

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

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Name of the Factory	: Design Express Ltd.
Address of the Factory	: Bhogra, Chandana, Gazipur, Bangladesh
Present Status of the Factory	: Under Operation.
Structural Assessment Conducted by	: VEC
Date of Structural Inspection	: 6 <sup>th</sup> June, 2015
Fire Assessment Conducted by	: VEC
Date of Fire Inspection	: 6 <sup>th</sup> June, 2015
Electrical Assessment Conducted by	: VEC
Date of Electrical Inspection	: 6 <sup>th</sup> June, 2015
BGMEA Membership No.	: 4292

### **BASIC INFORMATION:**

The assessed factory building is a two storied RCC beam column frame structure. Roof is used as a dining shed for their worker, which covered 50% of the roof level. Design Express Ltd. occupied the entire building. The following general information was noted:

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|-------------------------------|---|
| i. Building Usage Type        | : Garment Factory.  |
| ii. Structural System         | : RCC beam column frame system.   |
| iii. Floor System             | : RCC beam slab floor system.   |
| iv. Floor Area                | : Total floor area is 10000 sft.  |
| v. No. of Stories             | : 2-Storey.   |
| vi. Construction Year         | : 2006-2007.  |
| vii. Foundation Type          | : Pile foundation.  |
| viii. Design Drawings         | : Available: Structural drawing, Approval plan, machine lay-out plan, architectural drawing.<br>Not available- Floor load plan, Material test report. |
| ix. Soil Investigation Report | : Unavailable.  |
| x. Construction Materials     | : Brick Aggregate.(In column)   |
| xi. Generator                 | : At ground floor.  |

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

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

The recommendations for **Structural Safety** corrective action are:

Short Term (Immediate) : None.

Mid Term (6-weeks) : None.

Long Term (6-months) :

- Prepare the Floor load plan & Material test report by qualified engineer and should be kept on site for review.

The recommendations for **Fire & Electrical Safety** corrective action are:

**(A): Recommendations for Fire Safety corrective actions:**

Immediate <i>(the factory should not continue to be occupied until these non-conformities</i>	<ul style="list-style-type: none"><li>• None.</li></ul>
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<p><i>have been rectified):</i></p>	
<p>Short Term</p> <p><i>(Actions that must be incorporated into a Fire Safety Management Plan immediately (1 ~ 2 weeks) and should be a regular activity</i></p>	<ul style="list-style-type: none"> <li>• Factory needs to ensure adequate numbers of exit signs which need to be visible from any positions and comply with the following conditions: <ul style="list-style-type: none"> <li>(a) The color and design of lettering, arrows and other symbols on exit signs needs to be in high contrast with their background;</li> <li>(b) Words on the signs needs to be at least 150 mm with a stroke of not less 20 mm;</li> <li>(c) The source of illumination, contrast, intensity and luminance needs to be at least 50 lux, 0.5, 5.0 foot-candles and 0.2 cd/m<sup>2</sup> respectively.</li> </ul> </li> <li>• Factory needs to seal the penetration in rated wall by 2 hours fire rated construction/materials (Both the externally and internally).</li> <li>• Combustibles are to be managed with good housekeeping. Storage facilities with no air-conditioning duct shall be minimum 2.9 m and when used as a storage facility there shall be a minimum clearance of one third the floor height from the ceiling to the top of the storage stack.</li> </ul>
<p>Mid Term</p> <p><i>(The remedial works indicated must be carried out within a period of 6 weeks)</i></p>	<ul style="list-style-type: none"> <li>• Factory needs to prepare as built drawing with floor machine layout showing means of escape with proper dimension.</li> <li>• Fire manager/Director need to have safety training from proper authority &amp; worker of the factory should as far as possible be trained for use fire extinguisher.</li> <li>• Fire license needs to be updated for full occupied area.</li> <li>• All the exit doors need to be replaced by side swinging so that un-lockable doors can be opened easily in the direction of evacuation without the use of a key.</li> <li>• Factory needs to provide handrail on both sides of all the stairways.</li> <li>• Illuminated emergency light needs to be covered in all floors, exits, staircases and aisles of all the factory buildings or sheds. The intensity of illumination by means of escape lighting needs to be equal or more than 10 lux. The aisles need to be illuminated with escape lighting to a level of not less than 2.5 lux at floor level.</li> </ul>

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	<ul style="list-style-type: none"> <li>• Emergency back-up power needs to be connected for (a) exit sign, (b) fire alarm and detection system, (c) emergency lighting, (d) automatic fire detection and alarms systems.</li> </ul>
<p>Long Term</p> <p><i>(The remedial works indicated must be carried out within a period of 6 months)</i></p>	<ul style="list-style-type: none"> <li>• Factory needs to have a proper pre-plan for fire department.</li> <li>• Storage area need to be protected with 2 hours rated construction and 1.5 hours rated opening or doors.</li> <li>• All the stairs(Stair-1&amp;2) need to be protected with fire and smoke resistant enclosures and opening (1 hours rated enclosure and 45 minutes fire rated door) and provide theprotected route from all though the stairway to the final exits.</li> <li>• Factory need to install centralized and automatic fire detection &amp; alarm system on all occupied floors, including other tenanted floors of the building as per NTPA Guideline.</li> <li>• The factory need to install manually operated electrical fire alarm system and automatic fire alarm system with single or multiple call boxes on all occupied floors, including other tenanted floors of the building.</li> <li>• Factory needs to install control panel for centralized automatic fire detection and alarm system in the command station at the entrance lobby of the factory premises.</li> <li>• Factory need to install proper standpipe system having at least 75 mm diameter of riser.</li> <li>• Factory need to ensure the minimum pressure for standpipes supplying a 50mm or larger hose shall be at least 300 Kpa. For standpipe supplying first aid hose (38mm nominal) may have a minimum pressure of 200 Kpa.</li> <li>• Factory needs to be installed with Siamese connection for to the standpipe system located outside of the building and accessible to the fire department connection.</li> <li>• Factory needs to have dedicated fire pump with backup power system &amp; sufficient capacity for achieve required pressure in the remote place of the factory.</li> <li>• Factory need to have sufficient water storage capacity</li> </ul>

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	to get adequate pressure to feed fire-fighting equipment and at least 1900ltr x 75min=142500 liters water storage tank.
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### **(B): Recommendations for Electrical Safety corrective actions:**

<p>Immediate</p> <p><i>(the factory should not continue to be occupied until these non-conformities have been rectified):</i></p>	<ul style="list-style-type: none"> <li>Remove all unused cables from distribution boards and make sure all necessary cables are properly terminated at its point of termination using appropriate size and type of lug.</li> </ul>
<p>Short Term</p> <p><i>(Actions that must be incorporated into a Fire Safety Management Plan immediately (a week) and should be a regular activity</i></p>	<ul style="list-style-type: none"> <li>Provide two separate and distinct connections of earthing for the generator.</li> <li>Ensure all distribution boards (including panel door) are earthed properly.</li> <li>Ensure overcurrent protection device (circuit breaker/fuse) for each circuit/branch circuit.</li> <li>Clean interior components from dust and debris and seal all openings within the enclosure to prevent dust and debris from entering.</li> <li>Ensure inspection is being completed and documented.</li> </ul>
<p>Mid Term</p> <p><i>(The remedial works indicated must be carried out within a period of 6 weeks)</i></p>	<ul style="list-style-type: none"> <li>Post safety signage at generator room and ensure graded rubber mats are provided in front of all distribution boards.</li> <li>Provide Instruction board for first aid and artificial respiration in the generator room.</li> <li>Provide dedicated &amp; adequate size of earthing with proper identification for each circuit from the earth busbar of distribution boards and ensure continuous earth path is back to main building intake.</li> <li>Rewire to avoid the use of multiple cables on outgoing side of MCB's/MCCB's.</li> <li>Replace wooden base with metal clad construction for mounting the circuit breakers and socket.</li> <li>Ensure all electrical cables are sized according to capacity of circuit breakers.</li> <li>Ensure cable joints are made in respect of conductivity, insulation and mechanical strength.</li> </ul>

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	<ul style="list-style-type: none"> <li>• Connect all metal in the building to the building earthing system.</li> <li>• Find out the cause (improper cable/over current selection, over loading, improper lug, improper cable joints, rusted connection, insulation damage, multiple cables at single point, ) of overheating { ambient+( 20°C-40°C)} and take proper action.</li> </ul>
<p>Long Term</p> <p><i>(The remedial works indicated must be carried out within a period of 6 months)</i></p>	<ul style="list-style-type: none"> <li>• Develop an electrical layout diagram and an as-built single line diagram detailing key components and capacity of the electrical system.</li> <li>• Establish a periodical Insulation and earth Resistance Measurement Program and record the related testing data.</li> <li>• Inspect electrical panel boards on an annual basis.</li> <li>• Ensure overhead service connections to a building are achieved with service masts made of GI pipe at least 38 mm in diameter.</li> <li>• Replace the Main MCCB board with metal enclosed body.</li> <li>• Ensure distribution boards have no opening and all live internal components are concealed properly.</li> <li>• Provide dedicated &amp; adequate size of neutral with proper identification for each applicable circuit.</li> <li>• Ensure each distribution board is provided with a circuit list and means of identification is provided as per list.</li> <li>• Provide adequate support and mechanical guards for electrical equipment and wiring where necessary.</li> <li>• Use non-combustible material to make cable channel.</li> <li>• Provide proper cable terminator/connector for stranded conductors at its point of termination.</li> <li>• Install separate distribution boards for lighting and power circuits.</li> <li>• Install lightning protection system on the building.</li> </ul>