

Summary of Preliminary Assessment on Structural, Fire and Electrical Safety

Name of the Factory	: Divine Design Ltd
Address of the Factory	: 1 12/13 BSCIC I/A, Kalurghat, Chandgaon, Chittagong, Bangladesh
Present Status of the Factory	: Under Operation
Structural assessment conducted by	: Alliance
Date of Structural Inspection	: 15 Jun 2014
Fire & Electrical assessment conducted by	: Alliance
Date of Fire & Electrical Inspection	: 10 Jun 2014
BGMEA Membership No	: 5311
BGMEA Membership No	: 1665

BASIC INFORMATION:

There is one main building in the factory premises. The building is named as: 1) Seven Story RCC main production building. The following general information was noted:

i.	Building Usage Type	: Garments Factory.
ii.	Structural System	: Moment Resisting Frame
iii.	Floor System	: Monolithic beam slab.
iv.	Floor Area	: 68000.00 sft.
v.	No. of Stories	: 7-storied.
vi.	Construction Year	: 2010
vii.	Foundation Type	: Isolated column footing
viii.	Design Drawings	: Available.
ix.	Soil investigation Report	: Available
x.	Construction Materials	: Reinforced Concrete
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.

Mid Term (6 Weeks) :

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- i. Engage a qualified structural engineer to confirm structural performance of the structure.
- ii. 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.
- iii. 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.
- iv. 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. Relocate the water tanks immediately so that those are not placed closely to each other.
- v. Engage a qualified structural engineer to develop the required documents (i.e design report) to confirm the structural integrity of the buildings. Documents must comply with Alliance Standard Part 8 Section 8.19 and 8.20
- vi. Adequately anchor and brace all non-structural elements to resist earthquake forces to comply with the BNBC and Alliance Standard.
- vii. Engage a qualified structural engineer to confirm satisfactory structural performance of the buildings under wind loading.
- viii. Recommendations delivered during the previous assessment should be followed properly.
- ix. Have a qualified structural engineer prepare credible as-built documents based on the requirements of Part 8 Section 8.19 of the Alliance Standard.
- x. Under guidance from a qualified structural engineer, address all areas of needed maintenance by correcting the identified issues.
- xi. As part of the detailed assessment outlined elsewhere, conduct destructive core testing to validate the in-situ concrete compressive strength of structural elements.
- xii. Provide signage or the appropriate markings at all areas used for storage to indicate the acceptable loading limits detailed in the Load Plan.
- xiii. Have a qualified structural engineer develop Floor Loading Plans per the requirements of Part 8 Section 8.20.5.3.
- xiv. 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 all buildings.
- xv. Repair the exterior façade system to prevent water intrusion.

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Long Term (6 Months) :

- i. Necessary remediation work as per the recommendation of DEA
- ii. 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.

The recommendations for Electrical Safety corrective actions are:

Immediate	N/A
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>Install phase separators between terminal connections. Verify phase separators are installed at all remaining locations.</p> <p>Provide electrical insulation mats in front of distribution boards.</p> <p>Light fixtures without protective covers (otherwise known as naked lights) shall not be allowed in storage areas or in any area where the Inspector of the Factories Rules disallows these fixtures. Install signs posted in Bengali and English, indicating this prohibition at all entrances to these areas.</p> <p>Provide cable joints through porcelain/PVC connectors with PIB tape wound around joints.</p>
Mid Term (6 Weeks)	<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>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>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>Provide cable sockets for stranded conductors having a nominal cross sectional area 6mm² or greater. Conductors below 6 mm² without cable sockets, solder all strands at the exposed ends together or crimp using suitable sleeve or</p>

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	<p>ferrules.</p> <p>Ensure 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>
Long Term (6 Months)	<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 & Rotating Equipment and NFPA70B or a comparable standard.</p> <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>

The recommendations for Fire Safety corrective actions are:

Immediate	NA
Short Term (3 Weeks)	Remove existing gates and doors in the means of egress including all locking devices. Install doors with approved panic hardware that cannot be locked in the direction of egress under any conditions.
Mid Term (6 Weeks)	<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>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>Fire drills shall be conducted under the direction of a Fire Safety Director. All other requirements for fire drills shall be conducted in accordance with BNBC Part 4 Appendix A.</p> <p>Complete fire department pre-planning activities with the local Fire Service and Civil Defense.</p> <p>Apply to BSCIC, Chittagong for issuance of occupancy certificate and pursue the matter to expedite.</p> <p>Apply to BERC for 456KW power generation certificate and to BIDYUT LICENSE PRODAN BOARD for electrician license.</p>
Long Term (6 Months)	<p>Replace all non-compliant doors and frames in the means of egress with doors that are listed, approved, automatic-closing, side-swinging, fire rated doors in compatible fire rated frames with latching panic hardware.</p> <p>Provide opening protectives at all windows and other</p>

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	<p>openings on all the fire rated wall across the entire premises according to alliance standard Sections 3.4, 4.5 and 4.6. Close these openings if they are not required.</p> <p>Install 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>Have a qualified engineer review the pump capacity and ensure hydraulic calculation is done which can be supported by this pump. Also, identify all other performance data and ensure conformity to NFPA 14, 20, 22 and 25 standards.</p> <p>Install standpipe system at required locations. Standpipe system must comply with NFPA 14.</p> <p>Exits connecting four or more stories shall be enclosed with a minimum 2-hr fire-resistance rating. Install outward opening, side-swinging, self-closing, non-lockable fire doors of 1.5 hr rating in all stairwell enclosures as per Alliance 4.6.</p> <p>Replace all non-compliant doors and frames in the means of egress with doors that are listed, approved, automatic-closing, side-swinging, fire rated doors in compatible fire rated frames with latching panic hardware. Then provide re-entry as per Alliance Standards Part 6 Section 6.8.</p> <p>Arrange for direct connection of the fire alarm system to a central monitoring station or Fire Service and Civil</p> <p>Impart training in accordance with Alliance Safety Training Curriculum and keep record with proper documentation.</p> <p>Defense. Until that time that monitoring can be set up, arrange a monitoring system using factory's own central detection system and personnel. A person shall be assigned to contact the fire department in the event of fire alarm activation.</p> <p>Install illuminated exit signs 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>The means of egress paths shall be illuminated at all times the building is occupied. Illumination shall be a minimum of 10 lux for all corridors, exit doors, and stairways. Aisles shall be provided with a minimum 2.5 lux as per Alliance Standards Part 6 Section 6.7 Egress Illumination and Part 10 Section 10.12 Illumination of Exit Signs and Means Of Escape.</p> <p>Fire extinguishers are to be inspected, tested, and maintained in accordance with NFPA 10 Chapter 7.</p> <p>Develop an emergency evacuation plan which includes duties and responsibilities of various people/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</p>
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	<p>Alliance Standards and communicate the plan to all employees. The evacuation plan shall include provisions to assist physically disabled persons. A list of all employees with physical disabilities shall be kept by the Fire Service Director.</p> <p>Provide fire-resistive rated construction barriers between hazard types following Table 4.4.1 of Alliance Standard or Table 4.1.1 from BNBC Part 4. Consult a qualified fire protection engineer to design the required rated construction barrier. Otherwise relocate the fire pump from exit discharge point.</p> <p>Provide handrails on both side of each stairway. Provide intermediate handrail when the stair width exceeds 2.2m (87 inch). Provide handrail of height between the range 865 mm (34 in.) and 965 mm (38 in.).</p> <p>Install a standpipe system at required locations designed by a qualified fire protection engineer. The system is to be compliant with the requirements of NFPA 14.</p> <p>Establish a written housekeeping policy in compliance Section 13.6. 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.</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. The duties of the Fire Safety Director shall include the following: Establish internal and external rally points and communicate to all employees in the building. Fire department pre-planning. Conduct safety inspections as outlined in Alliance standard 13.9. Ensure all testing of fire protection equipment is conducted in accordance with Alliance standard 13.10.</p> <p>Install signage adjacent to each stair door indicating the stair name and the floor level at the noted locations.</p> <p>Develop a hot work permit program. The program must comply with the requirements of NFPA 51B. In general, this program should address process of request and approval authorities, necessary checks prior approval, standby fire watch and fire fighting equipment, sounding of alarm procedure, duration and expiry of permit and re-approval procedure etc.</p> <p>Once a standpipe system is installed at required locations designed by a qualified fire protection engineer, provide an inspection, testing and maintenance program in compliance with NFPA for the new system.</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 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</p>
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	pump. Program must comply with NFPA 25.
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