

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

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Name of the Factory	: <b>United Trousers Ltd</b>
Address of the Factory	: 20, Bangabondhu Road, Gouripur, Ashulia, Dhaka-1341
Present Status of the Factory	: <b>Under Operation</b>
Structural assessment conducted by	: Alliance
Date of Structural Inspection	: 22-May-2014
Fire & Electrical assessment conducted by:	Alliance
Date of Fire & Electrical Inspection	: 22 May 2014

### **BASIC INFORMATION:**

The present garment factory consists of 1 RCC buildings, 1 Steel shed, 1 Generator room, 1 Boiler shed and a kitchen room. The following general information was noted:

i.	Building Usage Type	: Garments Factory.
ii.	Structural System	: 1F and 2F slab is flat slab and above 2F are beam Supported slab
iii.	Floor System	: Beam slab and flat slab both.
iv.	Floor Area	: RCC building 60,000 sft (Existing), Steel shed 16800 sft
v.	No. of Stories	: 3 storied (partially completed 4th floor). The ground, 1st & 2nd floor is using for production purposes.
vi.	Construction Year	: RCC building is in 2010-2011, Steel shed in 2010
vii.	Foundation Type	: Unknown
viii.	Design Drawings	: Available
ix.	Soil investigation Report	: Available
x.	Construction Materials	: Reinforced Concrete.
xi.	Generator	: In a separate building.

### **RECOMMENDATIONS FOR CORRECTIVE ACTION:**

The recommendations of corrective action for Structural, Fire and Electrical Safety comprises in Short Term, Mid Term and Long Term basis.

#### **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.
- iii. Complete further testing on areas of deterioration and have a qualified structural engineer develop a remediation plan.

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Mid Term: (6 Weeks)

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- i. Take necessary steps for reducing the corrosion of steel and during construction check the construction work with qualified structural engineer.
- ii. Redistribute floor loads to comply with the Floor Loading Plans.
- iii. Have a qualified structural engineer prepare credible as-built documents based on the requirements of Part 8 Section 8.19 of the Alliance Standard.
- iv. Needs as built structural drawings and detail assessment to ensure the rebar in the columns.
- v. have a qualified structural engineer assess the durability aspects as suggested in Alliance Standard Part 7 Section 7.2 and take appropriate remedial measures
- vi. Have a qualified structural engineer complete an analytical evaluation of the structural impact of the addition.
- vii. Under guidance from a qualified structural engineer, address all areas of needed maintenance by correcting the identified issues.
- viii. 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.
- ix. Have a qualified structural engineer develop Floor Loading Plans per the requirements of Part 8 Section 8.20.5.3
- x. Have a qualified structural engineer prepare load plans including the information required in Section 8.20 of the Alliance Standard.
- xi. Provide Certificates of Occupancy for review.
- xii. 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)

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- i. 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.
- ii. Necessary remediation after assessment.

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

Immediate (3 to 6 Days)	Keep areas beneath cutting tables clear of combustibles at all times.
Short Term (3 Weeks)	Reduce the occupant load as per the capacity of the floor and the available means of egress or increase the available number and/or width of exits for this level.

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	<p>Doors shall be kept lock free in the direction of egress under all conditions. All hasps, locks, slide bolts, and other locking devices shall be removed where installed.</p>
<p>Mid Term (6 Weeks)</p>	<p>Post the occupant load for every assembly and production floor in a conspicuous space near the main exit or exit access doorway for the space.</p> <p>Develop a testing and maintenance program that ensures the operation of all exit signs is verified at least once per year. If battery-operated signs are used, these lights shall be tested on a monthly basis. Functional testing of battery powered signs shall be provided for a minimum 90 min 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 90 min once per year. Functional testing of battery powered signs is provided for a minimum 90 min once per year.</p> <p>Centralized fire alarm and detection system shall be install and the control panel of this system shall be monitored by a central station monitoring service or directly connected to the Fire Service and Civil Defense. Until that time that a central station monitoring service or direct connection to the Fire Service and Civil Defense can be set up, a person need to be assigned to contact the fire department in the event of fire alarm activation. An annunciator need to be located in a constantly attended location to alert this person.</p> <p>Training programs need to be implemented and documented in accordance with the Alliance Safety Training Curriculum.</p> <p>Once standpipe system is installed in accordance with NFPA 14, adjust and install signage at required locations and on required equipment. Signage must comply with NFPA 14.</p> <p>Apply to RAJUK for issuance of the Certificates of Occupancy for each building and ancillary structure according to building use. Pursue the matter to expedite.</p> <p>All applicable permits and license shall be kept up to date including BEREC waiver certificate of generator.</p> <p>Complete fire department pre-planning activities with the local Fire Service and Civil Defense.</p>

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Long Term (6 Months)	<p>Provide fire-resistive rated construction barriers and associated opening protection for elevators in accordance with Alliance Standard Section 10.14 and BNBC Part 8. Consult a qualified fire protection engineer to design the required rated construction of shaft.</p> <p>Provide fire-resistive rated assemblies for exit access corridors in accordance with Alliance Standard Section 6.3.1.1 or provide an automatic sprinkler system throughout the story or building per NFPA 13. Consult a qualified fire protection engineer to design the required rated assembly or sprinkler system.</p> <p>Replace all non-compliant doors and frames in the means of egress with side-swinging doors in accordance with Alliance Standard Section 6.8. Replacement doors shall be listed, approved, self-closing, fire rated door assemblies (door and frame) with latching panic hardware.</p> <p>Provide landing with the same width of stair in the direction of egress travel as the stair clear width provided at each level and at intermediate landings.</p> <p>Provide fire-resistive rated opening and 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 protectives or penetration systems.</p> <p>Provide one-hour fire rated construction for the egress court on both sides for a distance of 3050 mm (10 ft.) above the floor of the court.</p> <p>Modify existing or install new standpipe system to meet the requirements of Alliance Standard Part 5 Section 5.4. Standpipe system must also comply with the requirements of NFPA 14. Any newly installed standpipe system needs to be evaluated for compliance with the design pressure and flow demands of NFPA 14 or BNBC Section 5.4.3. Consult a qualified fire protection engineer before modifying existing or installing new system.</p> <p>Install a dedicated fire pump in accordance with NFPA 20 to supply the water demands for the fire protection systems along with a stored source of water to meet the demands per NFPA 22.</p> <p>Design and install automatic fire detection and alarm system by a qualified fire protection engineer throughout the building. Notification devices shall be spaced appropriately based on NFPA 72.</p>
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	<p>Provide fire-resistive rated penetration protection for floor assemblies and assemblies in accordance with Alliance Standard Sections 4.7. Consult a qualified fire protection engineer to design the required penetration systems.</p> <p>Provide fire-resistive rated construction barriers and associated opening protection 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 barriers with opening protection.</p> <p>Provide fire-resistive rated construction barriers between hazard types in accordance with Alliance Standard Sections 3.4 and 4.5. Rooms used for housing boiler, shall be separated from the surrounding occupancy with a minimum 1-hour fire rated construction with 0.75-hour fire rated opening protection (doors, windows, etc.). Rooms used for housing generators or oil filled transformers, shall be separated from surrounding occupancy with a minimum 2-hour fire rated construction with 1.5-hour fire rated opening protection (doors, windows, etc.). Fire doors shall be of the side-hinged, swinging type and shall swing in the direction of egress. Doors shall have a minimum clear width of 1 m (39 in.). Consult a qualified fire protection engineer to design the required rated construction barrier.</p> <p>Install handrails on the both sides of the stairs. 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 needs to be maintained when installing new handrails. Guards, where required shall be provided in accordance with Alliance Standard Section 6.3.7.</p> <p>Install Portable fire extinguishers as per potential fire class and hazards all through the building in accordance with NFPA 10 Chapter 5.</p> <p>Establish an inspection, testing, and maintenance program for all fire extinguishers. Program needs to comply with the requirements of NFPA 10 chapter 7.</p> <p>Install Illuminated exit signs with backup power and continuous graphics 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 parapet in every occupied roofs with a minimum height of 1067 mm (42 in.).</p> <p>Provide Fire Department (Siamese) connections in accordance with Alliance Standard Section 5.5.4. Connections shall match the Fire Service and Civil Defense</p>
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	<p>hose thread standard. Consult with a qualified fire protection engineer to design the Fire Department Connections.</p> <p>Repair or replace damaged piping at the noted locations. Repairs and replacements must comply with NFPA 14 and NFPA 25.</p> <p>Reduce the change of elevation with beveled slope of 1 in 2 that does not exceed 12.7 mm (1/2 in). Also an additional signage or floor marking is required.</p> <p>Once new fire pump is installed, establish an inspection, testing, and maintenance program for the fire pump. Program must comply with NFPA 25.</p> <p>Once a compliant system is installed, establish an inspection, testing, and maintenance program for the standpipe and hose system. Program needs to comply with the requirements of NFPA 25.</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.</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.</p> <p>Develop a hot work permit program. The program must comply with the requirements of NFPA 51B.</p>
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### The recommendations for Electrical Safety corrective actions are:

Immediate (3 to 6 Days)	<p>Ensure Signage indicating the prohibition of light fixtures without protective covers is installed at required locations.</p> <p>Find out the cause of overheating, overloading, or signs of burning and take proper action.</p>
Short Term (3 Weeks)	<p>Install additional lighting fixtures so that a minimum of 150 lux of illumination is available on all sides of the generator to perform maintenance.</p> <p>Ensure light fixtures without protective covers are not installed in storage areas or in any area where the Inspector of the Factories Rules (1.5.3.5) Part 53 disallows these fixtures.</p>

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	<p>Install two distinct earth connections of minimum 35 sqmm for generator frame earthing.</p>
<p>Mid Term (6 Weeks)</p>	<p>Have a qualified electrical engineer develop an as-built single line diagram, detailing key components and the capacity of the electrical system.</p> <p>Install phase separators between terminal connections. Verify phase separators are installed at all locations (MCCB).</p> <p>Remove multi looping of cables at circuit breakers within distribution boards.</p> <p>Remove the sanitary pipes from substation room and seal the openings.</p> <p>Complete an oil analysis on applicable transformers at appropriate intervals based on voltage and power.</p> <p>Relocate the distribution boards to a location where proper clearance is available in front.</p>
<p>Long Term ( 6 Months)</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>Develop an Insulation Resistance Measurement Program that ensures deterioration of insulation resistance will be identified quickly. Testing should be in compliance with Inter National 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>Provide fire rated doors on required sides of the substation room. Provide fire rated separation for space above the substation main door. Seal the holes for cables and BBT using non-combustible material.</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> <p>Check all the cables and circuit breakers and sort out the higher rated circuit breakers. The rated current of a protective device (MCB, MCCB and fuse) must not exceed the current carrying capacity of any conductor in the circuit.</p>