

## Summary of Preliminary Assessment on Structural, Fire and Electrical Safety

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Name of the Factory	: <b>Trouser Line Ltd</b>
Address of the Factory	: Toyebpur, Yarpur, Ashulia, Savar Ashulia, Savar Dhaka Bangladesh
Present Status of the Factory	: <b>Under Operation</b>
Structural assessment conducted by	: Alliance
Date of Structural Inspection	: 1-Mar-14
Fire & Electrical assessment conducted by	: Alliance
Date of Fire & Electrical Inspection	: 22-June-14 and 29-June-14
BGMEA Membership No	:4957

### **BASIC INFORMATION:**

There is 02 No buildings in the factory premises of which 4 storied RCC and single storied steel main building. The following general information was noted:

- i. Building Usage Type : Garment Factory.
- ii. Structural System : One RC building and one steel shed building (moment resisting frames with RC spread footings).
- iii. Floor System : RCC and Steel frame structure
- iv. Floor Area : 46500 sft.
- v. No. of Stories : Building 1: 2 storied Partially 4 storied RC building.  
Building 2: 1-storied shed. steel shed.
- vi. Construction Year : 2005
- vii. Foundation Type : Unknown
- viii. Design Drawings : Available.
- ix. Soil investigation Report : Available.
- x. Construction Materials : Steel frame
- 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 :
- i. Factory operations should be managed to limit floor live loads to 50psf maximum. Material storage and operating equipment should be continuously monitored to avoid floor loads that may exceed the floor design capacity. Techniques to manage the storage loads might include reducing the height of the stacks of materials, increasing the aisle widths between the stacks, and/or mixing lighter materials with the heavier materials.
  - ii. Factory operations should be managed to limit floor live loads to 50psf maximum. Material storage and operating equipment should be continuously monitored to avoid floor loads that may exceed the floor design capacity. Techniques to manage the storage loads might include reducing the height of the stacks of

## Summary of Preliminary Assessment on Structural, Fire and Electrical Safety

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materials, increasing the aisle widths between the stacks, and/or mixing lighter materials with the heavier materials.

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 load limits as described on the Floor Load Plans.

Mid Term (6 Weeks) :

- i. Structural documents, if available, should be made available for review. If structural drawings are not available, provide letter from the structural engineer responsible for the design describing the lateral load resisting system(s) and lateral load path(s).
- ii. Under guidance from a qualified structural engineer arrange Detail Engineering Assessment of the structure. This assessment should be conducted within 6 weeks and should include destructive testing to validate the in-situ tensile strength of structural steel elements.
- iii. Once floor loads plans are posted redistribute floor loads to comply with the Floor Loading Plans.
- iv. Structural and architectural documents, if available, should be provided for review."
- 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. The capacity of the building structure to safely support the additional loads applied by the added roof structure should be confirmed. The factory owner should obtain from the building structural engineer of record evidence that the roof as designed is adequate to resist these loads. Alternately the rooftop structure can be removed.
- vii. If verified that the observed water tanks are located on the factory building, the capacity of the structure to safely support the resulting loads should be confirmed. The Factory Owner should obtain from the building structural engineer of record evidence that the roof and building structure was designed to safely accommodate the loads applied by these tanks, or the tanks should be removed from the roof.
- viii. Engage a qualified structural engineer to confirm satisfactory structural performance of the buildings under wind loading.
- ix. If structural drawings are not available, the Factory Owner should provide a letter from the structural engineer responsible for the design describing the lateral load resisting system(s) and lateral load path(s) with supporting documentation.
- x. Adequately anchor and brace all non-structural elements to resist earthquake forces to comply with the BNBC and Alliance Standard.

## Summary of Preliminary Assessment on Structural, Fire and Electrical Safety

- xi. The capacity of the building structure to safely support the additional loads applied by the added roof structure should be confirmed. The factory owner should obtain from the building structural engineer of record evidence that the roof as designed is adequate to resist these loads. Alternately the rooftop structure can be removed.
- xii. Have a qualified structural engineer develop Floor Loading Plans per the requirements of Part 8 Section 8.20.5.3
- xiii. Have a qualified structural engineer prepare load plans including the information required in Section 8.20 of the Alliance Standard.
- xiv. 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. Provide Certificates of Occupancy for review.
- ii. Depending on the findings of the Detail Engineering Assessment, permanent remedial measures should be conducted for the safety of the building.

### The recommendations for Electrical Safety corrective actions are:

Immediate (3 to 6 Days)	<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. Install signs posted in Bengali and English, indicating this prohibition at all entrances to these areas.</p> <p>Find out the cause of overheating, overloading, or signs of burning and take proper action. Consider replacement of equipment immediately if necessary.</p>
Short Term (3 Weeks)	<p>Provide required Equipments and safety signage are posted within the room.</p> <p>Provide two separate points earthing (grounding) provided for generator from two individual earth pit.</p>
Mid Term (6 Weeks)	<p>Provide capacity information labels (Maximum current rating, no of circuit breakers etc.) for switchboards and/or distribution boards.</p> <p>Ensure distribution boards with a dead front construction.</p>
Long Term (6 Months)	<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>Establish a periodic inspection program to ensure the electrical systems are free from damage, debris, dirt, lint, etc. Maintain records concerning inspections and follow up actions.</p> <p>Develop an Insulation Resistance Measurement Program that</p>

## Summary of Preliminary Assessment on Structural, Fire and Electrical Safety

	<p>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>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 &amp; Rotating Equipment and NFPA70B or a comparable standard.</p> <p>Ensure inspection and testing procedures of the emergency generator being completed and documented.</p>
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### The recommendations for Fire Safety corrective actions are:

Immediate (3 to 6 Days)	Remove all combustibles stored underneath the cutting tables.
Short Term (3 Weeks)	Remove all locking devices from all egress doors and means of egress components.
Mid Term (6 Weeks)	<p>Post the occupant load for all assembly and production floor areas in a conspicuous space near the main exit or exit access doorway for the space.</p> <p>Install signage adjacent to each stair door indicating the stair name and the floor level in both English and Bengali.</p>
Long Term (6 Months)	<p>Provide a 2-hr. rated exterior wall along the exterior stairs and protect all openings with 90 min. doors. Have a structural engineer evaluate the stair and possibly rebuild this stair structure more remote from the building to provide adequate separation.</p> <p>Provide automatic sprinkler protection throughout the building to increase the allowable occupant loads on each floor. In the interim limit the occupant load on the 1st Floor to 542 and the 2nd Floor to 533.</p> <p>Replace all non-compliant doors in the means of egress with side-hinged swinging type doors.</p> <p>Reconfigure 2nd exit so that once an occupant leaves the building, they do not have to reenter to continue egress unless entering directly into a rated stair enclosure.</p> <p>Provide automatic sprinkler protection throughout the facility. The installation of sprinkler protection should be conducted in phases. The first phase would be to protect all storage areas. Prior to installation, the system should be properly designed by a qualified fire protection engineer</p>

## Summary of Preliminary Assessment on Structural, Fire and Electrical Safety

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	<p>and plans should be submitted to the Alliance for review.</p> <p>Provide fire-resistive rated construction barriers for exit enclosures in accordance with Alliance Standard Section 6.3.1.2. Consult a qualified fire protection engineer to design the required rated construction barrier.</p> <p>Install a dedicated fire pump for the facility in accordance with NFPA 20. Also, install a water storage tank in accordance with NFPA 22.</p> <p>Install initiating devices and notification appliances as required by the Alliance Standard and NFPA 72. Devices should be part of an automatic fire alarm and detection system for the facility.</p> <p>Either provide automatic sprinkler protection throughout in accordance with Alliance Standard Sections 3.5.3.1 and 5.3 or protect the structural steel with fire-resistive rated materials.</p> <p>Install standpipe system at required locations. Standpipe system must comply with NFPA 14.</p> <p>Remove additional exit stair from dining that obstructs the West Stair.</p>
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