

Summary of Preliminary Assessment on Structural, Fire and Electrical Safety

Name of the Factory	: B. Brothers Garments Co. Ltd.
Address of the Factory	: Holding # 90, Rupshi, Borpa, Rupganj, Narayanganj, Bangladesh.
Present Status of the Factory	: Under Operation.
Structural Assessment Conducted by	: VEC
Date of Structural Inspection	: 16 th April, 2015
Fire Assessment Conducted by	: VEC
Date of Fire Inspection	: 16 th April, 2015
Electrical Assessment Conducted by	: VEC
Date of Electrical Inspection	: 16 th April, 2015
BGMEA Membership No.	: 1737

BASIC INFORMATION:

The assessed factory building is four storied RCC beam-column frame structure. The B. Brothers Garments Co. Ltd. has occupied the entire building. The following general information was noted:

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 37,820 sft.
v. No. of Stories	: 4 Storey
vi. Construction Year	: 2012-2013.
vii. Foundation Type	: Mat foundation.
viii. Design Drawings	: Available: Structural as built drawing, architectural as built drawing Not available- Machine layout plan, floor load plan and material test.
ix. Soil Investigation Report	: Available.
x. Construction Materials	: Stone aggregate in column.
xi. Generator	: 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)	: <ul style="list-style-type: none">• Produce and actively manage a loading plan for all floor plates within the factory giving consideration to floor capacity and column capacity.• Prepare Approval plan, as-built machine layout plan and floor load plan.

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>	<p>N/A</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"> • Factory need to have proper testing plan & record of fire safety equipment. • Factory need to have minimum width of marked aisles at least 0.90m for one sided seat & at least 1.0m for both sided of seats. • Propagation of fire, smoke, gas or fume through the opening of fire resistive floors and walls need to be restricted by sealing such opening with an approved material which needs to have a minimum 2 hours fire resistance rating of the walls. • Lights in storage area needed to be installed with protective covers and conduits. • 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. • All required means of exit or exit access in buildings or areas requiring more than one exit shall be signposted. The signs shall be clearly visible at all times, where necessary supplemented by directional signs.
<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 have 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 need to provide handrail on both sides of each stairways. Flammable liquid need to manage in proper way following the NTPA guide line and following the MSDS of respective chemicals. • Illuminated emergency light needs to be covered in all

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	<p>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.</p> <ul style="list-style-type: none"> • Factory need to have emergency backup power for critical fire safety system with sufficient capacity & arrangement according to NTPA Guideline.
<p>Long Term <i>(The remedial works indicated must be carried out within a period of 6 months)</i></p>	<ul style="list-style-type: none"> • Factory needs to have a proper pre-plan for fire department. • The factory needs to rebuild proper slope having 1 horizontal and 8 vertical (1:8). • The final exit routes of stairs-1 need to be protected by providing 2 hour rated enclosure with 1.5 hour rated fire doors in each exit are connected with stairs-1, also need to be protected (2hours rated construction with 1.5 hours rated doors) from the working area (dyeing and finishing) of ground floor and the escape route till to reach outside of the building or safe refuse area. • The final exit routes of stairs-2 need to be protected by providing 2 hour rated enclosure with 1.5 hour rated fire doors in each exit are connected with stairs-1, also need to be protected (2hours rated construction with 1.5 hours rated doors) from the working area (dyeing and lab) of ground floor and the escape route till to reach outside of the building or safe refuse area. • Storage area need to be protected with 2 hours rated construction & 1.5 hours rated opening or doors. • Generator room needs to be fire separated with 4 hours fire rated enclosure and 2 hour rated opening having direct access from outside. Boiler room is to have a 4 hour fire resistance construction as well as chemical room also. • All the exits connecting to the staircase-1 and staircase-2 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 through the stairway to the final exits. • Factory need to install centralized and automatic fire detection & alarm system on all occupied floors,

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	<p>including other tenanted floors of the building as per NTPA Guideline.</p> <ul style="list-style-type: none"> • 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. • Factory needs to be installed with control panel for centralized automatic smoke detection & fire alarm system according to NTPA Guideline. • Install proper standpipe system having at least 75 mm diameter of standpipe. First aid hose system (38 mm nominal) shall be provided (Ref. Fire Service Standard # 9) in addition to Fire Aid Fire Fighting Appliances in existing high rise NTPA (20 m) buildings. In addition 50 mm or larger hose connection facility shall be provided. • Factory need to ensure the minimum pressure for standpipes supplying a 50mm or larger hose shall be at least 300 kPa and 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 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+ 40⁰C) and take proper action.
<p>Short Term</p> <p><i>(Actions that must be incorporated into a Fire Safety Management Plan</i></p>	<ul style="list-style-type: none"> • Provide two separate and distinct connections of earthing for each generator.

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<p><i>immediately (a week) and should be a regular activity</i></p>	<ul style="list-style-type: none"> • Ensure distribution boards (including panel door) are earthed properly. • 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. • Clean interior components from dust and debris and seal all openings within the enclosure to prevent dust and debris from entering. • Provide provision for inspection of all earthing system and ensure inspection is being completed and documented.
<p>Mid Term <i>(The remedial works indicated must be carried out within a period of 6 weeks)</i></p>	<ul style="list-style-type: none"> • Install appropriate type of safety signage at substation room. Also ensure graded rubber mats are provided in front of all distribution boards. • Provide Instruction board for first aid and artificial respiration in the substation room. • Fill the transformers breather with fresh Silica gel and oil cup with fresh Oil. • Provide dedicated & adequate size of earthing with proper identification for each circuit. • Rewire to ensure single cable at busbar and/or circuit breaker terminal to avoid loose connection, overloading and separate controlling of each circuit/branch circuit. • Ensure all electrical cables are sized according to capacity of circuit breakers. • Provide adequate support or mechanical guards for electrical equipment and wiring where necessary. • Use non-combustible material to make cable channel. • Ensure cable joints are made in respect of conductivity, insulation and mechanical strength. • 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.

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Long Term

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

- 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 data.
- Inspect electrical switchgear and panel boards on an annual basis.
- Ensure the substation room has adequate fire separation from the production area.
- Provide adequate means of ventilation for the substation room based on the installed equipment considering fire barriers.
- Install security measures to ensure access to the substation is restricted.
- 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 obtained as per list.
- Provide proper cable terminator/conductor for stranded conductors.
- Install separate distribution boards for lighting and power circuits.
- Install lightning protection system on the building.