

Summary of Preliminary Assessment on Structural, Fire and Electrical Safety

Name of the Factory	: Charulata Apparels Ltd.
Address of the Factory	: 1670/2091, Sholo Shahar, Aturar Dipo, Chittagong.
Present Status of the Factory	: Under operation
Structural Assessment Conducted by	: ALLIANCE
Date of Structural Inspection	: 2014-05-21
Fire Assessment Conducted by	: TÜV SÜD Bangladesh (Pvt.) Ltd.
Date of Fire Inspection	: 2015-03-25
Electrical Assessment Conducted by	: TÜV SÜD Bangladesh (Pvt.) Ltd.
Date of Electrical Inspection	: 2015-03-25
BGMEA Membership No.	: 3512

BASIC INFORMATION:

i. Building Usage Type	: Factory building.
ii. Structural System	: RCC moment resisting frame.
iii. Floor System	: Profile shed on steel and RCC slab
iv. Floor Area	: The main building area approximately is 182000 sft & ancillary building is about 200 sft.
v. No. of Stories	: 6 storied RCC main building and one shed for generator.
vi. Construction Year	: 1st phase (GF to 3rd)- in 1995 and 2nd phase (4th to 5th) – 2000 to 2001, Addition of tin roofing shed on roof slab in the year of 2001
vii. Foundation Type	: Strap foundation
viii. Design Drawings	: Available
ix. Soil Investigation Report	: Not verified.
x. construction Materials	: Brick Aggregated
xi. Generator	: Available at different room.

RECOMMENDATIONS FOR CORRECTIVE ACTION:

Short Term (Immediate)	:1.Engage a qualified structural engineer to confirm structural performance of the structure.
MidTerm(6-weeks)	:1.Under guidance from a qualified structural engineer arrange Detail Engineering Assessment of the structure. This assessment should Include destructive core testing to validate the insitu concrete compressive strength.This detailed assessment should be completed within 6 weeks. 2. Have a qualified structural engineer to complete an analytical evaluation of the structural impact of the addition. 3. Have a qualified structural engineer confirm that capacity to support the load is available. Load Plans complying with Alliance Standard Part 8 Section 8.20.4.3 should also be developed. 4. Have a qualified structural engineer to prepare credible as-built documentsbased on the requirements of Part 8 Section 8.19 of the Alliance Standard.

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5. Engage a qualified structural engineer to develop the required documents to confirm the structural integrity of the buildings. Documents must comply with Alliance Standard Part 8 Section 8.19 and 8.20.
6. Relocate the water tanks from cantilever portion immediately under guidance of a qualified structural engineer. Engage a qualified structural engineer to confirm and document that provisions have been made to accommodate concentrated loads. If provisions have not been made, have a qualified structural engineer develop a remediation plan.
7. Engage a qualified structural engineer to confirm satisfactory structural performance of the buildings under wind loading.
8. Adequately anchor and brace all non-structural elements to resist earthquake forces to comply with the BNBC and Alliance Standard.
9. Under guidance from a qualified structural engineer, address all areas of needed maintenance by correcting the identified issues.
10. Develop a program to ensure that all live loads for which a floor or roof has been designed for will not be exceeded. The designated Load Manager shall oversee this program and ensure it is enforced.

Long Term (6-months)

1. Organization is to apply for certificate of occupancy and obtain same as soon as possible from the concerned authority.
2. Have a qualified structural engineer provide further analysis of the building joint to determine the appropriate course of corrective action. If necessary, structural engineer should include recommendations for installing an expansion joint where one does not currently exist.
3. Repair the exterior façade system to prevent water intrusion.
4. Have a qualified structural engineer to develop Floor Loading Plans as per the requirements of Part 8 Section 8.20.5.3.
5. Designate a representative as the Factory Load Manager. The Factory Owner shall ensure that at least one individual, the Factory Load Manager who is located onsite full time at the factory, is trained in calculating operational load characteristics of the specific factory. The Factory Load Manager shall serve as an ongoing resource.

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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>	<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"> • 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. • Factory management should be checked alarm call points, alarm & detection system periodically and maintained the record properly. • The first aid hose and standpipe performance should be checked periodically and properly tagged.
<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. • 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. • Doors in stair should be outward opening, side-swing, self-closing, non-lockable 1.5 hours fire rated doors in all stair way encloses.(Also require fire rated door at the floor occupied by other tenants) • Prepare proper plan and design for 4 hours fire rated barriers with 2 hours fire rated door at 5th floor boiler, which located at the adjacent to production units. • 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

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	<p>fire alarm.(Also needs to cover the floors occupied by other tenants)</p> <ul style="list-style-type: none"> • Install Manual activation call point at all exit routes • Provide adequate nos. of smoke detectors to cover the whole factory building. • 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. • Power backup supply should be provided for fire alarm system. • Visual alarm should be placed at the generator room. • Update fire license / permit from issuing authority. -Cover all units / floors in a valid fire license • Obtain building approval from issuing authority • Implement to a single fire safety management system with approvals from all tenants in the factory building.
<p>Long Term (The remedial works indicated must be carried out within a period of 6 months)</p>	<ul style="list-style-type: none"> • Provide 4 hours fire rated barriers with 2 hours fire rated door at 5th floor boiler, which located at the adjacent to production units. • Install automatic detection system with automatic fire alarm.(Also needs to cover the floors occupied by other tenants) • Install dedicated fire pump with alternate backup power supply. • Provide sufficient number of hose pipe with respect to area and travel distance as per RMG guideline. • Provide dedicated storage tank for firefighting operation.

(B): Recommendations for Electrical Safety corrective actions:

<p>Immediate <i>(the factory should not continue to be occupied until these non-conformities have been rectified):</i></p>	<ul style="list-style-type: none"> • Over current protection devices (Circuit breakers) should be installed at all distribution panels.
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<p>Short Term (<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"> • Re-locate oil / fuel tanks away from control panels in generator room. • All strands cables at exposed ends should be properly soldered / crimped and insulated. • 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 <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. • All unwanted materials should be removed from 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. • 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. All stranded conductors > 6mm² to be provided with cable sockets. 2. All stranded conductors < 6 mm², at exposed end should be soldered / crimped. • Provide cable connections with properly soldered / welded lugs at (MDB/DB)'s. Ensure that all the electrical connections are properly secured with lugs and glands. • Select conductors and MCCB/MCB with adequate sizing without exceeding permissible current carrying capacity for insulation. • Avoid looping and bunch of cable at MCCB/MCB and bus bar terminal, use individual circuit and over current device for every

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	<p>incoming and outgoing circuit at the distribution boards.</p> <ul style="list-style-type: none"> • 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 separate earthing connection to electrical equipment's. 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.
<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"> • Substation should be on lowest floor level, with easy access for maintenance. • 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 40m², 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. • Provide calibrated Ammeters / Voltmeters at distribution boards MDB. • <ol style="list-style-type: none"> 1. Remove all the inflammable materials from surrounding of electrical circuitry at DB. 2. Ensure that all electric circuitry clean of inflammable materials. 3. Conduct periodic maintenance and maintain the records. • Provide and maintain easy access and proper height of switchboard /

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	<p>panel boards (< 2m from floor level).</p> <ul 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.• 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 (MDB/DB)'s with non-flammable materials. In addition:<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.• <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 are 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 at roof top of building.
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