

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

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| Name of the Factory                | : Designer Line (Pvt) Ltd.                       |
| Address of the Factory             | : 16/1, New Jurain, Postagola, Dhaka, Bangladesh |
| Present Status of the Factory      | : Under Operation.                               |
| Structural Assessment Conducted by | : BUET   |
| Date of Structural Inspection      | : 18 <sup>th</sup> November, 2014                |
| Fire Assessment Conducted by       | : VEC  |
| Date of Fire Inspection            | : 11 <sup>th</sup> April, 2015                   |
| Electrical Assessment Conducted by | : VEC  |
| Date of Electrical Inspection      | : 11 <sup>th</sup> April, 2015                   |
| BGMEA Membership No.               | : 2604   |

### **BASIC INFORMATION:**

On the basis of visual observations, study of design drawings of this building and discussion with the personnel present, the following information was noted:

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| i.    | Building Usage Type       | : As Garments Factory building  |
| ii.   | Structural System         | : RC Frame structure with shear walls   |
| iii.  | Floor System              | : Edge supported RCC slabs up to 4 <sup>th</sup> floor, thickness= 5"; 5 <sup>th</sup> floor roof slab and above, flat pate, thickness= 6.75" |
| iv.   | Floor Area                | : Approximately 3020 sq. meter (32500 sft) per floor  |
| v.    | No. of Stories            | : Six stories (plus one basement), designed as a 12-storied factory building  |
| vi.   | Construction Year         | : First phase: 1998, up to 3 <sup>rd</sup> floor; Second phase: 2005-06, 4 <sup>th</sup> floor, the rest of the building in 2007              |
| vii.  | Foundation Type           | : Raft foundation (thickness= 27")  |
| viii. | Design Drawings           | : Drawing available (RAJUK Approval no. 448/94/597, dt. 7/3/1994; Designer: Engr. Zainul Abedin, FIEB-4747)                                   |
| ix.   | Soil Investigation Report | : Available, done in 2013 by R.R. Boring & Engineering, House # 3/3, Road # 2, Kalyanpur, Dhaka-1207  |
| x.    | Construction Materials    | : Reinforced Concrete with Stone Chips (verified) and reinforcing steel fy = 40 ksi assumed.  |
| xi.   | Generator                 | : Outside of the building   |

### **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) :

- The factory owner has been instructed to prepare and submit a load plan for vetting.

Long Term (6-months) :

- A thorough structural adequacy check will also be needed in future for vertical extension of the building.

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

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

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| <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>• None.</li> </ul>  |
| <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>• Lights in storage area needed to be installed with protective covers and conduits.</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>• 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>• Provide intermediate handrail in the staircase-1 (north side) so that no point on the stair is farther than 1 m from the handrail.</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> <li>• Factory need to install sufficient capacities standby generator and connected to supply power for staircase and corridor Lighting, fire lifts, standby fire pump, pressurization fans and blowers, smoke extraction and damper systems in case of failure of normal electricity supply and must having the minimum capacity to serve for 1 hour with the NTPA requirements</li> <li>• Factory need to install suitable public address system having communication to all floors as well as facilities to receive messages from all floors.</li> </ul> |
| <p>Long Term</p>   | <ul style="list-style-type: none"> <li>• Factory needs to have a proper pre-plan for fire service</li> </ul>   |

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*(The remedial works indicated must be carried out within a period of 6 months)*

& civil department.

- All the final exit route(Stair route) need to be protected by 4 hours rated construction and lobby with 2 hours fire rated door/opening at each floor level entrance including ground floor and need to be protect from the shop at ground floor by providing such rated corridor or escape route till to reach safe refuse area.
- Child care need to be protected with 3 hours rated construction and 3 hours rated opening or doors.
- Storage area need to be protected with 2 hours rated construction & 1.5 hours rated opening or doors.
- Boiler room and Generator room needs to be fire separated from both the final exit by 4 hours fire rated construction with 2 hours fire rated opening and having direct access from outside of the building.
- All the stairs need to be protected with a 4 hours fire resistant and smoke proof lobby (4 hours rated enclosure and 2 hour rated door) at each floor entrance and provide the protected route from all though the stairway to the final exits
- Factory needs to provide 2 hours fire resistance wall and entry also needs to have 1.5 hours fire rated door are required between finished goods room and dining.
- Factory need to install fire lift with backup power including having 1 hour fire rated & auto closing fire door in 2 hours fire rated lift core with backup power & having minimum capacity of 545 kgs.
- Factory need to constructed fire separated lobby with 4hours rated wall and 2 hours rated fire door and smoke proof lobby near to exit leading to staircase.
- Basement staircase needs to be encased and placed near the outer edge of the basement with materials of 4 hours fire resistance. The stair needs to be separated from the basement in such a way that smoke from a fire in the basement not enters the ground and upper floors. Communication with the basement in case of emergency needs to be maintained through a lobby provided with a fire resisting self-closing door of 2 hours fire resistance.
- Factory need to install centralized and automatic fire

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|  | <p>detection &amp; alarm system on all occupied floors, including other tenanted floors of the building as per NTPA Guideline</p> <ul style="list-style-type: none"> <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 smoke detection &amp; fire alarm system according to NTPA Guideline</li> <li>• Factory needs to install proper standpipe system with having at least 100 mm dia 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 the building and accessible to the fire department connection</li> <li>• Factory needs to install dedicated fire pump with sufficient capacity and backup power.</li> <li>• Factory need to have sufficient water storage capacity to get adequate pressure to feed fire-fighting equipment and at least <math>1900 \times 75 = 142500</math> liters water storage tank.</li> <li>• Factory needs to have a command station on the entrance lobby which equipped with detailed floor plans along with clearly demarcated locations of fire detection and fighting devices and through the panel board able to detect fire alarm from any floor. The command station needs to be manned with properly trained personnel having responsibility of maintenance and operating fire-fighting facilities within the building.</li> </ul> |
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### ***(B): Recommendations for Electrical Safety corrective actions:***

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| <p>Immediate</p> <p><i>(the factory should not continue to be occupied until these non-conformities</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> |
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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 (a week) and should be a regular activity</i></p> | <ul style="list-style-type: none"> <li>• Discharge the generator exhaust to the exterior of the building in a safe location.</li> <li>• Ensure all panel boards are earthed properly using appropriate type and size of cables and the earthing cables have continuity up to main earth.</li> <li>• Provide additional insulation for wiring exposed to external heat sources to protect cable/conduit.</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>• Provide provision for inspection of all earthing system and 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>• Ensure appropriate number and type of safety signage in the generator room and graded rubber mats in front of all panel boards.</li> <li>• Fill the transformer breather with fresh silica gel and oil cup with fresh Oil.</li> <li>• Provide Instruction board for first aid and artificial respiration in the generator room.</li> <li>• Provide two separate and distinct connections of earthing for generator.</li> <li>• Provide dedicated &amp; adequate size of earthing with proper identification for each circuit and ensure continuous earth path is back to main building intake.</li> <li>• Rewire to avoid the use of multiple cables on incoming and outgoing side of MCB's/ MCCB's and busbar.</li> <li>• Ensure all electrical cables are sized according to capacity of circuit breakers.</li> <li>• Provide adequate support or mechanical guards for wiring where necessary.</li> <li>• Use non-combustible material to make channel.</li> <li>• Ensure cable joints are made in respect of conductivity,</li> </ul> |

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|   | <p>insulation and mechanical strength.</p> <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 to ensure that the equipment is in good working condition.</li> <li>• Ensure the generator room has adequate fire separation from the production area.</li> <li>• Provide adequate means of ventilation for the substation room based on the installed equipment considering fire barriers.</li> <li>• Ensure panel 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 circuit.</li> <li>• Ensure each distribution board is provided with a circuit list and means of identification is provided as per list.</li> <li>• Ensure surface/exposed wiring are run either horizontally or vertically with proper mechanical support and avoid wiring at an angle or hanging way with improper support.</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>• Provide individual fuse with suitable discrimination with backup fuse or miniature MCB for each 15/20A</li> </ul> |

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|  | <p>socket outlet.</p> <ul style="list-style-type: none"><li>• Install lightning protection system on the building.</li></ul> |
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