

Summary of Preliminary Assessment on Structural, Fire and Electrical Safety

Name of the Factory	: Eraf Composite Ltd.
Address of the Factory	: Post Office Road, Fatullah, Narayanganj, Bangladesh.
Present Status of the Factory	: Not operational.
Structural Assessment Conducted by	: TUV
Date of Structural Inspection	: 22 nd January, 2015.
Fire Assessment Conducted by	: TUV
Date of Fire Inspection	: 22 nd January, 2015.
Electrical Assessment Conducted by	: TUV
Date of Electrical Inspection	: 22 nd January, 2015.
BGMEA Membership No.	: 5587.
BKMEA Membership No.	: 1299.

BASIC INFORMATION:

The assessed factory buildings are made up of 3 sections. A rectangular 3 storey building was built in 1993. Next to it is a C-shaped 6 storey building completed in 2001. In the middle of C-shaped building there is a single storey steel framed shed. The structural safety assessment was carried out on the 6 storey section only, due to limitation of time. The rest 3 storey building will be surveyed on a later date. The building is owned by Fatullah Fabric Ltd. and has all necessary approvals in that name. Eraf Composite Ltd. is not operational at present due to pending approvals from BGMEA. Hence, the building structures and documents were verified for Fatullah Fabric Ltd. The following information was 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	: The typical plinth area is 22000 sq. ft. and total production floor is 1, 45,000 sft.
v. No. of Stories	: 6 Storey.
vi. Construction Year	: 1992.
vii. Foundation Type	: Spread Footing (As per structural drawing).
viii. Design Drawings	: Available. (Signed by Fatullah Union Parishad on 27th December, 2012)
ix. Soil Investigation Report	: Available.
x. Construction Materials	: Stone aggregate. (Identified by removing plaster)
xi. Generator	: Adjacent to exit of East facing wall near staircase.

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)	:	<ul style="list-style-type: none">• Factory Engineer to review design, loads and columns stresses in all columns.• Verify insitu concrete strength by taking 100mm diameter cores from 4 No. basement columns. Verify reinforcement grade, diameter and number of bars in columns.
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Summary of Preliminary Assessment on Structural, Fire and Electrical Safety

- A Detail Engineering Assessment of Building to be commenced, see attached Scope.
- The aeration tank need to be empty and cannot be used before further investigation.
- The stacking of fabrics need to be reduced and to be stored in an organized way.

Mid Term (6-weeks)

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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.
- Detail Engineering Assessment to be completed.
- Sections of plaster finish to beams and slab to be removed to investigate if cracks penetrate the building structure.
- Building Engineer to carry out design check on beams as part of the Detail Engineering Assessment.
- Sections of plaster finish to column to be removed to investigate if water penetrates into the building structure.
- The connection of steel structure needs to be checked by building engineer and the bracing system is required to ensure the stability of the structure.
- Corrosion of steel sheet and connection need to be checked and carry out any remedial actions as directed by the Building engineer.
- Sections of plaster finish of beam to be removed to investigate if dampness penetrates into the building structure.

Long Term (6-months)

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- Continue to implement loading plan.
- Carry out any remedial actions as directed by the Building Engineer for cracks in beam and slab.
- The drain needs to be relocated to let the column dry and the column needs to be repaired as required.
- Carry out any remedial actions as directed by the Building Engineer for dampness.

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>	N/A
<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"> • Exit signage should be clearly visible to guide the occupancy traffic.

Summary of Preliminary Assessment on Structural, Fire and Electrical Safety

<p><i>immediately (1 ~ 2 weeks) and should be a regular activity</i></p>	<ul style="list-style-type: none"> • Increase the nos. of quantity of emergency lighting at evacuation pathway, which requirement for intensity of illumination at floor level should not be less than 10 lux & aisles should not be less than 2 lux. • Increase the nos. of quantity of emergency lighting at evacuation Stairway, which requirement for intensity of illumination at floor level should not be less than 10 lux. • Remove combustible/flammable material near main distribution board at 3rd floor.
<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"> • Replace all existing doors on evacuation routes, exit doors, which are collapsible / sliding / roll down gates and end shutters in egress route with side hinged type door, which swing outward of the room or in the direction of travel. Swinging of the door should not be constrict the width of the corridor / passage below 0.9 meter. • Replace all existing doors on evacuation routes, exit doors, which are collapsible / sliding / roll down gates and end shutters in egress route with side hinged type door, always ensure that the doors do not get locked due to presence of obstructions, etc. • Doors in stairs should be outward opening, side-swinging, self-closing, non-lockable fire rated doors in all stair way enclosures. • Provide 2 hr fire rated barriers with fire rated doors at both generator room, which located at the final exit of the building. • All high risk room like boiler room is needed to enclose by 2 hr fire rated construction. Seal and/or protected all openings to maintain the required fire separation from the rest of the operational area. • Replace the single station smoke alarm with automatic detection system with automatic fire alarm. • Additional detectors are required to cover all area of the production floor as per RMG guideline. • Replace existing 1 inch hose pipe replace with 1.5 inch hose pipe to meet the requirement of RMG guideline. • Stand pipe supplying first aid hose should have

Summary of Preliminary Assessment on Structural, Fire and Electrical Safety

	<p>minimum pressure of 200 KPa.</p> <ul style="list-style-type: none"> The factory has to implement single fire safety management procedure means the coordination of automatic fire alarm system with addressable smoke detector. Obtain the boiler license from the proper issuing authority. Power backup supply should be provided to fire alarm system.
<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"> The fire pump should be so designed that it should satisfy the required pressures and flow for firefighting equipment's at the highest and most remote part of the protected premises during their peak demand hour or for roof storage tank. The pump should be housed in a readily accessible position in a building of noncombustible construction. The pump should be adequately protected against mechanical damage. A manually controlled pump may be used to feed water into gravity overhead tank with fire reserve. There should be provision for standby fire pump driven by a compression ignition (diesel) engine or electric pump with own generator. Provide dedicated water stored in storage tank for firefighting operation comply with the requirement of RMG guideline table 3.1 and not to be used for other purposes.

(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"> Ensure there is no break in the neutral wire in the form of fuse unit throughout the wiring installation. <p>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+ 40°C) and take proper action.</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"> Do repair of oil leakages at transformer room. Ensure that there should not any oil leakage in the oil type transformer. All strands cables at exposed ends should be properly soldered / crimped and insulated. 1. Remove all the inflammable materials from surrounding of electrical circuitry at MDBs/SDBs. 2. Ensure that all electric circuitry clean of inflammable

Summary of Preliminary Assessment on Structural, Fire and Electrical Safety

	<p>materials.</p> <p>3. Conduct periodic maintenance and maintain the records.</p> <ul style="list-style-type: none"> • Relocate switchboards away (> 2.5 m) from water source. • Provide cable joints of porcelain / PVC connectors with PIB tape wound around before placing the cable in the box. • Provide proper separate earthing/grounding to generator. Ensure that generator body frame to have two separate and distinct connections to the earth / ground.
<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. • Accessories of transformers like breathers, silica gel must be in order at substation. • Provide adequate illumination for substation. • All unwanted materials should be removed from Generator room. • Provide rubber mats in front of all distribution panels. • Install smoke detection and provide firefighting equipment in the substation and generator room. • Provide and maintain clear and legible identifications numbers & names on all incoming and outgoing circuits of HT / LT panels.

Summary of Preliminary Assessment on Structural, Fire and Electrical Safety

	<ul style="list-style-type: none">• 1. Provide High / Medium Voltage DBs marked with "Danger" signage.• 2. Ensure that all DBs shall have marked with "Danger" signage.• Relocate the MDBs with easy access. Ensure that all MDBs / SDBs should have easy accessibility.• 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 cable connections with properly soldered / welded lugs at (LT/MDB/DB/SDB)'s.• Ensure that all the electrical connections are properly secured with lugs and glands.• Select conductors with adequate sizing without exceeding permissible thermal limits for insulation.• Avoid looping and bunch of cable at MCCB/MCB or bus bar terminal, use individual circuit and over current device for every incoming and outgoing circuit at the distribution boards.• Provide circuit diagram /circuit list with proper current ratings and fuse size, marking for DBs identifying end use, voltage, no. of phases.• Provide the wiring in PVC conduits or in metallic GI pipes. Ensure that all electrical wiring should be covered in proper conduit pipes• Provide proper separate earthing/grounding to transformer. Ensure that transformer body frame to have two separate and distinct connections to the earth / ground.• 1. Provide sufficient and separate earthing for HT / LT panels in substation/transformer room• 2. Provide adequate number of earth electrodes.• 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 clearance in all sides of main HT/LT panel boards for easy maintenance.• As per Table 4.3 of RMG guideline Area required for Transformer Room and Substation for Different Capacities. Area of substation should be 13 m² for 1000 KVA and 13m² for 500 KVA• Maintain the minimum height of 3.6 m for the substation room.• Provide 4 hour fire rated walls all around the transformer / generator room on ground level.• Provide adequate cable trenches with non-flammable covers at substation areas.• Modify Area of generator room to meet requirements of Table 4.4, RMG Guideline; the area should be 112m².• 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.• Provide calibrated Ammeters / Voltmeters at distribution boards (LT/MDBs).• 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 and proper height of switchboard / panel boards (< 2m from floor level).• Each circuit should have a separate neutral (use of common neutral for more than one circuit shall not be permitted).• Seal the cable entry-exit points of (LT/MDB/DB/SDB)'s with non-flammable materials. In addition:
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Summary of Preliminary Assessment on Structural, Fire and Electrical Safety

	<ol style="list-style-type: none">1. Ensure that HT / LT panels / Switchgears to be vermin / damp proof.2. Ensure all unused holes / openings in DBs to be blocked properly. <ul style="list-style-type: none">• <ol style="list-style-type: none">1. Provide the ECC to meet minimum cross-sectional area as per table 4.5.2. Ensure that connections between conductors / equipment provided to durable electrical continuity and adequate mechanical strength and protection. 3. The continuous earth connection is provided back to the main intake supply earth.• Provide adequate protection against lightning depending on the probability of a strike and acceptable risk levels.
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