

Summary of Preliminary Assessment on Structural, Fire and Electrical Safety

Name of the Factory	: B. R. A DESIGN LTD.
Address of the Factory	: Shaheb Ali Building, Post Office Road, Kotobail, Fatullah, Narayanganj, Banlgadesh.
Present Status of the Factory	: Under Operation.
Structural Assessment Conducted by	: TUV
Date of Structural Inspection	: 11 th June, 2015
Fire Assessment Conducted by	: TUV
Date of Fire Inspection	: 11 th June, 2015
Electrical Assessment Conducted by	: TUV
Date of Electrical Inspection	: 11 th June, 2015
BKMEA Membership No.	: 1826.

BASIC INFORMATION:

The assessed factory building was a 4 - Storey RCC building. The frame system of the building is RCC beam column frame and beam slab floor system. B. R. A DESIGN LTD. operates the factory on a rental basis but partial area in ground floor which is occupied by 5 grocery shops in front of the building & south side of the building. The following general information were noted:

i. Building Usage Type	: Garment Factory.
ii. Structural System	: RCC beam column frame system.
iii. Floor System	: RCC beam slab system.
iv. Floor Area	: Operational floor area of the factory is approx. 9235 sft.
v. No. of Stories	: 4 Storey.
vi. Construction Year	: 1997.
vii. Foundation Type	: Unknown.
viii. Design Drawings	: Unavailable.
ix. Soil Investigation Report	: Unavailable.
x. Construction Materials	: Brick aggregate.
xi. Generator	: Ground floor of this 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) :

- 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 A3 or 100mm dia. cores from 4 columns.
- Strength & stability of emergency stair to be checked against evacuation loading & remedial action to be proposed as required

Summary of Preliminary Assessment on Structural, Fire and Electrical Safety

- As- built architectural & engineering drawings to be prepared and submitted for approval authority. As part of this process the building engineer will be required to make a number of checks on the structural design as described in the following recommendation.

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.

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"> • The minimum clear width of the pathway should be 0.9 meter • Provide aisle marking with arrow guiding and exit signage on all Evacuation pathways or provided with overhead signage fixed at ceiling level. <ul style="list-style-type: none"> - Illuminated exit sign should be posted above the exit door, - It should be clearly visible at all time, - Provide directional signs wherever necessary. - All exit doors should be clearly marked for easy identification. -signage should be uniform. • Provide fire extinguisher at required area and to keep the record for re filling & properly tagged. • The first aid hose and standpipe performance should be checked periodically and properly tagged. • Combustible materials should keep away from electrical source and all the lighting in storage area must have protecting covers and wiring must be in conduits. • Fire drill should be conducted quarterly (4 times a year) in existing buildings as detailed under the Fire Safety

Summary of Preliminary Assessment on Structural, Fire and Electrical Safety

	Plan & should kept record properly.
<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"> • Replace all existing exit doors on evacuation routes, exit doors with side hinged type door, which swing outward and in the direction of travel. Swinging of the door should not constrict the width of the corridor / passage below 0.9 meter. • Remove all locking device from all egress door. All exit doors should be open-able from the side they serve without the use of a key. • Exit door should have minimum clear width 0.9 meter. • Provide exit from 1st floor exterior stair to ground floor. • Prepare proper plan & design for staircase. <ul style="list-style-type: none"> - Minimum clear width should be 0.9 meter. • Provide handrails on both side of each stairway with height of 0.9m measured from the nose of stair to the top of the handrail. • Provide staircase so that the trade width should be minimum 215 mm. • Doors in stair should be outward opening, side-swing, self-closing, non-lockable 1.5 hours fire rated doors in all stair way encloses. • Provide 2 hour fire rated construction at unprotected opening window, which is adjacent to external staircase. • Prepare proper plan and design for fire rated barrier for 2 hour fire rating separated corridor for stair-1 at ground floor. <p>And also prepare proper plan & design for fire rated corridor of 2 hrs fire rated wall with 1.5 hrs fire rated door between internal stair and external stair at 2nd floor for evacuation route from 3rd floor & 2nd floor to GF</p> • Prepare proper plan and design for 4 hours fire rated barriers with 2 hours fire rated doors at ground floor generator room, which located at the adjacent to fabric store. • Prepare proper plan and design for 4 hours fire rated

Summary of Preliminary Assessment on Structural, Fire and Electrical Safety

	<p>barriers with 2 hours fire rated door at 1st floor generator room, which located at the adjacent to finishing section</p> <ul style="list-style-type: none"> • The egress paths should be illuminated with emergency lighting with power back-up supply & illumination should be a minimum of 10 lux for all corridors & exit doors. Aisles should be provided with a minimum 2 lux. • The stairway should be illuminated with emergency lighting with power back-up supply & illumination should be a minimum of 10 lux for stairway. • Produce design and plan for automatic detection system with automatic fire alarm. • Prepare proper design and plan for dedicated fire pump with alternate backup power supply. • Prepare plan and design for dedicated water storage tank for firefighting operation as per RMG guideline. • Obtain building approval from issuing authority
<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"> • Install staircase as per plan and design. - Minimum clear width should be 0.9 meter. • All stairway to have direct access to outside of the factory building, which requires 2 hour fire rated construction at ground floor for fire separated corridor. <p>And also provide fire rated corridor of 2 hrs fire rated wall with 1.5 hrs fire rated door between internal stair and external stair at 2nd floor for evacuation route from 3rd floor & 2nd floor to GF</p> <ul style="list-style-type: none"> • Provide 4 hours fire rated barriers with 2 hours fire rated doors at ground floor generator room, which located at the adjacent to fabric store. • Provide 4 hours fire rated barriers with 2 hours fire rated door at 1st floor generator room, which located at the adjacent to finishing section • Install automatic detection system with automatic fire alarm. • Install dedicated fire pump with alternate backup power supply. • Provide sufficient number of hose pipe with respect to

Summary of Preliminary Assessment on Structural, Fire and Electrical Safety

	<p>area and travel distance as per RMG guideline.</p> <ul style="list-style-type: none"> • Stand pipe supplying first aid hose should have minimum pressure of 200 KPa. • Provide dedicated storage tank for firefighting operation.
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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"> • None.
<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"> • All strands cables at exposed ends should be properly soldered / crimped and insulated.
<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"> • 1. Provide updated SLD matching the existing installation at the factory. • 2. SLD to indicate exact positions of all points of switch boxes and other outlets. • 3. SLD to be approved by the engineer-in-charge. • 1. Provide updated Electrical layout drawing prepared after proper locations of all outlets for lamps, fans, fixed and transportable appliances, motors etc. • 2. Drawings to indicate exact positions of all points of switch boxes and other outlets to match existing installation. • 3. As built drawing to be approved by the engineer-in-charge. • Provide adequate illumination for substation. • All unwanted materials should be removed from transformer / Generator room. • Provide rubber mats of adequate size in front of all distribution panels. • Install smoke detection and provide firefighting equipment in the substation and generator room.

	<ul style="list-style-type: none">• 1. Exit signs should be illuminated either by lamps external to the sign or by lamps contained within the sign.2. The source of illumination should be providing not less than 50 lux.• 1. Remove all the inflammable materials from surrounding of electrical circuitry at DBs.2. Ensure that all electric circuitry clean of inflammable materials.3. Conduct periodic maintenance and maintain the records.• Provide suitable & non-flammable protected supports and shades for hanged light fittings/fixtures.• The electrical panels to be of metal case and should be marked with “Danger 415 Volts” and identified with proper phase marking and danger signage.• Provide proper clearance of 0.8 - 1.0 m in front of all distribution panels/switchboards.• Provide circuit diagram /circuit list with proper current ratings and fuse size, marking for DBs identifying end use load, voltage, number of phases.• Provide cable joints of porcelain / PVC connectors with PIB tape wound around before placing the cable in the box.• Seal the cable penetrations through walls adequately with fire resistive elements.• Provide proper separate earthing/grounding to generator. Ensure that generator body frame to have two separate and distinct connections to the earth / ground.• Provide separate earthing connection to electrical equipments. Ensure that earth potential provided for all parts of equipment / installation (other than live parts) and that continuous earth connection is provided back to the main intake supply earth.• Provide adequate earthing to body and doors to all MDBs / DBs. Ensure that all electrical panels provided with proper and separate earth potential.
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Summary of Preliminary Assessment on Structural, Fire and Electrical Safety

<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">• Provide adequate ventilation arrangements for indoor substation.• Provide 4 hour fire rated walls all around the transformer / generator room on ground level.• Relocate generator set in substation building / adjacent to substation room.• Modify Area of generator room to meet requirements of Table 4.4, RMG Guideline; the area should be 20 m², or relocate the generator room.• Provide and maintain proper clearance in all sides of generator for ease of maintenance.•<ol style="list-style-type: none">1. Design to have proper segregation of different end used loads.2. Wiring design to have separate and distinct sub-circuits for power and heating system.3. All DBs to be placed conveniently.4. Wiring to be neat, tidy and located near ceiling.• Review capacity of standby generator on basis of loads for essential lighting / AC / Equipment / Services. Replace generator with larger capacity or install second generator if review indicates existing unit is too small.• Provide and maintain easy access to the switchboard / panel boards.•<ol style="list-style-type: none">1. Wooden switchboards / panel boards should be replaced by non-flammable materials.2. Prefer switchboards made of non-flammable materials.• Provide the wiring in PVC conduits or in metallic GI pipes. Ensure that all electrical wiring should be covered in proper conduit pipes.• Provide adequate protection against lightning depending on the probability of a strike and acceptable risk levels at roof top of building.
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