

Summary of Preliminary Assessment on Structural, Fire and Electrical Safety

Name of the Factory	: DB Tex Ltd.
Address of the Factory	: Nayapara, Kashimpur Gazipur, Bangladesh
Present Status of the Factory	: Under Operation
Structural assessment conducted by	: Alliance
Date of Structural Inspection	: 12-May-2014
Fire & Electrical assessment conducted by	: Alliance
Date of Fire & Electrical Inspection	: 10-May-14
BKMEA Membership No	: 1648

BASIC INFORMATION:

There are 16 buildings in the factory premises out of which nine are main production buildings, two are under construction buildings and 5 are ancillary buildings.(Number 1 to 9 are main buildings). The buildings are named as:1) MTL- Single story prefab production shed, 2) MTL- Three story RCC building, 3) HTL- Single story prefab production shed, 4) HTL- Four story steel structure building,5) HWL- Single story prefab production shed with mezzanine,6) DBTL- Single story prefab production shed,7) DBTL- Three story RCC building,8) DBTL- Three story RCC building,9) DBTL- Four story RCC building,10) Two Prefabricated Steel structure(Under construction),11) One five story R.C.C building(Under construction),12) Single story prefab boiler and compressor shed,13) Single story Generator and power control R.C.C Building,14) Single story Fire command CI shed,15) Single story Security building,16) Pump house building.(The buildings under construction will be main buildings when complete). The following general information was noted:

- i. Building Usage Type : Garments Factory
- ii. Structural System : The main portion of the factory building is single storied pre engineered structure. The store portion of the building in the middle is having four storied pre-engineered structure. The front portion of the building is having R.C framed structure. DB tex: DB tex ltd. is mainly a compound building .its major portion is consist of steel frame structure single PEB shade and the minor portion is consist of RCC framing system at north side (C-block/ three storied) & south side (D- block /three storied & E-block /four storied) which have been attached of the single PEB shed building.
- iii. Floor System : Steel structure and Beam supported slab in RCC building
- iv. Floor Area : Total area of all buildings in the premises: 373,260.12 sft.
- v. No. of Stories : 1)MTL-1 prefab production shed: Above grade: 1,below grade: 0,2) MTL-2 RCC building: Above grade: 3, below grade: 0, 3) HTL-1 prefab production shed: Above grade: 1, below grade: 0, 4) HTL-2 steel structure building: Above grade: 4, below grade: 0, 5) HWL prefab production shed with mezzanine: Above grade: 1, below grade: 0,6) DBTL-1 prefab production shed: Above grade: 1, below grade: 0, 7) DBTL-2 RCC building: Above grade: 3, below grade: 0,8) DBTL-3 RCC building: Above grade: 3, below grade: 0,9) DBTL-4 RCC building: Above grade: 4,below grade: 0,10) Two prefabricated Steel structure(Under construction), 11) One five story R.C.C building(Under construction),12) Prefab boiler and compressor shed: Above grade: 1, below grade: 0, 13) Generator and power control R.C.C Building: Above grade: 1,below grade: 0, 14) Fire command CI shed: Above grade: 1, below grade: 0,15) Security building: Above grade:

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	1, below grade: 0, 16) Pump house building: Above grade: 1, below grade: 0.
vi. Construction Year	: Factory personnel informed the date of construction as follows: 1) MTL-1 Single story prefab production shed: Finished in 2004, 2) MTL-2 Three story RCC building: Finished in 2004, 3) HTL-1 Single story prefab production shed: Finished in 2006, 4) HTL-2 Four story steel structure building: Finished in 2006, 5) HWL Single story prefab production shed with mezzanine: Finished in 2006, 6) DBTL-1 Single story prefab production shed: Finished in 2007, 7) DBTL-2 Three story RCC building: Finished in 2007, 8) DBTL-3 Three story RCC building: Finished in 2007, 9) DBTL-4 Four story RCC building: Finished in 2007.
vii. Foundation Type	: Unknown
viii. Design Drawings	: Available but not fully credible.
ix. Soil investigation Report	: Available.
x. Construction Materials	: Steel member and Reinforced Concrete for RCC portion.
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 loading limits as described on the Floor Loading Plans.

Mid Term (6 Weeks) :

- iii. Have a qualified structural engineer provide further testing and analysis of cracking in walls and provide a remediation plan to correct noted issues.
- iv. Adequately anchor and brace all non-structural elements to resist earthquake forces to comply with the BNBC and Alliance Standard.
- v. "Six storied Office & Store Building: Update the design report as per standard (Alliance Standard Part 8 Section 8.19 and 8.20) under guidance of a qualified structural engineer.

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- vi. Thermal & Boiler shed: Update the design report as per standard (Alliance Standard Part 8 Section 8.19 and 8.20 and BNBC 2006) under guidance of a qualified structural engineer.
- vii. For rest of the buildings (except PEB Production Shed) 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."
- viii. As the design report is not as per standard, further revision of design report is needed including confirmation of 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. "Six storied Office & Store Building: Under guidance of a qualified structural engineer update the design report to comply with the seismic and wind requirements stated in the 2006 BNBC.
- x. Thermal & Boiler shed: Under guidance of a qualified structural engineer update the design report to comply with the seismic and wind requirements stated in the 2006 BNBC.
- xi. For rest of the buildings (except PEB Production Shed) Have a qualified structural engineer document (i.e design report) compliance with the seismic and wind requirements stated in the 2006 BNBC."
- xii. "Six storied Office & Store Building: Under guidance of a qualified structural engineer update the design report to comply with the seismic and wind requirements stated in the 2006 BNBC.
- xiii. Thermal & Boiler shed: Under guidance of a qualified structural engineer update the design report to comply with the seismic and wind requirements stated in the 2006 BNBC.
- xiv. For rest of the buildings (except PEB Production Shed) have a qualified structural engineer document (i.e design report) compliance with the seismic and wind requirements stated in the 2006 BNBC."
- xv. Follow the Construction Practices and Safety requirements of Section 9 to maintain a accident free workplace.
- xvi. "Update the design reports based on the requirements of Part 8 Section 8.19 of the Alliance Standard and BNBC 2006 section 1.9.
- xvii. Also, have a qualified structural engineer prepare credible as-built documents based on the requirements of Part 8 Section 8.19 of the Alliance Standard for rain water harvesting building, generator shed and boiler & WTP shed."
- xviii. Under guidance from a qualified structural engineer, address all areas of needed maintenance by correcting the identified issues.
- xix. "Have a qualified structural engineer develop Floor Loading Plans for he multistory Office & Store building, stenter building, chemical dosing building as per the requirements of Part 8 Section 8.20.5.3
- xx. In case of remaining multistory structures, if they are supposed to use for production or storage purpose in future, floor load plans should be prepared for them also."
- xxi. Have a qualified structural engineer prepare load plans including the information required in Section 8.20 of the

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- Alliance Standard. Once Prepared do post them on each level of the building as required.
- xxii. "Have a qualified structural engineer develop Floor Loading Plans for the multistory Office & Store building, stenter building, chemical dosing building as per the requirements of Part 8 Section 8.20.5.3. Provide signage or the appropriate physical markings at all areas used for storage to indicate the acceptable loading limits detailed in the Load Plan.
- xxiii. In case of remaining multistory structures, if they are supposed to be used for production or storage purposes in future, floor load plans should be prepared for them also. After that, areas of storage should be physically marked to show acceptable loading limit."

Long Term (6 Months) :

The recommendations for Electrical Safety corrective actions are:

Immediate (3 to 6 Days)	Find out the cause of overheating, overloading, or signs of burning and take proper action.
Short Term (3 Weeks)	Ensure proper identification of emergency power switchboards, distribution boards, and circuits. Multi looping of wiring/cables should be removed at circuitbreakers within switchboards and/or distribution boards. Lighting and sockets should be separated.
Mid Term (6 Weeks)	Follow the color code for all Phase, Neutral and Earth conductors. Power and telecommunication or antenna cables are need to be led in separately. Electrical insulation mats are need to be provided in front of distribution boards. Distribution boards are need to metal enclosed with a dead front construction.
Long Term (6 Months)	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. Appoint a qualified electrical engineer to check and confirm the lightning protection system is designed and installed correctly according to BNBC requirements.

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The recommendations for Fire Safety corrective actions are:

Immediate (3 to 6 Days)	N/A
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.</p>
Mid Term (6 Weeks)	<p>Install a centralized automatic fire alarm and smoke/heat detection system with control panel following the requirement of NFPA 72 throughout all new and existing buildings and structures.</p> <p>Develop an emergency evacuation plan which includes all components required by the 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>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. All other requirements for fire drills shall be conducted in accordance with BNBC Part 4 Appendix A.</p> <p>Impart training in accordance with Alliance Safety Training Curriculum and keep records with proper documentation.</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 signs are to be 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 extinguishers with a gross weight of less than 18.14 kg (40 lb) shall be installed so that the top of the fire extinguisher is not more than 1.53 m (5 feet) above the floor. Fire extinguishers with a gross weight greater than 18.14 kg (40 lb) (except wheeled types) shall be installed so that the top of the fire extinguisher is not more than 1.07 m (3½ feet) above the floor.</p> <p>Develop a testing and maintenance program that ensures the operation of egress illumination lights is verified at least once per year. 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 of 90 minutes once per year.</p> <p>Post the occupant load for every assembly and production floor in a facility in a conspicuous space near the main exit</p>

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	<p>or exit access doorway for the space.</p> <p>Complete and document fire department pre-planning activities with the local Fire Service and Civil Defense.</p>
<p>Long Term (6 Months)</p>	<p>Provide a shaft enclosure of required rating by constructing the enclosure with rated material of the required thickness. Protect the openings of shaft enclosure by providing rated opening protective.</p> <p>Provide a fire-resistive rated assembly between the exterior exit stair and the building up to 10 feet beyond the end of the stairway to achieve the required separation. Enclose any openings (windows, etc.) with required fire rated construction within that 10 ft wall section. The rated assembly should be approved and/or designed by a qualified fire protection engineer.</p> <p>Provide 1 hour fire protective opening assemblies in 1 hour rated exit enclosures. Provide 1.5 hour fire protective opening assemblies in 2 hour rated exit enclosures. Exits connecting three stories shall be enclosed with a minimum 1 hour fire-resistance rating. Exits connecting four or more stories shall be enclosed with a minimum 2 hour fire-resistance rating. Exits shall be enclosed with the same fire-resistance rating as the floor penetrated but will not need to exceed 2 hours.</p> <p>Provide a 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 hour fire-resistance rated.</p> <p>Provide a rated exit enclosure and exit passageway (i.e., a 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 hour fire-resistance rated.</p> <p>Replace all collapsible doors, sliding doors, roll-down gates, and shutters in the means of egress with side-hinged, swinging-type doors of proper width and rating.</p> <p>Provide fire-resistive rated opening or penetration protection for rated walls and assemblies in accordance with Alliance Standard Sections 4.6 and 4.7. Consult a qualified fire protection engineer to design the required opening protective.</p> <p>Provide fire-resistive rated construction barriers between floors following Table 4.4.1 of Alliance Standard. Consult a qualified fire protection engineer to design the rated construction barriers.</p> <p>Provide fire-resistive rated construction barriers for exit enclosures in accordance with Alliance Standard Sections 4.5. Consult a qualified fire protection engineer to design the required rated construction barrier.</p> <p>Install a pump dedicated for firefighting or fire protection following the requirements of NFPA 20. Fire pump installation is to be tested for final acceptance in the</p>

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presence of the 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. This pump is to be connected to an alternative power source such as a generator, and the generator is to be connected with ATS (auto starter).

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 standpipe system for the DBTL-4 and HTL-2 buildings designed by a qualified fire protection engineer. The hydraulic calculations should be reviewed by the Alliance and the review is to be completed prior to start of work. Standalone standpipe systems shall meet the local BNBC requirements with a minimum 450 kPa (65 psi) pressure at the hydraulically most remote hose connection. 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.

Provide fire-resistive rated assemblies at the required exit access corridors. The rated assembly should be approved and/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 hour unless provided with automatic sprinkler protection throughout the story or building. Windows and glass block assemblies are to be tested for fire rating.

Provide fire-resistive rated construction barriers between hazard types in accordance with Alliance Standard Sections 3.4 and 4.5. Consult a qualified fire protection engineer to design the required rated construction barrier.

Provide handrails on both sides of each stairway. Intermediate handrails shall be provided when the stair width exceeds 2.2 m (87 in.). Mount new handrail at a height consistent with existing height (between 30 in. and 44 in.).

Arrange for direct connection of the fire alarm system to a central monitoring station or Fire Service and Civil Defense. Until such 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. An annunciator shall be located in a constantly attended location (such as a fire control room) to alert this

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	<p>person.</p> <p>Install fire department connections where required and in compliance with the Standard. Connections shall match the Fire Service and Civil Defense hose thread standard.</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 illuminating exit signs.</p> <p>Fire extinguishers are to be inspected, tested, and maintained in accordance with NFPA10.</p> <p>Establish an inspection, maintenance, and testing program for the standpipe and hose systems that comply with NFPA 25.</p> <p>Develop a hot-work permit program that complies with NFPA 51B. In general, this program should address the process of request and approval of authorities, necessary checks prior to approval, standby fire watch and firefighting equipment, sounding of alarm procedures, duration and expiry of permit and reapproved procedures, etc.</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 0.2 cd/m² may also be used.</p>
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