

Summary of Preliminary Assessment on Structural, Fire and Electrical Safety

Name of the Factory	: DESIGNER JEANS LTD.
Address of the Factory	: Plot No. 87 Beron Ashulia Savar Dhaka Bangladesh.
Present Status of the Factory	: Under Operation
Structural assessment conducted by	: Alliance
Date of Structural Inspection	: 19 Apr 2014
Fire & Electrical assessment conducted by	: Alliance
Date of Fire & Electrical Inspection	: 19 Apr 2014

BASIC INFORMATION:

The present garment factory comprises of eight stories with column and monolithic RC beam Supported slab. The following general information was noted:

i. Building Usage Type	: Garments Factory
ii. Structural System	: RC beam and column frame.
iii. Floor System	: RC beam Supported Slab.
iv. Floor Area	: approximately 104,987 square feet.
v. No. of Stories	: 8
vi. Construction Year	: 2004-2006.
vii. Foundation Type	: Unknown
viii. Design Drawings	: Available (As built)
ix. Soil investigation Report	: Available
x. Construction Materials	: Reinforced Concrete
xi. Generator	: Ancillary Building for Generator.

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.

The recommendations for Structural Safety corrective actions are:

Immediate : NA

Short Term: (3 Weeks) :

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- 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. An additional investigation should determine all of the locations in which that condition occurs (no structural connection between the concrete beam below and the concrete slab above). Contract a structural engineer to conduct this comprehensive structural investigation into the construction and load-bearing capacity of the referenced beam condition at all locations throughout the building. For those floor beams in which brick masonry infill is present, the structural analysis of the floor beam should consider that the beam and slab DO NOT act compositely. Follow any recommendations for remedial action.
- ii. Engage a qualified structural engineer to assess the strength of the concrete and quantity of the steel in the columns. Concrete strength shall be assessed by taking at least 4 nos. of 4 inch diameter cores from the area of concern. If cores are to be taken from column, it is advisable to take it from an upper level where the stresses are low (for practical reasons 3 inch cores may be taken from columns). In addition, UPV shall be used to have concrete strength in sufficient number of columns in the lower tiers so that a level of confidence is achieved. The calibrated results of core tests and UPV shall be used to determine a reliable value of concrete strength in columns. The size and diameter of steel rebar in most of the columns of two lowest tiers shall be authentically determined using a Ferro scanner or similar device. In order to confirm the diameter of embedded bars as obtained from Ferro scanner, the Assessor may have to remove the concrete cover in one or two locations.
- iii. Engage a qualified structural engineer to confirm satisfactory structural performance of the buildings under wind loading. Compliance may be waived if the Factory Owner provides satisfactory evidence of a cyclone operations plan that includes full evacuation of the factory in advance of any approaching cyclone.
- iv. The compressive strength of columns, floor framing and shear walls using MCAC shall be investigated by an appropriate program of in-situ testing and representative destructive testing of core samples.
- v. Develop engineered plans to brace all non-structural elements to resist earthquake forces to comply with the BNBC and Alliance Standard. Install anchor and braces as shown on approved plans.
- vi. Engage a qualified structural engineer to confirm and document that provisions have been made to accommodate concentrated loads of the water tanks.

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- vii. 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 (noted elsewhere).
- viii. Architectural plan approval should be provided with a date. Reconfirm the approval date with relevant authority and provide documentation.
- ix. Have a qualified structural engineer prepare credible as-built documents for the ancillary building (generator building) based on the requirements of Part 8 Section 8.19 of the Alliance Standard.
- x. Have a qualified structural engineer develop Floor Loading Plans per the requirements of Part 8 Section 8.20.5.3
- xi. Have a qualified structural engineer prepare load plans including the information required in Section 8.20 of the Alliance Standard. Load Plans shall be prepared for each floor. These Load Plans shall document the actual maximum operational loading that is intended and/or allowable on each floor. For each section of a floor, live load should be posted in the adjacent column, particularly for the critical sections.
- 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. Under guidance from a qualified structural engineer arrange geotechnical investigation at close vicinity of the structure and make the report available for review.

Long Term : NA

The recommendations for Fire Safety corrective actions are:

Immediate (3 to 6 Days)	Remove all combustibles stored underneath the cutting tables as per Alliance Standard Part 17 Section 13.7.2 Cutting tables.
Short Term (3 Weeks)	Remove all locking devices from exit doors. If locks are required for security reasons, utilize special door locking features complying with NFPA 101 (e.g. doors may be provided with locking hardware from the ingress side provided that a panic bar is installed).

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<p>Mid Term (6 Weeks)</p>	<p>Post maximum occupant load for all areas (near exit).</p> <p>Arrange for direct connection of the fire alarm and detection system to a central station monitoring service or the Fire Service and Civil Defense as per Alliance Standard Part 5 Section 5.7.5 Monitoring.</p> <p>Install signage adjacent to each stair door indicating the stair name (e.g. North Stairs) and the floor level at the noted locations.</p> <p>Assure signage and labeling for all standpipe system components per NFPA 14 Chapter 6. Including: identification of all valves with indication of what service they control, valve cabinets should be marked to include their contents, signs indicating the hydraulic design (e.g. location of most remote hose connections, design flow rate, inlet and outlet pressure, and design static pressure).</p>
<p>Long Term (6 Months)</p>	<p>Openings from exit enclosures to storage areas shall be provided with vestibules. The rating of the vestibule must match the rating of the exit enclosure (2-hr rating, 1.5 hour fire rated door assembly). Retain the services of a qualified fire engineer for the design of the vestibule/fire rating.</p> <p>Install an automatic sprinkler system throughout building that is designed by a qualified fire protection engineer.</p> <p>Revise the standpipe system to include Class I connections as defined by NFPA 14 (65 mm connections meant for Fire Department use in fighting fires) in all stairwells at each floor level. System changes should be designed by a qualified fire protection engineer (Provide shop drawings and hydraulic calculations as outlined in NFPA 14). Class II connections (40mm) will not be required once sprinklers are installed (see recommendation elsewhere). The standpipe must provide a minimum pressure of 450 kPa (65 psi) at the hydraulically most remote hose connection.</p> <p>Provide minimum 1.5-hr fire rated doors and seal all unprotected openings to separate the north exit stairs from work areas and other building spaces on all floor levels. Ensure that the fire doors are self-closing and positive latching and that they are provided with fire exit (panic) hardware where serving production floors. Fire doors assemblies shall conform to NFPA 252, BS 476 Part 22, EN 1364-1, GB 12955-2008, or IS 3614 Part II. Retain the services of qualified fire engineer to assist in specifying and installing fire rated assemblies.</p> <p>Remove all collapsible type gates/doors at and within the</p>

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	<p>exit stairs and along all portions of the means of egress. Replace with side-hinged swinging type doors in compliance with Standard. As noted elsewhere, exit enclosures require fire rated door assemblies (which should be side-hinged).</p> <p>During installation of fire rated door assemblies on north exit stair assure that every door in a stair enclosure serving more than 4 stories is provided with re-entry unless it meets the requirements of Alliance Standards Part 6 Section 6.8.3.1.</p> <p>Handrails shall be provided on both sides of each exit stairway. New handrails shall have a minimum height of 865 mm (34 in.) and a maximum height of 965 mm (38 in.) as measured from the leading edge of the tread.</p> <p>Fire department (Siamese) inlet connections should be installed to allow fire department pumper equipment to supplement the fire protection systems. 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. Signage for standpipe system is not in compliance with NFPA 14 Chapter 6 (e.g. no sign on Fire Department connection indicating STANDPIPE in 1 in lettering)</p> <p>Retain the services of a qualified fire engineer to properly design and approve enclosures listed below.</p> <p>Separate boiler room from other occupancies by a minimum 1 hour construction. Separate oil filled transformers for by a minimum 2 hour fire resistive rated construction. Separate substation from remainder of building by minimum 2-hr fire-rated construction. Seal and/or protect all openings to maintain the required fire separations. Generator sets shall be separated from all other occupancy areas by a minimum 2 hour construction. Wastage fabric storage room shall be separated from the surrounding occupancy with a minimum 1 hour construction. (NOTE: In process storage open to the surrounding occupancy is not required to be separated when the floor is provided. with automatic sprinkler, see additional recommendations regarding sprinklers).</p> <p>Separate cooking room from other occupancies by a minimum 1 hour construction.</p> <p>Install Illuminated exit signs at entrances to exits (7th floor dining room) and along the path of egress anywhere the continuation of egress is not obvious (north side Ground</p>
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	<p>Floor exit) or there is a change in the direction of the path of travel. The source of illumination shall provide not less than 50 lux at the illuminated surface with a contrast of not less than 0.5. Approved self-luminous signs, which provide evenly illuminated letters having a minimum luminance of 0.2cd/m², may also be used.</p> <p>Reconfigure/remove obstructions from exit doors and in exit corridors so as changes in elevation of walking surfaces do not exceed 6.35 mm (1/4 in) unless provided with a beveled slope of 1 in 2 that does not exceed 12.7 mm (1/2 in).</p> <p>Install emergency lighting at all exits and all paths of egress especially 6th floor egress route. For all areas confirm through testing (light meter) or other certification that all means of egress in ALL buildings will have illumination of 10 lux for all corridors, exit doors, and stairways and no less than 30 min in the event of failure of normal lighting.</p> <p>Develop a written hot work permit program. The program must comply with the requirements of NFPA 51B. Develop a maintenance and contractor safety policy that includes procedures for conducting hot work (e.g. welding). All hot work should be conducted with a proper permit and precautions must be available in case of fire (e.g. fire watch, fire extinguisher, etc.)</p> <p>Existing pump must be evaluated against requirements of NFPA 20 by a qualified fire engineer. Any deficiencies must then be rectified based on advice of engineer. All evaluations should be fully documented. All valves controlling fire pumps systems shall be electrically supervised by fire alarm system control unit. Inspections and testing should be conducted as per NFPA 25 Chapter 8. All testing should be made available for review.</p> <p>As noted elsewhere, illuminated exit signs must be placed at all exits or where exit path is not immediately apparent. The source of illumination shall provide not less than 50 lux at the illuminated surface with a contrast of not less than 0.5. Approved self-luminous signs, which provide evenly illuminated letters having a minimum luminance of 0.2cd/m², may also be used.</p>
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The recommendations for Electrical Safety corrective actions are:

Immediate	NA
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Short Term (3 Weeks)	<p>Ensure proper identification of emergency power switchboards, distribution boards, and circuits.</p> <p>Provide two separate points earthing (grounding) provided for generator.</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 (1.6.3.7) Part 53 disallows these fixtures.</p> <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>Inspection, maintenance, and testing procedures of the emergency generator need to be completed and documented.</p>
Mid Term (6 Weeks)	<p>Need to remove looping of wiring/cables at circuit breakers.</p> <p>Junction boxes and other electrical devices are needed to provide with covers.</p> <p>Install phase separators between terminal connections. Verify phase separators are installed at all locations (MCCB).</p> <p>Provide a capacity information label which contains the current carrying capacity and size of main cable, rated capacity of circuit breaker and the busbar (with dimension). Display panel schedules posted on panels' door (inner side).</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>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>Ensure the generator room properly rated and physically separated from the remainder of the building.</p> <p>Provide cable shaft for the whole building. Wiring and cables are arranged in shaft for ease of inspection and maintenance.</p>