

Summary of Preliminary Assessment on Structural, Fire and Electrical Safety

Name of the Factory	: Design Apparels (Pvt) Ltd.
Address of the Factory	: Block #B, Plot #B4, Sholashar, Nasirabad Industrial Area, (BSCIC) Nasirabad, Chittagong, Bangladesh.
Present Status of the Factory	: Under Operation.
Structural Assessment Conducted by	: VEC
Date of Structural Inspection	: 17 th June, 2015
Fire Assessment Conducted by	: VEC
Date of Fire Inspection	: 17 th June, 2015
Electrical Assessment Conducted by	: VEC
Date of Electrical Inspection	: 17 th June, 2015
BGMEA Membership No.	: 3848

BASIC INFORMATION:

The assessed factory building is a 5- Storey RCC building. The structural system of the building is RCC beam column frame and beam slab floor system. The entire building is used for Design Apparels (Pvt) Ltd. 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 67,360 sft. |
| v. No. of Stories | : 5-Storey. |
| vi. Construction Year | : 1999-2001. |
| vii. Foundation Type | : Isolated footing foundation. |
| viii. Design Drawings | : Available document: Approval plan, structural drawing, architectural drawing, soil test report, and machine layout plan.
Not available- Floor load plan, Material test report. |
| ix. Soil Investigation Report | : Available. |
| 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:

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| Short Term (Immediate) | : None. |
| Mid Term (6-weeks) | : |
| | <ul style="list-style-type: none">• Factory Engineer to review design, loads and columns stresses in area identified above.• Verify in situ concrete stresses either by 100mm dia. cores or existing cylinder strength data for [the identified columns] or [100mm dia. cores from 4 columns].• Reduce Loadings on particular floor to 2.0 KN/m² |

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- Sections of plaster finish to beams to be removed to investigate if cracks penetrate the building structure. Building Engineer to review further if cracks are found

Long Term (6-months)

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- Produce and actively manage a loading plan for all floor plates within the factory giving consideration to floor capacity and column capacity.
- Provide calculations showing the structural adequacy of all columns
- Carry out repair remedial works as required.

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

(A): Recommendations for Fire 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"> • None
<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"> • Factory need to have proper testing plan & record of fire safety equipment. • Combustibles are to be managed with good housekeeping. Storage facilities with no air-conditioning duct shall be minimum 2.9m 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.
<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"> • Factory needs to prepare as built drawing with floor machine layout showing means of escape with proper dimension. • Fire manager/Director need to have safety training from proper authority & worker of the factory should as far as possible be trained for use fire extinguisher. • 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. • Factory needs to provide handrail on both sides of all the stairways. • Factory needs to be installed with adequate illuminated emergency lighting in floors, exits & stairs. (Escape route).
<p>Long Term</p> <p><i>(The remedial works indicated must be</i></p>	<ul style="list-style-type: none"> • Fire department pre-plan needs to be developed.

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<p><i>carried out within a period of 6 months)</i></p>	<ul style="list-style-type: none">• Factory needs to maintain minimum width of exit 0.9 m and height 2 m.• Factory needs to ensure minimum clear width of stair 0.90 m.• Final exit route-1 (Stair-1 route) need to be protected (2 hour rated construction with 1.5 hour rated door) at each floor level entrance and need to be protected from generator at ground floor by 4 hours rated construction with 2 hours rated door/opening, also need to have a protected escape route till to reach safe refuse area.• Final exit route-2 need to be protected from working area at ground floor by 2 hours rated construction with 1.5 hours rated door/opening, also need to have a protected escape route till to reach safe refuse area.• Storage area need to be protected with 2 hours rated construction & 1.5 hours rated opening or doors.• Boiler room need to be protected (2 hour rated construction with 1.5 hour rated door) at each floor level entrance and need to be protected from boiler room at 2nd floor by 4 hours rated construction with 2 hours rated door/opening, also need to have a protected escape route till to reach safe refuse area.• Final exit route-1 (Stair-1 route) need to be protected (2 hour rated construction with 1.5 hour rated door) at each floor level entrance and need to be protected from generator at ground floor by 4 hours rated construction with 2 hours rated door/opening, also need to have a protected escape route till to reach safe refuse area.• All the stairs need to be protected with fire and smoke resistant enclosures and opening (2 hours rated enclosure and 1.5 hour rated door)and provide a protected route from all though the stairway to the final exits.• Factory need to install centralized and automatic fire detection & alarm system on all occupied floors, including other tenanted floors of the building as per NTPA Guideline.• 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,
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	<p>including other tenanted floors of the building.</p> <ul style="list-style-type: none"> • Factory needs to install control panel for centralized automatic smoke detection & fire alarm system according to NTPA Guideline. • Factory needs to install proper standpipe system with having at least 100 mm dia of riser. • Factory need to be installed by 1 riser per 1000 sqm of floor area with at least 38 mm dia of hoses. • 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. • Factory needs to be installed with Siamese connection for to the standpipe system located outside the building and accessible to the fire department connection. • Factory needs to have dedicated fire pump with backup power system & sufficient capacity for achieve required pressure in the remote place of the factory. • Factory needs to have sufficient water storage capacity 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"> • Find out cause (improper cable selection, improper protective device selection, improper termination, rusted connection, heat source etc.) of burning sign/insulation damage and take proper action including replacing cable or equipment where necessary.
<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"> • Provide two separate and distinct connections of earthing for each generator. • Ensure distribution boards (including panel door) are earthed properly. • Ensure over current protection device (circuit breaker/fuse) for each circuit/branch circuit. • Clean interior components from dust and debris and seal all openings within the enclosure to prevent dust

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	<p>and debris from entering.</p> <ul style="list-style-type: none"> • Ensure inspection of all earthing system is being completed and documented.
<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"> • Ensure appropriate type of safety signage and graded rubber mats at required location. • Provide Instruction board for first aid and artificial respiration in the generator room. • Ensure distribution boards have a minimum clearance of 1 m (39 in) in front. • Provide dedicated & adequate size of earthing with proper identification for each circuit from the earth bus bar of distribution boards and ensure continuous earth path is back to main building intake. • Rewire to ensure each incoming supply to an MCB has a dedicated supply from bus bar. Avoid the use of multiple cables on outgoing side of MCB's. • Replace wooden bases with metal clad construction for mounting the lighting boards and switch controls. • Consult with a qualified electrical engineer and ensure all electrical cables are sized according to capacity of circuit breakers. • Ensure cable joints are made in respect of conductivity, insulation and mechanical strength. • Ensure Lighting fixtures are supported from the structure properly and if flexible cords are used to support light fixture then make sure it has enough strength to carry the weight. • 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+(20⁰C-40⁰C)} and take proper action.t breakers.
<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"> • Develop an electrical layout diagram and an as-built single line diagram detailing key components and capacity of the electrical system. • Establish a periodical Insulation and earth Resistance Measurement Program and record the related testing

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	<p>data.</p> <ul style="list-style-type: none">• Inspect electrical panel boards on an annual basis.• Ensure the generator room has adequate fire separation from the production area/main building.• Ensure appropriate generator room size in order to properly access the generator to perform routine maintenance activities.• Ensure distribution boards have no opening and all live internal components are concealed properly.• Provide dedicated & adequate size of neutral with proper identification for each circuit.• Ensure each distribution board is provided with a circuit list and means of identification is provided as per list.• Provide adequate support or mechanical guards for electrical equipment where necessary.• Provide adequate covers on cable channel.• Install separate distribution boards for lighting and power circuits.• Install lightning protection system on the building.
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