

Summary of Preliminary Assessment on Structural, Fire and Electrical Safety

Name of the Factory	: Daf Knitwears Ltd
Address of the Factory	: 135/142, Nasirabad I/A, Baizid Bostami Road, Chittagong Bangladesh
Present Status of the Factory	: Under Operation
Structural assessment conducted by	: Alliance
Date of Structural Inspection	: 24 May 2014
Fire & Electrical assessment conducted by	: Alliance
Date of Fire & Electrical Inspection	: 21 May 2014
BKMEA Membership No	: 2144

BASIC INFORMATION:

There are 6 buildings in the factory premises out of which one is main production building and five are Ancillary buildings. The following general information was noted:

i.	Building Usage Type	: Garments Factory.
ii.	Structural System	: RC frame with RC column
iii.	Floor System	: Beam slab
iv.	Floor Area	: 87849 sft
v.	No. of Stories	: 6-storied main building.
vi.	Construction Year	: 2004-2009
vii.	Foundation Type	: Isolated column footing and combined footing.
viii.	Design Drawings	: Available.
ix.	Soil investigation Report	: Not Available
x.	Construction Materials	: Reinforced Concrete
xi.	Generator	: single storied shed

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. Under guidance from a qualified structural engineer arrange a Detail Engineering Assessment of both the main building within 6 weeks. This assessment should include destructive core testing to validate the in-situ concrete compressive strength of structural elements.
- ii. As part of the detailed engineering assessment outlined elsewhere, have a qualified structural engineer assess the durability aspects as suggested in Alliance Standard Part 7 Section 7.2, including destructive core cutting and testing to ensure concrete strength and take appropriate remedial measures.
- iii. As a part of Detail Engineering Assessment detailed elsewhere, under guidance from a qualified structural engineer arrange rebar scanning for all the important structural members.
- iv. 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.
- 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 complete an analytical evaluation of the structural impact of the addition.
- vii. 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.
- viii. 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.
- ix. Engage a qualified structural engineer to confirm satisfactory structural performance of the buildings under wind loading.
- x. Complete further testing on areas of deterioration and have a qualified structural engineer develop a remediation plan.
- xi. Under guidance from a qualified structural engineer, address all areas of needed maintenance by correcting the identified issues.
- xii. Under guidance from a qualified structural engineer arrange geotechnical investigation at close vicinity of the structure and make the report available for review.
- xiii. Have a qualified structural engineer develop Floor Loading Plans per the requirements of Part 8 Section 8.20.5.3.

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- 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 the building.
- xv. Provide signage or the appropriate markings at all areas used for storage to indicate the acceptable loading limits detailed in the Load Plan.

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	Remove all dirt, debris, lint, water, oil, and improperly stored materials from the substation rooms.
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>Ensure proper identification of emergency power switchboards, distribution boards, and circuits.</p> <p>Provide clear and permanent identification markings in all DBs, Switchboards, Sub-main boards & switches as necessary as per BNBC- Part 8 section 2.11.5.4.</p> <p>Lighting fittings shall be supported by suitable pipe/conduits, brackets fabricated from structural steel, steel chains or similar materials depending upon the type and weight of the fittings.</p>
Mid Term (6 Weeks)	<p>Provide earthing of equipment at required locations and connect to required number of electrodes.</p> <p>Ensure switchboards and/or distribution boards are metal enclosed with a dead front construction.</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>Cable joints are to be realized through porcelain/PVC connectors with PIB tape wound around.</p> <p>Ensure the means of identification is obtained by separate color coding, marking tape, tagging, or other approved means.</p> <p>Install switchboards and/or distribution boards in compliant locations so that operation is not hampered due to limited</p>

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	access.
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>Ensure the generator room properly rated and physically separated from the remainder of the building.</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)	<p>Remove all hasps, locks, slide bolts, or other locking devices at the noted locations. 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. 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. The re-entry provisions of section 6.8.3 must be met</p>
Mid Term (6 Weeks)	<p>Provide rated exit passageway i.e. protected path of egress from the exit enclosure to the public way. The rating of the exit passageway is to be equal to fire rating requirement of the exit that is being served and shall not be less than 1 hr fire-resistance rated.</p> <p>Develop a testing and maintenance program that ensures the operation of all emergency lights is verified at least once per year. If battery-operated emergency lights are used, these lights shall be tested on a monthly basis. Functional testing of battery powered emergency lights shall be provided for a minimum of 90 minutes 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 of 90 minutes once per year.</p> <p>Fire drills are to be conducted on a quarterly basis as outlined in BNBC Part 4 Appendix A for all garment facilities. Fire drills shall be conducted under the direction of a Fire Safety Director with a check list and a plan. All other requirements for fire drills shall be conducted in accordance with BNBC Part 4 Appendix A.</p> <p>Remove all combustibles stored underneath the cutting tables at the noted locations.</p>

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	<p>Apply to Chittagong Development Authority (CDA) for issuance of occupancy certificate and pursue the matter to expedite.</p> <p>Complete fire department pre-planning activities with the local Fire Service and Civil Defense.</p> <p>Get all the licenses and permits from the proper issuing authority. Apply to Bidyut Paridaptor for electrician license. Apply to CDA for approval of all building and sheds.</p> <p>Install signage adjacent to each stair door indicating the stair name at the noted locations.</p>
<p>Long Term (6 Months)</p>	<p>Provide 1.5 hr fire protective opening assemblies in 2 hr rated exit enclosure. Exits connecting three or fewer stories shall be enclosed with a minimum 1-hr fire-resistance rating. Exits connecting four or more stories shall be</p> <p>Replace all collapsible, sliding, roll-down gates and shutters in means of egresses with side-hinged swinging type doors of proper width and rating, enclosed with a minimum 2-hr fire-resistance rating.</p> <p>Provide opening protectives at all windows and other openings on all the fire rated wall across the entire premises. Close these openings if they are not required.</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. The hydraulic calculations and standpipe system installations shall be submitted for review by the Alliance for review prior to commencement of installation. System design should also account for the two additional stories currently under construction. Testing of the installation shall be conducted in accordance with NFPA 14 acceptance testing requirements. Documentation of all testing shall be submitted for review by the Alliance. Final inspection and testing of the installation shall be witnessed by the Alliance.</p> <p>Train and certify at least 25 percent of workers in fire fighting, first aid and rescue by the proper authority.E30:E31</p> <p>Provide 2 hr fire-resistive rated construction barriers at exit enclosures. Fit 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>Install a pump dedicated for fire fighting or fire protection following the requirements of NFPA 20. 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. Acceptance testing of the installation shall be in accordance with NFPA 20, 22, and 24 testing requirements. Documentation of all testing shall be submitted to the Alliance for review prior to final acceptance by the Alliance. This pump is to be connected to an alternative</p>

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	<p>power source such as a generator and the generator is</p> <p>Construct a rated exit passageway per section 6.15.</p> <p>Remove existing aisle marking and draw new marking to fulfill the minimum aisle width requirement. Relocate the machines accordingly if necessary.</p> <p>Provide fire-resistive rated assemblies at the required exit access corridors. The rated assembly should be approved or designed by a qualified fire protection engineer. Exit access corridors serving an occupant load exceeding 30 are to be separated by walls having a fire resistance rating of 1 hr in accordance with 4.5 unless provided with automatic sprinkler protection throughout the story or building. Window and Glass Block Assemblies are to be tested fire rating following NFPA 257.</p> <p>Increase stair width to minimum 0.9m. Or, close this stair and provide an alternate stair fulfilling the requirement for width and maximum travel distance.</p> <p>Manual fire alarm shall be provided throughout all new and existing occupancies B (2 or more story building), F (3 or more story building), G1, H and K unless located in buildings with other occupancies requiring an automatic fire alarm system as per clause 5.7.3. An automatic fire alarm shall be provided throughout all new and existing occupancies E, G2 and J. Approved shop drawings need to be prepared for pull stations, smoke detectors and audible devices.</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>Every door in a stair enclosure serving more than 5 stories shall be provided with re-entry unless it meets the following requirements. Stair doors may be permitted to be locked from the stair (ingress) side that prevents re-entry to the floor provided at least two floors allowing re-entry to access another exit are provided, there are not more than 4 stories intervening between re-entry floors, re-entry is allowed on the top or next to top level, reentry doors are identified as such on the stair side, and locked doors shall be identified as to the nearest re-entry floors. When the discharge floor is determined to be a required re-entry floor using the above requirements, re-entry does not have to be provided back into the building on this level.</p> <p>Impart training in accordance with Alliance Safety Training Curriculum and keep record with proper documentation.</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.</p> <p>Provided parapets or guards for all occupied roofs of a minimum height of 1067 mm (42in) as required.</p>
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	<p>Provide handrails on both side of each stairway. Provide intermediate handrail when the stair width exceeds 2.2m (87 inch).</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>Provide an emergency power source, either by battery backup or by connecting to the emergency power system, for compliantly illuminated exit signs.</p> <p>Fire extinguishers are to be inspected, tested, and maintained in accordance with NFPA 10 Chapter 7.</p> <p>Install appropriate means of illumination at the noted locations. 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.</p> <p>Arrange for direct connection of the fire alarm system to a central monitoring station or Fire Service and Civil Defense. Until that time that monitoring can be set up, a person shall be assigned to contact the fire department in the event of fire alarm activation. An annunciator shall be located in a constantly attended location (such as a fire control room) to alert this person.</p> <p>Make sure all required exit signs are illuminated continuously at all times. Exit signs may be illuminated either by lamps external to the sign or by lamps contained within the sign. 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>Establish written corporate and plant policies on housekeeping to 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. As a general rule the maximum tolerable deposit thickness for loose fluffy lint is 13 mm (½ in.) over a maximum of 46.5 m² (500 ft²). Limit dense deposits to 6 mm (¼ in.) and oil saturated deposits to 3.2 mm (⅛ in.).</p> <p>Install required identification signs at the noted locations. Signage must comply with NFPA 14 Chapter 6.</p> <p>Establish an inspection, maintenance, and testing program for the standpipe and hose system. Program must comply with the requirements of NFPA 25 Chapter 6 Table 6.1.1.2.</p> <p>Establish an inspection, maintenance, and testing program for the fire pump. Program must comply with NFPA 25.</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</p>
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	<p>authorities, necessary checks prior approval, standby fire watch and firefighting equipment, sounding of alarm procedure, duration and expiry of permit and re approval procedure etc.</p> <p>Provide handrail of height between the range 865 mm (34 in.) and 965 mm (38 in.).</p>
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