mats in front of distribution boards. Graded insulation/rubber mat need to provide in front of all switchboards and distribution boxes to prevent electrocution during work.</p> <p>Repair or replace meters and other electrical devices installed on the main electrical equipment are operational.</p>
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<p>Long Term (6 Months)</p>	<p>Contract a qualified electrical engineer to develop as-built electrical drawings providing detailing key components of the electrical system.</p> <p>Install earthing of equipment at required locations and connect to required number of electrodes. Refer to the BNBC for required number of electrodes. In general all parts of equipment and installation other than live parts shall be earth potential, thus ensuring that persons coming in contact with these parts shall also be at earth potential at all times.</p> <p>Install a readily accessible single point of disconnect for each main electrical service feed. Main feed of the panel shall include operable disconnect and shall be installed at accessible height, maximum 6 feet.</p> <p>Contract a qualified Electrical Engineer to design electrical cables sized according to capacity of circuit breakers. Replace wiring as required. Protective devices shall be provided to break any overload current flowing in the circuit conductors before such a current could cause a temperature rise detrimental to insulation, joints, terminations or surroundings of the conductors.</p> <p>Install earthing/grounding system for All metal in the building. In general all parts of equipment and installation other than live parts shall be earth potential, thus ensuring that persons coming in contact with these parts shall also be at earth potential at all times.</p> <p>Contract a qualified electrical engineer to design a lightning protection system according to the BNBC requirements. Contract a licensed electrician to install the designed system. Install protection against lightning depending on the probability of a stroke and acceptable risk levels. A complete lightning protection system shall consist of air termination network, down conductors and earth termination.</p> <p>Install switchboards and/or distribution boards in compliant locations, at an accessible height, at a safe distance from damp and wet locations, away from windows or doors where water may enter, etc.</p> <p>Install protective devices (circuit breakers) for all circuits drawn for loads. Install required protection at switchboards and distribution boards for all circuits and sub-circuits against short circuit and over-current. The protective apparatus shall be capable of interrupting any short circuit current that may occur without danger.</p> <p>Install emergency power for life safety loads. Life safety loads (fire alarm, fire pump, elevators, emergency lighting, exit signage, etc) shall be connected to the emergency power system to ensure an uninterrupted power supply to the equipment.</p>
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	<p>Install cable joints through porcelain/PVC connectors with PIB tape wound around joint. Cable joints shall be installed in accordance with the direction described in the standards to avoid loose connections.</p> <p>Implement an Insulation Resistance Measurement Program that ensures deterioration of insulation resistance will be identified quickly. Testing shall 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>Terminate all electrical wiring/cable properly at its point of termination. Unterminated cables may lead to electrical short circuit. Cables shall be connected to terminals only by soldered or welded lugs, unless the terminal are designed to securely clamp without cutting away any cable strands.</p> <p>Install dedicated neutrals for each circuit. The use of common neutral for more than one circuit is not allowed in the standard.</p> <p>Complete thermographic scans at least on a three year cycle. Thermographic scans shall be completed in accordance with the Standard for Infrared Inspection of Electrical Systems & Rotating Equipment and NFPA70B or a comparable standard.</p> <p>Install 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>Install grounding (earthing) for distribution boards per BNBC section 2.8.1. Panel board cabinets and panel board frames, if of metal, shall be in physical contact with each other and shall be grounded. Where the panel board is used with nonmetallic raceway or cable or where separate grounding conductors are provided, a terminal bar for the grounding conductors shall be secured inside the cabinet. The terminal bar shall be bonded to the cabinet and panel board frame, if of metal; otherwise it shall be connected to the grounding conductor that is run with the conductors feeding the panel board.</p> <p>Install phase separators between terminal connections. Phase separators are required at the terminals of circuit breakers to prevent arcing and short circuit between phases.</p> <p>Complete an oil analysis on applicable transformers at appropriate intervals based on voltage and power. Transformer oil analysis is shall be routinely performed to ensure uninterrupted service without major shutdowns.</p>
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The recommendations for Fire Safety corrective actions are:

Immediate (3 to 6 Days)	
Short Term (3 Weeks)	Remove all hasps, locks, slide bolts, or other locking devices in the means of egress.
Mid Term (6 Weeks)	Occupant load signage should be posted for every assembly and production floor, at a conspicuous space near the main exit or exit access doorway for the space. A hot work permit system program shall be enacted for all RMG facilities in accordance with NFPA 51B.
Long Term (6 Months)	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. Install a new automatic fire alarm and detection system in accordance NFPA 72. Once installed, arrange for direct connection of the fire alarm and detection system to a central station monitoring service or the Fire Service and Civil Defence as per Alliance Standard Part 5 Section 5.7.5 Monitoring. Until that time that a central station monitoring service or direct connection to the Fire Service and Civil Defence can be set up, a person trained to contact the Fire Service and Civil Defence in the event of fire alarm activation shall be provided. An annunciator shall be located in a constantly attended location (such as a fire control room) to alert this person